Title: Encyclopaedia Britannica, 11th Edition, "Baconthorpe" to "Bankruptcy"

Author: Various

Release date: December 10, 2008 [eBook #27479]
Most recently updated: January 4, 2021

Language: English

Credits: Produced by Don Kretz, Juliet Sutherland, Keith Edkins and the Online Distributed Proofreading Team at https://www.pgdp.net (This file was made using scans of public domain material from the Robinson Curriculum.)

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THE ENCYCLOPÆDIA BRITANNICA

A DICTIONARY OF ARTS, SCIENCES, LITERATURE AND GENERAL INFORMATION

ELEVENTH EDITION

VOLUME III

AUSTRIA LOWER to BISECTRIX

[E-Text Edition of Volume III - Part 1 of 2, Slice 2 of 3 - BACONTHORPE to BANKRUPTCY]

[v.03 p.0156]

BACONTHORPE [Bacon, Baco, Bacconius], **JOHN** (d. 1346), known as "the Resolute Doctor," a learned Carmelite monk, was born at Baconthorpe in Norfolk. He seems to have been the grandnephew of Roger Bacon (Brit. Mus. Add. MS. 19. 116). Brought up in the Carmelite monastery of Blakeney, near Walsingham, he studied at Oxford and Paris, where he was known as "Princeps" of the Averroists. Renan, however, says that he merely tried to justify Averroism against the charge of heterodoxy. In 1329 he was chosen twelfth provincial of the English Carmelites. He appears to have anticipated Wycliffe in advocating the subordination of the clergy to the king. In 1333 he was sent for to Rome, where, we are told, he first maintained the pope's authority in cases of divorce; but this opinion he retracted. He died in London in 1346. His chief work, *Doctoris resoluti Joannis Bacconis Anglici Carmelitae radiantissimi opus super quattuor sententiarum libris* (published 1510), has passed through several editions. Nearly three centuries later, it was still studied at Padua, the last home of Averroism, and Lucilio Vanini speaks of him with great veneration.

See Brucker, *Hist. Crit.* iii. 865; Stöckl, *Phil. d. Mittel.* ii. 1044-1045; Hauréau, *Phil. Scol.* ii. 476; K. Prantl, *Ges. d. Logik*, iii. 318. For information as to his life, not found otherwise and of doubtful accuracy, see J. B. de Lezana's *Annales Sacri*, iv.

BACSANYI, JANOS (1763-1845), Hungarian poet, was born at Tapolcza on the 11th of May 1763. In 1785 he published his first work, a patriotic poem, *The Valour of the Magyars*. In the same year he obtained a situation as clerk in the treasury at Kaschau, and there, in conjunction with other two Hungarian patriots, edited the *Magyar Museum*, which was suppressed by the government in 1792. In the following year he was deprived of his clerkship; and in 1794, having taken part in the conspiracy of Bishop Martinovich, he was thrown into the state prison of the Spielberg, near Brünn, where he remained for two years. After his release he took a considerable share in the *Magyar Minerva*, a literary review, and then proceeded to Vienna, where he obtained a post in the bank, and married. In 1809 he translated Napoleon's proclamation to the Magyars, and, in consequence of this anti-Austrian act, had to take refuge in Paris. After the fall of Napoleon he was given up to the Austrians, who allowed him to reside at Linz, on condition of never leaving that town. He published a collection of poems at Pest, 1827 (2nd ed. Buda, 1835), and also edited the poetical works of Anyos and Faludi. He died at Linz on the 12th of May 1845.

BACTERIOLOGY. The minute organisms which are commonly called "bacteria"[1] are also known popularly under other designations, *e.g.* "microbes," "micro-organisms," "microphytes," "bacilli," "micrococci." All these terms, including the usual one of bacteria, are unsatisfactory; for "bacterium," "bacillus" and "micrococcus" have narrow technical meanings, and the other terms are too vague to be scientific. The most satisfactory designation is that proposed by Nägeli in 1857, namely "schizomycetes," and it is by this term that they are usually known among botanists; the less exact term, however, is also used and is retained in this article since the science is commonly known as "bacteriology." The first part of this article deals with the general scientific aspects of the subject, while a second part is concerned with the medical aspects.

I. The Study of Bacteria

The general advances which have been made of late years in the study of bacteria are clearly brought to mind when we reflect that in the middle of the 19th century these organisms were only known to a few experts and in a few forms as curiosities of the microscope, chiefly interesting for their minuteness and motility. They were then known under the name of "animalculae," and were confounded with all kinds of other small organisms. At that time nothing was known of their life-history, and no one dreamed of their being of importance to man and other living beings, or of their capacity to produce the profound chemical changes with which we are now so familiar. At the present day, however, not only have hundreds of forms or species been described, but our knowledge of their biology has so extended that we have entire

laboratories equipped for their study, and large libraries devoted solely to this subject. Furthermore, this branch of science has become so complex that the bacteriological departments of medicine, of agriculture, of sewage, &c., have become more or less separate studies.

Definition.

The schizomycetes or bacteria are minute vegetable organisms devoid of chlorophyll and multiplying by repeated bipartitions. They consist of single cells, which may be spherical, oblong or cylindrical in shape, or of filamentous or other aggregates of cells. They are characterized by the absence of ordinary sexual reproduction and by the absence of an ordinary nucleus. In the two last-mentioned characters and in their manner of division the bacteria resemble Schizophyceae (Cyanophyceae or blue-green algae), and the two groups of Schizophyceae and Schizomycetes are usually united in the class Schizophyta, to indicate the generally received view that most of the typical bacteria have been derived from the Cyanophyceae. Some forms, however, such as "Sarcina," have their algal analogues in Palmellaceae among the green algae, while Thaxter's group of Myxobacteriaceae suggests a relationship with the Myxomycetes. The existence of ciliated micrococci together with the formation of endospores—structures not known in the Cyanophyceae—reminds us of the flagellate Protozoa, *e.g. Monas*, *Chromulina*. Resemblances also exist between the endospores and the spore-formations in the Saccharomycetes, and if *Bacillus inflatus*, *B. ventriculus*, &c., really form more than one spore in the cell, these analogies are strengthened. Schizomycetes such as *Clostridium*, *Plectridium*, &c., where the sporiferous cells enlarge, bear out the same argument, and we must not forget that there are extremely minute "yeasts," easily mistaken for Micrococci, and that yeasts occasionally form only one spore in the cell.

Nor must we overlook the possibility that the endospore-formation in non-motile bacteria more than merely resembles the development of azygospores in the Conjugatae, and some Ulothricaceae, if reduced in size, would resemble them. Meyer regards them as chlamydospores, and Klebs as "carpospores" or possibly chlamydospores similar to the endospores of yeast. The former also looks on the ordinary disjointing bacterial cell as an oidium, and it must be admitted that since Brefeld's discovery of the frequency of minute oidia and chlamydospores among the fungi, the probability that some so-called bacteria—and this applies especially to the branching forms accepted by some bacteriologists—are merely reduced fungi is increased. Even the curious one-sided growth of certain species which form sheaths and stalks—*e.g. Bacterium vermiforme*, *B. pediculatum*—can be matched by Algae such as *Oocardium*, *Hydrurus*, and some Diatoms. It is clear then that the bacteria are very possibly a heterogeneous group, and in the present state of our knowledge their phylogeny must be considered as very doubtful.

[v.03 p.0157]

Nearly all bacteria, owing to the absence of chlorophyll, are saprophytic or parasitic forms. Most of them are colourless, but a few secrete colouring matters other than chlorophyll. In size their cells are commonly about 0.001 mm. (1 micromillimetre or 1 μ) in diameter, and from two to five times that length, but smaller ones and a few larger ones are known. Some of the shapes assumed by the cells are shown in fig. 1.

Fig. 1.—Preparations showing various forms of bacteria and the various types of cilia and their arrangement.

A. *Bacillus subtilis*, Cohn, and *Spirillum undula*, Ehrenb.
B. *Planococcus citreus* (Menge) Migula.
C. *Pseudomonas pyocyanea* (Gessard), Migula.
D. *P. macroselmis*, Migula.
E. *P. syncyanea* (Ehrenb.), Migula.
F. *Bacillus typhi*, Gaffky.
G. *B. vulgaris* (Hauser), Migula.
H. *Microspira Comma* (Koch), Schroeter.
J, K. *Spirillum rubrum*, Esmarsch.
L, M. *S. undula* (Müller), Ehrenb. (*All after Migula.*)

Distribution in Time.

That bacteria have existed from very early periods is clear from their presence in fossils; and although we cannot accept all the conclusions drawn from the imperfect records of the rocks, and may dismiss as absurd the statements that geologically immured forms have been found still living, the researches of Renault and van Tieghem have shown pretty clearly that large numbers of bacteria existed in Carboniferous and Devonian times, and probably earlier.

Distribution in Space.

Schizomycetes are ubiquitous as saprophytes in still ponds and ditches, in running streams and rivers, and in the sea, and especially in drains, bogs, refuse heaps, and in the soil, and wherever organic infusions are allowed to stand for a short time. Any liquid (blood, urine, milk, beer, &c.) containing organic matter, or any solid food-stuff (meat preserves, vegetables, &c.), allowed to stand exposed to the air soon swarms with bacteria, if moisture is present and the temperature not abnormal. Though they occur all the world over in the space, air and on the surface of exposed bodies, it is not to be supposed that they are by any means equally distributed, and it is questionable whether the bacteria suspended in the air ever exist in such enormous quantities as was once believed. The evidence to hand shows that on heights and in open country, especially in the north, there may be few or even no Schizomycetes detected in the air, and even in towns their distribution varies greatly; sometimes they appear to exist in minute clouds, as it were, with interspaces devoid of any, but in laboratories and closed spaces where their cultivation has been promoted the air may be considerably laden with them. Of course the distribution of bodies so light and small is easily influenced by movements, rain, wind, changes of temperature, &c. As parasites, certain Schizomycetes inhabit and prey upon the organs of man and animals in varying degrees, and the conditions for their growth and distribution are then very complex. Plants appear to be less subject to their attacks—possibly, as has been suggested, because the acid fluids of the higher vegetable organisms are less suited for the development of Schizomycetes; nevertheless some are known to be parasitic on plants. Schizomycetes exist in every part of the alimentary canal of animals, except, perhaps, where acid secretions prevail; these are by no means necessarily harmful, though, by destroying the teeth for instance, certain forms may incidentally be the forerunners of damage which they do not directly cause.

History.

Little was known about these extremely minute organisms before 1860. A. van Leeuwenhoek figured bacteria as far back as the 17th century, and O. F. Müller knew several important forms in 1773, while Ehrenberg in 1830 had advanced to the commencement of a scientific separation and grouping of them, and in 1838 had proposed at least sixteen species, distributing them into four genera. Our modern more accurate though still fragmentary knowledge of the forms of Schizomycetes, however, dates from F. J. Conn's brilliant researches, the chief results of which were published at various periods between 1853 and 1872; Cohn's classification of the bacteria, published in 1872 and extended in 1875, has in fact dominated the study of these organisms almost ever since. He proceeded in the main on the assumption that the forms of bacteria as met with and described by him are practically constant, at any rate within limits which are not wide: observing that a minute spherical micrococcus or a rod-like bacillus regularly produced similar micrococci and bacilli respectively, he based his classification on what may be considered the constancy of forms which he called species and genera. As to the constancy of form, however, Cohn maintained certain reservations which have been ignored by some of his followers. The fact that Schizomycetes produce spores appeals to have been discovered by Cohn in 1857, though it was expressed dubiously in 1872; these spores had no doubt been observed previously. In 1876, however, Cohn had seen the spores germinate, and Koch, Brefeld, Pratzmowski, van Tieghem, de Bary and others confirmed the discovery in various species.

The supposed constancy of forms in Cohn's species and genera received a shock when Lankester in 1873 pointed out that his *Bacterium rubescens* (since named *Beggiatoa roseo-persicina*, Zopf) passes through conditions which would have been

described by most observers influenced by the current doctrine as so many separate "species" or even "genera,"—that in fact forms known as *Bacterium*, *Micrococcus*, *Bacillus*, *Leptothrix*, &c., occur as phases in one life-history. Lister put forth similar ideas about the same time; and Billroth came forward in 1874 with the extravagant view that the various bacteria are only different states of one and the same organism which he called *Cocco-bacteria septica*. From that time the question of the pleomorphism (mutability of shape) of the bacteria has been hotly discussed: but it is now generally agreed
[v.03 p.0158]
that, while a certain number of forms may show different types of cell during the various phases of the life-history,[2] yet the majority of forms are uniform, showing one type of cell throughout their life-history. The question of species in the bacteria is essentially the same as in other groups of plants; before a form can be placed in a satisfactory classificatory position its whole life-history must be studied, so that all the phases may be known. In the meantime, while various observers were building up our knowledge of the morphology of bacteria, others were laying the foundation of what is known of the relations of these organisms to fermentation and disease—that ancient will-o'-the-wisp "spontaneous generation" being revived by the way. When Pasteur in 1857 showed that the lactic fermentation depends on the presence of an organism, it was already known from the researches of Schwann (1837) and Helmholtz (1843) that fermentation and putrefaction are intimately connected with the presence of organisms derived from the air, and that the preservation of putrescible substances depends on this principle. In 1862 Pasteur placed it beyond reasonable doubt that the ammoniacal fermentation of urea is due to the action of a minute Schizomycete; in 1864 this was confirmed by van Tieghem, and in 1874 by Cohn, who named the organism *Micrococcus ureae*. Pasteur and Cohn also pointed out that putrefaction is but a special case of fermentation, and before 1872 the doctrines of Pasteur were established with respect to Schizomycetes. Meanwhile two branches of inquiry had arisen, so to speak, from the above. In the first place, the ancient question of "spontaneous generation" received fresh impetus from the difficulty of keeping such minute organisms as bacteria from reaching and developing in organic infusions; and, secondly, the long-suspected analogies between the phenomena of fermentation and those of certain diseases again made themselves felt, as both became better understood. Needham in 1745 had declared that heated infusions of organic matter were not deprived of living beings; Spallanzani (1777) had replied that more careful heating and other precautions prevent the appearance of organisms in the fluid. Various experiments by Schwann, Helmholtz, Schultz, Schroeder, Dusch and others led to the refutation, step by step, of the belief that the more minute organisms, and particularly bacteria, arose *de novo* in the special cases quoted. Nevertheless, instances were adduced where the most careful heating of yolk of egg, milk, hay-infusions, &c., had failed,—the boiled infusions, &c., turning putrid and swarming with bacteria after a few hours.

In 1862 Pasteur repeated and extended such experiments, and paved the way for a complete explanation of the anomalies; Cohn in 1872 published confirmatory results; and it became clear that no putrefaction can take place without bacteria or some other living organism. In the hands of Brefeld, Burdon-Sanderson, de Bary, Tyndall, Roberts, Lister and others, the various links in the chain of evidence grew stronger and stronger, and every case adduced as one of "spontaneous generation" fell to the ground when examined. No case of so-called "spontaneous generation" has withstood rigid investigation; but the discussion contributed to more exact ideas as to the ubiquity, minuteness, and high powers of resistance to physical agents of the spores of Schizomycetes, and led to more exact ideas of antiseptic treatments. Methods were also improved, and the application of some of them to surgery at the hands of Lister, Koch and others has yielded results of the highest value.

Long before any clear ideas as to the relations of Schizomycetes to fermentation and disease were possible, various thinkers at different times had suggested that resemblances existed between the phenomena of certain diseases and those of fermentation, and the idea that a virus or contagium might be something of the nature of a minute organism capable of spreading and reproducing itself had been entertained. Such vague notions began to take more definite shape as the ferment theory of Cagniard de la Tour (1828), Schwann (1837) and Pasteur made way, especially in the hands of the last-named savant. From about 1870 onwards the "germ theory of disease" has passed into acceptance. P. F. O. Rayer in 1850 and Davaine had observed the bacilli in the blood of animals dead of anthrax (splenic fever), and Pollender discovered them anew in 1855. In 1863, imbued with ideas derived from Pasteur's researches on fermentation, Davaine reinvestigated the matter, and put forth the opinion that the anthrax bacilli caused the splenic fever; this was proved to result from inoculation. Koch in 1876 published his observations on Davaine's bacilli, placed beyond doubt their causal relation to splenic fever, discovered the spores and the saprophytic phase in the life-history of the organism, and cleared up important points in the whole question (figs. 7 and 9). In 1870 Pasteur had proved that a disease of silkworms was due to an organism of the nature of a bacterium; and in 1871 Oertel showed that a *Micrococcus* already known to exist in diphtheria is intimately concerned in producing that disease. In 1872, therefore, Cohn was already justified in grouping together a number of "pathogenous" Schizomycetes. Thus arose the foundations of the modern "germ theory of disease;" and, in the midst of the wildest conjectures and the worst of logic, a nucleus of facts was won, which has since grown, and is growing daily. Septicaemia, tuberculosis, glanders, fowl-cholera, relapsing fever, and other diseases are now brought definitely within the range of biology, and it is clear that all contagious and infectious diseases are due to the action of bacteria or, in a few cases, to fungi, or to protozoa or other animals.

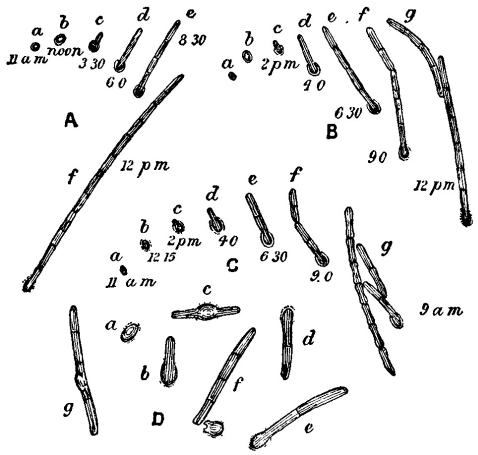

FIG. 2.—The various phases of germination of spores of *Bacillus ramosus* (Fraenkel), as actually observed in hanging drops under very high powers.
A. The spore sown at 11 A.M., as shown at *a*, had swollen (*b*) perceptibly by noon, and had germinated by 3.30 P.M., as shown at *c*: in *d* at 6 P.M., and *e* at 8.30 P.M.; the resulting filament is segmenting into bacilli as it elongates, and at midnight (*f*) consisted of twelve such segments.
B, C. Similar series of phases in the order of the small letters in each case, and with the times of observation attached. At *f* and *g* occurs the breaking up of the filament into rodlets.
D. Germinating spores in various stages, more highly magnified, and showing the different ways of escape of the filament from the spore-membrane. (H. M. W.)

Other questions of the highest importance have arisen from the foregoing. About 1880 Pasteur first showed that *Bacillus anthracis* cultivated in chicken broth, with plenty of oxygen and at a temperature of 42-43° C., lost its virulence after a few "generations," and ceased to kill even the mouse; Toussaint and Chauveau confirmed, and others have extended the observations. More remarkable still, animals inoculated with such "attenuated" bacilli proved to be curiously resistant to the deadly effects of subsequent inoculations of the non-attenuated form. In other words, animals vaccinated with the cultivated bacillus showed immunity from disease when reinoculated with the deadly wild form. The questions as to the causes and nature of the changes in the bacillus and in the host, as to the extent of immunity enjoyed by the latter, &c., are of the greatest interest and importance. These matters, however, and others such as phagocytosis (first described by Metchnikoff in 1884), and the epoch-making discovery of the opsonins of the blood by Wright, do not here concern us (see II. below).

MORPHOLOGY.—*Sizes, Forms, Structure, &c.*—The Schizomycetes consist of single cells, or of filamentous or other groups of cells, according as the divisions are completed at once or not.

Form and Structure.

While some unicellular forms are less than 1 μ (.001 mm.) in diameter, others have cells measuring 4 μ or 5 μ or even 7 μ or 8 μ, in thickness, while the length may vary from that of the diameter to many times that measurement. In the filamentous forms the individual cells are often difficult to observe until reagents are applied (*e.g.* fig. 14), and the length of the rows of cylindrical cells may be many hundred times greater than the breadth. Similarly, the diameters of flat or spheroidal colonies may vary from a few times to many hundred times that of the individual cells, the divisions of which have produced the colony. The shape of the individual cell (fig. 1) varies from that of a minute sphere to that of a straight, curved, or twisted filament or cylinder, which is not necessarily of the same diameter throughout, and may have flattened, rounded, or even

Cell-wall.

pointed ends. The rule is that the cells divide in one direction only—*i.e.* transverse to the long axis—and therefore produce aggregates of long cylindrical shape; but in rarer cases iso-diametric cells divide in two or three directions, producing flat, [v.03 p.0159] or spheroidal, or irregular colonies, the size of which is practically unlimited. The bacterial cell is always clothed by a definite cell-membrane, as was shown by the plasmolysing experiments of Fischer and others. Unlike the cell-wall of the higher plants, it gives usually no reactions of cellulose, nor is chitin present as in the fungi, but it consists of a proteid substance and is apparently a modification of the general protoplasm. In some cases, however, as in *B. tuberculosis*, analysis of the cell shows a large amount of cellulose. The cell-walls in some forms swell up into a gelatinous mass so that the cell appears to be surrounded in the unstained condition by a clear, transparent space. When the swollen wall is dense and regular in appearance the term "capsule" is applied to the sheath as in *Leuconostoc*. Secreted pigments (red, yellow, green and blue) are sometimes deposited in the wall, and some of the iron-bacteria have deposits of oxide of iron in the membranes.

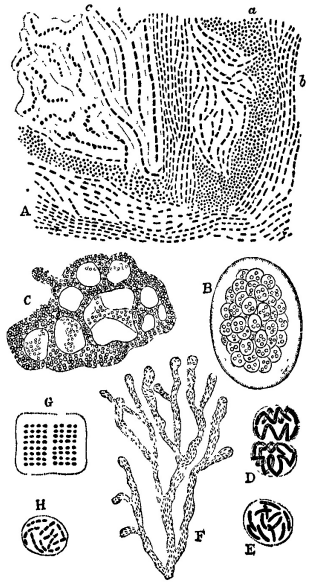

Fig. 3.—Types of Zoogloea. (After Zopf.)
A. Mixed zoogloea found as a pellicle on the surface of vegetable infusions, &c.; it consists of various forms, and contains cocci (*a*) and rodlets, in series (*b* and *c*), &c.
B. Egg-shaped mass of zoogloea of *Beggiatoa roseo-persicina* (*Bacterium rubescens* of Lankester); the gelatinous swollen walls of the large crowded cocci are fused into a common gelatinous envelope.
C. Reticulate zoogloea of the same.
D, E, H. Colonies of *Myconostoc* enveloped in diffluent matrix.
F. Branched fruticose zoogloea of *Cladothrix* (slightly magnified).
G. Zoogloea of *Bacterium merismopedioides*, Zopf, containing cocci arranged in tablets.

Cell-contents.

The substance of the bacterial cell when suitably prepared and stained shows in the larger forms a mass of homogeneous protoplasm containing irregular spaces, the vacuoles, which enclose a watery fluid. Scattered in the protoplasm are usually one or more deeply-staining granules. The protoplasm itself may be tinged with colouring matter, bright red, yellow, &c., and may occasionally contain substances other than the deeply-staining granules. The occurrence of a starch-like substance which stains deep blue with iodine has been clearly shown in some forms even where the bacterium is growing on a medium containing no starch, as shown by Ward and others. In other forms a substance (probably glycogen or amylo-dextrin) which turns brown with iodine has been observed. Oil and fat drops have also been shown to occur, and in the sulphur-bacteria numerous fine granules of sulphur.

Nucleus.

The question of the existence of a nucleus in the bacteria is one that has led to much discussion and is a problem of some difficulty. In the majority of forms it has not hitherto been possible to demonstrate a nucleus of the type which is so characteristic of the higher plants. Attention has accordingly been directed to the deeply-staining granules mentioned above, and the term chromatin-granules has been applied to them, and they have been considered to represent a rudimentary nucleus. That these granules consist of a material similar to the chromatin of the nucleus of higher forms is very doubtful, and the comparison with the nucleus of more highly organized cells rests on a very slender basis. The most recent works (Vejdovsky, Mencl), however, appear to show that nuclei of a structure and mode of division almost typical are to be found in some of the largest bacteria. It is possible that a similar structure has been overlooked or is invisible in other forms owing to their small size, and that there may be another type of nucleus—the diffuse nucleus—such as Schaudinn believed to be the case in *B. butschlii*. Many bacteria when suspended in a fluid exhibit a power of independent movement which is, of course, quite distinct from the Brownian movement—a non-vital phenomenon common to all finely-divided particles suspended in a fluid. Independent movement is effected by special motile organs, the cilia or flagella. These structures are invisible, with ordinary illumination in living cells or unstained preparations, and can only be made clearly visible by special methods of preparation and staining first used by Löffler. By these methods the cilia are seen to be fine protoplasmic outgrowths of the cell (fig. 1) of the same nature as those of the zoospores and antherozoids of algae, mosses, &c. These cilia appear to be attached to the cell-wall, being unaffected by plasmolysis, but Fischer states that they really are derived from the central protoplasm and pass through minute pores in the wall. The cilia may be present during a short period only in the life of a Schizomycete, and their number may vary according to the medium on which the organism is growing. Nevertheless, there is more or less constancy in the type of distribution, &c., of the cilia for each species when growing at its best. The chief results may be summed up as follows: some species, *e.g. B. anthracis*, have no cilia; others have only one flagellum at one pole (*Monotrichous*), *e.g. Bacillus pyocyaneus* (fig. 1, C, D), or one at each pole; others again have a tuft of several cilia at one pole (*Lophotrichous*), *e.g. B. syncyaneus* (fig. 1, E), or at each pole (*Amphitrichous*) (fig. 1, J, K, L); and, finally, many actively motile forms have the cilia springing all round (*Peritrichous*), *e.g. B. vulgaris* (fig. 1, G). It is found, however, that strict reliance cannot be placed on the distinction between the *Monotrichous*, *Lophotrichous* and *Amphitrichous* conditions, since one and the same species may have one, two or more cilia at one or both poles; nevertheless some stress may usually be laid on the existence of one or two as opposed to several—*e.g.* five or six or more —at one or each pole.

Cilia.

Vegetative State.

In *Beggiatoa*, a filamentous form, peculiar, slow, oscillatory movements are to be observed, reminding us of the movements of *Oscillatoria* among the *Cyanophyceae*. In these cases no cilia have been observed, and there is a firm cell-wall, so the movement remains quite unexplained.

While many forms are fixed to the substratum, others are free, being in this condition either motile or immotile. The chief of these forms are described below.

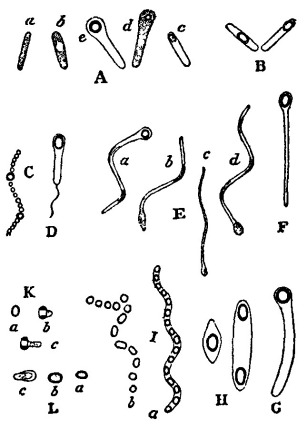

Fig. 4.—Types of Spore-formation in Schizomycetes. (After Zopf.)
A. Various stages in the development of the endogenous spores in a *Clostridium*—the small letters indicate the order.
B. Endogenous spores of the hay bacillus.
C. A chain of *cocci* of *Leuconostoc*

Cocci: spherical or spheroidal cells, which, according to their relative (not very well defined) sizes are spoken of as *Micrococci*, *Macrococci*, and perhaps *Monas* forms.

Fig. 5.—Characteristic groups of *Micrococci*. (After Cohn.) A. *Micrococcus prodigiosus*. B. *M. vaccinae*. C. Zoogloea stage of a *Micrococcus*, forming a close membrane on infusion—Pasteur's *Mycoderma*. (Very highly magnified.)

Rods or *rodlets*: slightly or more considerably elongated cells which are cylindrical, biscuit-shaped or somewhat fusiform. The cylindrical forms are short, *i.e.* only three or four times as long as broad (*Bacterium*), or longer (*Bacillus*); the biscuit-shaped ones are *Bacteria* in the early stages of division. *Clostridia*, &c., are spindle-shaped.

Filaments really consist of elongated cylindrical cells which remain united end to end after division, and they may break up later into elements such as those described above. Such filaments are not always of the same diameter throughout, and their segmentation varies considerably. They may be free or attached at one (the "basal") end. A distinction is made between *simple* filaments (*e.g. Leptothrix*) and such as exhibit a false branching (*e.g. Cladothrix*).

Curved and *spiral* forms. Any of the elongated forms described above may be curved or sinuous or twisted into a corkscrew-like spiral instead of straight. If the sinuosity is slight we have the *Vibrio* form; if pronounced, and the spiral winding well marked, the forms are known as *Spirillum*, *Spirochaete*, &c. These and similar terms have

mesenterioides, with two "resting spores," *i.e.* arthrospores. (After van Tieghem.)
D. A motile rodlet with one cilium and with a spore formed inside.
E. Spore-formation in *Vibrio*-like (*c*) and *Spirillum*-like (*a b, a*) Schizomycetes.
F. Long rod-like form containing a spore (these are the so-called "*Köpfchenbacterien*" of German authors).
G. *Vibrio* form with spore. (After Prazmowski.)
H. *Clostridium*—one cell contains two spores. (After Prazmowski.)
I. *Spirillum* containing many spores (*a*), which are liberated at *b* by the breaking up of the parent cells.
K. Germination of the spore of the hay bacillus (*B. subtilis*)—the axis of growth of the germinal rodlet is at right angles to the long axis of the spore.
L. Germination of spore of *Clostridium butyricum*—the axis of growth coincides with the long axis of the spore.

been applied partly to individual cells, but more often to filaments consisting of several cells; and much confusion has arisen from the difficulty of defining the terms themselves.

In addition to the above, however, certain Schizomycetes present aggregates in the form of plates, or solid or hollow and irregular branched colonies. This may be due to the successive divisions occurring in two or three planes instead of only across the long axis (*Sarcina*), or to displacements of the cells after division.

Reproduction.

Growth and Division.—Whatever the shape and size of the individual cell, cell-filament or cell-colony, the immediate visible results of active nutrition are elongation of the cell and its division into two equal halves, across the long axis, by the formation of a septum, which either splits at once or remains intact for a shorter or longer time. This process is then repeated and so on. In the first case the separated cells assume the character of the parent-cell whose division gave rise to them; in the second case they form filaments, or, if the further elongation and divisions of the cells proceed in different directions, plates or spheroidal or other shaped colonies. It not unfrequently happens, however, that groups of cells break away from their former connexion as longer or shorter straight or curved filaments, or as solid masses. In some filamentous forms this "fragmentation" into multicellular pieces of equal length or nearly so is a normal phenomenon, each partial filament repeating the growth, division and fragmentation as before (cf. figs. 2 and 6). By rapid division hundreds of thousands of cells may be produced in a few hours,[3] and, according to the species and the conditions (the medium, temperature, &c.), enormous collections of isolated cells may cloud the fluid in which they are cultivated, or form deposits below or films on its surface; valuable characters are sometimes obtained from these appearances. When these dense "swarms" of vegetative cells become fixed in a matrix of their own swollen contiguous cell-walls, they pass over into a sort of resting state as a so-called zoogloea (fig. 3).

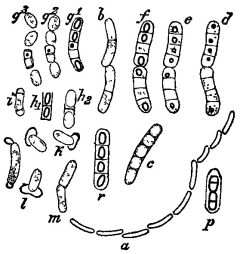

FIG. 6.—*Bacillus megaterium.* (After de Bary.)
a, a chain of motile rodlets still growing and dividing (*bacilli*).
b, a pair of bacilli actively growing and dividing.
p, a rodlet in this condition (but divided into four segments) after treatment with alcoholic iodine solution.
c, *d*, *e*, *f*, successive stages in the development of the spores.
r, a rodlet segmented in four, each segment containing one ripe spore.
g1, *g2*, *g3*, early stages in the germination of the spores (after being dried several days);
h1, *h2*, *k*, *l* and *m*, successive stages in the germination of the spore.

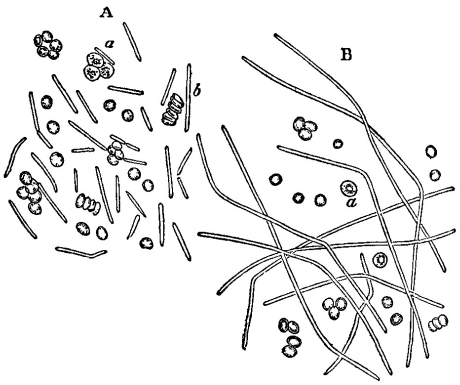

FIG. 7.—*Bacillus anthracis*. (After Koch.)
A. *Bacilli* mingled with blood-corpuscles from the blood of a guinea-pig; some of the *bacilli* dividing.
B. The rodlets after three hours' culture in a drop of aqueous humour. They grow out into long *leptothrix*-like filaments, which become septate later, and spores are developed in the segments.

Zoogloeae.

One of the most remarkable phenomena in the life-history of the Schizomycetes is the formation of this zoogloea stage, which corresponds to the "palmella" condition of the lower *Algae*. This occurs as a membrane on the surface of the medium, or as irregular clumps or branched masses (sometimes several inches across) submerged in it, and consists of more or less gelatinous matrix enclosing innumerable "cocci," "bacteria," or other elements of the Schizomycete concerned. Formerly regarded as a distinct genus—the natural fate of all the various forms—the zoogloea is now known to be a sort of resting condition of the Schizomycetes, the various elements being glued together, as it were, by their enormously swollen and diffluent cell-walls becoming contiguous. The zoogloea is formed by active division of single or of several mother-cells, and the progeny appear to go on secreting the cell-wall substance, which then absorbs many times its volume of water, and remains as a consistent matrix, in which the cells come to rest. The matrix—*i.e.* the swollen cell-walls—in some cases consists mainly of cellulose, in others chiefly of a proteid substance; the matrix in some cases is horny and resistant, in others more like a thick solution of gum. It is intelligible from the mode of formation that foreign bodies may become entangled in the gelatinous matrix, and compound zoogloeae may arise by the apposition of several distinct forms, a common event in macerating troughs (fig. 3, A). Characteristic forms may be assumed by the young zoogloea of different species,—spherical, ovoid, reticular, filamentous, fruiticose, lamellar, &c.,—but these vary considerably as the mass increases or comes in contact with others. Older zoogloeae may precipitate oxide of iron in the matrix, if that metal exists in small quantities in the medium. Under favourable conditions the elements in the zoogloea again become active, and move out of the matrix, distribute themselves in the surrounding medium, to grow and multiply as before. If the zoogloea is formed on a solid substratum it may become firm and horny; immersion in water softens it as described above.

[v.03 p.0161]

The growth of an ordinary bacterium consists in uniform elongation of the rodlet until its length is doubled, followed by division by a median septum, then by the simultaneous doubling in length of each daughter cell, again followed by the median division, and so on (figs. 13, 14). If the cells remain connected the resulting filament repeats these processes of elongation and subsequent division uniformly so long as the conditions are maintained, and very accurate measurements have been obtained on such a form, *e.g. B. ramosus*. If a rodlet in a hanging drop of nutrient gelatine is fixed under the microscope and kept at constant temperature, a curve of growth can be obtained recording the behaviour during many hours or days. The measured lengths are marked off on ordinates erected on an abscissa, along which the times are noted. The curve obtained on joining the former points then brings out a number of facts, foremost among which are (1) that as long as the conditions remain constant the doubling periods—*i.e.* the times taken by any portion of the filament to double its length—are constant, because each cell is equally active along the whole length; (2) there are optimum, minimum and maximum temperatures, other conditions remaining constant, at which growth begins, runs at its best and is soon exhausted, respectively; (3) that the most rapid cell-division and maximum growth do not necessarily accord with the best conditions for the life of the organism; and (4) that any sudden alteration of temperature brings about a check, though a slow rise may accelerate growth (fig. 8). It was also shown that exposure to light, dilution or exhaustion of the food-media, the presence of traces of poisons or metabolic products check growth or even bring it to a standstill; and the death or injury of any single cell in the filamentous series shows its effect on the curve by lengthening the doubling period, because its potential progeny have been put out of play. Hardy has shown that such a destruction of part of the filament may be effected by the attacks of another organism.

A very characteristic method of reproduction is that of spore-formation, and these minute reproductive bodies, which represent a resting stage of the organism, are now known in many forms. Formerly two kinds of spores were described, *arthrospores* and *endospores*. An arthrospore, however, is not a true spore but merely an ordinary vegetative cell which separates and passes into a condition of rest, and such may occur in forms which form endospores, *e.g. B. subtilis*, as well as in species not known to form endospores. The true spore or endospore begins with the appearance of a minute granule in the protoplasm of a vegetative cell; this granule enlarges and in a few hours has taken to itself all the protoplasm, secreted a thin but very resistive envelope, and is a ripe ovoid spore, smaller than the mother-cell and lying loosely in it

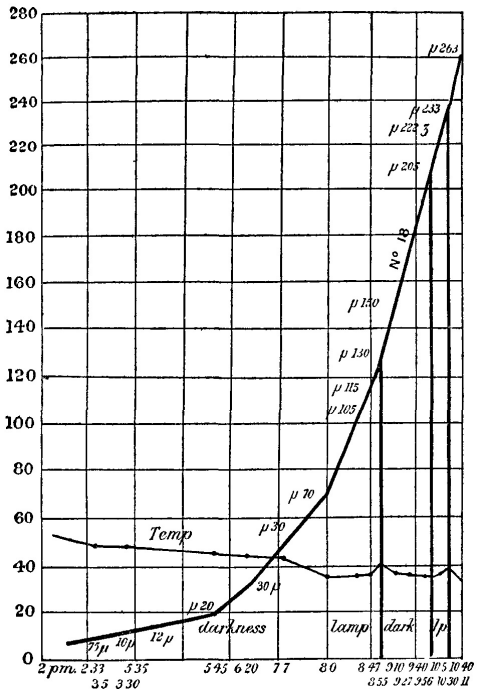

FIG. 8.—Curve of growth of a filament of *Bacillus ramosus* (Fraenkel), constructed from data such as in fig. 4. The abscissae represent intervals of time, the ordinates the measured lengths of the growing filament. Thus, at 2.33 P.M. the length of the filament was 6 μ; at 5.45, 20 μ; at 8 P.M., 70 μ and so on. Such curves show differences of steepness according to the temperature (see temp. curve), and to alterations of light (lamp) and darkness. (H. M. W.)

Measurement of growth.

Spores.

(cf. figs. 6, 9, 10, and 11). In the case of the simplest and most minute Schizomycetes (*Micrococcus*, &c.) no definite spores have been discovered; any one of the vegetative micrococci may commence a new series of cell by growth and division. We may call these forms "asporous," at any rate provisionally.

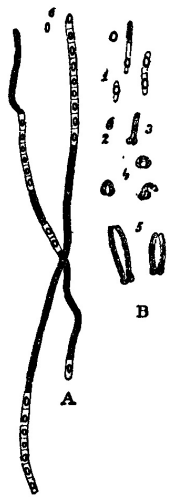

FIG. 9.
A. *Bacillus anthracis*. (After de Bary) Two of the long filaments (B, fig. 10) in which spores are being developed. The specimen was cultivated in broth, and spores are drawn a little too small—they should be of the same diameter transversely as the segments.
B. *Bacillus subtilis*. (After de Bary.) 1, fragments of filaments with ripe spores; 2-5, successive stages in the germination of the spores, the remains of the spore attached to the germinal rodlets.

The spore may be formed in short or long segments, the cell-wall of which may undergo change of form to accommodate itself to the contents. As a rule only one spore is formed in a cell, and the process usually takes place in a bacillar segment. In some cases the spore-forming protoplasm gives a blue reaction with iodine solutions. The spores may be developed in cells which are actively swarming, the movements not being interfered with by the process (fig. 4, D). The so-called "Köpfchenbacterien" of older writers are simply bacterioid segments with a spore at one end, the mother cell-wall having adapted itself to the outline of the spore (fig. 4, F). The ripe spores of Schizomycetes are spherical, ovoid or long-ovoid in shape and extremely minute (*e.g.* those of *Bacillus subtilis* measure 0.0012 mm. long by 0.0006 mm. broad according to Zopf), highly refractive and colourless (or very dark, probably owing to the high index of refraction and minute size). The membrane may be relatively thick, and even exhibit shells or strata.

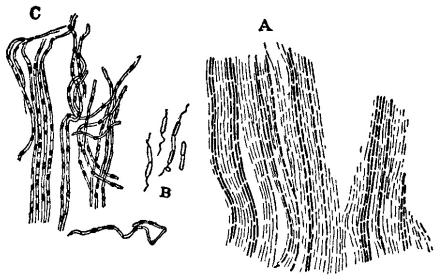

FIG. 10.—*Bacillus subtilis*. (After Strasburger.) A. Zoogloea pellicle. B. Motile rodlets. C. Development of spores.

The germination of the spores has now been observed in several forms with care. The spores are capable of germination at once, or they may be kept for months and even years, and are very resistant against desiccation, heat and cold, &c. In a suitable medium and at a proper temperature the germination is completed in a few hours. The spore swells and elongates and the contents grow forth to a cell like that which produced it, in some cases clearly breaking through the membrane, the remains of which may be seen attached to the young germinal rodlet (figs. 5, 9 and 11); in other cases the surrounding membrane of the spore swells and dissolves. The germinal cell then grows forth into the forms typical for the particular Schizomycete concerned.

The conditions for spore-formation differ. Anaerobic species usually require little oxygen, but aerobic species a free supply. Each species has an optimum temperature and many are known to require very special food-media. The systematic interference with these conditions has enabled bacteriologists to induce the development of so-called asporogenous races, in which the formation of spores is indefinitely postponed, changes in vigour, virulence and other properties being also involved, in some cases at any rate. The addition of minute traces of acids, poisons, &c., leads to this change in some forms; high temperature has also been used successfully.

The difficult subject of the classification[4] of bacteria dates from the year 1872, when Cohn published his system, which was extended in 1875; this scheme has in fact dominated the study of bacteria ever since. Zopf in 1885 proposed a scheme based on the acceptance of extreme views of pleomorphism; his system, however, was extraordinarily impracticable and was recognized by him as provisional only. Systems have also been brought forward based on the formation of arthrospores and endospores, but as explained above this is eminently unsatisfactory, as arthrospores are not true spores and both kinds of reproductive bodies are found in one and the same form. Numerous attempts have been made to construct schemes of classification based on the power of growing colonies to liquefy gelatine, to secrete coloured pigments, to ferment certain media with evolution of carbon dioxide or other gases, or to induce pathological conditions in animals. None of these systems, which are chiefly due to the medical bacteriologists, has maintained its position, owing to the difficulty of applying the characters and to the fact that such properties are physiological and liable to great fluctuations in culture, because a given organism may vary greatly in such respects according to its degree of

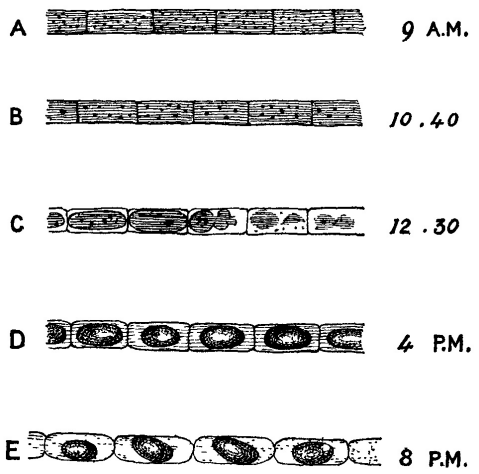

FIG. 11.—Stages in the development of spores of *Bacillus ramosus* (Fraenkel), in the order and at the times given, in a hanging drop culture, under a very high power. The process begins with the formation of brilliant granules (A, B); these increase, and the brilliant substance gradually balls together (C) and forms the spores (D), one in each segment, which soon acquire a membrane and ripen (E). (H. M. W.)

Classification.

vitality at the time, its age, the mode of nutrition and the influence of external factors on its growth. Even when used in conjunction with purely morphological characters, these physiological properties are too variable to aid us in the discrimination of species and genera, and are apt to break down at critical periods. Among the more characteristic of these schemes adopted at various times may be mentioned those of Miquel (1891), Eisenberg (1891), and Lehmann and Neumann (1897). Although much progress has been made in determining the value and constancy of morphological characters, we are still in need of a sufficiently comprehensive and easily applied scheme of classification, partly owing to the existence in the literature of imperfectly described forms the life-history of which is not yet known, or the microscopic characters of which have not been examined with sufficient accuracy and thoroughness. The principal attempts at morphological classifications recently brought forward are those of de Toni and Trevisan (1889), Fischer (1897) and Migula (1897). Of these systems, which alone are available in any practical scheme of classification, the two most important and most modern are those of Fischer and Migula. The extended investigations of the former on the number and distribution of cilia (see fig. 1) led him to propose a scheme of classification based on these and other morphological characters, and differing essentially from any preceding one. This scheme may be tabulated as follows:—

Fischer's Scheme.

I. ORDER—**Haplobacterinae.** Vegetative body unicellular; spheroidal, cylindrical or spirally twisted; isolated or connected in filamentous or other growth series.

1. *Family*—COCCACEAE. Vegetative cells spheroidal.

(*a*) Sub-family—ALLOCOCCACEAE. Division in all or any planes, colonies indefinite in shape and size, of cells in short chains, irregular clumps, pairs or isolated:— *Micrococcus* (Cohn), cells non-motile; *Planococcus* (Migula), cells motile.

(*b*) Sub-family—HOMOCOCCACEAE. Division planes regular and definite:—*Sarcina* (Goods.), cells non-motile; growth and division in three successive planes at right angles, resulting in packet-like groups; *Planosarcina* (Migula), as before, but motile; *Pediococcus* (Lindner), division planes at right angles in two successive planes, and cells in tablets of four or more; *Streptococcus* (Billr.), divisions in one plane only, resulting in chains of cells.

2. *Family*—BACILLACEAE. Vegetative cells cylindric (rodlets), ellipsoid or ovoid, and straight. Division planes always perpendicular to the long axis.

(*a*) Sub-family—BACILLEAE. Sporogenous rodlets cylindric, not altered in shape:—*Bacillus* (Cohn), non-motile; *Bactrinium* (Fischer), motile, with one polar flagellum (monotrichous); *Bactrillum* (Fischer), motile, with a terminal tuft of cilia (lophotrichous); *Bactridium* (Fischer), motile, with cilia all over the surface (peritrichous).

(*b*) Sub-family—CLOSTRIDIEAE. Sporogenous rodlets, spindle-shaped:—*Clostridium* (Prazm.), motile (peritrichous).

(*c*) Sub-family—PLECTRIDIEAE. Sporogenous rodlets, drumstick-shaped:—*Plectridium* (Fischer), motile (peritrichous).

3. *Family*—SPIRILLACEAE. Vegetative cells, cylindric but curved more or less spirally. Divisions perpendicular to the long axis:—*Vibrio* (Müller-Löffler), comma-shaped, motile, monotrichous; *Spirillum* (Ehrenb.), more strongly curved in open spirals, motile, lophotrichous; *Spirochaete* (Ehrenb.), spirally coiled in numerous close turns, motile, but apparently owing to flexile movements, as no cilia are found.

II. ORDER—**Trichobacterinae.** Vegetative body of branched or unbranched cell-filaments, the segments of which separate as swarm-cells (*Gonidia*).

1. *Family*—TRICHOBACTERIACEAE. Characters those of the Order.

(*a*) Filaments rigid, non-motile, sheathed:—*Crenothrix* (Cohn), filaments unbranched and devoid of sulphur particles; *Thiothrix* (Winogr.), as before, but with sulphur particles; *Cladothrix* (Cohn), filaments branched in a pseudo-dichotomous manner.

(*b*) Filaments showing slow pendulous and creeping movements, and with no distinct sheath:—*Beggiatoa* (Trev.), with sulphur particles.

The principal objections to this system are the following:—(1) The extraordinary difficulty in obtaining satisfactory preparations showing the cilia, and the discovery that these motile organs are not formed on all substrata, or are only developed during short periods of activity while the organism is young and vigorous, render this character almost nugatory. For instance, *B. megatherium* and *B. subtilis* pass in a few hours after commencement of growth from a motile stage with peritrichous cilia, into one of filamentous growth preceded by casting of the cilia. (2) By far the majority of the described species (over 1000) fall into the three genera—*Micrococcus* (about 400), *Bacillus* (about 200) and *Bactridium* (about 150), so that only a quarter or so of the forms are selected out by the other genera. (3) The monotrichous and lophotrichous conditions are by no means constant even in the motile stage; thus *Pseudomonas rosea* (Mig.) may have 1, 2 or 3 cilia at either end, and would be distributed by Fischer's classification between *Bactrinium* and *Bactrillum*, according to which state was observed. In Migula's scheme the attempt is made to avoid some of these difficulties, but others are introduced by his otherwise clever devices for dealing with these puzzling little organisms.

The question, What is an individual? has given rise to much difficulty, and around it many of the speculations regarding pleomorphism have centred without useful result. If a tree fall apart into its constituent cells periodically we should have the same difficulty on a larger and more complex scale. The fact that every bacterial cell in a species in most cases appears equally capable of performing all the physiological functions of the species has led most authorities, however, to regard it as the individual—a view which cannot be consistent in those cases where a simple or branched filamentous series exhibits differences between free apex and fixed base and so forth. It may be doubted whether the discussion is profitable, though it appears necessary in some cases—*e.g.* concerning pleomorphy—to adopt some definition of individual.

Myxobacteriaceae.—To the two divisions of bacteria, Haplobacterinae and Trichobacterinae, must now be added a third division, Myxobacterinae. One of the first members of this group, *Chondromyces crocatus*, was described as long ago as 1857 by Berkeley, but its nature was not understood and it was ascribed to the Hyphomycetes. In 1892, however, Thaxter rediscovered it and showed its bacterial nature, founding for it and some allied forms the group Myxobacteriaceae.

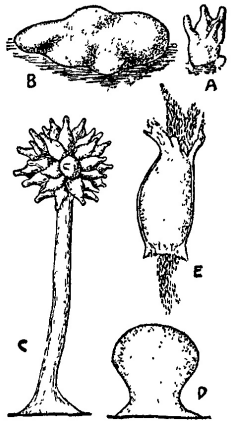

FIG. 12.
A. *Myxococcus digelatus*, bright red fructification occurring on dung.
B. *Polyangium primigenum*, red fructification on dog's dung.
C. *Chondromyces apiculatus*, orange fructification on antelope's dung.
D. Young fructification.
E. Single cyst germinating.
(A, B, after Quehl; C-E, after Thaxter.) From Strasburger's *Lehrbuch der Botanik*, by permission of Gustav Fischer.

Another form, which he described as *Myxobacter*, was shown later to be the same as *Polyangium vitellinum* described by Link in 1795, the exact nature of which had hitherto been in doubt. Thaxter's observations and conclusions were called in question by some botanists, but his later observations and those of Baur have established firmly the position of the group. The peculiarity of the group lies in the fact that the bacteria form plasmodium-like aggregations and build themselves up into sporogenous structures of definite form superficially similar to the cysts of the Mycetozoa (fig. 12). Most of the forms in question are found growing on the dung of herbivorous animals, but the bacteria occur not only in the alimentary canal of the animal but also free in the air. The Myxobacteria are most easily obtained by keeping at a temperature of 30-35° C. in the dark dung which has lain exposed to the air for at least eight days. The high temperature is favourable to the growth of the bacteria but inimical to that of the fungi which are so common on this substratum.

[v.03 p.0164]

Function and life of bacteria.

The discoveries that some species of nitrifying bacteria and perhaps pigmented forms are capable of carbon-assimilation, that others can fix free nitrogen and that a number of decompositions hitherto unsuspected are accomplished by Schizomycetes, have put the questions of nutrition and fermentation in quite new lights. Apart from numerous fermentation processes such as rotting, the soaking of skins for tanning, the preparation of indigo and of tobacco, hay, ensilage, &c., in all of which bacterial fermentations are concerned, attention may be especially directed to the following evidence of the supreme importance of Schizomycetes in agriculture and daily life. Indeed, nothing marks the attitude of modern bacteriology more clearly than the increasing attention which is being paid to useful fermentations. The vast majority of these organisms are not pathogenic, most are harmless and many are indispensable aids in natural operations important to man.

Fischer has proposed that the old division into saprophytes and parasites should be replaced by one which takes into account other peculiarities in the mode of nutrition of bacteria. The nitrifying, nitrogen-fixing, sulphur- and iron-bacteria he regards as monotrophic, *i.e.* as able to carry on one particular series of fermentations or decompositions only, and since they require no organic food materials, or at least are able to work up nitrogen or carbon from inorganic sources, he regards them as primitive forms in this respect and terms them *Prototrophic*. They may be looked upon as the nearest existing representatives of the primary forms of life which first obtained the power of working up non-living into living materials, and as playing a correspondingly important *rôle* in the evolution of life on our globe. The vast majority of bacteria, on the other hand, which are ordinarily termed saprophytes, are *saprogenic*, *i.e.* bring organic material to the putrefactive state—or *saprophilous*, *i.e.* live best in such putrefying materials—or become *zymogenic*, *i.e.* their metabolic products may induce blood-poisoning or other toxic effects (facultative parasites) though they are not true parasites. These forms are termed by Fischer *Metatrophic*, because they require various kinds of organic materials obtained from the dead remains of other organisms or from the surfaces of their bodies, and can utilize and decompose them in various ways (*Polytrophic*) or, if monotrophic, are at least unable to work them up. The true parasites—obligate parasites of de Bary—are placed by Fischer in a third biological group, *Paratrophic* bacteria, to mark the importance of their mode of life in the interior of living organisms where they live and multiply in the blood, juices or tissues.

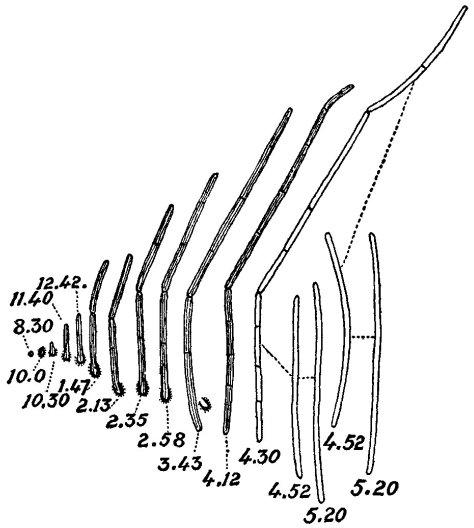

FIG. 13.—A series of phases of germination of the spore of *B. ramosus* sown at 8.30 (to the extreme left), showing how the growth can be measured. If we place the base of the filament in each case on a base line in the order of the successive times of observation recorded, and at distances apart proportional to the intervals of time (8.30, 10.0, 10.30, 11.40, and so on) and erect the straightened-out filaments, the proportional length of each of which is here given for each period, a line joining the tips of the filaments gives the curve of growth. (H. M. W.)

Nitrogen bacteria.

When we reflect that some hundreds of thousands of tons of urea are daily deposited, which ordinary plants are unable to assimilate until considerable changes have been undergone, the question is of importance, What happens in the meantime? In effect the urea first becomes carbonate of ammonia by a simple hydrolysis brought about by bacteria, more and more definitely known since Pasteur, van Tieghem and Cohn first described them. Lea and Miquel further proved that the hydrolysis is due to an enzyme—urase—separable with difficulty from the bacteria concerned. Many forms in rivers, soil, manure heaps, &c., are capable of bringing about this change to ammonium carbonate, and much of the loss of volatile ammonia on farms is preventible if the facts are apprehended. The excreta of urea alone thus afford to the soil enormous stores of nitrogen combined in a form which can be rendered available by bacteria, and there are in addition the supplies brought down in rain from the atmosphere, and those due to other living débris. The researches of later years have demonstrated that a still more inexhaustible supply of nitrogen is made available by the nitrogen-fixing bacteria of the soil. There are in all cultivated soils forms of bacteria which are capable of forcing the inert free nitrogen to combine with other elements into compounds assimilable by plants. This was long asserted as probable before Winogradsky showed that the conclusions of M. P. E. Berthelot, A. Laurent and others were right, and that *Clostridium pasteurianum*, for instance, if protected from access of free oxygen by an envelope of aerobic bacteria or fungi, and provided with the carbohydrates and minerals necessary for its growth, fixes nitrogen in proportion to the amount of sugar consumed. This interesting case of symbiosis is equalled by yet another case. The work of numerous observers has shown that the free nitrogen of the atmosphere is brought into combination in the soil in the nodules filled with bacteria on the roots of Leguminosae, and since these nodules are the morphological expression of a symbiosis between the higher plant and the bacteria, there is evidently here a case similar to the last.

As regards the ammonium carbonate accumulating in the soil from the conversion of urea and other sources, we know from Winogradsky's researches that it undergoes oxidation in two stages owing to the activity of the so-called "nitrifying" bacteria (an unfortunate term inasmuch as "nitrification" refers merely to a particular phase of the cycle of changes undergone by nitrogen). It had long been known that under certain conditions large quantities of nitrate (saltpetre) are formed on exposed heaps of manure, &c., and it was supposed that direct oxidation of the ammonia, facilitated by the presence of porous bodies, brought this to pass. But research showed that this process of nitrification is dependent on temperature, aeration and moisture, as is life, and that while nitre-beds can infect one another, the process is stopped by sterilization. R. Warington, J. T. Schloessing, C. A. Müntz and others had proved that nitrification was promoted by some organism, when Winogradsky hit on the happy idea of isolating the organism by using gelatinous silica, and so avoiding the difficulties which Warington had shown to exist with the organism in presence of organic nitrogen, owing to its refusal to nitrify on gelatine or other nitrogenous media. Winogradsky's investigations resulted in the discovery that two kinds of bacteria are concerned in nitrification; one of these, which he terms the *Nitroso-bacteria*, is only capable of bringing about the oxidation of the ammonia to nitrous acid, and the astonishing result was obtained that this can be done, in the dark, by bacteria to which only pure mineral salts—*e.g.* carbonates, sulphates and chlorides of ammonium, sodium and magnesium —were added. In other words these bacteria can build up organic matter from purely mineral sources by assimilating carbon from carbon dioxide in the dark and by obtaining their nitrogen from ammonia. The energy liberated during the

[v.03 p.0165]

oxidation of the nitrogen is regarded as splitting the carbon dioxide molecule,—in green plants it is the energy of the solar rays which does this. Since the supply of free oxygen is dependent on the activity of green plants the process is indirectly dependent on energy derived from the sun, but it is none the less an astounding one and outside the limits of our previous generalizations. It has been suggested that urea is formed by polymerization of ammonium carbonate, and formic aldehyde is synthesized from CO_2 and OH_2. The *Nitro-bacteria* are smaller, finer and quite different from the nitroso-bacteria, and are incapable of attacking and utilizing ammonium carbonate. When the latter have oxidized ammonia to nitrite, however, the former step in and oxidize it still further to nitric acid. It is probable that important consequences of these actions result from the presence of nitrifying bacteria in rotten stone, decaying bricks, &c., where all the conditions are realized for preparing primitive soil, the breaking up of the mineral constituents being a secondary matter. That "soil" is thus prepared on barren rocks and mountain peaks may be concluded with some certainty.

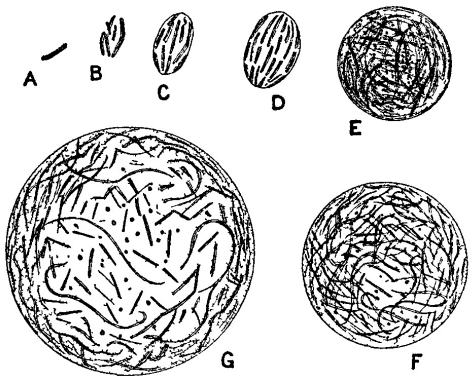

FIG. 14.—Stages in the formation of a colony of a variety of *Bacillus (Proteus) vulgaris* (Hauser), observed in a hanging drop. At 11 A.M. a rodlet appeared (A); at 4 P.M. it had grown and divided and broken up into eight rodlets (B); C shows further development at 8 P.M., D at 9.30 P.M.—all under a high power. At E, F, and G further stages are drawn, as seen under much lower power. (H. M. W.)

In addition to the bacterial actions which result in the oxidization of ammonia to nitrous acid, and of the latter to nitric acid, the reversal of such processes is also brought about by numerous bacteria in the soil, rivers, &c. Warington showed some time ago that many species are able to reduce nitrates to nitrites, and such reduction is now known to occur very widely in nature. The researches of Gayon and Dupetit, Giltay and Aberson and others have shown, moreover, that bacteria exist which carry such reduction still further, so that ammonia or even free nitrogen may escape. The importance of these results is evident in explaining an old puzzle in agriculture, viz. that it is a wasteful process to put nitrates and manure together on the land. Fresh manure abounds in de-nitrifying bacteria, and these organisms not only reduce the nitrates to nitrites, even setting free nitrogen and ammonia, but their effect extends to the undoing of the work of what nitrifying bacteria may be present also, with great loss. The combined nitrogen of dead organisms, broken down to ammonia by putrefactive bacteria, the ammonia of urea and the results of the fixation of free nitrogen, together with traces of nitrogen salts due to meteoric activity, are thus seen to undergo various vicissitudes in the soil, rivers and surface of the globe generally. The ammonia may be oxidized to nitrites and nitrates, and then pass into the higher plants and be worked up into proteids, and so be handed on to animals, eventually to be broken down by bacterial action again to ammonia; or the nitrates may be degraded to nitrites and even to free nitrogen or ammonia, which escapes.

Bacteria and Leguminosae.

That the Leguminosae (a group of plants including peas, beans, vetches, lupins, &c.) play a special part in agriculture was known even to the ancients and was mentioned by Pliny (*Historia Naturalis*, viii). These plants will not only grow on poor sandy soil without any addition of nitrogenous manure, but they actually enrich the soil on which they are grown. Hence leguminous plants are essential in all rotation of crops. By analysis it was shown by Schulz-Lupitz in 1881 that the way in which these plants enrich the soil is by increasing the nitrogen-content. Soil which had been cultivated for many years as pasture was sown with lupins for fifteen years in succession; an analysis then showed that the soil contained more than three times as much nitrogen as at the beginning of the experiment. The only possible source for this increase was the atmospheric nitrogen. It had been, however, an axiom with botanists that the green plants were unable to use the nitrogen of the air. The apparent contradiction was explained by the experiments of H. Hellriegel and Wilfarth in 1888. They showed that, when grown on sterilized sand with the addition of mineral salts, the Leguminosae were no more able to use the atmospheric nitrogen than other plants such as oats and barley. Both kinds of plants required the addition of nitrates to the soil. But if a little water in which arable soil had been shaken up was added to the sand, then the leguminous plants flourished in the absence of nitrates and showed an increase in nitrogenous material. They had clearly made use of the nitrogen of the air. When these plants were examined they had small swellings or nodules on their roots, while those grown in sterile sand without soil-extract had no nodules. Now these peculiar nodules are a *normal* characteristic of the roots of leguminous plants grown in ordinary soil. The experiments above mentioned made clear for the first time the nature and activity of these nodules. They are clearly the result of infection (if the soil extract was boiled before addition to the sand no nodules were produced), and their presence enabled the plant to absorb the free nitrogen of the air.

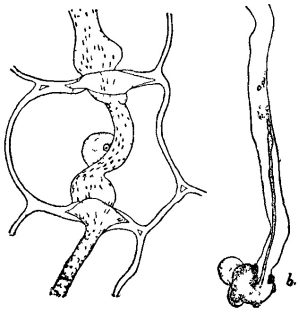

FIG. 15.—Invasion of leguminous roots by bacteria.
a, cell from the epidermis of root of Pea with "infection thread" (zoogloea) pushing its way through the cell-walls. (After Prazmowski.)
b, free end of a root-hair of Pea; at the right are particles of earth and on the left a mass of bacteria. Inside the hair the bacteria are pushing their way up in a thin stream.
(From Fischer's *Vorlesungen über Bakterien*.)

The work of recent investigators has made clear the whole process. In ordinary arable soil there exist motile rod-like bacteria, *Bacterium radicicola*. These enter the root-hairs of leguminous plants, and passing down the hair in the form of a long, slimy (zoogloea) thread, penetrate the tissues of the root. As a result the tissues become hypertrophied, producing the well-known nodule. In the cells of the nodule the bacteria multiply and develop, drawing material from their host. Many of the bacteria exhibit curious involution forms ("bacteroids"), which are finally broken down and their products absorbed by the plant. The nitrogen of the air is absorbed by the nodules, being built up into the bacterial cell and later handed on to the host-plant. It appears from the observations of Mazé that the bacterium can even absorb free nitrogen when grown in cultures outside the plant. We have here a very interesting case of symbiosis as mentioned above. The green plant, however, always keeps the upper hand, restricting the development of the bacteria to the nodules and later absorbing them for its own use. It should be mentioned that different genera require different races of the bacterium for the production of nodules.

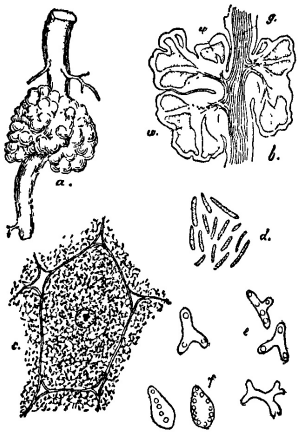

FIG. 16.
a, root nodule of the lupin, nat. size. (From Woromv.)
b, longitudinal section through root and nodule.
g, fibro-vascular bundle.
w, bacterial tissue. (After Woromv.)
c, cell from bacterial tissues showing nucleus and protoplasm filled with bacteria.
d, bacteria from nodule of lupin, normal undegenerate form.
e and *f*, bacteroids from *Vicia villosa* and *Lupinus albus*. (After Morck.)
(From Fischer's *Vorlesungen über Bakterien*.)

The important part that these bacteria play in agriculture led to the introduction in Germany of a commercial product (the so-called "nitragin") consisting of a pure culture of the bacteria, which is to be sprayed over the soil or applied to the seeds before sowing. This material was found at first to have a very uncertain effect, but later experiments in America, and the use of a modified preparation in England, under the direction of Professor Bottomley, have had successful results; it is possible that in the future a preparation of this sort will be widely used.

The apparent specialization of these bacteria to the leguminous plants has always been a very striking fact, for similar bacterial nodules are known only in two or three cases outside this particular group. However, Professor Bottomley announced at the meeting of the British Association for the

[v.03 p.0166]

Advancement of Science in 1907 that he had succeeded in breaking down this specialization and by a suitable treatment had caused bacteria from leguminous nodules to infect other plants such as cereals, tomato, rose, with a marked effect on their growth. If these results are confirmed and the treatment can be worked commercially, the importance to agriculture of the discovery cannot be overestimated; each plant will provide, like the bean and vetch, its own nitrogenous manure, and larger crops will be produced at a decreased cost.

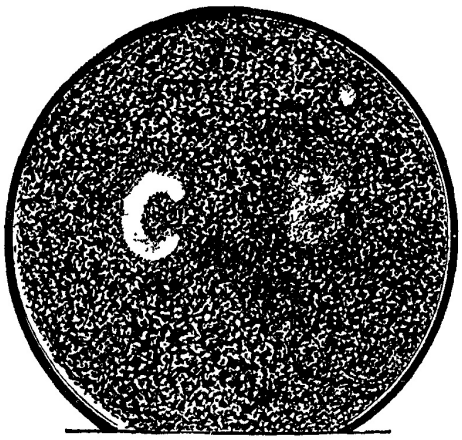

FIG. 17.—A plate-culture of a bacillus which had been exposed for a period of four hours behind a zinc stencil-plate, in which the letters C and B were cut. The light had to traverse a screen of water before passing through the C, and one of aesculin (which filters out the blue and violet rays) before passing the B. The plate was then incubated, and, as the figure shows, the bacteria on the C-shaped area were all killed, whereas they developed elsewhere on the plate (traces of the B are just visible to the right) and covered it with an opaque growth. (H. M. W.)

Cellulose-bacteria.

Another important advance is in our knowledge of the part played by bacteria in the circulation of carbon in nature. The enormous masses of cellulose deposited annually on the earth's surface are, as we know, principally the result of chlorophyll action on the carbon dioxide of the atmosphere decomposed by energy derived from the sun; and although we know little as yet concerning the magnitude of other processes of carbon-assimilation—*e.g.* by nitrifying bacteria—it is probably comparatively small. Such cellulose is gradually reconverted into water and carbon dioxide, but for some time nothing positive was known as to the agents which thus break up the paper, rags, straw, leaves and wood, &c., accumulating in cesspools, forests, marshes and elsewhere in such abundance. The work of van Tieghem, van Senus, Fribes, Omeliansky and others has now shown that while certain anaerobic bacteria decompose the substance of the middle lamella—chiefly pectin compounds—and thus bring about the isolation of the cellulose fibres when, for instance, flax is steeped or "retted," they are unable to attack the cellulose itself. There exist in the mud of marshes, rivers and cloacae, &c., however, other anaerobic bacteria which decompose cellulose, probably hydrolysing it first and then splitting the products into carbon dioxide and marsh gas. When calcium sulphate is present, the nascent methane induces the formation of calcium carbonate, sulphuretted hydrogen and water. We have thus an explanation of the occurrence of marsh gas and sulphuretted hydrogen in bogs, and it is highly probable that the existence of these gases in the intestines of herbivorous animals is due to similar putrefactive changes in the undigested cellulose remains.

Sulphur bacteria.

Cohn long ago showed that certain glistening particles observed in the cells of *Beggiatoa* consist of sulphur, and Winogradsky and Beyerinck have shown that a whole series of sulphur bacteria of the genera *Thiothrix*, *Chromatium*, *Spirillum*, *Monas*, &c., exist, and play important parts in the circulation of this element in nature, *e.g.* in marshes, estuaries, sulphur springs, &c. When cellulose bacteria set free marsh gas, the nascent gas reduces sulphates—*e.g.* gypsum—with liberation of SH_2, and it is found that the sulphur bacteria thrive under such conditions by oxidizing the SH_2 and storing the sulphur in their own protoplasm. If the SH_2 runs short they oxidize the sulphur again to sulphuric acid, which combines with any calcium carbonate present and forms sulphate again. Similarly nascent methane may reduce iron salts, and the black mud in which these bacteria often occur owes its colour to the FeS formed. Beyerinck and Jegunow have shown that some partially anaerobic sulphur bacteria can only exist in strata at a certain depth below the level of quiet waters where SH_2 is being set free below by the bacterial decompositions of vegetable mud and rises to meet the atmospheric oxygen coming down from above, and that this zone of physiological activity rises and falls with the variations of partial pressure of the gases due to the rate of evolution of the SH_2. In the deeper parts of this zone the bacteria absorb the SH_2, and, as they rise, oxidize it and store up the sulphur; then ascending into planes more highly oxygenated, oxidize the sulphur to SO_3. These bacteria therefore employ SH_2 as their respiratory substance, much as higher plants employ carbohydrates—instead of liberating energy as heat by the respiratory combustion of sugars, they do it by oxidizing hydrogen sulphide. Beyerinck has shown that *Spirillum desulphuricans*, a definite anaerobic form, attacks and reduces sulphates, thus undoing the work of the sulphur bacteria as certain de-nitrifying bacteria reverse the operations of nitro-bacteria. Here again, therefore, we have sulphur, taken into the higher plants as sulphates, built up into proteids, decomposed by putrefactive bacteria and yielding SH_2 which the sulphur bacteria oxidize, the resulting sulphur is then again oxidized to SO_3 and again combined with calcium to gypsum, the cycle being thus complete.

[v.03 p.0167]

Iron bacteria.

Chalybeate waters, pools in marshes near ironstone, &c, abound in bacteria, some of which belong to the remarkable genera *Crenothrix*, *Cladothrix* and *Leptothrix*, and contain ferric oxide, *i.e.* rust, in their cell-walls. This iron deposit is not merely mechanical but is due to the physiological activity of the organism which, according to Winogradsky, liberates energy by oxidizing ferrous and ferric oxide in its protoplasm—a view not accepted by H. Molisch. The iron must be in certain soluble conditions, however, and the soluble bicarbonate of the protoxide of chalybeate springs seems most favourable, the hydrocarbonate absorbed by the cells is oxidized, probably thus—

$$2FeCO_3 + 3OH_2 + O = Fe_2(OH)_6 + 2CO_2.$$

The ferric hydroxide accumulates in the sheath, and gradually passes into the more insoluble ferric oxide. These actions are of extreme importance in nature, as their continuation results in the enormous deposits of bog-iron ore, ochre, and—since Molisch has shown that the iron can be replaced by manganese in some bacteria—of manganese ores.

Pigment bacteria.

Considerable advances in our knowledge of the various chromogenic bacteria have been made by the studies of Beyerinck, Lankester, Engelmann, Ewart and others, and have assumed exceptional importance owing to the discovery that *Bacteriopurpurin*—the red colouring matter contained in certain sulphur bacteria—absorbs certain rays of solar energy, and enables the organism to utilize the energy for its own life-purposes. Engelmann showed, for instance, that these red-purple bacteria collect in the ultra-red, and to a less extent in the orange and green, in bands which agree with the absorption spectrum of the extracted colouring matter. Not only so, but the evident parallelism between this absorption of light and that by the chlorophyll of green plants, is completed by the demonstration that oxygen is set free by these bacteria—*i.e.* by means of radiant energy trapped by their colour-screens the living cells are in both cases enabled to do work, such as the reduction of highly oxidized compounds.

The most recent observations of Molisch seem to show that bacteria possessing bacteriopurpurin exhibit a new type of assimilation—the assimilation of organic material under the influence of light. In the case of these red-purple bacteria the colouring matter is contained in the protoplasm of the cell, but in most chromogenic bacteria it occurs as excreted pigment on and between the cells, or is formed by their action in the medium. Ewart has confirmed the principal conclusions concerning these purple, and also the so-called chlorophyll bacteria (*B. viride*, *B. chlorinum*, &c.), the results going to show that these are, as many authorities have held, merely minute algae. The pigment itself may be soluble in water, as is the case with the blue-green fluorescent body formed by *B. pyocyaneus*, *B. fluorescens* and a whole group of fluorescent bacteria. Neelson found that the pigment of *B. cyanogenus* gives a band in the yellow and strong lines at E and F in the solar spectrum—an absorption spectrum almost identical with that of triphenyl-rosaniline. In the case of the scarlet and crimson red pigments of *B. prodigiosus*, *B. ruber*, &c., the violet of *B. violacens*, *B janthinus*, &c., the red-purple of the sulphur bacteria, and indeed most bacterial pigments, solution in water does not occur, though alcohol extracts the colour readily. Finally, there are a few forms which yield their colour to neither alcohol nor water, *e.g.* the yellow *Micrococcus cereus flavus* and the *B. berolinensis*. Much work is still necessary before we can estimate the

importance of these pigments. Their spectra are only imperfectly known in a few cases, and the bearing of the absorption on the life-history is still a mystery. In many cases the colour-production is dependent on certain definite conditions—temperature, presence of oxygen, nature of the food-medium, &c. Ewart's important discovery that some of these lipochrome pigments occlude oxygen, while others do not, may have bearings on the facultative anaerobism of these organisms.

Dairy bacteria.

A branch of bacteriology which offers numerous problems of importance is that which deals with the organisms so common in milk, butter and cheese. Milk is a medium not only admirably suited to the growth of bacteria, but, as a matter of fact, always contaminated with these organisms in the ordinary course of supply. F. Lafar has stated that 20% of the cows in Germany suffer from tuberculosis, which also affected 17.7% of the cattle slaughtered in Copenhagen between 1891 and 1893, and that one in every thirteen samples of milk examined in Paris, and one in every nineteen in Washington, contained tubercle bacilli. Hence the desirability of sterilizing milk used for domestic purposes becomes imperative.

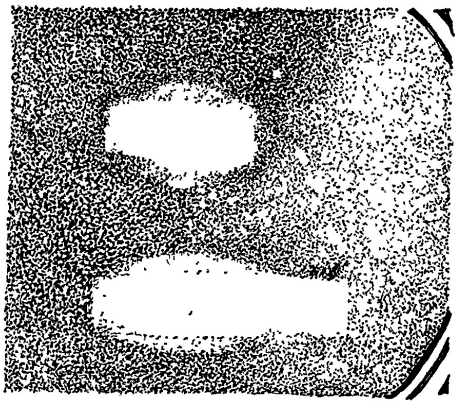

FIG. 18.—A similar preparation to fig. 17, except that two slit-like openings of equal length allowed the light to pass, and that the light was that of the electric arc passed through a quartz prism and casting a powerful spectrum on the plate. The upper slit was covered with glass, the lower with quartz. The bacteria were killed over the clear areas shown. The left-hand boundary of the clear area corresponds to the line F (green end of the blue), and the beginning of the ultra-violet was at the extreme right of the upper (short) area. The lower area of bactericidal action extends much farther to the right, because the quartz allows more ultra-violet rays to pass than does glass. The red-yellow-green to the left of F were without effect. (H. M. W.)

No milk is free from bacteria, because the external orifices of the milk-ducts always contain them, but the forms present in the normal fluid are principally those which induce such changes as the souring or "turning" so frequently observed in standing milk (these were examined by Lord Lister as long ago as 1873-1877, though several other species are now known), and those which bring about the various changes and fermentations in butter and cheese made from it. The presence of foreign germs, which may gain the upper hand and totally destroy the flavours of butter and cheese, has led to the search for those particular forms to which the approved properties are due. A definite bacillus to which the peculiarly fine flavour of certain butters is due, is said to be largely employed in pure cultures in American dairies, and in Denmark certain butters are said to keep fresh much longer owing to the use of pure cultures and the treatment employed to suppress the forms which cause rancidity. Quite distinct is the search for the germs which cause undesirable changes, or "diseases"; and great strides have been made in discovering the bacteria concerned in rendering milk "ropy," butter "oily" and "rancid," &c. Cheese in its numerous forms contains myriads of bacteria, and some of these are now known to be concerned in the various processes of ripening and other changes affecting the product, and although little is known as to the exact part played by any species, practical applications of the discoveries of the decade 1890-1900 have been made, *e.g.* Edam cheese. The Japanese have cheeses resulting from the bacterial fermentation of boiled Soja beans.

[v.03 p.0168]

Thermophilous bacteria.

That bacterial fermentations are accompanied by the evolution of heat is an old experience; but the discovery that the "spontaneous" combustion of sterilized cotton-waste does not occur simply if moist and freely exposed to oxygen, but results when the washings of fresh waste are added, has led to clearer proof that the heating of hay-stacks, hops, tobacco and other vegetable products is due to the vital activity of bacteria and fungi, and is physiologically a consequence of respiratory processes like those in malting. It seems fairly established that when the preliminary heating process of fermentation is drawing to a close, the cotton, hay, &c., having been converted into a highly porous friable and combustible mass, may then ignite in certain circumstances by the occlusion of oxygen, just as ignition is induced by finely divided metals. A remarkable point in this connexion has always been the necessary conclusion that the living bacteria concerned must be exposed to temperatures of at least 70° C. in the hot heaps. Apart from the resolution of doubts as to the power of spores to withstand such temperatures for long periods, the discoveries of Miquel, Globig and others have shown that there are numerous bacteria which will grow and divide at such temperatures, *e.g. B. thermophilus*, from sewage, which is quite active at 70° C., and *B. Ludwigi* and *B. ilidzensis*, &c., from hot springs, &c.

Phosphorescent bacteria.

The bodies of sea fish, *e.g.* mackerel and other animals, have long been known to exhibit phosphorescence. This phenomenon is due to the activity of a whole series of marine bacteria of various genera, the examination and cultivation of which have been successfully carried out by Cohn, Beyerinck, Fischer and others. The cause of the phosphorescence is still a mystery. The suggestion that it is due to the oxidation of a body excreted by the bacteria seems answered by the failure to filter off or extract any such body. Beyerinck's view that it occurs at the moment peptones are worked up into the protoplasm cannot be regarded as proved, and the same must be said of the suggestion that the phosphorescence is due to the oxidation of phosphoretted hydrogen. The conditions of phosphorescence are, the presence of free oxygen, and, generally, a relatively low temperature, together with a medium containing sodium chloride, and peptones, but little or no carbohydrates. Considerable differences occur in these latter respects, however, and interesting results were obtained by Beyerinck with mixtures of species possessing different powers of enzyme action as regards carbohydrates. Thus, a form termed *Photobacterium phosphorescens* by Beyerinck will absorb maltose, and will become luminous if that sugar is present, whereas *P. Pflugeri* is indifferent to maltose. If then we prepare densely inseminated plates of these two bacteria in gelatine food-medium to which starch is added as the only carbohydrate, the bacteria grow but do not phosphoresce. If we now streak these plates with an organism, *e.g.* a yeast, which saccharifies starch, it is possible to tell whether maltose or levulose and fructose are formed; if the former, only those plates containing *P. phosphorescens* will become luminous; if the latter, only those containing *P. Pflugeri*. The more recent researches of Molisch have shown that the luminosity of ordinary butcher's meat under appropriate conditions is quite a common occurrence. Thus of samples of meat bought in Prague and kept in a cool room for about two days, luminosity was present in 52% of the samples in the case of beef, 50% for veal, and 39% for liver. If the meat was treated previously with a 3% salt solution, 89% of the samples of beef and 65% of the samples of horseflesh were found to exhibit this phenomenon. The cause of this luminosity is *Micrococcus phosphorens*, an immotile round, or almost round organism. This organism is quite distinct from that causing the luminosity of marine fish.

Oxidizing bacteria.

It has long been known that the production of vinegar depends on the oxidization of the alcohol in wine or beer to acetic acid, the chemical process being probably carried out in two stages, viz. the oxidation of the alcohol leading to the formation of aldehyde and water, and the further oxidation of the aldehyde to acetic acid. The process may even go farther, and the acetic acid be oxidized to CO_2 and OH_2; the art of the vinegar-maker is directed to preventing the accomplishment of the last stage. These oxidations are brought about by the vital activity of several bacteria, of which four—*Bacterium aceti*, *B. pasteurianum*, *B. kutzingianum*, and *B. xylinum*—have been thoroughly studied by Hansen and A. Brown. It is these bacteria which form the zoogloea of the "mother of vinegar," though this film may contain other organisms as well. The idea that this film of bacteria oxidizes the alcohol beneath by merely condensing atmospheric oxygen in its interstices, after the manner of spongy platinum, has long been given up; but the explanation of the action as an incomplete combustion, depending on the peculiar respiration of these organisms—much as in the case of nitrifying and sulphur bacteria—is not clear, though the discovery that the acetic bacteria will not only oxidize alcohol to acetic acid, but further oxidize the latter to CO_2 and OH_2 supports the view that the alcohol is absorbed by the organism and employed as its respirable substance. Promise of more light on these oxidation fermentations is afforded by the recent discovery that not only bacteria and fungi, but even the living cells of

higher plants, contain peculiar enzymes which possess the remarkable property of "carrying" oxygen—much as it is carried in the sulphuric acid chamber—and which have therefore been termed oxydases. It is apparently the presence of these oxydases which causes certain wines to change colour and alter in taste when poured from bottle to glass, and so exposed to air.

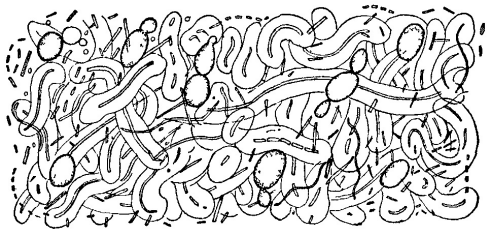

Fig. 19.—Ginger-beer plant, showing yeast (*Saccharomyces pyriformis*) entangled in the meshes of the bacterium (*B. vermiforme*). (H. M. W.)

Bacteria and light.

Much as the decade from 1880 to 1890 abounded with investigations on the reactions of bacteria to heat, so the following decade was remarkable for discoveries regarding the effects of other forms of radiant energy. The observations of Downes and Blunt in 1877 left it uncertain whether the bactericidal effects in broth cultures exposed to solar rays were due to thermal action or not. Further investigations, in which Arloing, Buchner, Chmelewski, and others took part, have led to the proof that rays of light alone are quite capable of killing these organisms. The principal questions were satisfactorily settled by Marshall Ward's experiments in 1892-1893, when he showed that even the spores of *B. anthracis*, which withstand temperatures of 100° C. and upwards, can be killed by exposure to rays of reflected light at temperatures far below anything injurious, or even favourable to growth. He also showed that the bactericidal action takes place in the absence of food materials, thus proving that it is not merely a poisoning effect of the altered medium. The principal experiments also indicate that it is the rays of highest refrangibility—the blue-violet and ultra-violet rays of the spectrum—which bring about the destruction of the organisms (figs. 17, 18). The practical effect of the bactericidal action of solar light is the destruction of enormous quantities of germs in rivers, the atmosphere and other exposed situations, and experiments have shown that it is especially the pathogenic bacteria—anthrax, typhoid, &c.—which thus succumb to light-action; the discovery that the electric arc is very rich in bactericidal rays led to the hope that it could be used for disinfecting purposes in hospitals, but mechanical difficulties intervene. The recent application of the action of bactericidal rays to the cure of lupus is, however, an extension of the same discovery. Even when the light is not sufficiently intense, or the exposure is too short to kill the spores, the experiments show that attenuation of virulence may result, a point of extreme importance in connexion with the lighting and ventilation of dwellings, the purification of rivers and streams, and the general diminution of epidemics in nature.

[v.03 p.0169]

Bacteria and cold.

As we have seen, thermophilous bacteria can grow at high temperatures, and it has long been known that some forms develop on ice. The somewhat different question of the resistance of ripe spores or cells to extremes of heat and cold has received attention. Ravenel, Macfadyen and Rowland have shown that several bacilli will bear exposure for seven days to the temperature of liquid air (-192° C. to -183° C.) and again grow when put into normal conditions. More recent experiments have shown that even ten hours' exposure to the temperature of liquid hydrogen -252° C. (21° on the absolute scale) failed to kill them. It is probable that all these cases of resistance of seeds, spores, &c., are to be connected with the fact that completely dry albumin does not lose its coagulability on heating to 110° C. for some hours, since it is well known that completely ripe spores and dry heat are the conditions of extreme experiments.

Pathogenic bacteria.

No sharp line can be drawn between pathogenic and non-pathogenic Schizomycetes, and some of the most marked steps in the progress of our modern knowledge of these organisms depend on the discovery that their pathogenicity or virulence can be modified—diminished or increased—by definite treatment, and, in the natural course of epidemics, by alterations in the environment. Similarly we are unable to divide Schizomycetes sharply into parasites and saprophytes, since it is well proved that a number of species—facultative parasites—can become one or the other according to circumstances. These facts, and the further knowledge that many bacteria never observed as parasites, or as pathogenic forms, produce toxins or poisons as the result of their decompositions and fermentations of organic substances, have led to important results in the applications of bacteriology to medicine.

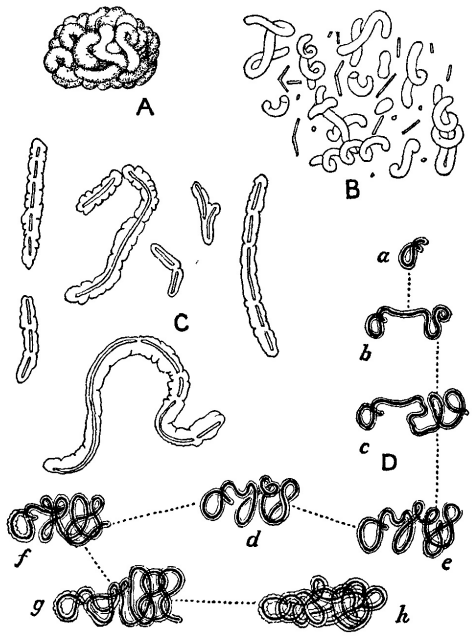

Fig. 20.—The ginger-beer plant.

A. One of the brain-like gelatinous masses into which the mature "plant" condenses.

B. The bacterium with and without its gelatinous sheaths (cf. fig. 19).

C. Typical filaments and rodlets in the slimy sheaths.

D. Stages of growth of a sheathed filament—*a* at 9 A.M., *b* at 3 P.M., *c* at 9 P.M., *d* at 11 A.M. next day, *e* at 3 P.M., *f* at 9 P.M., *g* at 10.30 A.M. next day, *h* at 24 hours later. (H. M. W.)

Bacteriosis in plants.

Bacterial diseases in the higher plants have been described, but the subject requires careful treatment, since several points suggest doubts as to the organism described being the cause of the disease referred to their agency. Until recently it was urged that the acid contents of plants explained their immunity from bacterial diseases, but it is now known that many bacteria can flourish in acid media. Another objection was that even if bacteria obtained access through the stomata, they could not penetrate the cell-walls bounding the intercellular spaces, but certain anaerobic forms are known to ferment cellulose, and others possess the power of penetrating the cell-walls of living cells, as the bacteria of Leguminosae first described by Marshall Ward in 1887, and confirmed by Miss Dawson in 1898. On the other hand a long list of plant-diseases has been of late years attributed to bacterial action. Some, *e.g.* the Sereh disease of the sugar-cane, the slime fluxes of oaks and other trees, are not only very doubtful cases, in which other organisms such as yeasts and fungi play their parts, but it may be regarded as extremely improbable that the bacteria are the primary agents at all; they are doubtless saprophytic forms which have gained access to rotting tissues injured by other agents. Saprophytic bacteria can readily make their way down the dead hypha of an invading fungus, or into the punctures made by insects, and Aphides have been credited with the bacterial infection of carnations, though more recent researches by Woods go to show the correctness of his conclusion that Aphides alone are responsible for the carnation disease. On the other hand, recent investigation has brought to light cases in which bacteria are certainly the primary agents in diseases of plants. The principal features are the stoppage of the vessels and consequent wilting of the shoots; as a rule the cut vessels on transverse sections of the shoots appear brown and choked with a dark yellowish slime in which bacteria may be detected, *e.g.* cabbages, cucumbers, potatoes, &c. In the carnation disease and in certain diseases of tobacco and other plants the seat of bacterial action appears to be the parenchyma, and it may be that Aphides or other piercing insects infect the plants, much as insects convey pollen from plant to plant, or (though in a different way) as mosquitoes infect man with malaria. If the recent work on the cabbage disease may be accepted, the bacteria make their entry at the water pores at the margins of the leaf, and thence via the glandular cells to the tracheids. Little is known of the mode of action of bacteria on these plants, but it may be assumed with great confidence that they excrete enzymes and poisons (toxins), which diffuse into the cells and kill them, and that the effects are in principle the same as those of parasitic fungi. Support is found for this opinion in Beyerinck's discovery that the juices of tobacco plants affected with the disease known as "leaf mosaic," will induce this disease after filtration through porcelain.

Symbiosis.

In addition to such cases as the kephir and ginger-beer plants (figs. 19, 20), where anaerobic bacteria are associated with yeasts, several interesting examples of symbiosis among bacteria are now known. *Bacillus chauvaei* ferments cane-sugar solutions in such a way that normal butyric arid, inactive lactic acid, carbon dioxide, and hydrogen result; *Micrococcus acidi-paralactici*, on the other hand, ferments such solutions to optically active paralactic acid. Nencki showed, however, that if both these organisms occur together, the resulting products contain large quantities of normal butyl alcohol, a substance neither bacterium can produce alone. Other observers have brought forward other cases. Thus neither *B. coli* nor the *B. denitrificans* of Burri and Stutzer can reduce nitrates, but if acting together they so completely undo the structure of sodium nitrate that the nitrogen passes off in the free state. Van Senus showed that the concurrence of two bacteria is necessary before his *B. amylobacter* can ferment cellulose, and the case of mud bacteria which evolve sulphuretted hydrogen below which is
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utilized by sulphur bacteria above has already been quoted, as also that of Winogradsky's *Clostridium pasteurianum*, which is anaerobic, and can fix nitrogen only if protected from oxygen by aerobic species. It is very probable that numerous symbiotic fermentations in the soil are due to this co-operation of oxygen-protecting species with anaerobic ones, *e.g. Tetanus*.

Activity of bacteria.

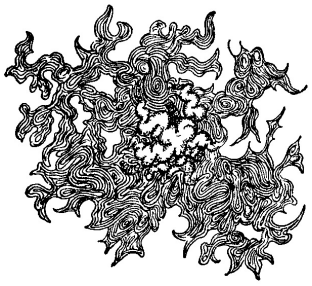

Fig. 21.—A plate-culture colony of a species of *Bacillus—Proteus* (Hauser) —on the fifth day. The flame-like processes and outliers are composed of writhing filaments, and the contours are continually changing while the colony moves as a whole. Slightly magnified. (H. M. W.)

Astonishment has been frequently expressed at the powerful activities of bacteria—their rapid growth and dissemination, the extensive and profound decompositions and fermentations induced by them, the resistance of their spores to dessication, heat, &c.—but it is worth while to ask how far these properties are really remarkable when all the data for comparison with other organisms are considered. In the first place, the extremely small size and isolation of the vegetative cells place the protoplasmic contents in peculiarly favourable circumstances for action, and we may safely conclude that, weight for weight and molecule for molecule, the protoplasm of bacteria is brought into contact with the environment at far more points and over a far larger surface than is that of higher organisms, whether—as in plants—it is distributed in thin layers round the sap-vacuoles, or—as in animals—is bathed in fluids brought by special mechanisms to irrigate it. Not only so, the isolation of the cells facilitates the exchange of liquids and gases, the passage in of food materials and out of enzymes and products of metabolism, and thus each unit of protoplasm obtains opportunities of immediate action, the results of which are removed with equal rapidity, not attainable in more complex multi-cellular organisms. To put the matter in another way, if we could imagine all the living cells of a large oak or of a horse, having given up the specializations of function impressed on them during evolution and simply carrying out the fundamental functions of nutrition, growth, and multiplication which mark the generalized activities of the bacterial cell, and at the same time rendered as accessible to the environment by isolation and consequent extension of surface, we should doubtless find them exerting changes in the fermentable fluids necessary to their life similar to those exerted by an equal mass of bacteria, and that in proportion to their approximation in size to the latter. Ciliary movements, which undoubtedly contribute in bringing the surface into contact with larger supplies of oxygen and other fluids in unity of time, are not so rapid or so extensive when compared with other standards than the apparent dimensions of the microscopic field. The microscope magnifies the distance traversed as well as the organism, and although a bacterium which covers 9-10 cm. or more in 15 minutes—say 0.1 mm. or 100 μ per second—appears to be darting across the field with great velocity, because its own small size—say 5 × 1 μ—comes into comparison, it should be borne in mind that if a mouse 2 in. long only, travelled twenty times its own length, *i.e.* 40 in., in a second, the distance traversed in 15 minutes at that rate, viz. 1000 yards, would not appear excessive. In a similar way we must be careful, in our wonder at the marvellous rapidity of cell-division and growth of bacteria, that we do not exaggerate the significance of the phenomenon. It takes any ordinary rodlet 30-40 minutes to double its length and divide into two equal daughter cells when growth is at its best; nearer the minimum it may require 3-4 hours or even much longer. It is by no means certain that even the higher rate is greater than that exhibited by a tropical bamboo which will grow over a foot a day, or even common grasses, or asparagus, during the active period of cell-division, though the phenomenon is here complicated by the phase of extension due to intercalation of water. The enormous extension of surface also facilitates the absorption of energy from the environment, and, to take one case only, it is impossible to doubt that some source of radiant energy must be at the disposal of those prototrophic forms which decompose carbonates and assimilate carbonic acid in the dark and oxidize nitrogen in dry rocky regions where no organic materials are at their disposal, even could they utilize them. It is usually stated that the carbon dioxide molecule is here split by means of energy derived from the oxidation of nitrogen, but apart from the fact that none of these processes can proceed until the temperature rises to the minimum cardinal point, Engelmann's experiment shows that in the purple bacteria rays are used other than those employed by green plants, and especially ultra-red rays not seen in the spectrum, and we may probably conclude that "dark rays"—*i.e.* rays not appearing in the visible spectrum—are absorbed and employed by these and other colourless bacteria. The purple bacteria have thus two sources of energy, one by the oxidation of sulphur and another by the absorption of "dark rays." Stoney (*Scient. Proc. R. Dub. Soc.*, 1893, p. 154) has suggested yet another source of energy, in the bombardment of these minute masses by the molecules of the environment, the velocity of which is sufficient to drive them well into the organism, and carry energy in of which they can avail themselves.

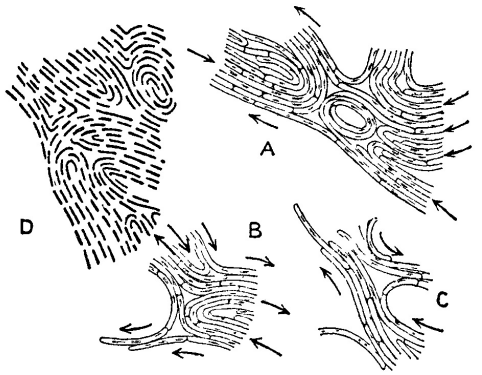

Fig. 22.—Portions of a colony such as that in fig. 21, highly magnified, showing the kinds of changes brought about in a few minutes, from A to B, and B to C, by the growth and ciliary movements of the filaments. The arrows show the direction of motion. (H. M. W.)

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Soil Bacillus of the type of de Bary's *B. megatherium*," *Phil. Trans.* vol. cxci. p. 147; Klein, L., *Ber. d. deutschen bot. Gesellsch.* (1889), Bd. vii.; and *Cent. f. Bakt. und Par.* (1889), Bd. vi. Classification: Marshall Ward, "On the Characters or Marks employed for classifying the Schizomycetes," *Ann. of Bot.*, 1892, vol. vi.; Lehmann and Neumann, *Atlas and Essentials of Bacteriology*; also the works of Migula and Fischer already cited. Myxobacteriaceae: Berkeley, *Introd. to Cryptogamic Botany* (1857), p. 313; Thaxter, "A New Order of Schizomycetes," *Bot. Gaz.* vol. xvii. (1892), p. 389; and "Further Observations on the Myxobacteriaceae," *ibid.* vol. xxiii. (1897), p. 395, and "Notes on the Myxobacteriaceae,"

ibid. vol. xxxvii. (1904), p. 405; Baur, "Myxobakterienstudien," *Arch. f. Protistenkunde*, Bd. v. (1904), p. 92; Smith, "Myxobacteria," *Jour. of Botany*, 1901, p. 69; Quehl, *Cent. f. Bakt.* xvi. (1896), p. 9. Growth: Marshall Ward, "On the Biology of *B. ramosus*," *Proc. R. Soc.* vol. lviii. p. 1 (1895). Fermentation, &c.: Warington, *The Chemical Action of some Micro-organisms* (London, 1888); Winogradsky, "Recherches sur les organismes de la nitrification," *Ann. de l'Inst. Past.*, 1890, pp. 213, 257, 760, 1891, pp. 92 and 577; "Sur l'assimilation de l'azote gazeux, &c.," *Compt. Rend.*, 12 Feb. 1894; "Zur Microbiologie des Nitrifikationsprozesses," *Cent. f. Bakt.* Abt. II. Bd. ii. (1896), p. 415; "Ueber Schwefel-Bakterien," *Bot. Zeitg.*, 1887, Nos. 31-37; *Beitr. zur Morph. u. Phys. der Bakterien*, H. 1 (1888); "Ueber Eisenbakterien," *Bot. Zeitg.*, 1888, p. 261; and Omeliansky, "Ueber den Einfluss der organischen Substanzen auf die Arbeit der nitrifizierenden Organismen," *Cent. f. Bakt.* Abt. II. Bd. v. (1896); Schorler, "Beitr. zur Kenntniss der Eisenbakterien," *Cent. f. Bakt.* Abt. II. Bd. xii. (1904), p. 681; Marshall Ward, "On the Tubercular Swellings on the Roots of Vicia Faba," *Phil. Trans.*, 1877, p. 539; Hellriegel and Wilfarth, "Unters. über die Stickstoffnahrung der Gramineen u. Leguminosen," *Beit. Zeit. d. Vereins für die Rübenzuckerindustrie* (Berlin, 1888); Nobbe and Hiltner, *Landw. Versuchsstationen* (1899), Bd. 51, p. 241, and Bd. 52, p. 455; Mazé, *Annales de l'Institut Pasteur*, t. II, p. 44, and t. 12, p. 1 (1897); Prazmowski, *Land. Versuchsstationen*, Bd. 37 (1890), p. 161, Bd. 38 (1891), p. 5; Frank, *Landw. Jahrb.* Bd. 17 (1888), p. 441; Omelianski, "Sur la fermentation de la cellulose," *Compt. Rend.*, 4 Nov. 1895; van Senus, *Beitr. zur Kenntn. der Cellulosegährung* (Leiden, 1890); van Tieghem, "Sur la fermentation de la cellulose," *Bull. de la soc. bot. de Fr.* t. xxvi. (1879), p. 28; Beyerinck "Ueber Spirillum desulphuricans, &c.," *Cent. f. Bakt.* Abt. II. Bd. i. (1895), p. 1; Molisch, *Die Pflanze in ihren Beziehungen zum Eisen* (Jena, 1892). Pigment Bacteria: Ewart, "On the Evolution of Oxygen from Coloured Bacteria," *Linn. Journ.*, 1897, vol. xxxiii. p. 123; Molisch, *Die Purpurbakterien* (Jena, 1907). Oxydases and Enzymes: Green, *The Soluble Ferments and Fermentation* (Cambridge, 1899). Action of Light, &c.: Marshall Ward, "The Action of Light on Bacteria," *Phil. Trans.*, 1893, p. 961, and literature. Resistance to Cold, &c.: Ravenel, *Med. News*, 1899, vol. lxxiv.; Macfadyen and Rowland, *Proc. R. Soc.* vol. lxvi. pp. 180, 339, and 488; Farmer, "Observations on the Effect of Desiccation of Albumin upon its Coagulability," *ibid.* p. 329. Pathogenic Bacteria: Baumgarten, *Pathologische Mykologie* (1890); Kolle and Wassermann, *Handbuch der pathogenen Mikroorganismen* (1902-1904); and numerous special works in medical literature. Immunity: Ehrlich, "On Immunity with Special Reference to Cell-life," *Proc. R. Soc.* vol. lxvi. p. 424; Calcar, "Die Fortschritte der Immunitäts- und Spezifizetätslehre seit 1870," *Progressus Rei Botanicae*, Bd. I. Heft 3 (1907). Bacteriosis: Migula, *l.c.* p. 322, has collected the literature; see also Sorauer, *Handbuch der Pflanzenkrankheiten*, I. (1905), pp. 18-93, for later literature. Symbiosis: Marshall Ward, "Symbiosis," *Ann. of Bot.* vol. xiii. p. 549, and literature.

(H. M. W.; V. H. B.)

II. Pathological Importance

The action of bacteria as pathogenic agents is in great part merely an instance of their general action as producers of chemical change, yet bacteriology as a whole has become so extensive, and has so important a bearing on subjects widely different from one another, that division of it has become essential. The science will accordingly be treated in this section from the pathological standpoint only. It will be considered under the three following heads, viz. (1) the methods employed in the study; (2) the modes of action of bacteria and the effects produced by them; and (3) the facts and theories with regard to immunity against bacterial disease.

Historical summary.

The demonstration by Pasteur that definite diseases could be produced by bacteria, proved a great stimulus to research in the etiology of infective conditions, and the result was a rapid advance in human knowledge. An all-important factor in this remarkable progress was the introduction by Koch of solid culture media, of the "plate-method," &c., an account of which he published in 1881. By means of these the modes of cultivation, and especially of separation, of bacteria were greatly simplified. Various modifications have since been made, but the routine methods in bacteriological procedure still employed are in great part those given by Koch. By 1876 the anthrax bacillus had been obtained in pure culture by Koch, and some other pathogenic bacteria had been observed in the tissues, but it was in the decade 1880-1890 that the most important discoveries were made in this field. Thus the organisms of suppuration, tubercle, glanders, diphtheria, typhoid fever, cholera, tetanus, and others were identified, and their relationship to the individual diseases established. In the last decade of the 19th century the chief discoveries were of the bacillus of influenza (1892), of the bacillus of plague (1894) and of the bacillus of dysentery (1898). Immunity against diseases caused by bacteria has been the subject of systematic research from 1880 onwards. In producing active immunity by the attenuated virus, Duguid and J. S. Burdon-Sanderson and W. S. Greenfield in Great Britain, and Pasteur, Toussaint and Chauveau in France, were pioneers. The work of Metchnikoff, dating from about 1884, has proved of high importance, his theory of phagocytosis (*vide infra*) having given a great stimulus to research, and having also contributed to important advances. The modes by which bacteria produce their effects also became a subject of study, and attention was naturally turned to their toxic products. The earlier work, notably that of L. Brieger, chiefly concerned ptomaines (*vide infra*), but no great advance resulted. A new field of inquiry was, however, opened up when, by filtration a bacterium-free toxic fluid was obtained which produced the important symptoms of the disease—in the case of diphtheria by P. P. E. Roux and A. Yersin (1888), and in the case of tetanus a little later by various observers. Research was thus directed towards ascertaining the nature of the toxic bodies in such a fluid, and Brieger and Fraenkel (1890) found that they were proteids, to which they gave the name "toxalbumins." Though subsequent researches have on the whole confirmed these results, it is still a matter of dispute whether these proteids are the true toxins or merely contain the toxic bodies precipitated along with them. In the United Kingdom the work of Sidney Martin, in the separation of toxic substances from the bodies of those who have died from certain diseases, is also worthy of mention. Immunity against toxins also became a subject of investigation, and the result was the discovery of the antitoxic action of the serum of animals immunized against tetanus toxin by E. Behring and Kitazato (1890), and by Tizzoni and Cattani. A similar result was also obtained in the case of diphtheria. The facts with regard to passive immunity were thus established and were put to practical application by the introduction of diphtheria antitoxin as a therapeutic agent in 1894. The technique of serum preparation has become since that time greatly elaborated and improved, the work of P. Ehrlich in this respect being specially noteworthy. The laws of passive immunity were shown to hold also in the case of immunity against living organisms by R. Pfeiffer (1894), and various anti-bacterial sera have been introduced. Of these the anti-streptococcic serum of A. Marmorek (1895) is one of the best known. The principles of protective inoculation have been developed and practically applied on a large scale, notably by W. M. W. Haffkine in the case of cholera (1893) and plague (1896), and more recently by Wright and Semple in the case of typhoid fever. One other discovery of great importance may be mentioned, viz. the agglutinative action of the serum of a patient suffering from a bacterial disease, first described in the case of typhoid fever independently by Widal and by Grünbaum in 1896, though led up to by the work of Pfeiffer, Gruber and Durham and others. Thus a new aid was added to medical science, viz. serum diagnosis of disease. The last decade of the 19th century will stand out in the history of medical science as the period in which serum therapeutics and serum diagnosis had their birth.

[v.03 p.0172]

In recent years the relations of toxin and antitoxin, still obscure, have been the subject of much study and controversy. It was formerly supposed that the injection of attenuated cultures or dead organisms—vaccines in the widest sense—was only of service in producing immunity as a preventive measure against the corresponding organism, but the work of Sir Almroth Wright has shown that the use of such vaccines may be of service even after infection has occurred, especially when the resulting disease is localized. In this case a general reaction is stimulated by the vaccine which may aid in the destruction of the invading organisms. In regulating the administration of such vaccines he has introduced the method of observing the *opsonic index*, to which reference is made below. Of the discoveries of new organisms the most important is that of the *Spirochaete pallida* in syphilis by Schaudinn and Hoffmann in 1905; and although proof that it is the cause of the disease is not absolute, the facts that have been established constitute very strong presumptive evidence in favour of this being the case. It may be noted, however, that it is still doubtful whether this organism is to be placed amongst the bacteria or amongst the protozoa.

Methods of study.

The methods employed in studying the relation of bacteria to disease are in principle comparatively simple, but considerable experience and great care are necessary in applying them and in interpreting results. In any given disease there are three chief steps, viz. (1) the

discovery of a bacterium in the affected tissues by means of the microscope; (2) the obtaining of the bacterium in pure culture; and (3) the production of the disease by inoculation with a pure culture. By means of microscopic examination more than one organism may sometimes be observed in the tissues, but one single organism by its constant presence and special relations to the tissue changes can usually be selected as the probable cause of the disease, and attempts towards its cultivation can then be made. Such microscopic examination requires the use of the finest lenses and the application of various *staining* methods. In these latter the basic aniline dyes in solution are almost exclusively used, on account of their special affinity for the bacterial protoplasm. The methods vary much in detail, though in each case the endeavour is to colour the bacteria as deeply, and the tissues as faintly, as possible. Sometimes a simple watery solution of the dye is sufficient, but very often the best result is obtained by increasing the staining power, *e.g.* by addition of weak alkali, application of heat, &c., and by using some substance which acts as a mordant and tends to fix the stain to the bacteria. Excess of stain is afterwards removed from the tissues by the use of decolorizing agents, such as acids of varying strength and concentration, alcohol, &c. Different bacteria behave very differently to stains; some take them up rapidly, others slowly, some resist decolorization, others are easily decolorized. In some instances the stain can be entirely removed from the tissues, leaving the bacteria alone coloured, and the tissues can then be stained by another colour. This is the case in the methods for staining the tubercle bacillus and also in Gram's method, the essential point in which latter is the treatment with a solution of iodine before decolorizing. In Gram's method, however, only some bacteria retain the stain, while others lose it. The tissues and fluids are treated by various histological methods, but, to speak generally, examination is made either in films smeared on thin cover-glasses and allowed to dry, or in thin sections cut by the microtome after suitable fixation and hardening of the tissue. In the case of any bacterium discovered, observation must be made in a long series of instances in order to determine its invariable presence.

Cultivation.

In cultivating bacteria outside the body various media to serve as food material must be prepared and sterilized by heat. The general principle in their preparation is to supply the nutriment for bacterial growth in a form as nearly similar as possible to that of the natural habitat of the organisms—in the case of pathogenic bacteria, the natural fluids of the body. The media are used either in a fluid or solid condition, the latter being obtained by a process of coagulation, or by the addition of a gelatinizing agent, and are placed in glass tubes or flasks plugged with cotton-wool. To mention examples, blood serum solidified at a suitable temperature is a highly suitable medium, and various media are made with extract of meat as a basis, with the addition of gelatine or agar as solidifying agents and of non-coagulable proteids (commercial "peptone") to make up for proteids lost by coagulation in the preparation. The reaction of the media must in every case be carefully attended to, a neutral or slightly alkaline reaction being, as a rule, most suitable; for delicate work it may be necessary to standardize the reaction by titration methods. The media from the store-flasks are placed in glass test-tubes or small flasks, protected from contamination by cotton-wool plugs, and are sterilized by heat. For most purposes the solid media are to be preferred, since bacterial growth appears as a discrete mass and accidental contamination can be readily recognized. Cultures are made by transferring by means of a sterile platinum wire a little of the material containing the bacteria to the medium. The tubes, after being thus inoculated, are kept at suitable temperatures, usually either at 37° C., the temperature of the body, or at about 20° C., a warm summer temperature, until growth appears. For maintaining a constant temperature incubators with regulating apparatus are used. Subsequent cultures or, as they are called, "subcultures," may be made by inoculating fresh tubes, and in this way growth may be maintained often for an indefinite period. The simplest case is that in which only one variety of bacterium is present, and a "pure culture" may then be obtained at once. When, however, several species are present together, means must be adopted for separating them. For this purpose various methods have been devised, the most important being the *plate-method* of Koch. In this method the bacteria are distributed in a gelatine or agar medium liquefied by heat, and the medium is then poured out on sterile glass plates or in shallow glass dishes, and allowed to solidify. Each bacterium capable of growth gives rise to a colony visible to the naked eye, and if the colonies are sufficiently apart, an inoculation can be made from any one to a tube of culture-medium and a pure culture obtained. Of course, in applying the method means must be adopted for suitably diluting the bacterial mixture. Another important method consists in inoculating an animal with some fluid containing the various bacteria. A pathogenic bacterium present may invade the body, and may be obtained in pure culture from the internal organs. This method applies especially to pathogenic bacteria whose growth on culture media is slow, *e.g.* the tubercle bacillus.

The full description of a particular bacterium implies an account not only of its microscopical characters, but also of its growth characters in various culture media, its biological properties, and the effects produced in animals by inoculation. To demonstrate readily its action on various substances, certain media have been devised. For example, various sugars—lactose, glucose, saccharose, &c.—are added to test the fermentative action of the bacterium on these substances; litmus is added to show changes in reaction, specially standardized media being used for estimating such changes; peptone solution is commonly employed for testing whether or not the bacterium forms indol; sterilized milk is used as a culture medium to determine whether or not it is curdled by the growth. Sometimes a bacterium can be readily recognized from one or two characters, but not infrequently a whole series of tests must be made before the species is determined. As our knowledge has advanced it has become abundantly evident that the so-called pathogenic bacteria are not organisms with special features, but that each is a member of a group of organisms possessing closely allied characters. From the point of view of evolution we may suppose that certain races of a group of bacteria have gradually acquired the power of invading the tissues of the body and producing disease. In the acquisition of pathogenic properties some of their original characters have become changed, but in many instances this has taken place only to a slight degree, and, furthermore, some of these changes are not of a permanent character. It is to be noted that in the case of bacteria we can only judge of organisms being of different species by the stability of the characters which distinguish them, and numerous examples might be given where their characters become modified by comparatively slight change in their environment. The cultural as well as the microscopical characters of a pathogenic organism may be closely similar to other non-pathogenic members of the same group, and it thus comes to be a matter of extreme difficulty in certain cases to state what criterion should be used in differentiating varieties. The tests which are applied for this purpose at present are chiefly of two kinds. In the first place, such organisms may be differentiated by the chemical change produced by them in various culture media, *e.g.* by their fermentative action on various sugars, &c., though in this case such properties may become modified in the course of time. And in the second place, the various serum reactions to be described below have been called into requisition. It may be stated that the introduction of a particular bacterium into the tissues of the body leads to certain properties appearing in the serum, which are chiefly exerted towards this particular bacterium. Such a serum may accordingly within certain limits be used for differentiating this organism from others closely allied to it (*vide infra*).

[v.03 p.0173]

The modes of cultivation described apply only to organisms which grow in presence of oxygen. Some, however—the strictly *anaerobic* bacteria—grow only in the absence of oxygen; hence means must be adopted for excluding this gas. It is found that if the inoculation be made deep down in a solid medium, growth of an anaerobic organism will take place, especially if the medium contains some reducing agent such as glucose. Such cultures are called "deep cultures." To obtain growth of an anaerobic organism on the surface of a medium, in using the plate method, and also for cultures in fluids, the air is displaced by an indifferent gas, usually hydrogen.

Inoculation.

In testing the effects of bacteria by inoculation the smaller rodents, rabbits, guinea-pigs, and mice, are usually employed. One great drawback in certain cases is that such animals are not susceptible to a given bacterium, or that the disease is different in character from that in the human subject. In some cases, *e.g.* Malta fever and relapsing fever, monkeys have been used with success, but in others, *e.g.* leprosy, none of the lower animals has been found to be susceptible. Discretion must therefore be exercised in interpreting negative results in the lower animals. For purposes of inoculation young vigorous cultures must be used. The bacteria are mixed with some indifferent fluid, or a fluid culture is employed. The injections are made by means of a hypodermic syringe into the subcutaneous tissue, into a vein, into one of the serous sacs, or more rarely into some special part of the body. The animal, after injection, must be kept in favourable surroundings, and any resulting symptoms noted. It may die, or may be killed at any time desired, and then a post-mortem examination is made, the conditions of the organs, &c., being observed and noted. The various tissues affected are examined microscopically and cultures made from them; in this way the structural changes and the relation of bacteria to them can be determined.

Though the causal relationship of a bacterium to a disease may be completely established by the methods given, another very important part of bacteriology is concerned with the poisons or toxins formed by bacteria. These toxins may become free in the culture fluid, and the living bacteria may then be got rid of by filtering the fluid through a filter of unglazed porcelain, whose pores are sufficiently small to retain them. The passage of the fluid is readily effected by negative pressure produced by an ordinary water exhaust-pump. The effects of the filtrate are then tested by the methods used in pharmacology. In other instances the toxins are retained to a large extent within the bacteria, and in this case the dead bacteria are injected as a suspension in fluid. Methods have been introduced for the purpose of breaking up the bodies of bacteria and setting free the intracellular toxins. For this purpose Koch ground up tubercle bacilli in an agate mortar and treated them with distilled water until practically no deposit remained. Rowland and Macfadyen for the same purpose introduced the method of grinding the bacilli in liquid air. At this temperature the bacterial bodies are extremely brittle, and are thus readily broken up. The study of the nature of toxins requires, of course, the various methods of organic chemistry. Attempts to obtain them in an absolutely pure condition have, however, failed in important cases. So that when a "toxin" is spoken of, a mixture with other organic substances is usually implied. Or the toxin may be precipitated with other organic substances, purified to a certain extent by re-solution, re-precipitation, &c., and desiccated. A "dry toxin" is thus obtained, though still in an impure condition. Toxic substances have also been separated by corresponding methods from the bodies of those who have died of certain diseases, and the action of such substances on animals is in some cases an important point in the pathology of the disease. Another auxiliary method has been applied in this department, viz. the separation of organic substances by filtration under high pressure through a colloid membrane, gelatine supported in the pores of a porcelain filter being usually employed. It has been found, for example, that a toxin may pass through such a filter while an antitoxin may not. The methods of producing immunity are dealt with below.

Separation of toxins.

Bacteria as agents of disease.

The fact that in anthrax, one of the first diseases to be fully studied, numerous bacilli are present in the blood of infected animals, gave origin to the idea that the organisms might produce their effect by using up the oxygen of the blood. Such action is now known to be quite a subsidiary matter. And although effects may sometimes be produced in a mechanical manner by bacteria plugging capillaries of important organs, *e.g.* brain and kidneys, it may now be stated as an accepted fact that all the important results of bacteria in the tissues are due to poisonous bodies or toxins formed by them. Here, just as in the general subject of fermentation, we must inquire whether the bacteria form the substances in question directly or by means of non-living ferments or enzymes. With regard to toxin formation the following general statements may be made. In certain instances, *e.g.* in the case of the tetanus and diphtheria bacilli, the production of soluble toxins can be readily demonstrated by filtering a culture in bouillon germ-free by means of a porcelain filter, and then injecting some of the filtrate into an animal. In this way the characteristic features of the disease can be reproduced. Such toxins being set free in the culture medium are often known as *extracellular*. In many cases, however, the filtrate, when injected, produces comparatively little effect, whilst toxic action is observed when the bacteria in a dead condition are used; this is the case with the organisms of tubercle, cholera, typhoid and many others. The toxins are here manifestly contained within the bodies of the bacteria, *i.e.* are *intracellular*, though they may become free on disintegration of the bacteria. The action of these intracellular toxins has in many instances nothing characteristic, but is merely in the direction of producing fever and interfering with the vital processes of the body generally, these disturbances often going on to a fatal result. In other words, the toxins of different bacteria are closely similar in their results on the body and the features of the corresponding diseases are largely regulated by the vital properties of the bacteria, their distribution in the tissues, &c. The distinction between the two varieties of toxins, though convenient, must not be pushed too far, as we know little regarding their mode of formation. Although the formation of toxins with characteristic action can be shown by the above methods, yet in some cases little or no toxic action can be demonstrated. This, for example, is the case with the anthrax bacillus; although the effect of this organism in the living body indicates the production of toxins which diffuse for a distance around the bacteria. This and similar facts have suggested that some toxins are only produced in the living body. A considerable amount of work has been done in connexion with this subject, and many observers have found that fluids taken from the living body in which the organisms have been growing, contain toxic substances, to which the name of *aggressins* has been applied. Fluid containing these aggressins greatly increases the toxic effect of the corresponding bacteria, and may produce death at an earlier stage than ever occurs with the bacteria alone. They also appear to have in certain cases a paralysing action on the cells which act as phagocytes. The work on this subject is highly suggestive, and opens up new possibilities with regard to the investigation of bacterial action within the body. Not only are the general symptoms of poisoning in bacterial disease due to toxic substances, but also the tissue changes, many of them of inflammatory nature, in the neighbourhood of the bacteria. Thus, to mention examples, diphtheria toxin produces inflammatory oedema which may be followed by necrosis; dead tubercle bacilli give rise to a tubercle-like nodule, &c. Furthermore, a bacillus may give rise to more than one toxic body, either as stages in one process of change or as distinct products. Thus paralysis following diphtheria is in all probability due to a different toxin from that which causes the acute symptoms of poisoning or possibly to a modification of it sometimes formed in specially large amount. It is interesting to note that in the case of the closely analogous example of snake venoms, there may be separated from a single venom a number of toxic bodies which have a selective action on different animal tissues.

[v.03 p.0174]

Nature of toxins.

Regarding the chemical nature of toxins less is known than regarding their physiological action. Though an enormous amount of work has been done on the subject, no important bacterial toxin has as yet been obtained in a pure condition, and, though many of them are probably of proteid nature, even this cannot be asserted with absolute certainty. Brieger, in his earlier work, found that alkaloids were formed by bacteria in a variety of conditions, and that some of them were poisonous. These alkaloids he called *ptomaines*. The methods used in the investigations were, however, open to objection, and it is now recognized that although organic bases may sometimes be formed, and may be toxic, the important toxins are not of that nature. A later research by Brieger along with Fraenkel pointed to the extracellular toxins of diphtheria, tetanus and other diseases being of proteid nature, and various other observers have arrived at a like conclusion. The general result of such research has been to show that the toxic bodies are, like proteids, precipitable by alcohol and various salts; they are soluble in water, are somewhat easily dialysable, and are relatively unstable both to light and heat. Attempts to get a pure toxin by repeated precipitation and solution have resulted in the production of a whitish amorphous powder with highly toxic properties. Such a powder gives a proteid reaction, and is no doubt largely composed of albumoses, hence the name *toxalbumoses* has been applied. The question has, however, been raised whether the toxin is really itself a proteid, or whether it is not merely carried down with the precipitate. Brieger and Boer, by precipitation with certain salts, notably of zinc, obtained a body which was toxic but gave no reaction of any form of proteid. There is of course the possibility in this case that the toxin was a proteid, but was in so small amount that it escaped detection. These facts show the great difficulty of the problem, which is probably insoluble by present methods of analysis; the only test, in fact, for the existence of a toxin is its physiological effect. It may also be mentioned that many toxins have now been obtained by growing the particular organism in a proteid-free medium, a fact which shows that if the toxin is a proteid it may be formed synthetically by the bacterium as well as by modification of proteid already present. With regard to the nature of intracellular toxins, there is even greater difficulty in the investigation and still less is known. Many of them, probably also of proteid nature, are much more resistant to heat; thus the intracellular toxins of the tubercle bacillus retain certain of their effects even after exposure to 100° C. Like the extracellular toxins they may be of remarkable potency; for example, fever is produced in the human subject by the injection into the blood of an extremely minute quantity of dead typhoid bacilli.

Enzymes.

We cannot as yet speak definitely with regard to the part played by enzymes in these toxic processes. Certain toxins resemble enzymes as regards their conditions of precipitation and relative instability, and the fact that in most cases a considerable period intervenes between the time of injection and the occurrence of symptoms has been adduced in support of the view that enzymes are present. In the case of diphtheria Sidney Martin obtained toxic albumoses in the spleen, which he considered were due to the digestive action of an enzyme formed by the bacillus in the membrane and absorbed into the circulation. According to this view, then, a part at least of the directly toxic substance is produced in the living body by enzymes present in the so-called toxin obtained from the bacterial culture. Recent researches go to show that enzymes play a greater part in fermentation

by living ferments than was formerly supposed, and by analogy it is likely that they are also concerned in the processes of disease. But this has not been proved, and hitherto no enzyme has been separated from a pathogenic bacterium capable of forming, by digestive or other action, the toxic bodies from proteids outside the body. It is also to be noted that, as in the case of poisons of known constitution, each toxin has a minimum lethal dose which is proportionate to the weight of the animal and which can be ascertained with a fair degree of accuracy.

The action of toxins is little understood. It consists in all probability of disturbance, by means of the chemical affinities of the toxin, of the highly complicated molecules of living cells. This disturbance results in disintegration to a varying degree, and may produce changes visible on microscopic examination. In other cases such changes cannot be detected, and the only evidence of their occurrence may be the associated symptoms. The very important work of Ehrlich on diphtheria toxin shows that in the molecule of toxin there are at least two chief atom groups—one, the "haptophorous," by which the toxin molecule is attached to the cell protoplasm; and the other the "toxophorous," which has a ferment-like action on the living molecule, producing a disturbance which results in the toxic symptoms. On this theory, susceptibility to a toxin will imply both a chemical affinity of certain tissues for the toxin molecule and also sensitiveness to its actions, and, furthermore, non-susceptibility may result from the absence of either of these two properties.

Bacterial infection.

A bacterial infection when analysed is seen to be of the nature of an intoxication. There is, however, another all-important factor concerned, viz. the multiplication of the living organisms in the tissues; this is essential to, and regulates, the supply of toxins. It is important that these two essential factors should be kept clearly in view, since the means of defence against any disease may depend upon the power either of neutralizing toxins or of killing the organisms producing them. It is to be noted that there is no fixed relation between toxin production and bacterial multiplication in the body, some of the organisms most active as toxin producers having comparatively little power of invading the tissues.

The production of disease.

We shall now consider how bacteria may behave when they have gained entrance to the body, what effects may be produced, and what circumstances may modify the disease in any particular case. The extreme instance of bacterial invasion is found in some of the septicaemias in the lower animals, *e.g.* anthrax septicaemia in guinea-pigs, pneumococcus septicaemia in rabbits. In such diseases the bacteria, when introduced into the subcutaneous tissue, rapidly gain entrance to the blood stream and multiply freely in it, and by means of their toxins cause symptoms of general poisoning. A widespread toxic action is indicated by the lesions found—cloudy swelling, which may be followed by fatty degeneration, in internal organs, capillary haemorrhages, &c. In septicaemia in the human subject, often due to streptococci, the process is similar, but the organisms are found especially in the capillaries of the internal organs and may not be detectable in the peripheral circulation during life. In another class of diseases, the organisms first produce some well-marked local lesion, from which secondary extension takes place by the lymph or blood stream to other parts of the body, where corresponding lesions are formed. In this way secondary abscesses, secondary tubercle glanders and nodules, &c., result; in typhoid fever there is secondary invasion of the mesenteric glands, and clumps of bacilli are also found in internal organs, especially the spleen, though there may be little tissue change around them. In all such cases there is seen a selective character in the distribution of the lesions, some organs being in any disease much more liable to infection than others. In still another class of diseases the bacteria are restricted to some particular part of the body, and the symptoms are due to toxins which are absorbed from it. Thus in cholera the bacteria are practically confined to the intestine, in diphtheria to the region of the false membrane, in tetanus to some wound. In the last-mentioned disease even the local multiplication depends upon the presence of other bacteria, as the tetanus bacillus has practically no power of multiplying in the healthy tissues when introduced alone.

[v.03 p.0175]

Tissue changes.

The effects produced by bacteria may be considered under the following heads: (1) tissue changes produced in the vicinity of the bacteria, either at the primary or secondary foci; (2) tissue changes produced at a distance by absorption of their toxins; (3) symptoms. The changes in the vicinity of bacteria are to be regarded partly as the *direct result* of the action of toxins on living cells, and partly as indicating a *reaction* on the part of the tissues. (Many such changes are usually grouped together under the heading of "inflammation" of varying degree—acute, subacute and chronic.) Degeneration and death of cells, haemorrhages, serous and fibrinous exudations, leucocyte emigration, proliferation of connective tissue and other cells, may be mentioned as some of the fundamental changes. Acute inflammation of various types, suppuration, granulation-tissue formation, &c., represent some of the complex resulting processes. The changes produced at a distance by distribution of toxins may be very manifold—cloudy swelling and fatty degeneration, serous effusions, capillary haemorrhages, various degenerations of muscle, hyaline degeneration of small blood-vessels, and, in certain chronic diseases, waxy degeneration, all of which may be widespread, are examples of the effects of toxins, rapid or slow in action. Again, in certain cases the toxin has a special affinity for certain tissues. Thus in diphtheria changes in both nerve cells and nerve fibres have been found, and in tetanus minute alterations in the nucleus and protoplasm of nerve cells.

Symptoms.

The lesions mentioned are in many instances necessarily accompanied by functional disturbances or clinical symptoms, varying according to site, and to the nature and degree of the affection. In addition, however, there occur in bacterial diseases symptoms to which the correlated structural changes have not yet been demonstrated. Amongst these the most important is fever with increased protein metabolism, attended with disturbances of the circulatory and respiratory Systems. Nervous symptoms, somnolence, coma, spasms, convulsions and paralysis are of common occurrence. All such phenomena, however, are likewise due to the disturbance of the molecular constitution of living cells. Alterations in metabolism are found to be associated with some of these, but with others no corresponding physical change can be demonstrated. The action of toxins on various glands, producing diminished or increased functional activity, has a close analogy to that of certain drugs. In short, if we place aside the outstanding exception of tumour growth, we may say that practically all the important phenomena met with in disease may be experimentally produced by the injection of bacteria or of their toxins.

Susceptibility.

The result of the entrance of a virulent bacterium into the tissues of an animal is not a disease with hard and fast characters, but varies greatly with circumstances. With regard to the subject of infection the chief factor is susceptibility; with regard to the bacterium virulence is all-important. Susceptibility, as is well recognized, varies much under natural conditions in different species, in different races of the same species, and amongst individuals of the same race. It also varies with the period of life, young subjects being more susceptible to certain diseases, *e.g.* diphtheria, than adults. Further, there is the very important factor of acquired susceptibility. It has been experimentally shown that conditions such as fatigue, starvation, exposure to cold, &c., lower the general resisting powers and increase the susceptibility to bacterial infection. So also the local powers of resistance may be lowered by injury or depressed vitality. In this way conditions formerly believed to be the causes of disease are now recognized as playing their part in predisposing to the action of the true causal agent, viz. the bacterium. In health the blood and internal tissues are bacterium-free; after death they offer a most suitable pabulum for various bacteria; but between these two extremes lie states of varying liability to infection. It is also probable that in a state of health organisms do gain entrance to the blood from time to time and are rapidly killed off. The circumstances which alter the virulence of bacteria will be referred to again in connexion with immunity, but it may be stated here that, as a general rule, the virulence of an organism towards an animal is increased by sojourn in the tissues of that animal. The increase of virulence becomes especially marked when the organism is inoculated from animal to animal in series, the method of *passage*. This is chiefly to be regarded as an adaptation to surroundings, though the fact that the less virulent members of the bacterial species will be liable to be killed off also plays a part. Conversely, the virulence tends to diminish on cultivation on artificial media outside the body, especially in circumstances little favourable to growth.

Immunity.

By immunity is meant non-susceptibility to a given disease, or to experimental inoculation with a given bacterium or toxin. The term must be used in a relative sense, and account must always be taken of the conditions present. An animal may be readily susceptible to a disease on experimental inoculation, and yet rarely or never suffer from it naturally, because the necessary conditions of infection

are not supplied in nature. That an animal possesses natural immunity can only be shown on exposing it to such conditions, this being usually most satisfactorily done in direct experiment. Further, there are various degrees of immunity, and in this connexion conditions of local or general diminished vitality play an important part in increasing the susceptibility. Animals naturally susceptible may acquire immunity, on the one hand by successfully passing through an attack of the disease, or, on the other hand, by various methods of inoculation. Two chief varieties of artificial immunity are now generally recognized, differing chiefly according to the mode of production. In the first—*active immunity*—a reaction or series of reactions is produced in the body of the animal, usually by injections of bacteria or their products. The second—*passive immunity*—is produced by the transference of a quantity of the serum of an animal actively immunized to a fresh animal; the term is applied because there is brought into play no active change in the tissues of the second animal. The methods of active immunity have been practically applied in *preventive inoculation* against disease; those of passive immunity have given us *serum therapeutics*. The chief facts with regard to each may now be stated.

1. *Active Immunity*.—The key to the artificial establishment of active immunity is given by the fact long established that recovery from an attack of certain infective diseases is accompanied by protection for varying periods of time against a subsequent attack. Hence follows the idea of producing a modified attack of the disease as a means of prevention—a principle which had been previously applied in inoculation against smallpox. Immunity, however, probably results from certain substances introduced into the system during the disease rather than from the disease itself; for by properly adjusted doses of the poison (in the widest sense), immunity may result without any symptoms of the disease occurring. Of the chief methods used in producing active immunity the first is by inoculation with bacteria whose virulence has been diminished, *i.e.* with an "attenuated virus." Many of the earlier methods of attenuation were devised in the case of the anthrax bacillus, an organism which is, however, somewhat exceptional as regards the relative stability of its virulence. Many such methods consist, to speak generally, in growing the organism outside the body under somewhat unsuitable conditions, *e.g.* at higher temperatures than the optimum, in the presence of weak antiseptics, &c. The virulence of many organisms, however, becomes diminished when they are grown on the ordinary artificial media, and the diminution is
[v.03 p.0176]
sometimes accelerated by passing a current of air over the surface of the growth. Sometimes also the virulence of a bacterium for a particular kind of animal becomes lessened on passing it through the body of one of another species. Cultures of varying degree of virulence may be obtained by such methods, and immunity can be gradually increased by inoculation with vaccines of increasing virulence. The immunity may be made to reach a very high degree by ultimately using cultures of intensified virulence, this "supervirulent" character being usually attained by the method of *passage* already explained. A second method is by injection of the bacterium in the dead condition, whereby immunity against the living organism may be produced. Here manifestly the dose may be easily controlled, and may be gradually increased in successive inoculations. This method has a wide application. A third method is by injections of the separated toxins of a bacterium, the resulting immunity being not only against the toxin, but, so far as present knowledge shows, also against the living organism. In the development of toxin-immunity the doses, small at first, are gradually increased in successive inoculations; or, as in the case of very active toxins, the initial injections are made with toxin modified by heat or by the addition of various chemical substances. Immunity of the same nature can be acquired in the same way against snake and scorpion poisons, and against certain vegetable toxins, *e.g.* ricin, abrin, &c.

In order that the immunity may reach a high degree, either the bacterium in a very virulent state or a large dose of toxin must ultimately be used in the injections. In such cases the immunity is, to speak generally, specific, *i.e.* applies only to the bacterium or toxin used in its production. A certain degree of non-specific immunity or increased tissue resistance may be produced locally, *e.g.* in the peritoneum, by injections of non-pathogenic organisms, peptone, nucleic acid and various other substances. In these cases the immunity is without specific character, and cannot be transferred to another animal. Lastly, in a few instances one organism has an antagonistic action to another; for example, the products of *B. pyocyaneus* have a certain protective action against *B. anthracis*. This method has, however, not yielded any important practical application.

2. *Passive Immunity: Anti-sera*.—The development of active immunity by the above methods is essentially the result of a reactive process on the part of the cells of the body, though as yet we know little of its real nature. It is, however, also accompanied by the appearance of certain bodies in the blood serum of the animal treated, to which the name of *anti-substances* is given, and these have been the subject of extensive study. It is by means of them that immunity (passive) can be transferred to a fresh animal. The development of anti-substances is, however, not peculiar to bacteria, but occurs also when alien cells of various kinds, proteins, ferments, &c., are injected. In fact, organic molecules can be divided into two classes according as they give rise to anti-substances or fail to do so. Amongst the latter, the vegetable poisons of known constitution, alkaloids, glucosides, &c., are to be placed. The molecules which lead to the production of anti-substances are usually known as antigens, and each antigen has a specific combining affinity for its corresponding anti-substance, fitting it as a lock does a key. The antigens, as already indicated, may occur in bacteria, cells, &c., or they may occur free in a fluid. Anti-substances may be arranged, as has been done by Ehrlich, into three main groups. In the first group, the anti-substance simply combines with the antigen, without, so far as we know, producing any change in it. The antitoxins are examples of this variety. In the second group, the anti-substance, in addition to combining with the antigen, produces some recognizable physical change in it; the precipitins and agglutinins may be mentioned as examples. In the third group, the anti-substance, after it has combined with the antigen, leads to the union of a third body called *complement* (*alexine* or *cytase* of French writers), which is present in normal serum. As a result of the union of the three substances, a dissolving or digestive action is often to be observed. This is the mode of action of the anti-substances in the case of a haemolytic or bacteriolytic serum. So far as bacterial immunity is concerned, the anti-serum exerts its action either on the toxin or on the bacterium itself; that is, its action is either antitoxic or anti-bacterial. The properties of these two kinds of serum may now be considered.

Antitoxic serum.

The term "antitoxic" signifies that serum has the power of neutralizing the action of the toxin, as is shown by mixing them together outside the body and then injecting them into an animal. The antitoxic serum when injected previously to the toxin also confers immunity (passive) against it; when injected after the toxin it has within certain limits a curative action, though in this case its dose requires to be large. The antitoxic property is developed in a susceptible animal by successive and gradually increasing doses of the toxin. In the earlier experiments on smaller animals the potency of the toxin was modified for the first injections, but in preparing antitoxin for therapeutical purposes the toxin is used in its unaltered condition, the horse being the animal usually employed. The injections are made subcutaneously and afterwards intravenously; and, while the dose must be gradually increased, care must be taken that this is not done too quickly, otherwise the antitoxic power of the serum may fall and the health of the animal suffer. The serum of the animal is tested from time to time against a known amount of toxin, *i.e.* is standardized. The unit of antitoxin in Ehrlich's new standard is the amount requisite to antagonize 100 times the minimum lethal dose of a particular toxin to a guinea-pig of 250 grm. weight, the indication that the toxin has been antagonized being that a fatal result does not follow within five days after the injection. In the case of diphtheria the antitoxic power of the serum may reach 800 units per cubic centimetre, or even more. The laws of antitoxin production and action are not confined to bacterial toxins, but apply also to other vegetable and animal toxins, resembling them in constitution, viz. the vegetable toxalbumoses and the snake-venom group referred to above.

Action of antitoxin.

The production of antitoxin is one of the most striking facts of biological science, and two important questions with regard to it must next be considered, viz. how does the antitoxin act? and how is it formed within the body? Theoretically there are two possible modes of action: antitoxin may act by means of the cells of the body, *i.e.* indirectly or physiologically; or it may act directly on the toxin, *i.e.* chemically or physically. The second view may now be said to be established, and, though the question cannot be fully discussed here, the chief grounds in support of a direct action may be given. (*a*) The action of antitoxin on toxin, as tested by neutralization effects, takes place more quickly in concentrated than in weak solutions, and more quickly at a warm (within certain limits) than at a cold temperature. (*b*) Antitoxin acts more powerfully when injected along with the toxin than when injected at the same time in another part of the body; if its action were on the tissue-cells one would expect that the site of injection would be immaterial. For example, the amount necessary to neutralize five times the lethal dose being determined, twenty times that amount will neutralize a hundred times the lethal dose. In the case of physiological

antagonism of drugs this relationship does not hold. (*c*) It has been shown by C. J. Martin and Cherry, and by A. A. Kanthack and Cobbett, that in certain instances the toxin can be made to pass through a gelatine membrane, whereas the antitoxin cannot, its molecules being of larger size. If, however, toxin be mixed with antitoxin for some time, it can no longer be passed through, presumably because it has become combined with the antitoxin.

Lastly it may be mentioned that when a toxin has some action which can be demonstrated in a test-tube experiment, for example, a dissolving action on red corpuscles, this action may be annulled by previously adding the antitoxin to toxin; in such a case the intervention of the living tissues is excluded. In view of the fact that antitoxin has a direct action on toxin, we may say that theoretically this may take place in one of two ways. It may produce a disintegration of the toxin molecule, or it may combine with it to produce a body whose combining affinities are satisfied. The latter view, first
[v.03 p.0177] advocated by Ehrlich, harmonizes with the facts established with regard to toxic action and the behaviour of antitoxins, and may now be regarded as established. His view as to the dual composition of the toxin molecule has already been mentioned, and it is evident that if the haptophorous or combining group has its affinity satisfied by union with antitoxin, the toxin will no longer combine with living cells, and will thus be rendered harmless. One other important fact in support of what has been stated is that a toxin may have its toxic action diminished, and may still require the same amount of antitoxin as previously for neutralization. This is readily intelligible on the supposition that the toxophorous group is more labile than the haptophorous. There is, however, still dispute with regard to the exact nature of the union of toxin and antitoxin. Ehrlich's view is that the two substances form a firm combination like a strong acid and a base. He found, however, that if he took the largest amount of toxin which was just neutralized by a given amount of antitoxin, much more than a single dose of toxin had to be added before a single dose was left free. For example, if 100 doses of toxin were neutralized by a unit of antitoxin (*v. supra*) it might be that 125 doses would need to be added to the same amount of antitoxin before the mixture produced a fatal result when it was injected. This result, which is usually known now as the "Ehrlich phenomenon," was explained by him on the supposition that the "toxin" does not represent molecules which are all the same, but contains molecules of different degrees of combining affinity and of toxic action. Accordingly, the most actively toxic molecules will be neutralized first, and those which are left over, that is, uncombined with antitoxin, will have a weaker toxic action. This view has been assailed by Thorvald Madsen and S. A. Arrhenius, who hold that the union of toxin and antitoxin is comparatively loose, and belongs to the class of reversible actions, being comparable in fact with the union of a weak acid and base. If such were the condition there would always be a certain amount both of free toxin and of free antitoxin in the mixture, and in this case also considerably more than a dose of toxin would have to be added to a "neutral mixture" before the amount of free toxin was increased by a dose, that is, before the mixture became lethal. It may be stated that while in certain instances the union of toxin and antitoxin may be reversible, all the facts established cannot be explained on this simple hypothesis of reversible action. Still another view, advocated by Bordet, is that the union of toxin and antitoxin is rather of physical than of strictly chemical nature, and represents an interaction of colloidal substances, a sort of molecular deposition by which the smaller toxin molecule becomes entangled in the larger molecule of antitoxin. Sufficient has been said to show that the subject is one of great intricacy, and no simple statement with regard to it is as yet possible. We are probably safe in saying, however, that the molecules of a toxin are not identical but vary in the degree of their combining affinities, and also in their toxic action, and that, while in some cases the combination of anti-substances has been shown to be reversible, we are far from being able to say that this is a general law.

Formation of antitoxin.

The origin of antitoxin is of course merely a part of the general question regarding the production of anti-substances in general, as these all combine in the same way with their homologous substances and have the same character of specificity. As, however, most of the work has been done with regard to antitoxin production we may consider here the theoretical aspect of the subject. There are three chief possibilities: (*a*) that the antitoxin is a modification of the toxin; (*b*) that it is a substance normally present, but produced in excess under stimulation of the toxin; (*c*) that it is an entirely new product. The first of these, which would imply a process of a very remarkable nature, is disproved by what is observed after bleeding an animal whose blood contains antitoxin. In such a case it has been shown that, without the introduction of fresh toxin, new antitoxin appears, and therefore must be produced by the living tissues. The second theory is the more probable *a priori*, and if established removes the necessity for the third. It is strongly supported by Ehrlich, who, in his so-called "side-chain" (*Seitenkette*) theory, explains antitoxin production as an instance of regeneration after loss. Living protoplasm, or in other words a biogen molecule, is regarded as consisting of a central atom group (*Leistungskern*), related to which are numerous secondary atom groups or side-chains, with unsatisfied chemical affinities. The side-chains

"Side-chain" theory.

constitute the means by which other molecules are added to the living molecule, *e.g.* in the process of nutrition. It is by means of such side-chains that toxin molecules are attached to the protoplasm, so that the living molecules are brought under the action of the toxophorous groups of the toxins. In antitoxin production this combination takes place, though not in sufficient amount to produce serious toxic symptoms. It is further supposed that the combination being of somewhat firm character, the side-chains thus combined are lost for the purposes of the cell and are therefore thrown off. By the introduction of fresh toxin the process is repeated and the regeneration of side-chains is increased. Ultimately the regeneration becomes an over-regeneration and free side-chains produced in excess are set free and appear in the blood as antitoxin molecules. In other words the substances, which when forming part of the cells fix the toxin to the cells, constitute antitoxin molecules when free in the serum. This theory, though not yet established, certainly affords the most satisfactory explanation at present available. In support of it there is the remarkable fact, discovered by A. Wassermann and Takaki in the case of tetanus, that there do exist in the nervous system molecules with combining affinity for the tetanus toxin. If, for example, the brain and spinal cord removed from an animal be bruised and brought into contact with tetanus toxin, a certain amount of the toxicity disappears, as shown by injecting the mixture into another animal. Further, these molecules in the nervous system present the same susceptibility to heat and other physical agencies as does tetanus antitoxin. There is therefore strong evidence that antitoxin molecules do exist as part of the living substance of nerve cells. It has, moreover, been found that the serum of various animals has a certain amount of antitoxic action, and thus the basis for antitoxin production, according to Ehrlich's theory, is afforded. The theory also supplies the explanation of the power which an animal possesses of producing various antitoxins, since this depends ultimately upon susceptibility to toxic action. The explanation is thus carried back to the complicated constitution of biogen molecules in various living cells of the body. It may be added that in the case of all the other kinds of anti-substances, which are produced by a corresponding reaction, we have examples of the existence of traces of them in the blood serum under normal conditions. We are, accordingly, justified in definitely concluding that their appearance in large amount in the blood, as the result of active immunization, represents an increased production of molecules which are already present in the body, either in a free condition in its fluids or as constituent elements of its cells.

Anti-bacterial serum.

In preparing anti-bacterial sera the lines of procedure correspond to those followed in the case of antitoxins, but the bacteria themselves in the living or dead condition or their maceration products are always used in the injections. Sometimes dead bacteria, living virulent bacteria, and living supervirulent bacteria, are used in succession, the object being to arrive ultimately at a high dosage, though the details vary in different instances. The serum of an animal thus actively immunized has powerful protective properties towards another animal, the amount necessary for protection being sometimes almost inconceivably small. As a rule it has no action on the corresponding toxin, *i.e.* is not antitoxic. In addition to the protective action, such a serum may possess activities which can be demonstrated outside the body. Of these the most important are (*a*) bacteriolytic or lysogenic action, (*b*) agglutinative action, and (*c*) opsonic action.

(a) Lysogenic action.

[v.03 p.0178] The first of these, lysogenic or bacteriolytic action, consists in the production of a change in the corresponding bacterium whereby it becomes granular, swells up and ultimately may undergo dissolution. Pfeiffer was the first to show that this occurred when the bacterium was injected into the peritoneal cavity of the animal immunized against it, and also when a little of the serum of such an animal was injected with the bacterium into the peritoneum of a fresh, *i.e.* non-immunized animal. Metchnikoff and Bordet subsequently devised means by which a similar change could be produced *in vitro*, and analysed the conditions necessary

for its occurrence. It has been completely established that in this phenomenon of lysogenesis there are two substances concerned, one specially developed or developed in excess, and the other present in normal serum. The former (*Immunkörper* of Ehrlich, *substance sensibilisatrice* of Bordet) is the more stable, resisting a temperature of 60° C., and though giving the specific character to the reaction cannot act alone. The latter is ferment-like and much more labile than the former, being readily destroyed at 60° C. It may be added that the protective power is not lost by exposure to the temperature mentioned, this apparently depending upon a specific anti-substance. Furthermore, lysogenic action is not confined to the case of bacteria but obtains also with other organized structures, *e.g.* red corpuscles (Bordet, Ehrlich and Morgenroth), leucocytes and spermatozoa (Metchnikoff). That is to say, if an animal be treated with injections of these bodies, its serum acquires the power of dissolving or of producing some disintegrative effect in them. The development of the immune body with specific combining affinity thus presents an analogy to antitoxin production, the difference being that in lysogenesis another substance is necessary to complete the process. It can be shown that in many cases when bacteria are injected the serum of the treated animal has no bacteriolytic effect, and still an immune body is present, which leads to the fixation of complement; in this case bacteriolysis does not occur, because the organism is not susceptible to the action of the complement. In all cases the important action is the binding of complement to the bacterium by means of the corresponding immune body; whether or not death of the bacterium occurs, will depend upon its susceptibility to the action of the particular complement, the latter acting like a toxin or digestive ferment. It is to be noted that in the process of immunization complement does not increase in amount; accordingly the immune serum comes to contain immune body much in excess of the amount of complement necessary to complete its action. An important point with regard to the therapeutic application of an anti-bacterial serum, is that when the serum is kept *in vitro* the complement rapidly disappears, and accordingly the complement necessary for the production of the bactericidal action must be supplied by the blood of the patient treated. This latter complement may not suit the immune body, that is, may not be fixed to the bacterium by means of it, or if the latter event does occur, may fail to bring about the death of the bacteria. These circumstances serve, in part at least, to explain the fact that the success attending the use of anti-bacterial sera has been much inferior to that in the case of antitoxic sera.

(b) Agglutination.

Another property which may be possessed by an anti-bacterial serum is that of agglutination. By this is meant the aggregation into clumps of the bacteria uniformly distributed in an indifferent fluid; if the bacterium is motile its movement is arrested during the process. The process is of course observed by means of the microscope, but the clumps soon settle in the fluid and ultimately form a sediment, leaving the upper part clear. This change, visible to the naked eye, is called *sedimentation*. B. J. A. Charrin and G. E. H. Roger first showed in the case of *B. pyocyaneus* that when a small quantity of the homologous serum (*i.e.* the serum of an animal immunized against the bacterium) was added to a fluid culture of this bacillus, growth formed a sediment instead of a uniform turbidity. Gruber and Durham showed that sedimentation occurred when a small quantity of the homologous serum was added to an emulsion of the bacterium in a small test-tube, and found that this obtained in all cases where Pfeiffer's lysogenic action could be demonstrated. Shortly afterwards Widal and also Grünbaum showed that the serum of patients suffering from typhoid fever, even at an early stage of the disease, agglutinated the typhoid bacillus—a fact which laid the foundation of serum diagnosis. A similar phenomenon has been demonstrated in the case of Malta fever, cholera, plague, infection with *B. coli*, "meat-poisoning" due to Gärtner's bacillus, and various other infections. As regards the mode of action of agglutinins, Gruber and Durham considered that it consists in a change in the envelopes of the bacteria, by which they swell up and become adhesive. The view has various facts in its support, but F. Kruse and C. Nicolle have found that if a bacterial culture be filtered germ-free, an agglutinating serum still produces some change in it, so that particles suspended in it become gathered into clumps. E. Duclaux, for this reason, considers that agglutinins are coagulative ferments.

The phenomenon of agglutination depends essentially on the union of molecules in the bacteria—the agglutinogens—with the corresponding agglutinins, but another essential is the presence of a certain amount of salts in the fluid, as it can be shown that when agglutinated masses of bacteria are washed salt-free the clumps become resolved. The fact that agglutinins appear in the body at an early stage in a disease has been taken by some observers as indicating that they have nothing to do with immunity, their development being spoken of as a reaction of infection. This conclusion is not justified, as we must suppose that the process of immunization begins to be developed at an early period in the disease, that it gradually increases, and ultimately results in cure. It should also be stated that agglutinins are used up in the process of agglutination, apparently combining with some element of the bacterial structure. In view of all the facts it must be admitted that the agglutinins and immune bodies are the result of corresponding reactive processes, and are probably related to one another. The development of all antagonistic substances which confer the special character on antimicrobic sera, as well as antitoxins, may be expressed as the formation of bodies with specific combining affinity for the organic substance introduced into the system—toxin, bacterium, red corpuscle, &c., as the case may be. The bacterium, being a complex organic substance, may thus give rise to more than one antagonistic or combining substance.

(c) Opsonic action.

By opsonic action is meant the effect which a serum has on bacteria in making them more susceptible to phagocytosis by the white corpuscles of the blood (*q.v.*). Such an effect may be demonstrated outside the body by making a suitable mixture of (*a*) a suspension of the particular bacterium, (*b*) the serum to be tested, and (*c*) leucocytes of a normal animal or person. The mixture is placed in a thin capillary tube and incubated at 37° C. for half an hour; a film preparation is then made from it on a glass slide, stained by a suitable method and then examined microscopically. The number of bacteria contained within a number of, say fifty, leucocytes can be counted and the average taken. In estimating the opsonic power of the serum in cases of disease a control with normal serum is made at the same time and under precisely the same conditions. The average number of bacteria contained within leucocytes in the case tested, divided by the number given by the normal serum, is called the *phagocytic index*. Wright and Douglas showed that under these conditions phagocytosis might occur when a small quantity of normal serum was present, whereas it was absent when normal salt solution was substituted for the serum; the latter thus contained substances which made the organisms susceptible to the action of the phagocytosis. They further showed that this substance acted by combining with the organisms and apparently producing some alteration in them; on the other hand it had no direct action on the leucocytes. This opsonin of normal serum is very labile, being rapidly destroyed at 55° C.; that is, a serum heated at this temperature has practically no greater effect in aiding phagocytosis than normal salt solution has. Various observers had previously found that the serum of an animal immunized against a particular bacterium had a special action in bringing about phagocytosis of that organism, and it had been found that this property was retained when the serum was heated at 55° C. It is now generally admitted that at least two distinct classes of substances are concerned in opsonic action, that thermostable immune opsonins are developed as a result of active immunization and these possess the specific properties of anti-substances in general, that is, act only on the corresponding bacterium. On the contrary the labile opsonins of normal serum have a comparatively general action on different organisms. It is quite evident that the specific immune-opsonins may play a very important part in the phenomena of immunity, as by their means the organisms are taken up more actively by the phagocytic cells, and thereafter may undergo rapid disintegration.

[v.03 p.0179]

The opsonic action of the serum has been employed by Sir A. Wright and his co-workers to control the treatment of bacterial infections by vaccines; that is, by injections of varying amounts of a dead culture of the corresponding bacterium. The object in such treatment is to raise the opsonic index of the serum, this being taken as an indication of increased immunity. The effect of the injection of a small quantity of vaccine is usually to produce an increase in the opsonic index within a few days. If then an additional quantity of vaccine be injected there occurs a fall in the opsonic index (negative phase) which, however, is followed later by a rise to a higher level than before. If the amounts of vaccine used and the times of the injection are suitably chosen, there may thus be produced by a series of steps a rise of the opsonic index to a high level. One of the chief objects in registering the opsonic power in such cases is to avoid the introduction of additional vaccine when the opsonic index is low, that is, during the negative phase, as if this were done a further diminution of the opsonic action might result. The principle in such treatment by means of vaccines is to stimulate the general production of anti-substances throughout the body, so that these may be carried to the sites of bacterial growth, and aid the destruction of the organisms by means of the cells of the tissues. A large number of favourable results

obtained by such treatment controlled by the observation of the opsonic index have already been published, but it would be unwise at present to offer a decided opinion as to the ultimate value of the method.

Active immunity has thus been shown to be associated with the presence of certain anti-substances in the serum. After these substances have disappeared, however, as they always do in the course of time, the animal still possesses immunity for a varying period. This apparently depends upon some alteration in the cells of the body, but its exact nature is not known.

Phagocytosis.

The destruction of bacteria by direct cellular agency both in natural and acquired immunity must not be overlooked. The behaviour of certain cells, especially leucocytes, in infective conditions led Metchnikoff to place great importance on phagocytosis. In this process there are two factors concerned, viz. the ingestion of bacteria by the cells, and the subsequent intracellular digestion. If either of these is wanting or interfered with, phagocytosis will necessarily fail as a means of defence. As regards the former, leucocytes are guided chiefly by chemiotaxis, *i.e.* by sensitiveness to chemical substances in their surroundings—a property which is not peculiar to them but is possessed by various unicellular organisms, including motile bacteria. When the cell moves from a less to a greater degree of concentration, *i.e.* towards the focus of production, the chemiotaxis is termed positive; when the converse obtains, negative. This apparently purposive movement has been pointed out by M. Verworn to depend upon stimulation to contraction or the reverse. Metchnikoff showed that in animals immune to a given organism phagocytosis is present, whereas in susceptible animals it is deficient or absent. He also showed that the development of artificial immunity is attended by the appearance of phagocytosis; also, when an anti-serum is injected into an animal, the phagocytes which formerly were indifferent might move towards and destroy the bacteria. In the light of all the facts, however, especially those with regard to anti-bacterial sera, the presence of phagocytosis cannot be regarded as the essence of immunity, but rather the evidence of its existence. The increased ingestion of bacteria in active immunity would seem to depend upon the presence of immune opsonins in the serum. These, as already explained, are true anti-substances. Thus the apparent increased activity of the leucocytes is due to a preliminary effect of the opsonins on the bacteria. We have no distinct proof that there occurs in active immunity any education of the phagocytes, in Metchnikoff's sense, that is, any increase of the inherent ingestive or digestive activity of these cells. There is some evidence that in certain cases anti-substances may act upon the leucocytes, and to these the name of "stimulins" has been given. We cannot, however, say that these play an important part in immunity, and even if it were so, the essential factor would be the development of the substances which act in this way. While in immunity there probably occurs no marked change in the leucocytes themselves, it must be admitted that the increased destruction of bacteria by these cells is of the highest importance. This, as already pointed out, depends upon the increase of opsonins, though it is also to be noted that in many infective conditions there is another factor present, namely a leucocytosis, that is, an increase of the leucocytes in the blood, and the defensive powers of the body are thereby increased. Evidence has been brought forward within recent years that the leucocytes may constitute an important source of the antagonistic substances which appear in the serum. Much of such evidence possesses considerable weight, and seeing that these cells possess active digestive powers it is by no means improbable that substances with corresponding properties may be set free by them. To ascribe such powers to them exclusively is, however, not justifiable. Probably the lining endothelium of the blood-vessels as well as other tissues of the body participate in the production of anti-substances.

Natural immunity.

The subject of artificial immunity has occupied a large proportion of bacteriological literature within recent years, and our endeavour has been mainly to indicate the general laws which are in process of evolution. When the facts of natural immunity are examined, we find that no single explanation is possible. Natural immunity against toxins must be taken into account, and, if Ehrlich's view with regard to toxic action be correct, this may depend upon either the absence of chemical affinity of the living molecules of the tissues for the toxic molecule, or upon insensitiveness to the action of the toxophorous group. It has been shown with regard to the former, for example, that the nervous system of the fowl, which possesses immunity against tetanus toxin, has little combining affinity for it. The non-sensitiveness of a cell to a toxic body when brought into immediate relationship cannot, however, be explained further than by saying that the disintegrative changes which underlie symptoms of poisoning are not brought about. Then as regards natural powers of destroying bacteria, phagocytosis aided by chemiotaxis plays a part, and it can be understood that an animal whose phagocytes are attracted by a particular bacterium will have an advantage over one in which this action is absent. Variations in chemiotaxis towards different organisms probably depend in natural conditions, as well as in active immunity, upon the opsonic content of the serum. Whether bacteria will be destroyed or not after they have been ingested by the leucocytes will depend upon the digestive powers of the latter, and these probably vary in different species of animals. The blood serum has a direct bactericidal action on certain bacteria, as tested outside the body, and this also varies in different animals. Observations made on this property with respect to the anthrax bacillus at first gave the hope that it might explain variations in natural immunity. Thus the serum of the white rat, which is immune to anthrax, kills the bacillus; whereas the serum of the guinea-pig, which is susceptible, has no such effect. Further observations, however, showed that this does not hold as a general law. The serum of the susceptible rabbit, for example, is bactericidal to this organism, whilst the serum of the immune dog is not. In the case of the latter animal the serum contains an opsonin which leads to phagocytosis of the bacillus, and the latter is then destroyed by the leucocytes. It is quite evident that bactericidal action as tested *in vitro* outside the body does not correspond to the degree of immunity possessed by the animal under natural conditions. We may say, however, that there are several factors concerned in natural immunity, of which the most important may be said to be the three following, viz. variations in the bactericidal action of the serum *in vivo*, variations in the chemiotactic or opsonic properties of the serum *in vivo*, and variations in the digestive properties of the leucocytes of the particular animal. It is thus evident that the explanation of natural immunity in any given instance may be a matter of difficulty and much complexity.

[v.03 p.0180]

Authorities.—Bacteriological literature has become so extensive that it is impossible to give here references to original articles, even the more important. A number of these, giving an account of classical researches, were translated from French and German, and published by the New Sydenham Society under the title *Microparasites in Disease: Selected Essays*, in 1886. The following list contains some of the more important books published within recent years. Abbott, *Principles of Bacteriology* (7th ed., London, 1905); Crookshank, *Bacteriology and Infective Diseases* (with bibliography, 4th ed., London, 1896); Duclaux, *Traité de microbiologie* (Paris, 1899-1900); Eyre, *Bacteriological Technique* (Philadelphia and London, 1902); Flügge, *Die Mikroorganismen* (3rd ed., Leipzig, 1896); Fischer, *Vorlesungen über Bakterien* (2nd ed., Jena, 1902); Günther, *Einführung in das Studium der Bakteriologie* (6th ed., Leipzig, 1906); Hewlett, *Manual of Bacteriology* (2nd ed., London, 1902); Hueppe, *Principles of Bacteriology* (translation, London, 1899); Klein, *Micro-organisms and Disease* (3rd ed., London, 1896); Kolle and Wassermann, *Handbuch der pathogenen Mikroorganismen* (Jena, 1904) (supplements are still being published; this is the most important work on the subject); Löffler, *Vorlesungen über die geschichtliche Entwickelung der Lehre von der Bacterien* (Leipzig, 1887); McFarland, *Text-book upon the Pathogenic Bacteria* (5th ed., London, 1906); Muir and Ritchie, *Manual of Bacteriology* (with bibliography, 4th ed., Edin. and Lond., 1908); Park, *Pathogenic Micro-organisms* (London, 1906); Sternberg, *Manual of Bacteriology* (with full bibliography, 2nd ed., New York, 1896); Woodhead, *Bacteria and their products* (with bibliography, London, 1891). The bacteriology of the infective diseases (with bibliography) is fully given in the *System of Medicine*, edited by Clifford Allbutt, (2nd ed., London, 1907). For references consult *Centralbl. für Bakter. u. Parasitenk.* (Jena); also *Index Medicus*. The most important works on immunity are: Ehrlich, *Studies in Immunity* (English translation, New York, 1906), and Metchnikoff, *Immunity in Infective Diseases* (English translation, Cambridge, 1905).

(R. M.*)

[1] Gr. βακτήριον, Lat. *bacillus*, little rod or stick.

[2] *Cladothrix dichotoma*, for example, which is ordinarily a branched, filamentous, sheathed form, at certain seasons breaks up into a number of separate cells which develop a tuft of cilia and escape from the sheath. Such a behaviour is very similar to the production of zoospores which is so common in many filamentous algae.

[3] Brefeld has observed that a bacterium may divide once every half-hour, and its progeny repeat the process in the same time. One bacterium might thus produce in twenty-four hours a number of segments amounting to many millions of millions.

[4] The difficulties presented by such minute and simple organisms as the Schizomycetes are due partly to the few "characters" which they possess and partly to the dangers of error in manipulating them; it is anything but an easy matter either to trace the whole development of a single form or to recognize with certainty any one stage in the development unless the others are known. This being the case, and having regard to the minuteness and ubiquity of these organisms, we should be very careful in accepting evidence as to the continuity or otherwise of any two forms which falls short of direct and uninterrupted observation. The outcome of all these considerations is that, while recognizing that the "genera" and "species" as defined by Cohn must be recast, we are not warranted in uniting any forms the continuity of which has not been directly observed; or, at any rate, the strictest rules should be followed in accepting the evidence adduced to render the union of any forms probable.

BACTRIA (*Bactriana*), the ancient name of the country between the range of the Hindu Kush (Paropamisus) and the Oxus (Amu Darya), with the capital Bactra (now Balkh); in the Persian inscriptions Bākhtri. It is a mountainous country with a moderate climate. Water is abundant and the land is very fertile. Bactria was the home of one of the Iranian tribes (see Persia: *Ancient History*). Modern authors have often used the name in a wider sense, as the designation of the whole eastern part of Iran. As there can be scarcely any doubt that it was in these regions, where the fertile soil of the mountainous country is everywhere surrounded and limited by the Turanian desert, that the prophet Zoroaster preached and gained his first adherents, and that his religion spread from here over the western parts of Iran, the sacred language in which the Avesta, the holy book of Zoroastrianism, is written, has often been called "old Bactrian." But there is no reason for this extensive use of the name, and the term "old Bactrian" is, therefore, at present completely abandoned by scholars. Still less foundation exists for the belief, once widely spread, that Bactria was the cradle of the Indo-European race; it was based on the supposition that the nations of Europe had immigrated from Asia, and that the Aryan languages (Indian and Iranian) stood nearest to the original language of the Indo-Europeans. It is now acknowledged by all linguists that this supposition is quite wrong, and that the Aryans probably came from Europe. The eastern part of Iran seems to have been the region where the Aryans lived as long as they formed one people, and whence they separated into Indians and Iranians.

The Iranian tradition, preserved in the Avesta and in Firdousi's *Shahnama*, localizes a part of its heroes and myths in the east of Iran, and has transformed the old gods who fight with the great snake into kings of Iran who fight with the Turanians. Many modern authors have attempted to make history out of these stories, and have created an old Bactrian empire of great extent, the kings of which had won great victories over the Turanians. But this historical aspect of the myth is of late origin: it is nothing but a reflex of the great Iranian empire founded by the Achaemenids and restored by the Sassanids. The only historical fact which we can learn from the Iranian tradition is that the contrast and the feud between the peasants of Iran and the nomads of Turan was as great in old times as it is now: it is indeed based upon the natural geographical conditions, and is therefore eternal. But a great Bactrian empire certainly never existed; the Bactrians and their neighbours were in old times ruled by petty local kings, one of whom was Vishtaspa, the protector of Zoroaster. Ctesias in his history of the Assyrian empire (Diodor. Sic. ii. 6 ff.) narrates a war waged by Ninus and Semiram, against the king of Bactria (whom some later authors, *e.g.* Justin i. 1, call Zoroaster). But the whole Assyrian history of Ctesias is nothing but a fantastic fiction; from the Assyrian inscriptions we know that the Assyrians never entered the eastern parts of Iran.

Whether Bactria formed part of the Median empire, we do not know; but it was subjugated by Cyrus and from then formed one of the satrapies of the Persian empire. When Alexander had defeated Darius III., his murderer Bessus, the satrap of Bactria, tried to organize a national resistance in the east. But Bactria was conquered by Alexander without much difficulty; it was only farther in the north, beyond the Oxus, in Sogdiana, that he met with strong resistance. Bactria became a province of the Macedonian empire, and soon came under the rule of Seleucus, king of Asia (see Seleucid Dynasty and Hellenism). The Macedonians (and especially Seleucus I. and his son Antiochus I.) founded a great many Greek towns in eastern Iran, and the Greek language became for some time dominant there. The many difficulties against which the Seleucid kings had to fight and the attacks of Ptolemy II., gave to Diodotus, satrap of Bactria, the opportunity of making himself independent (about 255 B.C.) and of conquering Sogdiana. He was the founder of the Graeco-Bactrian kingdom. Diodotus and his successors were able to maintain themselves against the attacks of the Seleucids; and when Antiochus III., "the Great," had been defeated by the Romans (190 B.C.), the Bactrian king Euthydemus and his son Demetrius crossed the Hindu Kush and began the conquest of eastern Iran and the Indus valley. For a short time they wielded great power; a great Greek empire seemed to have arisen far in the East. But this empire was torn by internal dissensions and continual usurpations. When Demetrius advanced far into India one of his generals, Eucratides, made himself king of Bactria, and soon in every province there arose new usurpers, who proclaimed themselves kings and fought one against the other. Most of them we know only by their coins, a great many of which are found in Afghanistan and India. By these wars the dominant position of the Greeks was undermined even more quickly than would otherwise have been the case. After Demetrius and Eucratides, the kings abandoned the Attic standard of coinage and introduced a native standard; at the same time the native language came into use by the side of the Greek. On the coins struck in India, the well-known Indian alphabet (called Brahmi by the Indians, the older form of the Devanagari) is used; on the coins struck in Afghanistan and in the Punjab the Kharoshṭhi alphabet, which is derived directly from the Aramaic and was in common use in the western parts of India, as is shown by one of the inscriptions of Asoka and by the recent discovery of many fragments of Indian manuscripts, written in Kharoshṭhi, in eastern Turkestan (formerly this alphabet has been called Arianic or Bactrian Pali; the true name is derived from Indian sources).

The weakness of the Graeco-Bactrian kingdoms was shown by their sudden and complete overthrow. In the west the Arsacid empire had risen, and Mithradates I. and Phraates II. began to conquer some of their western districts, especially
[v.03 p.0181] Areia (Herat). But in the north a new race appeared, Mongolian tribes, called Scythians by the Greeks, amongst which the Tochari, identical with the Yue-chi (*q.v.*) of the Chinese, were the most important. In 159 B.C., according to Chinese sources, they entered Sogdiana, in 139 they conquered Bactria, and during the next generation they had made an end to the Greek rule in eastern Iran. Only in India the Greek conquerors (Menander, Apollodotus) maintained themselves some time longer. But in the middle of the 1st century B.C. the whole of eastern Iran and western India belonged to the great "Indo-Scythian" empire. The ruling dynasty had the name Kushan (Kushana), by which they are called on their coins and in the Persian sources. The most famous of these kings is Kanishka (ca. 123-153), the great protector of Buddhism. The principal seat of the Tochari and the Kushan dynasty seems to have been Bactria; but they always maintained the eastern parts of modern Afghanistan and Baluchistan, while the western regions (Areia, *i.e.* Herat, Seistan and part of the Helmund valley) were conquered by the Arsacids. In the 3rd century the Kushan dynasty began to decay; about A.D. 320 the Gupta empire was founded in India. Thus the Kushanas were reduced to eastern Iran, where they had to fight against the Sassanids. In the 5th century a new people came from the east, the Ephthalites (*q.v.*) or "white Huns," who subjected Bactria (about 450); and they were followed by the Turks, who first appear in history about A.D. 560 and subjugated the country north of the Oxus. Most of the small principalities of the Tochari or Kushan became subject to them. But when the Sassanian empire was overthrown by the Arabs, the conquerors immediately advanced eastwards, and in a few years Bactria and the whole Iran to the banks of the Jaxartes had submitted to the rule of the caliph and of Islam.

Bibliography.—For the earlier times see Persia. For the Graeco-Bactrian and Indo-Scythian kingdoms see (beside articles on the separate kings):—H. H. Wilson, *Ariana Antiqua* (1841); Cunningham, "The Greeks of Bactriana, Ariana and India" in *Numismatic Chronicle*, N. Ser. viii.-xii.; A. von Sallet, *Die Nachfolger Alexanders des Grossen in Baktrien und Indien* (1879); P. Gardner, *The Coins of the Greek and Scythic Kings of India* (1886, Catalogue of Greek Coins in the British Museum, x.); A. von Gutschmid, *Geschichte Irans und seiner Nachbarländer von Alexander dem Grossen bis zum Untergang der Arsaciden* (1888); A. Stein, "Zoroastrian Deities on Indo-Scythian Coins," *Babylonian and Oriental Record*, i. 1887 (cf. Cunningham, *ib.* ii. 1888); Vincent A. Smith, "The Kushān or Indo-Scythian Period of Indian History," *Journal of the R. Asiatic Soc.*, 1903 (cf. his *Early History of India*, 2nd ed. 1908); W. W. Tarn, "Notes on Hellenism in Bactria and

India" in *Journ. of Hellenic Studies*, xxii. 1902. For the history and character of the Indian alphabet cf. J. Buhler, "Indische Paläographie" (in *Grundriss der indo-arischen Philologie*, Bd. i.). From the Greek authors only a few notices have been preserved, especially by Justin (and in the prologues of Trogus) and Strabo; for the later times we get some information from the Byzantine authors and from Persian and Armenian sources; cf. Th. Nöldeke's translation of Tabari (*Geschichte der Perser und Araber zur Zeit der Sasaniden*, 1890) and J. Marquart, "Eränšahr" (*Abhandlungen der königlichen Ges. d. Wissenschaften zu Göttingen*, 1901). The Chinese sources are given by Deguignes, "Recherches sur quelques événements qui concernent l'histoire des rois grecs de la Bactriane," *Mém. de l'acad. des inscriptions*, xxv.; E. Specht, "Études sur l'Asie centrale d'après les historiens chinois" in *Journal asiatique*, 8 série, ii. 1883, 9 série, x. 1857; Sylvain Lévi, "Notes sur les Indo-scythiens," *Journal asiatique*, 9 série ix., x. and others.

(Ed. M.)

BACUP, a market town and municipal borough in the Rossendale parliamentary division of Lancashire, England, on the river Irwell, 203 m. N.N.W. from London, and 22 N. by E. from Manchester, on the Lancashire & Yorkshire railway. Pop. (1901) 22,505. It is finely situated in a narrow valley, surrounded by wild, high-lying moorland. It is wholly of modern growth, and contains several handsome churches and other buildings, while among institutions the chief is the mechanics' institute and library. The recreation grounds presented in 1893 by Mr. J. H. Maden, M.P., are beautifully laid out. Cotton spinning and power-loom weaving are the chief of numerous manufacturing industries, and there are large collieries in the vicinity. The principle of co-operation is strongly developed, and a large and handsome store contains among other departments a free library for members. The borough was incorporated in 1882, and the corporation consists of a mayor, 6 aldermen and 17 councillors. Area, 6120 acres. In 1841 the population of the chapelry was only 1526. One of the hills in the vicinity is fortified with a great ancient earthwork and ditch.

BADAGAS (literally "a Telugu man"), a tribe inhabiting the Nilgiri Hills, in India, by some authorities declared not to be an aboriginal or jungle race. They are probably Dravidian by descent, though they are in religion Hindus of the Saiva sect. They are supposed to have migrated to the Nilgiris from Mysore about A.D. 1600, after the breaking up of the kingdom of Vijayanagar. They are an agricultural people and far the most numerous and wealthy of the hill tribes. They pay a tribute in grain, &c., to the Todas. Their language is a corrupt form of Kanarese. At the census of 1901 they numbered 34,178.

See J. W. Breeks, *An Account of the Primitive Tribes of the Nilgiris* (1873); *Nilgiri Manual*, vol. i. pp. 218-228; *Madras Journ. of Sci. and Lit.* vol. viii. pp. 103-105; *Madras Museum Bulletin*, vol. ii., no. 1, pp. 1-7.

BADAJOZ (formerly sometimes written Badajos), a frontier province of western Spain, formed in 1833 of districts taken from the province of Estremadura (*q.v.*), and bounded on the N. by Cáceres, E. by Cordova and Ciudad Real, S. by Seville and Huelva, and W. by Portugal. Pop. (1900) 520,246; area, 8451 sq. m. Badajoz is thus the largest province of the whole kingdom. Although in many districts there are low ranges of hills, the surface is more often a desolate and monotonous plain, flat or slightly undulating. Its one large river is the Guadiana, which traverses the north of the province from east to west, fed by many tributaries; but it is only at certain seasons that the river-beds fill with any considerable volume of water, and the Guadiana may frequently be forded without difficulty. The climate shows great extremes of heat in summer and of cold in winter, when fierce north and north-west winds blow across the plains. In the hot months intermittent fevers are prevalent in the Guadiana valley. The rainfall is scanty in average years, and only an insignificant proportion of the land is irrigated, while the rest is devoted to pasture, or covered with thin bush and forest. Agriculture, and the cultivation of fruit, including the vine and olive, are thus in a very backward condition; but Badajoz possesses more livestock than any other Spanish province. Its acorn-fed swine are celebrated throughout Spain for their hams and bacon, and large herds of sheep and goats thrive where the pasture is too meagre for cattle. The exploitation of the mineral resources of Badajoz is greatly hindered by lack of water and means of communication; in 1903, out of nearly 600 mines registered only 26 were at work. Their output consisted of lead, with very small quantities of copper. The local industries are not of much importance: they comprise manufactures of woollen and cotton stuffs of a coarse description, soaps, oils, cork and leather. The purely commercial interests are more important than the industrial, because of the transit trade to and from Portugal through no less than seven custom-houses. Many parts of the province are inaccessible except by road, and the roads are ill-made, ill-kept and wholly insufficient. The main line of the Madrid-Lisbon railway passes through Villanueva de la Serena, Mérida and Badajoz; at Mérida it is joined by the railways going north to Cáceres and south to Zafra, where the lines from Huelva and Seville unite. After Badajoz, the capital (pop. (1900) 30,899), the principal towns are Almendralejo (12,587), Azuaga (14,192), Don Benito (16,565), Jerez de los Caballeros (10,271), Mérida (11,168) and Villanueva de la Serena (13,489); these, and also the historically interesting village of Albuera, are described in separate articles. Other small towns, chiefly important as markets for agricultural produce, are Albuquerque (9030), Cabeza del Buey (7566), Campanario (7450), Fregenal de la Sierra (9615), Fuente de Cantos (8483), Fuente del Maestre (6934), Llerena (7049), Montijo (7644), Oliva de Jerez (8348), Olivenza (9066), San Vicente de Alcántara (7722), and Villafranca de los Barros (9954). Very few inhabitants emigrate from this province, where the birth-rate considerably exceeds the death-rate. Education, even primary, is in a very backward condition.

[v.03 p.0182] **BADAJOZ,** the capital of the Spanish province described above; situated close to the Portuguese frontier, on the left bank of the river Guadiana, and the Madrid-Lisbon railway. Pop. (1900) 30,899. Badajoz is the see of a bishop, and the official residence of the captain-general of Estremadura. It occupies a slight eminence, crowned by the ruins of a Moorish castle, and overlooking the Guadiana. A strong wall and bastions, with a broad moat and outworks, and forts on the surrounding heights, give the city an appearance of great strength. The river, which flows between the castle-hill and the powerfully armed fort of San Cristobál, is crossed by a magnificent granite bridge, originally built in 1460, repaired in 1597 and rebuilt in 1833. The whole aspect of Badajoz recalls its stormy history; even the cathedral, built in 1258, resembles a fortress, with massive embattled walls. Badajoz was the birthplace of the statesman Manuel de Godoy, duke of Alcúdia (1767-1851), and of the painter Luis de Morales (1509-1586). Two pictures by Morales, unfortunately retouched in modern times, are preserved in the cathedral. Owing to its position the city enjoys a considerable transit trade with Portugal; its other industries include the manufacture of linen, woollen and leather goods, and of pottery. It is not mentioned by any Roman historian, and first rose to importance under Moorish rule. In 1031 it became the capital of a small Moorish kingdom, and, though temporarily held by the Portuguese in 1168, it retained its independence until 1229, when it was captured by Alphonso IX. of Leon. As a frontier fortress it underwent many sieges. It was beleaguered by the Portuguese in 1660, and in 1705 by the Allies in the War of the Spanish Succession. During the Peninsular War Badajoz was unsuccessfully attacked by the French in 1808 and 1809; but on the 10th of March 1811, the Spanish commander, José Imaz, was bribed into surrendering to the French force under Marshal Soult. A British army, commanded by Marshal Beresford, endeavoured to retake it, and on the 16th of May defeated a relieving force at Albuera, but the siege was abandoned in June. The fortress was finally stormed on the 6th of April 1812, by the British under Lord Wellington, and carried with terrible loss. It was then delivered up to a two day's pillage. A military and republican rising took place here in August 1883, but completely failed.

BADAKSHAN, including Wakhan, a province on the north-east frontier of Afghanistan, adjoining Russian territory. Its north-eastern boundaries were decided by the Anglo-Russian agreement of 1873, which expressly acknowledged "Badakshan with its dependent district Wakhan" as "fully belonging to the amir of Kabul," and limited it to the left or southern bank of the Oxus. Much of the interior of the province is still unexplored. On the west, Badakshan is bounded by a line which crosses the Turkestan plains southwards from the junction of the Kunduz and Oxus rivers till it touches the eastern water-divide of the Tashkurghan river (here called the Koh-i-Chungar), and then runs south-east, crossing the Sarkhab affluent of the Khanabad (Kunduz), till it strikes the Hindu Kush. The southern boundary is carried along the crest of the Hindu Kush as far as the Khawak pass, leading from Badakshan into the Panjshir valley. Beyond this it is indefinite. It is known that the Kafirs occupy the crest of the Hindu Kush eastwards of the Khawak, but how far they extend north of the main watershed is not ascertainable. The southern limits of Badakshan become definite again at the Dorah pass. The Dorah connects Zebak and Ishkashim at the elbow, or bend, of the Oxus with the Lutku valley leading to Chitral. From the Dorah eastwards the crest of the Hindu Kush again becomes the boundary till it effects a junction with the Muztagh and Sarikol ranges, which shut off China from Russia and India. Skirting round the head of the Tagdumbash

Pamir, it finally merges into the Pamir boundary, and turns westwards, following the course of the Oxus, to the junction of that river and the Khanabad (Kunduz). So far as the northern boundary follows the Oxus stream, under the northern slopes of the Hindu Kush, it is only separated by the length of these slopes (some 8 or 10 m.) from the southern boundary along the crest. Thus Badakshan reaches out an arm into the Pamirs eastwards—bottle-shaped—narrow at the neck (represented by the northern slopes of the Hindu Kush), and swelling out eastwards so as to include a part of the great and little Pamirs. Before the boundary settlement of 1873 the small states of Roshan and Shignan extended to the left bank of the Oxus, and the province of Darwaz, on the other hand, extended to the right bank. Now, however, the Darwaz extension northwards is exchanged for the Russian Pamir extension westwards, and the river throughout is the boundary between Russian and Afghan territory; the political boundaries of those provinces and those of Wakhan being no longer coincident with their geographical limits.

The following are the chief provincial subdivisions of Badakshan, omitting Roshan and Shignan:—On the west Rustak, Kataghan, Ghori, Narin and Anderab; on the north Darwaz, Ragh and Shiwa; on the east Charan, Ishkashim, Zebak and Wakhan; and in the centre Faizabad, Farkhar, Minjan and Kishm. There are others, but nothing certain is known about these minor subdivisions.

The conformation of the mountain districts, which comprise all the southern districts of Badakshan and the northern hills and valleys of Kafiristan, is undoubtedly analogous to that of the rest of the Hindu Kush westwards. The water-divide of the Hindu Kush from the Dorah to the Khawak pass, *i.e.* through the centre of Kafiristan, has never been accurately traced; but its topographical conformation is evidently a continuation of that which has been observed in the districts of Badakshan to the west of the Khawak. The Hindu Kush represents the southern edge of a great central upheaval or plateau. It breaks up into long spurs southwards, deep amongst which are hidden the valleys of Kafiristan, almost isolated from each other by the rugged and snow-capped altitudes which divide them. To the north the plateau gradually slopes away towards the Oxus, falling from an average altitude of 15,000 ft. to 4000 ft. about Faizabad, in the centre of Badakshan, but tailing off to 1100 at Kunduz, in Kataghan, where it merges into the flat plains bordering the Oxus.

The Kokcha river traverses Badakshan from south-east to north-west, and, with the Kunduz, drains all the northern slopes of the Hindu Kush west of the Dorah pass. Some of its sources are near Zebak, close to the great bend of the Oxus northwards, so that it cuts off all the mountainous area included within that bend from the rest of Badakshan. Its chief affluent is the Minjan, which Sir George Robertson found to be a considerable stream where it approaches the Hindu Kush close under the Dorah. Like the Kunduz, it probably drains the northern slopes of the Hindu Kush by deep lateral valleys, more or less parallel to the crest, reaching westwards towards the Khawak pass. From the Oxus (1000 ft.) to Faizabad (4000 ft.) and Zebak (8500 ft.) the course of the Kokcha offers a high road across Badakshan; between Zebak and Ishkashim, at the Oxus bend, there is but an insignificant pass of 9500 ft.; and from Ishkashim by the Panja, through the Pamirs, is the continuation of what must once have been a much-traversed trade route connecting Afghan Turkestan with Kashgar and China. It is undoubtedly one of the great continental high-roads of Asia. North of the Kokcha, within the Oxus bend, is the mountainous district of Darwaz, of which the physiography belongs rather to the Pamir type than to that of the Hindu Kush.

A very remarkable meridional range extends for 100 m. northwards from the Hindu Kush (it is across this range that the route from Zebak to Ishkashim lies), which determines the great bend of the Oxus river northwards from Ishkashim, and narrows the valley of that river into the formation of a trough as far as the next bend westwards at Kala Wamar. The western slopes of this range drain to the Oxus either north-westwards, by the Kokcha and the Ragh, or else they twist their streams into the Shiwa, which runs due north across Darwaz. Here again we find the main routes which traverse the country following the rivers closely. The valleys are narrow, but fertile and populous. The mountains are rugged and difficult; but there is much of the world-famous beauty of scenery, and of the almost phenomenal agricultural wealth of the valleys of Bokhara and Ferghana to be found in the as yet half-explored recesses of Badakshan.

[v.03 p.0183] The principal domesticated animal is the yak. There are also large flocks of sheep, cows, goats, ponies, fine dogs and Bactrian camels. The more important wild animals are a large wild sheep (*Ovis poli*), foxes, wolves, jackals, bears, boars, deer and leopards; amongst birds, there are partridges, pheasants, ravens, jays, sparrows, larks, a famous breed of hawks, &c.

Badakshan proper is peopled by Tajiks, Turks and Arabs, who speak the Persian and Turki languages, and profess the orthodox doctrines of the Mahommedan law adopted by the Sunnite sect; while the mountainous districts are inhabited by Tajiks, professing the Shi'ite creed and speaking distinct dialects in different districts.

History.—Badakshan, part of the Greek Bactria, was visited by Hsüan Tsang in 630 and 644. The Arabian geographers of the 10th century speak of its mines of ruby and lapis lazuli, and give notices of the flourishing commerce and large towns of Waksh and Khotl, regions which appear to have in part corresponded with Badakshan. In 1272-1273 Marco Polo and his companions stayed for a time in Badakshan. During this and the following centuries the country was governed by kings who claimed to be descendants of Alexander the Great. The last of these kings was Shah Mahommed, who died in the middle of the 15th century, leaving only his married daughters to represent the royal line. Early in the middle of the 16th century the Usbegs obtained possession of Badakshan, but were soon expelled, and then the country was generally governed by descendants of the old royal dynasty by the female line. About the middle of the 18th century the present dynasty of Mirs established its footing in the place of the old one which had become extinct. In 1765 the country was invaded and ravaged by the ruler of Kabul. During the first three decades of the 19th century it was overrun and depopulated by Kohan Beg and his son Murad Beg, chiefs of the Kataghan Usbegs of Kunduz. When Murad Beg died, the power passed into the hands of another Usbeg, Mahommed Amir Khan. In 1859 the Kataghan Usbegs were expelled; and Mir Jahander Shah, the representative of the modern royal line, was reinstated at Faizabad under the supremacy of the Afghans. In 1867 he was expelled by Abdur Rahman and replaced by Mir Mahommed Shah, and other representatives of the same family.

(T. H. H.*)

BADALOCCHIO, SISTO, surnamed Rosa (1581-1647), Italian painter and engraver, was born at Parma. He was of the school of Annibale Carracci, by whom he was highly esteemed for design. His principal engravings are the series known as Raphael's Bible, which were executed by him in conjunction with Lanfranco, another pupil of Carracci. The best of his paintings, which are few in number, are at Parma. He died at Bologna.

BADALONA (anc. *Baetulo*), a town of north-eastern Spain, in the province of Barcelona; 6 m. N.E. of the city of Barcelona, on the left bank of the small river Besós, and on the Mediterranean Sea. Pop. (1900) 19,240. Badalona has a station on the coast railway from Barcelona to Perpignan in France, and a small harbour, chiefly important for its fishing and boat-building trades. There are gas, chemical and mineral-oil works in the town, which also manufactures woollen and cotton goods, glass, biscuits, sugar and brandy; while the surrounding fertile plains produce an abundance of grain, wine and fruit. Badalona thus largely contributes to the export trade of Barcelona, and may, in fact, be regarded as its industrial suburb.

BADBY, JOHN (d. 1410), one of the early Lollard martyrs, was a tailor (or perhaps a blacksmith) in the west Midlands, and was condemned by the Worcester diocesan court for his denial of transubstantiation. Badby bluntly maintained that when Christ sat at supper with his disciples he had not his body in his hand to distribute, and that "if every host consecrated at the altar were the Lord's body, then there be 20,000 Gods in England." A further court in St Paul's, London, presided over by Archbishop Arundel, condemned him to be burned at Smithfield, the tournament ground just outside the city walls. It is said that the prince of Wales (afterwards Henry V.) witnessed the execution and offered the sufferer both life and a pension if he would recant; but in Walsingham's words, "the abandoned villain declined the prince's advice, and chose rather to be burned than to give reverence to the life-giving sacrament. So it befell that this mischievous fellow was burnt to ashes, and died miserably in his sin."

BADDELEY, ROBERT (*c.* 1732-1794), English actor, is said to have been first a cook to Samuel Foote, "the English Aristophanes," and then a valet, before he appeared on the stage. In 1761, described as "of Drury Lane theatre," he was seen at the theatre in Smock Alley, Dublin, as Gomez in Dryden's *Spanish Friar*. Two years later he was a regular member of the Drury Lane company in London, where he had a great success in the low comedy and servants' parts. He remained at this theatre and the Haymarket until his death. He was the original Moses in the *School for Scandal*. Baddeley died on the 20th of November 1794. He bequeathed property to found a home for decayed actors, and also £3 per annum to provide wine and cake in the green-room of Drury Lane theatre on Twelfth Night. The ceremony of the Baddeley cake has remained a regular institution.

His wife SOPHIA BADDELEY (1745-1786), an actress and singer, was born in London, the daughter of a sergeant-trumpeter named Snow. She was a woman of great beauty, but excessive vanity and notorious conduct. At the age of eighteen she ran away with Baddeley, then acting at Drury Lane, and she herself made her first appearance on the stage there on the 27th of April 1765, as Ophelia. Later, as a singer, she obtained engagements at Ranelagh and Vauxhall. Though separated from her husband on account of her misconduct, she still played several years in the same company. Her beauty and her extravagance rendered her celebrated, but the money which she made in all sorts of ways was so freely squandered that she was obliged to take refuge from her creditors in Edinburgh, where she made her last appearance on the stage in 1784.

See *Memoirs of Mistress Sophia Baddeley*, by Mrs Elizabeth Steele, 6 vols. (1781).

BADEN, a town and watering-place of Austria, in lower Austria, 17 m. S. of Vienna by rail. Pop. (1900) 12,447. It is beautifully situated at the mouth of the romantic Helenenthal, on the banks of the Schwechat, and has become the principal summer resort of the inhabitants of the neighbouring capital. It possesses a new *Kurhaus*, fifteen bathing-establishments, a parish church in late Gothic style, and a town-hall, which contains interesting archives. The warm baths, which gave name to the town, are thirteen in number, with a temperature of from 72° F. to 97° F., and contain, as chief ingredient, sulphate of lime. They rise for the most part at the foot of the Calvarienberg (1070 ft.), which is composed of dolomitic limestone, and are mostly used for bathing purposes. Several members of the Austrian imperial family have made Baden their summer residence and have built here beautiful villas. There are about 20,000 visitors annually. Baden possesses several parks and is surrounded by lovely and interesting spots, of which the most frequented is the picturesque valley of the Helenenthal, which is traversed by the Schwechat. Not far from Baden, the valley is crossed by the magnificent aqueduct of the Vienna waterworks. At the entrance to the valley, on the right bank of the river, lie the ruins of the 12th-century castle of Rauheneck, and at its foot stands the Château Weilburg, built in 1820-1825 by Archduke Charles, the victor of Aspern. On the left bank, just opposite, stands the ruined castle of Rauhenstein, dating also from the 12th century. About 4 m. up the valley is Mayerling, a hunting-lodge, where the crown prince Rudolph of Austria was found dead in 1889. Farther up is Alland, whence a road leads to the old and well-preserved abbey of Heiligenkreuz. It possesses a church, in Romanesque style, dating from the 11th century, with fine cloisters and the tombs of several members of the Babenberg family. The highest point in the neighbourhood of Baden is the peak of the Hoher Lindkogel (2825 ft.), popularly called the Eiserne Thor, which is ascended in about three hours.

[v.03 p.0184]

The celebrity of Baden dates back to the days of the Romans, who knew it by the name of *Thermae Pannonicae*, and remains of their occupation still exist. It received its charter as a town in 1480, and although sacked at various times by Hungarians and Turks, it soon flourished again.

See J. Schwarz, *Die Heilquellen von Baden bei Wien* (Vienna, 3rd ed., 1900).

BADEN, or BADEN-BADEN (to distinguish it from other places of the name), a town and fashionable watering-place of Germany, in the grand-duchy of Baden, 23 m. S. by W. of Karlsruhe, with which it is connected by a branch of the Mannheim and Basel railway. Its situation—on a hill 600 ft. high, in the beautiful valley of the Black Forest—its extensive pleasure-grounds, gardens and promenades, and the brilliancy of the life that is led during the season, have long attracted crowds of visitors from all parts of the world. The resident population was in 1885, 12,779; in 1895, 14,862; and in 1905, 16,238; but the number of visitors exceeds 70,000 annually. Until the war of 1870, the prevailing nationality was French, but of late years Americans, Russians and English are the more numerous. The hot springs are twenty-nine in number, and vary in temperature from 37° to 54° R., *i.e.* from 115° to 153° Fahr. They flow from the castle rock at the rate of 90 gallons per minute, and the water is conveyed through the town in pipes to supply the different baths. There are two chief bathing-establishments, accounted the most elegant in Europe. The waters of Baden-Baden are specific in cases of chronic rheumatism and gout, paralysis, neuralgia, skin diseases and various internal complaints, such as stone and uric acid. The town proper is on the right bank of the Oos, but the principal resorts of the visitors are en the left. A *Conversationshaus* and a *Trinkhalle* or pump-room, a theatre and a picture-gallery, library and reading-room are among the chief buildings. The public gaming-tables, which for so many years were a striking feature, are now abolished. The only building of much antiquarian interest, with the exception of the castles, is the parish church, which dates from the 15th century, and contains the tombs of several of the margraves. The churches include a Lutheran, an English, in the Norman style of architecture, and a Russian, with beautiful frescoes; while on the Michaelsberg is the Greek chapel, with a gilded dome, which was erected over the tomb of a son of the Rumanian prince Michel Stourdza, who died here in 1863.

The springs of Baden were known to the Romans, and the foundation of the town is referred to the emperor Hadrian by an inscription of somewhat doubtful authenticity. The name of *Aurelia Aquensis* was given to it in honour of Aurelius Severus, in whose reign it would seem to have been well known. Fragments of its ancient sculptures are still to be seen, and in 1847 remains of Roman vapour baths, well preserved, were discovered just below the New Castle. From the 14th century down to the close of the 17th, Baden was the residence of the margraves, to whom it gave its name. They first dwelt in the Old Castle, the ruins of which still occupy the summit of a hill above the town, but in 1479 they removed to the New Castle, which is situated on the hill-side nearer to the town, and is remarkable for its subterranean dungeons. During the Thirty Years' War Baden suffered severely from the various combatants, but especially from the French, who pillaged it in 1643, and laid it in ashes in 1689. The margrave Louis William removed to Rastatt in 1706. Since the beginning of the 19th century the government has greatly fostered the growth of the town.

See Wettendorfer, *Der Kurort Baden-Baden* (2nd ed., 1898); Schwarz, *Die Heilquellen von Baden-Baden* (4th ed., 1902).

BADEN, a town in the Swiss canton of Aargau, on the left bank of the river Limmat, 14 m. by rail N.W. of Zürich. It is now chiefly visited by reason of its hot sulphur springs, which are mentioned by Tacitus (*Hist.* i. cap. 67) and were very fashionable in the 15th and 16th centuries. They are especially efficacious in cases of gouty and rheumatic affections, and are much frequented by Swiss invalids, foreign visitors being but few in number. They lie a little north of the old town, with which they are now connected by a fine boulevard. Many Roman remains have been found in the gardens of the Kursaal. The town is very picturesque, with its steep and narrow streets, and its one surviving gateway, while it is dominated on the west by the ruined castle of Stein, formerly a stronghold of the Habsburgs, but destroyed in 1415 and again in 1712. In 1415 Baden (with the Aargau) was conquered by the Eight Swiss Confederates, whose bailiff inhabited the other castle, on the right bank of the Limmat, which defends the ancient bridge across that river. As the conquest of the Aargau was the first made by the Confederates, their delegates (or the federal diet) naturally met at Baden, from 1426 to about 1712, to settle matters relating to these subject lands, so that during that period Baden was really the capital of Switzerland. The diet sat in the old town-hall or *Rathaus*, where was also signed in 1714 the treaty of Baden which put an end to the war between France and the Empire, and thus completed the treaty of Utrecht (1713). Baden was the capital of the canton of Baden, from 1798 to 1803, when the canton of Aargau was created. To the N.W. of the baths a new industrial quarter has sprung up of late years, the largest works being for electric engineering. In 1900 the permanent population of Baden was 6050 (German-speaking, mainly Romanists, with many Jews), but it is greatly swelled in summer by the influx of visitors.

One mile S. of Baden, on the Limmat, is the famous Cistercian monastery of Wettingen (1227-1841—the monks are now at Mehrerau near Bregenz), with splendid old painted glass in the cloisters and magnificent early 17th-century carved stalls

in the choir of the church. Six miles W. of Baden is the small town of Brugg (2345 inhabitants) in a fine position on the Aar, and close to the remains of the Roman colony of *Vindonissa* (Windisch), as well as to the monastery (founded 1310) of Königsfelden, formerly the burial-place of the early Habsburgs (the castle of Habsburg is but a short way off), still retaining much fine painted glass.

See Barth. Fricker, *Geschichte der Stadt und Bäder zu Baden* (Aarau, 1880).

(W. A. B. C.)

BADEN, GRAND DUCHY OF, a sovereign state of Germany, lying in the south-west corner of the empire, bounded N. by the kingdom of Bavaria and the grand-duchy of Hesse-Darmstadt; W. and practically throughout its whole length by the Rhine, which separates it from the Bavarian Palatinate and the imperial province of Alsace-Lorraine; S. by Switzerland, and E. by the kingdom of Württemberg and part of Bavaria. The country has an area of 5823 sq. m. and consists of a considerable portion of the eastern half of the fertile valley of the Rhine and of the mountains which form its boundary. The mountainous part is by far the most extensive, forming, indeed, nearly 80% of the whole area. From the Lake of Constance in the south to the river Neckar in the north is a portion of the Black Forest or *Schwarzwald*, which is divided by the valley of the Kinzig into two districts of different elevation. To the south of the Kinzig the mean height is 3100 ft., and the loftiest summit, the Feldberg, reaches about 4898 ft., while to the north the mean height is only 2100 ft., and the Belchen, the culminating point of the whole, does not exceed 4480 ft. To the north of the Neckar is the Odenwald Range, with a mean of 1440 ft., and in the Katzenbuckel, an extreme of 1980 ft. Lying between the Rhine and the Dreisam is the Kaiserstuhl, an independent volcanic group, nearly 10 m. in length and 5 in breadth, the highest point of which is 1760 ft. The greater part of Baden belongs to the basin of the Rhine, which receives upwards of twenty tributaries from the highlands; the north-eastern portion of the territory is also watered by the Main and the Neckar. A part, however, of the eastern slope of the Black Forest belongs to the basin of the Danube, which there takes its rise in a number of mountain streams. Among the numerous lakes which belong to the duchy are the Mummel, Wilder, Eichener and Schluch, but none of them is of any size. The Lake of Constance (*Boden-See*) belongs partly to Bavaria and Switzerland.

Owing to its physical configuration Baden presents great extremes of heat and cold. The Rhine valley is the warmest district in Germany, but the higher elevations of the Black Forest record the greatest degrees of cold experienced in the south. The mean temperature of the Rhine valley is approximately 50° F. and that of the high table-land, 43° F. July is the hottest and January the coldest month in the year.

[v.03 p.0185]

The mineral wealth of Baden is not great; but iron, coal, zinc and lead of excellent quality are produced, and silver, copper, gold, cobalt, vitriol and sulphur are obtained in small quantities. Peat is found in abundance, as well as gypsum, china-clay, potters' earth and salt. The mineral springs of Baden are very numerous and have acquired great celebrity, those of Baden-Baden, Badenweiler, Antogast, Griesbach, Freiersbach and Petersthal being the most frequented.

In the valleys the soil is particularly fertile, yielding luxuriant crops of wheat, maize, barley, spelt, beans, potatoes, flax, hemp, hops, beetroot and tobacco; and even in the more mountainous parts rye, wheat and oats are extensively cultivated. There is a considerable extent of pasture land, and the rearing of cattle, sheep, pigs and goats is largely practised. Of game, deer, wild boars, hares, snipe and partridges are fairly abundant, while the mountain streams yield trout of excellent quality. The culture of the vine increases, and the wines, which are characterized by a mildness of flavour, are in good demand. The gardens and orchards supply great abundance of fruits, especially almonds and walnuts; and bee-keeping is common throughout the country. A greater proportion of Baden than of any other of the south German states is occupied by forests. In these the predominant trees are the fir and pine, but many others, such as the chestnut, are well represented. A third, at least, of the annual supply of timber is exported.

Population.—At the beginning of the 19th century Baden was only a margraviate, with an area little exceeding 1300 sq. m., and a population of 210,000. Since then it has from time to time acquired additional territory, so that its area now amounts to 5823 sq. m., and its population (1905) to 2,009,320, of whom about 60% are Roman Catholics, 37% Protestants, 1½% Jews, and the remainder of other confessions. Of the population, about one-half may be classified as rural, *i.e.* living in communities of less than 2000 inhabitants; while the density of the population is about 330 to the square mile. The country is divided into the following districts, with the respective chief towns and populations as shown:—

District.	Chief towns.	Pop. (1905)
(1) Mannheim	Mannheim	162,607
	Heidelberg	49,439
(2) Karlsruhe	Karlsruhe	111,200
	Pforzheim	59,307
(3) Freiburg-im-Breisgau	Freiburg	74,102
(4) Constance	Constance	24,818

The capital of the duchy is Karlsruhe, and among important towns other than the above are Rastatt, Baden-Baden, Bruchsal and Lahr. The population is most thickly clustered in the north and in the neighbourhood of the Swiss town of Basel. The inhabitants of Baden are of various origin—those to the north of the Murg being descended from the Alemanni and those to the south from the Franks, while the Swabian plateau derives its name and its population from another race. (See WÜRTTEMBERG.)

Industries.—Of the area, 56.8% is cultivated and 38% forest, but the agricultural industry, which formerly yielded the bulk of the wealth of the country, is now equalled, if not surpassed, by the industrial output, which has attained very considerable dimensions. The chief articles of manufacture are machinery, woollen and cotton goods, silk ribbons, paper, tobacco, leather, china, glass, clocks, jewellery and chemicals. Beet sugar is also largely manufactured, and the inhabitants of the Black Forest have long been celebrated for their dexterity in the manufacture of wooden ornaments and toys, musical boxes and organs.

The exports of Baden, which coincide largely with the industries just mentioned, are of considerable importance, but the bulk of its trade consists in the transit of goods. The country is well furnished with roads and railways, the greater proportion of the latter being in the hands of the state. A line runs the whole length of the land, for the most part parallel with the Rhine, while branches cross obliquely from east to west. Mannheim is the great emporium for the export of goods down the Rhine and has a large river traffic. It is also the chief manufacturing town of the duchy and the seat of administrative government for the northern portion of the country.

Education and Religion.—The educational establishments of Baden are numerous and flourishing, and public education is entirely in the hands of the government. There are two universities, the Protestant at Heidelberg and the Roman Catholic at Freiburg-im-Breisgau, and a celebrated technical college at Karlsruhe. The grand-duke is a Protestant; under him the Evangelical Church is governed by a nominated council and a synod consisting of the "prelate," 48 elected, and 7 nominated lay and clerical members. The Roman Catholic archbishop of Freiburg is metropolitan of the Upper Rhine.

Constitution and Government.—The government of Baden is an hereditary monarchy, with the executive power vested in the grand-duke, while the legislative authority is shared by him with a representative assembly (*Landtag*) consisting of two chambers. The upper chamber is composed of all the princes of the reigning family who are of full age; the chiefs of the mediatized families; the archbishop of Freiburg; the president of the Protestant Evangelical church; a deputy from each of the universities and from the technical high school, eight members elected by the territorial nobility for four years, three representatives of the chamber of commerce, two of that of agriculture, one of that of trades, two mayors of municipalities, one burgomaster of lesser towns, one member of a district council, and eight members (two of them legal functionaries) nominated by the grand-duke. The lower chamber consists of 73 popular representatives, of whom 24 are elected by the burgesses of certain towns and 49 by the rural communities. Every citizen of 25 years of age, who has not

been convicted and is not a pauper, has a vote. The elections are, however, indirect; the citizens nominating the *Wahlmänner* (deputy electors) and the latter electing the representatives. The chambers meet at least every two years. The members of the lower chamber are elected for four years, half the number retiring at the expiration of every two years. The executive consists of four departments of state—those of the interior, of foreign affairs and of the grand-ducal house, of finance, and of justice, ecclesiastical affairs and education. The chief sources of revenue are direct and indirect taxes, domains and railways. The last are worked by the state, and the sole public debt, amounting to about 22 millions sterling, is attributable to this head. The supreme courts of justice of the duchy are in Karlsruhe, Freiburg, Offenburg, Heidelberg, Mosbach, Waldshut, Constance and Mannheim, whence appeals lie to the *Reichsgericht* (supreme tribunal of the empire) in Leipzig. By virtue of a convention with Prussia, of 1871, the Baden army forms a portion of the Prussian army.

History.—During the middle ages the district which now forms the grand-duchy of Baden was ruled by various counts, prominent among whom were the counts and dukes of Zähringen. In 1112 Hermann, a son of Hermann, margrave of Verona (d. 1074), and grandson of Bertold, duke of Carinthia and count of Zähringen, having inherited some of the German estates of his family, called himself margrave of Baden, and from this date the separate history of Baden may be said to begin. Hermann appears to have called himself by the title of margrave, and not the more usual title of count, owing to the connexion of his family with the margraviate of Verona. His son and grandson, both named Hermann, added to their territories, which about 1200 were divided, and the lines of Baden-Baden and Baden-Hochberg were founded, the latter of which was divided about a century later into the branches of Baden-Hochberg and Baden-Sausenberg. The family of Baden-Baden was very successful in increasing the area of its possessions, which after several divisions were united by the margrave Bernard I. in 1391. Bernard, a soldier of some renown, continued the work of his predecessors, and obtained other districts, including Baden-Hochberg, the ruling family of which died out in 1418.

[v.03 p.0186]

During the 15th century a war with the count palatine of the Rhine deprived Margrave Charles I. (d. 1475) of a part of his territories, but these losses were more than repaired by his son and successor, Christopher I. In 1503 the family of Baden-Sausenberg became extinct, and the whole of Baden was united by Christopher, who divided it, however, before his death in 1527 among his three sons. One of these died childless in 1533, and in 1535 his remaining sons, Bernard and Ernest, having shared their brother's territories, made a fresh division and founded the lines of Baden-Baden and Baden-Pforzheim, called after 1565 Baden-Durlach. Further divisions followed, and the weakness caused by these partitions was accentuated by a rivalry between the two main branches of the family. This culminated in open warfare, and from 1584 to 1622 Baden-Baden was in the possession of one of the princes of Baden-Durlach. Religious differences added to this rivalry. During the period of the Reformation some of the rulers of Baden adhered to the older and some adopted the newer faith, and the house was similarly divided during the Thirty Years' War. Baden suffered severely during this struggle, and both branches of the family were exiled in turn. The treaty of Westphalia in 1648 restored the *status quo*, and the family rivalry gradually died out. During the wars of the reign of Louis XIV. the margraviate was ravaged by the French troops, and the margrave of Baden-Baden, Louis William (d. 1707), was prominent among the soldiers who resisted the aggressions of France. In 1771 Augustus George of Baden-Baden died without sons, and his territories passed to Charles Frederick of Baden-Durlach, who thus became ruler of the whole of Baden.

Although in 1771 Baden was united under a single ruler it did not form a compact territory, and its total area was only about 1350 sq. m. Consisting of a number of isolated districts lying on either bank of the upper Rhine, it was the work of Charles Frederick to acquire the intervening stretches of land, and so to give territorial unity to his country. Beginning to reign in 1738 and coming of age in 1746, this prince is the most notable of the rulers of Baden. He was interested in the development of agriculture and commerce; sought to improve education and the administration of justice, and was in general a wise and liberal ruler. His opportunity for territorial aggrandizement came during the Napoleonic wars. When war broke out between France and Austria in 1792 the Badenese fought for Austria; consequently their country was devastated and in 1796 the margrave was compelled to pay an indemnity, and to cede his territories, on the left bank of the Rhine to France. Fortune, however, soon returned to his side. In 1803, largely owing to the good offices of Alexander I., emperor of Russia, he received the bishopric of Constance, part of the Rhenish Palatinate, and other smaller districts, together with the dignity of a prince elector. Changing sides in 1805 he fought for Napoleon, with the result that by the peace of Pressburg in that year he obtained the Breisgau and other territories at the expense of the Habsburgs. In 1806 he joined the Confederation of the Rhine, declared himself a sovereign prince, became a grand-duke, and received other additions of territory. The Baden contingent continued to assist France, and by the peace of Vienna in 1809 the grand-duke was rewarded with accessions of territory at the expense of the kingdom of Württemberg. Having quadrupled the area of Baden, Charles Frederick died in June 1811, and was succeeded by his grandson, Charles, who was married to Stephanie de Beauharnais (d. 1860), an adopted daughter of Napoleon. Charles fought for his father-in-law until after the battle of Leipzig in 1813, when he joined the Allies.

In 1815 Baden became a member of the Germanic confederation established by the Act of the 8th of June, annexed to the Final Act of the congress of Vienna of the 9th of June. In the hurry of the winding-up of the congress, however, the vexed question of the succession to the grand-duchy had not been settled. This was soon to become acute. By the treaty of the 16th of April 1816, by which the territorial disputes between Austria and Bavaria were settled, the succession to the Baden Palatinate was guaranteed to Maximilian I., king of Bavaria, in the expected event of the extinction of the line of Zähringen. As a counterblast to this the grand-duke Charles issued in 1817 a pragmatic sanction (*Hausgesetz*) declaring the counts of Hochberg, the issue of a morganatic marriage between the grand-duke Charles Frederick and Luise Geyer von Geyersberg (created Countess Hochberg), capable of succeeding to the crown. A controversy between Bavaria and Baden resulted, which was only decided in favour of the Hochberg claims by the treaty signed by the four great powers and Baden at Frankfort on the 10th of July 1819. Meanwhile the dispute had produced important effects in Baden. In order to secure popular support for the Hochberg heir, Charles in 1818 granted to the grand-duchy, under article xiii. of the Act of Confederation, a liberal constitution, under which two chambers were constituted and their assent declared necessary for legislation and taxation. The outcome was of importance far beyond the narrow limits of the duchy; for all Germany watched the constitutional experiments of the southern states. In Baden the conditions were not favourable to success. The people, belonging to the "Celtic fringe" of Germany, had fallen during the revolutionary period completely under the influence of French ideas, and this was sufficiently illustrated by the temper of the new chambers, which tended to model their activity on the proceedings of the Convention in the earlier days of the French Revolution. On the other hand, the new grand-duke Louis, who had succeeded in 1818, was unpopular, and the administration was in the hands of hide-bound and inefficient bureaucrats. The result was a deadlock; and, even before the promulgation of the Carlsbad decrees in October 1819 the grand-duke had prorogued the chambers, after three months of sterile debate. The reaction that followed was as severe in Baden as elsewhere in Germany, and culminated in 1823, when, on the refusal of the chambers to vote the military budget, the grand-duke dissolved them and levied the taxes on his own authority. In January 1825, owing to official pressure, only three Liberals were returned to the chamber; a law was passed making the budget presentable only every three years, and the constitution ceased to have any active existence.

In 1830 Louis was succeeded as grand-duke by his half-brother Leopold, the first of the Hochberg line. The July Revolution led to no disturbances in Baden; but the new grand-duke from the first showed liberal tendencies. The elections of 1830 were not interfered with; and the result was the return of a Liberal majority. The next few years saw the introduction, under successive ministries, of Liberal reforms in the constitution, in criminal and civil law, and in education. In 1832 the adhesion of Baden to the Prussian *Zollverein* did much for the material prosperity of the country. With the approach of the revolutionary year 1848, however, Radicalism once more began to lift up its head. At a popular demonstration held at Offenburg on the 12th of September 1847, resolutions were passed demanding the conversion of the regular army into a national militia which should take an oath to the constitution, a progressive income-tax and a fair adjustment of the interests of capital and labour.

The news of the revolution of February 1848 in Paris brought this agitation to a head. Numerous public meetings were held at which the Offenburg programme was adopted, and on the 4th of March, under the influence of the popular excitement, it was accepted almost unanimously by the lower chamber. As in other German states, the government bowed

to the storm, proclaimed an amnesty and promised reforms. The ministry was remodelled in a more Liberal direction; and a new delegate was sent to the federal diet at Frankfort, empowered to vote for the establishment of a parliament for united Germany. The disorders, fomented by republican agitators, none the less continued; and the efforts of the government to suppress them with the aid of federal troops led to an armed insurrection. For the time this was mastered without much difficulty; the insurgents were beaten at Kandern on the 20th of April; Freiburg, which they held, fell on the 24th; and on the 27th a Franco-German "legion," which had invaded Baden from Strassburg, was routed at Dossenbach.

At the beginning of 1849, however, the issue of a new constitution, in accordance with the resolutions of the Frankfort parliament, led to more serious trouble. It did little to satisfy the Radicals, who were angered by the refusal of the second [v.03 p.0187] chamber to agree to their proposal for the summoning of a constituent assembly (10th of February 1849). The new insurrection that now broke out was a more formidable affair than the first. A military mutiny at Rastatt on the 11th of May showed that the army sympathized with the revolution, which was proclaimed two days later at Offenburg amid tumultuous scenes. On the same day (13th of May) a mutiny at Karlsruhe forced the grand-duke to take to flight, and the next day he was followed by the ministers, while a committee of the diet under Lorenz Brentano (1813-1891), who represented the more moderate Radicals as against the republicans, established itself in the capital to attempt to direct affairs pending the establishment of a provisional government. This was accomplished on the 1st of June, and on the 10th the "constituent diet," consisting entirely of the most "advanced" politicians, assembled. It had little chance of doing more than make speeches; the country was in the hands of an armed mob of civilians and mutinous soldiers; and, meanwhile, the grand-duke of Baden had joined with Bavaria in requesting the armed intervention of Prussia, which was granted on the condition that Baden should join the League of the Three Kings.

From this moment the revolution in Baden was doomed, and with it the revolution in all Germany. The Prussians, under Prince William (afterwards emperor), invaded Baden in the middle of June. The insurgent forces were under the command of the Pole, Ludwig von Mieroslawski (1814-1878), who reduced them to some semblance of order. On the 20th he met the Prussians at Waghäusel, and was completely defeated; on the 25th Prince William entered Karlsruhe; and at the end of the month the members of the provisional government, who had taken refuge at Freiburg, dispersed. Such of the insurgent leaders as were caught, notably the ex-officers, suffered military execution; the army was dispersed among Prussian garrison towns; and Baden was occupied for the time by Prussian troops. The grand-duke returned on the 19th of August, and at once dissolved the diet. The elections resulted in a majority favourable to the new ministry, and a series of laws were passed of a reactionary tendency with a view to strengthening the government.

The grand-duke Leopold died on the 24th of April 1852, and was succeeded by his second son, Frederick, as regent, the eldest, Louis (d. 22nd of January 1858), being incapable of ruling.[1] The internal affairs of Baden during the period that followed have comparatively little general interest. In the greater politics of Germany, Baden, between 1850 and 1866, was a consistent supporter of Austria; and in the war of 1866 her contingents, under Prince William, had two sharp engagements with the Prussian army of the Main. Two days before the affair of Werbach (24th of July), however, the second chamber had petitioned the grand-duke to end the war and enter into an offensive and defensive alliance with Prussia. The grand-duke had from the first been opposed to the war with Prussia, but had been forced to yield owing to popular resentment at the policy of Prussia in the Schleswig-Holstein question (*q.v.*). The ministry, now at one, resigned; Baden announced her withdrawal from the German confederation; and on the 17th of August a treaty of peace and alliance was signed with Prussia. The adhesion of Baden to the North German confederation was prevented by Bismarck himself, who had no wish to give Napoleon III. so good an excuse for intervention; but it was the opposition of Baden to the formation of a South German confederation that made the ultimate union inevitable. The troops of Baden took a conspicuous share in the war of 1870; and it was the grand-duke of Baden, who, in the historic assembly of the German princes at Versailles, was the first to hail the king of Prussia as German emperor.

The internal politics of Baden, both before and after 1870, centre in the main round the question of religion. The signing on the 28th of June 1859 of a concordat with the Holy See, by which education was placed under the oversight of the clergy and the establishment of religious orders was facilitated, led to a constitutional struggle, which ended in 1863 with the victory of Liberal principles, the communes being made responsible for education, though the priests were admitted to a share in the management. The quarrel between Liberalism and Clericalism was, however, not ended. In 1867, on the accession to the premiership of Julius von Jolly (1823-1891), several constitutional changes in a Liberal direction were made; responsibility of ministers, freedom of the press, compulsory education. In the same year (6th of September) a law was passed to compel all candidates for the priesthood to pass the government examinations. The archbishop of Freiburg resisted, and, on his death in April 1868, the see was left vacant, In 1869 the introduction of civil marriage did not tend to allay the strife, which reached its climax after the proclamation of the dogma of papal infallibility in 1870. The "Kulturkampf" raged in Baden, as in the rest of Germany; and here as elsewhere the government encouraged the formation of Old Catholic communities. Not till 1880, after the fall of the ministry of Jolly, was a reconciliation with Rome effected; in 1882 the archbishopric of Freiburg was again filled up. The political tendency of Baden, meanwhile, mirrored that of all Germany. In 1891 the National Liberals had but a majority of one in the diet; from 1893 they could maintain themselves only with the aid of the Conservatives; and in 1897 a coalition of Ultramontanes, Socialists, Social-democrats and Radicals (*Freisinnige*), won a majority for the opposition in the chamber.

Amid all these contests the wise and statesmanlike moderation of the grand-duke Frederick won him universal esteem. By the treaty under which Baden had become an integral part of the German empire, he had reserved only the exclusive right to tax beer and spirits; the army, the post-office, railways and the conduct of foreign relations were placed under the effective control of Prussia. In his relations with the German empire, too, Frederick proved himself rather a great German noble than a sovereign prince actuated by particularist ambitions; and his position as husband of the emperor William I.'s only daughter, Louise (whom he had married in 1856), gave him a peculiar influence in the councils of Berlin. When, on the 20th of September 1906, the grand-duke celebrated at once the jubilee of his reign and his golden wedding, all Europe combined to do him honour. King Edward VII. sent him, by the hands of the duke of Connaught, the order of the Garter. But more significant, perhaps, was the tribute paid by the *Temps*, the leading Parisian paper. "Nothing more clearly demonstrates the sterile paradox of the Napoleonic work," it wrote, "than the history of the grand-duchy. It was Napoleon, and he alone, who created this whole state in 1803 to reward in the person of the little margrave of Baden a relative of the emperor of Russia. It was he who after Austerlitz aggrandized the margravate at the expense of Austria; transformed it into a sovereign principality and raised it to a grand-duchy. It was he too who, by the secularization on the one hand and by the dismemberment of Württemberg on the other, gave the grand-duke 500,000 new subjects. He believed that the recognition of the prince and the artificial ethnical formation of the principality would be pledges of security for France. But in 1813 Baden joined the coalition, and since then that nation created of odds and ends (*de bric et de broc*) and always handsomely treated by us, had not ceased to take a leading part in the struggles against our country. The grand-duke Frederick, grand-duke by the will of Napoleon, has done France all the harm he could. But French opinion itself renders justice to the probity of his character and to the ardour of his patriotism, and nobody will feel surprise at the homage with which Germany feels bound to surround his old age." He died at Mainau on the 28th of September 1907, and was succeeded by his son, the grand-duke Frederick II.

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[1] Frederick assumed the title of grand-duke on the 5th of September 1856.

BADENOCH, a district of south-east Inverness-shire, Scotland, bounded on the N. by the Monadhliath mountains, on the E. by the Cairngorms and Braemar, on the S. by Atholl and the Grampians, and on the W. by Lochaber. Its area is somewhat undefined, but it may be estimated to measure 36 m. from N.E. to S.W. and 15 m. from N. to S. Excepting the valley of the Spey and the great glens, it is almost entirely a wild mountainous tract, many hills exceeding 3000 ft. in height, and contains in the forests of Alder, Drumochter, Gaick and Feshie some of the best deer country in the Highlands. Loch Laggan and Loch Ericht are the principal lakes, and the district is abundantly watered by the Spey and its numerous tributaries. It is traversed, from Dalnaspidal to Boat of Garten, by the Highland railway. There are very few industries, and population groups itself at Kingussie and other places on or near the Spey. From 1229 to 1313 the lordship of Badenoch was owned by the Comyns. In 1371 Robert II. granted it to his son Alexander Stewart, 1st earl of Buchan (1343-1405), the "Wolf of Badenoch." Reverting to the crown, it was bestowed in 1452 upon the 1st earl of Huntly, and still gives the title of lord of Badenoch to the marquess of Huntly.

BADENWEILER, a health resort and watering place of the grand-duchy of Baden, Germany, 28 m. N. by E. by rail from Basel, at the western edge of the Black Forest. It is sheltered by the Blauen (3820 ft.) and the climate is excellent. Its new parish (Evangelical) church (1897) is built at the foot of the 11th-century castle which belonged to the margraves of Baden, and was destroyed by the French during the wars of Louis XV. The place is visited by 5000 people annually, partly for its warm mineral springs (70° F.), partly for its whey cure, and partly on account of its equable climate and picturesque surroundings. There are a *Kurhaus*, built in 1853, and a park of 15 acres; also a grand-ducal castle, refitted in 1887-1888. In 1784 well-preserved Roman baths were discovered here. The permanent population is about 600.

BADGER, the common name for any animal of the Musteline subfamily *Melinae* or the typical genus *Meles* (see Carnivora). The name is probably derived from "badge," device, on account of the marks on the head; or it may be identical with the term separately noticed below, the French *blaireau* being used in both senses. The members of the typical genus have the lower jaw so articulated to the upper, by means of a transverse condyle firmly locked into a long cavity of the cranium, that dislocation of the jaw is all but impossible, and this enables those creatures to maintain their hold with the utmost tenacity. The European badger (*Meles taxus* or *M. meles*) is from 25 in. to 29 in. long, with a tail of about 8 in.; the general hue of the fur is grey above and black on the under parts; the head is white, with a black stripe on each side. In habits it may be taken as typical of the subfamily. It is nowhere abundant, but is found over the northern parts of Europe and Asia, and is a quiet, inoffensive animal, nocturnal and solitary in its habits, sleeping by day in its burrow, and issuing forth at night to feed on roots, beech-mast, fruits, the eggs of birds, small quadrupeds, frogs and insects. It is said also to dig up the nests of wasps in order to eat the larvae, as the ratel—a closely allied South African form—is said to rob the bees of their honey. The male and female are seldom seen together, and are supposed to trace each other by the odour of the secretion in the anal glands. Fossil remains of the badger have been found in England in deposits of Pleistocene age. In eastern Persia this species is replaced by the Persian badger (*M. canescens*); two species—the white-tailed badger (*M. leucurus*) and the Chinese badger (*M. chinensis*) occur in eastern Asia; and another (*M. anacuma*) is found in Japan. The American badger (*Taxidea americana*) ranges over the greater part of the United States, and in habits closely resembles the European species, but seems to be more carnivorous. When badgers were more abundant than they now are, their skins, dressed with the hair attached, were commonly used for pistol furniture. They are now chiefly valued for the hair, that of the European badger being used in the manufacture of the best shaving-brushes while the softer hair of the American species is employed for the same purpose, and also for painters' pencils, and the fur is used for articles of ladies' apparel and trimmings. The Malay badger (*Mydaus meliceps*) is confined to the mountains of Java (where it is called the teledu), Sumatra and Borneo. The head and body are about 15 in. long, and the tail no more than an inch; the fur is dark brown, with the top of the head, neck and a broad dorsal stripe, white. Like the skunk, this animal can eject the foetid secretion of the anal glands. The sand-badgers (*Arctonyx*) are Asiatic; the best-known species (*A. collaris*) ranges from the eastern Himalayas to Burma; the smaller *A. taxoides* is found in Assam, Arakan and perhaps in China; and there is probably another in Tibet. In these the tail is much longer in proportion to the body than in the rest of the group.

The badger does not usually seek to attack, but, when driven to bay, its great muscular power and tough hide render it a formidable antagonist. The cruel sport of *badger-drawing* was formerly popular throughout Great Britain, but was prohibited about the middle of the 19th century, together with bear-baiting and bull-baiting. The badger-ward, who was usually attached to a bear-garden, kept his badger in a large box. Whenever a drawing was arranged, bets were made as to how many times the dog, usually a bull-terrier, would *draw* the badger, *i.e.* pull it out of its box, within a given number of minutes. As soon as the dog succeeded in doing this the animals were parted, often by the attendants biting their tails, and the badger was again shut up in his box, which, at a signal from the time-keeper, was again opened. Another method of baiting this animal is thus described in the *Encyclopaedia of Sport*: "They dig a place in the earth about a yard long, so that one end is four feet deep. At this end a strong stake is driven down. Then the badger's tail is split, a chain put through it, and fastened to the stake with such ability that the badger can come up to the other end of the place. The dogs are brought and set upon the poor animal who sometimes destroys several dogs before it is killed." The colloquial "to badger" (*i.e.* worry or tease) is a metaphorical derivative, and "drawing a badger" is similarly used in a figurative sense.

BADGER, a term of uncertain derivation (possibly derived from *bagger*, in allusion to the hawker's bag) for a dealer in food, such as corn or victuals (more expressly, fish, butter or cheese), which he has purchased in one place and brought for sale to another place; an itinerant dealer, corresponding to the modern hawker or huckster. An English statute of 1552 which summarized, and prescribed penalties against, the offences of engrossing, forestalling and regrating, specially exempted badgers from these penalties, but required them to be licensed by three justices of the peace for the county in which they dwelt. A statute of 1562-1563, after declaring that many people took up the trade of badgering "seeking only to live easily and to leave their honest labour," enacted that badgers should be licensed for a year only, should be householders of three years' standing in the county in which they were licensed, and should enter into recognizances not to engross or forestall. An act of 1844 abolished the offence of badgering, and repealed the statutes passed in relation to it. The word is still in common use in country districts.

BADGHIS ("home of the winds"), a district on the north-west of Afghanistan, between the Murghab and Hari Rud rivers, extending as far northward as the edge of the desert of Sarakhs. It includes the Chul formations through which the Russo-Afghan boundary runs. This region was surveyed by the boundary commission of 1885. Since that date it has been largely settled by the amir with purely Afghan tribes.

BADHAM, CHARLES (1813-1884), English scholar, was born at Ludlow, in Shropshire, on the 18th of July 1813. His father, Charles Badham, translator of Juvenal and an excellent classical scholar, was regius professor of physic at Glasgow; his mother was a cousin of Thomas Campbell, the poet. When about seven years old, Badham was sent to Switzerland, where he became a pupil of Pestalozzi. He was afterwards transferred to Eton, and in 1830 was elected to a scholarship at Wadham College, Oxford, but only obtained a third class in classics (1836), a failure which may have been due to his dislike of the methods of study then in fashion at Oxford, at a time when classical scholarship was in a very unsatisfactory condition. Shortly after taking his degree in 1837 Badham went to Italy, where he occupied himself in the study of ancient MSS., in particular those of the Vatican library. It was here that he began a life-long friendship with G. C. Cobet. He afterwards spent some time in Germany, and on his return to England was incorporated M.A. at Peterhouse, Cambridge, in 1847. Having taken holy orders, he was appointed headmaster of Louth grammar school, Lincolnshire (1851-1854), and subsequently headmaster of Edgbaston proprietary school, near Birmingham. In the interval he had taken the degree of D.D. at Cambridge (1852). In 1860 he received the honorary degree of doctor of letters at the university of Leiden. In 1866 he left England to take up the professorship of classics and logic in Sydney University, which he held until his death on the 26th of February 1884. He was twice married. Dr Badham's classical attainments were recognized by the most famous European critics, such as G. C. Cobet, Ludwig Preller, W. Dindorf, F. W. Schneidewin, J. A. F. Meineke, A. Ritschl and Tischendorf. Like many schoolmasters who are good scholars and even good teachers, he was not a professional success; and his hasty temper and dislike of anything approaching disingenuousness may have stood in the way of his advancement. But it is strange that a scholar and textual critic of his eminence and of European reputation should have made comparatively little mark in his native country. He published editions of Euripides, *Helena* and *Iphigenia in Tauris* (1851), *Ion* (1851); Plato's *Philebus* (1855, 1878); *Laches* and *Euthydemus* (1865), *Phaedrus*

(1851), *Symposium* (1866) and *De Platonis Epistolis* (1866). He also contributed to *Mnemosyne* (Cobet's journal) and other classical periodicals. His *Adhortatio ad Discipulos Academiae Sydniensis* (1869) contains a number of emendations of Thucydides and other classical authors. He also published an article on "The Text of Shakespere" in *Cambridge Essays* (1856); *Criticism applied to Shakespere* (1846); *Thoughts on Classical and Commercial Education* (1864).

A collected edition of his *Speeches and Lectures delivered in Australia* (Sydney, 1890) contains a memoir by Thomas Butler.

BADIUS, JODOCUS or JOSSE (1462-1535), sometimes called BADIUS ASCENSIUS from the village of Asche, near Brussels, where he was born, an eminent printer at Paris, whose establishment was celebrated under the name of *Prelum Ascensianum*. He was himself a scholar of considerable repute, had studied at Brussels and Ferrara, and before settling in Paris, had taught Greek for several years at Lyons. He illustrated with notes several of the classics which he printed, and was the author of numerous pieces, amongst which are a life of Thomas à Kempis, and a satire on the follies of women, entitled *Navicula Stultarum Mulierum*.

BADLESMERE, BARTHOLOMEW, BARON (1275-1322), English nobleman, was the son and heir of Gunselm de Badlesmere (d. 1301), and fought in the English army both in France and Scotland during the later years of the reign of Edward I. In 1307 he became governor of Bristol Castle, and afterwards Edward II. appointed him steward of his household; but these marks of favour did not prevent him from making a compact with some other noblemen to gain supreme influence in the royal council. Although very hostile to Earl Thomas of Lancaster, Badlesmere helped to make peace between the king and the earl in 1318, and was a member of the middle party which detested alike Edward's minions, like the Despensers, and his violent enemies like Lancaster. The king's conduct, however, drew him to the side of the earl, and he had already joined Edward's enemies when, in October 1321, his wife, Margaret de Clare, refused to admit Queen Isabella to her husband's castle at Leeds in Kent. The king captured the castle, seized and imprisoned Lady Badlesmere, and civil war began. After the defeat of Lancaster at Boroughbridge, Badlesmere was taken and hanged at Canterbury on the 14th of April 1322. His son and heir, Giles, died without children in 1338.

BADMINTON, or GREAT BADMINTON, a village in the southern parliamentary division of Gloucestershire, England, 100 m. W. of London by the Great Western railway (direct line to south Wales). Here is Badminton House, the seat of the dukes of Beaufort, standing in a park some 10 m. in circumference. The manor of Badminton was acquired in 1608 from Nicolas Boteler (to whose family it had belonged for several centuries) by Thomas, Viscount Somerset (d. 1650 or 1651), third son of Edward, 4th earl of Worcester, and was given by his daughter and heiress Elizabeth to Henry Somerset, 3rd marquess of Worcester and 1st duke of Beaufort (1629-1699), who built the present mansion (1682) on the site of the old manor house. It is a stone building in Palladian style, and contains a number of splendid paintings and much fine wood-carving. The parish church of St. Michael stands close to it. This is a Grecian building (1785), with a richly ornamented ceiling and inlaid altar-pavement; it also contains much fine sculpture in the memorials to former dukes, and is the burial-place of Field Marshal Lord Raglan, who was the youngest son of the 5th duke of Beaufort. Raglan Castle, near Monmouth, now a beautiful ruin, was the seat of the earls and the 1st marquess of Worcester, until it was besieged by the Parliamentarians in 1646, and after its capitulation was dismantled.

BADMINTON, a game played with rackets and shuttlecocks, its name being taken from the duke of Beaufort's seat in Gloucestershire. The game appears to have been first played in England about 1873, but before that time it was played in India, where it is still very popular. The Badminton Association in England was founded in 1895, and its laws were framed from a code of rules drawn up in 1887 for the Bath Badminton Club and based on the original Poona (1876) rules. In England the game is almost always played in a covered court. The All England championships for gentlemen's doubles, ladies' doubles, and mixed doubles were instituted in 1899, and for gentlemen's singles and ladies' singles in 1900; and the first championship between England and Ireland was played in 1904. Badminton may be played by daylight or by artificial light, either with two players on each side (the four-handed or double game) or with one player on each side (the two-handed or single game). The game consists entirely of volleying and is extremely fast, a single at Badminton being admitted to require more staying power than a single at lawn tennis. There is much scope for judgment and skill, *e.g.* in "dropping" (hitting the shuttle gently just over the net) and in "smashing" (hitting the shuttle with a hard downward stroke). The measurements of the court are shown on the accompanying plan.

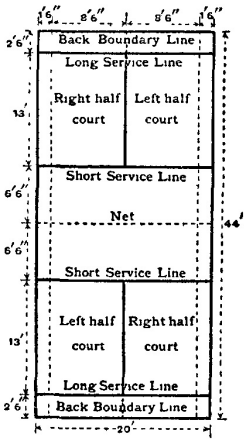

Diagram of Court.—In the two-handed game, the width of the court is reduced to 17 ft. and the long service lines are dispensed with, the back boundary lines being used as the long service lines, and the lines dividing the half courts being produced to meet the back boundary lines. The net posts are placed either on the side boundary lines or at any distance not exceeding 2 ft. outside the said lines; thus in the four-handed game, the distance between the posts is from 20 to 24 ft., and in the two-handed fame, from 17 to 21 ft. *N.B.*—With the exception of the net line, the dotted lines on the court apply only to the court for the two-handed game.

The Badminton hall should be not less than 18 ft. high. Along the net line is stretched a net 30 in. deep, from 17 to 24 ft. long according to the position of the posts, and edged on the top with white tape 3 in. wide. The top of the net should be 5 ft. from the ground at the centre and 5 ft. 1 in. at the posts. The shuttlecock (or shuttle) has 16 feathers from 2½ to 2¾ in. long, and weighs from 73 to 85 grains. The racket (which is of no specified size, shape or weight) is strung with strong fine gut and weighs as a rule about 6 oz.

[v.03 p.0190]

The game is for 15 or, rarely, for 21 aces, except in ladies' singles, when it is for 11 aces; and a rubber is the best of three games. Games of 21 aces are played only and always in matches decided by a single game, and generally in handicap contests. The right to choose ends or to serve first in the first game of the rubber is decided by tossing. If the side which wins the toss chooses first service, the other side chooses ends, and vice versa; but the side which wins the toss may call upon the other side to make first choice. The sides change ends at the beginning of the second game, and again at the beginning of the third game, if a third game is necessary. In the third game the sides change ends when the side which is leading reaches 8 in a game of 15 aces, and 6 in a game of 11 aces, or, in handicap games, when the score of either side reaches half the number of aces required to win the game. In matches of one game (21 aces) the sides change ends when the side which is leading has scored 11 aces. The side winning a game serves first in the next game, and, in the four-handed game, either player on the side that has won the last game may take first service in the next game.

In a game of 15 aces, when the score is "13 all" the side which first reaches 13 has the option of "setting" the game to 5, and when the score is "14 all" the side which first reaches 14 has the option of "setting" the game to 3, *i.e.* the side which first scores 5 or 3 aces, according as the game has been "set" at "13 all" or "14 all," wins. In ladies' singles, when the score is "9 all" the side first reaching 9 may "set" the game to 5, and when the score is "10 all" the side which first reaches 10 may "set" the game to 3. In games of 21 aces, the game may be "set" to 5 at "19 all" and to 3 at "20 all." There is no "setting" in handicap games.

In the four-handed game, the player who serves first stands in his right-hand half court and serves to the player who is standing in the opposite right-hand half court, the other players meanwhile standing anywhere on their side of the net. As soon as the shuttle is hit by the server's racket, all the players may stand anywhere on their side of the net. If the player served to returns the shuttle, *i.e.* hits it into any part of his opponents' court before it touches the ground, it has to be returned by one of the "in" (serving) side, and then by one of the "out" (non-serving) side, and so on, until a "fault" is made or the shuttle ceases to be "in play."[1] If the "in" side makes a "fault," the server loses his "hand" (serve), and the player served to becomes the server; but no score accrues. If the "out" side makes a "fault," the "in" side scores an ace, and the players on the "in" side change half courts, the server then serving from his left half court to the player in the opposite left

half court, who has not yet been served to. Only the player served to may take the service, and only the "in" side can score an ace. The first service in each innings is made from the right-hand half court. The side that starts a game has only one "hand" in its first innings; in every subsequent innings each player on each side has a "hand," the partners serving consecutively. While a side remains "in," service is made alternately from each half court into the half court diagonally opposite, the change of half courts taking place whenever an ace is scored. If, in play, the shuttle strikes the net but still goes over, the stroke is good; but if this happens in service and the service is otherwise good, it is a "let," *i.e.* the stroke does not count, and the server must serve again, even if the shuttle has been struck by the player served to, in which case it is assumed that the shuttle would have fallen into the proper half court. It is a "let," too, if the server, in attempting to serve, misses the shuttle altogether. It is a good stroke, in service or in play, if the shuttle falls on a line, or, in play, if it is followed over the net with the striker's racket, or passes outside either of the net posts and then drops inside any of the boundary lines of the opposite court. *Mutatis mutandis*, the above remarks apply to the two-handed game, the main points of difference being that, in the two-handed game, both sides change half courts after each ace is scored and the same player takes consecutive serves, whereas in the double game only the serving side changes half courts at an added ace and a player may not take two consecutive serves in the same game.

It is a "fault" (*a*) if the service is overhand, *i.e.* if the shuttle when struck is higher than the server's waist; (*b*) if, in serving, the shuttle does not fall into the half court diagonally opposite that from which service is made; (*c*) if, before the shuttle is struck by the server, both feet of the server and of the player served to are not inside their respective half courts, a foot *on* a line being deemed out of court; (*d*) if, in play, the shuttle falls outside the court, or, in service or play, passes through or under the net, or hangs in the net, or touches the roof or side walls of the hall or the person or dress of any player; (*e*) if the shuttle "in play" is hit before it reaches the striker's side; (*f*) if, when the shuttle is "in play," a player touches the net or its supports with his racket, person or dress; (*g*) if the shuttle is struck twice successively by the same player, or if it is struck by a player and his partner successively, or if it is not distinctly hit, *i.e.* if it is merely caught on the racket and spooned over the net; (*h*) if a player wilfully obstructs his opponent.

For full information on the laws of the game the reader is referred to the *Laws of Badminton and the Rules of the Badminton Association*, published annually (London). See also an article by S. M. Massey in the *Badminton Magazine* (February 1907), reprinted in a slightly revised form in the *Badminton Gazette* (November 1907). Until October 1907 *Lawn Tennis and Badminton* was the official organ of the Badminton Association; in November 1907 the *Badminton Gazette* became the official organ.

[1] The shuttle is "in play" from the time it is struck by the server's racket until it touches the ground, or touches the net without going over, or until a "fault" is made.

BADNUR, a town of British India, the headquarters of the district of Betul in the Central Provinces. It consists, besides the European houses, of two bazaars. Pop. (1901) 3766. There is a good *serai* or inn for native travellers, and a *dak bungalow* or resting-place for Europeans. Not far from Badnur is Kherla, the former residence of the Gond rajas, where there is an old fort, now in ruins, which used to be held by them.

BADRINATH, a village and celebrated temple in British India, in the Garhwal district of the United Provinces. It is situated on the right bank of the Vishnuganga, a tributary of the Alaknanda river, in the middle of a valley nearly 4 m. in length and 1 in breadth. The village is small, containing only twenty or thirty huts, in which reside the Brahmans and the attendants of the temple. This building, which is considered a place of high sanctity, is by no means equal to its great celebrity. It is about 40 or 50 ft. in height, built in the form of a cone, with a small cupola, on the top of which is a gilt ball and spire, and contains the shrine of Badrinath, dedicated to an incarnation of Vishnu. The principal idol is of black stone and is 3 ft. in height. Badrinath is a favourite resort of pilgrims from all parts of India. In ordinary years the number varies from 7000 to 10,000; but every twelfth year, when the festival of Kumbh-mela is celebrated, the concourse of persons is said to be 50,000. In addition to the gifts of votaries, the temple enjoys a further source of revenue from the rents of villages assigned by former rajas. Successive temples have been shattered by avalanches, and the existing building is modern. It is situated among mountains rising 23,000 ft. above the level of the sea. Elevation of the site of the temple, 10,294 ft.

BADULLA, the capital of the province of Uva, Ceylon, 54 m. S.E. of Kandy. It is the seat of a government agent and district judge, besides minor courts. It was in Kandyan times the home of a prince who ruled Uva as a principality. Badulla stands 2222 ft. above sea-level; the average annual rainfall is 79½ in.; the average temperature, 73°. The population of the town in 1901 was 5924; of the Badulla district, 186,674. There is a botanic garden; and the town, being almost encircled by a river—the Badullaeya—and overshadowed by the Naminacooly Kande range of mountains (highest peak 6680 ft.), is very picturesquely situated. The railway terminus at Bandarawella is 18 m. from Badulla. Tea is cultivated by the planters, and rice, fruit and vegetables by the natives in the district.

[v.03 p.0191]

BAEDEKER, KARL (1801-1859), German publisher, was born at Essen on the 3rd of November 1801. His father had a printing establishment and book-shop there, and Karl followed the same business independently in Coblenz. Here he began to issue the first of the series of guide-books with which his name is associated. They followed the model of the English series instituted by John Murray, but developed in the course of years so as to cover the greater part of the civilized world, and later were issued in English and French as well as German. Baedeker's son Fritz carried on the business, which in 1872 was transferred to Leipzig.

BAEHR, JOHANN CHRISTIAN FELIX (1798-1872), German philologist, was born at Darmstadt on the 13th of June 1798. He studied at the university of Heidelberg where he was appointed professor of classical philology in 1823, chief librarian in 1832, and on the retirement of G. F. Creuzer became director of the philological seminary. He died at Heidelberg on the 29th of November 1872. His earliest works were editions of Plutarch's *Alcibiades* (1822), *Philopoemen, Flamininus, Pyrrhus* (1826), the fragments of Ctesias (1824), and Herodotus (1830-1835, 1855-1862). But most important of all were his works on Roman literature and humanistic studies in the middle ages: *Geschichte der römischen Litteratur* (4th ed., 1868-1870), and the supplementary volumes, *Die christlichen Dichter und Geschichtschreiber Roms* (2nd ed., 1872), *Die christlich-römische Theologie* (1837), *Geschichte der römischen Litteratur im karolingischen Zeitalter* (1840).

BAEL FRUIT (*Aegle marmelos*). *Aegle* is a genus of the botanical natural order Rutaceae, containing two species in tropical Asia and one in west tropical Africa. The plants are trees bearing strong spines, with alternate, compound leaves each with three leaflets and panicles of sweet-scented white flowers. *Aegle marmelos*, the bael- or bel-fruit tree (also known as Bengal quince), is found wild or cultivated throughout India. The tree is valued for its fruit, which is oblong to pyriform in shape, 2-5 in. in diameter, and has a grey or yellow rind and a sweet, thick orange-coloured pulp. The unripe fruit is cut up in slices, sun-dried and used as an astringent; the ripe fruit is described as sweet, aromatic and cooling. The wood is yellowish-white, and hard but not durable. The name *Aegle* is from one of the Hesperides, in reference to the golden fruit; *marmelos* is Portuguese for quince.

BAENA, a town of southern Spain, in the province of Cordova; 32 m. by road S.E. of the city of Cordova. Pop. (1900) 14,539. Baena is picturesquely situated near the river Marbella, on the slope of a hill crowned with a castle, which formerly belonged to the famous captain Gonzalo de Cordova. Farming, horse-breeding, linen-weaving and the manufacture of olive-oil are the chief local industries. The nearest railway station is Luque (pop. 4972), 4 m. S.E. on the Jaén-Lucena line. The site of the Roman town (Baniana or Biniana) can still be traced, and various Roman antiquities have been disinterred. In 1292 the Moors under Mahommed II. of Granada vainly besieged Baena, which was held for Sancho IV. of Castile; and the five Moorish heads in its coat-of-arms commemorate the defence.

BAER, KARL ERNST VON (1792-1876), German biologist, was born at Piep, in Esthonia, on the 29th of February 1792. His father, a small landowner, sent him to school at Reval, which he left in his eighteenth year to study medicine at Dorpat University. The lectures of K. F. Burdach (1776-1847) suggested research in the wider field of life-history, and as at that time Germany offered more facilities for, and greater encouragement to, scientific work, von Baer went to Würzburg,

where J. I. J. Döllinger (1770-1841), father of the Catholic theologian, was professor of anatomy. In teaching von Baer, Döllinger gave a direction to his studies which secured his future pre-eminence in the science of organic development. He collaborated with C. H. Pander (1794-1865) in researches on the evolution of the chick, the results of which were first published in Burdach's treatise on physiology. Continuing his investigations alone von Baer extended them to the evolution of organisms generally, and after a sojourn at Berlin he was invited by his old teacher Burdach, who had become professor of anatomy at Königsberg, to join him as prosector and chief of the new zoological museum (1817). Von Baer's great discovery of the human ovum is the subject of his *Epistola de Ovo Mammalium et Hominis Genesi* (Leipzig, 1827), and in the following year he published the first part of his *History of the Evolution of Animals* (*Ueber die Entwickelungsgeschichte der Thiere*), the second part following in 1837. In this work he demonstrated first, that the Graafian follicles in the ovary are not the actual eggs, but that they contain the spherical vesicle, which is the true ovum, a body about the one hundred and twentieth of an inch in diameter, wherein lie the properties transmitting the physical and mental characteristics of the parent or grandparent, or even of more remote ancestors. He next showed that in all vertebrates the primary stage of cleavage of the fertilized egg is followed by modification into leaf-like germ layers—skin, muscular, vascular and mucous—whence arise the several organs of the body by differentiation. He further discovered the gelatinous, cylindrical cord, known as the *chorda dorsalis*, which passes along the body of the embryo of vertebrates, in the lower types of which it is limited to the entire inner skeleton, while in the higher the backbone and skull are developed round it. His "law of corresponding stages" in the development of vertebrate embryos was exemplified in the fact recorded by him about certain specimens preserved in spirit which he had omitted to label. "I am quite unable to say to what class they belong. They may be lizards, or small birds, or very young mammalia, so complete is the similarity in the mode of formation of the head and trunk in these animals. The extremities are still absent, but even if they had existed in the earliest stage of the development we should learn nothing, because all arise from the same fundamental form." Again, in his *History of Evolution* he suggests, "Are not all animals in the beginning of their development essentially alike, and is there not a primary form common to all?" (i. p. 223). Notwithstanding this, the "telic" idea, with the archetypal theory which it involved, possessed von Baer to the end of his life, and explains his inability to accept the theory of unbroken descent with modification when it was propounded by Charles Darwin and A. R. Wallace in 1858. The influence of von Baer's discoveries has been far-reaching and abiding. Not only was he the pioneer in that branch of biological science to which Francis Balfour, gathering up the labours of many fellow-workers, gave coherence in his *Comparative Embryology* (1881), but the impetus to T. H. Huxley's researches on the structure of the *medusae* came from him (*Life*, i. 163), and Herbert Spencer found in von Baer's "law of development" the "law of all development" (*Essays*, i. 30). In 1834 von Baer was appointed librarian of the Academy of Sciences of St Petersburg. In 1835 he published his *Development of Fishes*, and as the result of collection of all available information concerning the fauna and flora of the Polar regions of the empire, he was appointed leader of an Arctic expedition in 1837, The remainder of his active life was occupied in divers fields of research, geological as well as biological, an outcome of the latter being his fine monograph on the fishes of the Baltic and Caspian Seas. One of the last works from his prolific pen was an interesting autobiography published at the expense of the Esthonian nobles on the celebration of the jubilee of his doctorate in 1864. Three years afterwards he received the Copley medal. He died at Dorpat on the 28th of November 1876.

(E. Cʟ.)

BAER, WILLIAM JACOB (1860-), American painter, was born on the 29th of January 1860 in Cincinnati, Ohio. He studied at Munich in 1880-1884. He had much to do with the revival in America of the art of miniature-painting, to which he turned in 1892, and was the first president of the Society of Painters in Miniature, New York. Among his miniatures are "The Golden Hour," "Daphne," "In Arcadia" and "Madonna with the Auburn Hair."

BAETYLUS (Gr. βαίτυλος, βαιτύλιον), a word of Semitic origin (= bethel) denoting a sacred stone, which was supposed to be endowed with life. These fetish objects of worship were meteoric stones, which were dedicated to the gods or revered as symbols of the gods themselves (Pliny, *Nat. Hist.* xvii. 9; Photius, *Cod.* 242). In Greek mythology the term was specially applied to the stone supposed to have been swallowed by Cronus (who feared misfortune from his own children) in mistake for his infant son Zeus, for whom it had been substituted by Uranus and Gaea, his wife's parents (*Etymologicum Magnum*, s.v.). This stone was carefully preserved at Delphi, anointed with oil every day and on festal occasions covered with raw wool (Pausanias x. 24). In Phoenician mythology, one of the sons of Uranus is named Baetylus. Another famous stone was the effigy of Rhea Cybele, the holy stone of Pessinus, black and of irregular form, which was brought to Rome in 204 B.C. and placed in the mouth of the statue of the goddess. In some cases an attempt was made to give a more regular form to the original shapeless stone: thus Apollo Agyieus was represented by a conical pillar with pointed end, Zeus Meilichius in the form of a pyramid. Other famous baetylic idols were those in the temples of Zeus Casius at Seleucia, and of Zeus Teleios at Tegea. Even in the declining years of paganism, these idols still retained their significance, as is shown by the attacks upon them by ecclesiastical writers.

[v.03 p.0192]

See Munter, *Über die vom Himmel gefallenen Steine* (1805); Bösigk, *De Baetyliis* (1854); and the exhaustive article by F. Lenormant in Daremberg and Saglio's *Dictionary of Antiquities*.

BAEYER, JOHANN FRIEDRICH WILHELM ADOLF VON (1835-), German chemist, was born at Berlin on the 31st of October 1835, his father being Johann Jacob von Baeyer (1794-1885), chief of the Berlin Geodetical Institute from 1870. He studied chemistry under R. W. Bunsen and F. A. Kekulé, and in 1858 took his degree as Ph.D. at Berlin, becoming privat-docent a few years afterwards and assistant professor in 1866. Five years later he was appointed professor of chemistry at Strassburg, and in 1875 he migrated in the same capacity to Munich. He devoted himself mainly to investigations in organic chemistry, and in particular to synthetical studies by the aid of "condensation" reactions. The Royal Society of London awarded him the Davy medal in 1881 for his researches on indigo, the nature and composition of which he did more to elucidate than any other single chemist, and which he also succeeded in preparing artificially, though his methods were not found commercially practicable. To celebrate his seventieth birthday his scientific papers were collected and published in two volumes (*Gesammelte Werke*, Brunswick, 1905), and the names of the headings under which they are grouped give some idea of the range and extent of his chemical work:—(1) organic arsenic compounds, (2) uric acid group, (3) indigo, (4) papers arising from indigo researches, (5) pyrrol and pyridine bases, (6) experiments on the elimination of water and on condensation, (7) the phthaleins, (8) the hydro-aromatic compounds, (9) the terpenes, (10) nitroso compounds, (11) furfurol, (12) acetylene compounds and "strain" (*Spannungs*) theory, (13) peroxides, (14) basic properties of oxygen, (15) dibenzalacetone and triphenylamine, (16) various researches on the aromatic and (17) the aliphatic series.

BAÉZA (anc. *Beatia*), a town of southern Spain, in the province of Jaén; in the Loma de Ubeda, a mountain range between the river Guadalquiver on the S. and its tributary the Guadalimar on the N. Pop. (1900) 14,379. Baéza has a station 3 m. S.W. on the Liná res-Almería railway. Its chief buildings are those of the university (founded in 1533, and replaced by a theological seminary), the cathedral and the Franciscan monastery. The Cordova and Ubeda gates, and the arch of Baéza, are among the remains of its old fortifications, which were of great strength. The town has little trade except in farm-produce; but its red dye, made from the native cochineal, was formerly celebrated. In the middle ages Baéza was a flourishing Moorish city, said to contain 50,000 inhabitants; but it was sacked in 1239 by Ferdinand III. of Castile, who in 1248 transferred its bishopric to Jaén. It was the birthplace of the sculptor and painter, Caspar Becarra.

BAFFIN, WILLIAM (1584-1622), English navigator and discoverer. Nothing is known of his early life, but it is conjectured that he was born in London of humble origin, and gradually raised himself by his diligence and perseverance. The earliest mention of his name occurs in 1612, in connexion with an expedition in search of a North-West Passage, under the orders of Captain James Hall, whom he accompanied as chief pilot. Captain Hall was murdered in a fight with the natives on the west coast of Greenland, and during the two following years Baffin served in the Spitsbergen whale-fishery, at that time controlled by the Muscovy Company. In 1615 he entered the service of the Company for the discovery of the North-West Passage, and accompanied Captain Robert Bylot as pilot of the little ship "Discovery," and now carefully examined Hudson Strait. The accuracy of Baffin's tidal and astronomical observations on this voyage was confirmed in a remarkable manner by Sir Edward Parry, when passing over the same ground, two centuries later (1821). In the following

year Baffin again sailed as pilot of the "Discovery," and passing up Davis Strait discovered the fine bay to the north which now bears his name, together with the magnificent series of straits which radiate from its head and were named by him Lancaster, Smith and Jones Sounds, in honour of the generous patrons of his voyages. On this voyage he had sailed over 300 m. farther north than his predecessor Davis, and for 236 years his farthest north (about lat. 77° 45′) remained unsurpassed in that sea. All hopes, however, seemed now ended of discovering a passage to India by this route, and in course of time even Baffin's discoveries came to be doubted until they were re-discovered by Captain Ross in 1818. Baffin next took service with the East India Company, and in 1617-1619 performed a voyage to Surat in British India, and on his return received the special recognition of the Company for certain valuable surveys of the Red Sea and Persian Gulf which he had made in the course of the voyage. Early in 1620 he again sailed to the East, and in the Anglo-Persian attack on Kishm in the Persian Gulf, preparatory to the reduction of Ormuz, he received his death-wound and died on the 23rd of January 1622. Besides the importance of his geographical discoveries, Baffin is to be remembered for the importance and accuracy of his numerous scientific and magnetic observations, for one of which (the determination of longitude at sea by lunar observation) the honour is claimed of being the first of its kind on record.

BAFFIN BAY and **BAFFIN LAND,** an arctic sea and an insular tract named after the explorer William Baffin. Baffin or Baffin's Bay is part of the long strait which separates Baffin Land from Greenland. It extends from about 69° to 78° N. and from 54° to 76° W. From the northern end it is connected (1) with the polar sea northward by Smith Sound, prolonged by Kane Basin and Kennedy and Robeson Channels; (2) with the straits which ramify through the archipelago to the north-west by narrow channels at the head of Jones Sound, from which O. Sverdrup and his party conducted explorations in 1900-1902; (3) with the more southerly part of the same archipelago by Lancaster Sound. Baffin Bay was explored very fully in 1616 by Baffin. The coasts are generally high, precipitous and deeply indented. The most important island on the east side is Disco, to the north of Disco Bay, Greenland. During the greater part of the year this sea is frozen, but, while hardly ever free of ice, there are normally navigable channels along the coasts from the beginning of June to the end of September connected by transverse channels. The bay is noted as a centre of the whale and seal fishery. At more than one point a depth exceeding 1000 fathoms has been ascertained.

Baffin Land is a barren insular tract, included in Franklin district, Canada, with an approximate area of 236,000 sq. m., situated between 61° and 90° W. and 62° and 74° N. The eastern and northern coasts are rocky and mountainous, and are deeply indented by large bays including Frobisher and Home Bays, Cumberland Sound and Admiralty Inlet. Baffin Land is separated from Greenland by Baffin Bay and Davis Strait, from Ungava by Hudson Strait, from Keewatin and Melville Peninsula by Fox Channel and Fury-and-Hecla Strait, from Boothia Peninsula and North Somerset by the Gulf of Boothia and Prince Regent Inlet, and from North Devon by Lancaster Sound. Various names are given to various parts of the land [v.03 p.0193] —thus the north-western part is called Cockburn Land, farther east is North Galloway; on the extreme eastern peninsula are Cumberland and Penny Lands, while the southern is called Meta Incognita; in the west is Fox Land. In the southern part of the interior are two large lakes, Amadjuak, which lies at an altitude of 289 ft., and Nettiling or Kennedy.

BAGAMOYO, a seaport of German East Africa in 6° 22′ S., 38° 55′ E. Pop. about 18,000, including a considerable number of British Indians. Being the port on the mainland nearest the town of Zanzibar, 26 m. distant, Bagamoyo became the starting-point for caravans to the great lakes, and an entrepôt of trade with the interior of the continent. It possesses no natural harbour. The beach slopes gently down and ships anchor about 2 m. off the coast. The town is oriental in character. The buildings include the residence of the administrator, barracks, a government school for natives, a mosque and Hindu temple, and the establishment of the *Mission du Sacré Cœur*, which possesses a large plantation of coco-nut palms. Bagamoyo is in telegraphic communication with Zanzibar and with the other coast towns of German East Africa, and has regular steamship communication with Zanzibar. Of the explorers who made Bagamoyo the starting-point for their journeys to the interior of Africa, the most illustrious were Sir Richard Burton, J. H. Speke, J. A. Grant and Sir H. M. Stanley.

BAGATELLE (French, from Ital. *bagatella*, *bagata*, a trifle), primarily a thing of trifling importance. The name, though French, is given to a game which is probably of English origin, though its connexion with the *shovel-board* of Cotton's *Complete Gamester* is very doubtful. Strutt does not mention it. The game is very likely a modification of billiards, and is played on an oblong board or table varying in size from 6 ft. by 1½ ft. to 10 ft. by 3 ft. The bed of the table is generally made of slate, although, in the smaller sizes, wood covered with green cloth is often used. The sides are cushioned with india-rubber. The head is semicircular and fitted with 9 numbered cups set into the bed, their numbers showing the amount scored by putting a ball into them. An ordinary billiard-cue and nine balls, one black, four red and four white, are used. The black ball is placed upon a spot about 9 in. in front of hole 1, and about 18 in. from the player's end of the board a line (the baulk) is drawn across it, behind which is another spot for the player's ball. (These measurements of course differ according to the size of the table.) Some modern tables have pockets as well as cups.

Bagatelle Proper.—The black ball having been placed on the upper spot, the players "string" for the lead, the winner being that player who plays his ball into the highest hole. Any number may play, either separately, or in sides. Each player in turn plays all eight balls up the table, no score being allowed until a ball has touched the black ball, the object being to play as many balls as possible into the holes, the black ball counting double. Balls missing the black at the beginning, those rolling back across the baulk-line, and those forced off the table are "dead" for that round and removed. The game is decided by the aggregate score made in an agreed number of rounds.

Sans Égal.—This is a French form of the game. Two players take part, one using the red and one the white balls. After stringing for lead, the leader plays at the black, forfeiting a ball if he misses. His opponent then plays at the black if it has not been touched, otherwise any way he likes, and each then plays alternately, the object being to hole the black and his own balls, the winner being the one who scores the highest number of points. If a player holes one of his opponent's balls it is scored for his opponent. The game is decided by a certain number of rounds, or by points, usually 21 or 31. In other matters the rules of bagatelle apply.

The Cannon Game.—This is usually considered the best and most scientific of bagatelle varieties. Tables without cups are sometimes used. As in billiards three balls are required, the white, spot-white and black, the last being spotted and the non-striker's ball placed midway between holes 1 and 9. The object of the game is to make cannons (caroms), balls played into holes, at the same time counting the number of the holes, but if a ball falls into a hole during a play in which no cannon is made the score counts for the adversary. If the striker's ball is holed he plays from baulk; if an object-ball, it is spotted as at the beginning of the game. A cannon counts 2; missing the white object-ball scores 1 to the adversary; missing the black, 5 to the adversary. If there are pockets, the striker scores 2 for holing the white object-ball and 3 for holing the black, but a cannon must be made by the same stroke; otherwise the score counts for the adversary.

The Irish Cannon Game.—The rules of the *cannon game* apply, except that in all cases pocketed balls count for the adversary.

Mississippi.—This variation is played with a bridge pierced with 9 on more arches, according to the size of the table, the arches being numbered from 1 upwards. All nine balls are usually played, though the black is sometimes omitted, each player having a round, the object being to send the balls through the arches. This may not be done directly, but the balls must strike a cushion first, the black, if used, counting double the arch made. If a ball is played through an arch, without first striking a cushion, the score goes to the adversary, but another ball, lying in front of the bridge, may be sent through by the cue-ball if the latter has struck a cushion. If a ball falls into a cup the striker scores the value of the cup as well as of the arch.

Trou Madame.—This is a game similar to *Mississippi*, with the exceptions that the ball need not be played on to a cushion, and that, if a ball falls into a cup, the opponent scores the value of the cup and not the striker.

Bell-Bagatelle is played on a board provided with cups, arches from which bells hang, and stalls each marked with a number. The ball is played up the side and rolls down the board, which is slightly inclined, through the arches or into a cup or stall, the winner scoring the highest with a certain number of balls.

BAGDAD, or Baghdad, a vilayet of Asiatic Turkey, situated between Persia and the Syrian desert, and including the greater part of ancient Babylonia. The original vilayet extended from Mardin on the N. to the Persian Gulf on the S., and from the river Khabor on the W. to the Persian frontier on the E. From the middle of the 17th century, when this region was annexed by the Turks, until about the middle of the 19th century, the vilayet of Bagdad was the largest province of the Turkish empire, constituting at times an almost independent principality. Since then, however, it has lost much of its importance and all of its independence. The first reduction in size occurred in 1857, when some of the western portion of the vilayet was added to the newly created sanjak of Zor. In 1878 the Mosul vilayet was created out of its northern, and in 1884 the Basra vilayet out of its southern sanjaks. At the present time it extends from a point just below Kut el-Amara to a point somewhat above Tekrit on the Tigris, and from a point somewhat below Samawa to a point a little above Anah on the Euphrates. It is still, territorially, the largest province of the empire, and includes some of the most fertile lands in the Euphrates-Tigris valleys; but while possessing great possibilities for fertility, by far the larger portion of the vilayet is to-day a desert, owing to the neglect of the irrigation canals on which the fertility of the valley depends. From the latitude of Bagdad northward the region between the two rivers is an arid, waterless, limestone steppe, inhabited only by roving Arabs. From the latitude of Bagdad southward the country is entirely alluvial soil, deposited by the rivers Tigris and Euphrates, possessing great possibilities of fertility, but absolutely flat and subject to inundations at the time of flood of the two rivers. At that season much of the country, including the immediate surroundings of Bagdad, is under water. During the rest of the year a large part of the country is a parched and barren desert, and much of the remainder swamps and lagoons. Wherever there is any pretence at irrigation, along the banks of the two great rivers and by the few canals which are still in existence, the yield is enormous, and the shores of the Tigris and Euphrates in the neighbourhood of Bagdad and Hilla seem to be one great palm garden. Sultan Abd-ul-Hamid II. personally acquired large tracts of land in various parts of the vilayet. These so-called *senniehs* are well farmed and managed, in conspicuous contrast with the surrounding territory. Canals and dikes have been constructed to control and distribute the much-needed water, and the officials are housed in new buildings of substantial appearance. Indeed, wherever one finds a new and prosperous-looking village, it may be assumed to belong to the sultan. These *senniehs* are an advantage to the country in that they give security to their immediate region and certain employment to some part of its population. On the other hand, they withdrew large tracts of fertile and productive land from taxation (one-half of the cultivated land of the vilayet was said to be administered for the sultan's privy purse), and thus greatly reduced the revenue of the vilayet.

[v.03 p.0194]

The chief city of the vilayet is its capital, Bagdad. Between the Euphrates and the Arabian plateau lie the sacred cities of Kerbela or Meshed-Hosain, and Nejef or Meshed Ali, with a population of 20,000 to 60,000 each, while a number of towns, varying in population from 3000 to 10,000, are found along the Euphrates (Anah, Hit, Ramadieh, Musseyib, Hilla, Diwanieh and Samawa) and the Tigris (Tekrit, Samarra and Kut el-Amara). The settled population lies entirely along the banks of these streams and the canals and lagoons westward of the Euphrates, between Kerbela and Nejef. Away from the banks of the rivers, between the Euphrates and the Tigris and between the latter and the Persian mountains, are tribes of wandering Arabs, some of whom possess great herds of horses, sheep, goats, asses and camels, while in and by the marshes other tribes, in the transition stage from the nomadic to the settled life, own great herds of buffaloes. Of the wandering Arab tribes, the most powerful is the great tribe of Shammar, which ranges over all Mesopotamia. In January and February they descend as low as the neighbourhood of Diwanieh in such numbers that even Bagdad is afraid. Here and there are regions occupied by a semi-sedentary population, called *Madan*, occupying reed huts huddled around mud castles, called *meftul*. These, like the Bedouin Arabs, are practically independent, waging constant warfare among themselves and paying an uncertain tribute to the Turkish government. In general, Turkish rule is confined to the villages, towns and cities along the river banks, in and by which garrisons are located. Since the time (1868-1872) of Midhat Pasha, who did much to bring the independent Arab tribes under control, the Turkish government has been, however, gradually strengthening its grip on the country and extending the area of conscription and taxation. But from both the racial and religious standpoint, the Arab and Persian Shi'as, who constitute the vast bulk of the population, regard the Turks as foreigners and tyrants.

Of crops the vilayet produces wheat (which is indigenous), rice, barley (which takes the place of oats as food for horses), durra (a coarse, maize-like grain), sesame, cotton and tobacco; of fruits, the date, orange, lemon, fig, banana and pomegranate. The country is naturally treeless, except for the tamarisk, which grows by the swamps and along the river-beds. Here and there one sees a solitary *sifsaf* tree, or a small plantation of poplars or white mulberries, which trees, with the date-palm, constitute the only timber of the country. The willows reported by some travellers are in reality a narrow-leaved variety of poplar.

Besides the buffaloes and a few humped Indian oxen, there are no cattle in the country. Of wild animals, the pig, hyena, jackal, antelope and hare are extremely numerous; lions are still found, and wolves and foxes are not uncommon. Snipe and various species of wild fowl are found in the marshes, and pelicans and storks abound along the banks of the Euphrates and Tigris. Fish are caught in great numbers in the rivers and marshes, chiefly barbel and carp, and the latter attain so great a size that one is a sufficient load for an ass. The principal exports of the province are coarse wool, hides, dates and horses. At various points, especially at Hit, and from Hit southward along the edge of the Arabian plateau occur bitumen, naphtha and white petroleum springs, all of which remain undeveloped. The climate is very hot in summer, with a mean temperature of 97° F. From April to November no rain falls; in November the rains commence, and during the winter the thermometer falls to 46° F.

Cholera is endemic in some parts of the vilayet, and before 1875 the same was true of the bubonic plague. At that date this disease was stamped out by energetic measures on the part of the government, but it has reappeared again in recent years, introduced apparently from India or Persia by pilgrims. There are four great centres of pilgrimage for Shi'ite Moslems in the vilayet, Samarra, Kazemain, a suburb of Bagdad, Kerbela and Nejef. These are visited annually by tens of thousands of pilgrims, not only from the surrounding regions, but also from Persia and India; many of whom bring their dead to be buried in the neighbourhood of the sacred tombs.

Unpleasant, but not dangerous, is another disease, the so-called "Bagdad date-mark," known elsewhere as the "Aleppo button," &c. This disease extends along the rivers Tigris and Euphrates, and the country adjacent from Aleppo and Diarbekr to the Persian Gulf, although there are individual towns and regions in this territory which seem to be exempt. It shows itself as a boil, attacking the face and extremities. It appears in two forms, known to the natives as male and female respectively. The former is a dry scaly sore, and the latter a running, open boil. It is not painful but leaves ugly scars. The natives all carry somewhere on their face, neck, hands, arms or feet the scars of these boils which they have had as children. European children born in the country are apt to be seriously disfigured, as in their case the boils almost invariably appear on the face, and whereas native children have as a rule but one boil, those born of European parents will have several. Adult foreigners visiting the country are also liable to be attacked, and women, especially, rarely escape disfigurement if they stay in the country for any length of time. The boils last for about a year, after which there is no more likelihood of a recurrence of the trouble than in the case of smallpox.

The area of the vilayet is 54,480 sq. m. The population is estimated at 852,000; Christians, 8000, principally Nestorians or Chaldaeans; Jews, 54,000; Moslems, 790,000, of whom the larger part are Shi'as.

See G. le Strange, *Baghdad under the Abbasid Caliphate* (1901); *The Lands of the Eastern Caliphate* (Cambridge, 1905); V. Cuinet, *La Turquie d'Asie* (Paris, 1890); J. P. Peters, *Nippur* (New York and London, 1897); Ed. Sachau, *Am Euphrat und Tigris* (Leipzig, 1900); A. V. Geere, *By Nile and Euphrates* (Edinburgh, 1904).

(J. P. Pe.)

BAGDAD, or Baghdad, the capital of the Turkish vilayet of the same name. It is the headquarters of the VI. Army Corps, which garrisons also the Basra and Mosul vilayets. It lies on both sides of the river Tigris, in an extensive desert plain which has scarcely a tree or village throughout its whole extent, in latitude 33° 20′ N., longitude 44° 24′ E. At this point the Tigris and the Euphrates approach each other most nearly, the distance between them being little more than 25 m. At this point also the two rivers are connected by a canal, the northernmost of a series of canals which formerly united the

two great waterways, and at the same time irrigated the intervening plain. This canal, the Sakhlawieh (formerly Isa), leaves the Euphrates a few miles above Feluja and the bridge of boats, near the ruins of the ancient Anbar. As it approaches Bagdad it spreads out in a great marsh, and finally, through the Masudi canal, which encircles western Bagdad, enters the Tigris below the town. At the time of Chesney's survey of the Euphrates in 1838 this canal was still navigable for craft of some size. At present it serves no other purpose than to increase the floods which periodically turn Bagdad into an island city, and sometimes threaten to overwhelm the dikes which protect it and to submerge it entirely.

The original city of Bagdad was built on the western bank of the Tigris, but this is now, and has been for centuries, little more than a suburb of the larger and more important city on the eastern shore, the former containing an area of only 146 acres within the walls, while the latter extends over 591 acres. Both the eastern and the western part of the city were formerly enclosed by brick walls, with large round towers at the principal angles and smaller towers intervening at
[v.03 p.0195]
shorter distances, the whole surrounded by a deep fosse. There were three gates in the western city and four in the eastern; one of the latter, however, on the north side, called "Gate of the Talisman" from an Arabic inscription bearing the date A.D. 1220, has remained closed since the capture of the city by Murad IV. in 1638. These walls all fell into decay long since; at places they were used as brick quarries, and finally the great reforming governor, (1868-1872), Midhat Pasha, following the example set by many European cities, undertook to destroy them altogether and utilize the free space thus obtained as a public park and esplanade. His plans were only partially carried out. At present fragments of the walls exist here and there, with the great ditch about them, while elsewhere a line of mounds marks their course. A great portion of the ground within the wall lines is not occupied by buildings, especially in the north-western quarter; and even in the more populous parts of the city, near the river, a considerable space between the houses is occupied by gardens, where pomegranates, figs, oranges, lemons and date-palms grow in great abundance, so that the city, when seen at a distance, has the appearance of rising out of the midst of trees.

Along the Tigris the city spreads out into suburbs, the most important of which is Kazemain, on the western side of the river northward, opposite which on the eastern side lies Muazzam. The former of these is connected with western Bagdad by a very primitive horse-tramway, also a relic of Midhat Pasha's reforms. The two parts of the city are joined by pontoon bridges, one in the suburbs and one in the main city. The Tigris is at this point some 275 yds. wide and very deep. Its banks are of mud, with no other retaining walls than those formed by the foundations of the houses, which are consequently always liable to be undermined by the action of the water. The western part of the city, which is very irregular in shape, is occupied entirely by Shi'as. It has its own shops, bazaars, mosques, &c., and constitutes a quarter by itself. Beyond the wall line on that side vestiges of ancient buildings are visible in various directions, and the plain is strewn with fragments of bricks, tiles and rubbish. A burying-ground has also extended itself over a large tract of land, formerly occupied by the streets of the city. The form of the new or eastern city is that of an irregular oblong, about 1500 paces in length by 800 in breadth. The town has been built without the slightest regard to regularity; the streets are even more intricate and winding than those in most other Eastern towns, and with the exception of the bazaars and some open squares, the interior is little else than a labyrinth of alleys and passages. The streets are unpaved and in many places so narrow that two horsemen can scarcely pass each other; as it is seldom that the houses have windows facing the thoroughfares, and the doors are small and mean, they present on both sides the gloomy appearance of dead walls. All the buildings, both public and private, are constructed of furnace-burnt bricks of a yellowish-red colour, principally derived from the ruins of other places, chiefly Madain (Ctesiphon), Wasit and Babylon, which have been plundered at various times to furnish materials for the construction of Bagdad.

The houses of the richer classes are regularly built about an interior court. The ground floor, except for the *serdab*, is given up to kitchens, store-rooms, servants' quarters, stables, &c. The principal rooms are on the first floor and open directly from a covered veranda, which is reached by an open staircase from the court. These constitute the winter residence of the family, reception rooms, &c. The roofs of the houses are all flat, surrounded by parapets of sufficient height to protect them from the observation of the dwellers opposite, and separate them from their neighbours. In the summer the population sleeps and dines upon the roofs, which thus constitute to all intents a third storey. The remainder of the day, so far as family life is concerned, is spent in the *serdab*, a cellar sunk somewhat below the level of the courtyard, damp from frequent wettings, with its half windows covered with hurdles thatched with camel thorn and kept dripping with water. Occasionally the *serdabs* are provided with punkahs.

Sometimes, in the months of June, July and August, when the *sherki* or south wind is blowing, the thermometer at break of day is known to stand at 112° F., while at noon it rises to 119° and a little before two o'clock to 122°, standing at sunset at 114°, but this scale of temperature is exceptional. Ordinarily during the summer months the thermometer averages from about 75° at sunrise to 107° at the hottest time of the day. Owing to the extreme dryness of the atmosphere and the fact that there is always a breeze, usually from the N.W., this heat is felt much less than a greatly lower temperature in a more humid atmosphere. Moreover, the nights are almost invariably cool.

Formerly Bagdad was intersected by innumerable canals and aqueducts which carried the water of both the Euphrates and the Tigris through the streets and into the houses. To-day these have all vanished, with the exception of one aqueduct which still conveys the water of the Tigris to the shrine of Abd al-Qadir (ul-Kadir). The present population draws its water directly from the Tigris, and it is distributed through the city in goat-skins carried on the backs of men and asses. There is, of course, no sewerage system, the surfaces of the streets serving that purpose, and what garbage and refuse is not consumed by the dog scavengers washes down into the Tigris at the same place from which the water for drinking is drawn. As a consequence of these insanitary conditions the death-rate is very high, and in case of epidemics the mortality is enormous. At such times a large part of the population leaves the city and encamps in the desert northward.

The principal public buildings of the city, such as they are, lie in the eastern section along the river bank. To the north, just within the old wall line, stands the citadel, surrounded by a high wall, with a lofty clock-tower which commands an excellent view. To the south of this, also on the Tigris, is the *serai* or palace of the Turkish governor, distinguished rather for extent than grandeur. It is comparatively modern, built at different periods, a large and confused structure without proportion, beauty or strength. Somewhat farther southward, just below the pontoon bridge, stands the custom house, which occupies the site and is built out of the material of the medreseh or college of Mostansir (A.D. 1233). Of the original building of the caliph Mostansir all that remains is a minaret and a small portion of the outer walls. Farther down are the imposing buildings of the British residency. The German consulate also is on the river-front. As in all Mahommedan cities, the mosques are conspicuous objects. Of these very few are old. The Marjanieh mosque, not far from the minaret of Mostansir, although its body is modern, has some remains of old and very rich arabesque work on its surface, dating from the 14th century. The door is formed by a lofty arch of the pointed form guarded on both sides with red bands exquisitely sculptured and having numerous inscriptions. The mosque of Khaseki, supposed to have been an old Christian church, is chiefly distinguished for its prayer niche, which, instead of being a simple recess, is crowned by a Roman arch, with square pedestals, spirally fluted shafts and a rich capital of flowers, with a fine fan or shell-top in the Roman style. The building in its present form bears the date of A.D. 1682, but the sculptures which it contains belong probably to the time of the caliphate. The minaret of Suk el-Ghazl, in the south-eastern part of the city, dates from the 13th century. The other mosques, of which there are about thirty within the walls, excluding the chapels and places of prayer, are all of recent erection. Most of them are surmounted by bright-coloured cupolas and minarets. The Mosque of the Vizier, on the eastern side of the Tigris, near the pontoon bridge, has a fine dome and a lofty minaret, and the Great Mosque in the square of el Meidan, in the neighbourhood of the *serai*, is also a noble building.

The other mosques do not merit any particular attention, and in general it may be said that Bagdad architecture is neither distinctive nor imposing. Such attractions as the buildings possess are due rather to the richly coloured tiles with which many of them are adorned, or to inscriptions, like the Kufic inscription, dated A.D. 944, on the ruined *tekke* of the Bektash
[v.03 p.0196]
dervishes in western Bagdad. More important than the mosques proper are the tomb mosques. Of these, the most important and most imposing is that of Kazemain, in the northern suburb of the western city. Here are buried the seventh and ninth of the successors of Ali, recognized by Shi'as, namely Musa Ibn Ja'far el-Kazim, and his grandson, Mahommed Ibn Ali el-Jawad. In its present form this mosque dates from the 19th century. The two great domes above the tombs, the

four lofty minarets and part of the facade of this shrine, are overlaid with gold, and from whatever direction the traveler approaches Bagdad, its glittering domes and minarets are the first objects which meet his eye. It is one of the four great shrines of the Shiʻite Moslems in the vilayet of Bagdad. Christians are not allowed to enter its precincts, and the population of the Kazemain quarter is so fanatical that it is difficult and even dangerous to approach it.

In the suburb of Muazzam, on the western side of the river, is the tomb of Abū Ḥanifa (*q.v.*), the canon lawyer. There is a large mosque with a painted dome connected with this tomb, which is an object of veneration to the Sunni Moslems, but it seems cheap and unworthy in comparison with the magnificent shrine of Kazemain. On the same side of the river, lower down, is the shrine of Abd al-Qadir al-Jilani (of Jilan), founder of the Qādirite (Kadaria) sect of dervishes, also a noted place of pilgrimage. The original tomb was erected about A.D. 1253, but the present fine dome above the grave is later by at least two or three centuries. The possessor or controller of this wealthy mosque is the *nakib*, locally pronounced *najeeb*, or marshal of the nobles, whose office is to determine who are Seʻids, *i.e.* entitled to wear the green turban. He is second only to the governor or vali pasha in power, and indeed his influence is often greater than that of the official ruler of the vilayet. Just outside of the wall of the western city lies the tomb and shrine of Maʻruf Karkhi, dating from A.D. 1215, which also is a place of pilgrimage. Close to this stands the so-called tomb of Sitte Zobeide (Zobaida), with its octagonal base and pineapple dome, one of the most conspicuous and curious objects in the neighbourhood of Bagdad. Unfortunately it is rapidly falling into decay. K. Niebuhr reports that in his day (A.D. 1750) this tomb bore an inscription setting forth that Ayesha Khanum, the wife of the governor of Bagdad, was buried here in 1488, her grave having been made in the ancient sepulchre of the lady Zobeide (Zobaida), granddaughter of Caliph Mansur and wife of Harun al-Rashid, who died in A.D. 831. The tomb was restored at the time of her burial, at which date it was already ancient, and it was evidently believed to be the tomb of Zobeide. Contemporary historians, however, state that Zobeide was actually buried in Kazemain, and moreover, early writers, who describe the neighbouring tomb and shrine of Maʻruf Karkhi, make no reference to this monument.

About 3 m. west of Bagdad, on the Euphrates road, in or by a grove of trees, stands the shrine and tomb of Nabi Yusha or Kohen Yusha, a place of monthly pilgrimage to the Jews, who believe it to be the place of sepulture of Joshua, son of Josedech, the high priest at the close of the exilian period. This is one of four similar Jewish shrines in Irak; the others being the tomb of Ezra on the Shatt el-Arab near Korna, the tomb of Ezekiel in the village of Kefil near Kufa, and the well of Daniel near Hillah. This shrine is also venerated by Moslems, who call it the tomb of Yusuf (Joseph). The Jews bury here their chief priests, a right the Moslems at times contest, and in 1889 a serious conflict between Jews and Moslems resulted from an attempt of the former to exercise this right.

There are said to be about thirty *khans* or caravanserais in Bagdad for the reception of pilgrims and merchants and their goods, none of which is of any importance as a building, with the single exception of the khan el-Aurtmeh adjoining the Marjanieh mosque, to which it formerly belonged. This dates from A.D. 1356, and is said to occupy the site of an ancient Christian church. Its vaulted roof is a fine specimen of Saracenic brickwork. In recent years the demands of modern travel have led to the establishment of a hotel, which affords comfortable accommodation according to European methods. There is also an English club-house. There are said to be about fifty baths in Bagdad, but in general they are inferior in construction and accommodation. The bazaars of Bagdad are extensive and well stocked, and while not so fine in construction as those of some other Eastern cities, they are more interesting in their contents and industries, because Bagdad has on the whole been less affected by foreign innovations. Several of the bazaars are vaulted over with brickwork, but the greater number are merely covered with flat beams which support roofs of dried leaves or branches of trees and grass. The streets of the entire business section of the city are roofed over in this manner, and in the summer months the shelter from the sun is very grateful, but in the winter these streets are extremely trying to the foreign visitor, owing to their darkness and their damp and chilly atmosphere.

Bagdad is about 500 m. from the Persian Gulf, following the course of the river. It maintains steam communication with Basra, its port, which is situated on the Shatt el-Arab, somewhat more than 50 m. from the Persian Gulf, by means of two lines of steamers, one English and one Turkish. British steamers were first placed upon the Tigris as a result of the expedition of Colonel F. R. Chesney, in 1836. Since that time, a British gunboat has been stationed before the residency, and British steamers have been allowed to navigate the river. Only two of these, however, maintain a weekly connexion with Basra, and they are quite inadequate to the freight traffic between the two cities. The more numerous vessels of the Turkish service are so small, so inadequately equipped and so poorly handled, that they are used for either passenger or freight transport only by those who cannot secure the services of the British steamers. The navigation of the Tigris during the greater party of its course from Bagdad to Korna is slow and uncertain. The river, running through an absolutely flat country, composed entirely of alluvial soil, is apt to change its channel. In flood time the country at places becomes a huge lake, through which it is extremely difficult to find the channel. In the dry season, the autumn and winter, on the other hand, there is danger of grounding on the constantly shifting flats and shoals. To add to the uncertainties of navigation, the inhabitants along the eastern bank of the stream frequently dig new canals for irrigation purposes, which both reduces the water of the river and tends to make it shift its channel. Above Bagdad there are no steamers on the Tigris, but sailing vessels of 30 tons and more navigate the river to Samarra and beyond. The characteristic craft for local service in the immediate environment of Bagdad is the *kufa*, a circular boat of basket-work covered with bitumen, often of a size sufficient to carry five or six horses and a dozen men. These boats have been employed from the remotest antiquity through all this region, and are often depicted on the old Assyrian monuments. Equally ancient are the rafts called *kellek*, constructed of inflated goat-skins, covered with a framework of wood, often supporting a small house for passengers, which descend the Tigris from above Diarbekr. The wood of these rafts is sold in Bagdad, and constitutes, in fact, the chief supply of wood in that city.

Bagdad also lies on a natural line of communication between Persia and the west, the ancient caravan route from Khorasan debouching from the mountains at this point, while another natural caravan route led up the Euphrates to Syria and the Mediterranean and still another up the Tigris to Armenia and the Black Sea. It was its situation at the centre of the lines of communication between India and Persia and the west, both by land and water, which gave the city its great importance in early times. With the change of the methods of transportation its importance has naturally declined. The trade of Persia with the west now passes either through the ports of the Persian Gulf or northward over Trebizond, while India communicates with the west directly through the Suez Canal. Bagdad is, therefore, a decayed city. Money is scarce among all classes, and the wages of common labourers are scarcely half what is paid in Syria. It is still, however, the centre of distribution for a very large, if scantily populated, country, and it also derives much profit from pilgrims, lying as
[v.03 p.0197] it does on the route which Shiʻite pilgrims from Persia must take on their way to the sacred cities. It also possesses important shrines of its own which cause many pilgrims to linger there, and wealthy Indians not infrequently choose Bagdad as a suitable spot in which to end their days in the odour of sanctity. There has also sprung up of late years considerable direct trade between the European and American markets and Bagdad, and several foreign houses, especially English, have established themselves there. Germany also has invaded this market.

The staple articles of export are hides, wool and dates. The export trade of Bagdad amounts to about £750,000 annually, and the import trade to about £2,000,000. The imports consist of oil, cheap cottons, shoes and other similar goods, which are taking the place of the picturesque native manufactures. Even the Bedouin Arabs wear headdresses of cheap European cotton stuff purchased in Bagdad or thereabouts, while the common water vessels throughout the country are five-gallon petroleum tins, which also furnish metal for the manufacture of various utensils in the native bazaars.

Bagdad is in communication with Europe by means of two lines of telegraph, one British and one Turkish, and two postal services. There is a British consul-general, who is also political agent to the Indian government. His state is second only to that of the British ambassador at Constantinople. Besides the gunboat in the river, he has a guard of sepoys, and there is an Indian post-office in the residency. Formerly the British government maintained a camel-post across the desert to Damascus. This was abandoned about 1880 when the Turks established a similar service. By means of the Turkish camel-post letters reached Damascus in nine days. There is also a Russian consul-general at Bagdad, and French, Austrian and American consuls.

The Euphrates Valley (or Bagdad) railway scheme, which had previously been discussed, was brought forward prominently in 1899, and Russian proposals to undertake it were rejected. British proposals followed, but were opposed by the Germans, who, as controlling the line to Konia in Asia Minor, claimed preference in the matter. A provisional convention was granted to a German company by the Porte, and an iradé was obtained in 1902. In 1903 there was considerable discussion as to the placing of the line under international control, and the question aroused special interest in England in view of the short route which the line would provide to India, in connexion with fast steamship services in the Mediterranean and the Persian Gulf. It was decided by the British government that the proposals made to this effect did not offer sufficient security. The financial arrangement as finally agreed upon was that German financiers should control 40% of the capital of the line; French (through the Imperial Ottoman Bank), 30%; Austrian, Swiss, Italian and Turkish, 20%; and the Anatolian Railway Company, 10%. In 1904 the line was completed from Konia through Eregli to Bulgurli. In 1908 an iradé sanctioned the extension across the Taurus to Adana, and so to Helif near Mardin (522 m.).

The population of Bagdad is estimated variously from 70,000 to 200,000; perhaps halfway between may represent approximately the reality. More than two-thirds of the population are Moslems, mostly Shi'as, with the exception of the official classes. There are about 34,000 Jews occupying a quarter of their own in the north-western part of the city; while in a neighbouring quarter dwell upwards of 6000 Christians, chiefly so-called Chaldaeans or Nestorians. The Carmelites maintain a mission in Bagdad, as does also the (English) Church Missionary Society. The Jews are the only part of the population who are provided with schools. A school for boys was established by the *Alliance Israélite* in 1865, and one for girls in 1899. Besides these, there is also an apprentice school for industrial training.

The Jews constitute the wealthiest and most intelligent portion of the population. A large part of the foreign trade is in their hands, and at the season of the sheep-shearing their agents and representatives are found everywhere among the Bedouins and *Madan* Arabs of the interior, purchasing the wool and selling various commodities in return. They are the bankers of the country, and it is through their communications that the traveller is able to obtain credit. They are also the dealers in antiquities, both genuine and fraudulent. Next to them in enterprise and prosperity are the Persians. The porters of the town are all Kurds, the river-men Chaldaean Christians. Every nation retains its peculiar dress. The characteristic, but by no means attractive, street dress of the Moslem women of the better class comprises a black horse-hair visor completely covering the face and projecting like an enormous beak, the nether extremities being encased in yellow boots reaching to the knee and fully displayed by the method of draping the garments in front.

Bagdad is governed by a pasha, assisted by a council. The pasha and the higher officials in general come from Constantinople, but a very large portion of the other Turkish officials seem to come from the town of Kerkuk. They constitute a class quite distinct from the native Arab population, and they and the Turkish government in general are intensely unpopular among the Arabs, an unpopularity increased by their religious differences, the Arabs being as a rule Shi'ites, the Turks Sunnites. Besides the court of superior officers, which assists the pasha in the general administration of the province, there is also a *mejlis* or mixed tribunal for the settlement of municipal and commercial affairs, to which both Christian and Jewish merchants are admitted. Besides these, there are the religious heads of the community, especially the *nakib* and Jewish high priest, who possess an undefined and extensive authority in their own communities. The Jewish chief priest may be said to be the successor of the *exilarch* or *resh galutha* of the earlier period.

History.—There are in or near Bagdad a few remains of a period antedating Islam, the most conspicuous of which are the ruins of the palace of Chosroes at Ctesiphon or Madain, about 15 m. below Bagdad on the east side of the river. Almost equally conspicuous, and a landmark through the whole region, is the ruin called Akerkuf, in the desert, about 9 m. westward of Bagdad. This consists of a huge tower of unburned brick resting on a small hill of debris, the whole rising to a height of 100 ft. or more above the plain, in the centre of a network of ancient canals. Inscribed bricks found in the neighbourhood seem to connect this ruin with Kurigalzu, king of Babylon about 1300 B.C. Under substantially its present name, Akukafa, it is mentioned as a place of importance in connexion with the canals as late as the Abbasid caliphate. Within the limits of the city itself, on the west bank of the Tigris, are the remains of a quay, first observed by Sir Henry Rawlinson, at a period of low water, in 1849, built of bricks laid in bitumen, and bearing an inscription of Nebuchadrezzar, king of Babylon. *Baghdadu* was an ancient Babylonian city, dating back perhaps as far as 2000 B.C., the name occurring in lists in the library of Assur-bani-pal. It is also mentioned on the Michaux stone, found on the Tigris near the site of the present city, and dating from the time of Tiglath-Pileser I. (1100 B.C.) The quay of Nebuchadrezzar, mentioned above, establishes the fact that this ancient city of Baghdadu was located on the site of western or old Bagdad (see further under CALIPHATE: *Abbasids*, sections 2 foll.). References in the Jewish *Talmud* show that this city still continued to exist at and after the commencement of our era; but according to Arabian writers, at the time when the Arab city of Bagdad was founded by the caliph Mansur, there was nothing on that site except an old convent. One may venture to doubt the literal accuracy of this statement. It is clear that the ancient name, at least, still held firm possession of the site and was hence inherited by the new city.

The Arab city, the old or round city of Bagdad, was founded by the caliph Mansur of the Abbasid dynasty on the west side of the Tigris just north of the Isa canal in A.D. 762. It was a mile in diameter, built in concentric circles, with the mosque and palace of the caliph in the centre, and had four gates toward the four points of the compass. It grew with great rapidity. The suburb of Rusafa, on the eastern bank, sprang up almost immediately, and after the siege and capture of the round city by Mamun, in 814, this became the most important part of the capital. The period of the greatest prosperity of
[v.03 p.0198]
Bagdad was the period from its foundation until the death of Mamun, the successor of Harun, in 833. During this period the city, including both sides of the river, was 5 m. across within the walls, and it is said to have had a population of 2,000,000 souls. In literature, art and science, it divided the supremacy of the world with Cordova; in commerce and wealth it far surpassed that city. How its splendour impressed the imagination may be seen from the stories of the *Arabian Nights*. It was the religious capital of all Islam, and the political capital of the greater part of it, at a time when Islam bore the same relation to civilization which Christendom does to-day. As in Spanish Islam, so in the lands of the eastern caliphate, the Jews were treated relatively with favour. The seat of the *exilarch* or *resh galutha* was transferred from Pumbedita (Pumbeditha or Pombeditha) in Babylonia to Bagdad, which thus became the capital of oriental Judaism; from then to the present day the Jews have played no mean part in Bagdad.

Situated in a region where there is no stone, and practically no timber, Bagdad was built, like all the cities of the Babylonian plain, of brick and tiles. Its buildings depended for their effect principally on mass and gorgeous colouring. Like old Babylon, also, Bagdad was celebrated throughout the world for its brilliant-coloured textile fabrics. So famous was the silk of Bagdad, manufactured in the Attabieh quarter (named after Attab, a contemporary of the Prophet), that the place-name passed over into Spanish, Italian, French and finally into English in the form of "tabby," as the designation of a rich-coloured watered silk. Depending on coloured tiles and gorgeous fabrics for their rich effects, nothing of the buildings of the times of Harun al-Rashid or Mamun, once counted so magnificent, have come down to us. All have perished in the numerous sieges and inundations which have devastated the city.

With the rise of the Turkish body-guard under Mamun's successor, Mo'tassim, began the downfall of the Abbasid dynasty, and with it of the Abbasid capital, Bagdad. Mo'tassim founded Samarra, and for fifty-eight years caliph and court deserted Bagdad (see CALIPHATE, sect. C). Then, in A.D. 865, Mosta'in, attempting to escape from the tyranny of the Turkish guard, fled back again to Bagdad. The attempt was futile, Bagdad was besieged and taken, and from that time until their final downfall the Abbasid caliphs were mere puppets, while the real rulers were successively the Turkish guard, the Buyids and the Seljuks. But during all this period the caliphs continued to be the religious heads of Islam and their residence its capital. Bagdad, accordingly, although fallen from its first eminence, continued to be a city of the first rank, and during most of that period still the richest and most splendid city in the world. Its religious importance is attested by the number of its great shrines dating from those times; as for its wealth and size, while, as stated above, few remains of the actual buildings of that period survive, we still have abundant records describing their character, their size and their position. With the last century of the caliphates began a more rapid decline. From the records of that period it seems that the present city is identical in the position of its walls and the space occupied by the town proper with Bagdad at the close of the 12th century, the period when this rapid decline had already advanced so far that the western city is described by

travellers as almost in ruins, and the eastern half as containing large uninhabited spaces. With the capture of the city by the Mongols, under Hulagu (Hulaku), the grandson of Jenghiz Khan, in 1258, and the extinction of the Abbasid caliphate of Bagdad, its importance as the religious centre of Islam passed away, and it ceased to be a city of the first rank, although the glamour of its former grandeur still clung to it, so that even to-day in Turkish official documents it is called the "glorious city."

The Tatars retained possession of Bagdad for a century and a half, until about A.D. 1400. Then it was taken by Timur, from whom the sultan Ahmed Ben Avis fled, and, finding refuge with the Greek emperor, contrived later to repossess himself of the city, whence he was finally expelled by Kara Yusuf of the Kara-Kuyunli ("Black Sheep") Mongols in 1417. About 1468 the descendants of the latter were driven out by Uzun Hasan or Cassim of the Ak-Kuyunli ("White Sheep") Mongols. He and his descendants reigned in Bagdad until Shah Ismail I., the founder of the Safawid royal house of Persia, made himself master of the place (*c.* 1502 or 1508). From that time it continued for a long period an object of contention between the Turks and the Persians. It was taken by Suleiman I. the Magnificent and retaken by Shah Abbas the Great, in 1620. Eighteen years later, in 1638, it was besieged by Sultan Murad IV., with an army of 300,000 men and, after an obstinate resistance, forced to surrender, when, in defiance of the terms of capitulation, most of the inhabitants were massacred.

Since that period it has remained nominally a part of the Turkish empire; but with the decline of Turkish power, and the general disintegration of the empire, in the first half of the 18th century, a then governor-general, Ahmed Pasha, made it an independent pashalic. Nadir Shah, the able and energetic usurper of the Persian throne, attempting to annex the province once more to Persia, besieged the city, but Ahmed defended it with such courage that the invader was compelled to raise the siege, after suffering great loss. Turkish authority over the pashalic was again restored in the first part of the 19th century.

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(H. C. R.; J. P. PE.)

BAGÉ, a town and municipality of the state of Rio Grande do Sul, Brazil, about 176 m. by rail W.N.W. of the city of Rio Grande do Sul. Pop. of the municipality (1890) 22,692. It is situated in a hilly region 774 ft. above sea-level, and is the commercial centre of a large district on the Uruguayan border in which pastoral occupations are largely predominant. This region is the watershed for southern Rio Grande do Sul, from which streams flow E. and S.E. to the Atlantic coast, and N.W. and S.W. to the Uruguay river. The town dates from colonial times, and has always been considered a place of military importance because of its nearness to the Uruguay frontier, only 25 m. distant. It was captured by the Argentine general Lavalle in 1827, and figured conspicuously in most of the civil wars of Argentina. It is also much frequented by Uruguayan revolutionists.

BAGEHOT, WALTER (1826-1877), English publicist and economist, editor of the *Economist* newspaper from 1860 to his death, was born at Langport, Somerset, on the 3rd of February 1826, his father being a banker at that place. Bagehot was altogether a remarkable personality, his writings on different subjects exhibiting the same bent of mind and characteristics,—philosophic reflectiveness, practical common-sense, a bright and buoyant humour, brilliant wit and always a calm and tolerant judgment of men and things. Though he belonged to the Liberal party in politics he was essentially of conservative disposition, and often spoke with sarcastic boastfulness to his Liberal friends of the stupidity and tenacity of the English mind in adhering to old ways, as displayed in city and country alike. His life was comparatively uneventful, as he early gave up to literature the energies which might have gained him a large fortune in business or a great position in the political world. He took his degree at the London University in 1848, and was called to the bar in 1852, but from an early date he joined his father in the banking business of Stuckey & Co. in the west of England, and during a great part of his life, while he was editor of the *Economist*, he managed the London agency of the bank, lending its surplus money in "Lombard Street," and otherwise attending to its London affairs. He became also an underwriter at Lloyd's, taking no part, however, in the active detailed business, which was done for him by proxy.

Bagehot's connexion with the *Economist* began in 1858, about which time he married a daughter of the first editor, the Right Hon. James Wilson, at that time secretary of the treasury, and afterwards secretary of finance in India. Partly through this connexion he was brought into the inside of the political life of the time. He was an intimate friend of Sir George Cornewall Lewis, and was afterwards in constant communication with many of the political chiefs, especially with Gladstone, Robert Lowe and Grant Duff, and with the permanent heads of the great departments of state. In the city in the same way he was intimate with the governor and directors of the Bank of England, and with leading magnates in the banking and commercial world; while his connexion with the Political Economy Club brought him into contact in another way with both city and politics. His active life in business and politics, however, was not of so absorbing a kind as to prevent his real devotion to literature, but the literature largely grew out of his activities, and of no one can it be said more truly than of Bagehot that the atmosphere in which he lived gave tone and colour and direction to his studies, one thing of course acting and reacting on another. The special note of his books, apart from his remarkable gift of conversational epigrammatic style, which gives a peculiar zest to the writing, is the quality of scientific dispassionate description of matters which were hardly thought of previously as subjects of scientific study. This is specially the case with the two books which perhaps brought him the most reputation, *The English Constitution* (1867) and *Lombard Street* (1873). They are both books of observation and description. The English constitution is described, not from law books and as a lawyer would describe it, but from the actual working, as Bagehot himself had witnessed it, in his contact with ministers and the heads of government departments, and with the life of the society in which the politicians moved. The true springs and method of action are consequently described with a vivid freshness which gives the book a wonderful charm, and makes it really a new departure in the study of politics. It is the same with *Lombard Street*. The money market is there pictured as it really was in 1850-1870, and as Bagehot saw it with philosophic eyes. Beginning with the sentence, "The objects which you see in Lombard Street are the Bank of England, the joint stock banks, the private banks and the discount houses," he describes briefly and clearly the respective functions of these different bodies in the organism of the city, according to his own close observation as a banker himself, knowing the ways and thoughts of the men he describes, and as a man of business likewise in other ways, knowing at first hand the relation of banking to the trade and commerce of the country. *Lombard Street* is perhaps a riper work than *The English Constitution*, as its foundation was really laid in 1858 in a series of articles which Bagehot then wrote in the *Economist*, though it was not published till the early 'seventies, after it had been twice rewritten and revised with infinite labour and care. *Lombard Street*, like *The English Constitution* in political studies, is thus a new departure in economic and financial studies, applying the same sort of keen observation which Adam Smith used in the analysis of business generally to the special business of banking and finance in the complex modern world. It is, perhaps, not going too far to say that the whole theory of a one-reserve system of banking and how to work it, and of the practical means of fixing an "apprehension minimum" below which the reserve should not fall, originated in *Lombard Street* and the articles which were the foundation of it; and the subsequent conduct of banking in England and throughout the world has been infinitely better and safer in consequence. A like note is also struck in *Physics and Politics* (1869), which is a description of the evolution of communities of men. The materials here are derived mainly from books, the surface to be observed being so extensive, but the attitude is precisely the same, that of a scientific observer. To a certain extent the *Physics and Politics* had even a more remarkable influence on opinion, at least on foreign opinion, than *The English Constitution* or *Lombard Street*. It "caught on" as a development of the theory of evolution in a new direction, and Darwin himself was greatly interested, while one of the pleasures of Bagehot's later years was to receive a translation of the book into the Russian language. In *Literary Studies* (1879) and *Economic Studies* (1880), published after his death, there is more scope than in the books already mentioned for other characteristics besides those of the scientific observer, but observation always comes to the front, as in the account of Ricardo, whom

Bagehot describes as often, when he is most theoretical, really describing what a first-rate man of business would do and think in actual transactions. The observation, of course, is that of a type of business man in the city to which Ricardo as well as Bagehot belonged, though Ricardo could hardly look at it from the outside as Bagehot was able to do.

Bagehot had great city, political and literary influence, to which all his activities contributed, and much of his influence was lasting. In politics and economics especially his habit of scientific observation affected the tone of discussion, and both the English constitution and the money market have been better understood generally because he wrote and talked and diffused his ideas in every possible way. He was unsuccessful in two or three attempts to enter parliament, but he had the influence of far more than an ordinary member, as director of the *Economist* and as the adviser behind the scenes of the ministers and permanent heads of departments who consulted him. His death, on the 24th of March 1877, occurred at Langport very suddenly, when he was in the fullest mental vigour and might have looked forward to the accomplishment of much additional work and the exercise of even wider influence.

It is impossible to give a full idea of the brightness and life of Bagehot's conversation, although the conversational style of his writing may help those who did not know him personally to understand it. With winged words he would transfix a fallacy or stamp a true idea so that it could not be forgotten. He was certainly greater than his books and always full of ideas. The present writer recalls two notions he had, not for writing new books himself, but as something that might be done. One was that there might be a history of recent politics with new lights if some one were to do it who knew the family connexions and history of English politicians. This was *apropos* of the passage of a certain bill through parliament, when the head of the department in the House of Commons failed and the management of the measure was taken by the chancellor of the exchequer himself, a relative of the permanent head of the department concerned, who was thus able to carry his own ideas in legislation notwithstanding the failure of his political chief. Another book he wished to see written was an account of the differences in the administrative systems of England and Scotland, by which he had been greatly impressed, the differences not being in detail, but in fundamental idea and in form, so that no judicial or other officers in the one were represented in the other by corresponding functionaries. Many other illustrations might be given of his fulness of ideas which helped to make him an ideal editor. Reference must also be made to the assistance which Bagehot gave as a journalist to the study of statistics. From the manipulation of figures he was most averse, and he rather boasted that he was unable to add up. But he was a most excellent mathematician, and no one could be so careful as he was about the logic of the figures got together for his articles, which he always most carefully scrutinized. He would frequently point out that his figures were illustrative merely, and did not by themselves establish an argument. He was always anxious, again, to impress on those about him that a subject could not be studied with the help of figures and accounts alone. Whether it was insurance, or banking, or underwriting, or shipowning, he insisted that some one who knew the business should see the writing before it was published. Knowing so many departments of business from actual experience, he was a host in himself as referee, but when in doubt he would always consult some one who knew the facts; and he used his great influence so well that in subsequent years it inspired indirectly not a few who were hardly aware of his claims to be a statistician at all.

(R. Gn.)

BAGELKHAND, or Baghelkhand, a tract of country in central India, occupied by a collection of native states. The Bagelkhand agency is under the political superintendence of the governor-general's agent for central India, and under the direct jurisdiction of a political agent who is also superintendent of the Rewa state, residing ordinarily at Sutna or Rewa. The agency consists of Rewa state and eleven minor states and estates, of which the more important are Maihar, Nagode and Sohawal. The total area is 14,323 sq. m., and the population in 1901 was 1,555,024, showing a decrease of 11% in the decade, due to the results of famine. The rainfall was very deficient in 1895-1897, causing famine in 1897; and in 1899-1900 there was drought in some sections. The agency was established in March 1871. Until that date Bagelkhand was under the Bundelkhand agency, with which it is geographically and historically connected; a general description of the country will be found under that heading. According to Wilson, in his *Glossary of Indian Terms*, the Baghelas, who give their name to this tract of country, are a branch of the Sisodhyia Rajputs who migrated eastward and once ruled in Gujarat.

[v.03 p.0200]

BAGGĀRA ("Cowherds"), African "Arabs" of Semitic origin, so called because they are great cattle owners and breeders. They occupy the country west of the White Nile between the Shilluk territory and Dar Nuba, being found principally in Kordofan. They are true nomad Arabs, having intermarried little with the Nuba, and have preserved most of their national characteristics. The date of their arrival in the Sudan is uncertain: they appear to have drifted up the Nile valley and to have dispossessed the original Nuba population. A purely pastoral people, they move from pasture to pasture, as food becomes deficient. The true Baggāra tribesmen employ oxen as saddle and pack animals, carry no shield, and though many possess firearms the customary weapons are lance and sword. They have always had the reputation of being resolute fighters. Engaged from the earliest times in the slave trade, they were among the first, as they were certainly the most fervent, supporters of the mahdi when he rose in revolt against the Egyptians (1882). They constituted his real fighting force, and to their fanatical courage his victories were due. Their decision to follow him out of their own country to Khartum brought about the fall of that city. The mahdi's successor, the khalifa Abdullah, was a Baggāra, and throughout his rule the tribe held the first place in his favour. They have been described as "men who look the fiends they really are—of most sinister expression, with murder and every crime speaking from their savage eyes. Courage is their only good quality." They are famous, too, as hunters of big game, attacking even elephants with sword and spear. G. A. Schweinfurth declares them the best-looking of the Nile nomads, and the men are types of physical beauty, with fine heads, erect athletic bodies and sinewy limbs. There is little that is Semitic in their appearance. Their skins vary in colour from a dark red-brown to a deep black; but their features are regular and free of negro characteristics. In mental power they are much superior to the indigenous races around them. They have a passion for fine clothes and ornaments, tricking themselves out with glass trinkets, rings and articles of ivory and horn. Their mode of hair-dressing (mop-fashion) earned them, in common with the Hadendoa, the name of "Fuzzy-wuzzies" among the British soldiers in the campaigns of 1884-98.

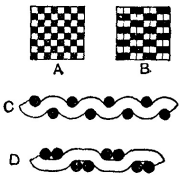
See G. A. Schweinfurth, *Heart of Africa* (1874); Sir F. R. Wingate, *Mahdism and the Egyptian Sudan* (1891), *Anglo-Egyptian Sudan*, edited by Count Gleichen (1905); A. H. Keane, *Ethnology of the Egyptian Sudan* (1884).

BAGGESEN, JENS IMMANUEL (1764-1826), Danish poet, was born on the 15th of February 1764 at Korsör. His parents were very poor, and before he was twelve he was sent to copy documents at the office of the clerk of the district. He was a melancholy, feeble child, and before this he had attempted suicide more than once. By dint of indomitable perseverance, he managed to gain an education, and in 1782 entered the university of Copenhagen. His success as a writer was coeval with his earliest publication; his *Comical Tales* in verse, poems that recall the *Broad Grins* that Colman the younger brought out a decade later, took the town by storm, and the struggling young poet found himself a popular favourite at twenty-one. He then tried serious lyrical writing, and his tact, elegance of manner and versatility, gained him a place in the best society. This sudden success received a blow in 1789, when a very poor opera, *Holge Danske*, which he had produced, was received with mockery and a reaction against him set in. He left Denmark in a rage and spent the next years in Germany, France and Switzerland. He married at Berne in 1790, began to write in German and published in that language his next poem, *Alpenlied*. In the winter of the same year he returned to his mother-country, bringing with him as a peace-offering his fine descriptive poem, the *Labyrinth*, in Danish, and was received with unbounded homage. The next twenty years were spent in incessant restless wanderings over the north of Europe, Paris latterly becoming his nominal home. He continued to publish volumes alternately in Danish and German. Of the latter the most important was the idyllic epos in hexameters called *Parthenais* (1803). In 1806 he returned to Copenhagen to find the young Öhlenschläger installed as the great poet of the day, and he himself beginning to lose his previously unbounded popularity. Until 1820 he resided in Copenhagen, in almost unceasing literary feud with some one or other, abusing and being abused, the most important feature of the whole being Baggesen's determination not to allow Öhlenschläger to be considered a greater poet than himself. He then left Denmark for the last time and went back to his beloved Paris, where he lost his second wife and youngest child in 1822, and after the miseries of an imprisonment for debt, fell at last into a state of hopeless

melancholy madness. In 1826, having slightly recovered, he wished to see Denmark once more, but died in the freemasons' hospital at Hamburg on his way, on the 3rd of October, and was buried at Kiel. His many-sided talents achieved success in all forms of writing, but his domestic, philosophical and critical works have long ceased to occupy attention. A little more power of restraining his egotism and passion would have made him one of the wittiest and keenest of modern satirists, and his comic poems are deathless. The Danish literature owes Baggesen a great debt for the firmness, polish and form which he introduced into it—his style being always finished and elegant. With all his faults he stands as the greatest figure between Holberg and Öhlenschläger. Of all his poems, however, the loveliest and best is a little simple song, *There was a time when I was very little*, which every Dane, high or low, knows by heart, and which is matchless in its simplicity and pathos. It has outlived all his epics.

(E. G.)

BAGGING, the name given to the textile stuff used for making bags (see also Sacking and Tarpaulin). The material used was originally Baltic hemp, while in the beginning of the 19th century Sunn hemp or India hemp was also employed. Modern requirements call for so many different types of bagging that it is not surprising to find all kinds of fibres used for this purpose. Most bagging is now made from yarns of the jute fibre. The cloth is, in general, woven with the plain weave, and the warp threads run in pairs, but large quantities of bags are made from cloths with single warp threads. In both cases the weave used for the cloth is that shown at A in the figure, but when double threads of warp are used, the arrangement is equivalent to the weave shown at B. The interlacings of the two sets of warp and weft for single and double warp are shown respectively at C and D, the black marks indicating the warp threads, and the white or blanks showing the weft. The particular style of bagging depends, naturally, upon the kind of material it is intended to hold. The coarsest type of bagging is perhaps that known as "cotton bagging," which derives its name from the fact that it is used in the manufacture of bags for transporting raw cotton from the United States of America. It is a heavy fabric 42 in. wide, and weighs from 2 to 2½ lb per yard. A similar, but rather finer make, is used for Sea Island and other fine cotton, and for any species of fibrous material; but for grain, spices, sugar, flour, coffee, manure, &c., the threads of warp and weft must lie closer, and the warp is usually single. For transporting such substances as sugar, it is not uncommon to line the bag with paper, which excludes foreign matter, and minimizes the loss. Although there are large quantities of seamless bags woven in the loom, the greater part of the cloth is woven in the ordinary way. It is then cut up into the required sizes by hand and by special machines, and afterwards sewn by one of the chain-stitch or straight-stitch bag sewing-machines.



[v.03 p.0201]

BAGHAL, a small native state in the Punjab, India. It is one of the group known as the Simla Hill states, and has an area of 124 sq. m.; pop. (1901) 25,720, showing an increase of 5% in the decade; a revenue £3300.

BAGHERIA, a town of the province of Palermo, Sicily, 8 m. by rail E. by S. of Palermo. Pop. (1901) 18,218. It contains many villas of the aristocracy of Palermo, the majority of which were erected in the 18th century, but have now fallen into decay.

BAGILLT, a town of Flintshire, North Wales, 14½ m. from Chester, on the London & North Western railway, in the ancient parish of Holywell. Pop. (1901) 2637. Its importance is due to its zinc, lead, iron, alkali and kindred works, and its collieries. Above Bagillt is Bryn Dychwelwch, "Hill of Retreat," so called from the retreat effected by Owen Gwynedd, when pursued by Henry II., with superior numbers. Near is Mostyn Hall, dating from the time of Henry VI., the seat of one of the oldest Welsh families. Here are antiquities and MSS. (old British history and Welsh, brought from Gloddaeth), a harp dated 1568, torques (*torchau*), &c. Henry VII., then earl of Richmond, is said to have been concealed here in the reign of Richard III., when the lord of Mostyn was Richard ap Howel.

BAGIMOND'S ROLL. In 1274 the council of Lyons imposed a tax of a tenth part of all church revenues during the six following years for the relief of the Holy Land. In Scotland Pope Gregory X. entrusted the collection of this tax to Master Boiamund (better known as Bagimund) de Vitia, a canon of Asti, whose roll of valuation formed the basis of ecclesiastical taxation for some centuries. Boiamund proposed to assess the tax, not according to the old conventional valuation but on the true value of the benefices at the time of assessment. The clergy of Scotland objected to this innovation, and, having held a council at Perth in August 1275, prevailed upon Boiamund to return to Rome for the purpose of persuading the pope to accept the older method of taxation. The pope insisted upon the tax being collected according to the true value, and Boiamund returned to Scotland to superintend its collection. A fragment of Bagimond's Roll in something very like its original form is preserved at Durham, and has been printed by James Raine in his *Priory of Coldingham* (Publications of the Surtees Society, vol. xii.). It gives the real values in one column and tenth parts in another column of each of the benefices in the archdeaconry of Lothian. The actual taxation to which this fragment refers was not the tenth collected by Boiamund but the tenth of all ecclesiastical property in England, Scotland, Wales and Ireland granted by Pope Nicholas IV. to Edward I. of England in the year 1288. The fragment should therefore be regarded as supplementary to the *Taxatio Ecclesiastica Angliae et Walliae* printed by the Record Commissioners in 1802. Although no contemporary copy of Bagimond's Roll is known to exist, at least three documents give particulars of the taxation of the Church of Scotland in the 16th century, which are based upon the original roll.

See *Statuta Ecclesiae Scoticanae* (Bannatyne Club, Edinburgh, 1866).

BAGIRMI, a country of north-central Africa, lying S.E. of Lake Chad and forming part of the Chad circumscription of French Congo. It extends some 240 m. north to south and has a breadth of about 150 m., with an area of 20,000 sq. m. The population in 1903 was estimated at 100,000, having been greatly reduced as the result of wars and slave-raiding. By including districts S. and S.E. occupied by former vassal states, the area and population of Bagirmi would be more than doubled. The surface of the country, which lies about 1000 ft. above sea-level, is almost flat with a very slight inclination N. to Lake Chad. It forms part of what seems to be the basin of an immense lake, of which Chad is the remnant. The soil is clay. The river Shari (*q.v.*) forms the western boundary. Numerous tributaries of the Shari flow through the country, but much of the water is absorbed by swamps and sand-obstructed channels, and seasons of drought are recurrent. The southern part of the country is the most fertile. Among the trees the acacia and the dum-palm are common. Various kinds of rubber vine are found. The fauna includes the elephant, hippopotamus, lion and several species of antelope. Ants are very numerous. Millet and sesame are the principal grains cultivated. Rice grows wild, and several kinds of Poa grass are used as food by the natives. Cotton and indigo are grown to a considerable extent, especially by Bornu immigrants. The capital is Chekna, on a tributary of the Shari, the former capital, Massenia, having been destroyed in 1898. Fort Lamy at the confluence of the Logone and Shari, and Fort de Cointet on the middle Shari, are French posts round which towns have grown. Trade is chiefly with Yola, a town on the Benue in British Nigeria, and with Khartum via Wadai. There is also an ancient caravan route which runs through Kanem and across the Sahara to Tripoli.

The population of Bagirmi is mixed. Negroid peoples predominate, but there are many pastoral Fula and Arabs. The Bagirmese proper are a vigorous, well-formed race of Negroid-Arab blood, who, according to their own traditions, came from the eastward several centuries ago, a tradition borne out by their language, which resembles those spoken on the White Nile. On their arrival they appear to have taken the place of the Bulala dynasty. They subdued the Fula and Arabs already settled in the district, and after being converted to Islam under Abdullah, their fourth king (about 1600), they extended their authority over a large number of tribes living to the south and east. The most important of these tribes are the Saras, Gaberi, Somrai, Gulla, Nduka, Nuba and Sokoro. These pagan tribes were repeatedly raided by the Bagirmese for slaves. Most of them are of a primitive type and appear to be dying out. The Saras are remarkable for their herculean stature, and are one of the most promising of African races. Tree worship is prevalent among the Somrai and the Gaberi. All the tribes believe in a supreme being whose voice is the thunder. Polygamy is general in upper Bagirmi, where some traces of a matriarchal stage of society linger, one small state being called Beled-el-Mra, "Women's Land," because its ruler is always a queen.

Bagirmi was made known to Europe by the travels of Dixon Denham (1823), Heinrich Barth (1852), who was imprisoned

by the Bagirmese for some time, Gustav Nachtigal (1872), and P. Matteucci and A. M. Massari (1881). The country in 1871 had been conquered by the sultan of Wadai, and about 1890 was over-run by Rabah Zobeir (*q.v.*) who subsequently removed farther west to Bornu. About this time French interest in the countries surrounding Lake Chad was aroused. The first expedition led thither through Bagirmi met with disaster, its leader, Paul Crampel, being killed by order of Rabah. Subsequent missions were more fortunate, and in 1897 Emile Gentil, the French commissioner for the district, concluded a treaty with the sultan of Bagirmi, placing his country under French protection. A resident was left at the capital, Massenia, but on Gentil's withdrawal Rabah descended from Bornu and forced sultan and resident to flee. It was not until after the death of Rabah in battle and the rout of his sons (1901) that French authority was firmly established. Kanem, a country north of Bagirmi and subject in turn to it and to Wadai, was at the same time brought under French control. So far as its European rivals are concerned, the French right to these regions is based on the Franco-German convention of the 15th of March 1894 and the Anglo-French declaration of the 21st of March 1899.

See H. Barth, *Travels and Discoveries in North and Central Africa* (London, 1857-1858); G. Nachtigal, *Sahara und Sudan* (Berlin, 1879-1889); E. Gentil, *La Chute de l'Empire de Rabah* (Paris, 1902). Also French Congo.

BAGNACAVALLO, BARTOLOMMEO (1484-1542), Italian painter. His real name was Ramenghi, but he received the cognomen Bagnacavallo from the little village where he was born. He studied first under Francia, and then proceeded to
[v.03 p.0202] Rome, where he became a pupil of Raphael. While studying under him he worked along with many others at the decoration of the gallery in the Vatican, though it is not known what portions are his work. On his return to Bologna he quickly took the leading place as an artist, and to him were due the great improvements in the general style of what has been called the Bolognese school. His works were considered to be inferior in point of design to some other productions of the school of Raphael, but they were distinguished by rich colouring and graceful delineation. They were highly esteemed by Guido Reni and the Carracci, who studied them carefully and in some points imitated them. The best specimens of Bagnacavallo's works, the "Dispute of St Augustine," and a "Madonna and Child," are at Bologna.

BAGNÈRES-DE-BIGORRE, a town of south-western France, capital of an arrondissement in the department of Hautes-Pyrénées, 13 m. S.S.E. of Tarbes on a branch line of the Southern railway. Pop. (1906) 6661. It is beautifully situated on the left bank of the Adour, at the northern end of the valley of Campan, and the vicinity abounds in picturesque mountain scenery. The town is remarkably neat and clean and many of the houses are built or ornamented with marble. It is one of the principal watering-places in France, and has some fifty mineral springs, characterized chiefly by the presence of sulphate of lime or iron. Their temperature ranges approximately from 59° to 122° Fahr., and they are efficacious in cases of rheumatism, nervous affections, indigestion and other maladies. The season begins in May and terminates about the end of October, during which time the population is more than doubled. The Promenade des Coustous is the centre of the life of Bagnères. Close by stands the church of St Vincent of the 14th and 15th centuries. The old quarter of the town, in which there are several old houses, contains a graceful octagonal tower of the 15th century, the remains of a Jacobin monastery. The Néothermes, occupying part of the casino, and the Thermes (dating from 1824), which has a good library, are the principal bathing-establishments; both are town property. The other chief buildings include the Carmelite church, remains of the old church of St Jean, a museum and the town-hall. Bagnères has tribunals of first instance and of commerce, and a communal college. The manufacture of *barège*, a light fabric of silk and wool, and the weaving and knitting of woollen goods, wood-turning and the working of marble found in the neighbourhood and imported from elsewhere, are among the industries, and there are also slate quarries. Bagnères was much frequented by the Romans, under whom it was known as *Vicus Aquensis*, but afterwards lost its renown. It begins to appear again in history in the 12th century when Centulle III., count of Bigorre, granted it a liberal charter. The baths rose into permanent importance in the 16th century, when they were visited by Jeanne d'Albret, mother of Henry IV., and by many other distinguished persons.

BAGNÈRES-DE-LUCHON, a town of south-western France, in the department of Haute-Garonne, 87 m. S.S.W. of Toulouse, on a branch line of the Southern railway from Montréjeau. Pop. (1906) 3448. The town is situated at the foot of the central Pyrenees in a beautiful valley at the confluence of the One and the Pique. It is celebrated for its thermal springs and as a fashionable resort. Of the promenades the finest and most frequented are the Allées d'Etigny, an avenue planted with lime-trees, at the southern extremity of which is the Thermes, or bathing-establishment, one of the most complete in existence. The springs, which number 48, vary in composition, but are chiefly impregnated with sulphate of sodium, and range in temperature from 62° to 150°. A large casino was opened in the town in 1877. The discovery of numerous Roman remains attests the antiquity of the baths, which are identified with the *Onesiorum Thermae* of Strabo. Their revival in modern times dates from the latter half of the 18th century, and was due to Antoine Mégret d'Etigny, *intendant* of Auch.

BAGOAS, a Persian name (*Bagoi*), a shortened form of names like Bagadata, "given by God," often used for eunuchs. The best-known of these ("Bagoses" in Josephus) became the confidential minister of Artaxerxes III. He threw in his lot with the Rhodian condottiere Mentor, and with his help succeeded in subjecting Egypt again to the Persian empire (probably 342 B.C.). Mentor became general of the maritime provinces, suppressed the rebels, and sent Greek mercenaries to the king, while Bagoas administered the upper satrapies and gained such power that he was the real master of the kingdom (Diod. xvi. 50; cf. Didymus, *Comm. in Demosth. Phil.* vi. 5). He became very wealthy by confiscating the sacred writings of the Egyptian temples and giving them back to the priests for large bribes (Diod. xvi. 51). When the high priest of Jerusalem, Jesus, murdered his brother Johannes in the temple, Bagoas (who had supported Johannes) put a new tax on the Jews and entered the temple, saying that he was purer than the murderer who performed the priestly office (Joseph. *Ant.* xi. 7.1). In 338 Bagoas killed the king and all his sons but the youngest, Arses (*q.v.*), whom he raised to the throne; two years later he murdered Arses and made Darius III. king. When Darius attempted to become independent of the powerful vizier (χιλίαρχος), Bagoas tried to poison him too; but Darius was warned and forced him to drink the poison himself (Diod. xvii. 5; Johann. Antioch, p. 38, 39 ed. Müller; Arrian ii. 14. 5; Curt. vi. 4. 10). A later story, that Bagoas was an Egyptian and killed Artaxerxes III. because he had killed the sacred Apis (Aelian, *Var. Hist.* vi. 8), is without historical value. Bagoas' house in Susa, with rich treasures, was presented by Alexander to Parmenio (Plut. *Alex.* 39); his gardens in Babylon, with the best species of palms, are mentioned by Theophrastus (*Hist. Plant*, ii. 6; Plin. *Nat. Hist.* xiii. 41). Another eunuch, Bagoas, was a favourite of Alexander the Great (Dicaearchus in Athen. xiii. 603b; Plut. *Al.* 67; Aelian, *Var. Hist.* 3. 23; Curt. vi. 5. 23; x. 1. 25 ff.).

(Ed. M.)

BAG-PIPE (Celt. *piob-mala*, *ullan-piob*, *cuislean*, *cuislin*; Fr. *cornemuse*, *chalemie*, *musette*, *sourdeline*, *chevrette*, *loure*; Ger. *Sackpfeife*, *Dudelsack*; M. H. Ger. *Suegdbalch*[1]; Ital. *cornamusa*, *piva*, *sampogna*, *surdelina*; Gr. ἄσκαυλος (?); Lat. *ascaulus* (?), *tibia utricularis*, *utricularium*; med. Lat. *chorus*), a complex reed instrument of great antiquity. The bag-pipe forms the link between the syrinx (*q.v.*) and the primitive organ, by furnishing the principle of the reservoir for the wind-supply, combined with a simple method of regulating the sound-producing pressure by means of the arm of the performer. The bag-pipes consists of an air-tight leather bag having three to five apertures, each of which contains a fixed stock or short tube. The stocks act as sockets for the reception of the pipes, and as air-chambers for the accommodation and protection of the reeds. The pipes are of three kinds: (1) a simple valved insufflation tube or "blow-pipe," by means of which the performer fills the bag reservoir; (2) the "chaunter" (chanter) or the melody-pipe, having according to the variety of the bag-pipe a conical or a cylindrical bore, lateral holes, and in some cases keys and a bell; the "chaunter" is invariably made to speak by means of a double-reed; (3) the "drones," jointed pipes with cylindrical bore, generally terminating in a bell, but having no lateral holes and being capable, therefore, of producing but one fixed note.

The main characteristic of the bag-pipe is the drone ground bass which sounds without intermission. Each drone is fitted with a beating-reed resembling the primitive "squeaker" known to all country lads; it is prepared by making a cut partly across a piece of cane or reed, near the open end, and splitting back from this towards a joint or knot, thus raising a tongue or flap. The beating-reed is then fixed in a socket of the drone, which fits into the stock. The sound is produced by the stream of air forced from the bag into the drone-pipe by the pressure of the performer's arm, causing the tongue of

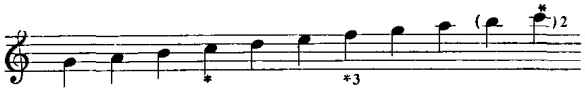
reed to vibrate over the aperture, thus setting the whole column of air in vibration. The drone-pipe, like all cylindrical tubes with reed mouthpieces, has the acoustic properties of the closed pipe and produces the note of a pipe twice its length. The drones are tuned by means of sliding-joints.

[v.03 p.0203]

The blow-pipe and the chaunter occupy positions at opposite extremities of the bag, which rests under the arm of the performer while the drones point over his shoulder. These are the main features in the construction of the bag-pipe, whose numerous varieties fall into two classes according to the method of inflating the bag: (1) by means of the blow-pipe described above; (2) by means of a small bellows connected by a valved feed-pipe with the bag and worked by the other arm or elbow to which it is attached by a ribbon or strap.

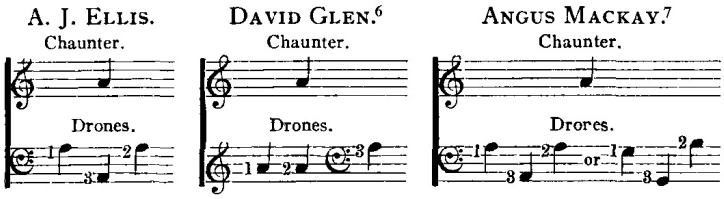
Class I. comprises: (*a*) the Highland bag-pipe; (*b*) the old Irish bag-pipe; (*c*) the cornemuse; (*d*) the bignou or biniou (Breton bag-pipe); (*e*) the Calabrian bag-pipe; (*f*) the ascaulus of the Greeks and Romans; (*g*) the tibia utricularis; (*h*) the chorus. To Class II. belong: (*a*) the musette; (*b*) the Northumbrian or border bag-pipe; (*c*) the Lowland bag-pipe; (*d*) the union pipes of Ireland; (*e*) the surdelina of Naples.

1. *The Highland Bag-pipe.*—The construction of the Highland pipes is practically that given above. The chaunter consists of a conical wooden tube terminating in a bell and measuring from 14 to 16 in. including the reed. There are seven holes in front and one at the back for the thumb of the left hand, which fingers the upper holes while the right thumb merely supports the instrument. The holes are stopped by the under part of the joints of the fingers. There is in addition a double hole near the bell, which is never covered, and merely serves to regulate the pitch. As the double reed is not manipulated by the lips of the performer, only nine notes are obtained from the chaunter, as shown:—[2][3]

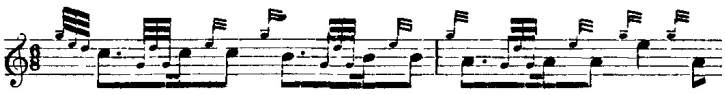


The notes do not form any known diatonic scale, for in addition to the C and F being too sharp, the notes are not strictly in tune with each other. Donald MacDonald, in his treatise on the bag-pipe[4] states that "the piper is to pay no attention to the flats and sharps marked on the clef, as they are not used in pipe music; yet the pipe imitates several different keys which are real, but ideal on the bag-pipe, as the music cannot be transposed for it into any other key than that in which it is first played or marked." Mr Glen, the great dealer in bag-pipes, gave it as his opinion "that if the chaunter were to be made perfect in any one scale, it would not go well with the drones. Also, there would not be nearly so much music produced (if you take into consideration that it has only nine invariable notes) as at present it adapts itself to the keys of A maj., D maj., B min., G maj., E min. and A min. Of course we do not mean that it has all the intervals necessary to form scales in all those keys, but that we find it playing tunes that are in one or other of them."[5] Mr Ellis considers that the natural scale of the chaunter of the bag-pipe corresponds most nearly with the Arab scale of Zalzal, a celebrated lutist who died *c.* A.D. 800.

The three drones are usually tuned to A, the two smallest one octave below the A of the chaunter, and the largest two octaves below. The three principal methods of tuning the drones are shown as follows:—[6][7]



The excessive use of ornamental notes on the Highland bag-pipe has arisen from a technical peculiarity of the instrument, which makes a repetition of the same note difficult without the interpolation of what is known among pipers as "cuts" or "warblers," *i.e.* grace notes fingered with great rapidity (see below for an example). These warblers, which consist not only of single notes but of groups of from three to seven notes, not consecutive but in leaps, assist in relieving the constant discord with the drone bass. Skilful pipers have been known to introduce warblers of as many as eleven notes between two beats in a bar.



The use of musical notation for the Highland pipe tunes is a recent innovation; the pipers used verbal equivalents for the notes; for instance, the piobaireachd *Coghiegh nha Shie*, "War of peace,"[8] which opens as shown here, was taken down by Capt. Niel MacLeod from the piper John M^{c}Crummen of Skye as verbally taught to apprentices as follows:—

> "Hodroho, hodroho, haninin, hiechin,
> Hodroha, hodroho, hodroho, hachin,
> Hiodroho, hodroho, haninin, hiechin," &c.

The conclusion of the tune is thus expressed:

> "Hiundratatateriri, hiendatatateriri, hiundratatateriri, hiundratatateriri."[9]

Written down this seems a mere unintelligible jumble, but could we hear it, as sounded by the pipers, with due regard for the rhythmical value of notes, it would be a very different matter. Alexander Campbell[10] relates that a melody had to be taken down or translated "from the syllabic jargon of illiterate pipers into musical characters, which, when correctly done, he found to his astonishment to coincide exactly with musical notation."

A Highland bag-pipe of the 15th century, dated MCCCCIX., in the possession of Messrs J. & R. Glen of Edinburgh, was exhibited at the Royal Military Exhibition in London in 1890[11] (see fig. 1 (4)). There were two drones, inserted in a single stock in the form of a wide-spread fork, and tuned to A in unison with the lowest note of the chaunter, which had seven finger-holes in front and a thumb-hole at the back.

The old Irish Bag-pipe.—Very little is known about this instrument. It is mentioned in the ancient Brehon Laws, said to date from the 5th century (they are cited in compilations of the 10th century), in describing the order of precedence of the king's bodyguard and household in the *Crith Gabhlach*: "Poets, harpers, *pipers*, horn-blowers and jugglers have their place in the south-east part of the house."[12] The word used for (bag-) pipers is *Cuislennaïgh*, a word associated with reed instruments (*cuiscrigh* = reeds; O'Reilly's *Irish-English Dictionary*, Dublin, 1864). The old Irish bag-pipe, of which we possess an illustration dated 1581,[13] had a long conical chaunter with a bell and apparently seven holes in front and a

thumb-hole behind; there were two drones of different lengths—one very long—both set in the same stock. It is exceedingly difficult to procure any accurate information concerning the development of the bag-pipe in Ireland until it assumed the present form, known as the union-pipes, which belong to Class II.

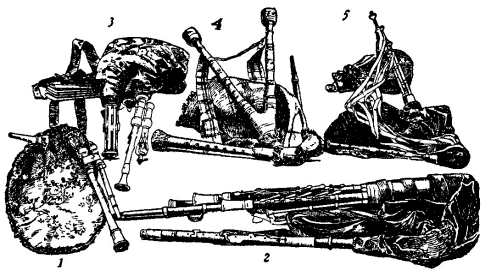
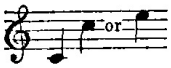
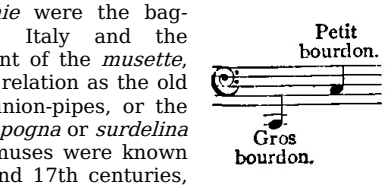


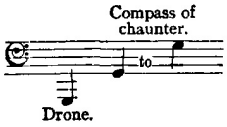
Fig. 1.—(1) Cornemuse. (2) Irish bag-pipe. (3) Musette. (4) Highland bag-pipe, A.D. 1409. (5) Border bag-pipe. (From Capt. C. R. Day's *Descriptive Catalogue of Musical Instruments exhibited at the Royal Military Exhibition*, by permission of Eyre & Spottiswoode.)

[v.03 p.0204]

The *cornemuse* and *chalemie* were the bag-pipes in use in France, Italy and the Netherlands before the advent of the *musette*, to which they bear the same relation as the old Irish bag-pipe does to the union-pipes, or the *cornemusa* or *piva* to the *sampogna* or *surdelina* in Italy. Two kinds of cornemuses were known in France during the 16th and 17th centuries, differing in one important structural detail, which affected the timbre of the instruments. Père Marin Mersenne[14] has given a detailed description of these varieties and of the musette, with very clear illustrations of the instruments and all their parts. The cornemuse or chalemie used by shepherds, and as a solo instrument (see fig. 1 (1)), was similar to the Highland bag-pipe; it consisted of a leather bag, inflated by means of a valved blow-pipe; a large drone (*gros bourdon*) 2½ ft. long included the beating-reed, which measured 2½ in., and was fixed in the stock; the small drone (*petit bourdon*), 1 ft. in length including a reed 2 in. long, also had a beating-reed and was fixed in the same stock as the chaunter. The two drones were tuned to C. The chaunter had a conical bore and a double reed like an oboe, but hidden within the stock; it could be taken out and played separately, when the compass given by the eight holes (seven in front and a thumb-hole) C to C′ could be increased by a third to E, by overblowing the D and E an octave by pressure of the breath and lips on the reed, now taken directly into the mouth. The second kind of cornemuse was played only in concert with a family of instruments known as *Hautbois de Poitou*, a hautbois having the reed enclosed in an air-chamber, just as is the case with the reeds of the bag-pipe. This cornemuse had but one drone which could, like the others, be lengthened for tuning by drawing out the joint; the reed was not a beating-reed but a double reed like that of the chaunter; this constitutes the main difference between the two cornemuses. The chaunter had eight holes, the lowest of which was covered by a key enclosed in a perforated box.

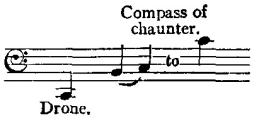






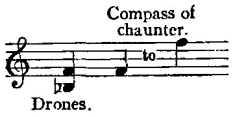
Sackpfeife or Dudelsack.

The *Sackpfeife* or *Dudelsack* of Germany was an instrument of some importance made in no less than five sizes, all described and illustrated by Michael Praetorius.[15] They consist of the *Grosser Bock* or double-bass bag-pipe, a formidable-looking instrument with a single cylindrical drone of a great length, terminating, as did the chaunter also, in a curved ram's horn (to which the name was due). The chaunter had seven finger-holes and a vent-hole in front, and a thumb-hole at the back. The drone was tuned to G, an octave below the chaunter.



Bock.

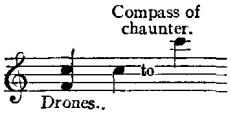
The *Bock*, of similar construction, was pitched a fourth higher in C.



Schäferpfeife.

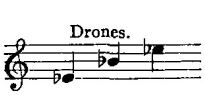
The *Schäferpfeife* had two drones in B flat and F. Praetorius explains that the upper notes of the chaunter of this sackpfeife had a faulty intonation which could not be corrected owing to the absence of the thumb-hole, usual in all other varieties of the instrument.

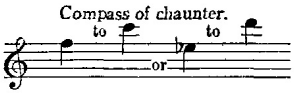
The *Hümmelchen* had two drones tuned to F and C.



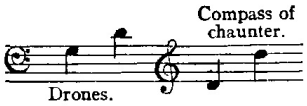
Hümmelchen.

The *Dudey* or treble sackpfeife was the smallest of the family, and had three drones tuned to E flat, B flat and E flat, and a chaunter with a compass ranging from F or E flat to C or D.





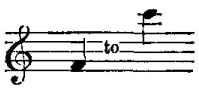
Praetorius also mentions a different kind of sackpfeife he saw in Magdeburg (see *op. cit. Theatrum*, pl. v., No. 4), which was somewhat larger than the schäferpfeife and pitched a third lower. There were two chaunters mounted in one stock, each having three holes in front and one for the thumb at the back. The right-hand chaunter sounded the five notes D, E, F, G, A, and the left-hand chaunter, G, A, B, C, D. The performer was thus able to play simple two-part melodies on the Magdeburg bag-pipe. Praetorius mentions in addition the French bag-pipe (*musette*), similar in pitch to the hümmelchen, but inflated by means of the bellows.



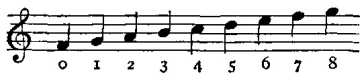
The *Calabrian bag-pipe* has a bag of goatskin with the hair left on, and is inflated by means of a blow-pipe. There are two drones and two chaunters, all fixed in one stock. Each chaunter has three or four finger-holes and the right-hand pipe has the fourth covered by a key enclosed in a perforated box; both drones and chaunter have double reeds.

The ancient Greek bag-pipe (see Askaules), and the Roman *tibia utricularis*, belonged to this class of instrument, inflated by the mouth, but it is not certain that they had drones (see below, *History*).

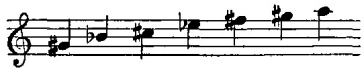
II. The second class of instruments, inflated by means of a small bellows worked by the arm, has as prototype the *musette* (see fig. 1 (3)), which is said to have been evolved during the 15th century;[16] from the end of the 15th century there were always musette players[17] at the French court, and we find the instrument fully developed at the beginning of the 17th century when Mersenne[18] gives a full description of all its parts. The chief characteristic of the musette was a certain rustic Watteau-like grace. The face of the performer was no longer distorted by inflating the bag; for the long cumbersome drones was substituted a short barrel droner, containing the necessary lengths of tubing for four or five drones, reduced to the smallest and most compact form. The bores were pierced longitudinally through the thickness of the wood in parallel channels, communicating with each other in twos or threes and providing the requisite length for each drone. The reeds were double "hautbois" reeds all set in a wooden stock or box within the bag; by means of regulators or slides, called *layettes*, moving up and down in longitudinal grooves round the circumference of the barrel, the length of the drone pipes could be so regulated that a simple harmonic bass, consisting mainly of the common chord, could be obtained. The chaunter, of narrow cylindrical bore, was also furnished with a double reed and had eleven holes, four of which had keys, giving a compass of twelve notes from F to C. This number of holes was not invariable. After Mersenne's time, Jean Hotteterre (d. 1678), a court musician, belonging to the band known as the *Musique de la Grande Écurie*,[19] in which he played the *dessus de hautbois*, introduced certain improvements in the drones of the musette.[20] His son Martin Hotteterre (d. 1712) added a second chaunter to the musette, shorter than the first, to which it was attached instead of being inserted into the stock. The Hotteterre chaunter, known as le *petit chalumeau*, had six keys, whereas the *grand chalumeau* had seven, besides eight finger-holes and a vent-hole in the bell.



All these keys were actuated by the little finger of the left hand and the thumb of the right hand, which were not required to stop holes on the large chaunter. The *grand* and *petit chalumeaux* are figured in detail with keys and holes in a rare and anonymous work by Borjon (or Bourgeon[21]), who gives much interesting information concerning one of the most popular instruments of his day. The bellows, he states, borrowed from the organ, were added to the musette about forty or fifty years before he wrote his treatise. The compass of the improved musette of Hotteterre was as shown:—



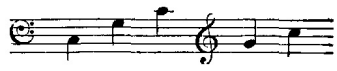
the eight holes of the grand chalumeau.



the seven keys of the grand chalumeau.

the six keys of the petit chalumeau.

The four or five drones were usually tuned thus:



The chaunters and drones were pierced with a very narrow cylindrical bore, and double reeds were used throughout, causing them to speak as closed pipes, which accounts for the deep pitch of these relatively short pipes (see Aulos). [v.03 p.0205] Martin Hotteterre was hardly the first to introduce the second chaunter for the bag-pipe, since Praetorius in 1618 figures and describes the Magdeburg *sackpfeife* with two chaunters, but without keys and with a conical bore.

The *surdelina* or *sampogna* is described and illustrated by Mersenne[22] as the *musette de Naples*; its construction was very complicated. Mersenne states that the instrument was invented by Jean Baptiste Riva (who was living in Paris in 1620), Dom Julio and Vincenze; but Mersenne seems to have made alterations himself in the original instrument, which are not very clearly explained. There were two chaunters with narrow cylindrical bore and having both finger-holes and keys; and two drones each having ten keys. The four pipes were fixed in the same stock, and double reeds were used throughout; the bag was inflated by means of bellows. Passenti of Venice published a collection of melodies for the zampogna in 1628, under the title of *Canora Zampogna*.

The modern *Lowland bag-pipe* differs from the Highland bag-pipe mainly in that it is blown by bellows instead of by the mouth.

The *Northumbrian* or *Border bag-pipe*, also blown by means of bellows, is chiefly distinguished by having a chaunter stopped at the lower end so that when all the holes are closed, the pipe is silent. There are seven finger-holes, one for the thumb, and a varying number of keys. The four drones are fixed in one stock and are tuned by means of stoppers, so that, as in the musette, any one of them may be silenced. A fine Northumbrian bag-pipe[23] from the collection of the Rev. F. W. Galpin is illustrated (fig. 1. (5)).

The union pipes of the 18th century, or modern *Irish bag-pipe*, blown by bellows (see fig. 1. (2)), had one chaunter with seven finger-holes, one thumb-hole and eight keys, which together gave the chromatic scale in two octaves. The drones were tuned to A in different octaves, and three regulators or drones with keys, played by the elbow, produced a kind of harmony; the regulators correspond to the sliders on the drone-barrel of the musette.

History of the Bag-pipe.—There is reason to believe that the origin of the bag-pipe must be sought in remote antiquity. No instrument in any degree similar to it is represented on any of the monuments of Egypt or Assyria known at the present day; we are, nevertheless, able to trace it in ancient Persia and by inference in Egypt, in Chaldaea and in ancient Greece. The most characteristic feature of the bag-pipe is not the obvious bag or air-reservoir from which the instrument derives its name in most languages, but the fixed harmony of the buzzing drones. The principle of the drone, *i.e.* the beating-reed sunk some three inches down the pipe, was known to the ancient Egyptians. In a pipe discovered in a mummy-case and now in the museum at Turin, was found a straw beating-reed in position. The arghoul (*q.v.*), a modern Egyptian instrument, possesses the characteristic feature of drone and chaunter without the bag. The same instrument occurs once in the hieroglyphs, being sounded *as-it*, and once on a mural painting preserved in the Musée Guimet and reproduced by Victor Loret.[24] During Jacques de Morgan's excavations in Persia some terracotta figures of musicians, dating from the 8th century B.C., were discovered in a *tell* (mound) at Susa,[25] two of which appear to be playing bag-pipes; the chaunter, curved in the shape of a hook from the stock, is clearly visible, the bag under the arm is indicated, and the lips are pursed as if in the act of blowing, but the insufflation tube is absent; a round hole in one of the figures suggests its presence formerly.

Among the names of musical instruments in Daniel iii. 5 and 15, the sixth, generally but wrongly rendered "dulcimer," is thought by many scholars to signify a kind of bag-pipe (see commentaries on *Daniel* and the theological encyc.). This belief is based on the supposition that the Aramaic *sumpōnyā* is a loan-word from the Greek, being a mispronunciation of συμφονία. The argument is, however, exceedingly weak. In the first place, the date of the book of Daniel is matter of controversy, hingeing partly on precisely such questions as the true significance and derivation of *sumpōnyā*. Second, it is possible that the word *sumpōnyā* is a late interpolation. Third, its exact form is uncertain; in verse 10, *sippōnyā* is used of the same instrument, suggesting a derivation from the Gr. σίφον (tube or pipe). Fourth, even if συμφονία is the source of the word, there is very little evidence that it was used for any particular instrument. The original natural sense of συμφονία is "concord of sound," "a concordant interval," and the evidence of its use for a particular instrument is of the 2nd century B.C., and, even so, very slight. Only one passage (Polyb. xxvi. 10. 5) really bears on the question, and there the translation of the word depends on a context the reading of which is uncertain (see Symphonia). It is, however, curious that the bag-pipe was known in Italy and Spain during the middle ages, the two countries through which Eastern culture was introduced into Europe, by the name of *zampogna* or *sampogna*, which strongly recall the Chaldaean *sumpōnyā*; and further that in the same countries the word *sinfonia* should be coexistent with *zampogna* and have the original meaning attached to the classical συμφονία, "a concord of sound." A single passage only in Dion Chrysostom (see Askaules) is enough to prove that the instrument was known in Greece in A.D. 100.[26] The Greeks had undoubtedly received some kind of bag-pipe from Egypt (in the form of the *as-it*), or from Chaldaea, but it remained a rustic instrument used only by shepherds and peasants. This conclusion is supported by allusions in Aristophanes and in Plato's *Crito*, which undoubtedly refer to the drone: "This, dear Crito, is the voice which I seem to hear murmuring in my ears like the sound of the flute (*aulos*) in the ears of the mystic; that voice, I say, is humming in my ears."[27] Aristophanes, in his play *The Acharnians*, indulges in a flight of satire at the expense of the musical Boeotians, by making a band of Theban pipers play a Boeotian merchant and his slave into town. The musicians are dubbed "bumblebee pipers" (βομβαύλιοι, l. 866) by the exasperated inhabitants. The verb used here for "blowing" is φυσᾶν, the very word applied to blowing or inflating the bellows (φῦσα), and not the usual verb αὐλεῖν, to play the aulos. Another instrument, mentioned by Aristophanes in *Lysistrata* (ll. 1242 and

1245), which was probably a kind of bag-pipe, is also derived from φῦσα, *i.e. physallis*, the "concrete,"[28] and *physateria*[29] the "collective"[28] form of the instrument. We leave the realm of inference for that of certainty when we reach the reign of Nero, who had a passion for the *Hydraulus* (see Organ: *History*) and the *tibia utricularis*.[30] That the bag-pipe was introduced by the Romans into the British Isles is a conclusion supported by the discovery in the foundations of the praetorian camp at Richborough of a small bronze figure of a Roman soldier playing the tibia utricularis. The Rev. Stephen Weston, who made a communication on the subject to *Archaeologia*,[31] points out further the interesting fact in connexion with the instrument, that the Romans had instituted colleges for training pipers on the bag-pipe, a practice followed in the Highlands in the 18th century and notably in Skye. Gruterus[32] mentions among the fraternities a *Corpus et Collegium Utriculariorum*, and Spon[33] also quotes the *Collegio Utricular*. The bag-pipe in question appears to have two drones in front pointing towards the right shoulder, and although no chaunter is shown in the design, both hands are held in correct positions over the spot where it ought to be; it may have been broken off. The bronze figure has been reproduced from drawings by Edward King in three positions.[34] The statement made by several writers on music that a bag-pipe is represented on a contorniate of Nero is erroneous, as a verification of certain references will show.[35] The
[v.03 p.0206]
error is due in the first place to Montfaucon, who misunderstood the explanation of Bianchini's drawing which he reproduced. The contorniate referred to is one containing the hydraulic organ, and the legend *Laurentinus Aug.*, but no bag-pipe. Bianchini gives a drawing of a bag-pipe with two long drones, which, he says, was copied from a marble relief over the gateway of the palace of the prince of Santa Croce in Rome, near the church of San Carlo ad Catinarios. If the drawing be accurate and the sculpture of classical Roman period, it would corroborate the details of the instrument held by the little bronze figure of the Roman soldier.

From England the bag-pipe spread to Caledonia and Ireland, where it took root, identifying itself with the life of the people, as a military instrument held in great esteem by the Celtic races. The bag-pipe was used at weddings and funerals, and at all festivals; to lighten labour, during the 18th century, as for instance in Skye, in 1786, when the inhabitants were engaged in roadmaking, and each party of labourers had its bag-piper. It was used in old mysteries at Coventry in 1534. Readers who wish to follow closely the history of the bag-pipe in the British Isles should consult Sir John Graham Dalyell's *Musical Memoirs of Scotland* (London, 1849, with illustrative plates).

Fig. 2.—Ancient Persian bag-pipe. (From Sir Robert Porter's *Travels in Georgia, Persia*, &c., vol. ii. p. 177, pl. lxiv.)

On the downfall of the Roman empire, the bag-pipe, sharing the fate of other instruments, probably lingered for a time among itinerant musicians, actors, jugglers, &c., reappearing later in primitive guise with the stamp of *naiveté* which characterizes the productions of the early middle ages, and with a new name, chorus (*q.v.*). An illustration of a Persian bag-pipe dating from the 6th century A.D. (reign of Chosroes II.) is to be found on the great arch at Takht-i-Bostan (see fig. 2). This very crude representation of the bag-pipe can only be useful as evidence that during centuries which elapsed between the moulding of the figurine found in the *tell* at Susa, mentioned above, and the carving in the rock at Takht-i-Bostan, the instrument had survived. The reign of Chosroes was noted for its high standard of musical culture. The fault probably lies with the draughtsman, who drew the sculptures on the arch for the book. Nothing more is heard henceforth of the tibia utricularis. If the drawings of the early medieval bag-pipes, which are by no means rare in MSS. and monuments of the 9th to the 13th century, are to be trusted, it seems hard to understand the *raison d'être* of the instrument shorn of its drones, to see how it justified its existence except as an ill-understood reminiscence. What could be the object of laboriously inflating a bag for the purpose of making a single chaunter speak, which could be done so much more satisfactorily by taking the reed itself into the mouth, as was the practice of the Greeks and Romans? There is a fine psalter in the library of University Court, Glasgow,[36] belonging co the Hunterian collection, in which King David is represented, as usual in the 12th century, playing or rather tuning a harp, surrounded by musicians playing bells, rebec, guitar fiddle (in 'cello position), quadruple pipes or ganistrum, and a bag-pipe with long chaunter having a well-defined stock. The insufflation tube appears to have been left out, and there are no drones to be seen.

There are interesting specimens of bag-pipes in Spanish illuminated MSS. such as the magnificent volume of the *Cantigas di Santa Maria*, in the Escurial, compiled for King Alphonso the Wise (13th century). There are fifty-one separate figures of instrumentalists forming a kind of introduction to the canticles, and among the instruments are three bag-pipes, one of which is a remarkable instrument having no less than four long drones and two chaunters which by an error of the draughtsmen are represented as being blown from the piper's mouth. The fifty-one musicians have been reproduced in black and white by Juan F. Riano[37] and also by Don F. Aznar.[38] Another fine Spanish MS. in the British Museum, Add. MS. 18,851, of the end of the 15th century, illustrated by Flemish artists for presentation to Queen Isabella, displays a profusion of musical instruments in innumerable concert scenes; there are bag-pipes on f. 13,412^{b} and 419; one of these has two drones, one conical, the other cylindrical, bound together, and a curved chaunter.

The most trustworthy evidence we have of the medieval bag-pipe is the fine Highland bag-pipe dated 1409, and belonging to Messrs J. & R. Glen, described above. Edward Buhle[39] points out that from the 13th century the bag-pipe became a court instrument played by minnesingers and troubadours, as seen in literature and in the MSS. and monuments. It was about 1250 that the human or animals' heads were used as stocks and as bells for the chaunters. The opinion advanced that the bellows were first added to the bag-pipe in Ireland seems untenable and is quite unsupported by facts; the bellows were in all probability added to the union-pipes in imitation of the musette. In the *Image of Ireland and Discoverie of Woodkarne*, by John Derrick, 1581, the Irish insurgents are portrayed in pictures full of life and character, as led to rebellion and pillage by a piper armed with a bag-pipe, similar to the Highland bag-pipe. The cradle of the musette is inconceivable anywhere but in France, among the courtiers and elegant world, turning from the pomps and luxuries of court life to an artificial admiration and cult of Nature, idealized to harmonize with silks and satins. The cornemuse of shepherds and rustic swains became the fashionable instrument, but as inflating the bag by the breath distorted the performer's face, the bellows were substituted, and the whole instrument was refined in appearance and tone-quality to fit it for its more exalted position. The Hotteterre family and that of Chédeville were past masters of the art of making the musette and of playing upon it; they counted among their pupils the highest and noblest in the land. The cult of the musette continued throughout the 17th and 18th centuries until the 'seventies, when its popularity was on the wane and musettes figured largely in sales.[40] Lully introduced the musette into his operas, and in 1758 the list of instruments forming the orchestra at the Opéra includes one musette.[41] Illustrations of bag-pipes are found in the miniatures of the following MSS. in the British Museum.—2 B. VII. f. 192 and 197; Add. MS. 34,294 (the *Sforza Book*), f. 62, vol. i.; Burney, 275, f. 715; Add. MS. 17,280, f. 238^{b}; Add. MS. 24,686 (*Tennyson Psalter*), f. 17^{b}; Add. MS. 17,280, f. 82^{b}; Add. MS. 24,681, f.44; Add. MS. 32,454; Add. MS. 11,867, f38; &c. &c.

(K. S.)

[1] See E. G. Graff, *Deutsche Interlinearversionen der Psalmen* (from a 12th-cent. Windberg MS. at Munich), p. 384, Ps. lxxx. 2. "nemet den Sulmen unde gebet den Suegdbalch."

[2] These harmonics may be obtained by good performers by what is known as "pinching" or only partially covering the B and C holes and increasing the wind pressure.

[3] The notes marked with asterisks are approximately a quarter of a tone sharp.

[4] "Complete Tutor for attaining a thorough knowledge of the pipe music," prefixed to *A Collection of the Ancient Martial Music of Caledonia called Piobaireachd, as performed on the Great Highland Bag-pipe*, Edinburgh, *c.* 1805.

[5] Paper on "The Musical Scales of Various Nations," by Alex. J. Ellis, F.R.S., *Jrnl. Soc. Arts*, 1885, vol. xxxiii. p. 499.

[6] *Tutor for the Highland Bag-pipe*, by David Glen (Edinburgh, 1899).

[7] *Tutor for the Highland Bag-pipe*, by Angus Mackay (Edinburgh, 1839).

[8] *A Collection of Ancient Piobaireachd or Highland Pipe Music* by Angus Mackay (Edinburgh, 1839), p. 128.

[9] *A Collection of Piobaireachd or Pipe Tunes as verbally taught by the M^{c} Crummen Pipers on the Isle of Skye to their apprentices*, as taken from John M^{c}Crummen (or Crimmon) by Niel MacLeod of Gesto, Skye (Edinburgh, 1880).

[10] Albyn's *Anthology*, vol. i. p. 90.

[11] *Descriptive Catalogue of the Musical Instruments exhibited at the Royal Military Exhibition*, London, 1890, Eyre & Spottiswoode, 1891, pl. ix. A, and description p. 57.

[12] *Ancient Laws of Ireland, Brehon Law Tracts*, published by the Commissioners for publishing the Ancient Laws and Institutions of Ireland (Dublin, 1879), vol. iv. pp. 338 and 339.

[13] John Derrick, *Image of Ireland and Discoverie of Woodkarne* (London, 1581), pl. ii.

[14] *L'Harmonie universelle*, vol. ii. bk. v. pp. 282-287 and 305 (Paris, 1636-1637).

[15] *Syntagma Musicum*, part ii., *De Organographia* (Wolfenbüttel, 1618); republished in Band xiii. of the *Publicationen der Gesellschaft für Musikforschung* (Berlin, 1884), chap. xix. and pl. v., xi., xiii.

[16] See E. Thoinan, *Les Hotteterre et les Chèdeville, célèbres facteurs de flûtes, hautbois, bassons et musettes* (Paris, 1894), p. 23. It is probable, however, that M. Thoinan, who makes this statement, has not considered the possibility of the word *musette* applying in this case to the small rustic hautbois or *dessus de bombarde*, also written *muse*, *muset*, *musele*, which occurs in many ballads of the 13th, 14th and 15th centuries. See Fr. Godefroy, *Dictionnaire de l'ancienne langue française du IX^{e} au XV^{e} siècle* (Paris, 1888).

[17] Musettes de Poitou; probably the *cornemuses* used in concert with the Hautbois de Poitou.

[18] *Op. cit.* vol. ii. bk. v. pp. 287-292.

[19] See Ernest Thoinan, *op. cit.* pp. 15 et seq. (cf. Jules Ecorcheville, "Quelques documents sur la musique de la Grande Écurie du Roi" in *Intern. Mus. Ges.*, Sammelband ii. 4, p. 625 and table 2, "Grands Hautbois").

[20] *Méthode pour la musette*, &c., by Hotteterre le Romain (Paris, 1737), 4to, chap. xvi.

[21] *Traité de la musette avec une nouvelle méthode*, &c. (Lyons, 1672), pp. 25-27 and plate. A copy of this work is in the British Museum.

[22] *Op. cit.* bk. v. p. 293.

[23] Illustrated and described by Capt. C. R. Day, *Descriptive Catalogue*, pl. ix. fig. C, p. 62.

[24] *L'Egypte au temps des Pharaons—la vie, la science et l'art; avec Photogravures*, &c. (Paris, 1889) 12mo, p. 139.

[25] See *Délégation en Perse*, by J. de Morgan (Paris, 1900), vol. i. pl. viii., Nos. 10 and 14.

[26] Dion Chrysostom, ed. Adolphus Emperius (Brunswick, 1844), p. 728 or lxxi. (R) 381. See Pauly-Wissowa, *Realencyclopadie*, *s.v.* "Askaules."

[27] 54, B. Jowett's Eng. translation (Oxford, 1892).

[28] A suggestion the writer owes to Mr G. Barwick of the British Museum.

[29] See "Researches into the Origin of the Organs of the Ancients," by Kathleen Schlesinger, Sammelband ii. *Intern. Musik. Ges.* vol. ii, 1901, pp. 188-202.

[30] Suetonius, *Nero*, 54 (S. Clarke's translation and text).

[31] *Archaeologia*, vol. xvii. pp. 176-179 (London, 1814).

[32] *Inscriptiones antiquae totius orbis romani* (Heidelberg, 1602-1603).

[33] *Miscell. erudit. antiquitatis*.

[34] *Munimenta antiqua*, vol. ii. (London, 1799), p. 22, pl. xx. fig. 3.

[35] See Montfaucon, *Suppl. de l'antiq. expliquée*, vol. iii. pl. lxxiii., Nos. 1 and 2, and explanation p. 189; Francesco Bianchini. *de tribus generibus instr. mus. veterum*, Romae, 1742, pl. ii., Nos. 12 and 13, and p. 11; Suetonius, *Vitae Neronis*, ed. Charles Patin, cap. 41, p. 304, where the contorniate in question, whose musical instrument differs essentially from Bianchini's and Montfaucon's, is figured.

[36] See Catalogue of the Exhibition of Illuminated MSS. at the Burlington Fine Arts Club, 1908, No. 31.

[37] *Notes of Early Spanish Music* (London, 1887), pp. 120 and 121.

[38] *Idumentario Española* (Madrid, 1880).

[39] *Die musikalischen Instrumente in den Miniaturen des frühen Mittelalters*, p. 50 (Leipzig, 1903).

[40] An interesting pamphlet by Eugène de Bricqueville, *Les Musettes* (Paris, 1894), p. 36, with illustrations.

[41] See Antoine Vidal, *Les Instruments à archet* (Paris, 1871), vol. i. p. 81, note 1.

BAGRATION, PETER, Prince (1765-1812), Russian general descended from the noble Georgian family of the Bagratides was born in 1765. He entered the Russian army in 1782, and served for some years in the Caucasus. He was engaged in the siege of Ochakov (1788), and in the Polish campaign of 1794, being present at the taking of Praga and Warsaw. His merits were recognized by Suvarov, whom he accompanied in the Italian and Swiss campaign of 1799, winning particular distinction by the capture of the town of Brescia. In the wars of 1805 his achievements were even more brilliant. With a small rearguard he successfully resisted the repeated attacks of forces five times his own numbers (Hollabrünn), and though half his men fell, the retreat of the main army under Kutusov was thereby secured. At Austerlitz he was engaged against the left wing of the French army, under Murat and Lannes, and at Eylau, Heilsberg and Friedland he fought with the most resolute and stubborn courage. In 1808 by a daring march across the frozen Gulf of Finland he captured the Åland Islands, and in 1809 he commanded against the Turks at the battles of Rassowa and Tataritza. In 1812 he commanded the 2nd army of the West, and though defeated at Mogilev (23rd July), rejoined the main army under Barclay, and led the left wing at Borodino (7th Sept.), where he received a mortal wound. A monument was erected in his honour by the tsar Nicholas I. on the battlefield of Borodino.

[v.03 p.0207]

BAGSHOT BEDS, in geology, a series of sands and clays of shallow-water origin, some being fresh-water, some marine. They belong to the upper Eocene formation of the London and Hampshire basins (England), and derive their name from Bagshot Heath in Surrey; but they are also well developed in Hampshire and the Isle of Wight. The following divisions are generally accepted:—

Upper	Bagshot	Beds	Barton sand, and Barton clay.
Middle	"	"	Bracklesham beds.
Lower	"	"	Bournemouth beds, Alum Bay beds, and Bovey Tracey beds (?).

The lower division consists of pale-yellow, current-bedded sand and loam, with layers of pipeclay and occasional beds of flint pebbles. In the London basin, wherever the junction of the Bagshot beds with the London clay is exposed, it is clear that no sharp line can be drawn between these formations. The Lower Bagshot beds may be observed at Brentwood, Billericay and Highbeech in Essex; outliers, capping hills of London clay, occur at Hampstead, Highgate and Harrow. In Surrey considerable tracts of London clay are covered by heath-bearing Lower Bagshot beds, as at Weybridge, Aldershot, Woking, &c. The "Ramsdell clay," N.W. of Basingstoke, belongs to this formation. In the Isle of Wight the lower division is well exposed at Alum Bay (660 ft.) and White Cliff Bay (140 ft.); here it consists of unfossiliferous sands (white, yellow, brown, crimson and every intermediate shade), and clays with layers of lignite and ferruginous sandstone. Similar beds are visible at Bournemouth, and in the neighbourhood of Poole, Wareham, Corfe and Studland.

The leaf-bearing clays of Alum Bay and Bournemouth are well known, and have yielded a large and interesting series of plant remains, including *Eucalyptus*, *Caesalpinia*, *Populus*, *Platanus*, *Sequoia*, *Aralia*, *Polypodium*, *Osmunda*, *Nipadites* and many others. The sands and clays of Bovey Tracey (see Bovey Beds) are probably of the same age. The clays of this formation are of great value for pottery manufacture; they are extensively mined in the vicinity of Wareham and Corfe, whence they are shipped from Poole and are consequently known as "Poole clays"; similarly, "Teignmouth clay" is obtained from the Bovey beds. Alum was formerly obtained from the clays of Alum Bay; and the lignites have been used as fuel near Corfe and at Bovey.

The Bracklesham beds (*q.v.*) are sometimes classed with the overlying Barton clay as Middle Bagshot. In the London basin the Barton beds are unknown. In Surrey and Berkshire the Bracklesham beds are from 20 to 50 ft. thick; in Alum Bay they are 100 ft., with beds of lignite in the lower portion; and about here they are sharply marked off from the Barton clay by a bed of conglomerate formed of flint pebbles. The Upper Bagshot beds, Barton sand and Barton clay, are from 140 to 200 ft. thick in the Isle of Wight.

The Agglestone (or Haggerstone) rock and Puckstone rock, near Studland in Dorsetshire, are formed of large indurated masses of the Lower Bagshot beds that have resisted the weather; Creechbarrow near Corfe is another striking feature due to the same beds. Many of the sarsen stones or greywethers of S.E. England have been derived from Bagshot strata.

See *Memoirs of the Geological Survey* (England):—"Geology of the Isle of Wight," new edition (1889); "The Geology of London and Part of the Thames Valley," vol. i. (1889); and "The Geology of the Country around Bournemouth" (1898).

BAHADUR KHEL, an Indian salt-mine in the Kohat district of the North-West Frontier Province, in the range of hills south of the village of Bahadur Khel between Kohat and Bannu. For a space of 4 m. in length by a quarter of a mile in breadth there exists an exposed mass of rock-salt with several large hillocks of salt on either side. The quarries extend over an area 1 m. long by half a mile broad, and the salt is hewn out in large blocks with picks and wedges. The Indian government formerly maintained a large preventive establishment for the preservation of the revenue, but it was withdrawn in 1898. Consumption of Kohat salt is restricted, on account of its paying less duty, to the tracts lying to the north of the Indus and to the frontier tribes. In 1903 the rate was fixed at R.1½ per maund, against R.2 for the rest of India. The mines are under the control of the Northern India Salt Department.

BAHADUR SHAH I., a Mogul emperor of Hindustan, A.D. 1707-1712, the son and successor of Aurangzeb. At the time of the latter's death his eldest surviving son, Prince Muazim, was governor of Kabul, and in his absence the next brother, Azam Shah, assumed the functions of royalty. Muazim came down from Kabul, and with characteristic magnanimity offered to share the empire with his brother. Azam would not accept the proposal and was defeated and slain on the plains of Agra. Muazim then ascended the throne under the title of Bahadur Shah. He was a man of 64 and died five years later. During his lifetime the empire was already falling to pieces before the inroads of the Sikhs and Mahrattas, and through internal dissensions.

BAHADUR SHAH II., the last of the Mogul emperors of Hindustan, 1837-1857. He was a titular emperor only, since from the time of the defeat of Shah Alam at Buxar in 1764 all real power had resided with the East India Company; but all proclamations were still worded under "The King's Realm and the Company's rule." His sole importance is due to the use made of his name during the Mutiny of 1857. Always feeble in character, he was at that time old, and, from the first, was wholly at the mercy of the mutinous soldiery in Delhi, who were controlled by a council called the Barah Topi, or Twelve Heads. His papers, seized after the fall of Delhi, are full of senile complaint of the disrespect and discourtesy which he suffered from them. At the time of the assault he fled to the Tomb of Humayun, 6 m. from Delhi, where he was captured by Major Hodson. In January 1858 he was brought to trial for rebellion and for complicity in the murder of Europeans. The trial lasted more than two months. The substance of the king's defence was that he had been a mere instrument in the hands of the mutineers. On the 29th of March he was found guilty and sentenced to imprisonment for life. He was transported to Rangoon, and died there on the 7th of November 1862.

BAHAMAS (*Lucayos*), an archipelago of the British West Indies. It is estimated to consist of 29 islands, 661 cays and 2387 rocks, and extends along a line from Florida on the northwest to Haiti on the south-east, between Cuba and the open Atlantic, over a distance of about 630 m., from 80° 50′ to 72° 50′ W., and 22° 25′ to 26° 40′ N. The total land area is estimated at 5450 sq. m., of which the main islands occupy 4424 sq. m., and the population was 43,521 in 1881 and 53,735 in 1901. Some 12,000 of these are whites, the remainder coloured. The main islands and groups, beginning from the north-west, are as follows: Little and Great Abaco, with Great Bahama to the west; Eleuthera (a name probably corrupted from the Spanish *Isla de Tierra*), Cat, Watling, or Guanahani, and Rum Cay on the outer line towards the open ocean, with New Providence, the Exuma chain and Long Island forming an inner line to the west, and still farther west Andros (named from Sir Edmund Andros, governor of Massachusetts, &c., at the close of the 17th century; often spoken of as one island, but actually divided into several by narrow straits); and finally the Crooked Islands, Mayaguana and Inagua. The Turks and Caicos islands continue the outer line, and belong geographically to the archipelago, but not politically. The surrounding seas are shallow for the most part, but there are three well-defined channels—the Florida or New Bahama channel, between the north-western islands and Florida, followed by the Gulf Stream, the Providence channels (north-east and north-west) from which a depression known as the Tongue of Ocean extends southward along the east side of Andros, and the Old Bahama channel, between the archipelago and Cuba. The Andros islands have a length of 95 m. and an area of 1600 sq. m.; Great Abaco is 70 m. long and its area is 680 sq. m.; Great Inagua is 34 m. long with an area of 530 sq. m., and Grand Bahama 66 m., with an area of 430 sq. m. But the most important island, as containing the capital, Nassau, is New Providence, which is only 19⅜ m. in length, with an area of 85 sq. m. This island supported a population in 1901 of 12,534. In point of population the next most important island is Eleuthera (8733), followed by the Andros Islands (5347) and Cat Island (4658). The Abaco and Exuma groups and Long Island each support populations exceeding 3000, and there are smaller populations on Grand Bahama, the Crooked Islands, Inagua, Mayaguana, Watling, Rum Cay and the Biminis, though these last, which are two very small north-western islands, are relatively densely populated with 545 persons.

[v.03 p.0208]

Physical Geography.—The islands are of coral formation and low-lying. The rock on the surface is as hard as flint, but underneath it gradually softens and furnishes an admirable stone for building which can be sawn into blocks of any size, hardening on exposure to the atmosphere. The highest hill in the whole range of the islands (in Cat Island) is only 400 ft. high. It is a remarkable fact that, except in the island of Andros, no streams of running water are to be found in the whole group. The inhabitants derive their water supply from wells. As a result of the porosity of the rock, many of the wells feel the influence of the sea and exhibit an ebb and flow. There is an extensive swampy lagoon in Eleuthera, the water of which is fresh or nearly so; and brackish lagoons also occur, as in Watling Island. An artificial lake in New Providence, constructed for the use of the turtle-catchers, is noted as exhibiting an extraordinary degree of phosphorescence. A

remarkable natural phenomenon is that of the so-called "banana holes," which frequently occur in the limestone. Their formation has been attributed to the effect of rotting vegetation on the rock, but without certainty. These holes are of various depths up to about 40 ft., and of curiously regular form. The Mermaid's Pool in New Providence, which is deeper still, is partly filled with water.

Geology.—The Bahamas consist almost entirely of aeolian deposits (cf. Bermudas) and coral reefs. The aeolian deposits, which form the greater part of the islands, frequently rise in rounded hills and ridges to a height of 100 or 200 ft., and in Cat Island nearly 400 ft. They vary in texture from a fine-grained compact oolite to a coarse-grained rock composed of angular or rounded fragments, and they commonly exhibit strongly marked false bedding. The material is largely calcareous, and has probably been derived from the disintegration of the reefs, and from the shells of animals living in the shallows. When freshly exposed the rock is soft, but by the action of rain and sea it becomes covered with a hard crust. The surface is often remarkably honeycombed, and the rock weathers into pinnacles, pillars and arches of extraordinary shapes. On the island of Andros there is an extremely fine white marl almost resembling a chalky ooze. The coral reefs are of especial interest from their bearing on the general question of the formation of coral reefs.

Nassau.—The scenery of the islands is picturesque, gaining beauty from the fine colouring of the sea and the rich vegetation. Nassau is a winter health-resort for many visitors from the United States and Canada. The town lies on a safe harbour on the north shore of New Providence, sheltered by the small Hog Island. There is a depth of 14 ft. at low-water spring-tide on the bar. The town extends along the shore, and up a slightly elevated ridge behind it. It contains the principal public buildings, and some interesting old forts, dating from the middle and close of the 18th century, though the subterranean works below Fort Charlotte are attributed to an earlier period. From the same century dates the octagonal building which, formerly a gaol, now contains a good public library. The sea-bathing is excellent. The months of February and March are the principal season for visitors. There is direct connexion with New York by steamers, which make the journey in about four days; and there is also connexion with Miami in Florida.

Climate, Flora, Fauna.—The climate of the Bahamas adds to their attractions. The mean temperature of the hottest months (June to September) is 88° F., and that of the coldest (January to March) 66°. In a series of observations of winds about one half have been found to indicate a direction from north-east or east. Hurricanes occur from July to October, and May to October are reckoned as the rainy months. The rainfall recorded in 1901 at Nassau amounted to 63.32 in. Where a mantle of soil covers the rock it is generally thin but very fertile. A well-defined area in New Providence is known as the "pine barrens," from the tree which principally grows in this rocky soil. Elsewhere three types of soil are distinguished—a black soil, of decayed vegetable matter, where the land is under forest, a reddish clay, and a white soil occurring along the shores. Andros Island and the Abaco Islands may be specially noted for their profusion of large timber, including mahogany, mastic, lignum vitae, iron and bullet woods, and many others. Unfortunately the want both of labour and of roads renders it impossible to turn much of this valuable timber to useful account, although attempts have been made to work it in Abaco. The fruits and spices of the Bahamas are very numerous, the fruit equalling any in the world. The produce of the islands includes tamarinds, olives, oranges, lemons, limes, citrons, pomegranates, pine-apples, figs, sapodillas, bananas, sour-sops, melons, yams, potatoes, gourds, cucumbers, pepper, cassava, prickly pears, sugar-cane, ginger, coffee, indigo, Guinea corn and pease. Tobacco and cascarilla bark also flourish; and cotton is indigenous and was woven into cloth by the aborigines. But although oranges, pine-apples and some other fruits form important articles of commerce, it is only rarely that systematic and thorough methods of cultivation are prosecuted. Cotton has been found to suffer much from insect pests. Sisal is grown in increasing quantity. The Bahamas are far poorer in their fauna than in their flora. It is said that the aborigines had a breed of dogs which did not bark, and a small coney is also mentioned. The guana also is indigenous to the islands. Oxen, sheep, horses and other live-stock introduced from Europe thrive well, but little attention is paid to stock-rearing. There are many varieties of birds to be found in the woods of the Bahamas; they include flamingoes and the beautiful hummingbird, as well as wild geese, ducks, pigeons, hawks, green parrots and doves. The waters of the Bahamas swarm with fish; the turtle procured here is particularly fine, and the sponge fishery is of importance. In some islands there are rich salt ponds, but their working has decreased. The portion of Nassau harbour known as the Sea Gardens exhibits an extraordinarily beautiful development of marine organisms.

Government, Trade, &c.—The colony of the Bahamas is under a British governor, who is assisted by an executive council of nine members, partly official, partly unofficial; and by a legislative council of nine members nominated by the crown. There is also a legislative assembly of 29 members, representing 15 electoral districts; the franchise being extended to white and coloured men of 21 years of age at least, resident in the colony for not less than twelve months, and possessing land of a value of £5 or more, or being householders for six months at a rental not less than £2:18s. in New Providence, or £1:4s. in other islands. The members' qualification is the possession of real or personal estate to the value of £200. The average annual revenue and expenditure may be set down at about £75,000, expenditure somewhat exceeding revenue. There is a public debt of about £105,000. The average annual value of imports is somewhat over £300,000, and of exports £200,000. The average annual tonnage of shipping, entering and clearing, exceeds 1,000,000. The government supports elementary free schools, controlled by a nominated board of education, while committees partly elected exercise local supervision. There are higher schools and a Queen's College in Nassau. Nassau is the seat of a bishopric of the Church of England created in 1861. The Bahamas are without railways, but there are good roads in New Providence, and a few elsewhere. A cable connects Nassau with West Jupiter in Florida.

History.—The story of the Bahamas is a singular one, and bears principally upon the fortunes of New Providence, which, from the fact that it alone possesses a perfectly safe harbour for vessels drawing more than 9 ft., has always been the seat of government when it was not the headquarters of lawlessness. San Salvador, however, claims historical precedence as the landfall of Columbus on his memorable voyage. Cat Island was long supposed to be the island first reached by Columbus (12th October 1492) and named by him San Salvador. Then the distinction was successively transferred to the neighbouring Watling, Great Turk, and Mariguana; but in 1880 the American marine surveyor, G. V. Fox, identified San Salvador, on seemingly good grounds, with Samana (Atwood Cay), which lies about midway between Watling and Mariguana. The chief difficulty is its size, for, if Samana is the true San Salvador, it must have been considerably larger then than now. Watling Island is generally accepted as the landfall.

[v.03 p.0209]

Columbus passed through the islands, and in one of his letters to Ferdinand and Isabella he said, "This country excels all others as far as the day surpasses the night in splendour; the natives love their neighbours as themselves; their conversation is the sweetest imaginable; their faces always smiling; and so gentle and so affectionate are they, that I swear to your highness there is not a better people in the world." But the natives, innocent as they appeared, were doomed to utter destruction. Ovando, the governor of Hispaniola (Haiti), who had exhausted the labour of that island, turned his thoughts to the Bahamas, and in 1509 Ferdinand authorized him to procure labourers from these islands. It is said that reverence and love for their departed relatives was a marked feature in the character of the aborigines, and that the Spaniards made use of this as a bait to trap the unhappy natives. They promised to convey the ignorant savages in their ships to the "heavenly shores" where their departed friends now dwelt, and about 40,000 were transported to Hispaniola to perish miserably in the mines. From that date, until after the colonization of New Providence by the British, there is no record of a Spanish visit to the Bahamas, with the exception of the extraordinary cruise of Juan Ponce de Leon, the conqueror of Porto Rico, who passed months searching the islands for Bimini, which was reported to contain the miraculous "Fountain of Youth." This is in South Bimini, and has still a local reputation for healing powers.

It is commonly stated that in 1629 the British formed a settlement in New Providence, which they held till 1641, when the Spaniards expelled them. This, however, refers to the Providence Island off the Mosquito Coast; it was only in 1646 that Eleuthera was colonized, and in 1666 New Providence, by settlers from the Bermudas. In 1670 Charles II. made a grant of the islands to Christopher, duke of Albemarle, and others. Governors were appointed by the lords proprietors, and there are copious records in the state papers of the attempts made to develop the resources of the islands. But the buccaneers or pirates who had made their retreat here offered heavy opposition; in 1680 there was an attack by the Spaniards, and in July 1703 the French and Spaniards made a descent on New Providence, blew up the fort, spiked the guns, burnt the church and carried off the governor, with the principal inhabitants, to Havana. In October the Spaniards made a second

descent and completed the work of destruction. It is said that when the last of the governors appointed by the lords proprietors, in ignorance of the Spanish raid, arrived in New Providence, he found the island without an inhabitant. It again, however, became the resort of pirates, and the names of many of the worst of these ruffians are associated with New Providence; the notorious Edward Teach, called Blackbeard, who was afterwards killed in action against two American ships in 1718, being chief among the number.

At last matters became so intolerable that the merchants of London and Bristol petitioned the crown to take possession and restore order, and Captain Woodes Rogers was sent out as the first crown governor and arrived at New Providence in 1718. Many families of good character now settled at the Bahamas, and some progress was made in developing the resources of the colony, although this was interrupted by the tyrannical conduct of some of the governors who succeeded Captain Woodes Rogers. At this time the pine-apple was introduced as an article of cultivation at Eleuthera; and a few years subsequently, during the American war of independence, colonists arrived in great numbers, bringing with them wealth and also slave labour. Cotton cultivation was now attempted on a large scale. In 1783, at Long Island, 800 slaves were at work, and nearly 4000 acres of land under cultivation. But the usual bad luck of the Bahamas prevailed; the red bug destroyed the cotton crops in 1788 and again in 1794, and by the year 1800 cotton cultivation was almost abandoned. There were also other causes that tended to retard the progress of the colony. In 1776 Commodore Hopkins, of the American navy, took the island of New Providence; he soon, however, abandoned it as untenable, but in 1781 it was retaken by the Spanish governor of Cuba. The Spaniards retained nominal possession of the Bahamas until 1783, but before peace was notified New Providence was recaptured by a loyalist, Lieutenant-Colonel Deveaux, of the South Carolina militia, in June 1783.

In 1784 and 1786 sums were voted in parliament to indemnify the descendants of the old lords proprietors, and the islands were formally reconveyed to the crown. The Bahamas began again to make a little progress, until the separation of Turks and Caicos Islands in 1848, which had been hitherto the most productive of the salt-producing islands, unfavourably affected the finances. Probably the abolition of the slave-trade in 1834 was not without its effect upon the fortunes of the landed proprietors. The next event of importance in the history of the Bahamas was the rise of the blockade-running trade, consequent on the closing of the southern ports of America by the Federals in 1861. At the commencement of 1865 this trade was at its highest point. In January and February 1865 no less than 20 steamers arrived at Nassau, importing 14,182 bales of cotton, valued at £554,675. The extraordinary difference between the normal trade of the islands and that due to blockade-running will be seen by comparing the imports and exports before the closing of the southern ports in 1860 with those of 1864. In the first year the imports were £234,029, and the exports £157,350, while in the second year the imports were £5,346,112, and the exports £4,672,398. The excitement, extravagance and waste existing at Nassau during the days of blockade-running exceed belief. Individuals may have profited largely, but the Bahamas probably benefited little. The government managed to pay its debt amounting to £43,786, but crime increased and sickness became very prevalent. The cessation of the trade was marked, however, by hardly any disturbance; there were no local failures, and in a few months the steamers and their crews departed, and New Providence subsided into its usual state of quietude. This, however, was not fated to last long, for in October 1866 a most violent hurricane passed over the island, injuring the orchards, destroying the fruit-trees, and damaging the sponges, which had proved hitherto a source of profit. The hurricane, too, was followed by repeated droughts, and the inhabitants of the out-islands were reduced to indigence and want, a condition which is still, in some measure, in evidence.

See the valuable *General Descriptive Report on the Bahama Islands*, by Sir G. T. Carter (governor, 1898-1904), issued in place of the ordinary annual report by the Colonial Office, London, 1902; also Governor R. W. Rawson's *Report*, 1866; Stark's *History and Guide to the Bahama Islands* (Boston, Mass., 1891); *Bahama Islands* (Geog. Soc. of Baltimore), ed. G. B. Shattuck (New York, 1905). For geology see A. Agassiz, "A Reconnaissance of the Bahamas and of the Elevated Reefs of Cuba in the steam yacht 'Wild Duck,' January to April 1893," *Bull. Mus. Comp. Zool. Harvard*, vol. xxvi. no. 1, 1894.

BAHAWALPUR, or Bhawalpur, a native state of India, within the Punjab, stretching for more than 300 m. along the left bank of the Sutlej, the Punjnud and the Indus. It is bounded on the N. and E. by Sind and the Punjab, and on the S. by the Rajputana desert. It is the principal Mahommedan state in the Punjab, ranking second only to Patiala. Edward Thornton thus described the general aspect of the state:—

> "Bahawalpur is a remarkably level country, there being no considerable eminence within its limits, as the occasional sand-hills, seldom exceeding 50 or 60 ft. in height, cannot be considered exceptions. The cultivable part extends along the river line for a distance of about 10 m. in breadth from the left or eastern bank. In the sandy part of the desert beyond this strip of fertility both men and beasts, leaving the beaten path, sink as if in loose snow. Here, too, the sand is raised into ever-changing hills by the force of the wind sweeping over it. In those parts of the desert which have a hard level soil of clay, a few stunted mimosas, acacias and other shrubs are produced, together with rue, various bitter and aromatic plants, and occasionally tufts of grass. Much of the soil of the desert appears to be alluvial; there are numerous traces of streams having formerly passed over it, and still, where irrigation is at all practicable, fertility in the clayey tract follows; but the rains are scanty, the wells few and generally 100 ft. deep or more."

[v.03 p.0210]

The area covers 15,918 sq. m.; pop. (1901) 720,877, showing an increase of 11% on the previous decade; estimated gross revenue, £146,700; there is no tribute. The chief, whose title is nawab, is a Mahommedan of the Daudputra family from Sind, and claims descent from Abbas, uncle of the Prophet. The dynasty established its independence of the Afghans towards the end of the 18th century, and made a treaty with the British in 1838 to which it has always been loyal. The benefits of canal irrigation were introduced in the 'seventies, and the revenue thus doubled. The territory is traversed throughout its length by the North-Western and Southern Punjab railways. There are an arts college and Anglo-vernacular schools.

The town of Bahawalpur is situated near the left bank of the Sutlej, and has a railway station 65 m. from Mooltan. It has a magnificent palace, which is visible from far across the Bikanir desert; it was built in 1882 by Nawab Sadik Mahommed Khan. Pop. (1901) 18,546.

BAHIA, an Atlantic state of Brazil, bounded N. by the states of Piauhy, Pernambuco and Sergipe, E. by Sergipe and the Atlantic, S. by Espirito Santo and Minas Geraes, and W. by Minas Geraes and Goyaz. Its area is 164,650 sq. m., a great part of which is an arid barren *chapada* (plateau), traversed from S. to N. and N.E. by the drainage basin of the São Francisco river, and having a general elevation of 1000 to 1700 ft. above that river, or 2300 to 3000 ft. above sea-level. On the W. the *chapada*, with an elevation of 2300 ft. and a breadth of 60 m., forms the western boundary of the state and the water-parting between the São Francisco and the Tocantins. East of the São Francisco it may be divided into three distinct regions: a rough limestone plateau rising gradually to the culminating ridges of the Serra da Chapada; a gneissose plateau showing extensive exposures of bare rock dipping slightly toward the coast; and a narrower plateau covered with a compact sandy soil descending to the coastal plain. The first two have a breadth of about 200 m. each, and are arid, barren and inhospitable, except at the dividing ridges where the clouds from the sea are deprived of some of their moisture. The third zone loses its arid character as it approaches the coast, and is better clothed with vegetation. The coastal plain varies in width and character: in some places low and sandy, or swampy, filled with lagoons and intersecting canals; in others more elevated, rolling and very fertile. The climate corresponds closely to these surface features, being hot and dry throughout the interior, hot and humid, in places unhealthy, along the coast. Cattle-raising was once the principal industry in the interior, but has been almost extinguished by the devastating droughts and increasing aridity caused by the custom of annually burning over the campos to improve the grass. In the agricultural regions sugar, cotton, tobacco, cacáo, coffee, mandioca and tropical fruits are produced. The exports also include hides, mangabeira rubber, piassava fibre, diamonds, cabinet woods and rum. The population is largely of a mixed and unprogressive character, and numbered 1,919,802 in 1890. There is but little immigration and the vegetative increase is low. The capital, São Salvador or Bahia (*q.v.*), which is one of the principal cities and ports of Brazil, is the export town for the Reconcavo, as the fertile

agricultural district surrounding the bay is called. The principal cities of the state are Alagoinhas and Bom Fim (formerly Villa Nova da Rainha) on the main railway line running N. to the São Francisco, Cachoeira and Santo Amaro near the capital in the Reconcavo, Caravellas and Ilheos on the southern coast, with tolerably good harbours, the former being the port for the Bahia & Minas railway, Feira de Santa Anna on the border of the *sertão* and long celebrated for its cattle fairs, and Jacobina, an inland town N.W. of the capital, on the slopes of the Serra da Chapada, and noted for its mining industries, cotton and tobacco. The state of Bahia includes four of the original captaincies granted by the Portuguese crown—Bahia, Paraguassú, Ilheos and Porto Seguro, all of which reverted to the direct control of that government in 1549. During the war with Holland several efforts were made to conquer this captaincy, but without success. In 1823 Bahia became a province of the empire, and in 1889 a state in the republic. Its government consists of a governor elected for four years, and a general assembly of two chambers, the senators being elected for six years and the deputies for two years.

(A. J. L.)

BAHIA, or São Salvador, a maritime city of Brazil and capital of the state of Bahia, situated on the Bay of All Saints (*Bahia de Todos os Santos*), and on the western side of the peninsula separating that bay from the Atlantic, in 13° S. lat. and 38° 30′ W. long. Pop. (1890) 174,412; (est. 1900) 200,000. The commercial section of the city occupies a long, narrow beach between the water-line and bluffs, and contains the arsenal, exchange, custom-house, post-office, railway station, market and principal business houses. It has narrow streets badly paved and drained, and made still more dirty and offensive by the surface drainage of the upper town. Communication with the upper town is effected by means of two elevators, a circular tramway, and steep zigzag roads. The upper town is built on the western slope of a low ridge, the backbone of the peninsula, and rises from the edge of the bluffs to altitudes of 200 to 260 ft. above the sea-level, affording magnificent views of the bay and its islands. There are wider streets, comfortable residences, and attractive gardens in this part of the city. Here also are to be found the churches, schools, theatres, asylums, and hospitals, academies of law and medicine, governor's palace, public library, and museum, and an interesting public garden on the edge of the bluff, overlooking the bay. The city is served by four street-car lines, connecting the suburbs with both the upper and lower towns. In 1906 contracts were made to reconstruct some of these lines for electric traction. The railways radiating from the city to inland points are the Bahia & Alagoinhas which is under construction to Joazeiro, on the São Francisco river, a short line to Santo Amaro, and two lines—the Bahia Central and the Nazareth tramway—extending inland from points on the opposite side of the bay. The port of Bahia, which has one of the best and most accessible harbours on the east coast of South America, has a large coastwise and foreign trade, and is also used as a port of call by most of the steamship lines trading between Europe and that continent. Bahia was founded in 1549 by Thomé de Souza, the first Portuguese governor-general of Brazil, and was the seat of colonial administration down to 1763. It was made the seat of a bishopric in 1551, and of an archbishopric in 1676, and until 1905 was the metropolis of the Roman Catholic Church in Brazil. The city was captured in 1624 by the Dutch, who held it only a few months. Always conservative in character, the city hesitated in adhering to the declaration of independence in 1822, and also to the declaration of the republic in 1889. Much of its commercial and political importance has been lost, also, through the decay of industrial activity in the state, and through the more vigorous competition of the agricultural states of the south.

(A. J. L.)

BAHIA BLANCA, a city and port of Argentina, on the Naposta river, 3 m. from its outlet into a deep, well-sheltered bay of the same name. Pop. (est. 1903) 11,600. It is situated in the extreme southern part of the province of Buenos Aires and is 447 m. by rail S.W. of the national capital. The opening to settlement of the national territories of La Pampa and Neuquén has contributed largely to the growth and importance of Bahia Blanca. It is the natural shipping-port for these territories and for the southern districts of the province of Buenos Aires, from which great quantities of wheat and wool are exported. The bay has long been recognized as one of the best on the Argentine coast, and when the channel is properly dredged, will admit steamers of 30 ft. draught at low-water. The Argentine government has located its principal naval station here, at the Puerto Militar, between the city and the entrance to the bay. The port, whose trade is increasing rapidly, is connected with the neighbouring and interior producing districts by five or six lines of railway and their branches. Bahia Blanca dates from 1828, when a fort and trading post were located here, but its development as a commercial centre began only in 1885, when its first railway line was opened. In 1908 direct railway communication was opened with Mendoza and San Juan. Though situated near the mountainous section of southern Buenos Aires, the immediate vicinity of the city is low and swampy, its water is brackish, and it has been decidedly unhealthy; but a water supply from the Sauce Grande, 50 m. distant, was projected in 1906, and this, with better drainage and street paving, was expected to improve matters. The mean annual temperature is 60°, and the average annual rainfall is 19 in. The city has street cars, electric-lights and telephone service, and the port has a shipping pier 1640 ft. long, with spacious warehouses and several miles of railway sidings.

[v.03 p.0211]

BAHR, the Arabic for "sea," with the diminutive *bahira*. Bahr also signifies a. river, especially one with a large body of water, *e.g.* the Nile, and is sometimes used to designate the dry bed of a river.

BAHRAICH or Bharaich, a town and district of British India, situated in the Fyzabad division of the United Provinces. The town is on the river Sarju. Since the opening of the railway the place has begun to flourish. It contains the most popular place of pilgrimage in Oudh, the tomb of Masaud, a champion of Islam, slain in battle by the confederate Rajputs in 1033, which is resorted to by Mahommedans and Hindus alike. There is also a Mussulman monastery, and the ruined palace of a nawab of Oudh. The American Methodists have a mission here. Pop. (1901) 27,304.

The district of Bahraich contains an area of 2647 sq. m. It consists of three tracts: (1) in the centre, an elevated triangular plateau, projecting from the base of the Himalayas for about 50 m. in a south-easterly direction—average breadth, 13 m., area, 670 sq. m.; (2) the great plain of the Gogra, on the west, about 40 ft. below the level of the plateau; and (3) on the east, another lesser area of depression, comprising the basin of the Rapti. The *tarai*, or the forest and marshy tracts along the southern slopes of the Himalayas, gradually merge within the district into drier land, the beds of the streams become deeper and more marked, the marshes disappear, and the country assumes the ordinary appearance of the plain of the Ganges. The Gogra skirts the district for 114 m.; and the Rapti, with its branch the Bhalka, drains the high grounds. In 1901 the population was 1,051,347, showing an increase of 5% in the decade. A considerable trade is conducted with Nepal, chiefly in timber. A line of railway has been opened through the district to Nepalganj on the frontier. As there are no canals in the district, irrigation is obtained solely from wells, tanks and rivers. The district is purely agricultural in character, and is one of large estates, 78% being held by *taluqdars*, of whom the four chief are the raja of Kapurthala, the maharaja of Balrampur, the raja of Nanpara and the raja of Payagpur.

Little is known of the history of the district before the Mahommedan invasion in A.D. 1033. Masaud was defeated and slain by the nobles of Bahraich in 1033, and the Mahommedans did not establish their authority over the country till the middle of the 13th century. About 1450 the Raikwars, or Rajput adventurers, made themselves masters of the western portion of the district, which they retain to this day. In 1816 by the treaty of Segauli the Nepal *tarai* was ceded to the British, but was given back in 1860. During the Mutiny the district was the scene of considerable fighting, and after its close a large portion was distributed in *jagirs* to loyal chiefs, thus originating the *taluqdari* estates of the present day.

BAHRĀM (*Varahrān*, in Gr. Οὐαραράνης or Οὐραράνης, the younger form of the old *Verethragna*, the name of a Persian god, "the killer of the dragon Verethra"), the name of five Sassanid kings.

1. Bahrām I. (A.D. 274-277). From a Pahlavi inscription we learn that he was the son (not, as the Greek authors and Tabari say, the grandson) of Shapur I., and succeeded his brother Hormizd (Ormizdas) I., who had only reigned a year. Bahrām I. is the king who, by the instigation of the magians, put to a cruel death the prophet Mani, the founder of Manichaeism. Nothing else is known of his reign.

2. Bahrām II. (277-294), son of Bahrām I. During his reign the emperor Carus attacked the Persians and conquered Ctesiphon (283), but died by the plague. Of Bahrām II.'s reign some theological inscriptions exist (F. Stolze and J. C.

Andreas, *Persepolis* (Berlin, 1882), and E. W. West, "Pahlavi Literature" in *Grundriss d. iranischen Philologie*, ii. pp. 75-129).

3. Bahrām III., son of Bahrām II., under whose rule he had been governing Sejistan (therefore called Saganshah, Agathias iv. 24, Tabari). He reigned only four months (in 294), and was succeeded by the pretender Narseh.

4. Bahrām IV. (389-399), son and successor of Shapur III., under whom he had been governor of Kirman; therefore he was called Kirmanshah (Agathias iv. 26; Tabari). Under him or his predecessor Armenia was divided between the Roman and the Persian empire. Bahrām IV. was killed by some malcontents.

5. Bahrām V. (420-439), son of Yazdegerd I., after whose sudden death (or assassination) he gained the crown against the opposition of the grandees by the help of al-Mondhir, the Arabic dynast of Hira. He promised to rule otherwise than his father, who had been very energetic and at the same time tolerant in religion. So Bahrām V. began a systematic persecution of the Christians, which led to a war with the Roman empire. But he had little success, and soon concluded a treaty by which both empires promised toleration to the worshippers of the two rival religions, Christianity and Zoroastrianism. Bahrām deposed the vassal king of the Persian part of Armenia and made it a province. He is a great favourite in Persian tradition, which relates many stories of his valour and beauty, of his victories over the Romans, Turks, Indians and Negroes, and of his adventures in hunting and in love; he is called Bahrām Gor, "the wild ass," on account of his strength and courage. In reality he seems to have been rather a weak monarch, after the heart of the grandees and the priests. He is said to have built many great fire-temples, with large gardens and villages (Tabari).

(Ed. M.)

BAHRDT, KARL FRIEDRICH (1741-1792), German theologian and adventurer, was born on the 25th of August 1741 at Bischofswerda, where his father, afterwards professor, canon and general superintendent at Leipzig, was pastor. At the age of sixteen young Bahrdt, a precocious lad whose training had been grossly neglected, began to study theology under the orthodox mystic, Christian August Crusius (1715-1775), who in 1757 had become first professor in the theological faculty. The boy varied the monotony of his studies by pranks which revealed his unbalanced character, including an attempt to raise spirits with the aid of *Dr Faust's Höllenzwang*. His orthodoxy was, however, unimpeachable, his talent conspicuous, and in 1761 he was appointed lecturer on biblical exegesis, and preacher (*Katechet*) at the church of St Peter. His eloquence soon gave him a reputation, and in 1766 he was appointed professor extraordinarius of biblical philology. Two years later, however, the scandals of his private life led to his dismissal. In spite of this he succeeded in obtaining the chair of biblical antiquities in the philosophical faculty at Erfurt. The post was unpaid, and Bahrdt, who had now married, lived by taking pupils and keeping an inn. He had meanwhile obtained the degree of doctor of theology from Erlangen, and was clever enough to persuade the Erfurt authorities to appoint him professor designate of theology. His financial troubles and coarse and truculent character, however, soon made the town too hot to hold him; and in 1771 he was glad to accept the offer of the post of professor of theology and preacher at Giessen.

[v.03 p.0212]

Thus far Bahrdt's orthodoxy had counterbalanced his character; but at Giessen, where his behaviour was no less objectionable than elsewhere, he gave a handle to his enemies by a change in his public attitude towards religion. The climax came with the publication of his *Neueste Offenbarungen Gottes in Briefen und Erzählungen* (1773-1775), purporting to be a "model version" of the New Testament, rendered, with due regard to enlightenment, into modern German. The book is remembered solely through Goethe's scornful attack on its want of taste; its immediate effect was to produce Bahrdt's expulsion from Giessen. He was lucky enough at once to find a post as principal of the educational institution established in his château at Marschlins by the Swiss statesman Ulysses von Salis (1728-1800). The school had languished since the death of its founder and first head, Martin Planta (1727-1772), and von Salis hoped to revive it by reconstituting it as a "Philanthropin" under Bahrdt's management. The experiment was a failure; Bahrdt, never at ease under the strict discipline maintained by von Salis, resigned in 1777, and the school was closed. At the invitation of the count of Leiningen-Dachsburg, Bahrdt now went as general superintendent to Dürkheim on the Hardt; his luckless translation of the Testament, however, pursued him, and in 1778 he was suspended by a decision of the high court of the Empire. In dire poverty he fled, in 1779, to Halle, where in spite of the opposition of the senate and the theologians, he obtained through the interest of the Prussian minister, von Zedlitz, permission to lecture on subjects other than theology. Forced to earn a living by writing, he developed an astounding literary activity. His orthodoxy had now quite gone by the board, and all his efforts were directed to the propaganda of a "moral system" which should replace supernatural Christianity.

By such means Bahrdt succeeded in maintaining himself until, on the death of Frederick the Great, the religious reaction set in at the Berlin court. The strain of writing had forced him to give up his lectures, and he had again opened an inn on the Weinberg near Halle. Here he lived with his mistress and his daughters—he had repudiated his wife—in disreputable peace until 1789, when he was condemned to a year's imprisonment for a lampoon on the Prussian religious edict of 1788. His year's enforced leisure he spent in writing indecent stories, coarse polemics, and an autobiography which is described as "a mixture of lies, hypocrisy and self-prostitution." He died on the 23rd of April 1792.

See life, with detailed bibliography, by Paul Tschakert in Herzog-Hauck, *Realencyklopadie*; a more favourable account is given in J. M. Robertson's *Short History of Freethought*, ii. 278.

BAHREIN ISLANDS, a group of islands situated about 20 m. east of the coast of El Hasa, in the Persian Gulf, a little to the south of the port of El Katif, which, if rightly identified with the ancient Gerrha, has been celebrated throughout history as the mart of Indian trade, the starting-point of caravans across Arabia. The largest of the group is called Bahrein. It is about 27 m. long from north to south and about 10 wide—a low flat space of sandy waste with cultivated oases and palm groves of great luxuriance and beauty. The rocky hill of Jebel Dukhan (the "mountain of the mist") rises in the midst of it to a height of 400 ft. The rest of the group are of coral formation. The next island in size to Bahrein is Moharek, curved in shape, and about 5 m. long by ½ m. in breadth. It lies 1 m. to the north of Bahrein. Sitrah (4 m. long) Nebbi, Saleh, Sayeh, Khasifeh and Arad (¾ m. long) complete the group. Of these minor islands Arad alone retains its classical name.

The climate is mild, but humid, and rather unhealthy. The soil is for the most part fertile, and produces rice, pot herbs and fruits, of which the citrons are especially good. Water is abundant. Fish of all kinds abound off the coast, and are very cheap in the markets. The inhabitants are a mixed race of Arab, Omanite and Persian blood, slender and small in their physical appearance; they possess great activity and intelligence, and are known in all the ports of the Persian Gulf for their commercial and industrial ability.

The sea around the Bahrein islands is shallow, so shallow as to admit only of the approach of native craft, and the harbour is closely shut in by reefs. There is very little doubt that it was from these islands that the Puni, or Phoenicians, emigrated northwards to the Mediterranean. Bahrein has always been the centre of the pearl fishing industry of the Persian Gulf. There are about 400 boats now employed in the pearl fisheries, each of them paying a tax to the Sheik. The pearl export from Linja is valued at about £30,000 to £35,000 per annum.

The capital town of Bahrein is *Manameh*, a long, straggling, narrow town of about 8000 inhabitants, chiefly of the Wahabi sect. Manameh is adjacent to the most northern point of the island, and looks across the narrow strait to Moharek.

Fish and sea-weed form the staple food of the islanders. The water-supply of Moharek is probably unique. It is derived from springs which burst through the beds below sea-level with such force as to retain their freshness in the midst of the surrounding salt water. Scattered through the islands are some fifty villages, each possessing its own date groves and cultivation, forming features in the landscape of great fertility and beauty. Most of these villages are walled in for protection.

The Portuguese obtained possession of the islands in 1507, but were driven from their settlements in that quarter by Shah Abbas in 1622. The islands afterwards became an object of contention between the Persians and Arabs, and at last the

Arabian tribe of the Athubis made themselves masters of them in 1784.

The present Sheik of Bahrein (who lives chiefly at Moharek) is of the family of El Kalifa. This ruling race was driven from the mainland (where they held great possessions) by the Turks about 1850. In the year 1867 the Persians threatened Bahrein, and in 1875 the Turks laid their hands on it. British interference in both cases was successful in maintaining the integrity of Arab rule, and the Bahrein islands are now under British protection.

To the south-west of the picturesque belts of palm trees which stretch inland from the northern coast of Bahrein, is a wide space of open sandy plain filled with gigantic tumuli or earth mounds, of which the outer layers of gravel and clay have been hardened by the weather action of centuries to the consistency of conglomerate. Within these mounds are two-chambered sepulchres, built of huge slabs of limestone, several of which have been opened and examined by Durand, Bent and others, and found to contain relics of undoubted Phoenician design. Scattered here and there throughout the islands are isolated mounds, or smaller groups, all of which are of the same appearance, and probably of similar origin.

(T. H. H.*)

BAHR-EL-GHAZAL, the chief western affluent of the river Nile, N.E. Africa, which it joins in 9° 30′ N., 30° 25′ E. The Bahr-el-Ghazal (Gazelle river) is a deep stream formed by the junction of many rivers, of which the Jur (see below) is the most important. The basin of the Ghazal is a large one, extending north-west to Darfur, and south-west to the Congo watershed. The main northern feeder of the Ghazal is a large river, whose headwaters are in the country west of 24° E. where the Nile, Congo and Shari watersheds meet. Reinforced by intermittent streams from the hills of Darfur and by considerable rivers flowing north from Dar Fertit, this river after reaching as far north as about 10° 30′ pursues a general south-easterly direction until it joins the Ghazal 87 m. above the Deleb confluence (see below). This main northern feeder passes through the country of the Homr Arabs and Bahr-el-Homr may be adopted as its name. On many maps it is marked as the Bahr-el-Arab, a designation also used as an alternative name for the Lol,[1] another tributary of the Ghazal, which eventually unites with the Bahr-el-Homr. The Bahr-el-Homr in its lower reaches was in 1906 completely blocked by sudd (*q.v.*) and then brought no water into the Bahr-el-Ghazal. The Sudan government, however, sent engineering parties to remove the sudd blocks and open out a continuous waterway. This Bahr-el-Homr is the only affluent of importance which has tributaries coming from north of the main stream; the rest of the very numerous affluents have their rise in the hilly country which stretches from Albert Nyanza in a general north-west direction as far as 23° E., and forms the watershed between the Nile basin and that of the Congo. The most westerly is the Lol or Bahr-el-Arab. It rises, as the Boro or Telgona, in Dar Fertit, and receives from the south and south-west the Raga, Sopo, Chel and Bongo. Dem Zobeir, formerly the chief station of Zobeir Rahama (*q.v.*), is near the Biri tributary of the Chel, in 7° 40′ N., 26° 10′ E. The Lol maintains a fairly straight course east to about 28° E., when it turns north-east, and in about 28½° E., 9½° N., joins the Bahr-el-Homr. The chief of the southern affluents, and that tributary of the Ghazal which contributes the largest volume of water, is the Jur, known in its upper course as the Sue, Swe or Souch. The Sue rises north of 4° N. in about 29° E., within three or four days' journey of the navigable waters of the Mbomu, a northern sub-tributary of the Congo. After flowing north for several hundred miles the Sue, now the Jur, is joined on the left bank, in about 7° 30′ N., 28° E., by the Wau, a considerable river whose headwaters are west of those of the Jur. The united stream now turns east and joins the Ghazal through a lake-like expansion (see below). The town of Wau (7° 42′ N., 28° 3′ E.), on the Jur, is the capital of the Bahr-el-Ghazal province of the Anglo-Egyptian Sudan. Meshra-er-Rek, the chief station and trading centre of the first European visitors to the country, is on a backwater south of this lake. Between the Jur and the Nile, and following a course generally parallel with these rivers, several streams run north from the Congo-Nile watershed and join the Bahr-el-Ghazal. The Tonj, the most westerly of these rivers, joins the Jur a little above its confluence with the Ghazal. The Rohl (or Yalo), farther east, empties into a wide channel known as Khor Deleb, which joins the Ghazal some 9 m. above Lake No, and from the confluence the stream is known as the Deleb. Lake No is little more than a depression into which the waters of the Ghazal system pass near the point of junction with the Bahr-el-Jebel. The lake is about 7 m. long from west to east, and the Bahr-el-Jebel, after passing through its eastern corner, changes its name to Bahr-el-Abiad or White Nile.

[v.03 p.0213]

Chief affluents.

In their upper courses all the southern affluents of the Ghazal flow across a plateau of ferruginous laterite, their valleys having steep banks. North of 7° 20′ N. (where rapids interrupt the currents) the valleys open out and the rivers wind in tortuous channels often choked by sandbanks. This alluvial region, flooded in the rainy season, gives place about 9° N. to a sea of swamps, forming in fact part of the huge swamp region of the Nile (*q.v.*). Through these swamps it is almost impossible to trace the course of the various rivers. The Bahr-el-Ghazal itself is described as a drainage channel rather than a true river. From the confluence of the Lol with the Jur, above which point none of the rivers is called Bahr-el-Ghazal, to the junction with the Nile at Lake No, is a distance of about 200 m. Just above the Lol confluence the Jur broadens out and forms a lake (Ambadi) 10 m. long and over a mile broad at low water and very much larger in flood time. This lake is the home of many sudd plants of the "swimming" variety—papyrus and ambach are absent. The *Balaeniceps rex*, elsewhere rare, is found here in large numbers. At first the Ghazal flows north with lagoon-like expansions having great breadth and little depth—nowhere more than 13 ft. Turning north-east the channel becomes narrower and deeper, and is characterized by occasional reaches of papyrus. Finally, the Ghazal turns east and again becomes broader until Lake No is reached. As a rule the banks in this section are marked by anthills and scrub. The anthills in one valley are so close together "that they somewhat resemble a gigantic graveyard." (Sir William Garstin). The rise of the Ghazal river in flood time is barely 3 ft., a depth sufficient, however, to place an enormous area of country under water.

Exploration of the River.—Rumours of the existence of the Bahr-el-Ghazal led some of the Greek geographers to imagine that the source of the Nile was westward in the direction of Lake Chad. The first map on which the course of the Ghazal is indicated with anything like accuracy is that of the French cartographer d'Anville, published in 1772. The exploration of the river followed the ascent of the White Nile by the Egyptian expeditions of 1839-1842. For a considerable portion of the period between 1833 and 1865 John Petherick, a Welshman, originally a mining engineer, explored the Ghazal region, particularly the main stream and the Jur. In 1859 a Venetian, Giovanni Miani, penetrated the southern regions of the Ghazal basin and was the first to bring back reports of a great river (the Welle) flowing west beyond the Nile watershed. In 1862 a Frenchman named Lejean surveyed the main river, of which he published a map. In 1863 Miss Alexandrine Tinné (*q.v.*) with a large party of friends and scientists ascended the Ghazal with the intention of seeing how far west the basin of the Nile extended. The chief scientists of the party were the Germans, Theodor von Heuglin and Hermann Steudner. Considerable additions to the knowledge of the region were made by this expedition, five out of the nine white members of which died from blackwater fever.[2] Georg Schweinfurth (*q.v.*) between 1869 and 1871 traversed the whole of the southern district, and crossing the watershed discovered the Welle. The efforts to destroy the slave trade in the Ghazal province led (1879-1881) to the further exploration of the river and its tributaries by Gessi Pasha, the Italian governor under General C. G. Gordon. Wilhelm Junker (*q.v.*) about the same period also explored the southern tributaries of the Ghazal. These were carefully surveyed, and the Jur (Sue) followed throughout its course by Lieutenant A. H. Dyé and other members of the French mission under Colonel (then Captain) J. B. Marchand, which crossing from the Congo (Oct. 1897) reached Fashoda on the White Nile in July 1898.

Like the Bahr-el-Jebel the Bahr-el-Ghazal is liable to be choked by sudd. Gessi Pasha was imprisoned in it for some six weeks. The river became almost blocked by the accumulation of this obstruction during the rule of the Mahdists. In 1901 and following years the sudd was removed by British officers from the Bahr-el-Ghazal, the Jur and other rivers. Uninterrupted steamboat communication was thus established during the flood season between Khartum and Wau, a distance of some 930 m. In 1905-1907 R. C. Bayldon, a British naval officer, Capt. C. Percival and Lieut. D. Comyn partly explored the northern and western affluents of the Ghazal, and threw some light on the puzzling hydrography and nomenclature of those tributaries.

See Nile and the authorities there quoted, especially Sir William Garstin's *Report upon the Basin of the Upper Nile, Egypt*, No. 2 (1904), and Capt. H. G. Lyons's *The Physiography of the River Nile and its Basin* (Cairo, 1906); also *The Geographical Journal*, vol. xxx. (1907).

(W. E. G.; F. R. C.)

[1] The Lol is also called the Kir, a name given likewise to the lower course of the Bahr-el-Homr. The confusion of names is partly attributable to the fact that each tribe has a different name for the same stream. It is also due in part to the belief that there was a large river flowing between the Bahr-el-Homr and the Lol. This third river, generally called the Kir, has proved to be only the lower course of the Lol of Bahr-el-Arab.

[2] Including Miss Tinné's mother and aunt and Dr Steudner.

BAHUT (a French word of unknown origin), a portable coffer or chest, with a rounded lid covered in leather, garnished with nails, used for the transport of clothes or other personal luggage,—it was, in short, the original portmanteau. This ancient receptacle, of which mention is made as early as the 14th century—its traditional form is still preserved in many varieties of the modern travelling trunk,—sometimes had its leather covering richly ornamented, and occasionally its interior was divided into compartments; but whatever the details of its construction it was always readily portable. Towards the end of the 17th century the name fell into desuetude, and was replaced by "coffer" (*q.v.*), which probably accounts for its misuse by the French romantic writers of the early 19th century. They applied it to almost any antique buffet, cupboard or wardrobe, and its use has now become hopelessly confused.

In architecture, this term is also used for a dwarf-wall of plain masonry, carrying the roof of a cathedral or church and masked or hidden behind the balustrade.

BAḤYA, IBN PAQUDA, a Jewish ethical writer who flourished at Saragossa in the 11th century. In 1040 he wrote in Arabic a treatise, *Duties of the Heart*. This book was one of the most significant and influential Jewish works of the middle ages. Baḥya portrays an intensely spiritual conception of religion, and rises at times to great heights of impassioned mysticism.

[v.03 p.0214] The Law, in the rabbinical sense, was reverenced by Baḥya, and he converted it into part and parcel of the Jew's inner life. The book is divided into ten parts:—the Unity of God; Contemplation; Worship; Trust; Consecration; Humility; Repentance; Self-Examination; the Ascetic Life; the Love of God. Some selections from Baḥya's work have been rendered into English by E. Collins.

(I. A.)

BAIAE, an ancient city of Campania, Italy, 10 m. W. of Neapolis, on the *Sinus Baianus*, a bay on the W. coast of the Gulf of Puteoli. It is said to derive its name from Βαῖος, the helmsman of Ulysses, whose grave was shown there; it was originally, perhaps, the harbour of Cumae. It was principally famous, however, for its warm sulphur springs, remarkable for their variety and curative properties (Pliny, *Hist. Nat* xxxi. 4), its mild climate, and its luxuriant vegetation (though in summer there was some malaria in the low ground). It was already frequented, especially by the rich, at the end of the republican period; and in Strabo's day it was as large as Puteoli. Julius Caesar possessed a villa here, the remains of which are probably to be recognized in some large substructures on the ridge above the 16th-century castle. Baiae was a favourite residence of the emperors. Nero built a huge villa probably on the site now occupied by the castle. Hadrian died in Caesar's villa in A.D. 138, and Alexander Severus erected large buildings for his mother. Baiae never became, however, an independent town, but formed part of the territory of Cumae. Three glass vases with views of the coast and its buildings were published by H. Jordan in *Archäologische Zeitung* (1868, 91). The luxury and immorality of the life of Baiae under both the republic and the empire are frequently spoken of by ancient writers.

Near Baiae was the villa resort of Bauli, so called from the Βοαύλια (stalls) in which the oxen of Geryon were concealed by Hercules. By some it is identified with the modern village of Bacoli (owing to a presumed similarity to the ancient name), 2 m. S.S.E. of Baiae; by others with the Punta dell' Epitaffio, 1 m. N.E. of Baiae (see G. B. de Rossi in *Notizie degli scavi*, 1888, 709). At Bauli, Pompey and Hortensius possessed villas, the former on the hills, while that of the latter, on the shores of the Lacus Lucrinus, was remarkable for its tame lampreys and as the scene of the dialogue in the second book of Cicero's *Academica Priora*; it afterwards became imperial property and was the scene of Agrippina's murder by Nero. It was from Bauli to Puteoli that Caligula built his bridge of boats.

Of the once splendid villas and baths of Baiae and its district, the foundations of which were often thrown far out into the sea, considerable, though fragmentary, remains exist. It is not, as a rule, possible to identify the various buildings, and the names which have been applied to the ruins are not authenticated. At Baiae itself there exist three large and lofty domed buildings, two octagonal, one circular, and all circular in the interior, of *opus reticulatum* and brick, which, though popularly called temples, are remains of baths or *nymphaea*. The Punta dell' Epitaffio also is covered with remains, while at Bacoli are several ruins—to the north of the village a small theatre, called the tomb of Agrippina; under the village the remains of a large villa; to the E. the remains of a large water reservoir, the so-called Cento Camerelle; to the S. another with a vaulted ceiling, known as the *piscina mirabilis*, measuring 230 by 85 ft. The villa of Marius, which was bought by Lucullus, and afterwards came into the possession of the imperial house, was the scene of the death of Tiberius. It is sometimes spoken of as *Baiana*, sometimes as *Misenensis*, and is perhaps to be sought at Bacoli (Th. Mommsen in *Corp. Inscrip. Latin.*, x., Berlin, 1883, 1748), though Beloch inclines to place it on the promontory S. of Misenum, and this perhaps agrees better with the description given by Phaedrus.

Baiae was devastated by the Saracens in the 8th century and entirely deserted on account of malaria in 1500.

See J. Beloch, *Campanien* (2nd ed., Breslau, 1890), 180 seq.

(T. As.)

BAIBURT, a town of Asiatic Turkey, on the direct carriage road from Trebizond to Erzerum, situated on both banks of the Churuk river, which here traverses an open cultivated plateau (altitude, 5100 ft.), before turning east. It is the chief place of a kaza under Erzerum; the bazaar is poor, and there is no special industry in the town. The houses run up the hillsides on both banks of the river to a considerable height. On an isolated mass of rock, on the left bank, is the old castle, with extensive walls partly ruined, built originally by the Armenians and restored by the Seljuks. The principal gate with some Arabic inscriptions stands at the S.W. corner. There are remains of a vaulted chamber, a Christian church, a mosque and two covered staircases to the river. A fine view is seen from the summit over the plain and the Pontic ranges to the north. The population numbers 10,000, mostly Turkish with some Armenians. The place was occupied by the Russians under General Paskevich during their invasion of 1829, and was the farthest point westward then reached by them.

(F. R. M.)

BAIḌĀWĪ (ʻAbdallah ibn ʻUmar al-Baiḍāwī), Mahommedan critic, was born in Fars, where his father was chief judge, in the time of the Atabek ruler Abu Bakr ibn Saʻd (1226-1260). He himself became judge in Shiraz, and died in Tabriz about 1286. His chief work is the commentary on the Koran entitled *The Secrets of Revelation and The Secrets of Interpretation (Asrār ut-tanzīl wa Asrār ut-taʼ wīl)*. This work is in the main a digest of the great Muʻtazalite commentary (*al-Kashshāf*) of Zamakhsharī (*q.v.*) with omissions and additional notes. By the orthodox Moslems it is considered the standard commentary and almost holy, though it is not complete in its treatment of any branch of theological or linguistic knowledge of which it treats, and is not always accurate (cf. Th. Nöldeke's *Geschichte des Qorans*, Göttingen, 1860, p. 29). It has been edited by H. O. Fleischer (2 vols., Leipzig, 1846-1848; indices ed. W. Fell, Leipzig, 1878). There are many editions published in the East. A selection with numerous notes was edited by D. S. Margoliouth as *Chrestomathia Beidawiana* (London, 1894). Many supercommentaries have been written on Baiḍāwī's work. He was also the author of several theological treatises.

See C. Brockelmann's *Geschichte der arabischen Litteratur* (Weimar, 1898), vol. i. pp. 416-418.

(G. W. T.)

BAÏF, JEAN ANTOINE DE (1532-1589), French poet and member of the Pléiade, was born at Venice in 1532. He was the natural son of the scholar Lazare de Baïf, who was at that time French ambassador at Venice. Thanks, perhaps, to the surroundings of his childhood, he grew up an enthusiast for the fine arts, and surpassed in zeal all the leaders of the Renaissance in France. His father spared no pains to secure the best possible education for his son. The boy was taught Latin by Charles Estienne, and Greek by Ange Vergèce, the Cretan scholar and calligraphist who designed Greek types for Francis I. When he was eleven years old he was put under the care of the famous Jean Daurat (*q.v.*). Ronsard, who was eight years his senior, now began to share his studies. Claude Binet tells how young Baïf, bred on Latin and Greek, smoothed out the tiresome beginnings of the Greek language for Ronsard, who in return initiated his companion into the mysteries of French versification. Baïf possessed an extraordinary facility, and the mass of his work has injured his reputation. Besides a number of volumes of short poems of an amorous or congratulatory kind, he translated or paraphrased various pieces from Bion, Moschus, Theocritus, Anacreon, Catullus and Martial. He resided in Paris, and enjoyed the continued favour of the court. He founded in 1567 an *académie de musique et de poésie*,[1] with the idea of establishing a closer union between music and poetry; his house became famous for the charming concerts which he gave, entertainments at which Charles IX. and Henry III. frequently flattered him with their presence. Baïf elaborated a system for regulating French versification by quantity. In this he was not a pioneer. Jacques de la Taille had written in 1562 the *Manière de faire des vers en français comme en grec et en latin* (printed 1573), and other poets had made experiments in the same direction. The 16th-century poets did not realize the incompatibility of the system of quantity with French rhythm. Baïf's innovations included a line of 15 syllables known as the *vers baïfin*. He also meditated reforms in French spelling. His theories are exemplified in *Etrenes de poezie Franzoeze an vers mezures* (1514). His works were published in 4 volumes, entitled *Œuvres en rime* (1573), consisting of *Amours, Jeux, Passetemps, et Poëmes*, containing, among much that is now hardly readable, some pieces of infinite grace and delicacy. His sonnet on the *Roman de la Rose* was said to contain the whole argument of that celebrated work, and Colletet says it was on everybody's lips. He also wrote a celebrated sonnet in praise of the massacre of Saint Bartholomew. Baïf was the author of two comedies, *L'Eunuque*, 1565 (published 1573), a free translation of Terence, and *Le Brave* (1567), an imitation of the *Miles Gloriosus*, in which the characters of Plautus are turned into Frenchmen, the action taking place at Orleans. Baïf published a collection of Latin verse in 1577, and in 1576 a popular volume of *Mimes, enseignemens et proverbes*. He died in 1589. His father, Lazare de Baïf,[2] published a translation of the *Electra* of Sophocles in 1537, and afterwards a version of the *Hecuba*; he was an elegant writer of Latin verse, and is commended by Joachim du Bellay as having introduced certain valuable words into the French language.

[v.03 p.0215]

The *Œuvres en rime* (5 vols., 1881-1890) of J. A. de Baïf form part of the *Pléiade française* of M. Ch. Marty-Laveaux. See also Becq de Fouquières, *Poésies choisies de J. A. de Baïf* (1874), with a valuable introduction; and F. Brunetière, *Hist. de la litt. française classique* (1904, bk. iii. pp. 398-422).

[1] For an account of this academy see Edouard Frémy, *Les Origines de l'Académie Française* (1887).

[2] See L. Pinvert, *Lazare de Baïf*, 1496?-1547 (1900).

BAIKAL (known to the Mongols as *Dalai-nor*, and to the Turkish tribes as *Bai-kul*), a lake of East Siberia, the sixth in size of all the lakes of the world and the largest fresh-water basin of Eurasia. It stretches from S.W. to N.E. (51° 29′ to 55° 50′ N. lat. and 103° 40′ to 110° E. long.), separating the government of Irkutsk from that of Transbaikalia, and has a length of 386 m. and a width of from 20 m. to 50 m. Its southern extremity penetrates into the high plateau of Asia, and the lake lies entirely in the Alpine zone which fringes that plateau on the north-west. Its area is 13,200 sq. m., *i.e.* nearly as great as Switzerland. The length of its coast-line is 525 m. along the western, and 640 m. along the eastern shore. Its altitude has been estimated at 1587 ft. (Chersky) and at 1679 ft. (Suess)—118 ft. above the level of the Angara at Irkutsk (*Zapiski Russ. Geog. Soc.* xv., 1885); but 1500 ft. would seem to be a more correct altitude (*Izvestia East Sib. Branch*, xxviii. 1, 1897). Its level is subject to slight oscillations, and after a heavy five weeks' rain in 1869 it rose 7 ft., an immense territory at the mouth of the Selenga being submerged.

A hydrographic survey of this lake was made by Drizhenko in 1897-1902. The elongated hilly island of Olkhon, and the peninsula of Svyatoi Nos, which forms its continuation on the opposite eastern shore, divide the lake into two basins. The deepest part is in the south-east, at the foot of the Khamar-daban border-ridge of the high plateau. An elongated trough, 66 m. long, reaches there a depth of over 600 fathoms, with a maximum depth of 880 fathoms, *i.e.* about 5280 ft. below the level of the ocean. As a rule the bottom of the lake has very steep slopes: the 100-fathom and even the 250-fathom lines run close to the shores, that is to say, the steepness of the surrounding mountains (4600 to 6000 ft.) continues beneath the surface. At the mouth of the Selenga, however, which enters from the south-east, pouring into it the waters and the alluvial deposits from a drainage area of 173,500 sq. m., a wide delta is thrust out into the lake, reducing its width to 20 m. and spreading under its waters, so as to leave only a narrow channel, 230 to 247 fathoms deep, along the opposite coast. The depth of the middle portion of the lake has not yet been measured, but must exceed 500 fathoms. It was expected that an underground ridge would be found connecting Olkhon with Svyatoi Nos; but depths exceeding 622 fathoms have been sounded even along that line. As to the northern basin, the configuration of its bottom is in accordance with the high mountains which surround it, and most of its area has a depth exceeding 400 fathoms, the maximum depths along three lines of soundings taken across it being 491, 485, and 476 fathoms respectively. The water is beautifully clear.

Temperature.—The surface-layers of this immense basin are heated in the summer up to temperatures of 55½° to 57° F., both close to the shores and at some distance from the mouth of the Selenga; but these warmer layers are not deep, and a uniform temperature of nearly 39° F. is generally found at a depth of 20 fathoms, as also on the surface in the middle of the lake. At a depth of 500 fathoms there is a nearly uniform temperature of 38°. At various places round the shores, *e.g.* the mouth of the Barguzin, hot springs exist. The lake freezes usually at the end of December, or in the beginning of January, so solidly that a temporary post-horse station is erected on the ice in the middle of the lake, and it remains frozen till the second half of May. The evaporation from this large basin exercises a certain influence on the climate of the surrounding country, while the absorption of heat for the thawing of the ice has a notable cooling effect in early summer.

Rivers.—Lake Baikal receives over 300 streams, mostly short mountain torrents, besides the Upper Angara, which enters its north-east extremity, the Barguzin, on the east, and the Selenga on the south-east. Its only outflow is the lower Angara, which issues through a rocky cleft on the west shore. The Irkut no longer reaches the Baikal, though it once did so. After approaching its south-west extremity it abandons the broad valley which leads to the lake, and makes its way northwards through a narrow gap in the mountains and joins the Angara at Irkutsk.

Mountains.—With the exception of the delta of the Selenga, Lake Baikal is surrounded by lofty mountains. The Khamar-daban border-ridge (the summit of a mountain of the same name is 5300 ft. above the lake), falling with steep cliffs towards the lake, fringes it on the south; a massive, deeply-ravined highland occupies the space between the Irkut and the Angara; the Onot and Baikal ridges (also Primorskiy) run along its north-west shore, striking it diagonally; an Alpine complex of yet unexplored mountains rises on its north-east shore; the Barguzin range impinges upon it obliquely in the east; and the Ulanburgasu mountains intrude into the delta of the Selenga.

Geology.—It is certain that in previous geological ages Lake Baikal had a much greater extension. It stretched westwards into the valley of the Irkut, and up the lower valleys of the Upper Angara and the Barguzin. Volcanic activity took place around its shores at the end of the Tertiary or during the Quaternary Age, and great streams of lava cover the Sayan and Khamar-daban mountains, as well as the valley of Irkut. Earthquakes are still frequent along its shores.

Fauna.—The fauna, explored by Dybowski and Godlewski, and in 1900-2 by Korotnev, is much richer than it was supposed to be, and has quite an original character; but hypotheses as to a direct communication having existed between Lake Baikal and the Arctic Ocean during the Post-Tertiary or Tertiary ages are not proved. Still, Lake Baikal has a seal (*Phoca vitulina*, *Phoca baikalensis* of Dybowski) quite akin to the seals of Spitsbergen, marine sponges, polychaetes, a marine mollusc (*ancilodoris*), and some marine gammarids. The waters of the lake swarm with fish (sturgeons and *salmonidae*), and its herring (*Salmo omul*) is the chief product of the fisheries, though notably fewer have been taken within the last

forty or fifty years. Plankton is very abundant. The little Lake Frolikha, situated close to the northern extremity of Lake Baikal and communicating with it by means of a river of the same name, contains a peculiar species of trout, *Salmo erythreas*, which is not known elsewhere. Generally, while there is a relative poverty of zoological groups, there is a great wealth of species within the group. Of gammarids, there are as many as 300 species, and those living at great depths (330 to 380 fathoms) tend to assume abyssal characters similar to those displayed by the deep-sea fauna of the ocean.

[v.03 p.0216]

Navigation.—Navigation of the lake is rendered difficult both by sudden storms and by the absence of good bays and ports. The principal port on the western shore, Listvinichnoe, near the outflow of the Angara, is an open roadstead at the foot of steep mountains. Steamers ply from it weekly to Misovaya (Posolskoe) on the opposite shore, a few times a year to Verkhne-Angarsk, at the northern extremity of the lake, and frequently to the mouth of the Selenga. Steamers ascend this river as far as Bilyutai, near the Mongolian frontier, and bring back tea, imported via Kiakhta, while grain, cedar nuts, salt, soda, wool and timber are shipped on rafts down the Khilok, Chikoi and Uda (tributaries of the Selenga), and manufactured goods are taken up the river for export to China. Attempts are being made to render the Angara navigable below Irkutsk down to the Yenisei. In winter, when the lake is covered with ice 3 ft. to 4 ft. thick, it is crossed on sledges from Listvinichnoe to Misovaya. But a highway, available all the year round, was made in 1863-1864 around its southern shore, partly by blasting the cliffs, and it is now (since 1905) followed by the trans-Siberian railway. Further, a powerful ice-breaker is used to ferry trains across from Listvinichnoe to Misovaya.

Authorities.—Drizhenko, "Hydrographic Reconnoitring of Lake Baikal," in *Izvestia Russ. Geogr. Soc.* (1897, 2); Russian Addenda to Ritter's *Asia, East Siberia, Baikal,* &c. (1895); Chersky's Geological Map of Shores of Lake Baikal, 6⅔ m. to the inch, in *Zapiski* of *Russ. Geogr. Soc.* xv. (1886); "Report of Geological Exploration of Shores of Lake Baikal," in *Zapiski* of *East Siberian Branch* of *Russ. Geogr. Soc.* xii. (1886); Obruchev, "Geology of Baikal Mountains," *Izvestia* of same Society (1890, xxi. 4 and 5); Dybowski and Godlewski on "Fauna," in same periodical (1876); Witkowski, on "Seals"; Yakovlev's "Fishes of Angara," in same periodical (1890-1893); "Fishing in Lake Baikal and its Tributaries," in same periodical (1886-1890); and *La Géographie* (No. 3, 1904).

(P. A. K.; J. T. Be.)

BAIKIE, WILLIAM BALFOUR (1824-1864), Scottish explorer, naturalist and philologist, eldest son of Captain John Baikie, R.N., was born at Kirkwall, Orkney, on the 21st of August 1824. He studied medicine at Edinburgh, and, on obtaining his M.D. degree, joined the royal navy in 1848. He early attracted the notice of Sir Roderick Murchison, through whom he was appointed surgeon and naturalist to the Niger expedition sent out in 1854 by Macgregor Laird with government support. The death of the senior officer (Consul Beecroft) occurring at Fernando Po, Baikie succeeded to the command. Ascending the Benue about 250 m. beyond the point reached by former explorers, the little steamer "Pleiad" returned and reached the mouth of the Niger, after a voyage of 118 days, without the loss of a single man. The expedition had been instructed to endeavour to afford assistance to Heinrich Barth (*q.v.*), who had in 1851 crossed the Benue in its upper course, but Baikie was unable to gain any trustworthy information concerning him. Returning to England, Baikie gave an account of his work in his *Narrative of an Exploring Voyage up the Rivers Kwora and Binue ...* (London, 1856). In March 1857 Baikie—with the rank of British consul—started on another expedition in the "Pleiad." After two years spent in exploring the Niger, the navigating vessel was wrecked in passing through some of the rapids of the river, and Baikie was unable longer to keep his party together. All returned home but himself; in no way daunted, he determined single-handed to carry out the purposes of the expedition. Landing from a small boat, with one or two native followers, at the confluence of the Niger and Benue, he chose Lokoja as the base of his future operations, it being the site of the model farm established by the expedition sent by the British government in 1841, and abandoned within a twelve-month on the death of most of the white settlers (see Capt. W. Alien, R.N., and T. R. H. Thomson, M.D., *A Narrative of the Expedition ... to the River Niger in 1841*, London, 1848). After purchasing the site, and concluding a treaty with the Fula emir of Nupe, he proceeded to clear the ground, build houses, form enclosures and pave the way for a future city. Numbers flocked to him from all neighbouring districts, and in his settlement were representatives of almost all the tribes of West-Central Africa. To the motley commonwealth thus formed he acted not merely as ruler, but also as physician, teacher and priest. In less than five years he had opened up the navigation of the Niger, made roads, and established a market to which the native produce was brought for sale and barter. He had also collected vocabularies of nearly fifty African dialects, and translated portions of the Bible and prayer-book into Hausa. Once only during his residence had he to employ armed force against the surrounding tribes. While on his way home, on leave of absence, he died at Sierra Leone on the 30th of November 1864. He had done much to establish British influence on the Niger, but after his death the British government abolished the consulate (1866), and it was through private enterprise that some twenty years later the district where Baikie had worked so successfully was finally secured for Great Britain (see Nigeria).

Baikie's *Observations on the Hausa and Fulfulde* (*i.e.* Fula) *Languages* was privately printed in 1861, and his translation of the Psalms into Hausa was published by the Bible Society in 1881. He was also the author of various works concerning Orkney and Shetland. A monument to his memory was placed in the nave of the ancient cathedral of St Magnus, Kirkwall.

BAIL,[1] in English common law, the freeing or setting at liberty of one arrested or imprisoned upon any action, either civil or criminal, on surety taken for his appearance on a certain day and at a place named. The surety is termed bail, because the person arrested or imprisoned is placed in the custody of those who bind themselves or become bail for his due appearance when required. So he may be released by them if they suspect that he is about to escape and surrendered to the court, when they are discharged from further liability. The sureties must be sufficient in the opinion of the court, and, as a rule, only householders are accepted; in criminal cases the solicitor or an accomplice of the person to be bailed, a married woman or an infant would not be accepted. Bail is obligatory in all summary cases. It is also obligatory in all misdemeanours, except such as have been placed on the level of felonies, viz. obtaining or attempting to obtain property on false pretences, receiving property so obtained or stolen, perjury or subornation of perjury, concealment of birth, wilful or indecent exposure of the person, riot, assault in pursuance of a conspiracy to raise wages, assault upon a peace-officer in the execution of his duty or upon any one assisting him, neglect or breach of duty as a peace-officer, any prosecution of which the costs are payable out of the county or borough rate or fund. In cases of treason, bail can only be granted by a secretary of state or the king's bench division. A person charged with felony is not entitled as of right to be released on bail. The power of admitting a prisoner to bail is discretionary and not ministerial, and the chief consideration in the exercise of that discretion must be the likelihood of the prisoner failing to appear at the trial. This must be gauged from the nature of the evidence in support of the accusation, the position of the accused and the severity of the punishment which his conviction will entail, as well as the independence of the sureties. The Bail Act 1898 gives a magistrate power, where a person is charged with felony or certain misdemeanours, or where he is committed for trial for any indictable offence, to dispense with sureties, if in his opinion the so dispensing will not tend to defeat the ends of justice. A surety may be examined on oath as to his means, while the court may also require notice to be given to the plaintiff, prosecutor or police. A person who has been taken into custody for an offence without a warrant, and cannot be brought before a court of summary jurisdiction within twenty-four hours, may be admitted to bail by a superintendent or inspector of police; and in a borough, if a person is arrested for a petty misdemeanour, he may be bailed by the constable in charge of the police-station. Bail in civil matters, since the abolition of arrest on mesne process, is virtually extinct. It took the form of

[v.03 p.0217]

an instrument termed a *bail-bond*, which was prepared in the sheriff's office after arrest, and executed by two sufficient sureties, and the person arrested.

In admiralty proceedings *in rem*, bail is often required for procuring the release of arrested ships or cargo. It is also given without the arrest of the ship, as a substitution of personal security for that of the *res*, generally in an amount to cover the claim and costs.

In the United States, bail (in a sum fixed by the committing magistrate) is a matter of right in all cases where a sentence of death cannot be inflicted (Rev. Stat. § 1015). In those where such a sentence can be inflicted, it may be allowed by one of the judges of the United States courts at his discretion (*ibid.* § 1016).

[1] The ultimate origin of this and cognate words is the Lat. *bajulus*, properly a bearer of burdens or porter, later a

tutor or guardian, and hence a governor or custodian, from which comes "bailiff"; from *bajulare* is derived the French *bailler*, to take charge of, or to place in charge of, and "bail" thus means "custody," and is applied to the person who gives security for the appearance of the prisoner, the security given, or the release of the prisoner on such security.

BAILÉN, or Baylén, a town of southern Spain, in the province of Jaén; 21 m. by road N. of the city of Jaén. Pop. (1900) 7420. Bailén is probably the ancient Baecula, where the Romans, under P. Cornelius Scipio the elder, signally defeated the Carthaginians in 209 and 206 B.C. In its neighbourhood, also, in 1212, was fought the great battle of Las Navas de Tolosa, in which, according to the ancient chroniclers, the Castilians under Alphonso VIII, slew 200,000 Moors, and themselves only lost 25 men. Although this estimate is absurd, the victory of the Christians was complete. The capitulation of Bailén, signed at Andújar by the French general Dupont, on the 23rd of July 1808 after several days' hard fighting, involved the surrender of 17,000 men to the Spaniards, and was the first severe blow suffered by the French in the Peninsular War.

BAILEY, GAMALIEL (1807-1859), American journalist, was born at Mount Holly, New Jersey, on the 3rd of December 1807. He graduated at the Jefferson Medical College in Philadelphia in 1827. After editing for a short time a religious journal, the *Methodist Protestant*, at Baltimore, he removed in 1831 to Cincinnati, Ohio, where at first he devoted himself almost exclusively to the practice of medicine. He was also a lecturer on physiology at the Lane Theological Seminary, and at the time of the Lane Seminary debates (February 1834) between the pro-slavery and the anti-slavery students, and the subsequent withdrawal of the latter, he became an ardent abolitionist. In 1836 he joined James G. Birney in the editorial control of the *Philanthropist*; in the following year he succeeded Birney as editor, and conducted the paper in spite of threats and acts of violence—the printing-office being thrice wrecked by a mob—until 1847. From 1843 also he edited a daily paper, the *Herald*. In 1847 he assumed control of the new abolitional organ, the *National Era*, at Washington, D.C. Here also his paper was the object of attack by pro-slavery mobs, at one time in 1848 the editor and printers being besieged in their office for three days. This paper had a considerable circulation, and in it, in 1851-1852, Mrs. H. B. Stowe's *Uncle Tom's Cabin* was first published. Bailey died at sea in the course of a trip to Europe on the 5th of June 1859.

BAILEY, NATHAN or Nathaniel (d. 1742), English philologist and lexicographer. He compiled a *Dictionarium Britannicum: a more compleat universal etymological English dictionary than any extant*, bearing the date 1730, but supposed to have been published in 1721. This was a great improvement on all previous attempts, and formed the basis of Dr Johnson's great work. Bailey, who was a Seventh-day Baptist (admitted 1691), had a school at Stepney, near London, and was the author of *Dictionarium Domesticum* and several other educational works. He died on the 27th of June 1742.

BAILEY, PHILIP JAMES (1816-1902), English poet, author of *Festus*, was born at Nottingham on the 22nd of April 1816. His father, who himself published both prose and verse, owned and edited from 1845 to 1852 the *Nottingham Mercury*, one of the chief journals in his native town. Philip James Bailey received a local education until his sixteenth year, when he matriculated at Glasgow University. He did not, however, take his degree, but moved in 1835 to London and entered Lincoln's Inn. Without making serious practice of the law he settled at Basford, and for three years was occupied with the composition of *Festus*, which appeared anonymously in 1839. Its success, both in England and America, was immediate. It passed through a dozen editions in the country of its birth, and nearly three times as many in the United States; and when in 1889 its author was able to publish a "Jubilee Edition," he could feel that it was one of the few poems of its time which was known to both the older and the younger generations. Its author is known almost exclusively by his one voluminous poem, for though Bailey published other verses he is essentially a man of one book. *Festus* has undergone many changes and incorporations, but it remains a singular example of a piece of work virtually completed in youth, and never supplanted or reinforced by later achievements of its author. It is a vast pageant of theology and philosophy, comprising in some twelve divisions an attempt to represent the relation of God to man and of man to God, to emphasize the benignity of Providence, to preach the immortality of the soul, and to postulate "a gospel of faith and reason combined." It contains fine lines and dignified thought, but its ambitious theme, and a certain incoherency in the manner in which it is worked out, prevent it from being easily readable by any but the most sympathetic student. Bailey died on the 6th of September 1902.

BAILEY, SAMUEL (1791-1870), British philosopher and author, was born at Sheffield in 1791. He was among the first of those Sheffield merchants who went to the United States to establish trade connexions. After a few years in his father's business, he retired with an ample fortune from all business concerns, with the exception of the Sheffield Banking Company, of which he was chairman for many years. Although an ardent liberal, he took little part in political affairs. On two occasions he stood for Sheffield as a "philosophic radical," but without success. His life is for the most part a history of his numerous and varied publications. His books, if not of first-rate importance, are marked by lucidity, elegance of style and originality of treatment. He died suddenly on the 18th of January 1870, leaving over £80,000 to the town of Sheffield. His first work, *Essays on the Formation and Publication of Opinions*, published anonymously in 1821 (2nd ed., 1826; 3rd ed., 1837), attracted more attention than any of his other writings. A sequel to it appeared in 1829, *Essays on the Pursuit of Truth* (2nd ed., 1844). Between these two were *Questions in Political Economy*, *Politics, Morals, &c.* (1823), and a *Critical Dissertation on the Nature, Measure, and Causes of Value* (1825), directed against the opinions of Ricardo and his school. His next publications also were on economic or political subjects, *Rationale of Political Representation* (1835), and *Money and its Vicissitudes* (1837), now practically forgotten; about the same time also appeared some of his pamphlets, *Discussion of Parliamentary Reform*, *Right of Primogeniture Examined*, *Defence of Joint-Stock Banks*. In 1842 appeared his Review of *Berkeley's Theory of Vision*, an able work, which called forth rejoinders from J. S. Mill in the *Westminster Review* (reprinted in *Dissertations*), and from Ferrier in *Blackwood* (reprinted in *Lectures and Remains*, ii). Bailey replied to his critics in a *Letter to a Philosopher* (1843), &c. In 1851 he published *Theory of Reasoning* (2nd ed., 1852), a discussion of the nature of inference, and an able criticism of the functions and value of the syllogism. In 1852 he published *Discourses on Various Subjects*; and finally summed up his philosophic views in the *Letters on the Philosophy of the Human Mind* (three series, 1855, 1858, 1863). In 1845 he published *Maro*, a poem in four cantoes (85 pp., Longmans), containing a description of a young poet who printed 1000 copies of his first poem, of which only 10 were sold. He was a diligent student of Shakespeare, and his last literary work was *On the Received Text of Shakespeare's Dramatic Writings and its Improvement* (1862). Many of the emendations suggested are more fantastic than felicitous.

The *Letters* contain a discussion of many of the principal problems in psychology and ethics. Bailey can hardly be classed as belonging either to the strictly empirical or to the idealist school, but his general tendency is towards the former. (1) In regard to method, he founds psychology entirely on introspection. He thus, to a certain extent, agrees with the Scottish school, but he differs from them in rejecting altogether the doctrine of mental faculties. What have been designated [v.03 p.0218] faculties are, upon his view, merely classified facts or phenomena of consciousness. He criticizes very severely the habitual use of metaphorical language in describing mental operations. (2) His doctrine of perception, which is, in brief, that "the perception of external things through the organs of sense is a direct mental act or phenomenon of consciousness not susceptible of being resolved into anything else," and the reality of which can be neither proved nor disproved, is not worked out in detail, but is supported by elaborate and sometimes subtle criticisms of all other theories. (3) With regard to general and abstract ideas and general propositions, his opinions are those of the empirical school, but his analysis frequently puts the matter in a new light. (4) In the theory of morals, Bailey is an advocate of utilitarianism (though he objects to the term "utility" as being narrow and, to the unthinking, of sordid content), and works out with great skill the steps in the formation of the "complex" mental facts involved in the recognition of duty, obligation, right. He bases all moral phenomena on five facts:—(1) Man is susceptible to pleasure (and pain); (2) he likes (or dislikes) their causes; (3) he desires to reciprocate pleasure and pain received; (4) he expects such reciprocation from others; (5) he feels more or less sympathy with the same feelings in his fellows (*Letters*, 3rd series).

See A. Bain's *Moral Science*; Th. Ribot, *La Psychologie anglaise contemp.*; J. F. Ferrier, *Philos. Remains* (Edinb. and Lond., 1875), pp. 351-381.

BAILEY (said to be a corruption of *Ballium* by some, and derived by others from the Fr. *baille*, a corruption of *bataille*, because there the soldiers were drilled in battle array), the open space between the inner and outer lines of a fortification.

Sometimes there were more than one, as the Inner and Outer Bailey; there are in England the Old Bailey at London and at York, and the Upper and Nether Baileys at Colchester.

BAILIFF and **BAILIE** (from Late Lat. *bajulivus*, adjectival form of *bajulus*, a governor or custodian; cf. BAIL), a legal officer to whom some degree of authority, care or jurisdiction is committed. Bailiffs are of various kinds and their offices and duties vary greatly.

The term was first applied in England to the king's officers generally, such as sheriffs, mayors, &c., and more particularly to the chief officer of a hundred. The county within which the sheriff exercises his jurisdiction is still called his bailiwick, while the term bailiff is retained as a title by the chief magistrates of various towns and the keepers of royal castles, as the high bailiff of Westminster, the bailiff of Dover Castle, &c. Under the manorial system, the bailiff, the steward and the reeve were important officers; the bailiff managed the property of the manor and superintended its cultivation (see Walter of Henley, *Husbandry*, R. Hist. Soc., 1890).

The bailiff of a franchise or liberty is the officer who executes writs and processes, and impanels juries within the franchise. He is appointed by the lord of such franchise (who, in the Sheriffs Act 1887, § 34, is referred to as the bailiff of the franchise).

The bailiff of a sheriff is an under-officer employed by a sheriff within a county for the purpose of executing writs, processes, distraints and arrests. As a sheriff is liable for the acts of his officers acting under his warrant, his bailiffs are annually bound to him in an obligation with sureties for the faithful discharge of their office, and thence are called *bound* bailiffs. They are also often called *bum-bailiffs*, or, shortly, *bums*. The origin of this word is uncertain; the *New English Dictionary* suggests that it is in allusion to the mode of catching the offender. Special bailiffs are officers appointed by the sheriff at the request of a plaintiff for the purpose of executing a particular process. The appointment of a special bailiff relieves the sheriff from all responsibility until the party is arrested and delivered into the sheriff's actual custody.

By the County Courts Act 1888, it is provided that there shall be one or more high-bailiffs, appointed by the judge and removable by the lord-chancellor; and every person discharging the duties of high-bailiff is empowered to appoint a sufficient number of able and fit persons as bailiffs to assist him, whom he can dismiss at his pleasure. The duty of the high-bailiff is to serve all summonses and orders, and execute all the warrants, precepts and writs issued out of the court. The high bailiff is responsible for all the acts and defaults of himself, and of the bailiffs appointed to assist him, in the same way as a sheriff of a county is responsible for the acts and defaults of himself and his officers. By the same act (§49) bailiffs are answerable for any connivance, omission or neglect to levy any such execution. No action can be brought against a bailiff acting under order of the court without six days' notice (§54). Any warrant to a bailiff to give possession of a tenement justifies him in entering upon the premises named in the warrant, and giving possession, provided the entry be made between the hours of 9 A.M. and 4 P.M. (§ 142). The Law of Distress Amendment Act 1888 enacts that no person may act as a bailiff to levy any distress for rent, unless he is authorized by a county-court judge to act as a bailiff.

In the Channel Islands the bailiff is the first civil officer in each island. He is appointed by the crown, and generally holds office for life. He presides at the royal court, and takes the opinions of the jurats; he also presides over the states, and represents the crown in all civil matters. Though he need not necessarily have had legal training, he is usually selected from among those who have held some appointment at the island bar.

In the United States the word bailiff has no special significance. It is sometimes applied to the officer who takes charge of juries and waits upon the court. The officer who corresponds to the English sheriff's bailiff is termed a deputy or under-sheriff.

Bailie.—In Scotland the word bailiff has taken the form of "bailie," signifying a superior officer or magistrate of a municipal corporation. Bailies, by virtue of their office, are invested with certain judicial and administrative powers within the burgh for which they are appointed. They sit as police-court magistrates, being assisted usually by a paid legal adviser, called an "assessor," and, in the larger burghs, act as a licensing court. It is usually said that a bailie is analogous to the English alderman, but this is only in so far as he is a person of superior dignity in the council, for, unlike an alderman, he continues to sit for the ward for which he has been elected after selection as a bailie. He is always appointed from within the council, and his term of office is only that of an ordinary councillor, that is, for not more than three years. *Bailie to give sasine* was the person who appeared for the superior at the ceremony of giving sasine. This ceremony was abolished in 1845. The *Bailie of Holyrood*, or *Bailie of the Abbey*, was the official who had jurisdiction in all civil debts contracted within the precincts of the sanctuary (*q.v.*).

(T. A. I.)

Bailli.—In France the bailiff (*bailli*), or seneschal in feudal days, was the principal officer of any noble importance. He it was who held the feudal court of assizes when the lord was not present himself. A great noble often also had a *prévôté*, where small matters were settled, and the preparatory steps taken relative to the more important cases reserved for the assizes. Among the great officers of the crown of France a grand-seneschal formerly figured until the reign of Philip Augustus, when the last holder of the office was not replaced by a successor. It is also under Philip Augustus that local bailiffs first make a definite appearance. In the ordinance of 1190, by which the king, about to set forth on the crusade, arranged for the administration of the kingdom during his absence, they figure as part of a general system. Probably the first royal bailiffs or seneschals were the seigniorial bailiffs of certain great fiefs that had been reunited to the crown, their functions still continuing after the annexation. Their essential function was at first the surveillance of the royal provosts (*prévôts*), who until then had had the sole administration of the various parts of the domain. They concentrated in their own hands the produce of the provostships, and they organized and led the men who by feudal rules owed military service to the king. They had also judicial functions, which, at first narrowly restricted in application, became much enlarged as time went on, and they held periodical assizes in the principal centres of their districts. When the right of appeal was instituted, it was they who heard the appeals from sentences pronounced by inferior royal judges and by the seigniorial justices. Royal cases, and cases in which a noble was defendant, were also reserved for them. The royal *bailli* or seneschal (no real difference existed between the two offices, the names merely changing according to the district), was for long the king's principal representative in the provinces, and the *bailliage* or the *sénéchaussée* was then as important administratively as judicially. But the political power of the bailiffs was greatly lessened when the provincial governors were created. They had already lost their financial powers, and their judicial functions now passed from them to their lieutenants.

[v.03 p.0219]

By his origin the bailiff had a military character; he was an officer of the "short robe" and not of the "long robe," which in those days was no obstacle to his being well versed in precedents. But when, under the influence of Roman and canon law, the legal procedure of the civil courts became *learned*, the bailiff often availed himself of a right granted him by ancient public law: that of delegating the exercise of his functions to whomsoever he thought fit. He delegated his judicial functions to lieutenants, whom he selected and discharged at will. But as this delegation became habitual, the position of the lieutenants was strengthened; in the 16th century they became royal officers by title, and even dispossessed the bailiffs of their judiciary prerogatives. The tribunal of the *bailliage* or *sénéchaussée* underwent yet another transformation, becoming a stationary court of justice, the seat of which was fixed at the chief town. During the 15th and 16th centuries ambulatory assizes diminished in both frequency and importance. In the 17th and 18th centuries they were no more than a survival, the *lieutenant* of such a *bailliage* having preserved the right to hold one assize each year at a certain locality in his district. The ancient bailiff or *bailli d'épée* still existed, however; the judgments in the tribunal of the bailliage were delivered in his name, and he was responsible for their execution. So long as the military service of the *ban* and *arrière ban*, due to the king from all fief-holders, was maintained (and it was still in force at the end of the 17th century), it was the bailiffs who organized it. Finally the *bailliage* became in principle the electoral district for the states-general, the unit represented therein by its three estates. The justiciary nobles retained their judges, often called bailiffs, until the Revolution. These judges, who were competent to decide questions as to the payment of seigniorial dues could not, legally at all events, themselves farm those revenues.

See Dupont Ferrier, *Les Officiers royaux des bailliages et sénéchaussées et les institutions monarchiques locales en France à la fin du moyen âge* (1902); Armand Brette, *Recueil de documents relatifs à la convocation des états-généraux de 1789* (3 vols. 1904) (vol. iii. gives the condition of the *bailliages* and *sénéchaussées* in 1789).

(J. P. E.)

BAILLET, ADRIEN (1649-1706), French scholar and critic, was born on the 13th of June 1649, at the village of Neuville near Beauvais, in Picardy. His parents could only afford to send him to a small school in the village, but he picked up some Latin from the friars of a neighbouring convent, who brought him under the notice of the bishop of Beauvais. By his kindness Baillet received a thorough education at the theological seminary, and was afterwards appointed to a post as teacher in the college of Beauvais. In 1676 he was ordained priest and was presented to a small vicarage. He accepted in 1680 the appointment of librarian to M. de Lamoignon, advocate-general to the *parlement* of Paris, of whose library he made a *catalogue raisonné* (35 vols.), all written with his own hand. The remainder of his life was spent in incessant, unremitting labour; so keen was his devotion to study that he allowed himself only five hours a day for rest. He died on the 21st of January 1706. Of his numerous works the following are the most conspicuous: (1) *Histoire de Hollande depuis la trève de 1609 jusqu'à 1690* (4 vols. 1693), a continuation of Grotius, and published under the name of La Neuville, (2) *Les Vies des saints ...* (4 vols. 1701), (3) *Des Satires personelles, traité historique et critique de celles qui portent le titre d' Anti* (2 vols. 1689), (4) *Vie de Descartes* (2 vols. 1691), (5) *Auteurs déguisés sous des noms étrangers, empruntés, &c.* (1690), (6) *Jugemens des savans sur les principaux ouvrages des auteurs* (9 vols. 1685-1686). The last is the most celebrated and useful of all his works. At the time of his death he was engaged on a *Dictionnaire universelle ecclésiastique*. The praise bestowed on the Jansenists in the *Jugemens des savans* brought down on Baillet the hatred of the Jesuits, and his *Vie des saints*, in which he brought his critical mind to bear on the question of miracles, caused some scandal. His *Vie de Descartes* is a mine of information on the philosopher and his work, derived from numerous unimpeachable authorities.

See the edition by M. de la Monnoye of the *Jugemens des savans* (Amsterdam, 4 vols. 1725), which contains the *Anti-Baillet* of Gilles Ménage and an *Abrégé de la vie de Mr Baillet*.

BAILLIE, LADY GRIZEL (1665-1746), Scottish song-writer, eldest daughter of Sir Patrick Hume or Home of Polwarth, afterwards earl of Marchmont, was born at Redbraes Castle, Berwickshire, on the 25th of December 1665. When she was twelve years old she carried letters from her father to the Scottish patriot, Robert Baillie of Jerviswood, who was then in prison. Home's friendship for Baillie made him a suspected man, and the king's troops occupied Redbraes Castle. He remained in hiding for some time in a churchyard, where his daughter kept him supplied with food, but on hearing of the execution of Baillie (1684) he fled to Holland, where his family soon after joined him. They returned to Scotland at the Revolution. Lady Grizel married in 1692 George Baillie, son of the patriot. She died on the 6th of December 1746. She had two daughters, Grizel, who married Sir Alexander Murray of Stanhope, and Rachel, Lady Binning. Lady Murray had in her possession a MS. of her mother's in prose and verse. Some of the songs had been printed in Allan Ramsay's *Tea-Table Miscellany*. "And werena my heart light I wad dee," the most famous of Lady Grizel's songs, originally appeared in *Orpheus Caledonius* (1725).

Memoirs of the Lives and Characters of the Right Hon. George Baillie of Jerviswood and Lady Grisell Baillie, by their daughter, Lady Murray of Stanhope, were printed in 1822. George Baillie's *Correspondence* (1702-1708) was edited by Lord Minto for the Bannatyne Club in 1842. "The Legend of Lady Grizelda Baillie" forms one of Joanna Baillie's *Metrical Legends of Exalted Character*.

BAILLIE, JOANNA (1762-1851), British poet and dramatist, was born at the manse of Bothwell, on the banks of the Clyde, on the 11th of September 1762. She belonged to an old Scottish family, which claimed among its ancestors Sir William Wallace. At an early period she moved with her sister Agnes to London, where their brother, Dr Matthew Baillie, was settled. The two sisters inherited a small competence from their uncle, Dr William Hunter, and took up their residence at Hampstead, then on the outskirts of London, where they passed the remainder of their lives. Joanna Baillie had received an excellent education, and began very early to write poetry. She published anonymously in 1790 a volume called *Fugitive Verses*; but it was not till 1798 that she produced the first volume of her "plays on the passions" under the title of *A Series of Plays*. Her design was to illustrate each of the deepest and strongest passions of the human mind, such as hate, jealousy, fear, love, by a tragedy and a comedy, in each of which should be exhibited the actions of an individual under the influence of these passions. The first volume was published anonymously, but the authorship, though at first attributed to Sir Walter Scott, was soon discovered. The book had considerable success and was followed by a second volume in 1802, a third in 1812 and three volumes of *Dramas* in 1836. *Miscellaneous Plays* appeared in 1804, and the *Family Legend* in 1810. Miss Baillie herself intended her plays not for the closet but for the stage. The *Family Legend*, brought out in 1810 at Edinburgh, under the enthusiastic patronage of Sir Walter Scott, had a brief though brilliant success; *De Monfort* had a short run in London, mainly through the acting of John Kemble and Mrs Siddons; *Henriquez* and *The Separation* were coldly received. With very few exceptions, Joanna Baillie's plays are unsuited for stage exhibition. Not only is there a flaw in the fundamental idea, viz. that of an individual who is the embodiment of a single passion, but the want of incident and the direction of the attention to a single point, present insuperable obstacles to their success as acting pieces. At the same time they show remarkable powers of analysis and acute observation and are written in a pure and vigorous style. Joanna Baillie's reputation does not rest entirely on her dramas; she was the author of some poems and songs of great beauty. The best of them are the *Lines to Agnes Baillie on her Birthday, The Kitten, To a Child* and some of her adaptations of Scottish songs, such as *Woo'd and Married an'a'*. Scattered throughout the dramas [v.03 p.0220] are also some lively and beautiful songs, *The Chough and the Crow* in *Orra*, and the lover's song in the *Phantom*. Miss Baillie died on the 23rd of February 1851, at the advanced age of 89, her faculties remaining unimpaired to the last. Her gentleness and sweetness of disposition made her a universal favourite, and her little cottage at Hampstead was the centre of a brilliant literary society.

See Joanna Baillie's *Dramatic and Poetical Works* (London, 1851).

BAILLIE, ROBERT (1602-1662), Scottish divine, was born at Glasgow. Having graduated there in 1620, he gave himself to the study of divinity. In 1631, after he had been ordained and had acted for some years as regent in the university, he was appointed to the living of Kilwinning in Ayrshire. In 1638 he was a member of the famous Glasgow Assembly, and soon after he accompanied Leslie and the Scottish army as chaplain or preacher. In 1642 he was made professor of divinity at Glasgow, and in the following year was selected as one of the five Scottish clergymen who were sent to the Westminster Assembly. In 1649 he was one of the commissioners sent to Holland for the purpose of inviting Charles II. to Scotland, and of settling the terms of his admission to the government. He continued to take an active part in all the minor disputes of the church, and in 1661 was made principal of Glasgow University. He died in August of the following year, his death being probably hastened by his mortification at the apparently firm establishment of episcopacy in Scotland. Baillie was a man of learning and ability; his views were not extreme, and he played but a secondary part in the stirring events of the time. His *Letters*, by which he is now chiefly remembered, are of first-rate historical importance, and give a very lively picture of the period.

A complete memoir and a full notice of all his writings will be found in D. Laing's edition of the *Letters and Journals of Robert Baillie* (1637-1662), Bannatyne Club, 3 vols. (Edinburgh, 1841-1842). Among his works are *Ladensium* αὐτοκατάκρισις, an answer to *Lysimachus Nicanor*, an attack on Laud and his system, in reply to a publication which charged the Covenanters with Jesuitry; *Anabaptism, the true Fountain of Independency, Brownisme, Antinomy, Familisme, &c.*, a sermon; *An Historical Vindication of the Government of the Church of Scotland; The Life of William (Laud) now Lord Archbishop of Canterbury Examined* (London, 1643); *A Parallel of the Liturgy with the Mass Book, the Breviary, the Ceremonial and other Romish Rituals* (London, 1661).

BAILLIE, ROBERT (d. 1684), Scottish conspirator, known as Baillie of Jerviswood, was the son of George Baillie of St. John's Kirk, Lanarkshire. He incurred the resentment of the Scottish government by rescuing, in June 1676, his brother-in-

law Kirkton, a Presbyterian minister who had illegally been seized and confined in a house by Carstairs, an informer. He was fined £500, remaining in prison for four months and then being liberated on paying one-half the fine to Carstairs. In despair at the state of his country he determined in 1683 to emigrate to South Carolina, but the plan came to nothing. The same year Baillie, with some of his friends, went to London and entered into communication with Monmouth, Russell and their party in order to obtain redress; and on the discovery of the Rye House Plot he was arrested. Questioned by the king himself he repudiated any knowledge of the conspiracy, but with striking truthfulness would not deny that he had been consulted with the view of an insurrection in Scotland. He was subsequently loaded with irons and sent back a prisoner to Scotland. Though there was no evidence whatever to support his connexion with the plot, he was fined £6000 and kept in close confinement. He was already in a languishing state when on the 23rd of December 1684 he was brought up again before the high court on the charge of treason. He was pronounced guilty on the following day and hanged the same afternoon at the market cross at Edinburgh with all the usual barbarities. His shocking treatment was long remembered as one of the worst crimes committed by the Stuart administration in Scotland. Bishop Burnet, who was his cousin, describes him as "in the presbyterian principles but ... a man of great piety and virtue, learned in the law, in mathematics and in languages." He married a sister of Sir Archibald Johnston, Lord Warriston, and left a son, George, who took refuge in Holland, afterwards returning with William III. and being restored to his estates.

BAILLY, JEAN SYLVAIN (1736-1793), French astronomer and orator, was born at Paris on the 15th of September 1736. Originally intended for the profession of a painter, he preferred writing tragedies until attracted to science by the influence of Nicolas de Lacaille. He calculated an orbit for the comet of 1759 (Halley's), reduced Lacaille's observations of 515 zodiacal stars, and was, in 1763, elected a member of the Academy of Sciences. His *Essai sur la théorie des satellites de Jupiter* (1766), an expansion of a memoir presented to the Academy in 1763, showed much original power; and it was followed up in 1771 by a noteworthy dissertation *Sur les inégalités de la lumière des satellites de Jupiter*. Meantime, he had gained a high literary reputation by his *Éloges* of Charles V., Lacaille, Molière, Corneille and Leibnitz, which were issued in a collected form in 1770 and 1790; he was admitted to the French Academy (February 26, 1784), and to the Académie des Inscriptions in 1785, when Fontenelle's simultaneous membership of all three Academies was renewed in him. Thenceforth, he devoted himself to the history of science, publishing successively:—*Histoire de l'astronomie ancienne* (1775); *Histoire de l'astronomie moderne* (3 vols. 1779-1782); *Lettres sur l'origine des sciences* (1777); *Lettres sur l'Atlantide de Platon* (1779); and *Traité de l'astronomie indienne et orientale* (1787). Their erudition was, however, marred by speculative extravagances.

The cataclysm of the French Revolution interrupted his studies. Elected deputy from Paris to the states-general, he was chosen president of the Third Estate (May 5, 1789), led the famous proceedings in the Tennis Court (June 20), and acted as mayor of Paris (July 15, 1789, to November 16, 1791). The dispersal by the National Guard, under his orders, of the riotous assembly in the Champ de Mars (July 17, 1791) rendered him obnoxious to the infuriated populace, and he retired to Nantes, where he composed his *Mémoires d'un témoin* (published in 3 vols. by MM. Berville and Barrière, 1821-1822), an incomplete narrative of the extraordinary events of his public life. Late in 1793, Bailly quitted Nantes to join his friend Pierre Simon Laplace at Melun; but was there recognized, arrested and brought (November 10) before the Revolutionary Tribunal at Paris. On the 12th of November he was guillotined amid the insults of a howling mob. He met his death with patient dignity, having, indeed, disastrously shared the enthusiasms of his age, but taken no share in its crimes.

Notices of his life are contained in the *Éloges* by Mérard de Saint Just, Delisle de Salles, Lalande and Lacretelle; in a memoir by Arago, read the 26th of February 1844 before the Académie des Sciences, and published in *Notices biographiques*, t. ii. (1852). See also Delambre, *Histoire de l'astronomie au 18me siècle*, p. 735, and Lalande, *Bibliographie astronomique*, p. 730.

BAILMENT (from Fr. *bailler*, to place in charge of, cf. Bail), in law, a delivery of goods from one person called the *bailor*, to another person called the *bailee*, for some purpose, upon a contract, express or implied, that after the purpose has been fulfilled they shall be redelivered to the bailor, or otherwise dealt with according to his direction, or kept till he reclaims them. The following is Chief Justice Holt's classification of bailments in *Coggs* v. *Bernard*, 1704, 1 Sm. L.C. 167, which is generally adopted. (1) *Depositum*, or bailment without reward, in order that the bailee may keep the goods for the bailor. In this case, the bailee has no right to use the thing entrusted to him, and is liable for gross negligence, but not for ordinary negligence. Thus, where a customer had deposited some securities with his banker (who received nothing for his services) and they were stolen by a cashier, it was held that as there was no proof of gross negligence the banker was not liable (*Giblin* v. *McMullen*, 1868, L.R. 2 P.C. 317). (2) *Commodatum*, or loan, where goods or chattels that are useful are lent to the bailee *gratis*, to be used by him. The bailee may be justly considered as representing himself to the bailor to be a person of competent skill to take care of the thing lent (*Wilson* v. *Brett*, 1843, 11 M. & W. 113), and the transaction being a gratuitous loan, and one for the advantage of the bailee solely, he is bound to use great diligence in the protection
[v.03 p.0221] of the thing bailed and will be responsible even for slight negligence. Thus, where a horse was lent to the defendant to ride, it was held that it did not warrant him in allowing his servant to do so (*Bringloe* v. *Morrice*, 1676, 1 Mod. 210). But where a horse was for sale and the vendor allowed the defendant to have the horse for the purpose of trying it, it was held that he had a right to allow a competent person upon the horse to try it (*Camoys* v. *Scurr*, 1840, 9 C. & P. 383). (3) *Locatio rei*, or lending for hire. In the case of hiring the bailee is bound to use such diligence as a prudent man would exercise towards his own property. Thus, where the defendant hired a horse, and it having fallen ill, prescribed for it himself instead of calling in a veterinary surgeon, he was held liable for the loss (*Dean* v. *Keate*, 1811, 3 Camp. 4). (4) *Vadium*, pawn or pledge; a bailment of personal property as a security for a debt. In this case the pledgee is bound to use ordinary diligence in guarding the thing pledged. (5) *Locatio operis faciendi*, where goods are delivered to be carried, or something is to be done about them for a reward to be paid to the bailee. In this case, the bailee is bound to use ordinary diligence in preserving the property entrusted to him. (6) *Mandatum*, a delivery of goods to somebody, who is to carry them, or do something about them *gratis*. The liabilities of a mandatory and of a depository are exactly the same; neither is liable for anything short of gross negligence.

See further under Banks and Banking; Carrier; Diligence; Factor; Hiring; Inns and Innkeepers; Lien; Negligence; Pledge; Pawnbroking; Principal and Agent, &c.

BAILY, EDWARD HODGES (1788-1867), British sculptor, was born at Bristol on the 10th of March 1788. His father, who was a celebrated carver of figureheads for ships, destined him for a commercial life, but even at school the boy showed his natural taste and remarkable talents by producing numerous wax models and busts of his schoolfellows, and afterwards, when placed in a mercantile house, still carried on his favourite employment. Two Homeric studies, executed for a friend, were shown to J. Flaxman, who bestowed on them such high commendation that in 1807 Baily came to London and placed himself as a pupil under the great sculptor. In 1809 he entered the academy schools. In 1811 he gained the academy gold medal for a model of "Hercules restoring Alcestis to Admetus," and soon after exhibited "Apollo discharging his Arrows against the Greeks" and "Hercules casting Lichas into the Sea." In 1821 he was elected R.A., and exhibited one of his best pieces, "Eve at the Fountain." He was entrusted with the carving of the bas-reliefs on the south side of the Marble Arch in Hyde Park, and executed numerous busts and statues, such as those of Nelson in Trafalgar Square, of Earl Grey, of Lord Mansfield and others. Baily died at Holloway on the 22nd of May 1867.

BAILY, FRANCIS (1774-1844), English astronomer, was born at Newbury in Berkshire, on the 28th of April 1774. After a tour in the unsettled parts of North America in 1796-1797, his journal of which was edited by Augustus de Morgan in 1856, he entered the London Stock Exchange in 1799. The successive publication of *Tables for the Purchasing and Renewing of Leases* (1802), of *The Doctrine of Interest and Annuities* (1808), and *The Doctrine of Life-Annuities and Assurances* (1810), earned him a high reputation as a writer on life-contingencies; he amassed a fortune through diligence and integrity and retired from business in 1825, to devote himself wholly to astronomy. He had already, in 1820, taken a leading part in the foundation of the Royal Astronomical Society; and its gold medal was awarded him, in 1827, for his preparation of the Astronomical Society's Catalogue of 2881 stars (*Memoirs R. Astr. Soc.* ii.). The reform of the *Nautical Almanac* in 1829 was set on foot by his protests; he recommended to the British Association in 1837, and in great part executed, the reduction of Joseph de Lalande's and Nicolas de Lacaille's catalogues containing about 57,000 stars; he

superintended the compilation of the British Association's Catalogue of 8377 stars (published 1845); and revised the catalogues of Tobias Mayer, Ptolemy, Ulugh Beg, Tycho Brahe, Edmund Halley and Hevelius (*Memoirs R. Astr. Soc.* iv., xiii).

His notice of "Baily's Beads," during an annular eclipse of the sun on the 15th of May 1836, at Inch Bonney in Roxburghshire, started the modern series of eclipse-expeditions. The phenomenon, which depends upon the inequalities of the moon's limb, was so vividly described by him as to attract an unprecedented amount of attention to the totality of the 8th of July 1842, observed by Baily himself at Pavia. He completed and discussed H. Foster's pendulum-experiments, deducing from them an ellipticity for the earth of 1/289 (*Memoirs R. Astr. Soc.* vii.); corrected for the length of the seconds-pendulum by introducing a neglected element of reduction; and was entrusted, in 1843, with the reconstruction of the standards of length. His laborious operations for determining the mean density of the earth, carried on by Henry Cavendish's method (1838-1842), yielded for it the authoritative value of 5.66. He died in London, on the 30th of August 1844. Baily's *Account of the Rev. John Flamsteed* (1835) is of fundamental importance to the scientific history of that time. It included a republication of the British Catalogue.

See J. Herschel's *Memoir of F. Baily, Esq.* (1845), also prefixed to Baily's *Journal of a Tour*, with a list of his writings; *Month. Not. R. Astr. Soc.* xiv. 1844.

BAILY, WILLIAM HELLIER (1819-1888), English palaeontologist, nephew of E. H. Baily the sculptor, was born at Bristol on the 7th of July 1819. From 1837 to 1844 he was Assistant Curator in the Bristol Museum, a post he relinquished to join the staff of the Geological Survey in London. In 1854 he became assistant naturalist, under Edward Forbes and afterwards under Huxley. In 1857 he was transferred to the Irish branch of the Geological Survey, as acting palaeontologist, and retained this post until the end of his life. He was the author of many papers on palaeontological subjects, and of notes on fossils in the explanatory memoirs of the Geological Survey of Ireland. He published (1867-1875) a useful work entitled *Figures of Characteristic British Fossils, with Descriptive Remarks*, of which only the first volume, dealing with palaeozoic species, was issued. The figures were all drawn on stone by himself. He died at Rathmines near Dublin on the 6th of August 1888.

BAIN, ALEXANDER (1818-1903), Scottish philosopher and educationalist, was born on the 11th of June 1818 in Aberdeen, where he received his first schooling. In early life he was a weaver, hence the punning description of him as *Weevir, rex philosophorum*. In 1836 he entered Marischal College, and came under the influence of John Cruickshank, professor of mathematics, Thomas Clark, professor of chemistry, and William Knight, professor of natural philosophy. His college career was distinguished, especially in mental philosophy, mathematics and physics. Towards the end of his arts course he became a contributor to the *Westminster Review* (first article "Electrotype and Daguerreotype," September 1840). This was the beginning of his connexion with John Stuart Mill, which led to a life-long friendship. In 1841 he became substitute for Dr Glennie, the professor of moral philosophy, who, through ill-health, was unable to discharge the active duties of the chair. This post he occupied for three successive sessions, during which he continued writing for the *Westminster*, and also in 1842 helped Mill with the revision of the MS. of his *System of Logic*. In 1843 he contributed the first review of the book to the *London and Westminster*. In 1845 he was appointed professor of mathematics and natural philosophy in the Andersonian University of Glasgow. A year later, preferring a wider field, he resigned the position and devoted himself to literary work. In 1848 he removed to London to fill a post in the board of health, under Edwin Chadwick, and became a prominent member of the brilliant circle which included George Grote and John Stuart Mill. In 1855 he published his first large work, *The Senses and the Intellect*, followed in 1859 by *The Emotions and the Will*. These treatises won for him a position among independent thinkers. He was examiner in logical and moral philosophy (1857-1862 and 1864-1869) to the university of London, and in moral science in the Indian Civil Service examinations.

[v.03 p.0222]

In 1860 he was appointed by the crown to the new chair of logic and English in the university of Aberdeen (created on the amalgamation of the two colleges, King's and Marischal, by the Scottish Universities Commission of 1858). Up to this date neither logic nor English had received adequate attention in Aberdeen, and Bain devoted himself to supplying these deficiencies. He succeeded not only in raising the standard of education generally in the north of Scotland, but also in forming a school of philosophy and in widely influencing the teaching of English grammar and composition. His efforts were first directed to the preparation of English textbooks: *Higher English Grammar* (1863), followed in 1866 by the *Manual of Rhetoric*, in 1872 by *A First English Grammar*, and in 1874 by the *Companion to the Higher Grammar*. These works covered a large field and their original views and methods met with wide acceptance. But the other subject of his chair also called for attention. His own philosophical writings already published, especially *The Senses and the Intellect* (to which was added, in 1861, *The Study of Character*, including an *Estimate of Phrenology*), were too large for effective use in the class-room. Accordingly in 1868, he published his *Manual of Mental and Moral Science*, mainly a condensed form of his treatises, with the doctrines re-stated, and in many instances freshly illustrated, and with many important additions. The year 1870 saw the publication of the *Logic*. This, too, was a work designed for the use of students; it was based on J. S. Mill, but differed from him in many particulars, and had as distinctive features the treatment of the doctrine of the conservation of energy in connexion with causation and the detailed application of the principles of logic to the various sciences. His services to education in Scotland were now recognized by the conferment of the honorary degree of doctor of laws by the university of Edinburgh in 1871. Next came two publications in "The International Scientific Series," namely, *Mind and Body* (1872), and *Education as a Science* (1879).

All these works, from the *Higher English Grammar* downwards, were written by Bain during his twenty years' professoriate at Aberdeen. To the same period belongs his institution of the philosophical journal *Mind*; the first number appeared in January 1876, under the editorship of a former pupil, G. Croom Robertson, of University College, London. To this journal Bain contributed many important articles and discussions; and in fact he bore the whole expenses of it till Robertson, owing to ill-health, resigned the editorship in 1891, when it passed into other hands. Bain resigned his professorship in 1880 and was succeeded by William Minto, one of his most brilliant pupils. Nevertheless his interest in thought, and his desire to complete the scheme of work mapped out in earlier years, remained as keen as ever. Accordingly, in 1882 appeared the *Biography of James Mill*, and accompanying it *John Stuart Mill: a Criticism, with Personal Recollections*. Next came (1884) a collection of articles and papers, most of which had appeared in magazines, under the title of *Practical Essays*. This was succeeded (1887, 1888) by a new edition of the *Rhetoric*, and along with it, a book *On Teaching English*, being an exhaustive application of the principles of rhetoric to the criticism of style, for the use of teachers; and in 1894 he published a revised edition of *The Senses and the Intellect*, which contains his last word on psychology. In 1894 also appeared his last contribution to *Mind*. His last years were spent in privacy at Aberdeen, where he died on the 18th of September 1903. He married twice but left no children.

Bain's life was mainly that of a thinker and a man of letters. But he also took a keen interest and frequently an active part in the political and social movements of the day; and so highly did the students of Aberdeen rate his practical ability, that, after his retirement from the chair of logic, they twice in succession elected him lord rector of the university, each term of office extending over three years. He was a strenuous advocate of reform, especially in the teaching of sciences, and supported the claims of modern languages to a place in the curriculum. A marble bust of him stands in the public library and his portrait hangs in the Marischal College.

Wide as Bain's influence has been as a logician, a grammarian and a writer on rhetoric, his reputation rests on his psychology. At one with Johannes Müller in the conviction *psychologus nemo nisi physiologus*, he was the first in Great Britain during the 19th century to apply physiology in a thoroughgoing fashion to the elucidation of mental states. He was the originator of the theory of psycho-physical parallelism, which is used so widely as a working basis by modern psychologists. His idea of applying the natural history method of classification to psychical phenomena gave scientific character to his work, the value of which was enhanced by his methodical exposition and his command of illustration. In line with this, too, is his demand that psychology shall be cleared of metaphysics; and to his lead is no doubt due in great measure the position that psychology has now acquired as a distinct positive science. Prof. Wm. James calls his work the "last word" of the earlier stage of psychology, but he was in reality the pioneer of the new. Subsequent psycho-physical investigations have all been in the spirit of his work; and although he consistently advocated the introspective method in

psychological investigation, he was among the first to appreciate the help that may be given to it by animal and social and infant psychology. He may justly claim the merit of having guided the awakened psychological interest of British thinkers of the second half of the 19th century into fruitful channels. He emphasized the importance of our active experiences of movement and effort, and though his theory of a central innervation sense is no longer held as he propounded it, its value as a suggestion to later psychologists is great. His autobiography, published in 1904, contains a full list of his works, and also the history of the last thirteen years of his life by W. L. Davidson of Aberdeen University, who further contributed to *Mind* (April 1904) a review of Bain's services to philosophy.

Works (beside the above):—Edition with notes of Paley's *Moral Philosophy* (1852); *Education as a Science* (1879); *Dissertations on leading philosophical topics* (1903, mainly reprints of papers in *Mind*); he collaborated with J. S. Mill and Grote in editing James Mill's *Analysis of the Phenomena of the Human Mind* (1869), and assisted in editing Grote's *Aristotle* and *Minor Works*; he also wrote a memoir prefixed to G. Croom Robertson's *Philosophical Remains* (1894). (See PSYCHOLOGY and ASSOCIATION OF IDEAS.)

(W. L. D.)

BAIN, ANDREW GEDDES (1797-1864), British geologist, was a native of Scotland. In 1820 he emigrated to Cape Colony, and carried on for some years the business of a saddler at Graaf Reinet. During the Kaffir War in 1833-34 he took command of a provisional battalion raised for the defence of the frontier. Later he was engaged to construct a military road through the Ecca Pass, and displayed engineering talents which led to his being permanently employed as surveyor of military roads under the corps of Royal Engineers. This occupation created an interest in geology, which was fostered in 1837 by the loan of Lyell's *Elements*. He discovered the remains of many reptilia, including the *Dicynodon*, which was obtained from the Karroo Beds near Fort Beaufort and described by Owen. Devoting all his spare energies to geological studies, Bain prepared in 1852 the first comprehensive geological map of South Africa, a work of great merit, which was published by the Geological Society of London in 1856. He died at Cape Town in 1864.

Obituary by Dr R. N. Rubidge, in *Geol. Mag.* January 1865, p. 47; also *Trans. Geol. Soc. S. Africa*, vol. ii. part v., June 1896 (with portrait).

BAINBRIDGE, JOHN (1582-1643), English astronomer, was born at Ashby-de-la-Zouch, in Leicestershire. He started as a physician and practised for some years, kept a school and studied astronomy. Having removed to London, he was admitted (November 6, 1618) a licentiate of the college of physicians, and attracted notice by a publication concerning the comet of 1618. Sir Henry Savile (1549-1622) thereupon appointed him in 1619 to the Savilian chair of astronomy just founded by him at Oxford; Bainbridge was incorporated of Merton College and became, in 1631 and 1635 respectively, junior and senior reader of Linacre's lectures. He died at Oxford on the 3rd of November 1643. He wrote *An Astronomical Description of the late Comet* (1619); *Canicularia* (1648); and translated Proclus' *De Sphaera*, and Ptolemy's *De Planetarum Hypothesibus* (1620). Several manuscript works by him exist in the library of Trinity College, Dublin.

[v.03 p.0223]

See Munk's *College of Physicians*, i. 175; Wood's *Athenae* (Bliss), iii. 67; *Biographia Britannica*, i. 419.

BAINBRIDGE, WILLIAM (1774-1833), commodore in the United States navy, was born on the 7th of May 1774 in Princeton, New Jersey. At the age of fourteen he went to sea in the merchant service, and was in command of a trading schooner at an early age. The American trading vessels of that period were supposed to be excluded by the navigation laws from commerce with the British West Indian Islands, though with the concealed or very slightly disguised assistance of the planters, they engaged in a good deal of contraband commerce. The war between France and Great Britain tended further to make the carrying trade of neutrals difficult. Bainbridge had therefore to expect, and when he could to elude or beat off, much interference on the part of French and British cruisers alike. He is said to have forced a British schooner, probably a privateer, which attacked him when on his way from Bordeaux to St Thomas, to strike, but he did not take possession. On another occasion he is said to have taken a man out of a British ship in retaliation for the impressment of an American seaman by H.M.S. "Indefatigable," then commanded by Sir Edward Pellew. When the United States navy was organized in 1798 he was included in the corps of naval officers, and appointed to the schooner "Retaliation." She was on one occasion seized by the French but afterwards released. As captain of the brig "Norfolk" of 18 guns, he was employed in cruising against the French, who were as aggressive against American commerce as the English. He was also sent to carry the tribute which the United States still condescended to pay to the dey of Algiers, in order to secure exemption from capture for its merchant ships in the Mediterranean—a service which he performed punctually, though with great disgust. When the United States found that bribing the pirate Barbary states did not secure exemption from their outrages, and was constrained at last to use force, he served against Algiers and Tunis. His ship, the "Philadelphia," ran aground on the Tunisian coast, and he was for a time imprisoned. On his release he returned for a time to the merchant service in order to make good the pecuniary loss caused by his captivity. When the war of 1812 broke out between Great Britain and the United States, Bainbridge was appointed to command the United States frigate "Constitution" (44), in succession to Captain Isaac Hull (*q.v.*). The "Constitution" was a very fine ship of 1533 tons, which had already captured the "Guerrière." Under Bainbridge she was sent to cruise in the South Atlantic. On the 29th of December 1812 he fell in with H.M.S. "Java," a vessel of 1073 tons, formerly the French frigate "Renommée" (40). She was on her way to the East Indies, carrying the newly appointed lieutenant-governor of Bombay. She had a very raw crew, including very few real seamen, and her men had only had one day's gunnery drill. The United States navy paid great attention to its gunnery, which the British navy, misled by its easy victories over the French, had greatly neglected. In these conditions the fate of the "Java" was soon sealed. She was cut to pieces and forced to surrender, after suffering heavy loss, and inflicting very little on the "Constitution." After the conclusion of the war with Great Britain, Bainbridge served against the Barbary pirates once more. During his later years he served on the board of navy commissioners. He died on the 28th of July 1833.

(D. H.)

BAINDIR (anc. *Caystrus*), a town in Asiatic Turkey in the Aidin vilayet, situated in the valley of the Kuchuk Menderes. Pop. under 10,000, nearly half Christian. It is connected with Smyrna by a branch of the Aidin railway, and has a trade in cotton, figs, raisins and tobacco.

BAINES, EDWARD (1774-1848), English newspaper-proprietor and politician, was born in 1774 at Walton-le-Dale, near Preston, Lancashire. He was educated at the grammar schools of Hawkshead and Preston, and at the age of sixteen was apprenticed to a printer in the latter town. After remaining there four years and a half he removed to Leeds, finished his apprenticeship, and at once started in business for himself. He was always a most assiduous student, and quickly became known as a man of great practical shrewdness and ability, who took a keen interest in political and social movements. His political opinions led him to sympathize with nonconformity and he soon joined the Independents. In 1801 the assistance of party friends enabled him to buy the *Leeds Mercury*. Provincial newspapers did not at that time possess much influence; it was no part of the editor's duty to supply what are now called "leading articles," and the system of reporting was defective. In both respects Baines made a complete change in the *Mercury*. His able political articles gradually made the paper the organ of Liberal opinion in Leeds, and the connexion of the Baines family with the paper made their influence powerful for many years in this direction. Baines soon began to take a prominent part in politics; he was an ardent advocate of parliamentary reform, and it was mainly by his influence that Macaulay was returned for Leeds in 1832; and in 1834 he succeeded Macaulay as member. He was re-elected in 1835 and 1837, but resigned in 1841. In parliament he supported the Liberal party, but with independent views. Like his son Edward after him, he strongly advocated the separation of church and state, and opposed government interference in national education. His letters to Lord John Russell on the latter question (1846) had a powerful influence in determining the action of the government. He died in 1848. His best-known writings are:—*The History, Directory and Gazetteer of the County of York*; *History, Directory and Gazetteer of the County of Lancaster*; *History of the County Palatine and Duchy of Lancaster*. He was also the author of a *History of the Wars of Napoleon*, which was continued under the title of *A History of the Reign of George III*.

His *Life* (1861) has been written by his son, Sir Edward Baines (1800-1890), who was editor and afterwards proprietor of the *Leeds Mercury*, M.P. for Leeds (1859-1874), and was knighted in 1880; his *History of the Cotton Manufacture* (1835)

was long a standard authority. An elder son, Matthew Talbot Baines (1790-1860), went to the bar, and became recorder of Hull (1837). He became M.P. for Hull in 1847, and in 1849 president of the Poor Law Board. In 1852 he was returned for Leeds, and again became president of the Poor Law Board (till 1855). In 1856 he entered the cabinet as chancellor of the duchy of Lancaster.

BAINI, GIUSEPPE (1775-1844), Italian priest, musical critic and composer of church music, was born at Rome on the 21st of October 1775. He was instructed in composition by his uncle, Lorenzo Baini, and afterwards by G. Jannaconi. In 1814 he was appointed musical director to the choir of the pontifical chapel, to which he had as early as 1802 gained admission in virtue of his fine bass voice. His compositions, of which very few have been published, were very favourable specimens of the severe ecclesiastical style; one in particular, a ten-part *Miserere*, composed for Holy Week in 1821 by order of Pope Pius VII., has taken a permanent place in the services of the Sistine chapel during Passion Week. Baini held a higher place, however, as a musical critic and historian than as a composer, and his *Life of Palestrina* (*Memorie storico-critiche della vita e delle opere di Giovanni Pierluigi da Palestrina*, 1828) ranks as one of the best works of its class. The phrase *Il Principe della Musica*, which has become finally associated with the name of Palestrina, originates with this biography. Giuseppe Baini died on the 21st of May 1844 in Rome.

BAIRAM, a Perso-Turkish word meaning "festival," applied in Turkish to the two principal festivals of Islam. The first of these, according to the calendar, is the "Lesser Festival," called by the Turks *Kütshük Bairām* ("Lesser Bairam"), or *Sheker Bairām* ("Sugar Bairam"), and by Arabic-speaking Moslems *ʻĪd al-Fitr* ("Festival of Fast-breaking"), or *Al-ʻīd aṣ-ṣaghīr* ("Lesser Festival"). It follows immediately the ninth or the fasting-month, Ramaḍān, occupying the first three days of the tenth month, Shawwāl. It is, therefore, also called by Turks *Ramazān Bairām*, and exhibits more outward signs of rejoicing than the technically "Greater Festival." Official receptions are held on it, and private visits paid; friends congratulate one another, and presents are given; new clothes are put on, and the graves of relatives are visited. The second, or "Greater Festival," is called by the Turks *Qurbān Bairām*, "Sacrifice Bairam," and by Arabic speakers *Al-ʻīd al-kabīr*, "Greater Festival," or *ʻĪḍ al-aḍḥā*, "Festival of Sacrifice." It falls on the tenth, and two or three following days, of the last month, *Dhū-l-ḥijja*, when the pilgrims each slay a ram, a he-goat, a cow or a camel in the valley of Mina in commemoration of the ransom of Ishmael with a ram. Similarly throughout the Moslem world, all who can afford it sacrifice at this time a legal animal, and either consume the flesh themselves or give it to the poor. Otherwise it is celebrated like the "Lesser Festival," but with less ardour. Both festivals, of course, belong to a lunar calendar, and move through the solar year every thirty-two years.

[v.03 p.0224]

See Lane's *Modern Egyptians*, chap. xxv.; Michell, *Egyptian Calendar*; Hughes, *Dictionary of Islam*, pp. 192 ff.; Sir R. Burton, *Pilgrimage*, chaps. vii., xxx.

(D. B. Ma.)

BAIRD, SIR DAVID (1757-1829), British general, was born at Newbyth in Aberdeenshire in December 1757. He entered the British army in 1773, and was sent to India in 1779 with the 73rd (afterwards 71st) Highlanders, in which he was a captain. Immediately on his arrival, Baird was attached to the force commanded by Sir Hector Munro, which was sent forward to assist the detachment of Colonel Baillie, threatened by Hyder Ali. In the action which followed the whole force was destroyed, and Baird, severely wounded, fell into the hands of the Mysore chief. The prisoners, who were most barbarously treated, remained captive for over four years. Baird's mother, on hearing that her son and other prisoners were in fetters, is said to have remarked, "God help the chiel chained to poor Davie." The bullet was not extracted from Baird's wound until his release. He became major in 1787, visited England in 1789, and purchased a lieutenant-colonelcy in 1790, returning to India in the following year. He held a brigade command in the war against Tippoo, and served under Cornwallis in the Seringapatam operations of 1792, being promoted colonel in 1795. Baird served also at the Cape of Good Hope as a brigadier-general, and he returned to India as a major-general in 1798. In the last war against Tippoo in 1799 Baird was appointed to the senior brigade command in the army. At the successful assault of Seringapatam Baird led the storming party, and was soon a master of the stronghold in which he had long been a prisoner. He had been disappointed that the command of the large contingent of the nizam was given to Colonel Arthur Wellesley; and when after the capture of the fortress the same officer obtained the governorship, Baird judged himself to have been treated with injustice and disrespect. He afterwards received the thanks of parliament and of the East India Company for his gallant bearing on that important day, and a pension was offered to him by the Company, which he declined, apparently from the hope of receiving the order of the Bath from the government. General Baird commanded the Indian army which was sent in 1801 to co-operate with Abercromby in the expulsion of the French from Egypt. Wellesley was appointed second in command, but owing to ill-health did not accompany the expedition. Baird landed at Kosseir, conducted his army across the desert to Kena on the Nile, and thence to Cairo. He arrived before Alexandria in time for the final operations. On his return to India in 1802, he was employed against Sindhia, but being irritated at another appointment given to Wellesley he relinquished his command and returned to Europe. In 1804 he was knighted, and in 1805-1806, being by now a lieutenant-general, he commanded the expedition against the Cape of Good Hope with complete success, capturing Cape Town and forcing the Dutch general Janssens to surrender. But here again his usual ill luck attended him. Commodore Sir Home Popham persuaded Sir David to lend him troops for an expedition against Buenos Aires; the successive failures of operations against this place involved the recall of Baird, though on his return home he was quickly re-employed as a divisional general in the Copenhagen expedition of 1807. During the bombardment of Copenhagen Baird was wounded. Shortly after his return, he was sent out to the Peninsular War in command of a considerable force which was sent to Spain to co-operate with Sir John Moore, to whom he was appointed second in command. It was Baird's misfortune that he was junior by a few days both to Moore and to Lord Cavan, under whom he had served at Alexandria, and thus never had an opportunity of a chief command in the field. At the battle of Corunna he succeeded to the supreme command after Moore's fall, but shortly afterwards his left arm was shattered, and the command passed to Sir John Hope. He again obtained the thanks of parliament for his gallant services, and was made a K.B. and a baronet. Sir David married Miss Campbell-Preston, a Perthshire heiress, in 1810. He was not employed again in the field, and personal and political enmities caused him to be neglected and repeatedly passed over. He was not given the full rank of general until 1814, and his governorship of Kinsale was given five years later. In 1820 he was appointed commander-in-chief in Ireland, but the command was soon reduced, and he resigned in 1822. He died on the 18th of August 1829.

See Theodore Hook's *Life of Sir David Baird*.

BAIRD, HENRY MARTYN (1832-1906), American historian and educationalist, a son of Robert Baird (1798-1863), a Presbyterian preacher and author who worked earnestly both in the United States and in Europe for the cause of temperance, was born in Philadelphia, Pennsylvania, on the 17th of January 1832. He spent eight years of his early youth with his father in Paris and Geneva, and in 1850 graduated at New York University. He then lived for two years in Italy and Greece, was a student in the Union Theological Seminary in New York city from 1853 to 1855, and in 1856 graduated at the Princeton Theological Seminary. He was a tutor for four years in the College of New Jersey (now Princeton University), and from 1859 until his death was professor of Greek language and literature in New York University. He is best known, however, as a historian of the Huguenots. His work, which appeared in three parts, entitled respectively *History of the Rise of the Huguenots of France* (2 vols., 1879), *The Huguenots and Henry of Navarre* (2 vols., 1886), and *The Huguenots and the Revocation of the Edict of Nantes* (2 vols., 1895), is characterized by painstaking thoroughness, by a judicial temper, and by scholarship of a high order. He also published *Modern Greece, A Narrative of a Residence and Travels in that Country* (1856); a biography of his father, *The Life of the Rev. Robert Baird, D.D.* (1866); and *Theodore Beza, the Counsellor of the French Reformation* (1899). He died in New York city on the 11th of November 1906.

His brother, Charles Washington Baird (1828-1887), a graduate of New York University (1848) and of the Union Theological Seminary (1852), and the minister in turn of a Dutch Reformed church at Brooklyn, New York, and of a Presbyterian church at Rye, New York, also was deeply interested in the history of the Huguenots, and published a scholarly work entitled *The History of the Huguenot Emigration to America* (2 vols., 1885), left unfinished at his death.

BAIRD, JAMES (1802-1876) Scottish iron-master, was born at Kirkwood, Lanarkshire, on the 5th of December 1802, the

son of a coal-master. In 1826 his father, two brothers and himself leased coalfields at Gartsherrie and in the vicinity, and in 1828 iron mines near by, and in 1830 built blast furnaces. In this year the father retired, the firm of William Baird & Co. was organized, and James Baird assumed active control. His improvements in machinery largely increased the output of his furnaces, which by 1864 had grown in number to nearly fifty, producing 300,000 tons annually and employing 10,000 hands. The brothers became great landowners, and James was M.P. for the Falkirk burghs in 1851-1852 and 1852-1857. He died at his estate near Ayr on the 20th of June 1876, leaving property valued at three million pounds. He had been during his life a great public benefactor, founding schools and the Baird Lectures (1871) for the defence of orthodox theology, and in 1873 the Baird Trust of £500,000 to enable the Established Church of Scotland to cope with the spiritual needs of the masses. He was twice married but left no children.

[v.03 p.0225]

BAIRD, SPENCER FULLERTON (1823-1887), American naturalist, was born in Reading, Pennsylvania, on the 3rd of February 1823. He graduated at Dickinson College, Carlisle, Pennsylvania in 1840, and next year made an ornithological excursion through the mountains of Pennsylvania, walking, says one of his biographers, "400 m. in twenty-one days, and the last day 60 m." In 1838 he met J. J. Audubon, and thenceforward his studies were largely ornithological, Audubon giving him a part of his own collection of birds. After studying medicine for a time, Baird became professor of natural history in Dickinson College in 1845, assuming also the duties of the chair of chemistry, and giving instruction in physiology and mathematics. This variety of duties in a small college tended to give him that breadth of scientific interest which characterized him through life, and made him perhaps the most representative general man of science in America. For the long period between 1850 and 1878 he was assistant-secretary of the Smithsonian Institution, Washington, and on the death of Joseph Henry he became secretary. From 1871 till his death he was U.S. Commissioner of Fish and Fisheries. While an officer of the Smithsonian, Baird's duties included the superintendence of the labour of workers in widely different lines. Thus, apart from his assistance to others, his own studies and published writings cover a broad range: iconography, geology, mineralogy, botany, anthropology, general zoology, and, in particular, ornithology; while for a series of years he edited an annual volume summarizing progress in all scientific lines of investigation. He gave general superintendence, between 1850 and 1860, to several government expeditions for scientific exploration of the western territories of the United States, preparing for them a manual of *Instructions to Collectors*. Of his own publications, the bibliography by G. Brown Goode, from 1843 to the close of 1882, includes 1063 entries, of which 775 were short articles in his *Annual Record*. His most important volumes, on the whole, were *Birds*, in the series of reports of explorations and surveys for a railway route from the Mississippi river to the Pacific ocean (1858), of which Dr Elliott Coues says (as quoted in the *Popular Science Monthly*, xxxiii. 553) that it "exerted an influence perhaps stronger and more widely felt than that of any of its predecessors, Audubon's and Wilson's not excepted, and marked an epoch in the history of American ornithology"; *Mammals of North America: Descriptions based on Collections in the Smithsonian Institution* (Philadelphia, 1859); and the monumental work (with Thomas Mayo Brewer and Robert Ridgway) *History of North American Birds* (Boston, 1875-1884; "Land Birds," 3 vols., "Water Birds," 2 vols). He died on the 19th of August 1887 at the great marine biological laboratory at Woods Hole, Massachusetts, an institution which was largely the result of his own efforts, and which has exercised a wide effect upon both scientific and economic ichthyology.

BAIRNSDALE, a town of Tanjil county, Victoria, Australia, on the Mitchell river, 171 m. by rail E. of Melbourne. Pop. (1901) 3074. It lies near the head of a lagoon called Lake King, which is open to the sea, and affords regular communication by water with Melbourne. In the district, which is chiefly pastoral, there are several goldfields, with both alluvial and reef mining. The town has tanneries, and cheese and butter factories. There is an active shipping trade with Melbourne in maize and other grain, hops, fruit and dairy produce.

BAITER, JOHANN GEORG (1801-1877), Swiss philologist and textual critic, was born at Zürich on the 31st of May 1801. Having received his early education in his native place, he went (1818) to the university of Tübingen, but from want of funds was obliged to return to Zürich, where for several years he was a private tutor. From 1824 to 1829 he studied at Munich under Friedrich Thiersch; at Göttingen, under Georg Dissen; at Königsberg, under Christian Lobeck. From 1833 to 1876 he was *Oberlehrer* at the gymnasium in Zürich, where he died on the 10th of October 1877. Baiter's strong point was textual criticism, applied chiefly to Cicero and the Attic orators; he was very successful in hunting up the best MS. authorities, and his collations were made with the greatest accuracy. Most of his works were produced in collaboration with other scholars, such as Orelli, who regarded him as his right-hand man. He edited Isocrates, *Panegyricus* (1831); with Sauppe, Lycurgus, *Leocratea* (1834) and *Oratores Attici* (1838-1850); with Orelli and Winckelmann, a critical edition of Plato (1839-1842), which marked a distinct advance in the text, two new MSS. being laid under contribution; with Orelli, Babrius, *Fabellae Iambicae nuper repertae* (1845); Isocrates, in the Didot collection of classics (1846). He had for some time been associated with Orelli in his great work on Cicero, and assisted in *Ciceronis Scholiastae* (1833) and *Onomasticon Tullianum* (1836-1838). For the *Fasti Consulares* and *Triumphales* he was alone responsible. With Orelli and (after his death) Halm, he assisted in the second edition of the Cicero, and, with Kayser, edited the same author for the Tauchnitz series (1860-1869). New editions of Orelli's Tacitus and Horace were also due to him. It is worth noting that, with Sauppe, he translated Leake's *Topography of Athens*.

BAIUS, or De Bay, **MICHAEL** (1513-1589), Belgian theologian, was born at Melun in Hainault in 1513. Educated at Louvain University, he studied philosophy and theology with distinguished success, and was rewarded by a series of academic appointments. In 1552 Charles V. appointed him professor of scriptural interpretation in the university. In 1563 he was nominated one of the Belgian representatives at the council of Trent, but arrived too late to take an important part in its deliberations. At Louvain, however, he obtained a great name as a leader in the anti-scholastic reaction of the 16th century. The champions of this reaction fought under the banner of St Augustine; and Baius' Augustinian predilections brought him into conflict with Rome on questions of grace, free-will and the like. In 1567 Pius V. condemned seventy-nine propositions from his writings in the Bull *Ex omnibus afflictionibus*. To this Baius submitted; though certain indiscreet utterances on the part of himself and his supporters led to a renewal of the condemnation in 1579 by Gregory XIII. Baius, however, was not disturbed in the tenure of his professorship, and even became chancellor of Louvain in 1575. He died, still in the enjoyment of these two dignities, in 1589. Baius is chiefly interesting as a forerunner of the more celebrated Cornelius Jansen (see Jansen). His writings are described by Harnack as a curious mixture of Catholic orthodoxy and unconscious tendencies to Protestantism; their most noticeable point is the great importance they attach to the fact of sin, both original and actual.

His principal works were published in a collected form at Cologne, 1696, 1 vol. 4to, in two parts; some large treatises have not been published. There is an excellent study of both books and author by Linsenmann, *Michael Baius, und die Grundlegung des Jansenismus*, published at Tübingen in 1867.

BAIZE (16th century Fr. *baies*, cf. English "bay"), a material probably named from its original colour, though a derivation is also suggested from the Fr. *baie*, as the cloth is said to have been originally dyed with Avignon berries. It is generally a coarse, woollen cloth with a long nap and is commonly dyed green or red. It is now also made of cotton. The manufacture is said to have been introduced into England in the 16th century by refugees from France and the Netherlands. It is used chiefly for curtains, linings, &c., and sometimes, in the lighter makes, for clothing. *Table baize* is a kind of oilcloth used as a cheap and easily-cleaned covering for tables.

BAJOCIAN, in geology, the name proposed in 1849 by d'Orbigny for the rocks of Middle Jurassic age which are well developed in the neighbourhood of Bayeux, Calvados. The Bajocian stage is practically equivalent to the Inferior Oolite of British geologists. It corresponds fairly closely with the Lower and Middle Brown Jura of Quenstedt, and with the Dogger of Oppel. By means of the fossil ammonites the Bajocia strata have been subdivided into the following zones, in descending order:—

Zone of *Parkinsonia Parkinsoni* and *Cosmoceras garantianum*
" *Coeloceras subcoronatum* (*Humphriesianum*)
" *Sonninia Romani*
" *Stephaeoceras Sowerbyi*

" *Harpoceras concavum*
" " *Murchisonae* } = Substage Aalénien
" " *opalinum* } = of Mayer-Eymar.

[v.03 p.0226] It should be remarked that some European geologists prefer to include the *Parkinsonia* zone in the base of the overlying Bathonian (*q.v.*).

The Bajocian rocks of Europe are mostly limestones of various kinds, very frequently oolitic. At Bayeux, the type district, they are ferruginous oolites; in the Jura and Lorraine a coral limestone overlies a crinoidal variety; calcareous sandy and marly beds occur in Maine and Anjou; in Poitou the limestone is dolomitic and bears nodules of chert. Rocks of the same age, as recognized by their fossil contents, have a wide range; they are found in north Africa, Goa, Somaliland, German East Africa, and north-west Madagascar; through southern Europe they may be followed into Turkestan, and the Kota-Maleri beds of the Upper Gondwana series of India may possibly belong to this stage. In South America they appear in Bolivia, Chile and Argentina; in North America, in British Columbia, Dakota, Mexico, Oregon and California. The Bajocian sea also included parts of New South Wales, New Zealand (Flag Hills beds?), Borneo and Japan, and it extended into the polar region of eastern Greenland and Franz Josef Land.

In addition to the ammonites already mentioned, the large belemnites (*Megateuthis giganteus*) and terebratulas (*T. perovalis*) are worthy of notice; crinoids and corals were abundant, and so also were certain forms of *Trigonia* (*T. costata*), *Pleurotomaria* and *Cidaris*.

See JURASSIC; also A. de Lapparent, *Traité de géologie*, vol. ii. (5th ed., 1906); and H. B. Woodward, "The Jurassic Rocks of Britain," vol. iv., 1894 (*Mem. Geol. Survey*); both works contain references to original papers.

(J. A. H.)

BAJOUR, or BAJAUR, a small district peopled by Pathan races of Afghan origin, in the North-West Frontier Province of India. It is about 45 m. long by 20. broad, and lies at a high level to the east of the Kunar valley, from which it is separated by a continuous line of rugged frontier hills, forming a barrier easily passable at one or two points. Across this barrier the old road from Kabul to India ran before the Khyber Pass was adopted as the main route. Bajour is inhabited almost exclusively by Tarkani (Tarkalanri) Pathans, sub-divided into Mamunds, Isazai, and Ismailzai, numbering together with a few Mohmands, Utmauzais, &c., about 100,000. To the south of Bajour is the wild mountain district of the Mohmands, a Pathan race. To the east, beyond the Panjkora river, are the hills of Swat, dominated by another Pathan race. To the north is an intervening watershed between Bajour and the small state of Dir; and it is over this watershed and through the valley of Dir that the new road from Malakand and the Punjab runs to Chitral. The drainage of Bajour flows eastwards, starting from the eastern slopes of the dividing ridge which overlooks the Kunar and terminating in the Panjkora river, so that the district lies on a slope tilting gradually downwards from the Kunar ridge to the Panjkora. Nawagai is the chief town of Bajour, and the khan of Nawagai is under British protection for the safeguarding of the Chitral road. Jandol, one of the northern valleys of Bajour, has ceased to be of political importance since the failure of its chief, Umra Khan, to appropriate to himself Bajour, Dir, and a great part of the Kunar valley. It was the active hostility between the amir of Kabul (who claimed sovereignty of the same districts) and Umra Khan that led, firstly to the demarcation agreement of 1893 which fixed the boundary of Afghanistan in Kunar; and, secondly, to the invasion of Chitral by Umra Khan (who was no party to the boundary settlement) and the siege of the Chitral fort in 1895.

An interesting feature in Bajour topography is a mountain spur from the Kunar range, which curving eastwards culminates in the well-known peak of Koh-i-Mor, which is visible from the Peshawar valley. It was here, at the foot of the mountain, that Alexander found the ancient city of Nysa and the Nysaean colony, traditionally said to have been founded by Dionysus. The Koh-i-Mor has been identified as the Meros of Arrian's history—the three-peaked mountain from which the god issued. It is also interesting to find that a section of the Kafir community of Kamdesh still claim the same Greek origin as did the Nysaeans; still chant hymns to the god who sprang from Gir Nysa (the mountain of Nysa); whilst they maintain that they originally migrated from the Swat country to their present habitat in the lower Bashgol. Long after Buddhism had spread to Chitral, Gilgit, Dir and Swat; whilst Ningrahar was still full of monasteries and temples, and the Peshawar valley was recognized as the seat of Buddhist learning, the Kafirs or Nysaeans held their own in Bajour and in the lower Kunar valley, where Buddhism apparently never prevailed. It is probable that the invader Baber (who has much to say about Bajour) fought them there in the early years of the 16th century, when on his way to found the Mogul dynasty of India centuries after Buddhism has been crushed in northern India by the destroyer Mahmud.

The Gazetteers and Reports of the Indian government contain nearly all the modern information available about Bajour. The autobiography of Baber (by Leyden and Erskine) gives interesting details about the country in the 16th century. For the connexion between the Kafirs and the ancient Nysaeans of Swat, see *R. G. S. Journal*, vol. vii., 1896.

(T. H. H.*)

BAJZA, JOSEPH (1804-1858), Hungarian poet and critic, was born at Szücsi in 1804. His earliest contributions were made to Kisfaludy's *Aurora*, a literary paper of which he was editor from 1830 to 1837. He also wrote largely in the *Kritische Blätter*, the *Athenaeum*, and the *Figyelmezö* or *Observer*. His criticisms on dramatic art were considered the best of these miscellaneous writings. In 1830 he published translations of some foreign dramas, *Ausländische Bühna*, and in 1835 a collection of his own poems. In 1837 he was made director of the newly established national theatre at Pest. He then, for some years, devoted himself to historical writing, and published in succession the *Historical Library* (*Törtereti Könyvtár*), 6 vols., 1843-1845; the *Modern Plutarch* (*Uj Plutarch*), 1845-1847; and the *Universal History* (*Világtörétet*), 1847. These works are to some extent translations from German authors. In 1847 Bajza edited the journal of the opposition, *Ellenör*, at Leipzig, and in March 1848 Kossuth made him editor of his paper, *Kossuth Hirlapja*. In 1850 he was attacked with brain disease and died in 1858.

BAKALAI (BAKALÉ, BANGOUENS), a Bantu negroid tribe inhabiting a wide tract of French Congo between the river Ogowé and 2° S. They appear to be immigrants from the south-east, and have been supposed to be connected racially with the Galoa, one of the Mpongwe tribes and the chief river-people of the Ogowé. The Bakalai have suffered much from the incursions of their neighbours the Fang, also arrivals from the south-east, and it may be that they migrated to their present abode under pressure from this people at an earlier date. They are keen hunters and were traders in slaves and rubber; the slave traffic has been prohibited by the French authorities. Their women display considerable ingenuity in dressing their hair, often taking a whole day to arrange a coiffure; the hair is built up on a substructure of clay and a good deal of false hair incorporated; a coat of red, green or yellow pigment often completes the effect. The same colours are used to decorate the hut doors. The villages, some of which are fortified with palisades, are usually very dirty; chiefs and rich men own plantations which are situated at some distance from the village and to which their womenfolk are sent in times of war. The Bakalai of Lake Isanga cremate their dead; those of the Upper Ogowé throw the bodies into the river, with the exception of those killed in war. The body of a chief is placed secretly in a hut erected in the depths of the forest, and the village is deserted for that night, in some cases altogether; the slaves of the deceased are (or were) sacrificed, and his wives scourged and secluded in huts for a week. "Natural" deaths are attributed to the machinations of a sorcerer, and the poison-ordeal is often practised. Of their social organization little is known, but it appears that nearly all individuals refrain from eating the flesh of some particular animal.

BAKE, JAN (1787-1864), Dutch philologist and critic, was born at Leiden on the 1st of September 1787, and from 1817 to 1854 he was professor of Greek and Roman literature at the university. He died on the 26th of March 1864. His principal works are:—*Posidonii Rhodii Reliquiae Doctrinae* (1810); *Cleomedis Circularis Doctrina de Sublimitate* (1820); *Bibliotheca Critica Nova* (1825-1831) and *Scholica Hypomnemata* (1837-1862), a collection of essays dealing mainly with Cicero and the Attic orators; Cicero, *De Legibus* (1842) and *De Oratore* (1863); the *Rhetorica* of Apsines and Longinus (1849).

[v.03 p.0227]

His biography was written (in Dutch) by his pupil Bakhuizen van der Brink (1865); for an appreciation of his services to classical literature see L. Müller, *Geschichte der klassischen Philologie in den Niederlanden* (1869).

BAKER, SIR BENJAMIN (1840-1907), English engineer, was born near Bath in 1840, and, after receiving his early training in a South Wales ironworks, became associated with Sir John Fowler in London. He took part in the construction of the Metropolitan railway (London), and in designing the cylindrical vessel in which Cleopatra's Needle, now standing on the Thames Embankment, London, was brought over from Egypt to England in 1877-1878. By this time he had already made himself an authority on bridge-construction, and shortly afterwards he was engaged on the work which made his reputation with the general public—the design and erection of the Forth Bridge. On the completion of this undertaking in 1890 he was made K.C.M.G., and in the same year the Royal Society recognized his scientific attainments by electing him one of its fellows. Twelve years later at the formal opening of the Assuan dam, for which he was consulting-engineer, he was created K.C.B. Sir Benjamin Baker, who also had a large share in the introduction of the system widely adopted in London of constructing intra-urban railways in deep tubular tunnels built up of cast iron segments, obtained an extremely large professional practice, ranging over almost every branch of civil engineering, and was more or less directly concerned with most of the great engineering achievements of his day. He was also the author of many papers on engineering subjects. He died at Pangbourne, Berks, on the 19th of May 1907.

BAKER, HENRY (1698-1774), English naturalist, was born in London on the 8th of May 1698. After serving an apprenticeship with a bookseller, he devised a system of instructing the deaf and dumb, by the practice of which he made a considerable fortune. It brought him to the notice of Daniel Defoe, whose youngest daughter Sophia he married in 1729. A year before, under the name of Henry Stonecastle, he was associated with Defoe in starting the *Universal Spectator and Weekly Journal*. In 1740 he was elected fellow of the Society of Antiquaries and of the Royal Society. He contributed many memoirs to the *Transactions* of the latter society, and in 1744 received the Copley gold medal for microscopical observations on the crystallization of saline particles. He was one of the founders of the Society of Arts in 1754, and for some time acted as its secretary. He died in London on the 25th of November 1774. Among his publications were *The Microscope made Easy* (1743), *Employment for the Microscope* (1753), and several volumes of verse, original and translated, including *The Universe, a Poem intended to restrain the Pride of Man* (1727). His name is perpetuated by the Bakerian lecture of the Royal Society, for the foundation of which he left by will the sum of £100.

BAKER, SIR RICHARD (1568-1644/5), author of the *Chronicle of the Kings of England* and other works, was probably born at Sissinghurst in Kent, and entered Hart Hall, Oxford, as a commoner in 1584. He left the university without taking a degree, studied law in London and afterwards travelled in Europe. In 1593 he was chosen member of parliament for Arundel, in 1594 his university conferred upon him the degree of M.A., and in 1597 he was elected to parliament as the representative of East Grinstead. In 1603 he was knighted by King James I., in 1620 he acted as high sheriff at Oxfordshire where he owned some property, and soon afterwards he married Margaret, daughter of Sir George Mainwaring, of Ightfield, Shropshire. By making himself responsible for some debts of his wife's family, he was reduced to great poverty, which led to the seizure of his Oxfordshire property in 1625. Quite penniless, he took refuge in the Fleet prison in 1635, and was still in confinement when he died on the 18th of February 1644 (1645). He was buried in the church of St Bride, Fleet Street, London.

During his imprisonment Baker spent his time mainly in writing. His chief work is the *Chronicle of the Kings of England from the Time of the Romans' Government unto the Death of King James* (1643, and many subsequent editions). It was translated into Dutch in 1649, and was continued down to 1658 by Edward Phillips, a nephew of John Milton. For many years the *Chronicle* was extremely popular, but owing to numerous inaccuracies its historical value is very slight. Baker also wrote *Cato Variegatus* or *Catoes Morall Distichs, Translated and Paraphrased by Sir Richard Baker, Knight* (London, 1636); *Meditations on the Lord's Prayer* (1637); *Translation of New Epistles by Moonsieur D'Balzac* (1638); *Apologie for Laymen's Writing in Divinity, with a Short Meditation upon the Fall of Lucifer* (1641); *Motives for Prayer upon the seaven dayes of ye weeke* (1642); a translation of Malvezzi's *Discourses upon Cornelius Tacitus* (1642), and *Theatrum Redivivum, or The Theatre Vindicated*, a reply to the *Histrio-Mastix* of William Prynne (1642). He also wrote *Meditations* upon several of the psalms of David, which have been collected and edited by A. B. Grosart (London, 1882).

See J. Granger, *Biographical History of England to the Revolution* (London, 1804); *Biographia Britannica*, corrected by A. Kippis (London, 1778-1793).

BAKER, SIR SAMUEL WHITE (1821-1893), English explorer, was born in London on the 8th of June 1821. He was educated partly in England and partly in Germany. His father, a West India merchant, destined him for a commercial career, but a short experience of office work proved him to be entirely unsuited to such a life. On the 3rd of August 1843 he married Henrietta Biddulph Martin, daughter of the rector of Maisemore, Gloucestershire, and after two years in Mauritius the desire for travel took him in 1846 to Ceylon, where in the following year he founded an agricultural settlement at Nuwara Eliya, a mountain health-resort. Aided by his brother, he brought emigrants thither from England, together with choice breeds of cattle, and before long the new settlement was a success. During his residence in Ceylon he published, as a result of many adventurous hunting expeditions, *The Rifle and the Hound in Ceylon* (1853), and two years later *Eight Years' Wanderings in Ceylon* (1855). After a journey to Constantinople and the Crimea in 1856, he found an outlet for his restless energy by undertaking the supervision of the construction of a railway across the Dobrudja, connecting the Danube with the Black Sea. After its completion he spent some months in a tour in south-eastern Europe and Asia Minor. It was during this time that he met in Hungary the lady who (in 1860) became his second wife, Florence, daughter of Finnian von Sass, his first wife having died in 1855. In March 1861 he started upon his first tour of exploration in central Africa. This, in his own words, was undertaken "to discover the sources of the Nile, with the hope of meeting the East African expedition under Captains Speke and Grant somewhere about the Victoria Lake." After a year spent on the Sudan-Abyssinian border, during which time he learnt Arabic, explored the Atbara and other Nile tributaries, and proved that the Nile sediment came from Abyssinia, he arrived at Khartum, leaving that city in December 1862 to follow up the course of the White Nile. Two months later at Gondokoro he met Speke and Grant, who, after discovering the source of the Nile, were following the river to Egypt. Their success made him fear that there was nothing left for his own expedition to accomplish; but the two explorers generously gave him information which enabled him, after separating from them, to achieve the discovery of Albert Nyanza, of whose existence credible assurance had already been given to Speke and Grant. Baker first sighted the lake on the 14th of March 1864. After some time spent in the exploration of the neighbourhood, during which Baker demonstrated that the Nile flowed through the Albert Nyanza—of whose size he formed an exaggerated idea—he started upon his return journey, and reached Khartum after many checks in May 1865. In the following October he returned to England with his wife, who had accompanied him throughout the whole of the perilous and arduous journey. In recognition of the achievements by which Baker had indissolubly linked his name with the solution of the problem of the Nile sources, the Royal Geographical Society awarded him its gold medal, and a similar distinction was bestowed on him by the Paris Geographical Society. In August 1866 he was knighted. In the same year he published *The Albert N'yanza, Great Basin of the Nile, and Explorations of the Nile Sources*, and in 1867 *The Nile Tributaries of Abyssinia*, both books quickly going through several editions. In 1868 he published a popular story called *Cast up by the Sea*. In 1869 he attended the prince of Wales, afterwards King Edward VII., in a tour through Egypt. In the same year, at the request of the khedive Ismail, Baker undertook the command of a military expedition to the equatorial regions of the Nile, with the object of suppressing the slave-trade there and opening the way to commerce and civilization. Before starting from Cairo with a force of 1700 Egyptian troops—many of them discharged convicts—he was given the rank of pasha and major-general in the Ottoman army. Lady Baker, as before, accompanied him. The khedive appointed him governor-general of the new territory for four years at a salary of £10,000 a year; and it was not until the expiration of that time that Baker returned to Cairo, leaving his work to be carried on by the new governor, Colonel Charles George Gordon. He had to contend with innumerable difficulties—the blocking of the river by sudd, the bitter hostility of officials interested in the slave-trade, the armed opposition of the natives—but he succeeded in planting in the new territory the foundations upon which others could build up an administration. He returned to England with his wife in 1874, and in the following year purchased the estate of Sandford Orleigh in South Devon, where he made his home for the rest of his life. He published his narrative of the central African expedition under the title of *Ismailia* (1874). *Cyprus as I saw it in 1879*

was the result of a visit to that island. He spent several winters in Egypt, and travelled in India, the Rocky Mountains and Japan in search of big game, publishing in 1890 *Wild Beasts and their Ways*. He kept up an exhaustive and vigorous correspondence with men of all shades of opinion upon Egyptian affairs, strongly opposing the abandonment of the Sudan and subsequently urging its reconquest. Next to these, questions of maritime defence and strategy chiefly attracted him in his later years. He died at Sandford Orleigh on the 30th of December 1893.

See, besides his own writings, *Sir Samuel Baker, a Memoir*, by T. Douglas Murray and A. Silva White (London, 1895).

BAKER, THOMAS (1656-1740), English antiquary, was born on the 14th of September 1656 at Lanchester, Durham. He was the grandson of Colonel Baker of Crook, Durham, who won fame in the civil war by his defence of Newcastle against the Scots. He was educated at the free school at Durham, and proceeded thence in 1672 to St John's College, Cambridge, where he afterwards obtained a fellowship. Lord Crew, bishop of Durham, collated him to the rectory of Long-Newton in his diocese in 1687, and intended to give him that of Sedgefield with a prebend had not Baker incurred his displeasure by refusing to read James II.'s Declaration of Indulgence. The bishop who disgraced him for this refusal, and who was afterwards specially excepted from William's Act of Indemnity, took the oaths to that king and kept his bishopric till his death. Baker, on the other hand, though he had opposed James, refused to take the oaths to William; he resigned Long-Newton on the 1st of August 1690, and retired to St John's, in which he was protected till the 20th of January 1716-1717, when he and one-and-twenty others were deprived of their fellowships. After the passing of the Registering Act in 1723, he could not be prevailed on to comply with its requirements by registering his annuity of £40, although that annuity, left him by his father, with £20 per annum from his elder brother's collieries, was now his whole subsistence. He retained a lively sense of the injuries he had suffered; and inscribed himself in all his own books, as well as in those which he gave to the college library, *socius ejectus*, and in some *rector ejectus*. He continued to reside in the college as commoner-master till his sudden death from apoplexy on the 2nd of July 1740. The whole of his valuable books and manuscripts he bequeathed to the university. The only works he published were, *Reflections on Learning, showing the Insufficiency thereof in its several particulars, in order to evince the usefulness and necessity of Revelation* (Lond., 1709-1710) and the preface to Bishop Fisher's *Funeral Sermon for Margaret, Countess of Richmond and Derby* (1708)—both without his name. His valuable manuscript collections relative to the history and antiquities of the university of Cambridge, amounting to thirty-nine volumes in folio and three in quarto, are divided between the British Museum and the public library at Cambridge,—the former possessing twenty-three volumes, the latter sixteen in folio and three in quarto.

The life of Baker was written by Robert Masters (Camb., 1784), and by Horace Walpole in the quarto edition of his works.

BAKER, VALENTINE [Baker Pasha] (1827-1887), British soldier, was a younger brother of Sir Samuel Baker (*q.v.*). He was educated at Gloucester and in Ceylon, and in 1848 entered the Ceylon Rifles as an ensign. Soon transferred to the 12th Lancers, he saw active service with that regiment in the Kaffir war of 1852-53. In the Crimean War Baker was present at the action of Traktir (or Tchernaya) and at the fall of Sevastopol, and in 1859 he became major in the 10th Hussars, succeeding only a year later to the command. This position he held for thirteen years, during which period the highest efficiency of his men was reached, and outside the regiment he did good service to his arm by his writings. He went through the wars of 1866 and 1870 as a spectator with the German armies, and in 1873 he started upon a famous journey through Khorassan. Though he was unable to reach Khiva the results of the journey afforded a great deal of political, geographical and military information, especially as to the advance of Russia in central Asia. In 1874 he was back in England and took up a staff appointment at Aldershot. Less than a year later Colonel Baker's career in the British army came to an untimely end. He was arrested on a charge of indecent assault upon a young woman in a railway carriage, and was sentenced to a year's imprisonment and a fine. His dismissal from the service was an inevitable consequence; it must be stated, however, that the view taken of the circumstances by good authorities was that Baker's conduct, when judged by conventional standards, admitted of considerable extenuation. He himself never opened his mouth in self-defence. Two years later, having meanwhile left England, he entered the service of Turkey in the war with Russia. At first in a high position in the gendarmerie, he was soon transferred to Mehemet's staff, and thence took over the command of a division of infantry. With this division Baker sustained the brilliant rearguard action of Tashkessan against the troops of Gourko. Promoted *Ferik* (lieutenant-general) for this feat, he continued to command Suleiman's rearguard with distinction. After the peace he was employed in an administrative post in Armenia, where he remained until 1882. In this year he was offered the command of the newly formed Egyptian army, which he accepted. On his arrival at Cairo, however, the offer was withdrawn and he only obtained the command of the Egyptian police. In this post he devoted by far the greater amount of his energy to the training of the gendarmerie, which he realized would be the reserve of the purely military forces.

When the Sudan War broke out, Baker, hastening with 3500 men to relieve Tokar, encountered the enemy under Osman Digna at El Teb. His men became panic-stricken at the first rush and allowed themselves to be slaughtered like sheep. Baker himself with a few of his officers succeeded by hard fighting in cutting a way out, but his force was annihilated. British troops soon afterwards arrived at Suakin, and Sir Gerald Graham took the offensive. Baker Pasha accompanied the British force, and guided it in its march to the scene of his defeat, and at the desperately-fought second battle of El Teb he was wounded. He remained in command of the Egyptian police until his death in 1887. Amongst his works may be mentioned *Our National Defences* (1860), *War in Bulgaria, a Narrative of Personal Experience* (London, 1879), *Clouds in the East* (London, 1876).

[v.03 p.0229]

BAKER CITY, a city and the county-seat of Baker county, Oregon, U.S.A., about 337 m. E. by S. of Portland. Pop. (1890) 2604; (1900) 6663 (1017 foreign-born); (1910) 6742. The city is served by the Oregon Railroad & Navigation Company, and by the Sumpter Valley railway, a short line (62 m.) extending from Baker City to Austin, Oregon. Baker City lies in the valley of Powder river, at the base of the Blue Mountains, and has an elevation of about 3440 ft. above the sea. It is the largest city in eastern Oregon, and is the centre of important mining, lumber, farming and live-stock interests. It was laid out as a town in 1865, became the county-seat in 1868, and was chartered as a city in 1874. The county and the city were named in honour of Edward Dickinson Baker (1811-1861), a political leader, orator and soldier, who was born in London, England, was taken to the United States in 1815, was a representative in Congress from Illinois in 1845-1846 and 1849-1851, served in the Mexican War as a colonel (1846-1847), became a prominent lawyer in California and later in Oregon, was a Republican member of the United States Senate in 1860-1861 and was killed at Ball's Bluff, Virginia, on the 21st of October in 1861, while serving as a colonel in the Federal army.

BAKEWELL, ROBERT (1725-1795) English agriculturist, was born at Dishley, Leicestershire, in 1725. His father, a farmer at the same place, died in 1760, and Robert Bakewell then took over the management of the estate. By visiting a large number of farms all over the country, he had already acquired a wide theoretical knowledge of agriculture and stock-breeding; and this knowledge he now put to practical use at Dishley. His main object was to improve the breed of sheep and oxen, and in this he was highly successful, his new Leicestershire breed of sheep attaining within little more than half a century an international reputation, while the Dishley cattle (also known as the new Leicestershire long-horn) became almost as famous. He extended his breeding experiments to horses, producing a new and particularly useful type of farm-horse. He was the first to establish the trade in ram-letting on a large scale, and founded the Dishley Society, the object of which was to ensure purity of breed. The value of his own stock was quickly recognized, and in one year he made 1200 guineas from the letting of a single ram. Bakewell's agricultural experiments were not confined to stock-breeding. His reputation stood high in every detail of farm-management, and as an improver of grass land by systematic irrigation he had no rival. He died on the 1st of October 1795.

BAKEWELL, ROBERT (1768-1843), English geologist, was born in 1768. He was an able observer, and deserving of mention as one of the earliest teachers of general and practical geology. His *Introduction to Geology* (1813) contained much sound information, and reached a fifth edition in 1838. The second edition was translated and published in Germany, and the third and fourth editions were reprinted in America by Professor Silliman of Yale College. Bakewell as author also of an *Introduction to Mineralogy* (1819), and of *Travels comprising Observations made during a Residence in the Tarentaise*, &c. (2 vols., 1823). He died at Hampstead on the 15th of August 1843.

BAKEWELL, a market-town in the western parliamentary division of Derbyshire, England, on the river Wye, 25 m. N.N.W. of Derby, on the Midland railway. Pop. of urban district (1901) 2850. The church of All Saints is mentioned in Domesday, and tradition ascribes the building of its nave to King John, while the western side of the tower must be older still. Within are some admirable specimens of encaustic tiles, and several monuments of the Vernon and Manners families; while an ancient runic rood-stone stands in the churchyard. Zinc and marble are worked in the neighbourhood. The cotton manufacture was established in the town by Sir Richard Arkwright. Bakewell is noted for a chalybeate spring, of use in cases of chronic rheumatism, and there are baths attached to it. A kind of jam-cake, called a "Bakewell pudding," gives another sort of fame to the place. The almshouses, known as St John's hospital, were founded in 1602; and in 1637 a free grammar school was endowed by Lady Grace Manners. Among modern buildings may be mentioned the Bakewell and High Peak Institute, and the town hall and museum. On Castle Hill, in the vicinity, are the remains of an earthwork, said to have been raised by Edward the Elder in 924. Within the parish are included the mansions of Burton Closes and Castle Hill. Two miles from the town, amidst beautiful gardens and meadows, is Haddon Hall. To the east lies the magnificent domain of Chatsworth. The scenery of the neighbourhood, in both the Wye and the Derwent valleys, is very beautiful; the village of Eyam (pronounced Eem) near the Derwent may be noticed as specially picturesque. The plague of 1665, carried hither from London, almost depopulated this village, and the name of the rector, William Mompesson, attracted wide notice on account of his brave attempts to combat the outbreak.

BAKHCHI-SARAI (Turk. for "garden-palace"), a town of Russia, in the government of Taurida, situated in a narrow gorge in the Crimea, 20 m. by rail S.S.W. of Simferopol. From the close of the 15th century down to 1783 it was the residence of the Tatar khans of the Crimea; and its streets wear a decidedly oriental look. The principal building, the palace, or *Khan-sarai*, was originally erected in 1519 by Abdul-Sahal-Ghirai, destroyed in 1736, and restored at Potemkin's command for the reception of Catherine II. Attached to it is a mausoleum, which contains the tombs of many of the khans. There are in the place no fewer then thirty-six mosques. The population consists for the most part of Tatars. Bakhchi-sarai manufactures morocco, sheepskin cloaks, agricultural implements, sabres and cutlery. Pop. (1897) 12,955. Two and a half miles to the east is Chufut-Kaleh (or Jews' city), formerly the chief seat of the Karaite Jews of the Crimea, situated on lofty and almost inaccessible cliffs; it is now deserted except by the rabbi. Between Bakhchi-sarai and Chufut-kaleh is the Uspenskiy monastery, clinging like a swallow's nest to the face of the cliffs, and the scene of a great pilgrimage on the 15th (29th) of August every year.

BAKHMUT, a town of Russia, in the government of Ekaterinoslav, near the river from which it derives its name, 136 m. E. of the town of Ekaterinoslav. It owed its origin in the latter half of the 17th century to the discovery of salt-springs, and now produces coal, salt, alabaster and quicksilver, and manufactures steel rails. Pop. (1897) 19,416.

BAKHTIÁRI, one of the great nomad tribes of Persia, whose camping-grounds are in the hilly district, known as the Bakhtiári province. This province extends from Chaharmahal (west of Isfahan) in the E., to near Shushter in the W., and separated from Luristan in the N. by the Dizful river (Ab i Diz), and in the S touches Behbahan and Ram Hormuz. The Bakhtiári are divided into the two great divisions Haft-lang and Chahar-lang, and a number of branches and clans, and were known until the 15th century as the "Great Lurs," the "Little Lurs" being the tribes settled in the district now known as Luristan, with Khorremábád as capital. According to popular tradition the Lurs originally came from Syria in the 10th century, but it is now held that they were in Persia long, perhaps fifteen centuries, before. They speak the Lur language, a Persian dialect. The Bakhtiári number about 38,000 or 40,000 families, under 200,000 souls, while the area of the district occupied by them is about 25,000 sq. m. In the middle of the 19th century they could put 20,000 well-equipped horsemen into the field, but in consequence of misrule and long-lasting feuds between the different branches, which the government often fostered, or even instigated, the district has become poor, and it would now be difficult to find 4000 horsemen. The province is under the governor-general of Arabistan, and pays a yearly tribute of about £5000. The chiefs of the Bakhtiári in 1897, having obtained the shah's permission for improving the road between Shushter or Ahvaz and Isfahan, an iron suspension bridge with a span of 120 ft. was erected over the Karun river at Gudár i Bulútek; another, with a span of 70 ft., over the Bázuft river at Pul i Amárat; and a stone bridge over the Karun at Do-pu-lán.

For accounts of the Bakhtiari see Mrs Bishop (Isabella Bird), *Journeys in Persia and Kurdistan* (London, 1893); C. de Bode, *Travels in Luristan* (London, 1841); Lord Curzon, *Persia and the Persian Question*, vol. ii. 283-303 (London, 1892); Sir H. Layard, *Early Adventures in Persia* (London, 1894).

(A. H.-S.)

[v.03 p.0230]

BAKING, the action of the verb "to bake," a word, in various forms, common to Teutonic languages (cf. Ger. *backen*), meaning to cook by dry heat. "Baking" is thus primarily applied to the process of preparing bread, and is also applied to the hardening by heat or "firing" of pottery, earthenware or bricks. (See Bread; Ceramics and Brick.)

BAKIS (*i.e.* "speaker," from βάζω), a general name for the inspired prophets and dispensers of oracles who flourished in Greece from the 8th to the 6th century B.C. Suidas mentions three: a Boeotian, an Arcadian and an Athenian. The first, who was the most famous, was said to have been inspired by the nymphs of the Corycian cave. His oracles, of which specimens are extant in Herodotus and Pausanias, were written in hexameter verse, and were considered to have been strikingly fulfilled. The Arcadian was said to have cured the women of Sparta of a fit of madness. Many of the oracles which were current under his name have been attributed to Onomacritus.

Herodotus viii. 20, 77, ix. 43; Pausanias iv. 27, ix. 17, x. 12; Schol. Aristoph. *Pax*, 1070; see Göttling, *Opuscula Academica* (1869).

BAKÓCZ, TAMÁS, Cardinal (1442-1521), Hungarian ecclesiastic and statesman, was the son of a wagoner, adopted by his uncle, who trained him for the priesthood and whom he succeeded as rector of Tétel (1480). Shortly afterwards he became one of the secretaries of King Matthias I., who made him bishop of Gyor and a member of the royal council (1490). Under Wladislaus II. (1490-1516) he became successively bishop of Eger, the richest of the Hungarian sees, archbishop of Esztergom (1497), cardinal (1500), and titular patriarch of Constantinople (1510). From 1490 to his death in 1521 he was the leading statesman of Hungary and mainly responsible for her foreign policy. It was solely through his efforts that Hungary did not accede to the league of Cambrai, was consistently friendly with Venice, and formed a family compact with the Habsburgs. He was also the only Magyar prelate who seriously aspired to the papal throne. In 1513, on the death of Julius II., he went to Rome for the express purpose of bringing about his own election as pope. He was received with more than princely pomp, and all but succeeded in his design, thanks to his extraordinary adroitness and the command of an almost unlimited bribing-fund. But Venice and the emperor played him false, and he failed. He returned to Hungary as papal legate, bringing with him the bull of Leo X. proclaiming a fresh crusade against the Turks. But the crusade degenerated into a *jacquerie* which ravaged the whole kingdom, and much discredited Bakócz. He lost some of his influence at first after the death of Wladislaus, but continued to be the guiding spirit at court, till age and infirmity confined him almost entirely to his house in the last three years of his life. Bakócz was a man of great ability but of no moral principle whatever. His whole life was a tissue of treachery. He was false to his benefactor Matthias, false to Matthias's son János Corvinus (*q.v.*), whom he chicaned out of the throne, and false to his accomplice in that transaction, Queen Beatrice. His rapacity disgusted even an age in which every one could be bought and sold. His attempt to incorporate the wealthy diocese of Transylvania with his own primatial province was one of the principal causes of the spread of the Reformation in Hungary. He left a fortune of many millions. His one redeeming feature was a love of art; his own cathedral was a veritable Pantheon.

See Vilmos Fraknoi, *Tamás Bakócz* (Hung.) (Budapest, 1889).

(R. N. B.)

BAKRI [Abū ʿUbaid ʿAbdallah ibn ʿAbd ul-ʿAzīz ul-Bakrī], (1040-1094), Arabian geographer, was born at Cordova. His best-known work is the dictionary of geographical names which occur in the poets, with an introduction on the seats of the Arabian tribes. This has been edited by F. Wüstenfeld (Göttingen, 1876-1877). Another of his works was a general

geography of the world, which exists in manuscript. The part referring to North Africa was edited by M^cG. de Slane (Algiers, 1857).

See C. Brockelmann's *Gesch. der Arab. Litteratur* (Weimar, 1898), vol. i. p. 476.

BAKU, a government of Russian Transcaucasia, stretching along the west coast of the Caspian Sea from 41° 50′ to 38° 30′ N. lat., and bounded on the W. by the government of Elisavetpol and the province of Daghestan, and on the S. by Persia. It includes the Kuba plain on the north-east slope of the Caucasus; the eastern extremity of that range from the Shad-dagh (13,960 ft.) and the Bazardyuz (14,727 ft.) to the Caspian, where it terminates in the Apsheron peninsula; the steppes of the lower Kura and Aras on the south of the Caucasus, and a narrow coast-belt between the Anti-Caucasus and the Caspian. The last-mentioned region lies partly round the Kizil-agach Bay, opening to the south. Area of government, 15,172 sq. m. Both slopes of the Caucasus are very fertile and well irrigated, with fine forests, fields of rice and other cereals, and flourishing gardens. The steppes of the Kura are also fertile, but require artificial irrigation, especially for cotton. In addition to agriculture and cattle-breeding, the vine and mulberry are extensively grown. The Apsheron peninsula is dry and bare of vegetation; but within it are situated the famous petroleum wells of Baku. These, which go down to depths of 700 to 1700 ft., yield crude naphtha, from which the petroleum or kerosene is distilled; while the heavier residue (*mazut*) is used as lubricating oil and for fuel, for instance in the locomotives of the Transcaspian railway. Whereas in 1863 the output was only 5500 tons of crude naphtha, in 1904 it amounted to 9,833,600 tons; but business was much injured by a serious fire in 1905. The oil-fields lie around the town of Baku: the largest, that of Balakhany-Sabunchi-Romany (6 sq. m.), is 8½ m. north of the town; that of Bibi-Eybat, is 3½ m. south; the "black town" (Nobel's) is 2 m. south-east; and beyond the last names is the "white town" (Rothschild's). The lighter oil is conveyed to Batum on the Black Sea in pipes, and is there shipped for export; the heavier oils reach the same port and the ports of Novorossiysk and Poti, also on the Black Sea, in tank railway-cars. At Surakhani, 13 m. east of the town, is the now disused temple of the Parsee fire-worshippers, who were attracted thither by the natural fountains of inflammable gas.

The government is divided into six districts, the chief towns of which are Baku (the capital of the government), Geok-chai (pop. 2247 in 1897), Kuba (15,346), Lenkoran (8768), Salyany (10,168), in district of Jevat, and Shemakha (20,008). The population numbered 828,511 in 1897, of whom the major part were Tatars; other races were Russians, the Iranian tribes of the Tates (89,519) and Talysh (34,994), Armenians (52,233) and the Caucasian mountaineers known as Kurins.

BAKU, the chief town of the government of the same name, in Russian Transcaucasia, on the south side of the peninsula of Apsheron, in 40° 21′ N. and 49° 50′ E. It is connected by rail with the south Russian railway system at Beslan, the junction for Vladikavkaz (400 m.), via Derbent and Petrovsk, with Batum (560 m.) and Poti (536 m.) on the Black Sea via Tiflis. A long stone quay next the harbour is backed by the new town climbing up the slopes behind. To the west is the old town, consisting of steep, narrow, winding streets, and presenting a decidedly oriental appearance. Here are the ruins of a palace of the native khans, built in the 16th century; the mosques of the Persian shahs, built in 1078 and now converted into an arsenal; nearer the sea the "maidens' tower," transformed into a lighthouse; and not far from it remains of ancient walls projecting above the sea, and showing traces of Arabic architecture of the 9th and 10th centuries. Beside the harbour are engineering works, dry docks and barracks, stores and workshops belonging to the Russian Caspian fleet. Besides the petroleum refineries the town possesses oil-works (for fuel), flour-mills, sulphuric acid works and tobacco factories. Owing to its excellent harbour Baku is a chief depot for merchandise coming from Persia and Transcaspia—raw cotton, silk, rice, wine, fish, dried fruit and timber—and for Russian manufactured goods. The climate is extreme, the mean temperature for the year being 58° F., for January 38°, for July 80°; annual rainfall 9.4 in. A wind of exceptional violence blows sometimes from the N.N.W. in winter. Pop. (1860) 13,381; (1897) 112,253; (1900) 179,133. The town is mentioned by the Arab geographer, Masudi, in the 10th century. From 1509 it was in the possession of the Persians. The Russians captured it from them in 1723, but restored it in 1735; it was incorporated in the Russian empire in 1806. In
[v.03 p.0231]
1904-1905, in consequence of the general political anarchy, serious conflicts took place here between the Tatars and the Armenians, and two-thirds of the Balakhani and Bibi-Eybat oil-works were burned.

See Marvin, *The Region of the Eternal Fire* (ed. 1891) and J. D. Henry, *Baku, an Eventful History* (1906).

(P. A. K.)

BAKUNIN, MIKHAIL (1814-1876), Russian anarchist, was born of an aristocratic family at Torjok, in the government of Tver, in 1814. As an officer of the Imperial Guard, he saw service in Poland, but resigned his commission from a disgust of despotism aroused by witnessing the repressive methods employed against the Poles. He proceeded to Germany, studied Hegel, and soon got into touch with the leaders of the young German movement in Berlin. Thence he went to Paris, where he met Proudhon and George Sand, and also made the acquaintance of the chief Polish exiles. From Paris he journeyed to Switzerland, where he resided for some time, taking an active share in all socialistic movements. While in Switzerland he was ordered by the Russian government to return to Russia, and on his refusal his property was confiscated. In 1848, on his return to Paris, he published a violent tirade against Russia, which caused his expulsion from France. The revolutionary movement of 1848 gave him the opportunity of entering upon a violent campaign of democratic agitation, and for his participation in the Dresden insurrection of 1849 he was arrested and condemned to death. The death sentence, however, was commuted to imprisonment for life, and he was eventually handed over to the Russian authorities, by whom he was imprisoned and finally sent to eastern Siberia in 1855. He received permission to remove to the Amur region, whence he succeeded in escaping, making his way through Japan and the United States to England in 1861. He spent the rest of his life in exile in western Europe, principally in Switzerland. In 1869 he founded the Social Democratic Alliance, which, however, dissolved in the same year, and joined the International (*q.v.*). In 1870 he attempted a rising at Lyons on the principles afterwards exemplified by the Paris Commune. At the Hague congress of the International in 1872 he was outvoted and expelled by the Marx party. He retired to Lugano in 1873 and died at Bern on the 13th of June 1876.

Nothing can be clearer or more frank and comprehensive in its destructiveness than the revolutionary anarchism of Bakunin. He rejects all the ideal systems in every name and shape, from the idea of God downwards; and every form of external authority, whether emanating from the will of a sovereign or from universal suffrage. "The liberty of man," he says in his *Dieu et l'État* (published posthumously in 1882) "consists solely in this, that he obeys the laws of nature, because he has himself recognized them as such, and not because they have been imposed upon him externally by any foreign will whatsoever, human or divine, collective or individual." In this way will the whole problem of freedom be solved, that natural laws be ascertained by scientific discovery, and the knowledge of them be universally diffused among the masses. Natural laws being thus recognized by every man for himself, he cannot but obey them, for they are the laws also of his own nature; and the need for political organization, administration and legislation will at once disappear. Nor will he admit of any privileged position or class, for "it is the peculiarity of privilege and of every privileged position to kill the intellect and heart of man. The privileged man, whether he be privileged politically or economically, is a man depraved in intellect and heart." "In a word, we object to all legislation, all authority, and all influence, privileged, patented, official and legal, even when it has proceeded from universal suffrage, convinced that it must always turn to the profit of a dominating and exploiting minority, against the interests of the immense majority enslaved." Bakunin's methods of realizing his revolutionary programme are not less frank and destructive than his principles. The revolutionist, as he would recommend him to be, is a consecrated man, who will allow no private interests or feelings, and no scruples of religion, patriotism or morality, to turn him aside from his mission, the aim of which is by all available means to overturn the existing society. (See Anarchism.)

BA-KWIRI, a Bantu nation of German Cameroon, West Africa. According to tradition they are migrants from the eastward. The "Brushmen," for that is the meaning of their name, are grouped in about sixty separate clans. They are a lively intelligent people, brave fighters and daring hunters, and in their love of songs, music and elocution are superior to many negro races. Their domestic affections are strongly developed. Their chief physical peculiarity is the great disparity between the size and complexion of the sexes, most of the women being much shorter and far lighter in colour than the men. The Ba-Kwiri are generous and open-handed among themselves; but the law of blood for blood is mercilessly fulfilled, even in cases of accidental homicide. Their religion is ancestor-worship blended with witchcraft and magic. They

believe in good and evil spirits, those of the forests and seas being especially feared. In common with their neighbours the Dualla (*q.v.*) the Ba-Kwiri possess a curious drum language. By drum-tapping news is conveyed from clan to clan. Slaves and women are not allowed to master this language, but all the initiated are bound to repeat it so as to pass the messages on. The Ba-Kwiri have also a horn language peculiar to themselves.

BALA, a market-town and urban district of Merionethshire, N. Wales, at the north end of Bala Lake, 17 m. N.E. of Dolgelley (Dolgellau). Pop. (1901) 1554. It is little more than one wide street. Its manufactures are flannel, stockings, gloves and hosiery (for which it was well known in the 18th century). The Tower of Bala (some 30 ft. high by 50 diameter) is a tumulus or "moat-hill," formerly thought to mark the site of a Roman camp. The theological college of the Calvinistic Methodists and the grammar school (endowed), which was founded in 1712, are the chief features, together with the statue of the Rev. Thomas Charles, the distinguished theological writer, to whom was largely due the foundation of the British and Foreign Bible Society. Bala Lake, the largest in Wales (4 m. long by some ¾ m. wide), is subject to sudden and dangerous floods, deep and clear, and full of pike, perch, trout, eel and *gwyniad*. The *gwyniad* (Caregonus) is peculiar to certain waters, as those of Bala Lake, and is fully described by Thomas Pennant in his *Zoology* (1776).

The lake (*Llyn Tegid*) is crossed by the Dee, local tradition having it that the waters of the two never mix, like those of Alpheus and the sea.

BALAAM (בִּלְעָם Bil'am; Βαλαάμ; Vg. *Balaam*; the etymology of the name is uncertain), a prophet in the Bible. Balaam, the son of Beor, was a Gentile seer; he appears in the history of the Israelites during their sojourn in the plains of Moab, east of Jordan, at the close of the Forty Years' wandering, shortly before the death of Moses and the crossing of the Jordan. Israel had conquered two kings of eastern Palestine—Sihon, king of the Amorites, and Og, king of Bashan. Balak, king of Moab, became alarmed, and sent for Balaam to curse Israel; Balaam came after some hesitation, but when he sought to curse Israel Yahweh compelled him to bless them.

The main passage concerning Balaam in Num. xxii-xxv.; it consists of a narrative which serves as a framework for seven oracular poems, the first four being of some length and the last three very brief. The story is doubtless based on ancient traditions, current in various forms; the Old Testament references are not wholly consistent.

The narrative in Num. xxii. ff. is held to be compiled with editorial additions from the two ancient documents (900-700 B.C.) commonly denoted by the symbols **J** and **E** The distribution of the material between the two documents is uncertain; but some such scheme as the following is not improbable. The references to portions the origin of which is especially uncertain are placed in brackets ( ).

The present narrative, therefore, is not really a single continuous story, but may be resolved into two older accounts. In combining these two and using them as a framework for the poems, the compilers have altered, added and omitted. Naturally, when both documents made statements which were nearly identical, one might be omitted; so that neither
[v.03 p.0232]
account need be given in full in the composite passage. The two older accounts, as far as they are given here, may have run somewhat thus: restorations of supposed omissions are given in square brackets [ ].

(*i*) **J**. xxii. 3*b*-5*a* to "Beor" (5*c* to "to the land"—7, 11, 17, 18). Balak, king of Moab, alarmed at the Israelite conquests, sends *elders* of Moab and Midian to Balaam, son of Beor, to the land of *Ammon*, to induce him to come and curse Israel. He sends back word that he can only do what Yahweh commands.

The land of *Ammon*. The current Hebrew Text has the land of *ammo*, *i.e.* as EV, "his people," but *Ammon* is read by the Samaritan Pentateuch, the Syriac and Vulgate Versions and some Hebrew MSS., and is accepted by many modern scholars.

xxii. 22-35*a* to "Balaam," also "Go" and "So Balaam went." Nevertheless Balaam sets out with two servants to go to Balak, but the Angel of Yahweh meets him. At first the Angel is seen only by the ass, which arouses Balaam's anger by its efforts to avoid the Angel. The ass is miraculously enabled to speak to Balaam. Yahweh at last enables Balaam to see the Angel, who tells him that he would have slain him but for the ass. Balaam offers to go back, but is told to go on.

Speaking animals are a common feature of folk-lore; the only other case in the Old Testament is the serpent in Eden. Maimonides suggested that the episode of the Angel and the conversation with the ass is an account of a vision; similar views have been held by E. W. Hengstenberg and other Christian scholars. Others, *e.g.* Volck in Hauck's *Realencyklopadie* (s. "Bileam"), regard the statements about the ass speaking as figurative; the ass brayed, and Balaam translated the sound into words. The ordinary literal interpretation is more probable; but it does not follow that the authors of the Pentateuch intended the story to be taken as historical in its details. It need hardly be said that the exact accuracy of such narratives is not an essential part of the Christian faith; no such doctrine is laid down by the creeds and confessions.

xxii. 36, 39, xxiv. 1, 2, 10-14, 25. Balak meets Balaam and they go together [and offer sacrifices]; Balaam, however, blesses Israel by divine inspiration; Balak remonstrates, but Balaam reminds him of his message and again blesses Israel. Then Balaam goes home. (For the relation of the poems to **J**'s narrative, see below.)

(ii.) **E**. xxii. 2, 3*a*, 5*b* "to Pethor, which is by the river," 8-10, 12-16, 19-21, 37*a*, to "unto me," 38. Balak, king of Moab, alarmed at the conquests of Israel, sends the princes of Moab to Balaam at *Pethor* on the Euphrates, that he may come and curse Israel.

A. Jeremias, *Das Alte Testament im Lichte des alten Orients*, p. 278, adopts Marquart's view that the "River" (*nahar*) is the so-called "River" (better "Ravine" *nahal*) of Egypt or Musri, on the southern frontier of Judea. So too Winckler, in the new edition of E. Schrader's *Die Keilinschriften und das Alte Testament*. It has been usual to keep *nahar* and take it in its ordinary sense when used absolutely, *i.e.* the Euphrates, and to identify *Pethor* with a *Pitru* on a tributary of the Euphrates, mentioned in an inscription of Shalmaneser II. Deut. xxiii. 4 places Pethor in Mesopotamia.

God appears to him in a dream and forbids him to go. The princes return and report to Balak, who sends them back to put further pressure on Balaam. God in another dream permits him to go, on condition that he speaks what God tells him. He goes with the *princes of Moab*. Balak meets them, and Balaam warns him that he can only speak what God tells him.

xxii. 40, 41, xxiii. 1-6, 11-17. Balak offers sacrifices, but Yahweh inspires Balaam with a blessing on Israel. Balak remonstrates and Balaam explains. They try to get a more favourable result by sacrificing on a different spot, and by placing Balaam on the top of Pisgah to view Israel, but he is again compelled to bless Israel. After further remonstrances and explanations [Balaam goes home]. (For the relation of the poems to **E**'s narrative, see below.)

Deut. xxiii. 3-6[1] summarizes **E**'s account of this incident, adding, however, the feature that the Ammonites were associated with the Moabites, possibly an imperfect reminiscence of the reference to Ammon in **J**. Joshua, in his farewell speech to the Israelites,[2] also refers to this episode. The Priestly Code[3] has a different story of Balaam, in which he advises the *Midianites* how they may bring disaster on Israel by seducing the people from their loyalty to Yahweh. Later on he is slain in battle, fighting in the ranks of Midian.

It is often supposed that the name of the king of Edom,[4] Bela, son of Beor, is a corruption of Balaam, and that, therefore, one form of the tradition made him a king of Edom.

The *Poems* fall into two groups: the first four, in xxiii. 1.-xxiv. 19, are commonly regarded as ancient lyrics of the early monarchy, perhaps in the time of David or Solomon, which **J** and **E** inserted in their narrative. Some recent critics,[5] however, are inclined to place them in the post-exilic period, in which case a late editor has substituted them for earlier, probably less edifying, oracles. But the features which are held to indicate late date may be due to editorial revision.

The first two are found in an **E** setting, and therefore, if ancient, formed part of **E**.

The *First*, xxiii. 7-10, prophesies the unique exaltation of Israel, and its countless numbers.

The *Second*, xxiii. 18-24, celebrates the moral virtue of Israel, the monarchy and its conquests.

Again the second couple are connected with **J**.

The *Third*, xxiv. 3-9, also celebrates the glory and conquests of the monarchy.

Agag, in verse 7, can hardly be the Amalekite king of 1 Sam. xv.; Amalek was too small and obscure. The Septuagint and other Greek Versions and Sam. Pent, have *Gog*, which would imply a post-exilic date, cf. Ezek. xxxix. Probably both Agag and Gog are textual corruptions. *Og* has been suggested, but does not seem a great improvement.

The *Fourth*, xxiv. 14-19, announces the coming of a king, possibly David, who shall conquer Edom and Moab.

The remaining poems are usually regarded as later additions; thus the *Oxford Hexateuch* on Num. xxiv. 20-24. "The three concluding oracles seem irrelevant here, being concerned neither with Israel nor Moab. It has been thought that they were added to bring the cycle up to seven."

The *Fifth*, xxiv. 20, deals with the ruin of Amalek. It is of uncertain date; if the historical Amalek is meant, it may be early; but Amalek may be symbolical.

The *Sixth*, xxiv. 21 f., deals with the destruction of the Kenite state by Assyria; also of uncertain date, Assyria being, according to some, the ancient realm of Nineveh, according to others the Seleucid kingdom of Syria, which was also called Assyria.

The *Seventh*, xxiv. 23 f., speaks of the coming of ships from the West, to attack Assur and "Eber"; it may refer to the conquest of Persia by Alexander the Great. An interesting, but doubtful, emendation makes this poem describe the ruin of Shamal, a state in N. W. Syria.

In the New Testament Balaam is cited as a type of avarice;[6] in Rev. ii. 14 we read of false teachers at Pergamum who held the "teaching of Balaam, who taught Balak to cast a stumbling-block before the children of Israel, to eat things sacrificed to idols, and to commit fornication."

Balaam has attracted much interest, alike from Jews, Christians and Mahommedans. Josephus[7] paraphrases the story *more suo*, and speaks of Balaam as the best prophet of his time, but with a disposition ill adapted to resist temptation. Philo describes him in the *Life of Moses* as a great magician; elsewhere[8] he speaks of "the sophist Balaam, being," *i.e.* symbolizing, "a vain crowd of contrary and warring opinions"; and again[9] as "a vain people"; both phrases being based on a mistaken etymology of the name Balaam. The later Targums and the Talmuds represent him as a typical sinner; and there are the usual worthless Rabbinical fables, *e.g.* that he was blind of one eye; that he was the Elihu of Job; that, as one of Pharaoh's counsellors, he was governor of a city of Ethiopia, and rebelled against Pharaoh; Moses was sent against him by Pharaoh at the head of an army, and stormed the city and put Balaam to flight, &c. &c.

[v.03 p.0233] Curiously enough, the Rabbinical (Yalkut) identification of Balaam with Laban, Jacob's father-in-law, has been revived from a very different standpoint, by a modern critic.[10] The Mahommedans, also, have various fables concerning Balaam. He was one of the Anakim, or giants of Palestine; he read the books of Abraham, where he got the name Yahweh, by virtue of which he predicted the future, and got from God whatever he asked. It has been conjectured that the Arabic wise man, commonly called Luqman (*q.v.*), is identical with Balaam. The names of their fathers are alike, and "Luqman" means *devourer*, *swallower*, a meaning which might be got out of Balaam by a popular etymology.

If we might accept the various theories mentioned above, Balaam would appear in one source of **J** as an Edomite, in another as an Ammonite; in **E** as a native of the south of Judah or possibly as an Aramaean; in the tradition followed by the Priestly Code probably as a Midianite. All these peoples either belong to the Hebrew stock or are closely connected with it. We may conclude that Balaam was an ancient figure of traditions originally common to all the Hebrews and their allies, and afterwards appropriated by individual tribes; much as there are various St Georges.

The chief significance of the Balaam narratives for the history of the religion of Israel is the recognition by **J** and **E** of the genuine inspiration of a non-Hebrew prophet. Yahweh is as much the God of Balaam as he is of Moses. Probably the original tradition goes back to a time when Yahweh was recognized as a deity of a circle of connected tribes of which the Israelite tribes formed a part. But the retention of the story without modification may imply a continuous recognition through some centuries of the idea that Yahweh revealed his will to nations other than Israel.

Apparently the Priestly Code ignored this feature of the story.

Taking the narratives as we now have them, Balaam is a companion figure to Jonah, the prophet who wanted to go where he was not sent, over against the prophet who ran away from the mission to which he was called.

Bibliography.—Ewald, *Geschichte des Volkes Israel*^{3}, Bd. ii. p. 298; Hengstenberg's *Die Geschichte Bileams und seine Weissagungen* (1842); the commentaries on the scriptural passages, especially G. B. Gray on Numbers xxii.-xxiv.; and the articles on "Balaam" (Bileam) in Hamburger's *Realencyclopädie für Bibel und Talmud*, Hastings' *Bible Dict.*, Black and Cheyne's *Encyclopaedia Biblica*, Herozog-Hauck's *Realencyklopadie*. For the analysis into earlier documents, see also the *Oxford Hexateuch*, Estlin Carpenter and Harford-Battersby.

(W. H. Be.)

[1] Quoted Neh. xiii. 1 f.

[2] Josh. xxiv. 9, 10. E; cf. Micah vi. 5.

[3] Num. xxxi. 8 (quoted Josh. xiii. 22), 16. These references are not necessarily inconsistent with **JE**; but they are probably based on an independent tradition. The date of the Priestly Code is *ca.* 400 B.C.

[4] Gen. xxxvi. 32.

[5] For names and reasons, see Gray, *Numbers*, 314.

[6] 2 Peter ii. 16, 17 (also refer to the ass speaking), Jude xi.

[7] *Ant.* iv. 6.

[8] *Quod. Det. Potiori*, § 20.

[9] *De Cherub.*, § 10.

[10] T. Steuernagel, *Einwanderung der israelitischen Stämme* (1901).

BALĀDHURĪ (Abū-l-ʿAbbās Ahmad ibn Yahyā ibn Jābir al-Balādhurī), Arabian historian, was a Persian by birth, though his sympathies seem to have been strongly with the Arabs, for Masʿūdī refers to one of his works in which he refuted the Shuʿūbites (see Abu ʿUbaida). He lived at the court of the caliphs al-Mutawakkil and al-Mustaʿīn and was tutor to the son of al-Muʿtazz. He died in 892 as the result of a drug called *balādhur* (hence his name). The work by which he is best known is the *Futūh ul-Buldān* (Conquests of Lands), edited by M. J. de Goeje as *Liber expugnationis regionum* (Leiden, 1870; Cairo, 1901). This work is a digest of a larger one, which is now lost. It contains an account of the early conquests of Mahomet and the early caliphs. Balādhurī is said to have spared no trouble in collecting traditions, and to have visited various parts of north Syria and Mesopotamia for this purpose. Another great historical work of his was the *Ansāb ul-Ashrāf*

(Genealogies of the Nobles), of which he is said to have written forty parts when he died. Of this work the eleventh book has been published by W. Ahlwardt (Greifswald, 1883), and another part is known in manuscript (see *Journal of the German Oriental Society*, vol. xxxviii. pp. 382-406). He also made some translations from Persian into Arabic.

(G. W. T.)

BALAGHAT (*i.e.* "above the *ghats* or passes," the highlands), a district of British India in the Nagpur division of the Central Provinces. The administrative headquarters are at the town of Burha. The district contains an area of 3132 sq. m. It forms the eastern portion of the central plateau which divides the province from east to west. These highlands, formerly known as the Raigarh Bichhia tract, remained desolate and neglected until 1866, when the district of Balaghat was formed, and the country opened to the industrious and enterprising peasantry of the Wainganga valley. Geographically the district is divided into three distinct parts:—(1) The southern lowlands, a slightly undulating plain, comparatively well cultivated and drained by the Wainganga, Bagh, Deo, Ghisri and Son rivers. (2) The long narrow valley known as the Mau Taluka, lying between the hills and the Wainganga river, and comprising a long, narrow, irregular-shaped lowland tract, intersected by hill ranges and peaks covered with dense jungle, and running generally from north to south. (3) The lofty plateau, in which is situated the Raigarh Bichhia tract, comprising irregular ranges of hills, broken into numerous valleys, and generally running from east to west. The highest points in the hills of the district are as follows:—Peaks above Lanji, 2300 or 2500 feet; Tepagarh hill, about 2600 ft.; and Bhainsaghat range, about 3000 ft. above the sea. The principal rivers in the district are the Wainganga, and its tributaries, the Bagh, Nahra and Uskal; a few smaller streams, such as the Masmar, the Mahkara, &c.; and the Banjar, Halon and Jamunia, tributaries of the Nerbudda, which drain a portion of the upper plateau. In the middle of the 19th century the upper part of the district was an impenetrable waste. About that time one Lachhman Naik established the first villages on the Paraswara plateau. But a handsome Buddhist temple of cut stone, belonging to some remote period, is suggestive of a civilization which had disappeared before historic times. The population in 1901 was 326,521, showing a decrease of 15% in the decade, due to the effects of famine. A large part of the area is still covered with forest, the most valuable timber-tree being *sal*. There are few good roads. The Gondia-Jubbulpore line of the Bengal-Nagpur railway traverses the Wainganga valley in the west of the district. The district suffered very severely from the famine of 1896-1897. It suffered again in 1900, when in April the number of persons relieved rose above 100,000.

BALAGUER, VICTOR (1824-1901), Spanish politician and author, was born at Barcelona on the 11th of December 1824, and was educated at the university of his native town. His precocity was remarkable; his first dramatic essay, *Pepin el jorobado*, was placed on the Barcelona stage when he was fourteen years of age, and at nineteen he was publicly "crowned" after the production of his second play, *Don Enrique el Dadivoso*. From 1843 to 1868 he was the chief of the Liberal party in Barcelona, and as proprietor and editor of *El Conseller* did much to promote the growth of local patriotism in Catalonia. But it was not till 1857 that he wrote his first poem in Catalan—a copy of verses to the Virgin of Montserrat. Henceforward he frequently adopted the pseudonym of "lo Trovador de Montserrat"; in 1859 he helped to restore the "Juegos Florales," and in 1861 was proclaimed *mestre de gay saber*. He was removed to Madrid, took a prominent part in political life, and in 1867 emigrated to Provence. On the expulsion of Queen Isabella, he returned to Spain, represented Manresa in the Cortes, and in 1871-1872 was successively minister of the colonies and of finance. He resigned office at the restoration, but finally followed his party in rallying to the dynasty; he was appointed vice-president of congress, and was subsequently a senator. He died at Madrid on the 14th of January 1901. Long before his death he had become alienated from the advanced school of Catalan nationalists, and endeavoured to explain away the severe criticism of Castile in which his *Historia de Cataluña y de la Corona de Aragon* (1860-1863) abounds. This work, like his *Historia politica y literaria de los trovadores* (1878-1879), is inaccurate, partial and unscientific; but both books are attractively written and have done great service to the cause which Balaguer once upheld. As a poet he is imitative: reminiscences of Quintana are noticeable in his patriotic songs, of Zorrilla in his historical ballads, of Byron in his lyrical poems. He wrote too hastily to satisfy artistic canons; but if he has the faults he has also the merits of a pioneer, and in Catalonia his name will endure.

[v.03 p.0234]

BALAKIREV, MILI ALEXEIVICH (1836-), Russian musical composer, was born at Nijni-Novgorod on the 31st of December 1836. He had the advantage as a boy of living with Oulibichev, author of a *Life of Mozart*, who had a private band, and from whom Balakirev obtained a valuable education in music. At eighteen, after a university course in mathematics, he went to St Petersburg, full of national ardour, and there made the acquaintance of Glinka. Round him gathered César Cui (b. 1835), and others, and in 1862 the Free School of Music was established, by which, and by Balakirev's personal zeal, the modern school of Russian music was largely stimulated. In 1869 Balakirev was appointed director of the imperial chapel and conductor of the Imperial Musical Society. His influence as a conductor, and as an organizer of Russian music, give him the place of a founder of a new movement, apart even from his own compositions, which though few in number are remarkable in themselves. His works consist largely of songs and collections of folk-songs, but include a symphony (first played in England in 1901), two symphonic poems ("Russia" and "Tamara"), and four overtures, besides pianoforte pieces. His orchestral works are of the "programme-music" order, but all are brilliant examples of the highly coloured, elaborate style characteristic of modern Russian composers, and developed by Balakirev's disciples, such as Borodin and Rimsky-Korsakov.

BALAKLAVA, a village in the Crimea, east of Sevastopol, famous for a battle in the Crimean War. The action of Balaklava (October 25th, 1854) was brought about by the advance of a Russian field army under General Liprandi to attack the allied English, French and Turkish forces besieging Sevastopol. The ground on which the engagement took place was the Vorontsov ridge (see Crimean War), and the valleys on either side of it. Liprandi's corps formed near Traktir Bridge, and early on the 25th of October its advanced guard moved southward to attack the ridge, which was weakly occupied by Turkish battalions behind slight entrenchments. The two nearest British divisions were put into motion as soon as the firing became serious, but were prevented by their orders from descending at once into the plain, and the Turks had to meet the assault of greatly superior numbers. They made a gallant resistance, but the Russians quickly cleared the ridge, capturing several guns, and their first line was followed by a heavy mass of cavalry which crossed the ridge and descended into the Balaklava plain. At this moment the British cavalry division under the earl of Lucan was in the plain, but their commander was prevented from engaging the Russians by the tenor of his orders. One of his brigades, the Heavy (4th and 5th Dragoon Guards, 1st, 2nd and 6th Dragoons) under Brigadier-General J. Y. Scarlett, was in the Balaklava plain; the other, the Light Brigade under Lord Cardigan (4th and 13th Light Dragoons now Hussars, 8th and 11th Hussars and 17th Lancers) in the valley to the north of the Vorontsov ridge. All these regiments were very weak in numbers. The Russian cavalry mass, after crossing the ridge, moved towards Balaklava; a few shots were fired into it by a Turkish battery and a moment later the Heavy Brigade charged. The attack was impeded at first by obstacles of ground, but in the *mêlée* the weight of the British troopers gradually broke up the enemy, and the charge of the 4th Dragoon Guards, delivered against the flank of the Russian mass, was decisive. The whole of the Russian cavalry broke and fled to the ridge. This famous charge occupied less than five minutes from first to last, and at the same time some of the Russian squadrons, attempting to charge the 93rd Highlanders (who were near Balaklava) were met by the steady volleys of the "thin red line," and fled with the rest. The defeated troops retreated past the still inactive Light Brigade, on whose left a French cavalry brigade was now posted. The Russians were at this juncture reinforced by a mixed force on the Fedukhine heights; Liprandi's infantry occupied the captured ridge, and manned the guns taken from the Turks. The cavalry defeated by the Heavy Brigade was re-formed in the northern valley behind the field guns, and infantry, cavalry and artillery were on both the Fedukhine and the Vorontsov heights. Thus, in front of the Light Brigade was a valley over a mile long, at the end of which was the enemy's cavalry and twelve guns, and on the ridges on either side there were in all twenty-two guns, with cavalry and infantry. It was under these circumstances that an order was given by the British headquarters, which led to the charge for which above all Balaklava is remembered. It was carried to Lord Lucan by Captain L. E. Nolan, 15th Hussars, and ran as follows:—"Lord Raglan wishes the cavalry to advance rapidly to the front and try to prevent the enemy carrying away the guns ... French cavalry is on your left." Lucan, seeing no attempt on the part of the enemy to move guns, questioned Nolan, who is said to have pointed down the valley to the artillery on the plain; whereupon Lucan rode to Lord Cardigan, the commander of the Light Brigade, and repeated Lord Raglan's order and Nolan's explanation.

The Light Brigade then advanced straight to its front, and soon came under fire from the guns on both flanks. Nolan was killed as he rode across the front of the brigade, perhaps with the intention of changing its direction to the Vorontsov ridge. Five minutes later the guns in front began to fire with telling effect. The pace was increased, though the "charge" was not sounded, and Cardigan and those of his men who remained mounted, rode up to and through the Russian line of guns. Small parties even charged the Russian cavalry in rear and on either flank. The French 4th *Chasseurs d' Afrique* made a dashing charge which drove the Russians off the Fedukhine heights, though at considerable loss. Lucan had meanwhile called up the Heavy Brigade to support the Light, but it lost many men and horses and was quickly withdrawn. Only two formed bodies of the Light Brigade found their way back. The 13th Light Dragoons mustered but ten mounted men at the evening parade; the brigade as a whole had lost 247 men and 497 horses out of a total strength of 673 engaged in the charge, which lasted twenty minutes from first to last. The two infantry divisions which now approached the field were again halted, and Liprandi was left undisturbed on the Vorontsov ridge and in possession of the captured guns. The result of the day was thus unfavourable to the allies, but the three chief incidents of the engagement—the two cavalry charges and the fight of the 93rd Highlanders—gave to it all the prestige of a victory. The impression created by the conduct of the Light Brigade was forcibly expressed in Tennyson's well-known ballad, and in spite of the equally celebrated remark of the French general Bosquet, *C'est magnifique mais ce n'est pas la guerre*, it may be questioned whether the moral effect of the charge did not outweigh the very serious loss in trained men and horses involved.

BALALAÏKA, a stringed instrument said to have retained its primitive form unchanged, very popular in Russia among the peasants, more especially in Ukraine. The instrument has a triangular soundboard to which is glued a vaulted back, forming a body having a triangular base, enabling it to stand upright. To the body is added a fretted neck strung with two, three or four strings, generally so tuned as to produce a minor chord when sounded together. The strings are generally plucked with the fingers, but the peasants obtain charming "glissando" effects by sweeping the strings lightly one after the other with the fingers or side of the hand. The Balalaïka is common to the Slav races, who use it to accompany their folk-songs and dances. It is also to be seen in the hands of gipsies at rural festivities and fairs.

BALANCE (derived through the Fr. from the Late Lat. *bilantia*, an apparatus for weighing, from *bi*, two, and *lanx*, a dish or scale), a term originally used for the ordinary beam balance or weighing machine with two scale pans, but extended to include (with or without adjectival qualification) other apparatus for measuring and comparing weights and forces. In addition to beam and spring balances (see Weighing Machines), apparatus termed "torsion balances," in which forces are measured or compared by their twisting moment on a wire, are used, especially in gravitational, electrostatic and magnetic experiments (see Gravitation and Electrometer). The term also connotes the idea of equality or equalization; *e.g.* in the following expressions: "balance," in bookkeeping, the amount which equalizes the debit and credit accounts;
[v.03 p.0235]
"balance wheel," in horology, a device for equalizing the relaxing of a watch or clock spring (see Clock); the "balancing of engines," the art of minimizing the total vibrations of engines when running, and consisting generally in the introduction of masses which induce vibrations opposed to the vibrations of the essential parts of the engine.

BALANCE OF POWER, a phrase in international law for such a "just equilibrium" between the members of the family of nations as should prevent any one of them from becoming sufficiently strong to enforce its will upon the rest. The principle involved in this, as Hume pointed out in his *Essay on the Balance of Power*, is as old as history, and was perfectly familiar to the ancients both as political theorists and as practical statesmen. In its essence it is no more than a precept of commonsense born of experience and the instinct of self-preservation; for, as Polybius very clearly puts it (lib. i. cap. 83): "Nor is such a principle to be despised, nor should so great a power be allowed to any one as to make it impossible for you afterwards to dispute with him on equal terms concerning your manifest rights." It was not, however, till the beginning of the 17th century, when the science of international law took shape at the hands of Grotius and his successors, that the theory of the balance of power was formulated as a fundamental principle of diplomacy. According to this the European states formed a sort of federal community, the fundamental condition of which was the preservation of the balance of power, *i.e.* such a disposition of things that no one state or potentate should be able absolutely to predominate and prescribe laws to the rest; and, since all were equally interested in this settlement, it was held to be the interest, the right and the duty of every power to interfere, even by force of arms, when any of the conditions of this settlement were infringed or assailed by any other member of the community.[1] This principle, once formulated, became an axiom of political science. It was impressed as such by Fénelon, in his *Instructions*, on the young duke of Burgundy; it was proclaimed to the world by Frederick the Great in his *Anti-Machiavel*; it was re-stated with admirable clearness in 1806 by Friedrich von Gentz in his *Fragments on the Balance of Power*. It formed the basis of the coalitions against Louis XIV. and Napoleon, and the occasion, or the excuse, for most of the wars which desolated Europe between the congress of Münster in 1648 and that of Vienna in 1814. During the greater part of the 19th century it was obscured by the series of national upheavals which have remodelled the map of Europe; yet it underlay all the efforts of diplomacy to stay or to direct the elemental forces let loose by the Revolution, and with the restoration of comparative calm it has once more emerged as the motive for the various political alliances of which the ostensible object is the preservation of peace (see Europe: *History*).

An equilibrium between the various powers which form the family of nations is, in fact,—as Professor L. Oppenheim (*Internat. Law*, i. 73) justly points out—essential to the very existence of any international law. In the absence of any central authority, the only sanction behind the code of rules established by custom or defined in treaties, known as "international law," is the capacity of the powers to hold each other in check. Were this to fail, nothing could prevent any state sufficiently powerful from ignoring the law and acting solely according to its convenience and its interests.

See, besides the works quoted in the article, the standard books on International Law (*q.v.*).

(W. A. P.)

[1] Emerich de Vattel, *Le Droit des gens* (Leiden, 1758).

BALANCE OF TRADE, a term in economics belonging originally to the period when the "mercantile theory" prevailed, but still in use, though not quite perhaps in the same way as at its origin. The "balance of trade" was then identified with the sum of the precious metals which a country received in the course of its trading with other countries or with particular countries. There was no doubt an idea that somehow or other the amount of the precious metals received represented profit on the trading, and each country desired as much profit as possible. Princes and sovereigns, however, with political aims in view, were not close students of mercantile profits, and would probably have urged the acquisition of the precious metals as an object of trade even if they had realized that the country as a whole was exporting "money's worth" in order to buy the precious metals which were desired for political objects. The "mercantile theory" was exploded by Adam Smith's demonstration that gold and silver were only commodities like others with no special virtue in them, and that they would come into a country when there was a demand for them, according to the amount, in proportion to other demands, which the country could afford to pay; but the ideas in which the theory itself has originated have not died out, and the idea especially of a "balance of trade" to which the rulers of a country should give attention is to be found in popular discussions of business topics and in politics, the general notion being that a nation is prosperous when its statistics show a "trade balance" in its favour and unprosperous when the reverse is shown. In modern times the excess of imports over exports or of exports over imports, shown in the statistics of foreign trade, has also come to be identified in popular speech with the "balance of trade," and many minds are no doubt imbued with the ideas (1) that an excess of imports over exports is bad, and (2) an excess of exports over imports is the reverse, because the former indicates an "unfavourable" and the latter a "favourable" trade balance. In the former case it is urged that a nation so circumstanced is living on its capital. Exact remedies are not suggested, although the idea of preventing or hampering foreign imports as a means of developing home trade and of thus altering the supposed disastrous trade balance is obviously the logical inference from the arguments. A consideration of these ideas and of recent discussions about imports and exports, appears accordingly to be needed, although the "mercantile theory" is itself exploded.

The phrase "balance of trade," then, appears to be an application of a trader's language in his own business to the larger affairs of nations or rather of the aggregate of individuals in a nation engaged in foreign trade. A trader in his own books

sets his sales against his purchases, and the amount by which the former exceed the latter is his trade balance or profit. What is true of the individual, it is assumed, must be true of a nation or of the aggregate of individual traders in a nation engaged in the foreign trade. If their collective sales amount to more than their collective purchases the trade balance will be in their favour, and they will have money to receive. Contrariwise, if their purchases amount to more than their sales, they will have to pay money, and they will presumably be living on their capital. The argument fails, however, in many ways. Even as regards the experience of the individual trader, it is to be observed that he may or may not receive his profit, if any, in money. As a rule he does not do so. As the profit accrues he may invest it either by employing labour to add to his machinery or warehouses, or by increasing his stock-in-trade, or by adding to his book debts, or by a purchase of stocks or shares outside his regular business. At the end of a given period he may or may not have an increased cash balance to show as the result of his profitable trading. Even if he has an increased cash balance, according to the modern system of business, this might be a balance at his bankers', and they in turn may have invested the amount so that there is no stock of the precious metals, of "hard money," anywhere to represent it. And the argument fails still further when applied to the transactions between nations, or rather, to use the phrase already employed, between the aggregate of individuals in nations engaged in the foreign trade. It is quite clear that if a nation, or the individuals of a nation, do make profit in their foreign trading, the amount may be invested as it accrues—in machinery, or warehouses, or stock-in-trade, or book debts, or stocks and shares purchased abroad, so that there may be no corresponding "balance of trade" to bring home. There is no doubt also that what may be is in reality what largely happens. A prosperous foreign trade carried on by any country implies a continuous investment by that country either abroad or at home, and there may or may not be a balance receivable in actual gold and silver.

[v.03 p.0236]

In another particular the argument also fails. In the aggregate of individual trading with various countries, there may sometimes be purchases and sales as far as the individuals are concerned, but not purchases and sales as between the nations. For example, goods are exported from the United Kingdom, ammunition and stores and ships, which appear in the British returns as exports, and which have really been sold by individual British traders to individuals abroad; but these sales are not set off by any purchases on the other side which come into the international account, as the set-off is a loan by the people of one country to the people or government of another. The same with the export of railway and other material when goods are exported for the purpose of constructing railways or other works abroad. The sales are made by individuals in the United Kingdom to individuals abroad; but there is no set-off of purchases on the other side. *Mutatis mutandis* the same explanation applies to the remittance of goods by one country to another, or by individuals in one country to individuals in another to pay the interest or repay the capital of loans which have been received in former times. These are all cases of the movement of goods irrespective of international sales and purchases, though the movements themselves appear in the international records of imports and exports, and therefore it seems to be assumed, though without any warrant, in the international records of the balance of trade. There is yet another failure in the comparison. The individual trader would include in his sales and purchases services such as repairs performed by him for others, and similar services which others do for himself; but no similar accounts are kept of the corresponding portions of international trade such as the earning of freights and commissions, although in strictness, it is obvious, they belong as much to international trade as the imports and exports themselves, which cannot therefore show a complete "balance of trade."

The illusions which may result then from the confusion of ideas between a balance of trade or profit, and a balance of cash paid or received, and from the identification of an excess of imports over exports or of exports over imports with the balance of trade itself, though they are not the same things, hardly need description. The believers in such illusions are not entitled to any hearing as economists, however, much they may be accepted in the market-place or among politicians.

The "balance of trade" and "the excess of imports over exports" are thus simply pitfalls for the amateur and the unwary. On the statistical side, moreover, there is a good deal more to be urged in order to impress the student with care and attention. The records of imports and exports themselves may vary from the actual facts of international purchases and sales. The actual values of the goods imported and paid for by the nation may vary from the published returns of imports, which are, by the necessity of the case, only estimated values. And so with the exports. The actual purchases and sales may be something very different. A so-called sale may prove abortive through its not being paid for at all, the debtor failing altogether. In any case the purchases of a year may not be paid for by the sales of the year, and the "squaring" of the account may take a long time. Still more the estimates of value may be so taken as not to give even an approximately correct account as far as the records go. Thus in the plan followed in the United Kingdom imports are valued as at the port where they arrive and exports at the port where they are despatched from—a plan which so far places them on an equal footing for the purpose of striking a balance of trade. But in the import and export records of the United States a different plan is followed. The imports are no longer valued as at the port of arrival with the freight and other charges included, but as at the port of shipment. The results on the balance of trade drawn out must accordingly be quite different in the two cases. With other countries similar differences arise. To deduce then from records of imports and exports any conclusions as to the excess of imports or exports at different times is a work of enormous statistical difficulty. Excellent illustrations will be found in J. Holt Schooling's *British Trade Book* (1908).

The country which presents the most interesting questions in connexion with the study is the United Kingdom, with its largely preponderating foreign trade. Its annual imports and exports, excluding bullion, exceed 800 millions sterling, and the bullion one year with another is 100 millions more. Its excess of imports, moreover, between the middle and end of the 19th century gradually rose from a small figure to 180 millions sterling annually, and occasioned the popular discussion referred to respecting an "adverse" balance of trade, and particularly the belief existing in many quarters that the nation is living on its capital. The result has been a new investigation of the subject, so as to bring out and present the credits to which the country is entitled in its trade as a shipowner and commission merchant, and to exhibit at the same time the magnitude of British foreign investments, which cannot be less than 2000 millions sterling and must bring in an enormous annual income. Other countries such as France, Germany, Belgium, Holland, Denmark, Norway and Sweden, are in the same condition, though their foreign trade is not on the same scale, and similar rules apply to the reading of their import and export accounts. The United States is a conspicuous instance of a country which in the first decade of the 20th century was still in the position of a borrower and had a large excess of exports, though there were signs of a change in the opposite direction. New countries generally, such as Canada, Australia and the South American countries, resemble the United States. Comparisons are made difficult by the want of uniformity in the methods of stating the figures, but that different countries have to be grouped according as they are indebted or creditor countries is undeniable, and no study of the trade statistics is possible without recognition of the underlying economic circumstances.

In conclusion it may be useful to repeat the main propositions laid down as to the balance of trade, (1) A "balance of trade" to the individual trader, from whose experience the phrase comes, is not necessarily, as is supposed, a balance received or receivable in the precious metals. It may be invested as it accrues—in machinery, or warehouses, or stock-in-trade, or in book debts, or in stocks and shares or other property outside the trader's business, as well as in cash. (2) What is true of the individual trader is also true of the aggregate of individuals engaged in the foreign trade of a country. Cash is only one of the forms in which they may elect to be paid. (3) The imports and exports recorded in the statistical returns of a country do not correspond with the purchases and sales of individual traders, as the sales especially may be set off by loans, while the so-called imports may include remittances of interest and of capital repaid. (4) When capital is repaid the country receiving it need not be living on it, but may be investing it at home. (5) The foreign trading of countries may also comprise many transactions, such as the earning of freights and commissions, which ought to appear in a proper account showing a balance of trade, as similar transactions appear in an individual trader's account, but which are not treated as imports or exports in the statistical returns of a nation's foreign trade. (6) Import and export returns themselves are not the same as accounts of purchases and sales; the values are only estimates, and must not be relied on literally without study of the actual facts. (7) Import and export returns in different countries are not in all cases taken at the same point, there being important variations, for instance, in this respect between the returns of two great countries, the United Kingdom and the United States, which are often compared, but are really most difficult to compare. (8) The United Kingdom is a conspicuous instance of a country which has a great excess of imports over exports in consequence of its large lending abroad in former times; while its accounts are specially affected by the magnitude of its services as a

trading nation carrying passengers and goods all over the world, which do not result, however, in so-called "exports." The United States, on the other hand, is a conspicuous instance of an indebted nation, which has or had until lately few or no sums to its credit in foreign trade except the visible exports. (9) The various countries of the world naturally fall into groups. The nations of western Europe, such as France, Germany, Belgium, Holland, Sweden and Norway, fall into a group with Great Britain as creditor nations, while Canada, Australasia and the South American countries fall into a group with the United States as undeveloped and indebted countries, So also of other countries, each belongs naturally to one group or another. (10) The excess of imports or exports may vary indefinitely at different times according as a creditor country is receiving or lending at the time, or according as a debtor country is borrowing or paying off its debts at the time, but the permanent characteristics are always to be considered.

[v.03 p.0237]

(R. Gn.)

BALANOGLOSSUS, the general name given to certain peculiar, opaque, worm-like animals which live an obscure life under stones, and burrow in the sand from between tide-marks down to the abyssal regions of the sea. Their colour is usually some tone of yellow with dashes of red, brown and green, and they frequently emit a pungent odour. The name has reference to the tongue-shaped muscular proboscis by which the animal works its way through the sand. The proboscis is not the only organ of locomotion, being assisted by the succeeding segment of the body, the buccal segment or collar. By the waves of contraction executed by the proboscis accompanied by inflation of the collar, progression is effected, sometimes with marvellous rapidity. The third body region or trunk may attain a great length, one or two feet, or even more, and is also muscular, but the truncal muscles are of subordinate importance in locomotion, serving principally to promote the peristaltic contractions of the body by which the food is carried through the gut. The function of alimentation is closely associated with that of locomotion, somewhat as in the burrowing earthworm; in the excavation of its burrows the sand is passed through the body, and any nutrient matter that may adhere to it is extracted during its passage through the intestine, the exhausted sand being finally ejected through the vent at the orifice of the burrow and appearing at low tide as a worm casting. In accordance with this manner of feeding, the mouth is kept permanently open and prevented from collapsing by a pair of skeletal cornua belonging to a sustentacular apparatus (the nuchal skeleton), the body of which lies within the narrow neck of the proboscis; the latter is inserted into the collar and surrounded by the anterior free flap of this segment of the body.

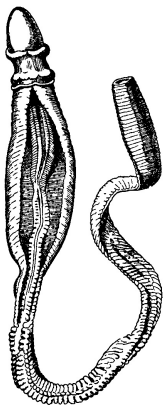


Fig. 1.—*Ptychodera flava* (New Caledonia), from above; about life size.

When first discovered by J. F. Eschscholtz at the Marshall Islands in 1825, *Balanoglossus* was described as a worm-like animal belonging to the Echinoderm order of Holothurians or sea-cucumbers. In 1865 Kowalevsky discovered that the organs of respiration consist of numerous pairs of gill-slits leading from the digestive canal through the thickness of the body-wall to the exterior. On this account the animal was subsequently placed by Gegenbaur in a special class of Vermes, the Enteropneusta. In 1883-1886 Bateson showed by his embryological researches that the Enteropneusta exhibit chordate (vertebrate) affinities in respect of the coelomic, skeletal and nervous systems as well as in regard to the respiratory system, and, further, that the gill-slits are formed upon a plan similar to that of the gill-slits of *Amphioxus*, being subdivided by tongue-bars which depend from the dorsal borders of the slits.

Coelom and Pore-canals.—In correspondence with the tri-regional differentiation of the body in its external configuration, the coelom (body-cavity, perivisceral cavity) is divided into three portions completely separated from one another by septa:—(1) proboscis-coelom, or first body-cavity; (2) the collar-coelom, or second body-cavity; (3) truncal coelom, or third body-cavity. Of these divisions of the coelom the first two communicate with the exterior by means of a pair of ciliated pore-canals placed at the posterior end of their respective segments. The proboscis-pores are highly variable, and frequently only one is present, that on the left side; sometimes the pore-canals of the proboscis unite to open by a common median orifice, and sometimes their communication with the proboscis-coelom appears to be occluded, and finally the pore-canals may be quite vestigial. The collar-pores are remarkable for their constancy; this is probably owing co the fact that they have become adapted to a special function, the inhalation of water to render the collar turgid during progression. There are reasons for supposing that the truncal coelom was at one time provided with pore-canals, but supposed vestiges of these structures have only been described for one genus, *Spengelia*, in which they lie near the anterior end of the truncal coelom.

Enteron.—Not only is the coelom thus subdivided, but the enteron (gut, alimentary canal, digestive tube) itself shows indications of three main subsections in continuity with one another:—(1) proboscis-gut (*Eicheldarm*, stomochord, *vide infra*); (2) collar-gut (buccal cavity, throat); (3) truncal gut extending from the collar to the vent.

Stomochord.—The proboscis-gut occurs as an outgrowth from the anterior dorsal wall of the collar-gut, and extends forward into the basal (posterior) region of the proboscis, through the neck into the proboscis-coelom, ending blindly in front. Although an integral portion of the gut, it has ceased to assist in alimentation, its epithelium undergoes vacuolar differentiation and hypertrophy, and its lumen becomes more or less vestigial. It has, in fact, become metamorphosed into a resistant supporting structure resembling in some respects the notochord of the true Chordata, but probably not directly comparable with the latter structure, being related to it solely by way of substitution. On account of the presence and mode of origin (from the gut-wall) of this organ Bateson introduced the term hemichorda as a phyletic name for the class Enteropneusta. As the proboscis-gut appears to have undoubtedly skeletal properties, and as it also has topographical relations with the mouth, it has been designated in English by the non-committal term stomochord. It is not a simple diverticulum of the collar-gut, but a complex structure possessing paired lateral pouches and a ventral convexity (ventral caecum) which rests in a concavity at the front end of the body of the nuchal skeleton (fig. 3). In some species (*Spengelidae*) there is a long capillary vermiform extension of the stomochord in front. The nuchal skeleton is a non-cellular laminated thickening of basement-membrane underlying that portion of the stomochord which lies between the above-mentioned pouches and the orifice into the throat. At the point where the stomochord opens into the buccal cavity the nuchal skeleton bifurcates, and the two cornua thus produced pass obliquely backwards and downwards embedded in the wall of the throat, often giving rise to projecting ridges that bound a dorsal groove of the collar-gut which is in continuity with the wall of the stomochord (fig. 3).

Nervous System.—At the base of the epidermis (which is in general ciliated) there is over the entire surface of the body a layer of nerve-fibres, occurring immediately outside the basement-membrane which separates the epidermis from the subjacent musculature. The nervous system is thus essentially epidermal in position and diffuse in distribution; but an interesting concentration of nerve-cells and fibres has taken place in the collar-region, where a medullary tube, closed in from the outside, opens in front and behind by anterior and posterior neuropores. This is the collar nerve-tube. Sometimes the central canal is wide and uninterrupted between the two neuropores; in other cases it becomes broken up into a large number of small closed medullary cavities, and in others again it is obsolete. In one family, the *Ptychoderidae*, the medullary tube of the collar is connected at intermediate points with the epidermis by means of a variable number of unpaired outgrowths from its dorsal wall, generally containing an axial lumen derived from and in continuity with the central canal. These hollow roots terminate blindly in the dorsal epidermis of the collar, and place the nervous layer of the latter in direct connexion with the fibres of the nerve-tube. The exact significance of these roots is a matter for speculation, but it seems possible that they are epiphysial structures remotely comparable with the epiphysial (pineal) complex of the craniate vertebrates. In accordance with this view there would be also some probability in favour of regarding the collar nerve-tube of the Enteropneusta as the equivalent of the cerebral vesicle only of *Amphioxus* and the Ascidian tadpole, and also of the primary fore-brain of vertebrates.

Special thickenings of the diffuse nervous layer of the epidermis occur in certain regions and along certain lines. In the neck of the proboscis the fibrous layer is greatly thickened, and other intensifications of this layer occur in the dorsal and ventral middle lines of the trunk extending to the posterior end of the body. The dorsal epidermal nerve-tract is continued in front into the ventral wall of the collar nerve-tube, and at the point of junction there is a circular commissural

thickening following the posterior rim of the collar and affording a special connexion between the dorsal and ventral nerve-tracts. From the ventral surface of the collar nerve-tube numerous motor fibres may be seen passing to the subjacent musculature. These fibres are not aggregated into roots.

[v.03 p.0238]

Gill-slits.—The possession of gill-slits is as interesting a feature in the organization of *Balanoglossus* as is the presence of tracheae in *Peripatus*. These gill-slits occupy a variable extent of the anterior portion of the trunk, commencing immediately behind the collar-trunk septum. The branchial bars which constitute the borders of the clefts are of two kinds:—(1) Septal bars between two contiguous clefts, corresponding to the primary bars in *Amphioxus*; (2) Tongue-bars. The chief resemblances between *Balanoglossus* and *Amphioxus* in respect of the gill-slits may be stated briefly as follows:—(α) the presence of two kinds of branchial bars in all species and also of small crossbars (synapticula) in many species; (β) numerous gill-slits, from forty to more than a hundred pairs; (γ) the addition of new gill-slits by fresh perforation at the posterior end of the pharynx throughout life. The chief differences are, that (*a*) the tongue-bar is the essential organ of the gill-slit in *Balanoglossus*, and exceeds the septal bars in bulk, while in *Amphioxus* the reverse is the case; (*b*) the tongue-bar contains a large coelomic space in *Balanoglossus*, but is solid in *Amphioxus*; (*c*) the skeletal rods in the tongue-bars of *Balanoglossus* are double; (*d*) the tongue-bar in *Balanoglossus* does not fuse with the ventral border of the cleft, but ends freely below, thus producing a continuous U-shaped cleft. The meaning of this singular contrast between the two animals may be that we have here an instance of an interesting gradation in evolution. From serving primitively as the essential organ of the cleft the tongue-bar may have undergone reduction and modification, becoming a secondary bar in *Amphioxus*, subordinate to the primary bars in size, vascularity and development; finally, in the craniate vertebrates it would then have completed its involution, the suggestion having been made that the tongue-bars are represented by the thymus-primordia.

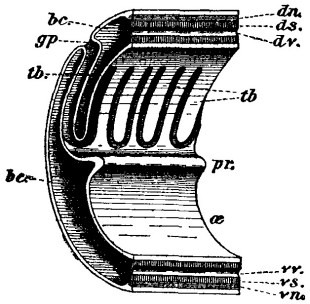


Fig. 2.—Structure of branchial region.

bc, coelom.
tb, tongue-bars.
ds, mesentery.
pr, ridge.
vv, vessel.
gp, gill-pore.
dn, dorsal nerve.
dv, vessel.
œ, oesophagus.
vs, mesentery.
vn, ventral nerve.

Gill-pouches and Gill-pores.—Only rarely do the gill-slits open freely and directly to the exterior (fig. 1). In most species of *Balanoglossus* each gill-slit may be said to open into its own atrial chamber or gill-pouch; this in its turn opens to the exterior by a minute gill-pore. There are, therefore, as many gill-pouches as there are gill-slits and as many gill-pores as pouches. The gill-pores occur on each side of the dorsal aspect of the worm in a longitudinal series at the base of a shallow groove, the branchial groove. The respiratory current of water is therefore conducted to the exterior by different means from that adopted by *Amphioxus*, and this difference is so great that the theory which seeks to explain it has to postulate radical changes of structure, function and topography.

Excretory and Vascular Systems.—It seems likely that the coelomic pore-canals were originally excretory organs, but in the existing Enteropneusta the pore-canals (especially the collar canals) have, as we have seen, acquired new functions or become vestigial, and the function of excretion is now mainly accomplished by a structure peculiar to the Enteropneusta called the glomerulus, a vascular complex placed on either side of the anterior portion of the stomochord, projecting into the proboscis-coelom. The vascular system itself is quite peculiar, consisting of lacunae and channels destitute of endothelium, situated within the thickness of the basement-membrane of the body-wall, of the gut-wall and of the mesenteries. The blood, which is a non-corpuscular fluid, is propelled forwards by the contractile dorsal vessel and collected into the central blood-sinus; this lies over the stomochord, and is surrounded on three sides by a closed vesicle, with contractile walls, called the pericardium (*Herzblase*). By the pulsation of the pericardial vesicle (best observed in the larva) the blood is driven into the glomerulus, from which it issues by efferent vessels which effect a junction with the ventral (sub-intestinal) vessel in the trunk. The vascular system does not readily lend itself to morphological comparison between such widely different animals as *Balanoglossus* and *Amphioxus*, and the reader is therefore referred to the memoirs cited at the end of this article for further details.

Reproductive System.—The sexes are separate, and when mature are sometimes distinguished by small differences of colour in the genital region. Both male and female gonads consist of more or less lobulated hollow sacs connected with the epidermis by short ducts. In their disposition they are either uniserial, biserial or multiserial. They occur in the branchial region, and also extend to a variable distance behind it. In exceptional cases they are either confined to the branchial region or excluded from it. When they are arranged in uniserial or biserial rows the genital ducts open into or near the branchial grooves in the region of the pharynx and in a corresponding position in the post-branchial region. An important feature is the occurrence in some species (*Ptychoderidae*) of paired longitudinal pleural or lateral folds of the body which are mobile, and can be approximated at their free edges so as to close in the dorsal surface, embracing both the median dorsal nerve-tract and the branchial grooves with the gill-pores, so as to form a temporary peri-branchial and medullary tube, open behind where the folds cease. On the other hand, they can be spread out horizontally so as to expose their own upper side as well as the dorsal surface of the body (fig. 1). These folds are called the genital pleurae because they contain the bulk of the gonads. Correlated with the presence of the genital pleurae there is a pair of vascular folds of the basement membrane proceeding from the dorsal wall of the gut in the post-branchial portion of the branchio-genital region, and from the dorsal angles made by the pleural folds with the body-wall in the pharyngeal region; they pass, in their most fully developed condition, to the free border of the genital pleurae. These vascular membranes are called the lateral septa. Since there are many species which do not possess these genital pleurae, the question arises as to whether their presence or their absence is the more primitive condition. Without attempting to answer this question categorically, it may be pointed out that within the limits of the family (*Ptychoderidae*) which is especially characterized by their presence there are some species in which the genital pleurae are quite obsolete, and yet lateral septa occur (*e.g. Ptychodera ruficollis*), seeming to indicate that the pleural folds have in such cases been secondarily suppressed.

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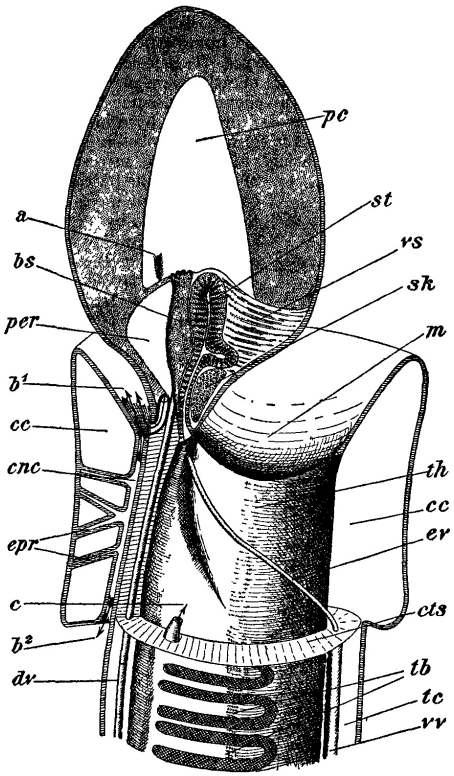

Fig. 3.—Structure of anterior end.

a, Arrow from proboscis-cavity (*pc*) passing to left of pericardium (*per*) and out through proboscis pore-canal.

b^1, arrow from central canal of neurochord (*cnc*) passed out through anterior neuropore.

b^2, ditto; through posterior neuropore.

c, arrow intended to pass from 1st gill-pouch through collar pore-canal into collar-coelom (*cc*).

cts, posterior limit of collar.

Development.—The development of *Balanoglossus* takes place according to two different schemes, known as direct and indirect, correlated with the occurrence in the group of two kinds of ova, large and small. Direct development, in which the adult form is achieved without striking metamorphosis by a gradual succession of stages, seems to be confined to the family *Balanoglossidae*. The remaining two families of Enteropneusta, *Ptychoderidae* and *Spengelidae*, contain species of which probably all pursue an indirect course of development, culminating in a metamorphosis by which the adult

form is attained. In these cases the larva, called *Tornaria*, is pelagic and transparent, and possesses a complicated ciliated seam, the longitudinal ciliated band, often drawn out into convoluted bays and lappets. In addition to this ciliated band the form of the *Tornaria* is quite characteristic and unlike the adult. The Tornaria larva offers a certain similarity to larvae of Echinoderms (sea-urchins, star-fishes, and sea-cucumbers), and when first discovered was so described. It is within the bounds of possibility that *Tornaria* actually does indicate a remote affinity on the part of the Enteropneusta to the Echinoderms, not only on account of its external form, but also by reason of the possession of a dorsal water-pore communicating with the anterior body-cavity. In the direct development Bateson showed that the three divisions of the coelom arise as pouches constricted off from the archenteron or primitive gut, thus resembling the development of the mesoblastic somites of *Amphioxus*. It would appear that while the direct development throws light upon the special plan of organization of the Enteropneusta, the indirect development affords a clue to their possible derivation. However this may be, it is sufficiently remarkable that a small and circumscribed group like the Enteropneusta, which presents such a comparatively uniform plan of composition and of external form, should follow two such diverse methods of development.

dv, dorsal vessel passing into central sinus (*bs*).
ev, efferent vessel passing into ventral vessel (*vv*).
epr, epiphysial tubes.
st, stomochord.
vs, ventral septum of proboscis.
sk, body of nuchal skeleton.
m, mouth.
th, throat.
tb, tongue-bars.
tc, trunk coelom.

Distribution.—Some thirty species of *Balanoglossus* are known, distributed among all the principal marine provinces from Greenland to New Zealand. The species which occurs in the English Channel is *Ptychodera sarniensis*. The *Ptychoderidae* and *Spengelidae* are predominantly tropical and subtropical, while the *Balanoglossidae* are predominantly arctic and temperate in their distribution. One of the most singular facts concerning the geographical distribution of Enteropneusta has recently been brought to light by Benham, who found a species of *Balanoglossus*, *sensu stricto*, on the coast of New Zealand hardly distinguishable from one occurring off Japan. Finally, *Glandiceps abyssicola* (*Spengelidae*) was dredged during the "Challenger" expedition in the Atlantic Ocean off the coast of Africa at a depth of 2500 fathoms.

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(A. W.*)

BALARD, ANTOINE JERÔME (1802-1876), French chemist, was born at Montpellier on the 30th of September 1802. He started as an apothecary, but taking up teaching he acted as chemical assistant at the faculty of sciences of his native town, and then became professor of chemistry at the royal college and school of pharmacy and at the faculty of sciences. In 1826 he discovered in sea-water a substance which he recognized as a previously unknown element and named *bromine*. The reputation brought him by this achievement secured his election as successor to L. J. Thénard in the chair of chemistry at the faculty of sciences in Paris, and in 1851 he was appointed professor of chemistry at the Collège de France, where he had M. P. E. Berthelot first as pupil, then as assistant and finally as colleague. He died in Paris on the 30th of April 1876. While the discovery of bromine and the preparation of many of its compounds was his most conspicuous piece of work, Balard was an industrious chemist on both the pure and applied sides. In his researches on the bleaching compounds of chlorine he was the first to advance the view that bleaching-powder is a double compound of calcium chloride and hypochlorite; and he devoted much time to the problem of economically obtaining soda and potash from sea-water, though here his efforts were nullified by the discovery of the much richer sources of supply afforded by the Stassfurt deposits. In organic chemistry he published papers on the decomposition of ammonium oxalate, with formation of oxamic acid, on amyl alcohol, on the cyanides, and on the difference in constitution between nitric and sulphuric ether.

BALA SERIES, in geology, a series of dark slates and sandstones with beds of limestone which occurs in the neighbourhood of Bala, Merionethshire, North Wales. It was first described by A. Sedgwick, who considered it to be the upper part of his Cambrian System. The series is now placed at the top of the Ordovician System, above the Llandeilo beds. The Bala limestone is from 20 to 40 ft. thick, and is recognizable over most of North Wales; it is regarded as the equivalent of the Coniston limestone of the Lake District. The series in the type area consists of the Hirnant limestone, a thin inconstant bed, which is separated by 1400 ft. of slates from the Bala limestone, below this are more slates and volcanic rocks. The latter are represented by large contemporaneous deposits of tuff and felsitic lava which in the Snowdon District are several thousand feet thick. In South Wales the Bala Series contains the following beds in descending order:—the *Trinucleus seticornis* beds (Slade beds, Redhill shales and Sholeshook limestone), the Robeston Wathen beds, and the *Dicranograptus* shales. The typical graptolites are, in the upper part, *Dicellograptus anceps* and *D. complanatus*; in the lower part, *Pleurograptus linearis* and *Dicranograptus Clingani*. In Shropshire this series is represented by the Caradoc and Chirbury Series; in southern Scotland by the Hartfell and Ardmillan Series, and by similar rocks in Ireland. See Caradoc Series and Ordovician System.

BALASH (in the Greek authors, Balas; the later form of the name Vologaeses), Sassanian king in A.D. 484-488, was the brother and successor of Pērōz, who had died in a battle against the Hephthalites (White Huns) who invaded Persia from the east. He put down the rebellion of his brother Zareh, and is praised as a mild and generous monarch, who made concessions to the Christians. But as he did nothing against his enemies, he was, after a reign of four years, deposed and blinded, and his nephew, Kavadh I., raised to the throne.

(Ed. M.)

BALASORE, a town and district of British India, in the Orissa division of Bengal. The town is the principal one and the administrative headquarters of the district, and is situated on the right bank of the river Burabalang, about 7 m. from the sea-coast as the crow flies and 16 m. by the river. There is a station on the East Coast railway. The English settlement of Balasore, formed in 1642, and that of Pippli in its neighbourhood seven years earlier, became the basis of the future greatness of the British in India. The servants of the East India Company here fortified themselves in a strong position, and carried on a brisk investment in country goods, chiefly cottons and muslins. They flourished in spite of the oppressions of the Mahommedan governors, and when needful asserted their claims to respect by arms. In 1688, affairs having come to a crisis, Captain William Heath, commander of the company's ships, bombarded the town. In the 18th century Balasore rapidly declined in importance, on account of a dangerous bar which formed across the mouth of the river. At present the bar has 12 to 15 ft. of water at spring-tides, but not more than 2 or 3 ft. at low water in the dry season. Large ships have to anchor outside in the open roadstead. The town still possesses a large maritime trade, despite the silting-up of the river mouth. Pop. (1901) 20,880.

The district forms a strip of alluvial land between the hills and the sea, varying from about 9 to 34 m. in breadth; area, 2085 sq. m. The hill country rises from the western boundary line. The district naturally divides itself into three well-defined tracts—(1) The salt tract, along the coast; (2) The arable tract, or rice country; and (3) The submontane tract, or jungle lands. The salt tract runs the whole way down the coast, and forms a desolate strip a few miles broad. Towards the beach it rises into sandy ridges, from 50 to 80 ft. high, sloping inland and covered with a vegetation of low scrub jungle. Sluggish brackish streams creep along between banks of fetid black mud. The sandhills on the verge of the ocean are carpeted with creepers and the wild convolvulus. Inland, it spreads out into prairies of coarse long grass and scrub jungle,

which harbour wild animals in plenty; but throughout this vast region there is scarcely a hamlet, and only patches of rice cultivation at long intervals. From any part of the salt tract one may see the boundary of the inner arable part of the district fringed with long lines of trees, from which every morning the villagers drive their cattle out into the saliferous plains to graze. The salt tract is purely alluvial, and appears to be of recent date. Towards the coast the soil has a distinctly saline taste.

Salt used to be largely manufactured in the district by evaporation, but the industry is now extinct. The arable tract lies beyond the salt lands, and embraces the chief part of the district. It is a long dead-level of rich fields, with a soil lighter in colour than that of Bengal or Behar; much more friable, and apt to split up into small cubes with a rectangular cleavage. A peculiar feature of the arable tract is the *Pāts* (literally cups) or depressed lands near the river-banks. They were probably marshes that have partially silted up by the yearly overflow of the streams. These *pāts* bear the finest crops. As a whole, the arable tract is a treeless region, except around the villages, which are encircled by fine mango, *pipal*, banyan and tamarind trees, and intersected with green shady lanes of bamboo. A few palmyras, date-palms and screw-pines (a sort of aloe, whose leaves are armed with formidable triple rows of hook-shaped thorns) dot the expanse or run in straight lines between the fields. The submontane tract is an undulating country with a red soil, much broken up into ravines along the foot of the hills. Masses of laterite, buried in hard ferruginous clay, crop up as rocks or slabs. At Kopari, in Kila Ambohata, about 2 sq. m. are almost paved with such slabs, dark-red in colour, perfectly flat and polished like plates of iron. A thousand mountain torrents have scooped out for themselves picturesque ravines, clothed with an ever-fresh verdure of prickly thorns, stunted gnarled shrubs, and here and there a noble forest tree. Large tracts are covered with sal jungle, which nowhere, however, attains to any great height.

Balasore district is watered by six distinct river systems: those of the Subanrekha, the Burabalang, the Jamka, the Kansbans and the Dhamra.

The climate greatly varies according to the seasons of the year. The hot season lasts from March to June, but is tempered by cool sea-breezes; from June to September the weather is close and oppressive; and from October to February the cold season brings the north-easterly winds, with cool mornings and evenings.

Almost the only crop grown is rice, which is largely exported by sea. The country is exposed to destructive floods from the hill-rivers and also from cyclonic storm-waves. The district is traversed throughout its entire length by the navigable Orissa coast canal, and also by the East Coast railway from Calcutta to Madras. The seaports of Balasore, Chandbali and Dhamra conduct a very large coasting trade. The exports are almost confined to rice, which is sent to Ceylon, the Maldives and Mauritius. The imports consist of cotton twist and piece goods, mineral oils, metals, betel-nuts and salt. In 1901 the population was 1,071,197, an increase of 9% in the decade.

BALASSA, BÁLINT, Baron of Kékkö and Gyarmat (1551-1594), Magyar lyric poet, was born at Kékkö, and educated by the reformer, Péter Bornemissza, and by his mother, the highly gifted Protestant zealot, Anna Sulyok. His first work was a translation of Michael Bock's *Würtzgertlein für die krancken Seelen*, to comfort his father while in prison (1570-1572) for some political offence. On his father's release, Bálint accompanied him to court, and was also present at the coronation diet of Pressburg in 1572. He then joined the army and led a merry life at the fortress of Eger. Here he fell violently in love with Anna Losonczi, the daughter of the hero of Temesvár, and evidently, from his verses, his love was not unrequited. But a new mistress speedily dragged the ever mercurial youth away from her, and deeply wounded, she gave her hand to Krisztóf Ungnad. Naturally Balassa only began to realize how much he loved Anna when he had lost her. He pursued her with gifts and verses, but she remained true to her pique and to her marriage vows, and he could only enshrine her memory in immortal verse. In 1574 Bálint was sent to the camp of Gáspár Békesy to assist him against Stephen Báthory; but his troops were encountered and scattered on the way thither, and he himself was severly wounded and taken prisoner. His not very rigorous captivity lasted for two years, and he then disappears from sight. We next hear of him in 1584 as the wooer and winner of Christina Dobo, the daughter of the valiant commandant of Eger. What led him to this step we know not, but it was the cause of all his subsequent misfortunes. His wife's greedy relatives nearly ruined him by legal processes, and when in 1586 he turned Catholic to escape their persecutions they declared that he and his son had become Turks. His simultaneous desertion of his wife led to his expulsion from Hungary, and from 1589 to 1594 he led a vagabond life in Poland, sweetened by innumerable amours with damsels of every degree from cithara players to princesses. The Turkish war of 1594 recalled him to Hungary, and he died of his wounds at the siege of Esztergom the same year. Balassa's poems fall into four divisions: religious hymns, patriotic and martial songs, original love poems, and adaptations from the Latin and German. They are all most original, exceedingly objective and so excellent in point of style that it is difficult even to imagine him a contemporary of Sebastian Tinodi and Peter Ilosvay. But his erotics are his best productions. They circulated in MS. for generations and were never printed till 1874, when Farkas Deák discovered a perfect copy of them in the Radvanyi library. For beauty, feeling and transporting passion there is nothing like them in Magyar literature till we come to the age of Michael Csokonai and Alexander Petöfi. Balassa was also the inventor of the strophe which goes by his name. It consists of nine lines—a a b c c b d d b, or three rhyming pairs alternating with the rhyming third, sixth and ninth lines.

See Áron Szilády, *Bálint Balassa's Poems* (Hung.) Budapest, 1879.

(R. N. B.)

BALATON (Plattensee), the largest lake of middle Europe, in the south-west of Hungary, situated between the counties of Veszprém, Zala and Somogy. Its length is 48 m., average breadth 3½ to 4½ m., greatest breadth 7½ m., least breadth a little less than 1 m. It covers 266 sq. m. and has an extreme depth of 149 ft. Its northern shores are bordered by the beautiful basaltic cones of the Bakony mountains, the volcanic soil of which produces grapes yielding excellent wine; the southern consist partly of a marshy plain, partly of downs. The most beautiful point of the lake is that where the peninsula of Tihany projects in the waters. An ancient church of the Benedictines is here situated on the top of a hill. In a tomb therein is buried Andrew I. (d. 1061), a king of the Hungarian Arpadian dynasty. The temperature of the lake varies greatly, in a manner resembling that of the sea, and many connect its origin with a sea of the Miocene period, the waters of which are said to have covered the Hungarian plain. About fifty streams flow into the lake, which drains into the Danube and is well stocked with fish. It often freezes in winter. Lake Balaton is of growing importance as a bathing resort.

BALAYAN, a town and port of entry of the province of Batangas, Luzon, Philippine Islands, at the head of the Gulf of Balayan, about 55 m. S. by W. of Manila. Pop. (1903) 8493. Subsequently in October 1903, Calatagan (pop. 2654) and Tuy (pop. 2430) were annexed. Balayan has a healthful climate, and is in the midst of a fertile district (with a volcanic soil), which produces rice, cane-sugar, cacao, coffee, pepper, cotton, Indian corn, fruit (oranges, bananas, mangoes, &c.) and native dyes. Horses and cattle are raised for market in considerable numbers. The fisheries are important. The native language is Tagalog.

[v.03 p.0241]

BALBI, ADRIAN (1782-1848), Italian geographer, was born at Venice on the 25th of April 1782. The publication of his *Prospetto politico-geografico dello stato attuale del globo* (Venice, 1808) obtained his election to the chair of professor of geography at the college of San Michele at Murano; in 1811-1813 he was professor of physics at the Lyceum of Fermo, and afterwards became attached to the customs office at his native city. In 1820 he visited Portugal, and there collected materials for his *Essai statistique sur le royaume de Portugal et d'Algarve*, published in 1822 at Paris, where the author resided from 1821 until 1832. This was followed by *Variétés politiques et statistiques de la monarchie portugaise*, which contains some curious observations respecting that country under the Roman sway. In 1826 he published the first volume of his *Atlas ethnographique du globe, ou classification des peuples anciens et modernes d'après leurs langues*, a work of great erudition. In 1832 appeared the *Abrégé de Géographie*, which, in an enlarged form, was translated into the principal languages of Europe. Balbi retired to Padua and there died on the 14th of March 1848. His son, Eugenio Balbi (1812-1884), followed a similar career, being professor of geography at Pavia, and publishing his father's *Scritti Geografici* (Turin, 1841), and original works in *Gea, ossia la terra* (Trieste, 1854-1867) and *Saggio di geografia* (Milan, 1868).

BALBO, CESARE, Count (1789-1853), Italian writer and statesman, was born at Turin on the 21st of November 1789. His

father, Prospero Balbo, who belonged to a noble Piedmontese family, held a high position in the Sardinian court, and at the time of Cesare's birth was mayor of the capital. His mother, a member of the Azeglio family, died when he was three years old; and he was brought up in the house of his great-grandmother, the countess of Bugino. In 1798 he joined his father at Paris. From 1808 to 1814 Balbo served in various capacities under the Napoleonic empire at Florence, Rome, Paris and in Illyria. On the fall of Napoleon he entered the service of his native country. While his father was appointed minister of the interior, he entered the army, and undertook political missions to Paris and London. On the outbreak of the revolution of 1821, of which he disapproved, although he was suspected of sympathizing with it, he was forced into exile; and though not long after he was allowed to return to Piedmont, all public service was denied him. Reluctantly, and with frequent endeavours to obtain some appointment, he gave himself up to literature as the only means left him to influence the destinies of his country. This accounts for the fitfulness and incompleteness of so much of his literary work, and for the practical, and in many cases temporary, element which runs through even his most elaborate productions. The great object of his labours was to help in securing the independence of Italy from foreign control. Of true Italian unity he had no expectation and no desire, but he was devoted to the house of Savoy, which he foresaw was destined to change the fate of Italy. A confederation of separate states under the supremacy of the pope was the genuine ideal of Balbo, as it was the ostensible one of Gioberti. But Gioberti, in his *Primato*, seemed to him to neglect the first essential of independence, which he accordingly inculcated in his *Speranze* or *Hopes of Italy*, in which he suggests that Austria should seek compensation in the Balkans for the inevitable loss of her Italian provinces. Preparation, both military and moral, alertness and patience were his constant theme. He did not desire revolution, but reform; and thus he became the leader of a moderate party, and the steady opponent not only of despotism but of democracy. At last in 1848 his hopes were to some extent satisfied by the constitution granted by the king. He was appointed a member of the commission on the electoral law, and became first constitutional prime-minister of Piedmont, but only held office a few months. With the ministry of d'Azeglio, which soon after got into power, he was on friendly terms, and his pen continued the active defence of his political principles till his death on the 3rd of June 1853. The most important of his writings are historico-political, and derive at once their majesty and their weakness from his theocratic theory of Christianity. His style is clear and vigorous, and not unfrequently terse and epigrammatic. He published *Quattro Novelle* in 1829; *Storia d'Italia sotto i Barbari* in 1830; *Vita di Dante*, 1839; *Meditazioni Storiche*, 1842-1845; *Le Speranze d'Italia*, 1844; *Pensieri sulla Storia d'Italia*, 1858; *Della Monarchia rappresentativa in Italia* (Florence, 1857).

See E. Ricotti, *Della Vita e degli Scritti di Cesare Balbo* (1856); A. Vismara, *Bibliografia di Cesare Balbo* (Milan, 1882).

BALBOA, VASCO NUÑEZ DE (*c.* 1475-1517), the discoverer of the Pacific, a leading figure among the Spanish explorers and conquerors of America, was born at Jerez de los Caballeros, in Estremadura, about 1475. Though poor, he was by birth a gentleman (*hidalgo*). Little is known of his life till 1501, when he followed Rodrigo de Bastidas in his voyage of discovery to the western seas. He appears to have settled in Hispaniola, and took to cultivating land in the neighbourhood of Salvatierra, but with no great success, as his debts soon became oppressive. In 1509 the famous Ojeda (Hojeda) sailed from San Domingo with an expedition and founded the settlement of San Sebastian. He had left orders with Enciso, an adventurous lawyer of the town, to fit out two ships and convey provisions to the new settlement. Enciso set sail in 1510, and Balboa, whose debts made the town unpleasant to him, managed to accompany him by concealing himself, it is said, in a cask of "victuals for the voyage," which was conveyed from his farm to the ship. The expedition reached San Sebastian to find Ojeda gone and the settlement in ruins. While Enciso was undecided how to act, Balboa proposed that they should sail for Darien, on the Gulf of Uraba, where he had touched when with Bastidas. His proposal was accepted and a new town was founded, named Sta Maria de la Antigua del Darien; but quarrels soon broke out among the adventurers, and Enciso was deposed, thrown into prison and finally sent off to Spain with Balboa's ally, the alcalde Zamudio. Being thus left in authority, Balboa began to conquer the surrounding country, and by his bravery, courtesy, kindness of heart and just dealing gained the friendship of several native chiefs. On one of these excursions he heard for the first time, from the cacique Comogre, of the ocean on the other side of the mountains and of the gold of Peru. Soon after his return to Darien he received letters from Zamudio, informing him that Enciso had complained to the king, and had obtained a sentence condemning Balboa and summoning him to Spain. In his despair at this message Vasco Nuñez resolved to attempt some great enterprise, the success of which he trusted would conciliate his sovereign. On the 1st of September 1513 he set out with one hundred and ninety Spaniards (Francisco Pizarro among them) and one thousand natives; on the 25th or 26th of September he reached the summit of the range, and sighted the Pacific. Pizarro and two others were sent on to reconnoitre; one of these scouts, Alonzo Martin, was the first European actually to embark upon the new-found ocean, in St Michael's Gulf. On the 29th of September Balboa himself arrived upon the shore, and formally took possession of the "Great South Sea" in the name of the Spanish monarch. He remained on the coast for some time, heard again of Peru, visited the Pearl Islands, and thence returned to Darien, which he entered in triumph with a great booty on the 18th of January 1514. He at once sent messengers to Spain bearing presents, to give an account of his discoveries; and the king, Ferdinand the Catholic, partly reconciled to his daring subject, named him *Adelantado of the South Sea*, or admiral of the Pacific, and governor of Panama and Coyba. None the less an expedition sailed from Spain under Don Pedro Arias de Ávila (generally called Pedrarias Dávila) to replace Balboa in the government of the Darien colony itself. Meanwhile the latter had crossed the isthmus and revisited the Pacific several (some say more than twenty) times; plans of the conquest of Peru and of the exploration of the western ocean began to shape themselves in his mind; and with a view to these projects, materials for shipbuilding were gathered together upon the Pacific coast, and two light brigantines were built, launched and armed. With these Vasco Nuñez now took possession of the Pearl Islands, and, had it not been for the weather, would have reached the coast of Peru. But his career was stopped by the jealousy of Pedrarias, who pretended that Balboa proposed to throw off his allegiance, and enticed him to Acla, near Darien, by a crafty message. As soon as he had him in his power, he threw him into prison, had him tried for treason, and forced the judge to condemn him to death. The sentence was carried into execution on the public square of Acla in 1517. From a reckless adventurer, Balboa had developed into an able general, an excellent colonial administrator, and a statesman of mature judgment and brilliant foresight.

[v.03 p.0242]

See G. F. de Oviedo, *Historia general ... de las Indias* (1526, bk. xxxix. chs. 2, 3); D. M. T. Quintana, *Vidas de Españoles celebres*; M. F. de Navarrete, *Coleccion de los Viajes y Descubrimientos* (1825-1837); J. Acosta, *Compendio historico de la Nueva Granada* (1848); O. Peschel, *Geschichte der Erdkunde* (1865, p. 237), and *Zeitalter der Entdeckungen*, pp. 442-3 &c.; Washington Irving's *Voyages and Discoveries of the Companions of Columbus* (1831), and Varela's notes on the same in *Biblioteca del Comercio del Plata* (Monte Video); Ferdinand Denis, art. "Vasco Nuñez de Balboa," in *Nouv. Biog. Gén.*

BALBRIGGAN, a market-town and seaport of Co. Dublin, Ireland, in the north parliamentary division, 21¾ m. N.N.E. of Dublin by the Great Northern railway. Pop. (1901) 2236. The harbour, though dry at low tides, has a depth of 14 ft. at high-water springs, and affords a good refuge from the east or southeast gales. There are two piers, and a railway viaduct of eleven arches crosses the harbour. The town has considerable manufactures of cottons and hosiery, "Balbriggan hose" being well known. The industry was founded by Baron Hamilton in 1761. There is some coast trade in grain, &c., and sea-fishery is prosecuted. Balbriggan is much frequented as a watering-place in summer.

BALBUS, literally "stammerer," the name of several Roman families. Of the Acilii Balbi, one Manius Acilius Balbus was consul in 150 B.C., another in 114. To another family belonged T. Ampius Balbus, a supporter of Pompey, but afterwards pardoned by Julius Caesar (cf. Cic. *ad Fam.* vi. 12 and xiii. 70). We know also of Q. Antonius Balbus, praetor in Sicily in 82 B.C., and Marcus Atius Balbus, who married Julia, a sister of Caesar, and had a daughter Atia, mother of Augustus. The most important of the name were the two Cornelii Balbi, natives of Gades (Cadiz).

1. Lucius Cornelius Balbus (called *Major* to distinguish him from his nephew) was born early in the last century B.C. He is generally considered to have been of Phoenician origin. For his services against Sertorius in Spain, the Roman citizenship was conferred upon him and his family by Pompey. Becoming friendly with all parties, he had much to do with the formation of the First Triumvirate, and was one of the chief financiers in Rome. He was careful to ingratiate himself with Caesar, whom he accompanied when propraetor to Spain (61), and to Gaul (58) as chief engineer (*praefectus fabrum*). His position as a naturalized foreigner, his influence and his wealth naturally made Balbus many enemies, who in 56 put up a native of Gades to prosecute him for illegally assuming the rights of a Roman citizen, a charge directed against the

triumvirs equally with himself. Cicero, Pompey and Crassus all spoke on his behalf, and he was acquitted. During the civil war he endeavoured to get Cicero to mediate between Caesar and Pompey, with the object of preventing him from definitely siding with the latter; and Cicero admits that he was dissuaded from doing so, against his better judgment. Subsequently, Balbus became Caesar's private secretary, and Cicero was obliged to ask for his good offices with Caesar. After Caesar's murder, Balbus seems to have attached himself to Octavian; in 43 or 42 he was praetor, and in 40 consul—an honour then for the first time conferred on an alien. The year of his death is not known. Balbus kept a diary of the chief events in his own and Caesar's life (Suetonius, *Caesar*, 81). The 8th book of the *Bell. Gall.*, which was probably written by his friend Hirtius at his instigation, was dedicated to him.

Cicero, *Letters* (ed. Tyrrell and Purser, iv. introd. p. 62) and *Pro Balbo*; see also E. Jullien, *De L. Cornelia Balbo Maiore* (1886).

2. Lucius Cornelius Balbus (called *Minor*), nephew of the above, received the Roman citizenship at the same time as his uncle. During the civil war, he served under Caesar, by whom he was entrusted with several important missions. He also took part in the Alexandrian and Spanish wars. He was rewarded for his services by being admitted into the college of pontiffs. In 43 he was quaestor in Further Spain, where he amassed a large fortune by plundering the inhabitants. In the same year he crossed over to Bogud, king of Mauretania, and is not heard of again until 21, when he appears as proconsul of Africa. Mommsen thinks that he had incurred the displeasure of Augustus by his conduct as praetor, and that his African appointment after so many years was due to his exceptional fitness for the post. In 19 Balbus defeated the Garamantes, and on the 27th of March in that year received the honour of a triumph, which was then for the first time granted to one who was not a Roman citizen by birth, and for the last time to a private individual. He built a theatre in the capital, which was dedicated on the return of Augustus from Gaul in 13 (Dio Cassius liv. 25; Pliny, *Nat. Hist.* xxxvi. 12, 60). Balbus appears to have given some attention to literature. He wrote a play of which the subject was his visit to Lentulus in the camp of Pompey at Dyrrhachium, and, according to Macrobius (*Saturnalia*, iii. 6), was the author of a work called Ἐξηγητικά, dealing with the gods and their worship.

See Velleius Paterculus ii. 51; Cicero, *ad Att.* viii. 9; and on both the above the exhaustive articles in Pauly-Wissowa, *Realencyclopadie*, iv. pt. i. (1900).

BALCONY (Ital. *balcōne* from *balco*, scaffold; cf. O. H. Ger. *balcho*, beam, Mod. Ger. *Balken*, Eng. *balk*), a kind of platform projecting from the wall of a building, supported by columns or console brackets, and enclosed with a balustrade. Sometimes balconies are adapted for ceremonial purposes, *e.g.* that of St Peter's at Rome, whence the newly elected pope gives his blessing *urbi et orbi*. Inside churches balconies are sometimes provided for the singers, and in banqueting halls and the like for the musicians. In theatres the "balcony" was formerly a stage-box, but the name is now usually confined to the part of the auditorium above the dress circle and below the gallery.

BALDE, JAKOB (1604-1668), German Latinist, was born at Ensisheim in Alsace on the 4th of January 1604. Driven from Alsace by the marauding bands of Count Mansfeld, he fled to Ingolstadt where he began to study law. A love disappointment, however, turned his thoughts to the church, and in 1624 he entered the Society of Jesus. Continuing his study of the humanities, he became in 1628 professor of rhetoric at Innsbruck, and in 1635 at Ingolstadt, whither he had been transferred by his superiors in order to study theology. In 1633 he was ordained priest. His lectures and poems had now made him famous, and he was summoned to Munich where, in 1638, he became court chaplain to the elector Maximilian I. He remained in Munich till 1650, when he went to live at Landshut and afterwards at Amberg. In 1654 he was transferred to Neuberg on the Danube, as court preacher and confessor to the count palatine. In the opinion of his contemporaries, Balde revived the glories of the Augustan age, and Pope Alexander VII. and the scholars of the Netherlands combined to do him honour; even Herder regarded him as a greater poet than Horace. While such judgments are naturally exaggerated, there is no doubt that he takes a very high place among modern Latin poets. He died at Neuberg on the 9th of August 1668.

A collected edition of Balde's works in 4 vols. was published at Cologne in 1650; a more complete edition in 8 vols. at Munich, 1729; also a good selection by L. Spach (Paris and Strassburg, 1871). An edition of his Latin lyrics appeared at Regensburg in 1884. There are translations into German of his finer odes, by J. Schrott and M. Schleich (Munich, 1870). See G. Westermayer, *Jacobus Balde, sein Leben und seine Werke* (1868); J. Bach, *Jakob Balde* (Freiburg, 1904).

BALDER, a Scandinavian god, the son of Odin or Othin. The story of his death is given in two widely different forms, by Saxo in his *Gesta Danorum* (ed. Holder, pp. 69 ff.) and in the prose Edda (*Gylfaginning*, cap. 49).

See F. Kauffmann, *Balder: Mythus und Sage* (Strassburg, 1902). For other works, see Teutonic Peoples, § 7.

BALDERIC, the name given to the author of a chronicle of the bishops of Cambrai, written in the 11th century. This *Gesta episcoporum Cambracensium* was for some time attributed to Balderic, archbishop of Noyon, but it now seems tolerably certain that the author was an anonymous canon of Cambrai. The work is of considerable importance for the history of the north of France during the 11th century, and was first published in 1615. The best edition is in the *Monumenta Germaniae historica. Scriptores*, Bd. vii. (Hanover and Berlin, 1826-1892), which contains an introduction by L. C. Bethmann.

[v.03 p.0243]

See *Histoire littéraire de la France*, tome viii. (Paris, 1865-1869).

BALDI, BERNARDINO (1533-1617), Italian mathematician and miscellaneous writer, was descended of a noble family at Urbino, in which city he was born on the 6th of June 1533. He pursued his studies at Padua with extraordinary zeal and success, and is said to have acquired, during the course of his life, no fewer than sixteen languages, though according to Tiraboschi the inscription on his tomb limits the number to twelve. The appearance of the plague at Padua obliged him to retire to his native city, whence he was, shortly afterwards, called to act as tutor to Ferrante (Ferdinand) Gonzaga, from whom he received the rich abbey of Guastalla. He held office as abbot for twenty-five years, and then retired to his native town. In 1612 he was employed by the duke as his envoy to Venice, where he distinguished himself by the congratulatory oration he delivered before the Venetian senate on the election of the new doge, Andrea Memmo. Baldi died at Urbino on the 12th of October 1617. He was, perhaps, the most universal genius of his age, and is said to have written upwards of a hundred different works, the chief part of which have remained unpublished. His various works give satisfactory evidence of his abilities as a theologian, mathematician, geographer, antiquary, historian and poet. The *Cronica dei Matematici* (published at Urbino in 1707) is an abridgment of a larger work, on which he had bestowed twelve years of labour, and which was intended to contain the lives of more than two hundred mathematicians. His life has been written by Affò, Mazzuchelli and others.

BALDINGER, ERNST GOTTFRIED (1738-1804), German physician, was born near Erfurt on the 13th of May 1738. He studied medicine at Erfurt, Halle and Jena, and in 1761 was entrusted with the superintendence of the military hospitals connected with the Prussian encampment near Torgau. He published in 1765 a treatise *De Militum Morbis*, which met with a favourable reception. In 1768 he became professor of medicine at Jena, whence he removed in 1773 to Göttingen, and in 1785 to Marburg, where he died of apoplexy on the 21st of January 1804. Among his pupils were S. T. Sömmerring and J. F. Blumenbach. Some eighty-four separate treatises are mentioned as having proceeded from his pen, in addition to numerous papers scattered through various collections and journals.

BALDINUCCI, FILIPPO (1624-1696), Italian writer on the history of the arts, was born at Florence. His chief work is entitled *Notizie de' Professori del Disegno da Cimabue ... (dal 1260 sino al 1670)*, and was first published in six vols. 4to, 1681-1728. The capital defect of this work is the attempt to derive all Italian art from the schools of Florence. A good edition is that by Ranalli (5 vols. 8vo, Florence, 1845-1847). Baldinucci's whole works were published in fourteen vols. at Milan, 1808-1812.

BALDNESS[1] (technically *alopecia*, from ἀλώπεξ, a fox, foxes often having bald patches on their coats), the result of loss of hair, particularly on the human scalp. So far as remediable alopecia is concerned, two forms may be distinguished: one

the premature baldness so commonly seen in young men, due to alopecia seborrhoica, the other alopecia areata, now regarded as an epidemic disease.

Alopecia seborrhoica is that premature baldness so constantly seen, in which the condition steadily advances from the forehead backwards, until only a fringe of hair is left on the head. It is always due to the underlying disease seborrhoea, and though it progresses steadily if neglected, is yet very amenable to treatment. The two drugs of greatest value in this trouble are sulphur and salicylic acid, some eighteen grains of each added to an ounce of vaseline making a good application. This should be rubbed well into the scalp daily for a prolonged period. Where the greasiness is objected to, the following salicylic lotion may be substituted, though the vaseline application has probably the greater value: ℞ Ac. salicyl. ʒ i-iv; Ol. ricini ʒ ii-iv; Ol. ros. geran. ℳ x; Spt. vini ad ℥ vi. The head must be frequently cleansed, and in very mild cases a daily washing with soap spirit will at times effect a cure unaided.

Alopecia areata is characterized by the development of round patches more or less completely denuded of hair. It is most commonly observed on the scalp, though it may occur on any part of the body where hair is naturally present. The patches are rounded, smooth and somewhat depressed owing to the loss of a large proportion of the follicles. At the margin of the patches short broken hairs are usually to be seen. Clinical evidence is steadily accumulating to show that this disease may be transmitted. Organisms are invariably present, in some cases few in number, but in others very abundant and forming a continuous sheath round the hair. They were first described by Dr George Thin, who gave them the name of *Bacterium decalvens*. The disease must be distinguished from ringworm—especially the bald variety; but though this is at times somewhat difficult clinically, the use of the microscope leaves no room for doubt. It must be remembered that for patients under forty years of age, time alone will generally bring about the desired end, though treatment undoubtedly hastens recovery. After forty every year added to the patient's age makes the prognosis less good. The general hygiene and mode of life of the sufferer must be very carefully attended to, and any weakness suitably treated. The following lotion should be applied daily to the affected parts, at first cautiously, later more vigorously, and in stronger solution:—℞ Acidi lactici ʒ i-℥ i; Ol. ricini ʒ ii; Spt. vini ad ℥ iv.

The loss of hair following acute fevers must be treated by keeping the hair short, applying stimulating lotions to the scalp, and attending to the general hygiene of the patient.

[1] The adjective "bald" M. E. "balled" is usually explained as literally "round and smooth like a ball," but it may be connected with a stem *bal*, white or shining. The Greek φαλακρός certainly suggests some such derivation.

BALDOVINETTI, ALESSIO (1427-1499), Florentine painter, was born on the 14th of October 1427, and died on the 29th of August 1499. He was a follower of the group of scientific realists and naturalists in art which included Andrea del Castagno, Paolo Uccello and Domenico Veneziano, the influence of the last-named master being particularly manifest in his work. Tradition, probable in itself though not attested by contemporary records, says that he assisted in the decorations of the chapel of S. Egidio in Santa Maria Nuova, carried out during the years 1441-1451 by Domenico Veneziano and in conjunction with Andrea del Castagno. That he was commissioned to complete the series at a later date (1460) is certain. In 1462 Alessio was employed to paint the great fresco of the Annunciation in the cloister of the Annunziata, which still exists in ruined condition. The remains as we see them give evidence of the artist's power both of imitating natural detail with minute fidelity and of spacing his figures in a landscape with a large sense of air and distance; and they amply verify two separate statements of Vasari concerning him: that "he delighted in drawing landscapes from nature exactly as they are, whence we see in his paintings rivers, bridges, rocks, plants, fruits, roads, fields, cities, exercise-grounds, and an infinity of other such things," and that he was an inveterate experimentalist in technical matters. His favourite method in wall-painting was to lay in his compositions in fresco and finish them *a secco* with a mixture of yolk of egg and liquid varnish. This, says Vasari, was with the view of protecting the painting from damp; but in course of time the parts executed with this vehicle scaled away, so that the great secret he hoped to have discovered turned out a failure. In 1463 he furnished a cartoon of the Nativity, which was executed in tarsia by Giuliano de Maiano in the sacristy of the cathedral and still exists. From 1466 date the groups of four Evangelists and four Fathers of the Church in fresco, together with the Annunciation on an oblong panel, which still decorate the Portuguese chapel in the church of S. Miniato, and are given in error by Vasari to Pietro Pollaiuolo. A fresco of the risen Christ between angels inside a Holy Sepulchre in the chapel of the Rucellai family, also still existing, belongs to 1467. In 1471 Alessio undertook important works for the church of Sta Trinità on the commission of Bongianni Gianfigliazzi. First, to paint an altar-piece of
[v.03 p.0244]
the Virgin and Child with six saints; this was finished in 1472 and is now in the Academy at Florence: next, a series of frescoes from the Old Testament which was to be completed according to contract within five years, but actually remained on hand for fully sixteen. In 1497 the finished series, which contained many portraits of leading Florentine citizens, was valued at a thousand gold florins by a committee consisting of Cosimo Rosselli, Benozzo Gozzoli, Perugino and Filippino Lippi; only some defaced fragments of it now remain. Meanwhile Alessio had been much occupied with other technical pursuits and researches apart from painting. He was regarded by his contemporaries as the one craftsman who had rediscovered and fully understood the long disused art of mosaic, and was employed accordingly between 1481 and 1483 to repair the mosaics over the door of the church of S. Miniato, as well as several of those both within and without the baptistery of the cathedral.

These are the recorded and datable works of the master; others attributed to him on good and sufficient internal evidences are as follows:—A small panel in the Florence Academy, with the three subjects of the Baptism, the Marriage of Cana and the Transfiguration; this was long attributed to Fra Angelico, but is to all appearance early work of Baldovinetti: an Annunciation in the Uffizi, formerly in the church of S. Giorgio; unmistakably by the master's hand though given by Vasari to Peselino: several Madonnas of peculiarly fine and characteristic quality; one in the collection of Madame André at Paris acquired direct from the descendants of the painter, a second, formerly in the Duchâtel collection and now in the Louvre, a third in the possession of Mr Berenson at Florence. All these are executed with the determined patience and precision characteristic of Baldovinetti; two, those at the Louvre and in the André collection, are distinguished by beautiful landscape backgrounds; and all, but especially the example in the Louvre, add a peculiar and delicate charm to the quality of grave majesty which Alessio's works share with those of Piero della Francesca and others of Domenico Veneziano's following. They probably belong to the years 1460-1465. In the later of his preserved works, while there is no abatement of precise and laborious finish, we find beginning to prevail a certain harshness and commonness of type, and a lack of care for beauty in composition, the technical and scientific searcher seeming more and more to predominate over the artist.

See also Vasari, ed. Milanesi, vol. ii.; Crowe-Cavalcaselle, *Hist. of Painting in Italy*, vol. ii.; Bernhard Berenson, *Study and Criticism of Italian Art*, 2nd series.

(S. C.)

BALDRIC (from O. Fr. *baudrei*, O. Ger. *balderich*, of doubtful origin; cognate with English "belt"), a belt worn over one shoulder, passing diagonally across the body and under the other arm, either as an ornament or a support for a sword, bugle, &c.

BALDUINUS, JACOBUS, Italian jurist of the 13th century, was by birth a Bolognese, and is reputed to have been of a noble family. He was a pupil of Azo, and the master of Odofredus, of Hostiensis, and of Jacobus de Ravanis, the last of whom has the reputation of having first applied dialectical forms to legal science. His great fame as a professor of civil law at the university of Bologna caused Balduinus to be elected *podestà* of the city of Genoa, where he was entrusted with the reforms of the law of the republic. He died at Bologna in 1225, and has left behind him some treatises on procedure, the earliest of their kind.

BALDUS DE UBALDIS, PETRUS (1327-1406), Italian jurist, a member of the noble family of the Ubaldi (Baldeschi), was born at Perugia in 1327, and studied civil law there under Bartolus, being admitted to the degree of doctor of civil law at the early age of seventeen. Federicus Petrucius of Siena is said to have been the master under whom he studied canon law. Upon his promotion to the doctorate he at once proceeded to Bologna, where he taught law for three years; after

which he was advanced to a professorship at Perugia, where he remained for thirty-three years. He taught law subsequently at Pisa, at Florence, at Padua and at Pavia, at a time when the schools of law in those universities disputed the palm with the school of Bologna. He died at Pavia on the 28th of April 1406. The extant works of Baldus hardly bear out the great reputation which he acquired amongst his contemporaries, due partly to the active part he took in public affairs, and partly to the fame he acquired by his consultations, of which five volumes have been published (Frankfort, 1589). Baldus was the master of Pierre Roger de Beaufort, who became pope under the title of Gregory XI., and whose immediate successor, Urban VI., summoned Baldus to Rome to assist him by his consultations in 1380 against the anti-pope Clement VII. Cardinal de Zabarella and Paulus Castrensis were also amongst his pupils. His *Commentary on the Liber Feudorum*, is considered to be one of the best of his works, which were unfortunately left by him for the most part in an incomplete state. His brothers Angelus (1328-1407) and Petrus (1335-1400) were of almost equal eminence with himself as jurists.

BALDWIN I. (d. 1205), emperor of Romania, count of Flanders and Hainaut, was one of the most prominent leaders of the fourth crusade, which resulted in the capture of Constantinople, the conquest of the greater part of the East Roman empire, and the foundation of the Latin empire of Romania. The imperial crown was offered to, and refused by, Henry Dandolo, doge of Venice. The choice then lay between Baldwin and Boniface of Montferrat. Baldwin was elected (9th of May 1204), and crowned a week later. He was young, gallant, pious and virtuous, one of the few who interpreted and observed his crusading vows strictly; the most popular leader in the host. The empire of Romania was organized on feudal principles; the emperor was feudal superior of the princes who received portions of the conquered territory. His own special portion consisted of Constantinople, the adjacent regions both on the European and the Asiatic side, along with some outlying districts, and several islands including Lemnos, Lesbos, Chios and Tenos. The territories had still to be conquered; and first of all it was necessary to break the resistance of the Greeks in Thrace and secure Thessalonica. In this enterprise (summer of 1204) Baldwin came into collision with Boniface of Montferrat, the rival candidate for the empire, who was to receive a large territory in Macedonia with the title of king of Saloniki. He hoped to make himself quite independent of the empire, to do no homage for his kingdom, and he opposed Baldwin's proposal to march to Thessalonica. The antagonism between Flemings and Lombards aggravated the quarrel. Baldwin insisted on going to Thessalonica; Boniface laid siege to Hadrianople, where Baldwin had established a governor; civil war seemed inevitable. An agreement was effected by the efforts of Dandolo and the count of Blois. Boniface received Thessalonica as a fief from the emperor, and was appointed commander of the forces which were to march to the conquest of Greece.

During the following winter (1204-1205) the Franks prosecuted conquests in Bithynia, in which Henry, Baldwin's brother, took part. But in February the Greeks revolted in Thrace, relying on the assistance of John (Kaloyan), king of Bulgaria, whose overtures of alliance had been unwisely rejected by the emperor. The garrison of Hadrianople was expelled. Baldwin along with Dandolo, the count of Blois, and Marshal Villehardouin, the historian, marched to besiege that city. The Bulgarian king led to its relief an army which far outnumbered that of the crusaders. The Frank knights fought desperately, but were utterly defeated (14th of April 1205); the count of Blois was slain, and the emperor captured. For some time his fate was uncertain, and in the meanwhile Henry, his brother, assumed the regency. Not till the middle of July was it definitely ascertained that he was dead. It seems that he was at first treated well as a valuable hostage, but was sacrificed by the Bulgarian monarch in a sudden outburst of rage, perhaps in consequence of the revolt of Philippopolis, which passed into the hands of the Franks. One contemporary writer says that his hands and feet were cut off, and he was thrown into a valley where he died on the third day; but the manner of his death is obscure. King John himself wrote to Pope Innocent III. that he died in prison. His brother Henry was crowned emperor in August.

[v.03 p.0245]

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(J. B. B.)

BALDWIN II. (1217-1273), emperor of Romania, was a younger son of Yolande, sister of Baldwin I. Her husband, Peter of Courtenay, was third emperor of Romania, and had been followed by his son Robert, on whose death in 1228 the succession passed to Baldwin, a boy of eleven years old. The barons chose John of Brienne (titular king of Jerusalem) as emperor-regent for life; Baldwin was to rule the Asiatic possessions of the empire when he reached the age of twenty, was to marry John's daughter Mary, and on John's death to enjoy the full imperial sovereignty. The marriage contract was carried out in 1234. Since the death of the emperor Henry in 1216, the Latin empire had declined and the Greek power advanced; and the hopes that John of Brienne might restore it were disappointed. He died in 1237. The realm which Baldwin governed was little more than Constantinople. His financial situation was desperate, and his life was chiefly occupied in begging at European courts. He went to the West in 1236, visited Rome, France and Flanders, trying to raise money and men to recover the lost territory of his realm. His efforts met with success, and in 1240 he returned to Constantinople (through Germany and Hungary) at the head of a considerable army. Circumstances hindered him from accomplishing anything with this help, and in 1245 he travelled again to the West, first to Italy and then to France, where he spent two years. The empress Maria and Philip of Toucy governed during his absence. He was happy to be able to get money from King Louis IX. in exchange for relics. In 1249 he was with King Louis at Damietta. The extremity of his financial straits reduced him soon afterwards to handing over his only son Philip to merchants as a pledge for loans of money. Louis IX. redeemed the hostage. The rest of his inglorious reign was spent by Baldwin in mendicant tours in western Europe. In 1261 Constantinople was captured by Michael Palaeologus, and Baldwin's rule came to an end. He escaped in a Venetian galley to Negropont, and then proceeded to Athens, thence to Apulia, finally to France. As titular emperor, his rôle was still the same, to beg help from the western powers. In 1267 he went to Italy; his hopes were centred in Charles of Anjou. Charles seriously entertained the idea of conquering Constantinople, though various complications hindered him from realizing it. He made a definite treaty with Baldwin to this intent (May 1267). During the next year Baldwin and his son Philip lived on pensions from Charles. In October 1273 Philip married Beatrice, daughter of Charles, at Foggia. A few days later Baldwin died.

See authorities for BALDWIN I. above; also Norden, *Das Papsttum und Byzanz* (Berlin 1903).

(J. B. B.)

BALDWIN I., prince of Edessa (1098-1100), and first king of Jerusalem (1100-1118), was the brother of Godfrey of Bouillon (*q.v.*). He was originally a clerk in orders, and held several prebends; but in 1096 he joined the first crusade, and accompanied his brother Godfrey as far as Heraclea in Asia Minor. When Tancred left the main body of the crusaders at Heraclea, and marched into Cilicia, Baldwin followed, partly in jealousy, partly from the same political motives which animated Tancred. He wrested Tarsus from Tancred's grip (September 1097), and left there a garrison of his own. After rejoining the main army at Marash, he received an invitation from an Armenian named Pakrad, and moved eastwards towards the Euphrates, where he occupied Tell-bashir. Another invitation followed from Thoros of Edessa; and to Edessa Baldwin came, first as protector, and then, when Thoros was assassinated, as his successor (March 1098). For two years he ruled in Edessa (1098-1100), marrying an Armenian wife, and acting generally as the intermediary between the crusaders and the Armenians. During these two years he was successful in maintaining his ground, both against the Mahommedan powers by which he was surrounded, and from which he won Samosata and Seruj (Sarorgia), and against a conspiracy of his own subjects in 1098. At the end of 1099 he visited Jerusalem along with Bohemund I.; but he returned to Edessa in January 1100. On the death of Godfrey he was summoned by a party in Jerusalem to succeed to his brother. A lay reaction against the theocratic pretensions of Dagobert, who was counting on Norman support, was responsible for

the summons; and in the strength of that reaction Baldwin was able to become the first king of Jerusalem. He was crowned on Christmas Day, 1100, by the patriarch himself; but the struggle of church and state was not yet over, and in the spring of 1101 Baldwin had Dagobert suspended by a papal legate, while later in the year the two disagreed on the question of the contribution to be made by the patriarch towards the defence of the Holy Land. The struggle ended in the deposition of Dagobert and the triumph of Baldwin (1102).

As Baldwin had secured the supremacy of the lay power in Jerusalem, so he extended into a compact kingdom the poor and straggling territories to which he had succeeded. This he did by an alliance with the Italian trading towns, especially Genoa, which supplied in return for the concession of a quarter in the conquered towns, the instruments and the skill for a war of sieges, in which the coast towns of Palestine were successively reduced. Arsuf and Caesarea were captured in 1101; Acre in 1104; Beirut and Sidon in 1110 (the latter with the aid of the Venetians and Norwegians). Meanwhile Baldwin repelled in successive years the attacks of the Egyptians (1102, 1103, 1105), and in the latter years of his reign (1115-1118) he even pushed southward at the expense of Egypt, penetrating as far as the Red Sea, and planting an outpost at Monreal. In the north he had to compose the dissensions of the Christian princes in Tripoli, Antioch and Edessa (1109-1110), and to help them to maintain their ground against the Mahommedan princes of N.E. Syria, especially Maudud and Aksunk-ur, amirs of Mosul. In this way Baldwin was able to make himself into practical suzerain of the three Christian principalities of the north, though the suzerainty was, and always continued to be, somewhat nominal. In 1118 he died, after an expedition to Egypt, during which he captured Farama, and, as old Fuller says, "caught many fish, and his death in eating them."

Baldwin was one of the "adventurer princes" of the first crusade, and as such he stands alongside of Bohemund, Tancred and Raymund. On the whole he was the most successful of his class. By his defence of the lay power against a nascent theocracy, and by his alliance with the Italian towns, he was the real founder of the Latin kingdom of Jerusalem. Events worked for him: he might never have come to the throne, unless Bohemund had fallen into the hands of Danishmend; and the dissensions among the Mahommedans alone made possible the subsequent consolidation of his kingdom. But he had *virtù* as well as *fortuna*; and on his tombstone it was written that he was "a second Judas Maccabaeus, whom Kedar and Egypt, Dan and Damascus dreaded." As king, he still retained something of the clerk in the habit of his dress; but he was at the same time a warrior so impetuous, as to be sometimes foolhardy, and his policy was on the whole anti-clerical. He may be accused of greed: his life was not chaste; and the two defects met in his rejection of his Armenian wife and his marriage to the rich Sicilian widow Adelaide (1113). But "on the holiest soil of history, he gave his people a fatherland"; and Fulcher of Chartres, his chaplain, who paints at the beginning of Baldwin's reign the terrors of the lonely band of Christians in the midst of their foes, can celebrate at the end the formation of a new nation in the East (*qui fuimus occidentales, nunc facti sumus orientales*)—an achievement which, so far as it was the work of any one man, was the work of Baldwin I.

[v.03 p.0246]

LITERATURE.—The *Historia Hierosolymitana* of Fulcher, who had accompanied Baldwin as chaplain to Edessa, and had lived in Jerusalem during his reign, is the primary authority for Baldwin's career. There is a monograph on Baldwin by Wolff (*König Baldwin I. von Jerusalem*), and his reign is sketched in R. Röhricht's *Geschichte des Königreichs Jerusalem* (Innsbruck, 1898) C. i.-iv.

(E. BR.)

BALDWIN II., count of Edessa (1100-1118), king of Jerusalem (1118-1131), originally known as Baldwin de Burg, was a son of Count Hugh of Rethel, and a nephew of Godfrey of Bouillon and Baldwin I. He appears on the first crusade at Constantinople as one of Godfrey's men; and he helped Tancred to occupy Bethlehem in June 1099. After the capture of Jerusalem he served for a time with Bohemund at Antioch; but when Baldwin of Edessa became king of Jerusalem, he summoned Baldwin de Burg, and left him as count in Edessa. From Edessa Baldwin conducted continual forays against the Mahommedan princes; and in the great foray of 1104, in which he was joined by Bohemund, he was defeated and captured at Balich. Tancred became guardian of Edessa during Baldwin's captivity, and did not trouble himself greatly to procure his release. Baldwin, however, recovered his liberty at the beginning of 1108, and at once entered upon a struggle with Tancred for the recovery of Edessa. In September 1108 he regained his principality; but the struggle with Tancred continued, until it was composed by Baldwin in 1109. For the next ten years Baldwin ruled his principality with success, if not without severity. Planted in the farthest Christian outpost in northern Syria, he had to meet many attacks, especially from Mardin and Mosul, in revenge for the provocation offered by his own forays and those of the restless Tancred. In 1110 he was besieged in Edessa, and relieved by Baldwin I.; in 1114 he repelled an attack by Aksunkur of Mosul; in 1115 he helped to defeat Aksunkur at Danith. At the same time, if Matthew of Edessa may be trusted, he also carried his arms against the Armenians, and plundered in his avarice every Armenian of wealth and position. In 1118 he was on his way to spend Easter at Jerusalem, when he received the news of the death of Baldwin I.; and when he arrived at Jerusalem, he was made king, chiefly by the influence of the patriarch Arnulf. In a reign of thirteen years, Baldwin II. extended the kingdom of Jerusalem to its widest limits. His reign is marked by almost incessant fighting in northern Syria. In 1119, after the defeat and death of Roger of Antioch, he defeated the amirs of Mardin and Damascus at Danith; in subsequent years he extended his sway to the very gates of Aleppo. In 1123 he was captured by Balak of Mardin, and confined in Kharput with Joscelin, his successor in the county of Edessa, who had been captured in the previous year. During his captivity Eustace Graverius became regent of Jerusalem, and succeeded, with the aid of the Venetians, in repelling an Egyptian attack, and even in capturing Tyre, 1124. In 1124 Baldwin II. succeeded in securing his liberty, under conditions which he instantly broke; and he at once embarked on strenuous and not unsuccessful hostilities against Aleppo and Damascus (1124-1127), exacting tribute from both. During his reign he twice acted as regent in Antioch (1119, 1130), and in 1126 he married his daughter Alice to Bohemund II. In 1128 he offered the hand of his eldest daughter, Melisinda, to Fulk of Anjou, who had been recommended to him by Honorius II. In 1129 Fulk came and married Melisinda, and in 1131, on the death of Baldwin, he succeeded to the crown.

Baldwin II. had much of the churchmanship of Godfrey and Baldwin I.; but he appears most decidedly as an incessant warrior, under whom the Latin domination in the East stretched, as Ibn al-Athir writes, in a long line from Mardin in the North to el-Arish on the Red Sea—a line only broken by the Mahommedan powers of Aleppo, Hamah, Homs and Damascus. The Franks controlled the great routes of trade, and took tolls of the traders; and in 1130 their power may be regarded as having reached its height.

LITERATURE.—Fulcher of Chartres narrates the reign of Baldwin II. down to 1127; for the rest of the reign the authority is William of Tyre. R. Röhricht, *Geschichte des Königreichs Jerusalem* (Innsbruck, 1898), C. vii.-x., is the chief modern authority.

(E. BR.)

BALDWIN III., king of Jerusalem (1143-1162), was the eldest son of Fulk of Jerusalem by his wife Melisinda. He was born in 1130, and became king in 1143, under the regency of his mother, which lasted till 1152. He came to the throne at a time when the attacks of the Greeks in Cilicia, and of Zengi on Edessa, were fatally weakening the position of the Franks in northern Syria; and from the beginning of his reign the power of the Latin kingdom of Jerusalem may be said to be slowly declining, though as yet there is little outward trace of its decay to be seen. Edessa was lost, however, in the year after Baldwin's accession, and the conquest by Zengi of this farthest and most important outpost in northern Syria was already a serious blow to the kingdom. Upon it in 1147 there followed the second crusade; and in that crusade Baldwin III., now some eighteen years of age, played his part by the side of Conrad III. and Louis VII. He received them in Jerusalem in 1148; with them he planned the attack on Damascus and with them he signally failed in the attack. In 1149, after the failure of the crusade, Baldwin III. appeared in Antioch, where the fall of Raymund, the husband of the princess Constance, made his presence necessary. He regulated affairs in Antioch, and tried to strengthen the north of Palestine generally against the arm of Zengi's successor, Nureddin, by renewing the old and politic alliance with Damascus interrupted since 1147, and by ceding Tellbashir, the one remnant of the county of Edessa, to Manuel of Constantinople. In 1152 came the inevitable struggle between the young king and his mother, who had ruled with wisdom and vigour

during the regency and was unwilling to lay down the reins of power. Baldwin originally planned a solemn coronation, as the signal of his emancipation. Dissuaded from that course, he nevertheless wore his crown publicly in the church of the Sepulchre. A struggle followed: in the issue, Baldwin agreed to leave his mother in possession of Jerusalem and Nablus, while he retained Acre and Tyre for himself. But he repented of the bargain; and a new struggle began, in which Baldwin recovered, after some fighting, the possession of his capital. From these internal dissensions Baldwin was now summoned to the north, to regulate anew the affairs of Antioch and also those of Tripoli, where the death of Count Raymund had thrown on his shoulders the cares of a second regency. On his return to Jerusalem he was successful in repelling an attack by an army of Turcomans; and his success encouraged him to attempt the siege of Ascalon in the spring of 1153. He was successful: the "bride of Syria," which had all but become the property of the crusaders in 1099, but had since defied the arms of the Franks for half a century, became part of the kingdom of Jerusalem. From 1156 to 1158 Baldwin was occupied in hostilities with Nureddin. In 1156 he had to submit to a treaty which cut short his territories; in the winter of 1157-1158 he besieged and captured Harim, in the territory once belonging to Antioch: in 1158 he defeated Nureddin himself. In the same year Baldwin married Theodora, a near relative of the East Roman emperor Manuel; while in 1159 he received a visit from Manuel himself at Antioch. The Latin king rode behind the Greek emperor, without any of the insignia of his dignity, at the entry into Antioch; but their relations were of the friendliest, and Manuel—as great a physician as he was a hunter—personally attended to Baldwin when the king was thrown from his horse in attempting to equal the emperor's feats of horsemanship. In the same year Baldwin had to undertake the regency in Antioch once more, Raynald of Chatillon, the second husband of Constance, being captured in battle. Three years later he died (1162), without male issue, and was succeeded by his brother Amalric I.

Baldwin III. was the first of the kings of Jerusalem who was a native of the soil of Palestine. His three predecessors had all been emigrants from the West. His reign also marks a new departure from another point of view. His predecessors had been men of a type half military, half clerical—at once hard fighters and sound churchmen. Baldwin was a man of a subtler type—a man capable of dealing with the intrigues of a court and with problems of law, and, as such, suited for guiding the middle age of the kingdom, which the different qualities of his predecessors had been equally suited to found.
[v.03 p.0247]
Like his brother, Amalric I., he was a clerkly and studious king versed in law, and ready to discuss points of dogma. In an excellent sketch of Baldwin's character (xvi. cii.), William of Tyre tells us that he spent his spare time in reading and had a particular affection for history; that he was well skilled in the *jus consuetudinarium* of the kingdom (afterwards recorded by lawyers like John of Ibelin and Philip of Novara as "the assizes of Jerusalem"); and that he had the royal faculty for remembering faces, and could generally be trusted to address by name anybody whom he had once met, so that he was more popular with high and low than any of his predecessors. He had, William also reports, a gift of impromptu eloquence, and a faculty both for saying witty things pleasantly at other people's expense and for listening placidly to witticisms directed against himself; while he was generous to excess without needing to make exactions in order to support his generosity, and always respected the Church. If in his youth he had been prone to gambling, and before his marriage with Theodora had been somewhat lax in his morals, when he became a man he put away childish things; his married life was a shining example to his people and he was abstemious both in food and drink, holding that "excess in either was an incentive to the worst of crimes." Even his enemy, Nureddin, said of him, when he died—"the Franks have lost such a prince that the world has not now his like."

LITERATURE.—William of Tyre is the great primary authority for his reign; Cinnamus and Ibn-al-athir (see *Bibliography* to the article CRUSADES) give the Byzantine and Mahommedan point of view. His reign is described by R. Röhricht, *Geschichte des Königreichs Jerusalem* (Innsbruck, 1898), C. xiii.-xvi.

(E. BR.)

BALDWIN IV., the son of Amalric I. by his first wife Agnes, ruled in Jerusalem from 1174 to 1183, when he had his nephew Baldwin crowned in his stead. Educated by William of Tyre, Baldwin IV. came to the throne at the early age of thirteen; and thus the kingdom came under the regency of Raymund II. of Tripoli. Happily for the kingdom whose king was a child and a leper, the attention of Saladin was distracted for several years by an attempt to wrest from the sons of Nureddin the inheritance of their father—an attempt partially successful in 1174, but only finally realized in 1183. The problems of the reign of Baldwin IV. may be said to have been two—his sister Sibylla and the fiery Raynald of Chatillon, once prince of Antioch through marriage to Constance (1153-1159), then a captive for many years in the hand of the Mahommedans, and since 1176 lord of Krak (Kerak), to the east of the Dead Sea. Sibylla was the heiress of the kingdom; the problem of her marriage was important. Married first to William of Montferrat, to whom she bore a son, Baldwin, she was again married in 1180 to Guy of Lusignan; and dissensions between Sibylla and her husband on the one side, and Baldwin IV. on the other, troubled the latter years of his reign. Meanwhile Raynald of Krak took advantage of the position of his fortress, which lay on the great route of trade from Damascus and Egypt, to plunder the caravans (1182), and thus helped to precipitate the inevitable attack by Saladin. When the attack came, Guy of Lusignan was made regent by Baldwin IV., but he declined battle and he was consequently deposed both from his regency and from his right of succession, while Sibylla's son by her first husband was crowned king as Baldwin V. in 1183. For a time Baldwin IV. still continued to be active; but in 1184 he handed over the regency to Raymund of Tripoli, and in 1185 he died.

LITERATURE.—The narrative of William of Tyre concludes with Baldwin IV.'s transfer of the regency to Raymund of Tripoli. R. Röhricht describes the reign of Baldwin IV., *Geschichte des Königreichs Jerusalem* (Innsbruck, 1898), C. xix.-xxi.

(E. BR.)

BALDWIN V., the son of Sibylla (daughter of Amalric I.) by her first husband, William of Montferrat, was the nominal king of Jerusalem from 1183 to 1186, under the regency of Raymund of Tripoli. His reign is marked by the advance of Saladin and by dissensions between the government and Guy of Lusignan.

BALDWIN, JAMES MARK (1861-), American philosopher, was born at Columbia, S.C., and educated at Princeton and several German universities. He was professor of philosophy in the university of Toronto (1889), of psychology at Princeton (1893), and subsequently (1903) of philosophy and psychology in Johns Hopkins University. Prominent among experimental psychologists, he was one of the founders of the *Psychological Review*. In 1892 he was vice-president of the International Congress of Psychology held in London, and in 1897-1898 president of the American Psychological Association; he received a gold medal from the Royal Academy of Arts and Sciences of Denmark (1897), was honorary president of the International Congress of Criminal Anthropology held in Geneva in 1896, and was made an honorary D.Sc. of Oxford University. Apart from articles in the *Psychological Review*, he has written:—*Handbook of Psychology* (1890); translation of Ribot's *German Psychology of To-day* (1886); *Elements of Psychology* (1893); *Social and Ethical Interpretations in Mental Development* (1898); *Story of the Mind* (1898); *Mental Development in the Child and the Race* (1896); *Thought and Things* (London and New York, vol. i., 1906). He also contributed largely to the *Dictionary of Philosophy and Psychology* (1901-1905), of which he was editor-in-chief.

BALDWIN, ROBERT (1804-1858), Canadian statesman, was born at York (now Toronto) on the 12th of May 1804. His father, William Warren Baldwin (d. 1844), went to Canada from Ireland in 1798; though a man of wealth and good family and a devoted member of the Church of England, he opposed the religious and political oligarchy which was then at the head of Canadian affairs, and brought up his son in the same principles. Robert Baldwin was called to the Bar in 1825, and entered into partnership with his father. In 1829 he was elected a member of the parliament of Upper Canada for the town of York, but was defeated in the following year and retired for a time into private life. During the next six years, he so constantly advocated a responsible executive as the one cure for the political and economic evils of the time that he was known as "the man of one idea." In 1836 he was called by Sir Francis Bond Head (1793-1875), the lieutenant-governor, to the executive council, but finding himself without influence, and compelled to countenance measures to which he was opposed, he resigned within a month. Though a reformer, he strongly disapproved of the rebellion of 1837-1838. On the union of the two Canadas he became (1841) a member of the executive council under Lord Sydenham, but soon resigned on the question of responsible government. In 1842 he formed the first Liberal administration, in connexion with Mr (afterwards Sir) L. H. Lafontaine, but resigned the next year, after a quarrel with the governor-general, Sir

Charles Metcalfe, on a question of patronage, in which he felt that of responsible government to be involved. At the general election which followed, the governor-general was sustained by a narrow majority, but in 1848 the Liberals were again returned to power, and he and Mr Lafontaine formed their second administration under Lord Elgin and carried numerous important reforms, including the freeing from sectarian control of the Provincial University and the introduction into Upper Canada of an important municipal system.

Internal dissensions soon began to appear in the Liberal party, and in 1851 Mr Baldwin resigned. The special struggle leading to his resignation was an attempt to abolish the court of chancery of Upper Canada, whose constitution was due to a measure introduced by Baldwin in 1849. The attempt, though defeated, had been supported by a majority of the representatives from Upper Canada, and Baldwin's fastidious conscience took it as a vote of want of confidence. A deeper reason was his inability to approve of the advanced views of the Radicals, or "Clear Grits," as they came to be called. On seeking re-election in York, he declined to give any pledge on the burning question of the Clergy Reserves and was defeated. In 1858 the Liberal-Conservative party, formed in 1854 by a coalition, attempted to bring him out as a candidate for the upper house, which was at this date elective, but though he had broken with the advanced reformers, he could not approve of the tactics of their opponents, and refused to stand. He died on the 9th of December 1858. Even those who most bitterly attacked his measures admitted the purity and unselfishness of his motives. After the concession of responsible government, he devoted himself to bringing about a good understanding between the English and French-speaking inhabitants of Canada, and his memory is held as dear among the French Canadians as in his native province of Ontario.

[v.03 p.0248]

See J. C. Dent, *Canadian Portrait Gallery* (1880). His life, by the Hon. Geo. W. Ross, is included in *The Makers of Canada* series (Toronto).

BALE, JOHN (1495-1563), bishop of Ossory, English author, was born at Cove, near Dunwich in Suffolk, on the 21st of November 1495. At the age of twelve he entered the Carmelite monastery at Norwich, removing later to the house of "Holme," probably the abbey of the Whitefriars at Hulne near Alnwick. Later he entered Jesus College, Cambridge, and took his degree of B.D. in 1529. At Cambridge he came under the influence of Cranmer and of Thomas Wentworth, 1st Baron Wentworth, and became an ardent partisan of the Reformers. He laid aside his monastic habit, and, as he himself puts it with characteristically brutal violence, "that I might never more serve so execrable a beast, I took to wife the faithful Dorothy." He obtained the living of Thornden, Suffolk, but in 1534 was summoned before the archbishop of York for a sermon against the invocation of saints preached at Doncaster, and afterwards before Stokesley, bishop of London, but he escaped through the powerful protection of Thomas Cromwell, whose notice he is said to have attracted by his miracle plays. He was an unscrupulous controversialist, and in these plays he allows no considerations of decency to stand in the way of his denunciations of the monastic system and its supporters. The prayer of Infidelitas which opens the second act of his *Thre Laws* (quoted by T. Warton, *Hist. Eng. Poetry*, sect. 41) is an example of the lengths to which he went in profane parody. These coarse and violent productions were well calculated to impress popular feeling, and no doubt Cromwell found in him an invaluable instrument. But on his patron's fall in 1540 Bale fled with his wife and children to Germany. He returned on the accession of Edward VI. He received the living of Bishopstoke, Hampshire, being promoted in 1552 to the Irish see of Ossory. He refused to be consecrated by the Roman rite, which still obtained in the Irish church, and won his point, though the dean of Dublin entered a protest against the revised office during the ceremony (see his *Vocacyon of John Bale to the Bishopperycke of Ossorie, Harl. Misc.* vol. vi.). He pushed his Protestant propaganda in Ireland with no regard to expediency, and when the accession of Mary inaugurated a reaction in matters of religion, it was with difficulty that he was got safely out of the country. He tried to escape to Scotland, but on the voyage was captured by a Dutch man-of-war, which was driven by stress of weather to St. Ives in Cornwall. Bale was arrested on suspicion of treason, but soon released. At Dover he had another narrow escape, but he eventually made his way to Holland and thence to Frankfort and Basel. During his exile he devoted himself to writing. After his return, on the accession of Elizabeth, he received (1560) a prebendal stall at Canterbury. He died in November 1563 and was buried in the cathedral.

The scurrility and vehemence with which "foul-mouthed Bale," as Wood calls him, attacked his enemies does not destroy the value of his contributions to literature, though his strong bias against Roman Catholic writers does detract from the critical value of his works. Of his mysteries and miracle plays only five have been preserved, but the titles of the others, quoted by himself in his *Catalogus*, show that they were animated by the same political and religious aims. The *Thre Laws of Nature, Moses and Christ, corrupted by the Sodomytes, Pharisees and Papystes most wicked* (pr. 1538 and again in 1562) was a morality play. The direction for the dressing of the parts is instructive: "Let Idolatry be decked like an old witch, Sodomy like a monk of all sects, Ambition like a bishop, Covetousness like a Pharisee or spiritual lawyer, False Doctrine like a popish doctor, and Hypocrisy like a gray friar." *A Tragedye; or enterlude manyfesting the chief promyses of God unto Man ...* (1538, printed in Dodsley's *Old Plays*, vol. 1), *The Temptacyon of our Lorde* (ed. A. B. Grosart in *Miscellanies of the Fuller Worthies Library*, vol. i., 1870), and *A brefe Comedy or Enterlude of Johan Baptystes preachynge in the Wyldernesse, &c.* (*Harl. Misc.* vol. i.) were all written in 1538. His plays are doggerel, but he is a figure of some dramatic importance as the author of *Kynge Johan* (*c.* 1548), which marks the transition between the old morality play and the English historical drama. It does not appear to have directly influenced the creators of the chronicle histories. To the authors of the *Troublesome Raigne of King John* (1591) it was apparently unknown, but it is noteworthy that an attempt, however feeble, at historical drama was made fourteen years before the production of *Gorboduc*. *Kynge Johan* (ed. J. P. Collier, Camden Soc. 1838) is itself a polemic against the Roman Catholic Church. King John is represented as the champion of English rites against the Roman see:—

> "This noble Kynge Johan, as a faythfull Moses
> Withstode proude Pharao for his poore Israel."

But the English people remained in the bondage of Rome,—

> "Tyll that duke Josue, whych was our late Kynge Henrye,
> Clerely brought us out in to the lande of mylke and honye."

Elsewhere John is called a Lollard and accused of "heretycall langage," and he is finally poisoned by a monk of Swinestead. Allegorical characters are mixed with the real persons. Ynglonde *vidua*, represents the nation, and the jocular element is provided by Sedwyson (sedition), who would have been the Vice in a pure morality play. One actor was obviously intended to play many parts, for stage directions such as "Go out Ynglond, and dress for Clargy" are by no means uncommon. The MS. of *Kynge Johan* was discovered between 1831 and 1838 among the corporation papers at Ipswich, where it was probably performed, for there are references to charitable foundations by King John in the town and neighbourhood. It is described at the end of the MS. as two plays, but there is no obvious division, the end of the first act alone being noted. The first part is corrected by Bale and the latter half is in his handwriting, but his name nowhere occurs. In the list of his works, however, he gives a play *De Joanne Anglorum Rege*, written *in idiomate materno*.

But Bale's most important work is *Illustrium majoris Britanniae scriptorum, hoc est, Angliae, Cambriae, ac Scotiae Summarium ...* (Ipswich and Wesel, for John Overton, 1548, 1549). This contained five centuries, but another edition, almost entirely rewritten and containing fourteen centuries, was printed at Basel with the title *Scriptorum illustrium majoris Britanniae ... Catalogus* (1557-1559). The chronological catalogue of British authors and their works was partly founded on the *Collectanea* and *Commentarii* of John Leland, but Bale was an indefatigable collector and worker, and himself examined many of the valuable libraries of the Augustinian and Carmelite houses before their dissolution. In his notebook he records as an instance of the wholesale destruction in progress: "I have bene also at Norwyche, our second citye of name, and there all the library monuments are turned to the use of their grossers, candelmakers, sopesellers, and other worldly occupiers ... As much have I saved there and in certen other places in Northfolke and Southfolke concerning the authors names and titles of their workes, as I could, and as much wold I have done through out the whole realm, yf I had been able to have borne the charges, as I am not." His work is therefore invaluable, in spite of the inaccuracies and

the abuse lavished on Catholic writers, for it contains much information that would otherwise have been hopelessly lost.

A list of Bale's works is to be found in *Athenae Cantabrigienses* (vol. i. pp. 227 et seq.). Beside the reprints already mentioned, *The Examinations of Lord Cobham, William Thorpe and Anne Askewe, &c.* were edited by the Rev. H. Christmas for the Parker Society in 1849. Bale's autograph note-book is preserved in the Selden Collection of the Bodleian Library, Oxford. It contains the materials he collected for his two published catalogues arranged alphabetically, with no attempt at ornament of any kind, and without the personalities which deface his completed work. He also gives in most cases the sources from which his information was derived. This book was prepared for publication with notes by Dr R. Lane Poole, with the help of Miss Mary Bateson, as *Index Britanniae Scriptorum quos ... collegit Ioannes Baleus* (Clarendon Press, 1902), forming part ix. of *Anecdota Oxoniensia*.

[v.03 p.0249]

John Pits or Pitseus (1560-1616), an English Catholic exile, founded on Bale's work his *Relationum historicarum de rebus anglicis tomus primus* (Paris, 1619), better known by its running title of *De illustribus Angliae scriptoribus*. This is really the fourth book of a more extensive work. He omits the Wycliffite and Protestant divines mentioned by Bale, and the most valuable section is the lives of the Catholic exiles resident in Douai and other French towns. He does not scruple to assert (*Nota de Joanne Bale*) that Bale's *Catalogus* was a misrepresentation of Leland's matter, though there is every reason to believe that he was only acquainted with Leland's work at second-hand, through Bale.

BALE. (1) (A word common to Teutonic languages, in O. Eng. *balu*, cf. Icelandic *böl*), evil, suffering, a word obsolete except in poetry, and more common in the adjectival form "baleful." In early alliterative poetry it is especially used antithetically with "bliss." (2) (O. Eng. *bael*, a blazing fire, a funeral pyre), a bonfire, a northern English use more common in the tautological "bale-fire," with sometimes a confused reference from (1) to evil. (3) (A word of doubtful origin, possibly connected with "ball "), a bundle of merchandise, especially of cotton, wool or hay, packed with a cover, or fastened with bands of metal, &c. for transportation; the weight and capacity varies with the goods. (4) (Properly "bail," from Fr. *baille*, possibly connected with Lat. *bacula*, a tub), to empty water out of a boat by means of a bail or bucket.

BALEARIC ISLANDS (*Baleáres*), an archipelago of four large and eleven small islands in the Mediterranean Sea, off the east coast of Spain, of which country it forms a province. Pop. (1900) 311,649; area, 1935 sq. m. The archipelago, which lies between 38° 40′ and 40° 5′ N., and between 1° and 5° E., comprises two distinct groups. The eastern and larger group, corresponding with the ancient Insulae Baleares, comprises the two principal members of the archipelago, Majorca (Spanish, Mallorca) and Minorca (Spanish, Menorca), with seven islets:—Aire, Aucanada, Botafoch, Cabrera, Dragonera, Pinto and El Rey. The western group, corresponding with the ancient Pityusae or Pine Islands, also comprises two relatively large islands, Iviza (Spanish, Ibiza or, formerly, Ivica) and Formentera, with the islets of Ahorcados, Conejera, Pou and Espalmador. Majorca, Minorca and Iviza are described in separate articles. Formentera is described with Iviza. The total population of the eleven islets only amounted to 171 in 1900, but all were inhabited. None of them is of any importance except Cabrera, which is full of caverns, and was formerly used as a place of banishment. In 1808 a large body of Frenchmen were landed here by their Spanish captors, and allowed almost to perish of starvation.

The origin of the name Baleáres is a mere matter of conjecture; it is obvious, however, that the modern Majorca and Minorca are obtained from the Latin *Major* and *Minor*, through the Byzantine forms Μαιορικά and Μινορικά; while Iviza is plainly the older Ebusus, a name probably of Carthaginian origin. The Ophiusa of the Greeks (Colubraria of the Romans) is now known as Formentera.

Geology.—The strata which form the Balearic Isles fall naturally into two divisions. There is an older series, ranging from the Devonian to the Cretaceous, which is folded and faulted and forms all the higher hills, and there is a newer series of Tertiary age, which lies nearly horizontal and rests unconformably upon the older beds. The direction of the folds in the older series is in Iviza nearly west to east, in Majorca south-west to north-east, and in Minorca south to north, thus forming an arc convex towards the south-east. The Devonian is visible only in Minorca, the Trias being the oldest system represented in the other islands. The higher part of the Cretaceous is absent, and it appears to have been during this period that the principal folding of the older beds took place. The Eocene beds are nummulitic. There is a lacustrine group which has usually been placed in the Lower Eocene, but the discovery of *Anthracotherium magnum* in the interbedded lignites proves it to be Oligocene, in part at least. The Miocene included a limestone with *Clypeaster*. Pliocene beds also occur.

Climate, Fauna, Flora.—The climate of the archipelago, though generally mild, healthy and favourable to plant life, is by no means uniform, owing to the differences of altitude and shelter from wind in different islands. The fauna and flora resemble those of the Mediterranean coasts of Spain or France.

Inhabitants.—The islanders are a Spanish race, very closely akin to the Catalans; but the long period of Moorish rule has left its mark on their physical type and customs. In character they are industrious and hospitable, and pique themselves on their loyalty and orthodoxy. Crime is rare. There are higher schools in the principal towns, and the standard of primary education is well up to the average of Spain. Vaccination is common except in the cities,—the women often performing the operation themselves when medical assistance cannot be got. Castilian is spoken by the upper and commercial classes; the lower and agricultural employ a dialect resembling that of the Catalans.

Commerce.—Fruit, grain, wine and oil are produced in the islands, and there is an active trade with Barcelona in fresh fish, including large quantities of lobsters. Shoemaking is one of the most prosperous industries. There is not a very active trade direct with foreign countries, as the principal imports—cotton, leather, petroleum, sugar, coal and timber—are introduced through Barcelona. The export trade is chiefly with the Peninsula, France, Italy, Algeria and with Cuba and Porto Rico. Most of the agricultural products are sent to the Peninsula; wine, figs, marble, almonds, lemons and rice to Europe and Africa.

Administration.—The administration of the Balearic Islands differs in no respect from that of the other Spanish provinces on the mainland. There are five judicial districts (*partidos judiciales*), named after their chief towns—Inca, Iviza, Manacor, Palma and Port Mahon.

History.—Of the origin of the early inhabitants of the Balearic Islands nothing is certainly known, though Greek and Roman writers refer to the Boeotian and Rhodian settlements. There are numerous sepulchral and other monuments, which are generally believed to be of prehistoric origin. According to general tradition the natives, from whatever quarter derived, were a strange and savage people till they received some tincture of civilization from the Carthaginians, who early took possession of the islands and built themselves cities on their coasts. Of these cities, Port Mahon, the most important, still retains the name which is derived from the family of Mago. About twenty-three years after the destruction of Carthage the Romans accused the islanders of piracy, and sent against them Q. Caecilius Metellus, who soon reduced them to obedience, settled amongst them 3000 Roman and Spanish colonists, founded the cities of Palma and Pollentia (Pollensa), and introduced the cultivation of the olive. Besides valuable contingents of the celebrated Balearic slingers, the Romans derived from their new conquest mules (from Minorca), edible snails, sinope and pitch. Of their occupation numerous traces still exist,—the most remarkable being the aqueduct at Pollensa. In A.D. 423 the islands were seized by the Vandals and in 798 by the Moors. They became a separate Moorish kingdom in 1009, which, becoming extremely obnoxious for piracy, was the object of a crusade directed against it by Pope Paschal II., in which the Catalans took the lead. This expedition was frustrated at the time, but was resumed by James I. of Aragon, and the Moors were expelled in 1232. During their occupation the island was populous and productive, and an active commerce was carried on with Spain and Africa. King James conferred the sovereignty of the isles on his third son, under whom and his successor they formed an independent kingdom up to 1349, from which time their history merges in that of Spain. In 1521 an insurrection of the peasantry against the nobility, whom they massacred, took place in Majorca, and was not suppressed without much bloodshed. In the War of the Spanish Succession all the islands declared for Charles; the duke of Anjou had no footing anywhere save in the citadel of Mahon. Minorca was reduced by Count Villars in 1707; but it was not till June 1715 that Majorca was subjugated, and meanwhile Port Mahon was captured by the English under General Stanhope in 1708. In 1713 the island was secured to them by the peace of Utrecht; but in 1756 it was invaded by a force of 12,000 French, who,

[v.03 p.0250] after defeating the British under Admiral Byng, captured Port Mahon. Restored to England in 1763, the island remained in possession of the British till 1782, when it was retaken by the Spaniards. Again seized by the British in 1798, it was finally ceded to Spain by the peace of Amiens in 1803. When the French invaded Spain in 1808, the Mallorquins did not remain indifferent; the governor, D. Juan Miguel de Vives, announced, amid universal acclamation, his resolution to support Ferdinand VII. At first the Junta would take no active part in the war, retaining the corps of volunteers that was formed for the defence of the island; but finding it quite secure, they transferred a succession of them to the Peninsula to reinforce the allies. Such was the animosity excited against the French when their excesses were known to the Mallorquins, that some of the French prisoners, conducted thither in 1810, had to be transferred with all speed to the island of Cabrera, a transference which was not effected before some of them had been killed.

BIBLIOGRAPHY.—For a general account of the islands, the most valuable books are *Die Balearen geschildert in Wort und Bild*, by the archduke Ludwig Salvator of Austria (Leipzig, 1896); *Les Îles oubliées*, by G. Vuillier (Paris, 1904), the first edition of which has been translated under the title of *The Forgotten Isles* (London, 1896)—and *Islas Baleáres*, an illustrated volume of 1423 pages, by P. Pifferrer, in the series "España" (Barcelona, 1888). An article by George Sand in the *Revue des deux mondes* (1841) also deserves notice. The following are monographs on special subjects:—*The Story of Majorca and Minorca*, by Sir C. R. Markham (London, 1908); *Illustrationes florae insularum Balearium*, by M. Willkomm (Stuttgart, 1881-1892); *Monuments primitifs des îles baléares*, by E. Cartailhac (*Mission scientifique du ministère de l'instruction publique*, Toulouse, 1892). The *British Foreign Office Reports for the Consular District of Barcelona* give some account of the movement of commerce (London, annual). Much of the material available for a scientific history will be found in *La Historia general del regno baleárico*, by J. Dameto and V. Mut (Majorca, 1632-1650). For the period of Moorish rule, see *Bosquejo histórico de la dominacion islamita en las islas Baleáres*, by A. Campaner y Fuertes (Palma, 1888). See also the elaborate treatise *Les Relations de la France avec le royaume de Majorque*, by A. Lecoy de la Marche (Paris, 1892).

BALES [BALESIUS], **PETER** (1547-1610?), English calligraphist, one of the inventors of shorthand writing, was born in London in 1547, and is described by Anthony Wood as a "most dexterous person in his profession, to the great wonder of scholars and others." We are also informed that "he spent several years in sciences among Oxonians, particularly, as it seems, in Gloucester Hall; but that study, which he used for a diversion only, proved at length an employment of profit." He is mentioned for his skill in micrography in Holinshed's *Chronicle*. "Hadrian Junius," says Evelyn, "speaking as a miracle of somebody who wrote the Apostles' Creed and the beginning of St John's Gospel within the compass of a farthing: what would he have said of our famous Peter Bales, who, in the year 1575, wrote the Lord's Prayer, the Creed, Decalogue, with two short prayers in Latin, his own name, motto, day of the month, year of the Lord, and reign of the queen, to whom he presented it at Hampton Court, all of it written within the circle of a single penny, inchased in a ring and borders of gold, and covered with a crystal, so accurately wrought as to be very plainly legible; to the great admiration of her majesty, the whole privy council, and several ambassadors then at court?" Bales was likewise very dexterous in imitating handwritings, and between 1576 and 1590 was employed by Secretary Walsingham in certain political manœuvres. We find him at the head of a school near the Old Bailey, London, in 1590, in which year he published his *Writing Schoolemaster, in three Parts*. This book included an *Arte of Brachygraphie*, which is one of the earliest attempts to construct a system of shorthand. In 1595 he had a great trial of skill with one Daniel Johnson, for a golden pen of £20 value, and won it; and a contemporary author further relates that he had also the arms of calligraphy given him, which are azure, a pen or. Bales died about the year 1610.

BALFE, MICHAEL WILLIAM (1808-1870), Irish musical composer, was born on the 15th of May 1808, at Dublin. His musical gifts became apparent at an early age. The only instruction he received was from his father, who was a dancing master, and from a musician, C. E. Horn (1786-1849). Between 1814 and 1815 he played the violin for his father's dancing-classes, and at the age of seven composed a polacca. In 1817 he appeared as a violinist in public, and in this year composed a ballad, first called "Young Fanny" and afterwards, when sung in *Paul Pry* by Madame Vestris, "The Lovers' Mistake." On the death of his father in 1823 he was engaged in the orchestra of Drury Lane, and being in possession of a small but pleasant baritone voice, he chose the career of an operatic singer. An unsuccessful début was made at Norwich in *Der Freischütz*. In 1825 he was taken to Rome by Count Mazzara, being introduced to Cherubini on the way. In Italy he wrote his first dramatic work, a ballet, *La Pérouse*. At the close of 1827 he appeared as Figaro in Rossini's *Barbière*, at the Italian opera in Paris. Balfe soon returned to Italy, where, during the next nine years, he remained, singing at various theatres and composing a number of operas. During this time he married Mdlle Luisa Roser, a Hungarian singer whom he had met at Bergamo. Fétis says that the public indignation roused by an attempt at "improving" Meyerbeer's opera *Il Crociato* by interpolated music of his own compelled Balfe to throw up his engagement at the theatre La Fenice in Venice. By this time he had produced his first complete opera, *I Rivali di se stessi*, at Palermo in the carnival season of 1829-1830; the opera *Un Avvertimento ai gelosi* at Pavia; and *Enrico Quarto* at Milan, where he had been engaged to sing with Malibran at the Scala. He returned to England in the spring of 1833, and on the 29th of October 1835 his *Siege of Rochelle* was produced and rapturously received at Drury Lane. Encouraged by his success, he produced *The Maid of Artois* on the 27th of May 1836—the success of the opera being confirmed by the exquisite singing of Malibran. Balfe was a prolific composer, as may be seen from the following imperfect list of his English operas alone:—*Siege of Rochelle* (1835); *The Maid of Artois* (1836); *Catherine Grey* (1837); *Joan of Arc* (1837); *Falstaff* (1838, Lablache in title-rôle); *Amelia, or the Love Test* (1838); *Keolanthe* (1841); *The Bohemian Girl*, his best known work (1844); *The Daughter of St. Mark* (1844); *The Enchantress* (1845); *The Bondman* (1846); *The Devil's in it* (1847); *The Maid of Honour* (1847); *The Sicilian Bride* (1852); *The Rose of Castile* (1857); *Satanella* (1858); *Bianca* (1860); *The Puritan's Daughter* (1861); *The Armourer of Nantes* (1863); *Blanche de Nevers* (1863). Balfe also wrote several operas for the Opéra Comique and Grand Opéra in Paris, where MM. Scribe and St George provided him with the libretti for his *Le Puits d'amour* (1843) and his *Les Quatre Fils Aymon* (1844). His *L'Étoile de Seville* was written in 1845 for the Académie Royale. The fact that Balfe was an Irishman, who produced operas in English, French and Italian with conspicuous success, is in itself interesting. When to this we add the record of his operatic impersonations on the stage, the European success of his *Bohemian Girl*, his picturesque retirement into Hertfordshire in 1864 as a gentleman farmer, and above all the undeniable gift for creating such pure melodies as his songs "When other Hearts" and "I dreamt that I dwelt in marble halls," it is idle to refuse him a prominent place in the history of music. He wrote much that was trivial, but also much that was enduring. He died on the 20th of October 1870, and was buried at Kensal Green. In 1882 a medallion portrait of him was unveiled in Westminster Abbey.

BALFOUR, ARTHUR JAMES (1848-), British statesman, eldest son of James Maitland Balfour of Whittingehame, Haddingtonshire, and of Lady Blanche Gascoyne Cecil, a sister of the third marquess of Salisbury, was born on the 25th of July 1848. He was educated at Eton and Trinity College, Cambridge. In 1874 he became M.P. in the Conservative interest for Hertford, and represented that constituency until 1885. When, in the spring of 1878, Lord Salisbury became foreign minister on the resignation of the fifteenth Lord Derby, Mr Balfour became his private secretary. In that capacity he accompanied his uncle to the Berlin congress, and gained his first experience of international politics in connexion with the settlement of the Russo-Turkish conflict. It was at this time also that he became known in the world of letters, the intellectual subtlety and literary capacity of his *Defence of Philosophic Doubt* (1879) suggesting that he might make a
[v.03 p.0251] reputation as a speculative thinker. Belonging, however, to a class in which the responsibilities of government are a traditional duty, Mr Balfour divided his time between the political arena and the study. Being released from his duties as private secretary by the general election of 1880, he began to take a rather more active part in parliamentary affairs. He was for a time politically associated with Lord Randolph Churchill, Sir Henry Drummond Wolff and Sir John (then Mr) Gorst, the quartette becoming known as the "Fourth Party," and gaining notoriety by the freedom of the criticisms directed by its leader, Lord Randolph Churchill, against Sir Stafford Northcote, Lord Cross and other prominent members of the "old gang." In these sallies, however, Mr Balfour had no direct share. He was thought to be merely amusing himself with politics. It was regarded as doubtful whether his health could withstand the severity of English winters, and the delicacy of his physique and the languor of his manner helped to create the impression that, however great his intellectual powers might be, he had neither the bodily strength nor the energy of character requisite for a political career. He was the "odd man" of the Fourth Party, apparently content to fetch and carry for his colleagues, and was believed to have no definite ambitions of his own. His reputation in the parliament of 1880-1886 was that of a dilettante, who allied himself

with the three politicians already named from a feeling of irresponsibility rather than of earnest purpose; he was regarded as one who, on the rare occasions when he spoke, was more desirous to impart an academic quality to his speeches than to make any solid contribution to public questions. The House, indeed, did not take him quite seriously. Members did not suspect the reserve of strength and ability beneath what seemed to them to be the pose of a parliamentary *flâneur*; they looked upon him merely as a young member of the governing classes who remained in the House because it was the proper thing for a man of family to do. As a member of the coterie known as the "Souls" he was, so to speak, caviare to the general. Indolence was supposed to be the keynote of his character—a refined indolence, not, however, without cleverness of a somewhat cynical and superior order.

That these views were not shared by Lord Salisbury was sufficiently shown by the fact that in his first administration (June 1885-January 1886) he made Mr Balfour president of the Local Government Board, and in forming his second administration (July 1886) secretary for Scotland with a seat in the cabinet. These offices gave few opportunities for distinction, and may be regarded merely as Mr Balfour's apprenticeship to departmental responsibilities. The accidents of political life suddenly opened out to him a career which made him, next to Lord Salisbury, the most prominent, the most admired and the most attacked Conservative politician of the day. Sir Michael Hicks-Beach, who was chief secretary for Ireland, suffered from an affection of the eyes and found it desirable to resign, and Lord Salisbury appointed his nephew in his stead. The selection took the political world by surprise, and was much criticized. By the Irish Nationalists it was received with contemptuous ridicule, for none suspected Mr Balfour's immense strength of will, his debating power, his ability in attack and his still greater capacity to disregard criticism. The debates on the Crimes Bill and the Irish Land Bill quickly undeceived them, and the steady and even remorseless vigour with which the government of Ireland was conducted speedily convinced the House of Commons and the country that Mr. Balfour was in his right place as chief secretary. His policy was that of "coercion"—the fearless administration of the Crimes Act,—coupled with remedial legislation; and he enforced the one while he proceeded with the other, regardless of the risk of outrage outside the House and of insult within. Mr Balfour's work in this office covered one of the most turbulent and most exciting periods in modern parliamentary history and Irish administration. With a courage that never faltered he broke down the Plan of Campaign in Ireland, and in parliament he not only withstood the assaults of the Irish Nationalists, but waged successful warfare with the entire Home Rule party. He combined an obstinacy of will with a mastery of facts unsurpassed by any of his predecessors in the secretaryship. Events, it is true, were in his favour. The disclosures before the Parnell Commission, the O'Shea divorce proceedings, the downfall of Mr Parnell and the disruption of the Irish party, assisted him in his task; but the fact remains that by persistent courage and undeviating thoroughness he reduced crime in Ireland to a vanishing point. His work was also constructive, for he broadened the basis of material prosperity and social progress by creating the Congested Districts Board in 1890. During this period, from 1886-1892, moreover, he developed gifts of oratory which made him one of the most effective of public speakers. Impressive in matter rather than in manner of delivery, and seldom rising to the level of eloquence in the sense in which that quality was understood in a House which had listened to Bright and Gladstone, his speeches were logical and convincing, and their attractive literary form delighted a wider audience than that which listens to the mere politician.

In 1888 Mr Balfour served on the Gold and Silver Commission, currency problems from the standpoint of bimetallism being among the more academic subjects which had engaged his attention. On the death of Mr W. H. Smith in 1891 he became first lord of the treasury and leader of the House of Commons, and in that capacity introduced in 1892 a Local Government Bill for Ireland. The Conservative government was then at the end of its tether, and the project fell through. For the next three years Mr Balfour led the opposition with great skill and address. On the return of the Unionists to power in 1895 he resumed the leadership of the House, but not at first with the success expected of him, his management of the abortive education proposals of '96 being thought, even by his own supporters, to show a disinclination for the continuous drudgery of parliamentary management under modern conditions. But after the opening session matters proceeded more smoothly, and Mr Balfour regained his old position in the estimation of the House and the country. He had the satisfaction of seeing a bill pass for providing Ireland with an improved system of local government, and took an active share in the debates on the various foreign and domestic questions that came before parliament during 1895-1900. His championship of the voluntary schools, his adroit parliamentary handling of the problems opened up by the so-called "crisis in the Church" caused by the Protestant movement against ritualistic practices, and his pronouncement in favour of a Roman Catholic university for Ireland—for which he outlined a scheme that met with much adverse criticism both from his colleagues and his party,—were the most important aspects of Mr Balfour's activity during these years. His speeches and work throughout this period took a wider range than before his accession to the leadership of the Commons. During the illness of Lord Salisbury in 1898, and again in Lord Salisbury's absence abroad, he was in charge of the foreign office, and it fell to his lot to conduct the very critical negotiations with Russia on the question of railways in North China. To his firmness, and at the same time to the conciliatory readiness with which he accepted and elaborated the principles of a *modus vivendi*, the two powers owed the avoidance of what threatened to be a dangerous quarrel. As a member of the cabinet responsible for the Transvaal negotiations in 1899 he bore his full share of controversy, and when the war opened so disastrously he was the first to realize the necessity for putting the full military strength of the country into the field. At the general election of 1900 he was returned for East Manchester (which he had represented since 1885) by a majority of 2453, and continued in office as first lord of the treasury. His leadership of the House of Commons in the first session of the new parliament was marked by considerable firmness in the suppression of obstruction, but there was a slight revival of the criticisms which had been current in 1896. Mr Balfour's inability to get the maximum amount of work out of the House was largely due to the situation in South Africa, which absorbed the intellectual energies of the House and of the country and impeded the progress of legislation.

The principal achievements of the long session of 1902 (which extended to the autumn) were the passing of the Education Act,—entirely reorganizing the system of primary education, abolishing the school boards and making the county councils
[v.03 p.0252] the local authority; new rules of procedure; and the creation of the Metropolitan Water Board; and on all these questions, and particularly the two first, Mr Balfour's powers as a debater were brilliantly exhibited.

On Lord Salisbury's resignation on the 11th of July 1902, Mr Balfour succeeded him as prime minister, with the cordial approval of all sections of the Unionist party. For the next three and a half years his premiership involves the political history of England, at a peculiarly interesting period both for foreign and domestic affairs. Within a few weeks Mr Balfour had reconstituted the cabinet. He himself became first lord of the treasury and lord privy seal, with the duke of Devonshire (remaining lord president of the council) as leader of the House of Lords; Lord Lansdowne remained foreign secretary, Mr (afterwards Lord) Ritchie took the place of Sir Michael Hicks-Beach (afterwards Lord St Aldwyn) as chancellor of the exchequer, Mr J. Chamberlain remained colonial secretary, his son Austen being postmaster-general with a seat in the cabinet. Mr G. Wyndham as chief secretary for Ireland was included in the cabinet; Lord Selborne remained at the admiralty, Mr St John Brodrick (afterwards Lord Midleton) war minister, Lord George Hamilton secretary for India, and Mr Akers-Douglas, who had been first commissioner of works, became home secretary; Lord Balfour of Burleigh remained secretary for Scotland, Lord Dudley succeeded Lord Cadogan as lord lieutenant of Ireland, and Lord Londonderry became president of the Board of Education (with Sir William Anson as parliamentary secretary in the House of Commons). Mr Balfour's brother Gerald (b. 1853), who had entered public life as his private secretary when at the Local Government Board, and had been chief secretary for Ireland from 1895-1900, retained his position (since 1900) as president of the Board of Trade.

The new prime minister came into power practically at the same moment as the king's coronation (see Edward VII.) and the end of the South African War (see Transvaal). The task of clearing up after the war, both in South Africa and at home, lay before him; but his cordial relations with Mr Chamberlain (*q.v.*), and the enthusiastic support of a large parliamentary majority, made the prospects fair. For a while no cloud appeared on the horizon: and the Liberal party were still disorganized (see Campbell-Bannerman and Rosebery) over their attitude towards the Boers. Mr Chamberlain went to South Africa in the late autumn, with the hope that his personality would influence the settlement there; and the session of 1903 opened in February with no hint of troubles to come. A difficulty with Venezuela, resulting in British and German co-operation to coerce that refractory republic, caused an explosion of anti-German feeling in England and some restlessness in the United States, but the government brought the crisis to an end by tactful handling and by an ultimate recourse to

arbitration. The two chief items of the ministerial parliamentary programme were the extension of the new Education Act to London and Mr Wyndham's Irish Land Purchase Act, by which the British exchequer should advance the capital for enabling the tenants in Ireland to buy out the landlords. Moreover, the budget was certain to show a surplus and taxation could be remitted. As events proved, it was the budget which was to provide a cause of dissension, bringing a new political movement into being, and an issue overriding all the legislative interest of the session. Mr Ritchie's remission of the shilling import-duty on corn led to Mr Chamberlain's crusade in favour of tariff reform and colonial preference, and as the session proceeded the rift grew in the Unionist ranks.

In the separate article on Mr Chamberlain the progress of this movement is sufficiently narrated. From this moment it is only necessary here to realize Mr Balfour's position. He had always admitted the onesidedness of the English free-trade system, and had supported the desirability of retaliating against unfair competition and "dumping" by foreign countries. But Mr Chamberlain's new programme for a general tariff, with new taxes on food arranged so as to give a preference to colonial products, involved a radical alteration of the established fiscal system, and such out-and-out Unionist free-traders in the cabinet as Mr Ritchie and Lord George Hamilton, and outside it, like Lord Hugh Cecil and Mr Arthur Elliot (secretary to the treasury), were entirely opposed to this. Mr Balfour was anxious to avoid a rupture, doubtful of the feeling of the country, uncertain of the details by which Mr Chamberlain's scheme could be worked out. As leader of the party and responsible for the maintenance of so great a political engine, he was anxious not to be precipitate. He was neither for nor against the new movement, and professed to hold "no settled convictions" on the subject. Mr Chamberlain rested his case largely on the alleged diminution in British trade, and the statistics therefore required investigation before the government could adopt any such programme. From the middle of May, when Mr Chamberlain began to press the matter, Mr Balfour had a difficult hand to play, so long as it was uncertain how the party would follow the new lead. The Board of Trade was asked to supply full figures, and while its report was awaited the uncertainty of attitude on the part of the government afforded grateful opportunity for opposition mischief-making, since the Liberal party had now the chance of acting as the conservative champions of orthodox economics. Another opportunity for making political capital was provided by the publication of the report of the royal commission on the Boer War under Lord Elgin's chairmanship, which horrified the country by its disclosures (August 26th) as to the political and military muddling which had gone on, and the want of any efficient system of organization.

The session ended in August without any definite action on the fiscal question, but in the cabinet the discussions continued. On the 16th of September Mr Balfour published a pamphlet on "Insular Free Trade," and on the 18th it was announced that Lord George Hamilton and Mr Ritchie had resigned, Lord Balfour of Burleigh and Mr Arthur Elliot following a day or two later. These were the strait free-traders, but at the same time Mr Chamberlain resigned also. The correspondence between Mr Chamberlain and Mr Balfour (September 9th and 16th) was published, and presented the latter in the light of a sympathizer with some form of fiscal union with the colonies, if practicable, and in favour of retaliatory duties, but unable to believe that the country was yet ready to agree to the taxation of food required for a preferential tariff, and therefore unwilling to support that scheme; at the same time he encouraged Mr Chamberlain to test the feeling of the public and to convert them by his missionary efforts outside the government. Mr Chamberlain on his side emphasized his own parliamentary loyalty to Mr Balfour. In his pamphlet on "Insular Free Trade" the prime minister reviewed the economic history since Cobden's time, pointed to the falsification of the promises of the early free-traders, and to the fact that England was still the only free-importing country, and insisted that he was "in harmony with the true spirit of free-trade" when he pleaded for "freedom to negotiate that freedom of exchange may be increased." This manifesto was at first taken, not only as the platform of the government, but also as that from which its resigning free-trade members had dissented; and the country was puzzled by a statement from Lord George Hamilton that Mr Balfour had circulated among his colleagues a second and different document, in fuller agreement with Mr Chamberlain. The situation was confused by personal suspicion and distrust as well as by economic difficulties. But the public noted that the duke of Devonshire, whose orthodoxy was considered typical, remained in the cabinet.

The crisis, however, soon developed further, owing to explanations between the free-trade Unionists. On October 1st Mr Balfour spoke at Sheffield, reiterating his views as to free-trade and retaliation, insisting that he "intended to lead," and declaring that he was prepared at all events to reverse the traditional fiscal policy by doing away with the axiom that import duties should only be levied for revenue purposes. The speech was enthusiastically received by the National Union of Conservative Associations, who had year by year flirted with protectionist resolutions, and who were known to be predominantly in sympathy with Mr Chamberlain. But the free-traders did not like Mr Balfour's formula as to reversing
[v.03 p.0253]
the traditional fiscal policy of import taxes for revenue only. Next day the duke of Devonshire resigned, a step somewhat bitterly resented by Mr Balfour, who clearly thought that his sacrifices in order to conciliate the duke had now been made in vain. During this critical fortnight the duke had apparently acquiesced in Mr Balfour's compromise, and had co-operated in reconstituting the ministry; his nephew and heir had been made financial secretary to the treasury, while Mr Alfred Lyttelton was appointed colonial secretary, Mr Austen Chamberlain chancellor of the exchequer, Mr Brodrick secretary for India, Mr H. O. Arnold-Forster war minister, Lord Stanley postmaster-general and Mr Graham Murray secretary for Scotland. Lord Londonderry now became president of the council, Lord Lansdowne leader of the House of Lords, and Lord Salisbury, son of the late premier, who as Lord Cranborne had for three years been under-secretary for foreign affairs, was included in the cabinet as lord privy seal.

During the remainder of 1903 the struggle within the Unionist party continued. Mr Chamberlain spoke all over the country, advocating a definite scheme for reorganizing the budget, so as to have more taxes on imports, including food, but proposing to adjust the taxation so as to improve the position of the working-classes and to stimulate employment. The free-trade Unionists, with the duke of Devonshire, Lord Goschen, Lord James and Lord Hugh Cecil, as their chief representatives, started a Free Food league in opposition to Mr Chamberlain's Tariff Reform league; and at a great meeting at Queen's Hall, London, on the 24th of November their attitude was made plain. They rejected Mr Chamberlain's food-taxes, discredited his statistics, and, while admitting the theoretical orthodoxy of retaliation, criticized Mr Balfour's attitude and repudiated his assumption that retaliation would be desirable. Finally in December came the appointment of Mr Chamberlain's Tariff Commission. There was no doubt about the obstinacy and persistency of both sections, and both were fighting, not only to persuade the public, but for the capture of the party and of its prime minister. Both sides were inclined to claim him; neither could do so without qualification. His dialectical dexterity in evading the necessity of expressing his fiscal opinions further than he had already done became a daily subject for contemptuous criticism in the Liberal press; but he insisted that in any case no definite action could be taken till the next parliament; and while he declined to go the "whole hog"—as the phrase went—with Mr Chamberlain, he did nothing to discourage Mr Chamberlain's campaign. Whether he would eventually follow in the same direction, or would come back to the straiter free-trade side, continued to be the political conundrum for month after month. Minor changes were made in the ministry in 1903, Mr Brodrick going to the India office and Mr Arnold-Forster becoming minister for war, but Mr Balfour's personal influence remained potent, the government held together, and in 1904 the Licensing Bill was successfully carried. Though a few Unionists transferred their allegiance, notably Mr. Winston Churchill, and by-elections went badly, Mr Balfour still commanded a considerable though a dwindling majority, and the various contrivances of the opposition for combining all free-traders against the government were obstructed by the fact that anything tantamount to a vote of censure would not be supported by the "wobblers" in the ministerial party, while the government could always manage to draft some "safe" amendment acceptable to most of them. This was notably shown in the debate on Mr Black's motion on the 18th of May. On the 3rd of October Mr Balfour spoke at Edinburgh on the fiscal question. The more aggressive protectionists among Mr Chamberlain's supporters had lately become very confident, and Mr Balfour plainly repudiated "protection" in so far as it meant a policy aiming at supporting or creating home industries by raising home prices; but he introduced a new point by declaring that an Imperial Conference would be called to discuss with the colonies the question of preferential tariffs if the Unionist government obtained a majority at the next general election. The Edinburgh speech was again received with conflicting interpretations, and much discussion prevailed as to the conditions of the proposed conference, and as to whether it was or was not an advance, as the Chamberlainites claimed, towards Mr Chamberlain. Meanwhile the party was getting more and more disorganized, and the public were getting tired of the apparent mystification. The opposition used the situation to make capital in the country, and loudly called for a dissolution.

It was plain indeed that the fiscal question itself was ripe for the polls; Board of Trade statistics had been issued in profusion, and the whole case was before the country. But, though Mr Chamberlain declared his desire for an early appeal to the electors, he maintained his parliamentary loyalty to Mr Balfour. There were, moreover, public reasons why a change of government was undesirable. From 1903 onwards the question of army reform had been under discussion, and the government was anxious to get this settled, though in fact Mr Brodrick's and Mr Arnold-Forster's schemes for reorganization failed to obtain any general support. And while foreign affairs were being admirably conducted by Lord Lansdowne, they were critical enough to make it dangerous to contemplate a "swopping of horses." The Russo-Japanese War might at any moment lead to complications. The exercise by Russian warships of the right of search over British ships was causing great irritation in English commercial circles during 1904; after several incidents had occurred, the stopping of the P. & O. steamer "Malacca" on July 13th in the Red Sea by the Russian volunteer cruiser "Peterburg" led to a storm of indignation, and the sinking of the "Knight Commander" (July 24th) by the Vladivostok squadron intensified the feeling. On the 23rd of October the outrageous firing by the Russian Baltic fleet on the English fishing-fleet off the Dogger Bank in the North Sea was within an ace of causing war. It was not till the 28th that Mr Balfour, speaking at Southampton, was able to announce that the Russian government had expressed regret, and that an international commission would inquire into the facts with a view to the responsible persons being punished. Apart from the importance of seeing the Russo-Japanese War through, there were important negotiations on foot for a renewal or revision of the treaty with Japan; and it was felt that on these grounds it would be a mistake for the government to allow itself to be driven into a premature dissolution, unless it found itself unable to maintain a majority in parliament. At the same time the government's tenure of office was obviously drawing to its close; the usual interpretation of the Septennial Act involved a dissolution either in 1905 or 1906, and the government whips found increased difficulty in keeping a majority at Westminster, since neither the pronounced Chamberlainites nor the convinced free-trade Unionists showed any zeal, and a large number of the uncertain Unionists did not intend to stand again for parliament.

The events of the session of 1905 soon foreshadowed the end. The opposition were determined to raise debates in the House of Commons on the fiscal question, and Mr Balfour was no less determined not to be caught in their trap. These tactics of avoidance reached their culminating point when on one occasion Mr Balfour and his supporters left the House and allowed a motion hostile to tariff reform to be passed *nem. con*. Though the Scottish Churches Bill, the Unemployed Bill and the Aliens Bill were passed, a complete fiasco occurred over the redistribution proposals, which pleased nobody and had to be withdrawn owing to a blunder as to procedure; and though on the 17th of July a meeting of the party at the foreign office resulted in verbal assurances of loyalty, only two days later the government was caught in a minority of four on the estimates for the Irish Land Commission. For a few days it was uncertain whether they would resign or dissolve, but it was decided to hold on.

The real causes, however, which kept the government in office, were gradually losing their validity. The Russo-Japanese War came to an end; the new offensive and defensive alliance with Japan was signed on the 12th of August; the successful Anglo-French agreement, concluded in April 1904, had brought out a vigorous expression of cordiality between England and France, shown in an enthusiastic exchange of naval visits; and the danger, which threatened in the early summer, of
[v.03 p.0254]
complications with France and Germany over Morocco, was in a fair way of being dispelled by the support given to France by Great Britain. The Liberal leaders had given public pledges of their adhesion to Lord Lansdowne's foreign policy, and the fear of their being unable to carry it on was no longer a factor in the public mind. The end came in November 1905, precipitated by a speech made by Mr Balfour at Newcastle on the 14th, appealing for unity in the party and the sinking of differences, an appeal plainly addressed to Mr Chamberlain, whose supporters—the vast majority of the Unionists—were clamouring for a fighting policy. But Mr Chamberlain was no longer prepared to wait. On the 21st of November at Bristol he insisted on his programme being adopted, and Mr Balfour was compelled to abandon the position he had held with so much tactical dexterity for two years past. Amid Liberal protests in favour of immediate dissolution, he resigned on the 4th of December; and Sir Henry Campbell-Bannerman, being entrusted by the king with the formation of a government, filled his cabinet with a view to a general election in January. The Unionists went to the polls with divided counsels, and sustained a crushing defeat, remarkable nevertheless for the comparative success of the tariff reformers. While Mr Chamberlain had a signal personal triumph in all the divisions of Birmingham, Mr Balfour himself was defeated by a large majority in Manchester.

Being in a miserable minority in parliament (157 Unionists against 379 Liberals, 51 Labour members, and 83 Nationalists), some form of consolidation among the Unionists was immediately necessary, and negotiations took place between Mr Balfour and Mr Chamberlain which resulted in the patching up of an agreement (expressed in a correspondence dated February 14th), and its confirmation at a meeting of the party at Lansdowne House a few days later. The new compact was indicated in Mr Balfour's letter, in which he declared that "fiscal reform is, and must remain, the first constructive work of the Unionist party; its objects are to secure more equal terms of competition for British trade and closer commercial union with the colonies; and while it is at present unnecessary to prescribe the exact methods by which these objects are to be attained, and inexpedient to permit differences of opinion as to these methods to divide the party, though other means are possible, the establishment of a moderate general tariff on manufactured goods, not imposed for the purpose of raising prices, or giving artificial protection against legitimate competition, and the imposition of a small duty on foreign corn, are not in principle objectionable, and should be adopted if shown to be necessary for the attainment of the ends in view or for purposes of revenue." Mr Balfour's leadership of the whole party was now confirmed; and a seat was found for him in the City of London by the retirement of Mr Gibbs.

The downfall of Mr Balfour's administration, and the necessity of reorganizing the Unionist forces on the basis of the common platform now adopted, naturally represented a fresh departure under his leadership, the conditions of which to some extent depended on the opportunities given to the new opposition by the proceedings of the Radical government (see Campbell-Bannerman, Sir H.; and Asquith, H. H.). His own administration had been wrecked, through no initiative of his, by the dissensions over the fiscal question. But his wide range of knowledge and interests, his intellectual *finesse*, his personal hold over his supporters, his statesmanlike grasp upon imperial problems and his oratorical ability, had been proved to a remarkable degree; and in foreign affairs his tenure of power had been conspicuously successful. He left his country indeed in a position of strength abroad, which it had not held since the Crimean War. His institution of the permanent Committee of Imperial Defence, and of the new Army Council (1904), were reforms of the highest importance, resulting from the report of a "triumvirate" consisting of Lord Esher, Sir John Fisher and Sir George Clarke, appointed in November 1903. The Unionist regime as a whole, however, had collapsed. Its ministers had become "stale." The heavy taxation of the war years was still retained, to the disgust especially of the income-tax payers; and new issues arose over the Education Act, labour questions, and the introduction of Chinese labour into South Africa (in 1904), which were successfully used against the government in the constituencies. The result was an electoral defeat which indicated, no doubt, a pronounced weakening of Mr Balfour's position in public confidence. This verdict, however, was one based mainly on temporary reasons, which were soon to be overshadowed by the new issues involved in the change of ministry. As a matter of fact, a year of opposition had not passed before his power in the House of Commons, even with so small a party behind him, was once more realized. The immense Radical majority started with a feeling of contempt for the leader who had been rejected at Manchester, but by 1907 he had completely reasserted his individual pre-eminence among parliamentarians. Mr Balfour had never spoken more brilliantly, nor shone more as a debater, than in these years when he had to confront a House of Commons three-fourths of which was hostile. His speech at Birmingham (November 14, 1907), fully accepting the principles of Mr Chamberlain's fiscal policy, proved epoch-making in consolidating the Unionist party—except for a small number of free-traders, like Lord Robert Cecil, who continued to hold out—in favour of tariff reform; and during 1908 the process of recuperation went on, the by-elections showing to a marked degree the increased popular support given to the Unionist candidates. This recovery was due also to the forcible-feeble character of the Radical campaign against the House of Lords, the unpopularity of the Licensing Bill, the failure of the government to arrive at an education settlement, the incapacity of its Irish administration, its apparent domination by the "little navy" section, and its dallying with Socialism in the budget of 1909. The rejection of this budget in December by the House of Lords led to a desperate struggle at the polls in January 1910, but the confident hopes of the Unionists were doomed to disappointment. They won back over a hundred seats, returning 273 strong, but were still in a minority, the Liberals numbering 275,

Labour members 40, and Irish Nationalists 82. Mr Balfour himself was elected for the City of London by an enormous majority.

Mr Balfour's other publications, not yet mentioned, include *Essays and Addresses* (1893) and *The Foundations of Belief, being Notes introductory to the Study of Theology* (1895). He was made LL.D. of Edinburgh University in 1881; of St Andrews University in 1885; of Cambridge University in 1888; of Dublin and Glasgow Universities in 1891; lord rector of St Andrews University in 1886; of Glasgow University in 1890; chancellor of Edinburgh University in 1891; member of the senate London University in 1888; and D.C.L. of Oxford University in 1891. He was president of the British Association in 1904, and became a fellow of the Royal Society in 1888. He was known from early life as a cultured musician, and became an enthusiastic golf player, having been captain of the Royal and Antient Golf Club of St Andrews in 1894-1895.

(H. Ch.)

BALFOUR, FRANCIS MAITLAND (1851-1882), British biologist, younger brother of Arthur James Balfour, was born at Edinburgh on the 10th of November 1851. At Harrow school he showed but little interest in the ordinary routine, but in one of the masters, Mr George Griffith, he fortunately found a man who encouraged and aided him in the pursuit of natural science, a taste for which, and especially for geology, had been cultivated in him by his mother from an early age. Going into residence at Trinity College, Cambridge, in 1870, he was elected a natural science scholar of his college in the following year, and although his reading was not ordered on the lines usual for the Schools, he obtained the second place in the Natural Science Tripos of December 1873. A course of lectures on embryology, delivered by Sir Michael Foster in 1871, definitely turned his attention to animal morphology, and, after his tripos, he was selected to occupy one of the two seats allocated to the university of Cambridge at the Naples zoological station. The research work which he began there contributed in an important degree to his election as a fellow of Trinity in 1874, and also afforded him material for a series [v.03 p.0255] of papers (published as a monograph in 1878) on the Elasmobranch fishes, which threw new light on the development of several organs in the Vertebrates, in particular of the uro-genital and nervous systems. His next work was to write a large treatise, *Comparative Embryology*, in two volumes; the first, published in 1880, dealing with the Invertebrates, and the second (1881) with the Vertebrates. This book displayed a vigorous scientific imagination, always controlled by a logical sense that rigidly distinguished between proved fact and mere hypothesis, and it at once won wide recognition, not only as an admirable digest of the numberless observations made with regard to the development of animals during the quarter of a century preceding its publication, but also on account of the large amount of original research incorporated in its pages. Balfour's reputation was now such that other universities became anxious to secure his services, and he was invited to succeed Professor George Rolleston at Oxford and Sir Wyville Thomson at Edinburgh. But although he was only a college lecturer, holding no official post in his university, he declined to leave Cambridge, and in the spring of 1882 the university recognized his merits by instituting a special professorship of animal morphology for his benefit. Unhappily he did not deliver a single professorial lecture. During the first term after his appointment he was incapacitated from work by an attack of typhoid fever. Going to the Alps to recruit his health, he perished, probably on the 19th of July 1882, in attempting the ascent of the Aiguille Blanche, Mont Blanc, at that time unscaled. Besides being a brilliant morphologist, Balfour was an accomplished naturalist, and had he lived would probably have taken a high place among British taxonomists.

BALFOUR, SIR JAMES, Bart. (of Denmylne and Kinnaird) (*c.* 1600-1657), Scottish annalist and antiquary. He was well acquainted with Sir William Segar and with Dugdale, to whose *Monasticon* he contributed. He was knighted by Charles I. in 1630, was made Lyon king-at-arms in the same year, and in 1633 baronet of Kinnaird. He was removed from his office of king-at-arms by Cromwell and died in 1657. Some of his numerous works are preserved in the Advocates' library at Edinburgh, together with his correspondence—from which rich collection Haig published *Balfour's Annales of Scotland* in 4 vols. 8vo (1824-1825).

See Sibbald, *Memoria Balfouriana* (1699).

BALFOUR, SIR JAMES (of Pittendreich) (d. 1583 or 1584), Scottish judge and politician, son of Sir Michael Balfour of Montquhanny, was educated for the legal branch of the church of Scotland. In June 1547, together with Knox and others taken at St Andrews, he was condemned to the French galleys, but was released in 1549, abjured the reformers, entered the service of Mary of Guise, and was rewarded with some considerable legal appointments. Subsequently he went over to the lords of the congregation and then betrayed their plans. After Mary's arrival in Scotland he became one of her secretaries, in 1565 being reported as her greatest favourite after Rizzio.[1] He obtained the parsonage of Flisk in Fife in 1561, was nominated a lord of session, and in 1563 one of the commissaries of the court which now took the place of the former ecclesiastical tribunal; in 1565 he was made a privy-councillor, and in 1566 lord-clerk-register, and was knighted. According to Mary his murder was intended together with Rizzio's in 1566. An adherent of Bothwell, he was deeply implicated in Darnley's murder, though not present at the commission of the crime. By his means Darnley was lodged at Kirk o' Field, his brothers' house. He was supposed to have drawn up the bond at Craigmillar for the murder; he signed it, was made under Bothwell deputy-governor of Edinburgh Castle, and is said to have drawn up the marriage-contract between Bothwell and Mary. When, however, the fall of Bothwell was seen to be impending he rapidly changed sides and surrendered the castle to Murray, stipulating for his pardon for Darnley's murder, the retention of the priory of Pittenweem, and pecuniary rewards. He was appointed president of the court of session on resigning the office of lord-clerk-register. He was present at the battle of Langside with the regent in 1568, and was accused of having advised Mary to leave Dunbar to her ruin, and of having betrayed to her enemies the casket letters. The same year, however, in consequence of renewed intrigues with Mary's faction, he was dismissed, and next year was imprisoned on the charge of complicity in Darnley's murder. He succeeded in effecting his escape by means of bribery, the expenses of which he is said to have paid by intercepting the money sent from France to Mary's aid. In August 1571, during the regency of Lennox, an act of forfeiture was passed against him, but next year he was again playing traitor and discovering the secrets of his party to Morton, and he obtained a pardon from the latter in 1573 and negotiated the pacification of Perth the same year. Distrusted by all parties, he fled to France, where he seems to have remained till 1580. In 1579 his forfeiture was renewed by act of parliament. In January 1580 he wrote to Mary offering her his services, and in June protested his desire to be useful to Elizabeth, lamented the influence of the Jesuits, and intended a journey to Dieppe to hear some good Protestant preaching.[2] On the 27th of December of the same year he returned to Scotland and effected the downfall and execution of Morton by producing a bond, probably that in defence of Bothwell and to promote his marriage with Mary, and giving evidence of the latter's knowledge of Bothwell's intention to murder Darnley. In July 1581 his cause was reheard; he was acquitted of murder by assize, and shortly afterwards in 1581 or 1582 he was restored to his estates and received at court. His career, one of the blackest in the annals of political perfidy and crime, closed shortly before the 24th of January 1584. He was the greatest lawyer of his day, and part-author at least of Balfour's *Practicks*, the earliest text-book of Scottish law, not published, however, till 1754. He married Margaret, daughter and heir of Michael Balfour of Burleigh, by whom, besides three daughters, he had six sons, the eldest of whom was created Baron Balfour of Burleigh in 1607.[3]

Bibliography.—See article in the *Dict. of Nat. Biog.* and authorities there quoted; Balfour's *Practicks* (1754) and introductory preface; A. Lang's *Hist. of Scotland*, vol. ii. and authorities (1902); Sir J. Melville's *Memoirs* (Bannatyne Club, 1827); *Cal. of State Papers—Register of Privy Council of Scotland*, i.-iii.; *Scottish Series* (Thorpe), i. and ii. (Bain), ii.-iv.; *The Border Papers*, i.; *Hamilton Papers*, ii. (*Foreign*).

(P. C. Y.)

[1] *Cal. of State Pap. (Scottish)*, ii. 218, 250.

[2] *Cal. of State Pap. (Foreign)*, 1579-1580, p. 294.

[3] The title was attainted in 1716, through the 5th baron's complicity in the Jacobite rising of 1715. In 1869 it was restored to Alexander Hugh Bruce (b. 1849), as 6th baron; he became one of the most influential of contemporary Scottish noblemen, on the Conservative side in politics, and was secretary for Scotland from 1895 to 1903.

BALFOUR, ROBERT (known also as Balforeus) (1550?-1625?), Scottish philosopher, was educated at St Andrews and the university of Paris. He was for many years principal of the Guienne College at Bordeaux. His great work is his *Commentarii in Organum Logicum Aristotelis* (Bordeaux, 1618); the copy in the British Museum contains a number of highly-eulogistic poems in honour of Balfour, who is described as *Graium aemulus acer*. Balfour was one of the scholars who contributed to spread over Europe the fame of the *praefervidum ingenium Scotorum*. His contemporary, Dempster, called him the "phoenix of his age, a philosopher profoundly skilled in the Greek and Latin languages, and a mathematician worthy of being compared with the ancients." His *Cleomedis meteora*, with notes and Latin translation, was reprinted at Leiden as late as 1820.

See Dempster, *Historia Ecclesiastica Gent. Scotorum*; Irving's *Lives of the Scottish Writers*; Anderson's *Scottish Nation*, i. 217.

BALGUY, JOHN (1686-1748), English divine and philosopher, was born at Sheffield on the 12th of August 1686. He was educated at the Sheffield grammar school and at St John's College, Cambridge, graduated B.A. in 1706, was ordained in 1710, and in 1711 obtained the small living of Lamesley and Tanfield in Durham. He married in 1715. It was the year in which Bishop Hoadley preached the famous sermon on "The Kingdom of Christ," which gave rise to the "Bangorian controversy"; and Balguy, under the nom de plume of Silvius, began his career of authorship by taking the side of Hoadley
[v.03 p.0256] in this controversy against some of his High Church opponents. In 1726 he published *A letter to a Deist concerning the Beauty and Excellency of Moral Virtue, and the Support and Improvement which it receives from the Christian Religion*, chiefly designed to show that, while a love of virtue for its own sake is the highest principle of morality, religious rewards and punishments are most valuable, and in some cases absolutely indispensable, as sanctions of conduct. In 1727 he was made a prebendary of Salisbury by his friend Hoadley. He published in the same year the first part of a tractate entitled *The Foundation of Moral Goodness*, and in the following year a second part, *Illustrating and enforcing the Principles contained in the former*. The aim of the work is two-fold—to refute the theory of Hutcheson regarding the basis of rectitude, and to establish the theory of Cudworth and Clarke, that virtue is conformity to reason—the acting according to fitnesses which arise out of the eternal and immutable relations of agents to objects. In 1729 he became vicar of Northallerton, in the county of York. His next work was an essay on *Divine Rectitude: or, a Brief Inquiry concerning the Moral Perfections of the Deity, particularly in respect of Creation and Providence*. It is an attempt to show that the same moral principle which ought to direct human life may be perceived to underlie the works and ways of God: goodness in the Deity not being a mere disposition to benevolence, but a regard to an order, beauty and harmony, which are not merely relative to our faculties and capacities, but real and absolute; claiming for their own sakes the reverence of all intelligent beings, and alone answering to the perfection of the divine ideas. Balguy wrote several other terse and readable tracts of the same nature, which he collected and published in a single volume in 1734. In 1741 he published an *Essay on Redemption*, containing somewhat advanced views. Redemption as taught in Scripture means, according to him, "the deliverance or release of mankind from the power and punishment of sin, by the meritorious sufferings of Jesus Christ," but involves no *translation of guilt*, *substitution of persons* or *vicarious punishment*. Freed from these ideas, which have arisen from interpreting literally expressions which are properly figurative, the doctrine, he argues, satisfies deep and urgent human wants, and is in perfect consistence and agreement with reason and rectitude. His last publication was a volume of sermons, pervaded by good sense and good feeling, and clear, natural and direct in style. He died at Harrogate on the 21st of September 1748. A second volume of sermons appeared in 1750 (3rd ed. in 2 vols., 1760).

BALI, an island of the East Indies, E. of Java, from which it is separated by Bali Strait, which is shallow, and scarcely over a mile in width at its narrowest point. Bali is 93 m. in length, and its greatest breadth is 50 m. The area is 2095 sq. m. In 1882, for administrative purposes, Bali was separated from Java and combined with the island of Lombok to form the Dutch residency of Lombok and Bali. Politically its divisions are two:—(1) the two districts, Buleleng and Jembrana, on Dutch territory; and (2) the autonomous states of Klung Lung, Bangli, Mengui, Badung and Tabanan. Buleleng, on the north-west, is the chief town. The population on Dutch territory in the whole residency in the year 1905 was 523,535. Bali belongs physically to Java; the climate and soil are the same and it has mountains of proportionate height. There are several lakes of great depth and streams well fitted for the purposes of irrigation, of which full advantage is taken by the natives. The geological formation includes (like that of Java) three regions—the central volcanic, the southern peninsula of Tertiary limestone, and alluvial plains between the older formations. The highest volcanoes, Tabanan, Batur and Gunung Agung (Bali Beak), have respectively heights of 7545 ft., 7383 ft., and 10,497 ft., the central chain having an average altitude of 3282 ft. As regards flora and fauna Bali is associated with Java. The deep strait which separates it on the east from Lombok was taken by A. R. Wallace (*q.v.*) as representing the so-called Wallace's Line, whereby he demarcated the Asiatic from the Australian fauna.

The natives of Bali, though of the same stock as the Javanese, and resembling them in general appearance, exceed them in stature and muscular power, as well as in activity and enterprise. They are skilful agriculturists and artisans, especially in textile fabrics and the manufacture of arms. Though native rule is tyrannical and arbitrary, especially in the principalities of Badung and Tabanan, trade and industry could not flourish if insecurity of persons and property existed to any great extent. The natives have also a remedy against the aggression of their rulers in their own hands; it is called *Metilas*, consists in a general rising and renunciation of allegiance, and proves mostly successful. Justice is administered from a written civil and criminal code. Slavery is abolished. Hinduism, which was once the religion of Java, but has been extinct there for four centuries, is still in vogue in the islands of Bali and Lombok, where the cruel custom of widow-burning (suttee) is still practised, and the Hindu system of the four castes, with a fifth or Pariah caste (called *Chandala*), adhered to. It appears partly blended with Buddhism, partly overgrown with a belief in *Kalas*, or evil spirits. To appease these, offerings are made to them either direct or through the mediation of the *Devas* (domestic or agrarian deities); and if these avail not, the *Menyepi* or Great Sacrifice is resorted to. In the course of this ceremony, after the sacrifice, men rush in all directions carrying torches; the women also carry fire-brands, or knock on the houses with rice-crushers and other heavy implements, and thus the evil spirits are considered to be driven away. The Mahommedan religion occurs among the coastal population. The Balinese language belongs to the same group of the Malayan class as the Javanese, Sundanese, Madurese, &c., but is as distinct from each of these as French is from Italian. It is most nearly akin to the Sasak language spoken in Lombok and on the east coast of Bali. The literary language has embodied many of its ingredients from the Old Javanese, as spoken in Java at the time of the fall of Majapahit (15th century), while the vulgar dialect has kept free from such admixture. Javanese influence is also traceable in the use of three varieties of speech, as in the Javanese language, according to the rank of the people addressed. The alphabet is with some modifications the same as the Javanese, but more complicated. The material universally used for writing on is the prepared leaf of the lontar palm. The sacred literature of the Balinese is written in the ancient Javanese or *Kawi* language, which appears to be better understood here than it is in Java. A general decline in culture is manifest in the Balinese. Of the early history of their island the Balinese know nothing. The oldest tradition they possess refers to a time shortly after the overthrow of the Majapahit dynasty in Java, about the middle of the 15th century; but it has been supposed that there must have been Indian settlers here before the middle of the 1st century, by whom the present name, probably cognate with the Sanskrit *balin*, strong, was in all likelihood imposed. It was not till 1633 that the Dutch attempted to enter into alliance with the native princes, and their earliest permanent settlement at Port Badung only dates from 1845. Their influence was extended by the results of the war which they waged with the natives about 1847-49.

The only roadstead safe all the year round is Temukus on the north coast. The rivers are not navigable. Agriculture is the chief means of subsistence; rice being a crop of particular importance. Other crops grown for export are coffee, tobacco, cocoa and indigo. Gold-working, the making of arms and musical instruments, wood-carving, cotton, silk and gold thread weaving are of importance. There are numerous Arab and Chinese traders.

See R. Van Eck, *Schetsen van het eiland Bali*, Tijdsch. van Nederl. Indie (1878-1879); J. Jacobs, *Eenigen tijd onder de Baliers* (Batavia, 1883); H. Tonkes, *Volkskunde von Bali* (Halle, 1888); Liefrinck, *De rijst cultuur op Bali*, Indische Gids. (1886).

BALIKISRI (*Balukiser*), a town of Asia Minor, capital of the Karasi sanjak in the vilayet of Brusa, altitude 575 ft., situated

on rising ground above a fertile plain which drains to the Sea of Marmora. Pop. 20,000 (Moslems, 15,000; Christians, 5000). It is a centre of trade in opium, silk and cereals, communicating by carriage roads with Panderma. The sanjak is rich in mineral wealth; silver mines are worked at Balia and boracite mines at Susurlu. At or near Balikisri was the Roman town of Hadrianutherae, founded, as its name commemorates, by the emperor Hadrian.

[v.03 p.0257]

BALIOL, the name of a family which played an important part in the history of Scotland. The founder of the family in England was a Norman baron, Guy or Guido de Baliol, who held the fiefs of Bailleul, Dampierre, Harcourt and Vinoy in Normandy. Coming to England with William the Conqueror, he received lands in the north of England from William II., and his son, or grandson, Bernard or Barnard de Baliol, built a fortress in Durham called Castle Barnard, around which the town of Barnard Castle grew. The first burgesses probably obtained their privileges from him. Bernard fought for King Stephen during the civil war, was present at the battle of the Standard in August 1138, and was taken prisoner at the battle of Lincoln in February 1141. The date of his death is uncertain. Dugdale only believes in the existence of one Bernard de Baliol, but it seems more probable that the Bernard de Baliol referred to after 1167 was a son of the elder Bernard, and not the same individual. If so the younger Bernard was one of the northern barons who raised the siege of Alnwick, and took William the Lion, king of Scotland, prisoner in July 1174. He also confirmed the privileges granted by his father to the burgesses of Barnard Castle, and was succeeded by his son Eustace. Practically nothing is known of Eustace, or of his son Hugh who succeeded about 1215. Hugh's son and successor, John de Baliol, who increased his wealth and position by a marriage with Dervorguila (d. 1290), daughter of Alan, earl of Galloway, is said to have possessed thirty knights' fees in England and one half of the lands in Galloway. He was one of the regents of Scotland during the minority of Alexander III., but in 1255 was deprived of this office and his lands forfeited for treason. He then appeared in England fighting for Henry III. against Simon de Montfort, and was taken prisoner at the battle of Lewes in 1264. About 1263 he established several scholarships at Oxford, and after his death in 1269 his widow founded the college which bears the name of the family. He left four sons, three of whom died without issue, and in 1278 his lands came to his son, John de Baliol (*q.v.*), who was king of Scotland from 1292 to 1296, and who died in Normandy in 1315. John's eldest son by his marriage with Isabel, daughter of John de Warenne, earl of Surrey, was Edward de Baliol who shared his father's captivity in England in 1296. Subsequently crossing over to France, he appears to have lived mainly on his lands in Normandy until 1324, when he was invited to England by King Edward II., who hoped to bring him forward as a candidate for the Scottish crown. A favourable opportunity, however, did not arise until after the death of King Robert the Bruce in 1329, when Edward III. had succeeded his father on the English throne. Although Edward did not give Baliol any active assistance, the claimant placed himself at the head of some disinherited Scottish nobles, raised a small army and sailed from Ravenspur. Landing at Kinghorn in Fifeshire in August 1332, he gained a complete victory over the Scots under Donald, earl of Mar, at Dupplin Moor, took Perth, and on the 24th of September was crowned king of Scotland at Scone. He then acknowledged Edward III. as his superior, but soon afterwards was defeated at Annan (where his brother, Henry de Baliol, was slain) and compelled to fly to England. Regaining his kingdom after the defeat of the Scots at Halidon Hill in July 1333, Baliol surrendered the whole of the district formerly known as Lothian to Edward, and did homage for Scotland to the English king. His party, however, was weakened by disunion, and he won no serious support in Scotland. Entirely dependent on Edward, he again sought refuge in England, and took a very slight part in the war waged on his behalf. He returned to Scotland after the defeat of King David II. at Neville's Cross in 1346. After making an absolute surrender of Scotland to Edward III. in 1356 at Roxburgh in return for a pension, Edward de Baliol died at Wheatley near Doncaster in 1367.

A cadet branch of the Baliol family was descended from Ingelram, or Engelram, a son of the younger Bernard de Baliol. Ingelram's wife was the daughter and heiress of William de Berkeley, lord of Reidcastle in Forfarshire, and chamberlain of Scotland, and by her he had a son Henry, who became chamberlain about 1223. Henry married Lora or Lauretta, a daughter of Philip de Valoines (Valsques), lord of Panmure, and in 1234 inherited part of the rich English fiefs of the Valoines family. He sided with the English barons against John in 1215, and accompanied Henry III. to France in 1242. He died in 1246. It is probable but not certain that Henry's son was Alexander de Baliol, lord of Cavers in Teviotdale, and chamberlain of Scotland. Alexander took a leading part in Scottish affairs during the latter part of the 13th century, and is first mentioned as chamberlain in 1287. He shared in the negotiations between the Scottish nobles and Edward I. of England which culminated in the treaty of Salisbury in 1289, and the treaty of Brigham in 1290. Probably deprived of his office as chamberlain about 1296 he may have shared the imprisonment of his kinsman, John de Baliol the king. He then fought in Scotland for Edward, and was summoned to several English parliaments. His wife was Isabella de Chilham, through whom he obtained lands in Kent. He died about 1309, leaving a son, Alexander, whose son, Thomas, sold the estate of Cavers to William, earl of Douglas, in 1368. Thomas is the last of the Baliols mentioned in the Scottish records.

A late and dubious tradition asserts that the family name became so discredited owing to the pusillanimous conduct of John and Edward Baliol that it was abandoned by its owners in favour of the form Baillie.

See John of Fordun, *Chronica gentis Scotorum*, edited by W. F. Skene (Edinburgh, 1871-1872); Andrew of Wyntoun, *The Orygynale Cronykil of Scotland*, edited by David Laing (Edinburgh, 1872-1879); *Gesta Edwardi de Carnarvan*, by a canon of Bridlington, edited by W. Stubbs (London, 1883); W. Dugdale, *The Baronage of England* (London, 1675-1676); R. Surtees, *The History of Durham* (London, 1816-1840); *Documents and Records illustrating the History of Scotland*, edited by F. T. Palgrave (London, 1837); *Documents illustrative of the History of Scotland* (1286-1306), edited by J. Stevenson (Edinburgh, 1870); *Calendar of Documents relating to Scotland*, edited by J. Bain (Edinburgh, 1881-1888).

BALIOL, JOHN DE (1249-1315), king of Scotland, was a son of John de Baliol (d. 1269) of Barnard Castle, Durham, by his wife Dervorguila, daughter of Alan, earl of Galloway, and became head of the Baliol family (see above) and lord of extensive lands in England, France and Scotland on his elder brother's death in 1278. Little else, however, is known of his early life. He came into prominence when the Scottish throne became vacant in 1290 owing to the death of Margaret, the "maid of Norway," a granddaughter of King Alexander III., and was one of the three candidates for the crown whose pretensions were seriously considered. Claiming through his maternal grandmother, Margaret, the eldest daughter of David, earl of Huntingdon (d. 1219), who was a grandson of King David I., Baliol's principal rival was Robert Bruce, earl of Annandale, and the dispute was the somewhat familiar one of the eldest by descent against the nearest of kin. Meanwhile the English king, Edward I., was closely watching the trend of affairs in Scotland and was invited to settle this dispute. It is doubtful what rights, if any, the English kings had over Scotland, but when Edward met the Scottish nobles at Norham in May 1291, he demanded a formal recognition of his position as overlord of Scotland. After some delay this was tacitly admitted by the nobles, and acknowledged by Baliol and the other competitors, who all agreed to abide by his decision. A court of eighty Scotsmen and twenty-four Englishmen was then appointed to try the question. Traversing the statements made in favour of Bruce, Baliol claimed by the principles of feudal law for an indivisible inheritance, and on the advice of the court Edward decided in his favour. Having sworn fealty to the English king, Baliol was crowned king of Scotland at Scone on the 30th of November 1292; in his new capacity he did homage to Edward at Newcastle, and in January 1293 released the English king from all promises and obligations made while the kingdom of Scotland was in his hands. These amicable relations were soon disturbed. A Scottish vassal carried his case to Edward as Baliol's overlord, and Baliol himself was soon summoned to the English court to answer a suit brought against him. After a short struggle he admitted Edward's right, and in May 1294 attended a parliament in London. He soon quarrelled with his overlord, the exact point at

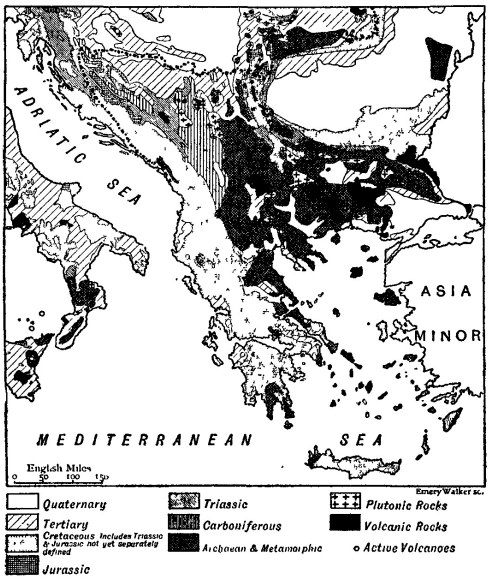
[v.03 p.0258]

issue being doubtful, and returned to Scotland. Consequent on the dispute which had broken out between England and France, a council of twelve was appointed to assist him, and it was decided to defy Edward. Englishmen were dismissed from the Scottish court, their fiefs were confiscated, and an alliance was concluded with Philip IV., king of France. War broke out, but Baliol did not take the field in person. Invading Scotland, Edward met with a feeble resistance, and at Brechin in July 1296 Baliol surrendered his kingdom to Antony Bek, bishop of Durham, as the representative of the English king. About the same time he appeared before Edward at Montrose, and delivered to him a white rod, the feudal token of resignation. With his son, Edward, he was taken a prisoner to England, remaining in captivity until July 1299, when he was released at the request of Pope Boniface VIII. He lived for some time under the pope's supervision, and seems to have passed his remaining days quietly on his French estates. He died in Normandy early in 1315, leaving several children by his wife, Isabel, a daughter of John de Warenne, earl of Surrey (d. 1304).

See *Documents and Records illustrating the History of Scotland*, edited by F. T. Palgrave (London, 1837); *Documents illustrative of the History of Scotland*, 1286-1306, edited by J. Stevenson (Edinburgh, 1870), J. H. Burton, *History of Scotland*, vol. ii. (Edinburgh, 1905); A. Lang, *History of Scotland*, vol. i. (Edinburgh, 1904); Sir H. Maxwell, *Robert the Bruce* (London, 1897); *Calendar of Documents relating to Scotland*, edited by J. Bain (Edinburgh, 1881-1888). Also SCOTLAND: *History*.

BALIUAG, a town of the province of Bulacán, Luzon, Philippine Islands, on the Quingua river, 29 m. (by rail) N.N.W. of Manila. Pop. (1903) 21,008, including the population (7072) of Bustos, which was annexed to Baliuag in that year after the census was taken. Baliuag is served by an extension of the railway between Manila and Dagupan. It is the trade centre of a fertile agricultural district, and manufactures bamboo hats, silk and native fibre goods.

BALKAN PENINSULA, the most easterly of the three large peninsulas which form the southern extremities of the European continent. Its area, 184,779 sq. m., is about 35,000 sq. m. less than that of the Iberian Peninsula, but more than twice that of the Italian. Its northern boundary stretches from the Kilia mouth of the Danube to the Adriatic Sea near Fiume, and is generally regarded as marked by the courses of the rivers Danube, Save and Kulpa. On the E. it is bounded by the Black Sea, the Sea of Marmora, and the Aegean; on the S. by the Mediterranean; on the W. by the Ionian Sea and the Adriatic. With the exception of the Black Sea coast and the Albanian littoral, its shores are considerably indented and flanked by groups of islands. The Peninsula in its general contour resembles an inverted pyramid or triangle, terminating at its apex in a subsidiary peninsula, the Peloponnesus or Morea. Its surface is almost entirely mountainous, the only extensive plains being those formed by the valleys of the Danube and Maritza, and the basin of Thessaly drained by the Salambria (ancient *Peneus*). The Danubian plain, lying, for the most part, outside the Peninsula, is enclosed, on the north, by the Carpathians; and on the south by the Balkans, from which the Peninsula derives its name. These ranges form together the great semicircular mountain-chain, known as the anti-Dacian system, through which the Danube finds a passage at the Iron Gates. The other mountain-systems display great complexity of formation; beginning with the Dinaric Alps and the parallel ranges of Bosnia, they run, as a rule, from north-west to south-east; the great chain of Rhodope traverses the centre of the Peninsula, throwing out spurs towards the Black Sea and the Aegean; farther west are the lofty Shar Dagh and the mountains of Montenegro and Albania, continued by the Pindus range and the heights of Acarnania and Aetolia. The principal summits are Olympus (9794 ft.), overlooking the Gulf of Salonica; Musallá (9631) and Popova Shapka (8855), both in the Rhodope system; Liubotrn in the Shar Dagh (8989); Elin, in the Perin Planina (8794); Belmeken in southern Bulgaria (chain of Dospat, 8562); Smolika in the Pindus range (8445); Dormitor in northern Montenegro (8294); Kaimakchalan in central Macedonia (8255); and Kiona in Aetolia (8235). Owing to the distribution of the mountain-chains, the principal rivers flow in an easterly or south-easterly direction; the Danube falls into the Black Sea, the Maritza, Mesta, Struma (*Strymon*), Vardar and Salambria into the Aegean. The only considerable rivers flowing into the Adriatic are the Narenta, Drin and Viossa. The principal lakes are those of Ochrida, Prespa, Scutari and Iannina. The climate is more severe than that of the sister peninsulas, and the temperature is liable to sudden changes. The winter, though short, is often intensely cold, especially in the Danubian plain and in Thrace, the rigorous climate of which is frequently alluded to by the Latin poets. Bitter north-easterly winds prevail in the spring, and snow is not uncommon even in the low-lying districts of Greece. The autumn weather is generally fine and clear.



Geology.—Broadly speaking, the Balkan Peninsula may be divided into four areas which geologically are distinct. There is a central region, roughly triangular in shape, with its base resting upon the Aegean Sea and its apex in Servia. On two sides this area is bordered by belts of folded beds which form on the west the mountain ranges of the Adriatic and Ionian coasts, and on the north the chain of the Balkans. Finally, beyond the Balkans lies the great Rumanian depression, occupied chiefly by undisturbed Cretaceous and Tertiary strata. The *central region*, although wedged in between two belts of folding, is not affected by the folds of either, excepting near its margins. It consists largely of crystalline and schistose rocks. The core is formed by the mountain masses of Rhodope, Belasitza, Perin and Rila; and here Palaeozoic and Mesozoic beds are absent, and the earliest sedimentary deposits belong to the Tertiary period and lie flat upon the crystalline rocks. Upon the margins, however, Cretaceous beds are found. The eastern parts of Greece are composed almost entirely of Cretaceous beds, but nevertheless they must be considered to belong to the central area, for the folds which affect them are nearly at right angles to those of the western chains. In general, however, the central area is one of faulting rather than of folding, and the sedimentary beds sometimes lie in troughs formed by faults. Extensive volcanic outbursts occurred in this region during the Tertiary period. In the *western folded belt* the strike of the folds is N.W.-S.E., or N.N.W.-S.S.E. There are many local irregularities, but the general direction is maintained as far as the southern extremity of Greece, where the folds show a tendency to curve towards Crete. In the north, Carboniferous beds are present, and the Trias and the Jura take a considerable part in the formation of the chain. The Sarmatian beds are also involved in the folds, indicating that the folding was not completed till Pliocene times. In the south, the older beds disappear and the whole chain is formed [v.03 p.0259] chiefly of Cretaceous beds, though Eocene and probably Jurassic rocks are present. The Eocene beds are folded, but the marginal Pliocene beds are not, and the final folding seems to have taken place during the Miocene period. (For the Balkans, see BULGARIA.)

Area and Population.—The following figures show the area and population of the various political divisions of the Balkan Peninsula in 1909; see also the articles on the separate countries.

Political Divisions	Area in sq. m.	Pop. in 1909	Pop. per sq. m.
Croatia-Slavonia (south of the Save and Kulpa)	(about) 8,200	(about) 1,200,000	146.3
Servia	18,782	2,493,770	132.2
Bulgaria (with Eastern Rumelia)	37,240	4,028,239	88.
The Dobrudja (Rumania)	5,896	258,242	43.9
Dalmatia (Austria)	4,923	591,597	120.1
Montenegro	3,255	311,564	94
Bosnia and Herzegovina (Austria-Hungary)	19,696	1,568,092	70.9
Sanjak of Novibazar (Turkish)	2,840	153,000	53.5
Albania, Macedonia and other Turkish possessions	62,744	5,812,300	92.6
Greece	24,400	2,631,952	107.8
	187,976	19,048,756	101.3

For full details as to the physical features, natural products, population, customs, trade, finance, government, religion, education, language, literature, antiquities, history, politics, &c., of the Balkan lands, see ALBANIA, BOSNIA AND HERZEGOVINA, BULGARIA, CROATIA-SLAVONIA, DALMATIA, DOBRUDJA, GREECE, ILLYRIA, MACEDONIA, MONTENEGRO, NOVIBAZAR, SERVIA and TURKEY.

Races.—The Peninsula is inhabited by a great variety of races, whose ethnological limits are far from corresponding with the existing political boundaries. The Turkish population, descended in part from the Ottoman invaders of the 14th and 15th centuries, in part from colonists introduced at various epochs from Asia by the Turkish government, declined considerably during the 19th century, especially in the countries withdrawn from the sultan's authority. It is diminishing in Thessaly; it has entirely disappeared in the rest of Greece, almost entirely in Servia; and it continues to decrease in Bulgaria notwithstanding the efforts of the authorities to check emigration. It is nowhere found in compact masses except in north-eastern Bulgaria and the region between Adrianople, the Black Sea and the Sea of Marmora. Elsewhere it appears in separate villages and isolated districts, or in the larger towns and their immediate neighbourhood. The total Turkish population of the Peninsula scarcely exceeds 1,800,000. The Slavonic population, including the Serbo-Croats and Bulgars, is by far the most numerous; its total aggregate exceeds 10,000,000. The majority of the Serbo-Croats left their homes among the Carpathians and settled in the Balkan Peninsula in the 7th century. The distinction between the Serbs of the more central region and the Croats of the north-west, was first drawn by the early Byzantine chroniclers, and was well established by the 12th century. It does not correspond with any valid linguistic or racial difference; but in the course of time a strong religious difference arose. Along the Croatian and Dalmatian coast there existed a well-developed Latin civilization, which was sustained by constant intercourse with Italy; and, under its influence, the Serbo-Croatian immigrants were converted to the Roman Catholic Church. In the wild and mountainous interior, however, the Byzantine Church had few or no rivals and the Orthodox creed prevailed. The Orthodox Serbs inhabit the kingdom of Servia, Old Servia (or Novibazar and north-western Macedonia), Montenegro, Herzegovina and parts of Bosnia. The Roman Catholic Croats predominate in Dalmatia, north-western Bosnia and Croatia-Slavonia. Montenegro, like the other mountainous regions, adhered to the Greek Church; it received a number of Orthodox Servian refugees at the beginning of the 15th century, when the Turks occupied Servia. The numbers of the Serbo-Croats may be estimated at about 5,600,000. The Bulgars, who descend from a fusion of the Slavonic element with a later Ugro-Finnish immigration, inhabit the kingdom of Bulgaria (including Eastern Rumelia), parts of the Dobrudja and the greater part of Macedonia, except Old Servia and the Aegean littoral. Apart from their colonies in Bessarabia and elsewhere, they may be reckoned at 4,400,000. Only a portion of the widely-spread Ruman or Vlach race, which extends over a great part of Transylvania, south Hungary and Bessarabia, as well as the Rumanian kingdom, falls within the limits of the Peninsula. It is found in numerous detached settlements in Macedonia, Albania and northern Greece, and in colonies of recent date in Servia and Bulgaria. The nomad Vlachs or Tzintzars of these countries call themselves Arumani or "Romans"; they are a remnant of the native Latinized population which received an increase from the immigration of Daco-Roman refugees, who fled southwards during the 3rd century, after the abandonment of Dacia by Aurelian. (See VLACHS.) The entire Ruman population of the Balkan countries may be set down approximately at 600,000. The Albanians, who call themselves *Shküpetar* or *Arber*, are the representatives of the primitive Illyrian population; they inhabit the Adriatic littoral from the southern frontier of Montenegro to the northern boundary of Greece, in which country they are found in considerable numbers. They have shown a tendency to advance in a north-easterly direction towards the Servian frontier, and the movement has been encouraged for political reasons by the Turkish government. The whole Albanian nation possibly numbers from 1,500,000 to 1,600,000. The Greeks, whose immigration from Asia Minor took place in pre-historic times, are, next to the Albanians, the oldest race in the Peninsula. Their maritime and commercial instincts have led them from the earliest times to found settlements on the sea-coast and the islands. They inhabit the Black Sea littoral from Varna to the Bosporus, the shores of the Sea of Marmora and the Aegean, the Aegean archipelago, the mainland of Greece, Epirus and the western islands as far north as Corfu. In Constantinople they probably exceed 300,000. They are seldom found in large numbers at any great distance from the sea, and usually congregate in the principal towns and commercial centres, such as Adrianople, Constantza, Varna and Philippopolis; there are also detached colonies at Melnik, Stanimaka, Kavakly, Niegush and elsewhere. The Greek inhabitants of the Peninsula and adjacent islands probably number 4,500,000. The remainder of the population is for the most part composed of Armenians, Jews and gipsies. The Armenians, like the Greeks, congregate in the principal centres of trade, especially at Constantinople; their numbers were greatly reduced by the massacres of 1896. The Jews are most numerous at Salonica where they form half the population. The gipsies are scattered widely throughout the Peninsula; they are found not only in wandering troops, as elsewhere in Europe, but in settlements or cantonments in the neighbourhood of towns and villages.

[v.03 p.0260]

Religions.—Owing to the numerous conversions to Islam which followed the Turkish conquest, the Mahommedan population of the Peninsula is largely in excess of the purely Turkish element. More than half the Albanian nation and 35% of the inhabitants of Bosnia and Herzegovina adopted the creed of the conquering race. Among the Bulgars and Greeks the conversions were less numerous. The Bulgarian Mahommedans, or Pomaks, who inhabit the valleys of Rhodope and certain districts in northern Bulgaria, are numerically insignificant; the Greek followers of Islam are almost confined to Crete. The whole Moslem population of the Peninsula is about 3,300,000. The great bulk of the Christian population belongs to the Orthodox Church, of which the oecumenical patriarch at Constantinople is the nominal head, having precedence over all other ecclesiastical dignitaries. The Bulgarian, Servian, Montenegrin and Greek churches are, however, in reality autocephalous. The Bulgarian church enjoys an exceptional position, inasmuch as its spiritual chief, the exarch, who resides at Constantinople, controls the Bulgarian prelates in European Turkey as well as those in the kingdom of Bulgaria. On the other hand, the Greek prelates in Bulgaria are subject to the patriarch. Religious and political questions are intimately connected in eastern Europe. The heads of the various religious communities are the only representatives of the Christian population recognized by the Turkish government; they possess a seat in the local administrative councils and supervise the Christian schools. The efforts of the several branches of the Orthodox Church to obtain a separate organization in the Turkish dominions are to be attributed exclusively to political motives, as no difference of dogma divides them. The Serbo-Croats of Dalmatia, and Croatia-Slavonia, some of the Gheg tribes in Albania, about 21% of the Bosnians, a still smaller number of Bulgarians in the kingdom and in Macedonia and a few Greeks in the islands belong to the Roman Catholic Church. A certain number of Bulgars at Kukush in Macedonia and elsewhere form a "uniate" church, which accepts the authority and dogma of Rome, but preserves the Orthodox rite and discipline. The Armenians are divided between the Gregorian and Uniate-Armenian churches, each under a patriarch. The other Christian confessions are numerically inconsiderable. The Gagaüzi in Eastern Bulgaria, a Turanian and Turkish-speaking race, profess Christianity.

Languages.—Until comparatively recent times Turkish and Greek were the only languages systematically taught or officially recognized in the Balkan lands subject to Turkish rule. The first, the speech of the conquering race, was the official language; the second, owing to the intellectual and literary superiority of the Greeks, their educational zeal and the privileges acquired by their church, became the language of the upper classes among the Christians. The Slavonic masses, however, both Servian and Bulgarian, preserved their language, which saved these nationalities from extinction. The Servian dialect extending into regions which escaped the Turkish yoke, enjoyed certain advantages denied to the Bulgarian: in free Montenegro the first Slavonic printing-press was founded in 1493; at Ragusa, a century later, Servian literature attained a high degree of excellence. Bulgarian, for nearly four centuries, ceased to be a written language

except in a few monasteries; a literary revival, which began about the middle of the 18th century, was the first symptom of returning national consciousness. The Servian, Bulgarian and Rumanian languages have borrowed largely from the Turkish in their vocabularies, but not in their structural forms, and have adopted many words from the Greek. Modern Greek has also a large number of Turkish words which are rejected in the artificial literary language. The revival of the various Balkan nationalities was in every case accompanied or preceded by a literary movement; in Servian literature, under the influence of Obradovich and Vuk Karajich, the popular idiom, notwithstanding the opposition of the priesthood, superseded the ecclesiastical Russian-Slavonic; in Bulgaria the eastern dialect, that of the Sredna Gora, prevailed. Among the Greeks, whose literature never suffered a complete eclipse, a similar effort to restore the classical tongue resulted in a kind of compromise; the conventional literary language, which is neither ancient nor modern, differs widely from the vernacular. Albanian, the only surviving remnant of the ancient Thraco-Illyrian speech, affords an interesting study to philologists. It undoubtedly belongs to the Indo-European family, but its earlier forms cannot, unfortunately, be ascertained owing to the absence of literary monuments. Certain remarkable analogies between Albanian and the other languages of the Peninsula, especially Bulgarian and Rumanian, have been supposed to point to the influence exercised by the primitive speech upon the idioms of the immigrant races.

History.—The great Slavonic immigration, which changed the ethnographic face of the Peninsula, began in the 3rd century A.D. and continued at intervals throughout the following four centuries. At the beginning of this movement the Byzantine empire was in actual or nominal possession of all the regions south of the Danube; the greater part of the native Thraco-Illyrian population of the interior had been romanized and spoke Latin. The Thracians, the progenitors of the Vlachs, took refuge in the mountainous districts and for some centuries disappeared from history: originally an agricultural people, they became nomad shepherds. In Albania the aboriginal Illyrian element, which preserved its ancient language, maintained itself in the mountains and eventually forced back the immigrant race. The Greeks, who occupied the maritime and southern regions, were driven to the sea-coast, the islands and the fortified towns. Slavonic place-names, still existing in every portion of the Peninsula, bear witness to the multitude of the invaders and the permanency of their settlements. In the 6th century the Slavs penetrated to the Morea, where a Slavonic dialect was spoken down to the middle of the 15th century. In the 7th the Serbo-Croats invaded the north-western regions (Croatia, Servia, Bosnia, Herzegovina, Montenegro and northern Albania); they expelled or assimilated the Illyrian population, now represented in Dalmatia by the slavonized Morlachs or Mavro-Vlachs, and appropriated the old Roman colonies on the Adriatic coast. At the end of the 7th century the Bulgars, a Turanian race, crossed the Danube and subjected the Slavonic inhabitants of Moesia and Thrace, but were soon assimilated by the conquered population, which had already become partly civilized. Under their tsar Krum (802-815) the Bulgars invaded the districts of Adrianople and central Macedonia; under Simeon (893-927), who fixed his capital at Preslav, their empire extended from the Adriatic to the Black Sea. In 971 "the first Bulgarian empire" was overthrown by the emperor John Zimisces, but Bulgarian power was soon revived under the Shishman dynasty at Ochrida. In 1014 Tsar Samuel of Ochrida, who had conquered the greater part of the Peninsula, was defeated at Belasitza by the Greek emperor Basil II., and the "western Bulgarian empire" came to an end. In the 10th century the Vlachs reappear as an independent power in Southern Macedonia and the Pindus district, which were known as Great Walachia (Μεγάλη Βλαχία). The Serbs, who owing to the dissensions of their zhupans or chiefs, had hitherto failed to take a prominent part in the history of the Peninsula, attained unity under Stephen Nemanya (1169-1195), the founder of the Nemanyich dynasty. A new Bulgarian power, known as the "second" or "Bulgaro-Vlach empire," was founded at Trnovo in 1186 under the brothers Ivan and Peter Asên, who led a revolt of Vlachs and Bulgars against the Greeks. In 1204 Constantinople was captured by the Latins of the Fourth Crusade, and Baldwin of Flanders was crowned emperor; the Venetians acquired several maritime towns and islands, and Frankish feudal dynasties were established in Salonica, Athens, Achaea and elsewhere. Greek rule, however, survived in the despotate of Epirus under princes of the imperial house of the Angeli. The Latin tenure of Constantinople lasted only 57 years; the imperial city was recaptured in 1261 by Michael VIII. Palaeologus, but most of the feudal Latin states continued to exist till the Turkish conquest; the Venetians retained their possessions for several centuries later and waged continual wars with the Turks. In 1230 Theodore of Epirus, who had conquered Albania, Great Walachia and Macedonia, was overthrown at Klokotnitza by Ivan Asên II., the greatest of Bulgarian monarchs (1218-1241), who defeated Baldwin at Adrianople and extended his sway over
[v.03 p.0261]
most of the Peninsula. The Bulgarian power declined after his death and was extinguished at the battle of Velbûzhd (1330) by the Servians under Stephen Urosh III. A short period of Servian predominance followed under Stephen Dushan (1331-1355) whose realm included Albania, Macedonia, Epirus, Thessaly and northern Greece. The Servian incursion was followed by a great Albanian emigration to the southern regions of the Peninsula. After Dushan's death his empire disappeared, and Servia fell a prey to anarchy. For a short time the Bosnians, under their king Stephen Tvrtko (1353-1391), became the principal power in the west of the Peninsula. The disorganization and internecine feuds of the various states prepared the way for the Ottoman invasion. In 1356 the Turks seized Gallipoli; in 1361 the sultan Murad I. established his capital at Adrianople; in 1389 the fate of the Slavonic states was decided by the rout of the Servians and their allies at Kossovo. The last remnant of Bulgarian national existence disappeared with the fall of Trnovo in 1393, and Great Walachia was conquered in the same year. Under Mahommed II. (1451-1481) the Turks completed the conquest of the Peninsula. The despotate of Epirus succumbed in 1449, the duchy of Athens in 1456; in 1453 Constantinople was taken and the decrepit Byzantine empire perished; the greater part of Bosnia submitted in 1463; the heroic resistance of the Albanians under Scanderbeg collapsed with the fall of Croia (1466), and Venetian supremacy in Upper Albania ended with the capture of Scutari (1478). Only the mountain stronghold of Montenegro and the Italian city-states on the Adriatic coast escaped subjection. In the 16th century under Solyman the Magnificent (1520-1566) the Ottoman power attained its greatest height; after the unsuccessful siege of Vienna (1683) it began to decline. The period of decadence was marked in the latter half of the 18th century by the formation of practically independent pashaliks or fiefs, such as those of Scutari under Mahommed of Bushat, Iannina under Ali of Tepelen, and Viden under Pasvan-oglu. The detachment of the outlying portions of the empire followed. Owing to the uncompromising character of the Mahommedan religion and the contemptuous attitude of the dominant race, the subject nationalities underwent no process of assimilation during the four centuries of Turkish rule; they retained not only their language but their religion, manners and peculiar characteristics, and when the power of the central authority waned they still possessed the germs of a national existence. The independence of Greece was acknowledged in 1829, that of Servia (as a tributary principality) in 1830. No territorial changes within the Peninsula followed the Crimean War; but the continuance of the weakened authority of the Porte tended indirectly to the independent development of the various nationalities. The Ionian Islands were ceded by Great Britain to Greece in 1864. The great break-up came in 1878. The abortive treaty of San Stefano, concluded in that year, reduced the Turkish possessions in the Peninsula to Albania, Epirus, Thessaly and a portion of southern Thrace. A large Bulgarian principality was created extending from the Danube to the Aegean and from the Black Sea to the river Drin in Albania; it received a considerable coast-line on the Aegean and abutted on the Gulf of Salonica under the walls of that town. At the same time the frontiers of Servia and Montenegro were enlarged so as to become almost contiguous, and Montenegro received the ports of Antivari and Dulcigno on the Adriatic. From a strategical point of view the Bulgaria of the San Stefano treaty threatened Salonica, Adrianople and Constantinople itself; and the great powers, anticipating that the new state would become a Russian dependency, refused their sanction to its provisions. The treaty of Berlin followed, which limited the principality to the country between the Danube and the Balkans, created the autonomous province of Eastern Rumelia south of the Balkans, and left the remainder of the proposed Bulgarian state under Turkish rule. The Montenegrin frontier laid down at San Stefano was considerably curtailed, Dulcigno, the district north-east of the Tara, and other territories being restored to Turkey; in addition to Nish, Servia received the districts of Pirot and Vranya on the east instead of the Ibar valley on the west; the Dobrudja, somewhat enlarged, was ceded to Rumania, which surrendered southern Bessarabia to Russia. Bosnia and Herzegovina were handed over to Austrian administration; under a subsequent convention with Turkey, Austria sent troops into the sanjak of Novibazar. The complete independence of the principalities of Servia, Rumania and Montenegro was recognized. The claims of Greece, ignored at San Stefano, were admitted at Berlin; an extension of frontier, including Epirus as well as Thessaly, was finally sanctioned by the powers in 1880, but owing to the tenacious resistance of Turkey only Thessaly and the district of Arta were acquired by Greece in 1881. Rumania was proclaimed a kingdom in that year, Servia in 1882. In 1880, after a naval demonstration by the powers, Dulcigno was surrendered to Montenegro in compensation for the districts of Plava and Gusinye restored to Turkey. In 1886 the informal union of Eastern Rumelia with Bulgaria was sanctioned by Europe, the districts of Tumrush (Rhodope)

and Krjali being given back to the sultan. In 1897 Crete was withdrawn from Turkish administration, and the Greco-Turkish War of that year was followed by the cession to Turkey of a few strategical points on the Thessalian frontier. In 1908 Bosnia and Herzegovina were annexed to the Dual Monarchy, and Bulgaria (including Eastern Rumelia) was proclaimed an independent kingdom.

A Balkan confederation.

The growth and development of the Balkan nations have, to a great extent, been retarded by the international jealousies arising from the Eastern Question. The possibility of the young states entering into a combination which would enable them to offer a united resistance to foreign interference while simultaneously effecting a compromise in regard to their national aims, has at various times occupied the attention of Balkan politicians. Among the earliest advocates of this idea was Ristich, the Servian statesman. During the reaction against Russia which followed the war of 1877 informal discussions were conducted with this object, and it was even suggested that a reformed or constitutional Turkey might find a place in the confederation. The movement was favourably regarded by King Charles of Rumania and Prince Alexander of Bulgaria. But the revolt of Eastern Rumelia, followed by the Servo-Bulgarian War and the coercion of Greece by the powers, embittered the rivalry of the various races, and the project was laid aside. It was revived in a somewhat modified form in 1891 by Tricoupis, who suggested an offensive alliance of the Balkan states, directed against Turkey and aiming at a partition of the Sultan's possessions in Europe. The scheme, which found favour in Servia, was frustrated by the opposition of Stamboloff, who denounced it to the Porte. In 1897 a Bulgarian proposal for joint pacific action with a view to obtaining reforms in Macedonia was rejected by Greece.

AUTHORITIES.—Special bibliographies are appended to the separate articles which deal with the various political divisions of the Peninsula. For a general description of the whole region, its inhabitants, political problems, &c., see "Odysseus," *Turkey in Europe* (London, 1900), a work of exceptional interest and value. See also *The Balkan Question*, ed. L. Villari (London, 1905); W. Miller, *Travels and Politics in the Near East* (London, 1898); L. Lamouche, *La Péninsule balkanique* (Paris, 1899); H. C. Thomson, *The Outgoing Turk* (London, 1897); T. Joanne, *États du Danube et des Balkans* (Paris, 1895); R. Millet, *Souvenirs des Balkans* (Paris, 1891); V. Cambon, *Autour des Balkans* (Paris, 1890); P. J. Hamard, *Par delà l'Adriatique et les Balkans* (Paris, 1890); E. de Laveleye, *La Péninsule des Balkans* (Brussels, 1886). For geology see F. Toula, "Materialien zu einer Geologic der Balkan-halbinsel," *Jahr. k.-k. geol. Reichsanst.* (Vienna, vol. xxxiii. 1883), pp. 61-114; A. Bittnel. M. Neumayr, &c., *Denks. k. Akad. Wiss. Wien, math.-nat. Cl.*, vol. xl. (1880); A. Philippson, *Der Peloponnes* (Berlin, 1892); J. Cvijić, "Die Tektonik der Balkanhalbinsel," *C. R. IX. Cong. géol. inter. Vienne*, pp. 347-370 (1904). For the condition of the Peninsula before the Treaty of Berlin, see E. Rüffer, *Die Balkanhalbinsel und ihre Volker* (Bautzen, 1869); Mackenzie and Irby, *Travels in the Slavonic Provinces of Turkey* (London, 1866); and A. Boué, *La Turquie d'Europe* (Paris, 1840). W. Miller, *The Balkans* (London, 1896), sketches the history of Bulgaria, Montenegro, Rumania and Servia. See also Sir E. Hertslet, *The Map of Europe by Treaty*, esp. vol. iv. (London, 1875-1891); J. D. Bourchier, "A Balkan Confederation," in the *Fortnightly Review* (London, September 1891); the Austrian and Russian staff maps, and the ethnographical maps of Kiepert and Peucker.

(J. D. B.)

[v.03 p.0262]

BALKASH, or BALKHASH (called by the Kirghiz *Ak-denghiz* or *Ala-denghiz* and by the Chinese *Si-hai*), a lake of Asiatic Russia, in the Kirghiz steppes, between the governments of Semipalatinsk and Semiryechensk, in 45° to 47° N. and 73° 30′ to 79° E., about 600 m. to the east of Lake Aral. It is fourth in size of the lakes in Eurasia, having an area of 7115 sq. m., and lies at an altitude of 900 ft. It has the shape of a broad crescent, about 430 m. long from W.S.W. to E.N.E., having its concave side turned southwards; its width varies from 36 to 53 m. Its north-western shore is bordered by a dreary plateau, known as the Famine Steppe (*Bek-pak-dala*). The south-east shore, on the contrary, is low, and bears traces of having extended formerly as far as the Sasyk-kul and the Ala-kul. The Kirghiz in 1903 declared that its surface had been rising steadily during the preceding ten years, though prior to that it was dropping. The chief feeder of the lake is the Ili, which rises in the Khantengri group of the Tian-shan Mountains. The Karatal, the Aksu and the Lepsa also enter from the south-east, and the Ayaguz from the north-east. The first three rivers make their way with difficulty through the sands and reeds, which at a quite recent time were covered by the lake. Although it has no outlet, its waters are relatively fresh. It freezes generally from November to April. Its greatest depth, 35 ft., is along the north-west shore. The fauna of the lake and of its tributaries—explored by Nikolsky—is more akin to the fauna of the rivers of the Tarim basin than to that of the Aral; it also does not contain the common frog. It seems, therefore, probable that Lake Balkash stood formerly in communication through lakes Ebi-nor and Ayar (Telli-nor) with the lake that formerly filled the Lukchun depression (in 89½° E. long, and 42½° N. lat.), but researches show that a connexion with Lake Aral—at least in recent times—was improbable. The lake has been investigated by L. S. Berg (see *Petermanns Mitteilungen*, 1903).

BALKH, a city of Afghanistan, about 100 m. E. of Andkhui and some 46 m. S. of the Oxus. The city, which is identical with the ancient Bactra or Zainaspa, is now for the most part a mass of ruins, situated on the right bank of the Balkh river, 1200 ft. above the sea. It comprises about 500 houses of Afghan settlers, a colony of Jews and a small bazaar, set in the midst of a waste of ruins and many acres of débris. Entering by the west (or Akcha) gate, one passes under three arches, which are probably the remnants of a former Jama Masjid. The outer walls (mostly in utter disrepair) are about 6½ to 7 m. in perimeter, and on the south-eastern borders are set high on a mound or rampart, indicating a Mongol origin. The fort and citadel to the north-east are built well above the town on a barren mound and are walled and moated. There is, however, little left but the remains of a few pillars. The Masjid Sabz, with its green-tiled dome, is said to be the tomb of a Khwaja, Abul Narsi Parsar. Nothing but the arched entrance remains of the Madrasa, which is traditionally not very old. The earlier Buddhist constructions have proved more durable than the Mahommedan buildings. The Top-i-Rustam is 50 yds. in diameter at the base and 30 yds. at the top, circular and about 50 ft. high. Four circular vaults are sunk in the interior and four passages have been pierced below from the outside, which probably lead to them. The base of the building is constructed of sun-dried bricks about 2 ft. square and 4 or 5 in. thick. The Takht-i-Rustam is wedge-shaped in plan, with uneven sides. It is apparently built of pisé mud (*i.e.* mud mixed with straw and puddled). It is possible that in these ruins we may recognize the Nan Vihara of the Chinese traveller Hsüan Tsang. There are the remains of many other topes (or stupas) in the neighbourhood. The mounds of ruins on the road to Mazar-i-Sharif probably represent the site of a city yet older than those on which stands the modern Balkh. The town is garrisoned by a few hundred kasidars, the regular troops of Afghan Turkestan being cantoned at Takhtapul, near Mazar-i-Sharif. The gardens to the north-east contain a caravanserai, which is fairly well kept and comfortable. It forms one side of a courtyard, which is shaded by a group of magnificent chenar trees.

The antiquity and greatness of the place are recognized by the native populations, who speak of it as the *Mother of Cities*. Its foundation is mythically ascribed to Kaiomurs, the Persian Romulus; and it is at least certain that, at a very early date, it was the rival of Ecbatana, Nineveh and Babylon. For a long time the city and country was the central seat of the Zoroastrian religion, the founder of which is said to have died within the walls. From the *Memoirs of Hsüan Tsang*, we learn that, at the time of his visit in the 7th century, there were in the city, or its vicinity, about a hundred Buddhist convents, with 3000 devotees, and that there was a large number of *stupas*, and other religious monuments. The most remarkable was the *Nau Behar*, *Nava Bihara* or New Convent, which possessed a very costly statue of Buddha. A curious notice of this building is found in the Arabian geographer Yaqut. Ibn-Haukal, an Arabian traveller of the 10th century, describes Balkh as built of clay, with ramparts and six gates, and extending half a parasang. He also mentions a castle and a mosque. Idrisi, in the 12th century, speaks of its possessing a variety of educational establishments, and carrying on an active trade. There were several important commercial routes from the city, stretching as far east as India and China. In 1220 Jenghiz Khan sacked Balkh, butchered its inhabitants and levelled all the buildings capable of defence,—treatment to which it was again subjected in the 14th century by Timur. Notwithstanding this, however, Marco Polo can still, in the following century, describe it as "a noble city and a great." Balkh formed the government of Aurangzeb in his youth. In 1736 it was conquered by Nadir Shah. Under the Durani monarchy it fell into the hands of the Afghans; it was conquered by Shah Murad of Kunduz in 1820, and for some time was subject to the khan of Bokhara. In 1850 Mahommed Akram Khan, Barakzai, captured Balkh, and from that time it remained under Afghan rule.

See *Hsüan Tsang*, tr. by Julien, vol. i. pp. 29-32; Burnes's *Travels in Bokhara* (1831-1833); Ferrier's *Travels*; Vambery's *Bokhara* (1873); *Report of the Russo-Afghan Boundary Commission of 1884-1885*.

(T. H. H.*)

BALL, SIR ALEXANDER JOHN, BART. (1759-1809), British rear-admiral and governor of Malta, came of a Gloucestershire family. He entered the navy, and in 1778 was promoted lieutenant. Three years later began a close association with Rodney, and, two days after his chief's crowning victory of April 12, 1782, Ball was promoted commander, and in 1783 he became captain. At this time he spent a year in France with the double purpose of learning the language and living economically. Nelson, then a captain, was at this time by no means favourably impressed by his future friend and comrade, and spoke of him as a "great coxcomb." It was not until 1790 that Ball received a command. From that year, however, he was continuously employed. In 1798, assistance rendered by him to Nelson's ship in heavy weather caused the latter to forget his former animosity, and from that time the two were close friends. Under Nelson's command Ball took part in the battle of the Nile, and his ship, the "Alexander," was the particular opponent of Brueys' flagship, "L'Orient," which blew up. Two months later he was ordered to the blockade of Malta, which was kept up without a break for the next two years. Ball committed the blockade to his first lieutenant, and himself led the marines and local militia, which made the siege on the land side. His care for his men laid the foundations of his popularity with the Maltese which continued till his death. After the fall of Malta, Ball practically retired from the service, in spite of Nelson's urgent entreaty that he should continue afloat, and from 1801 (when he was made a baronet) to 1809 he was governor of Malta, where he endeared himself to the people by his regard for their interests, and his opposition to the policy of treating the island as a conquered dependency. His friendship with Lord Nelson, whose letters prove his high regard for him, was only broken by death. Ball died on the 20th of October 1809 and was buried in Malta. Sir Alexander Ball was kind to Coleridge and is highly praised by him in *The Friend*, "The Third Landing Place." There are numerous mentions of Ball in Nelson's *Despatches*, in Sir H. Nicolas' edition.

[v.03 p.0263]

BALL, JOHN (d. 1381), an English priest who took a prominent part in the peasant revolt in 1381. Little is known of his early years, but he lived probably at York and afterwards at Colchester. He gained considerable fame as a preacher by expounding the doctrines of John Wycliffe, but especially by his insistence on the principle of social equality. These utterances brought him into collision with the archbishop of Canterbury, and on three occasions he was committed to prison. He appears also to have been excommunicated, and in 1366 all persons were forbidden to hear him preach. His opinions, however, were not moderated, nor his popularity diminished by these measures, and his words had a considerable effect in stirring up the rising which broke out in June 1381. Ball was then in prison at Maidstone; but he was quickly released by the Kentish rebels, to whom he preached at Blackheath from the text, "When Adam delved and Eve span, Who was then a gentleman?" He urged his hearers to kill the principal lords of the kingdom and the lawyers; and he was afterwards among those who rushed into the Tower of London to seize Simon of Sudbury, archbishop of Canterbury. When the rebels dispersed Ball fled to the midland counties, but was taken prisoner at Coventry and executed in the presence of Richard II. on the 15th of July 1381. Ball, who was called by Froissart "the mad priest of Kent," seems to have possessed the gift of rhyme. He undoubtedly voiced the feelings of the lower orders of society at that time.

See Thomas Walsingham, *Historia Anglicana*, edited by H. T. Riley (London, 1863-1864); Henry Knighton, *Chronicon*, edited by J. R. Lumby (London, 1889-1895); Jean Froissart, *Chroniques*, edited by S. Luce and G. Raynaud (Paris, 1869-1897); C. E. Maurice, *Lives of English Popular Leaders in the Middle Ages* (London, 1875); C. Oman, *The Great Revolt of 1381* (Oxford, 1906).

BALL, JOHN (1585-1640), English puritan divine, was born at Cassington, Oxfordshire, in October 1585. After taking his B.A. degree from St Mary's Hall, Oxford, in 1608, he went into Cheshire to act as tutor to the children of Lady Cholmondeley. He adopted Puritan views, and after being ordained without subscription, was appointed to the small curacy of Whitmore in Staffordshire. He was soon deprived by John Bridgeman, the high church bishop of Chester, who put him to much suffering. He became a schoolmaster and earned a wide and high reputation for his scholarship and piety. He died on the 20th of October 1640. The most popular of his numerous works was *A Short Catechisme, containing all the Principal Grounds of Religion* (14 editions before 1632). His *Treatise of Faith* (1632), and *Friendly Trial of the Grounds tending to Separation* (1640), the latter of which defines his position with regard to the church, are also valuable.

BALL, JOHN (1818-1889), Irish politician, naturalist and Alpine traveller, eldest son of an Irish judge, Nicholas Ball, was born at Dublin on the 20th of August 1818. He was educated at the Roman Catholic College at Oscott near Birmingham, and at Christ's College, Cambridge. He showed in early years a taste for natural science, particularly botany; and after leaving Cambridge he travelled in Switzerland and elsewhere in Europe, studying his favourite pursuits, and contributing papers on botany and the Swiss glaciers to scientific periodicals. In 1846 he was made an assistant poor-law commissioner, but resigned in 1847, and in 1848 stood unsuccessfully as a parliamentary candidate for Sligo. In 1849 he was appointed second poor-law commissioner, but resigned in 1852 and successfully contested the county of Carlow in the Liberal interest. In the House of Commons he attracted Lord Palmerston's attention by his abilities, and in 1885 was made under-secretary for the colonies, a post which he held for two years. At the colonial office he had great influence in furthering the cause of natural science, particularly in connexion with equipment of the Palliser expedition in Canada, and with Sir W. Hooker's efforts to obtain a systematic knowledge of the colonial floras. In 1858 he stood for Limerick, but was beaten, and he then gave up politics and devoted himself to natural history. He was first president of the Alpine Club (founded 1857), and it is for his work as an Alpinist that he is chiefly remembered, his well-known *Alpine Guide* (London, 1863-1868) being the result of innumerable climbs and journeys and of careful observation recorded in a clear and often entertaining style. He also travelled in Morocco (1871) and South America (1882), and recorded his observations in books which were recognized as having a scientific value. He died in London on the 21st of October 1889.

BALL, THOMAS (1819-), American sculptor, was born at Charlestown, Massachusetts, on the 3rd of June 1819. He was the son of a house-and-sign-painter, and after starting, self-taught, as a portrait painter he turned his attention in 1851 to sculpture, his earliest work being a bust of Jenny Lind. At thirty-five he went to Florence for study; there, with an interval of work in Boston, Massachusetts, in 1857-1865, he remained for more than thirty years, being one of the artistic colony which included the Brownings and Hiram Powers. He returned to America in 1897, and lived in Montclair, New Jersey, with a studio in New York City. His work includes many early cabinet busts of musicians (he was an accomplished musician himself, and was the first in America to sing "Elijah"), and later the equestrian statue of Washington in the Boston public gardens, probably his best work; Josiah Quincy in City Hall Square, Boston; Charles Sumner in the public gardens of Boston; Daniel Webster in Central Park, New York City; the Lincoln Emancipation group at Washington; Edwin Forrest as "Coriolanus," in the Actors' Home, Philadelphia, and the Washington monument in Methuen, Massachusetts. His work has had a marked influence on monumental art in the United States and especially in New England. In 1891 he published an autobiographical volume, *My Three Score Years and Ten*.

BALL (in Mid. Eng. *bal*; the word is probably cognate with "bale," Teutonic in origin, cf. also Lat. *follis*, and Gr. πάλλα), any rounded body, particularly one with a smooth surface, whether used for games, as a missile, or applied to such rounded bodies as the protuberance at the root of the thumb or the big toe, to an enarthrosis, or "ball socket" joint, such as that of the hip or shoulder, and the like. A ball, as the essential feature in nearly every form of game requiring physical exertion, must date from the very earliest times. A rolling object appeals not only to a human baby but to a kitten and a puppy. Some form of game with a ball is found portrayed on Egyptian monuments, and is played among the least advanced of savage tribes at the present day. In Homer, Nausicaa was playing at ball with her maidens when Odysseus first saw her in the land of the Phaeacians (*Od.* vi. 100). And Halios and Laodamas performed before Alcinous and Odysseus with ball play, accompanied with dancing (*Od.* viii. 370). The Hebrews, the least athletic of races, have no mention of the ball in their scriptures. Among the Greeks games with balls (σφαῖραι) were regarded as a useful subsidiary to the more violent athletic exercises, as a means of keeping the body supple, and rendering it graceful, but were generally left to boys and girls. Similarly at Rome they were looked upon as an adjunct to the bath, and were graduated to the age and health of the bathers, and usually a place (*sphaeristerium*) was set apart for them in the baths (*thermae*). Of

regular rules for the playing of ball games, little trace remains, if there were any such. The names in Greek for various forms, which have come down to us in such works as the Ὀνομαστικόν of Pollux of Naucratis, imply little or nothing of such; thus, ἀπόρραξις only means the putting of the ball on the ground with the open hand, οὐρανία, the flinging of the ball in the air to be caught by two or more players; φαινίνδα would seem to be a game of catch played by two or more, where feinting is used as a test of quickness and skill. Pollux (i. x. 104) mentions a game called ἐπίσκυρος, which has often been looked on as the origin of football. It seems to have been played by two sides, arranged in lines; how far there was any form of "goal" seems uncertain. Among the Romans there appear to have been three types or sizes of ball, the *pila*, or small ball, used in catching games, the *paganica*, a heavy ball stuffed with feathers, and the *follis*, a leather ball filled with air, the largest of the three. This was struck from player to player, who wore a kind of gauntlet on the arm. There was a [v.03 p.0264] game known as *trigon*, played by three players standing in the form of a triangle, and played with the *follis*, and also one known as *harpastum*, which seems to imply a "scrimmage" among several players for the ball.[1] These games are known to us through the Romans, though the names are Greek. The various modern games played with a ball or balls and subject to rules are treated under their various names, such as polo, cricket, football, &c.

From Fr. *bal*, *baller*, to dance (late Lat. *ballare*, and hence connected with "ballad," "ballet") comes "ball," meaning a dance, and especially a social gathering of people for the purpose of dancing.

[1] Martial (iv. 19. 6) calls the *harpastum*, *pulverulentum*, implying that it involves a considerable amount of exertion.

BALLADE, the technical name of a complicated and fixed form of verse, arranged on a precise system, and having nothing in common with the word *ballad*, except its derivation from the same Low Latin verb, *ballare*, to dance. In the 14th and 15th centuries it was spelt *balade*. In its regular conditions a ballade consists of three stanzas and an envoi; there is a refrain which is repeated at the close of each stanza and of the envoi. The entire poem should contain but three or four rhymes, as the case may be, and these must be reproduced with exactitude in each section. These rules were laid down by Henri de Croi, whose *L'Art et science de rhétorique* was first printed in 1493, and he added that if the refrain consists of eight syllables, the ballade must be written in huitains (eight-line stanzas), if of ten syllables in dizains (ten-line), and so on. The form can best be studied in an example, and we quote, as absolutely faultless in execution, the famous "Ballade aux Enfants Perdus," composed by Théodore de Banville in 1861:—

"Je le sais bien que Cythère est en deuil!
Que son jardin, soufflеté par l'orage,
O mes amis, n'est plus qu'un sombre écueil
Agonisant sous le soleil sauvage.
La solitude habite son rivage.
Qu'importe! allons vers les pays fictifs!
Cherchons la plage où nos désirs oisifs
S'abreuveront dans le sacré mystère
Fait pour un chœur d'esprits contemplatifs:
Embarquons-nous pour la belle Cythère,

"La grande mer sera notre cercueil;
Nous servirons de proie au noir naufrage,
Le feu du ciel punira notre orgueil
Et l'aiguillon nous garde son outrage.
Qu'importe! allons vers le clair paysage!
Malgré la mer jalouse et les récifs,
Venez, portons comme des fugitifs,
Loin de ce monde au souffle délétère.
Nous dont les cœurs sont des ramiers plaintifs,
Embarquons-nous pour la belle Cythère.

"Des serpents gris se traînent sur le seuil
Où souriait Cypris, la chère image
Aux tresses d'or, la vierge au doux accueil!
Mais les Amours sur le plus haut cordage
Nous chantent l'hymne adoré du voyage.
Héros cachés dans ces corps maladifs,
Fuyons, partons sur nos légers esquifs,
Vers le divin bocage où la panthère
Pleure d'amour sous les rosiers lascifs:
Embarquons-nous pour la belle Cythère.

Envoi.

"Rassasions d'azur nos yeux pensifs!
Oiseaux chanteurs, dans la brise expansifs,
Ne souillons pas nos ailes sur la terre.
Volons, charmés, vers les dieux primitifs!
Embarquons-nous pour la belle Cythère."

This is the type of the ballade in its most elaborate and highly-finished form, which it cannot be said to have reached until the 14th century. It arose from the *canzone de ballo* of the Italians, but it is in Provençal literature that the ballade first takes a modern form. It was in France, however, and not until the reign of Charles V., that the ballade as we understand it began to flourish; instantly it became popular, and in a few years the out-put of these poems was incalculable. Machault, Froissart, Eustache Deschamps and Christine de Pisan were among the poets who cultivated the ballade most abundantly. Later, those of Alain Chartier and Henri Baude were famous, while the form was chosen by François Villon for some of the most admirable and extraordinary poems which the middle ages have handed down to us. Somewhat later, Clément Marot composed ballades of great precision of form, and the fashion culminated in the 17th century with those of Madame Deshoulières, Sarrazin, Voiture and La Fontaine. Attacked by Molière, and by Boileau, who wrote

"La ballade asservie à ses vieilles maximes,
Souvent doit tout son lustre au caprice des rimes,"

the ballade went entirely out of fashion for two hundred years, when it was resuscitated in the middle of the 19th century by Théodore de Banville, who published in 1873 a volume of *Trente-six ballades joyeuses*, which has found many imitators. The ballade, a typically French form, has been extensively employed in no other language, except in English. In the 15th and 16th centuries many ballades were written, with more or less close attention to the French rules, by the leading English poets, and in particular by Chaucer, by Gower (whose surviving ballades, however, are all in French) and by Lydgate. An example from Chaucer will show that the type of strophe and rhyme arrangement was in medieval English:—

"Madamë, ye been of all beauty shrine
As far as circled is the mappëmound;
For, as the crystal, glorious ye shine,
And likë ruby been your cheekës round.
Therewith ye been so merry and so jocúnd

That at a revel when that I see you dance,
It is an oinëment unto my wound,
Though ye to me ne do no daliance.

"For though I weep of tearës full a tine [cask],
Yet may that woe my heartë not confound;
Your seemly voice, that ye so small out-twine,
Maketh my thought in joy and bliss abound.
So courteously I go, with lovë bound,
That to myself I say, in my penance,
Sufficeth me to love you, Rosamound,
Though ye to me ne do no daliance.

"Was never pike wallowed in galantine,
As I in love am wallowed and y-wound;
For which full oft I of myself divine
That I am truë Tristram the second.
My love may not refrayed [cooled down] be nor afound [foundered];
I burn ay in an amorous pleasance.
Do what you list, I will your thrall be found,
Though ye to me ne do no daliance."

The absence of an envoi will be noticed in Chaucer's, as in most of the medieval English ballades. This points to a relation with the earliest French form, in its imperfect condition, rather than with that which afterwards became accepted. But a ballade without an envoi lacks that section whose function is to tie together the rest, and complete the whole as a work of art. After the 16th century original ballades were no more written in English until the latter part of the 19th, when they were re-introduced, almost simultaneously, by Algernon Charles Swinburne, Austin Dobson, Andrew Lang, Edmund Gosse and W. E. Henley; but D. G. Rossetti's popular translation of Villon's "Ballade of Fair Ladies" may almost be considered an original poem, especially as it entirely disregards the metrical rules of the ballades. Mr. Dobson's "The Prodigals" (1876) was one of the earliest examples of a correct English specimen. In 1880 Mr Lang published a volume of *Ballades in Blue China*, which found innumerable imitators. The modern English ballades have been, as a rule, closely modelled on the lines laid down in the 15th century by Henri de Croi. With the exception of the sonnet, the ballade is the noblest of the artificial forms of verse cultivated in English literature. It lends itself equally well to pathos and to mockery, and in the hands of a competent poet produces an effect which is rich in melody without seeming fantastic or artificial.

(E. G.)

BALLADS. The word "ballad" is derived from the O. Fr. *baller*, to dance, and originally meant a song sung to the rhythmic movement of a dancing chorus. Later, the word, in the form of *ballade* (*q.v.*), became the technical term for a particular form of old-fashioned French poetry, remarkable for its involved and recurring rhymes. "Laisse moi aux Jeux Floraux de Toulouse toutes ces vieux poésies Françoises comme *ballades*," says Joachim du Bellay in 1550; and Philaminte, the lady pedant of Molière's *Femmes Savantes*, observes— [v.03 p.0265]

"La ballade, à mon goût, est une chose fade,
Ce n'en est plus la mode, elle sent son vieux temps."

In England the term has usually been applied to any simple tale told in simple verse, though attempts have been made to confine it to the subject of this article, namely, the literary form of popular songs, the folk-tunes associated with them being treated in the article Song. By popular songs we understand what the Germans call *Volkslieder*, that is, songs with words composed by members of the people, for the people, handed down by oral tradition, and in style, taste and even incident, common to the people in all European countries. The beauty of these purely popular ballads, their directness and freshness, has made them admired even by the artificial critics of the most artificial periods in literature. Thus Sir Philip Sydney confesses that the ballad of *Chevy Chase*, when chanted by "a blind crowder," stirred his blood like the sound of trumpet. Addison devoted two articles in the *Spectator* to a critique of the same poem. Montaigne praised the *naïveté* of the village carols; and Malherbe preferred a rustic *chansonnette* to all the poems of Ronsard. These, however, are rare instances of the taste for popular poetry, and though the Danish ballads were collected and printed in the middle of the 16th century, and some Scottish collections date from the beginning of the 18th, it was not till the publication of Allan Ramsay's *Evergreen and Tea Table Miscellany*, and of Bishop Percy's *Reliques* (1765), that a serious effort was made to recover Scottish and English folk-songs from the recitation of the old people who still knew them by heart. At the time when Percy was editing the *Reliques*, Madame de Chénier, the mother of the celebrated French poet of that name, composed an essay on the ballads of her native land, modern Greece; and later, Herder and Grimm and Goethe, in Germany, did for the songs of their country what Scott did for those of Liddesdale and the Forest. It was fortunate, perhaps, for poetry, though unlucky for the scientific study of the ballads, that they were mainly regarded from the literary point of view. The influence of their artless melody and straightforward diction may be felt in the lyrics of Goethe and of Coleridge, of Wordsworth, of Heine and of André Chénier. Chénier, in the most affected age even of French poetry, translated some of the Romaic ballads; one, as it chanced, being almost identical with that which Shakespeare borrowed from some English reciter, and put into the mouth of the mad Ophelia. The beauty of the ballads and the interest they excited led to numerous forgeries and modern interpolations, which it is seldom difficult to detect with certainty. Editors could not resist the temptation to interpolate, to restore, and to improve the fragments that came in their way. The marquis de la Villemarqué, who first drew attention to the ballads of Brittany, is not wholly free from this fault. Thus a very general scepticism was awakened, and when questions came to be asked as to the date and authorship of the Scottish traditional ballads, it is scarcely to be wondered at that Dr Chambers attributed most of them to the accomplished Lady Wardlaw, who lived in the middle of the 18th century.

The vexed and dull controversy as to the origin of Scottish folk-songs was due to ignorance of the comparative method, and of the ballad literature of Europe in general. The result of the discussion was to leave a vague impression that the Scottish ballads were perhaps as old as the time of Dunbar, and were the production of a class of professional minstrels. These minstrels are a stumbling-block in the way of the student of the growth of ballads. The domestic annals of Scotland show that her kings used to keep court-bards, and also that strollers, *jongleurs*, as they were called, went about singing at the doors of farm-houses and in the streets of towns. Here were two sets of minstrels who had apparently left no poetry; and, on the other side, there was a number of ballads that claimed no author. It was the easiest and most satisfactory inference that the courtly minstrels made the verses, which the wandering crowders imitated or corrupted. But this theory fails to account, among other things, for the universal sameness of tone, of incident, of legend, of primitive poetical formulae, which the Scottish ballad possesses, in common with the ballads of Greece, of France, of Provence, of Portugal, of Denmark and of Italy. The object, therefore, of this article is to prove that what has long been acknowledged of nursery tales, of what the Germans call *Märchen*, namely, that they are the immemorial inheritance at least of all European peoples, is true also of some ballads. Their present form, of course, is relatively recent: in centuries of oral recitation the language altered automatically, but the stock situations and ideas of many romantic ballads are of dateless age and world-wide diffusion. The main incidents and plots of the fairy tales of Celts and Germans and Slavonic and Indian peoples, their unknown antiquity and mysterious origin, are universally recognized. No one any longer attributes them to this or that author, or to this or that date. The attempt to find date or author for a genuine popular song is as futile as a similar search in the case of a *Märchen*. It is to be asked, then, whether what is confessedly true of folk-tales,—of such stories as the *Sleeping Beauty* and *Cinderella*,—is true also of folk-songs. Are they, or have they been, as universally sung as the fairy tales have been narrated? Do they, too, bear traces of the survival of primitive creeds and primitive forms of consciousness and of imagination? Are they, like *Märchen*, for the most part, little influenced by the higher religions, Christian or polytheistic? Do they turn, as *Märchen* do, on the same incidents, repeat the same stories, employ the same

machinery of talking birds and beasts? Lastly, are any specimens of ballad literature capable of being traced back to extreme antiquity? It appears that all these questions may be answered in the affirmative; that the great age and universal diffusion of the ballad may be proved; and that its birth, from the lips and heart of the people, may be contrasted with the origin of an artistic poetry in the demand of an aristocracy for a separate epic literature destined to be its own possession, and to be the first development of a poetry of personality,—a record of individual passions and emotions. After bringing forward examples of the identity of features in European ballad poetry, we shall proceed to show that the earlier genre of ballads with refrain sprang from the same primitive custom of dance, accompanied by improvised song, which still exists in Greece and Russia, and even in valleys of the Pyrenees.

There can scarcely be a better guide in the examination of the *notes* or marks of popular poetry than the instructions which M. Ampère gave to the committee appointed in 1852-1853 to search for the remains of ballads in France. M. Ampère bade the collectors look for the following characteristics:—"The use of assonance in place of rhyme, the brusque character of the recital, the textual repetition, as in Homer, of the speeches of the persons, the constant use of certain numbers,—as three and seven,—and the representation of the commonest objects of every-day life as being made of gold and silver." M. Ampère might have added that French ballads would probably employ a "bird chorus," the use of talking-birds as messengers; that they would repeat the plots current in other countries, and display the same non-Christian idea of death and of the future world (see "The Lyke-wake Dirge"), the same ghostly superstitions and stories of metamorphosis, and the same belief in elves and fairies, as are found in the ballads of Greece, of Provence, of Brittany, Denmark and Scotland. We shall now examine these supposed common notes of all genuine popular song, supplying a few out of the many instances of curious identity. As to brusqueness of recital, and the use of assonance instead of rhyme, as well as the aid to memory given by reproducing speeches verbally, these are almost unavoidable in all simple poetry preserved by oral tradition. In the matter of recurring numbers, we have the eternal—

> "Trois belles filles
> L'y en a'z une plus belle que le jour,"

who appear in old French ballads, as well as the "Three Sailors," whose adventures are related in the Lithuanian and
[v.03 p.0266] Provençal originals of Thackeray's *Little Billee*. Then there is "the league, the league, the league, but barely three," of Scottish ballads; and the τριὰ πουλακιά, three golden birds, which sing the prelude to Greek folk-songs, and so on. A more curious note of primitive poetry is the lavish and reckless use of gold and silver. H. F. Tozer, in his account of ballads in the *Highlands of Turkey*, remarks on this fact, and attributes it to Eastern influences. But the horses' shoes of silver, the knives of fine gold, the talking "birds with gold on their wings," as in Aristophanes, are common to all folk-song. Everything almost is gold in the *Kalewala* (*q.v.*), a so-called epic formed by putting into juxtaposition all the popular songs of Finland. Gold is used as freely in the ballads, real or spurious, which M. Verkovitch has had collected in the wilds of Mount Rhodope. The Captain in the French song is as lavish in his treatment of his runaway bride,—

> "Son amant l'habille,
> Tout en or et argent";

and the rustic in a song from Poitou talks of his *faucille d'or*, just as a variant of Hugh of Lincoln introduces gold chairs and tables. Again, when the lover, in a ballad common to France and to Scotland, cuts the winding-sheet from about his living bride—"il tira ses ciseaux d'or fin." If the horses of the Klephts in Romaic ballads are gold shod, the steed in *Willie's Lady* is no less splendidly accoutred,—

> "Silver shod before,
> And gowden shod behind."

Readers of Homer, and of the Chanson de Roland, must have observed the same primitive luxury of gold in these early epics, in Homer reflecting perhaps the radiance of the actual "golden Mycenae."

Next as to talking-birds. These are not so common as in *Märchen*, but still are very general, and cause no surprise to their human listeners. The omniscient popinjay, who "up and spoke" in the Border minstrelsy, is of the same family of birds as those that, according to Talvj, pervade Servian song; as the τριὰ πουλακιά which introduce the story in the Romaic ballads; as the wise birds whose speech is still understood by exceptionally gifted Zulus; as the wicked dove that whispers temptation in the sweet French folk-song; as the "bird that came out of a bush, on water for to dine," in the *Water o' Wearies Well*.

In the matter of identity of plot and incident in the ballads of various lands, it is to be regretted that no such comparative tables exist as Von Hahn tried, not very exhaustively, to make of the "story-roots" of *Märchen*. Such tables might be compiled from the learned notes and introductions of Prof. Child to his *English and Scottish Popular Ballads* (1898). A common plot is the story of the faithful leman, whose lord brings home "a braw new bride," and who recovers his affection at the eleventh hour. In Scotland this is the ballad of Lord Thomas and Fair Annie; in Danish it is Skiaen Anna. It occurs twice in M. Fauriel's collection of Romaic songs. Again, there is the familiar ballad about a girl who pretends to be dead, that she may be borne on a bier to meet her lover. This occurs not only in Scotland, but in the popular songs of Provence (collected by Damase Arbaud) and in those of Metz (Puymaigre), and in both countries an incongruous sequel tells how the lover tried to murder his bride, and how she was too cunning, and drowned him. Another familiar feature is the bush and briar, or the two rose trees, which meet and plait over the graves of unhappy lovers, so that all passers-by see them, and say in the Provençal,—

> "Diou ague l'amo
> Des paures amourous."

Another example of a very widespread theme brings us to the ideas of the state of the dead revealed in folk-songs. *The Night Journey*, in M. Fauriel's Romaic collection, tells how a dead brother, wakened from his sleep of death by the longing of love, bore his living sister on his saddle-bow, in one night, from Bagdad to Constantinople. In Scotland this is the story of Proud Lady Margaret; in Germany it is the song which Bürger converted into Lenore; in Denmark it is Aagé und Elsé; in Brittany the dead foster-brother carries his sister to the apple close of the Celtic paradise (*Barzaz Breiz*). Only in Brittany do the sad-hearted people think of the land of death as an island of Avalon, with the eternal sunset lingering behind the flowering apple trees, and gleaming on the fountain of forgetfulness. In Scotland the channering worm doth chide even the souls that come from where, "beside the gate of Paradise, the birk grows fair enough." The Romaic idea of the place of the dead, the garden of Charon, whence "neither in spring or summer, nor when grapes are gleaned in autumn, can warrior or maiden escape," is likewise pre-Christian. In Provençal and Danish folk-song, the cries of children ill-treated by a cruel step-mother awaken the departed mother,—

> "'Twas cold at night and the bairnies grat,
> The mother below the mouls heard that."

She reappears in her old home, and henceforth, "when dogs howl in the night, the step-mother trembles, and is kind to the children." To this identity of superstition we may add the less tangible fact of identity of tone. The ballads of Klephtic exploits in Greece match the Border songs of Dick of the Cow and Kinmont Willie. The same simple delight of living animates the short Greek *Scolia* and their counterparts in France. Everywhere in these happier climes, as in southern Italy, there are snatches of popular verse that make but one song of rose trees, and apple blossom, and the nightingale that sings for maidens loverless,—

> "Il ne chante pas pour moi,
> J'en ai un, Dieu merci,"

says the gay French refrain.

It would not be difficult to multiply instances of resemblance between the different folk-songs of Europe; but enough has, perhaps, been said to support the position that some of them are popular and primitive in the same sense as *Märchen*. They are composed by peoples of an early stage who find, in a natural improvisation, a natural utterance of modulated and rhythmic speech, the appropriate relief of their emotions, in moments of high-wrought feeling or on solemn occasions. "Poesie" (as Puttenham well says in his *Art of English Poesie*, 1589) "is more ancient than the artificiall of the Greeks and Latines, and used of the savage and uncivill, who were before all science and civilitie. This is proved by certificate of merchants and travellers, who by late navigations have surveyed the whole world, and discovered large countries, and wild people strange and savage, affirming that the American, the Perusine, and the very Canniball do sing and also say their highest and holiest matters in certain riming versicles." In the same way Aristotle, discoursing of the origin of poetry, says (*Poet*. c. iv.), ἐγέννησαν τὴν ποίησιν ἐκ τῶν αὐτοσχεδιασμάτων M. de la Villemarqué in Brittany, M. Pitré in Italy, Herr Ulrich in Greece, have described the process of improvisation, how it grows out of the custom of dancing in large bands and accompanying the figure of the dance with song. "If the people," says M. Pitré, "find out who is the composer of a *canzone*, they will not sing it." Now in those lands where a blithe peasant life still exists with its dances, like the *kolos* of Russia, we find ballads identical in many respects with those which have died out of oral tradition in these islands. It is natural to conclude that originally some of the British ballads too were first improvised, and circulated in rustic dances. We learn from M. Bujeaud and M. de Puymaigre in France, that all ballads there have their air or tune, and that every dance has its own words, for if a new dance comes in, perhaps a fashionable one from Paris, words are fitted to it. Is there any trace of such an operatic, lyrical, dancing peasantry in austere Scotland? We find it in Gawin Douglas's account of—

> "Sic as we clepe wenches and damosels,
> In gersy greens, wandering by spring wells,
> Of bloomed branches, and flowers white and red,
> Plettand their lusty chaplets for their head,
> Some sang ring-sangs, dances, ledes, and rounds."

Now, ring-sangs are ballads, dancing songs; and *Young Tamlane*, for instance, was doubtless once danced to, as we know it possessed an appropriate air. Again, Fabyan, the chronicler (quoted by Ritson) says that the song of triumph over Edward II., "was after many days sung *in dances*, to the carols of the maidens and minstrels of Scotland." We might quote the *Complaynt of Scotland* to the same effect. "The shepherds, and their wyvis sang mony other melodi sangs, ... than efter this sueit celestial harmony, tha began to dance in ane ring." It is natural to conjecture that, if we find identical ballads in Scotland, and in Greece and Italy, and traces of identical customs—customs crushed by the Reformation, by Puritanism, by modern so-called civilization,—the ballads sprang out of the institution of dances, as they still do in warmer and pleasanter climates. It may be supposed that legends on which the ballads are composed, being found as they are from the White Sea to Cape Matapan, are part of the stock of primitive folk-lore. Thus we have an immemorial antiquity for the legends, and for the lyrical choruses in which their musical rendering was improvised. We are still at a loss to discover the possibly mythological germs of the legends; but, at all events, some ballads may be claimed as distinctly popular, and, so to speak, impersonal in matter and in origin. It would be easy to show that survivals out of this stage of inartistic lyric poetry linger in the early epic poetry of Homer and in the French *épopées*, and that the Greek drama sprang from the sacred choruses of village vintagers. In the great early epics, as in popular ballads, there is the same directness and simplicity, the same use of recurring epithets, the "green grass," the "salt sea," the "shadowy hills," the same repetition of speeches and something of the same barbaric profusion in the use of gold and silver. But these resemblances must not lead us into the mistake of supposing Homer to be a collection of ballads, or that he can be properly translated into ballad metre. The *Iliad* and the *Odyssey* are the highest form of an artistic epic, not composed by piecing together ballads, but developed by a long series of noble ἀοιδοί, for the benefit of the great houses which entertain them, out of the method and materials of popular song.

[v.03 p.0267]

We have here spoken mainly of romantic ballads, which retain in the refrain a vestige of the custom of singing and dancing; of a period when "dance, song and poetry itself began with a communal consent" (Gummere, *The Beginnings of Poetry*, p. 93, 1901). The custom by which a singer in a dancing-circle chants a few words, the dancers chiming in with the refrain, is found by M. Junod among the tribes of Delagoa Bay (Junod, *Chantes et contes des Ba Ronga*, 1897). Other instances are the Australian song-dances (Siebert, in Howitt's *Native Tribes of South-East Australia*, Appendix 1904; and Dennett, *Folk-Lore of the Fiort*). We must not infer that even among the aborigines of Australia song is entirely "communal." Known men, inspired, they say, in dreams, or by the All Father, devise new forms of song with dance, which are carried all over the country; and Mr Howitt gives a few examples of individual lyric. The history of the much exaggerated opinion that a whole people, as a people, composed its own ballads is traced by Prof. Gummere in *The Beginnings of Poetry*, pp. 116-163. Some British ballads retain traces of the early dance-song, and most are so far "communal" in that, as they stand, they have been modified and interpolated by many reciters in various ages, and finally (in *The Border Minstrelsy*) by Sir Walter Scott, and by hands much weaker than his (see *The Young Tamlane*). There are cases in which the matter of a ballad has been derived by a popular singer from medieval literary romance (as in the Arthurian ballads), while the author of the romance again usually borrowed, like Homer in the *Odyssey*, from popular *Märchen* of dateless antiquity. It would be an error to suppose that most romantic folk-songs are vulgarizations of literary romance—a view to which Mr Courthope, in his *History of English Poetry*, and Mr Henderson in *The Border Minstrelsy* (1902), incline—and the opposite error would be to hold that this process of borrowing from and vulgarization of literary medieval romance never occurred. A good illustration of the true state of the case will be found in Child's introduction to the ballad of *Young Beichan*.

Gaston Paris, a great authority, holds that early popular poetry is "improvised and contemporary with its facts" (*Histoire poétique de Charlemagne*). If this dictum be applied to such ballads as "The Bonny Earl o' Murray," "Kinmont Willie," "Jamie Telfer" and "Jock o' the Side," it must appear that the contemporary poets often knew little of the events and knew that little wrong. We gather the true facts from contemporary letters and despatches. In the ballads the facts are confused and distorted to such a degree that we must suppose them to have been composed in a later generation on the basis of erroneous oral tradition; or, as in the case of *The Queen's Marie*, to have been later defaced by the fantastic interpolations of reciters. To prove this it is only necessary to compare the historical Border ballads (especially those of 1595-1600) with Bain's *Border Papers* (1894-1896). Even down to 1750, the ballads on Rob Roy's sons are more or less mythopoeic. It seems probable that the existing form of most of our border ballads is not earlier than the generation of 1603-1633, after the union of the crowns. Even when the ballads have been taken from recitation, the reciter has sometimes been inspired by a "stall copy," or printed broadsheet.

Authorities.—The indispensable book for the student of ballads is Child's *English and Scottish Popular Ballads*, published in 1897-1898 (Boston, U.S.A.). Professor Child unfortunately died without summing up his ideas in a separate essay, and they must be sought in his introductions, which have never been analysed. He did not give much attention to such materials for the study of ancient poetry as exist copiously in anthropological treatises. In knowledge of the ballads of all European peoples he was unrivalled, and his bibliography of collections of ballads contains some four hundred titles, (Child, vol. v., pp. 455-468). The most copious ballad makers have been the Scots and English, the German, Slavic, Danish, French and Italian peoples; for the Gaelic there is but one entry, Campbell of Islay's *Lea har na Feinne* (London, 1872). The general bibliography occupies over sixty pages, and to this the reader must be referred, while Prof. Gummere's book, *The Beginnings of Poetry*, is an adequate introduction to the literature, mainly continental, of the ballad question, which has received but scanty attention in England. For the relation of ballad to epic there is no better guide than Comparetti's *The Kalewala*, of which there is an English translation. For purely literary purposes the best collection of ballads is Scott's *Border Minstrelsy* in any complete edition. The best critical modern edition is that of Mr T. F. Henderson; his theory of ballad origins is not that which may be gathered from Professor Child's introductions.

(A. L.)

BALLANCE, JOHN (1839-1893), New Zealand statesman, eldest son of Samuel Ballance, farmer, of Glenavy, Antrim, Ulster, was born on the 27th of March 1839. He was educated at a national school, and, on leaving, was apprenticed to an ironmonger at Belfast. He became a clerk in a wholesale ironmonger's house in Birmingham, and migrated to New Zealand, intending to start in business there as a small jeweller. After settling at Wanganui, however, he took an opportunity, soon offered, of founding a newspaper, the *Wanganui Herald*, of which he became editor and remained chief owner for the rest of his life. During the fighting with the Maori chief Titokowaru, in 1867, Ballance was concerned in the raising of a troop of volunteer horse, in which he received a commission. Of this he was deprived owing to the appearance in his newspaper of articles criticizing the management of the campaign. He had, however, behaved well in the field, and, in spite of his dismissal, was awarded the New Zealand war medal. He entered the colony's parliament in 1875 and, with one interval (1881-1884), sat there till his death. Ballance was a member of three ministries, that of Sir George Grey (1877-1879); that of Sir Robert Stout (1884-1887); and that of which he himself was premier (1891-1893). His alliance with Grey ended with a notorious and very painful quarrel. In the Stout government his portfolios were those of lands and native affairs; but it was at the treasury that his prudent and successful finance made the chief mark. As native minister his policy was pacific and humane, and in his last years he contrived to adjust equitably certain long-standing difficulties relating to reserved lands on the west coast of the North Island. He was resolutely opposed to the sale of crown lands for cash, and advocated with effect their disposal by perpetual lease. His system of state-aided "village settlements," by which small farms were allotted to peasants holding by lease from the crown, and money lent them to make a beginning of building and cultivation, has been on the whole successful. To Ballance, also, was due the law reducing the life-tenure of
[v.03 p.0268]
legislative councillors to one of seven years. He was actively concerned in the advocacy of woman suffrage. But his best known achievement was the imposition, in 1891, of the progressive land-tax and progressive income-tax still levied in the colony. As premier he brought together the strong experimental and progressive party which long held office in New Zealand. In office he showed debating power, constructive skill and tact in managing men; but in 1893, at the height of his success and popularity, he died at Wellington of an intestinal disease after a severe surgical operation. Quiet and unassuming in manner, Ballance, who was a well-read man, always seemed fonder of his books and his chessboard than of public bustle; yet his loss to New Zealand political life was great. A statue was erected to his memory in front of Parliament House, Wellington.

(W. P. R.)

BALLANCHE, PIERRE SIMON (1776-1847), French philosopher of the theocratic school, was born at Lyons. Naturally delicate and highly-strung, he was profoundly stirred by the horrors of the siege of Lyons. His sensitiveness received a second blow in an unsuccessful love affair, which, however, he bore with fortitude. He devoted himself to an examination of the nature of society and his work brought him into connexion with the literary circle of Châteaubriand and Madame Récamier. His great work is the *Palingénésie*, which is divided into three parts, *L'orphée*, *La formule*, *La ville des expiations*. The first deals with the prehistoric period of the world, before the rise of religion; the second was to be an endeavour to deduce a universal law from known historical facts; the third to sketch the ultimate state of perfection to which humanity is moving. Of these the first alone was completed, but fragments of the other parts exist. Perhaps the most valuable part, of the work is the general introduction. His last work, *Vision d'Hébal*, intended as part of the *Ville des expiations*, describes the chief of a Scottish clan, who, gifted with second sight, gives semi-prophetic utterances as to the course of world-history. In 1841 Ballanche was elected a member of the French Academy. He died in 1847. A collected edition of his works in nine volumes was begun in 1830. Four only appeared. In 1833 a second edition in six volumes was published. As a man, Ballanche was warm-hearted and enthusiastic, but he was endowed with a too-vivid imagination and his strange thoughts are expressed in equally bizarre language. To give a connected account of his views is difficult; their full development should be studied in relation with his life-history, the stages of which are curiously parallel to his theory of the progress of man, the fall, the trial, the perfection.

As has been said, he belonged to the theocratic school, who, in opposition to the rationalism of the preceding age, emphasized the principle of authority, placing revelation above individual reason, order above freedom and progress. But Ballanche made a sincere endeavour to unite in one system what was valuable in the opposed modes of thinking. He held with the theocratists that individualism was an impracticable view; man, according to him, exists only in and through society. He agreed further with them that the origin of society was to be explained, not by human desire and efforts, but by a direct revelation from God. Lastly, with De Bonald, he reduced the problem of the origin of society to that of the origin of language, and held that language was a divine gift. But at this point he parts company with the theocratists, and in this very revelation of language finds a germ of progress. Originally, in the primitive state of man, speech and thought are identical; but gradually the two separate; language is no longer only spoken, it is also written and finally is printed. Thus the primitive unity is broken up; the original social order which co-existed with, and was dependent on it, breaks up also. New institutions spring up, upon which thought acts, and in and through which it even draws nearer to a final unity, a *palingenesis*. The volition of primitive man was one with that of God but it becomes broken up into separate volitions which oppose themselves to the divine will, and through the oppositions and trials of this world work onward to a second and completer harmony. Humanity, therefore, passes through three stages, the fall from perfection, the period of trial and the final re-birth or return to perfection. In the dim records of mythical times may be traced the obscure outlines of primitive society and of its fall. Actual history exhibits the conflict of two great principles, which may be said to be realized in the patricians and plebeians of Rome. Such a distinction of caste is regarded by Ballanche as the original state of historical society; and history, as a whole, he considers to have followed the same course as that taken by the Roman plebs in its attempts to attain equality with the patriciate. On the events through which the human race is to achieve its destiny Ballanche gives few intelligible hints. The sudden flash which disclosed to the eyes of Hébal the whole epic of humanity cannot be reproduced in language trammelled by time and space. Scattered throughout the works of Ballanche are many valuable ideas on the connexion of events which makes possible a philosophy of history; but his own theory does not seem likely to find more favour than it has already received. Besides the *Palingénésie*, Ballanche wrote a poem on the siege at Lyons (unpublished); *Du sentiment considéré dans la littérature et dans les arts* (1801); *Antigone*, a prose poem (1814); *Essai sur les institutions sociales* (1818), intended as a prelude to his great work; *Le Vieillard et le jeune homme*, a philosophical dialogue (1819); *L'Homme sans nom*, a novel (1820).

See Ampère, *Ballanche* (Paris, 1848); Ste Beuve, *Portraits contemporains*, vol. ii.; Damiron, *Philosophie de XIX^{e} siècle*; Eugène Blum, "Essai sur Ballanche" (in *Critique Philos.*, 30th June 1887); Gaston Frainnet, *Essai sur la philos de P. S. Ballanche* (Paris, 1903, containing unpublished letters, portraits and full bibliography); C. Huit, *La Vie et les œuvres de Ballanche* (1904). An admirable analysis of the works composing the *Palingénésie* is given by Barchou, *Revue des deux mondes* (1831), t. 2. pp. 410-456.

BALLANTINE, WILLIAM (1812-1887), English serjeant-at-law, was born in London on the 3rd of January 1812, being the son of a London police-magistrate. He was educated at St Paul's school, and called to the bar in 1834. He began in early life a varied acquaintance with dramatic and literary society, and his experience, combined with his own pushing character and acute intellect, helped to obtain for him very soon a large practice, particularly in criminal cases. He became known as a formidable cross-examiner, his great rival being Serjeant Parry (1816-1880). The three great cases of his career were his successful prosecution of the murderer Franz Müller in 1864, his skilful defence of the Tichborne claimant in 1871 and his defence of the gaekwar of Baroda in 1875, his fee in this last case being one of the largest ever known. Ballantine became a serjeant-at-law in 1856. He died at Margate on the 9th of January 1887, having previously published more than one volume of reminiscences. Serjeant Ballantine's private life was decidedly Bohemian; and though he earned large sums, he died very poor.

BALLANTYNE, ROBERT MICHAEL (1825-1894), Scottish writer of fiction, was born at Edinburgh on the 24th of April 1825, and came of the same family as the famous printers and publishers. When sixteen years of age he went to Canada and was for six years in the service of the Hudson's Bay Company. He returned to Scotland in 1847, and next year published his first book, *Hudson's Bay: or, Life in the Wilds of North America*. For some time he was employed by Messrs Constable, the publishers, but in 1856 he gave up business for the profession of literature, and began the series of excellent stories of adventure for the young with which his name is popularly associated. *The Young Fur-Traders* (1856),

The Coral Island (1857), *The World of Ice* (1859), *Ungava: a Tale of Eskimo Land* (1857), *The Dog Crusoe* (1860), *The Lighthouse* (1865), *Deep Down* (1868), *The Pirate City* (1874), *Erling the Bold* (1869), *The Settler and the Savage* (1877), and other books, to the number of upwards of a hundred, followed in regular succession, his rule being in every case to write as far as possible from personal knowledge of the scenes he described. His stories had the merit of being thoroughly healthy in tone and possessed considerable graphic force. Ballantyne was also no mean artist, and exhibited some of his water-colours at the Royal Scottish Academy. He lived in later years at Harrow, and died on the 8th of February 1894, at Rome, where he had gone to attempt to shake off the results of overwork. He wrote a volume of *Personal Reminiscences of Book-making* (1893).

BALLARAT [Ballaarat] and **BALLARAT EAST,** a city and a town of Grenville county, Victoria, Australia, 74 m. by rail W.N.W. of Melbourne. The city and Ballarat East, separated only by the Yarrowee Creek, are distinct municipalities. Pop. of Ballarat (1901) 25,448, of Ballarat East, 18,262. Ballarat is the second city and the chief gold-mining centre of the state. The alluvial gold-fields were the richest ever opened up, but as these deposits have become exhausted the quartz reefs at deep levels have been exploited, and several mines are worked at depths exceeding 2000 ft. The city is the seat of Anglican and Roman Catholic bishops. It has a number of admirable public buildings, while, among several parks and recreation grounds, mention must be made of the fine botanical garden, 750 acres in extent, where, in Lake Wendouree, pisciculture is carried on with great success. The school of mines is the most important in Australia and is affiliated to the university of Melbourne. Ballarat is an important railway centre and its industries include woollen-milling, brewing, iron-founding, flour-milling and distilling. Owing to its elevation of 1438 ft. it has an exceptionally cool and healthy climate. Although the district is principally devoted to mining it is well adapted for sheep-farming, and some of the finest wool in the world is produced near Ballarat. The existence of the towns is due to the heavy immigration which followed upon the discovery of the gold-fields in 1851. In 1854, in their resistance of an arbitrary tax, the miners came into armed conflict with the authorities; but a commission was appointed to investigate their grievances; and a charter was granted to the town in 1855. In 1870 Ballarat was raised to the rank of a city.

[v.03 p.0269]

BALLAST (O. Swed. *barlast,* perhaps from *bar*, bare or mere, and *last*, load), heavy material, such as gravel, stone or metal, placed in the hold of a ship in order to immerse her sufficiently to give adequate stability. In botany "ballast-plants" are so-called because they have been introduced into countries in which they are not indigenous through their seeds being carried in such ballast. A ship "in ballast" is one which carries no paying cargo. In modern vessels the place of ballast is taken by water-tanks which are filled more or less as required to trim the ship. The term is also applied to materials like gravel, broken slag, burnt clay, &c., used to form the bed in which the sleepers or ties of a railway track are laid, and also to the sand which a balloonist takes up with him, in order that, by throwing portions of it out of the car from time to time, he may lighten his balloon when he desires to rise to a higher level.

BALLATER (Gaelic for "the town on a sloping hill"), a village in the parish of Glenmuick, Aberdeenshire, Scotland, 670 ft. above the sea, on the left bank of the Dee, here crossed by a fine bridge, 43¼ m. by rail W. by S. of Aberdeen. It is the terminus of the Deeside railway and the station for Balmoral, 9 m. to the W. Founded in 1770 to provide accommodation for the visitors to the mineral wells of Pannanich, 1½ m. to the E., it has since become a popular summer resort. It contains the Albert Memorial Hall and the barracks for the sovereign's bodyguard, used when the king is in residence at Balmoral. Red granite is the chief building material of the houses. Ballatrich farm, where Byron spent part of his boyhood, lies some 4 m. to the E. Ballater has a mean temperature of 44.6° F., and an average annual rainfall of 33.4 in.

BALLENSTEDT, a town of Germany, in the duchy of Anhalt, on the river Getel, 20 m. E. of Quedlinburg by rail. Pop. (1900) 5423. It is pleasantly situated under the north-eastern declivity of the Harz mountains. The inhabitants are mostly engaged in agriculture and there is practically no other industry. The palace of the dukes of Anhalt, standing on an eminence, contains a library and collections of various kinds, including a good picture gallery. It is approached by a fine avenue of trees and is surrounded by a well-wooded park. In the Schlosskirche the grave of Albert the Bear, margrave of Brandenburg (1100-1170) has been discovered.

BALLET, a performance in which dancing, music and pantomime are involved. Originally derived from the (Sicilian) Gr. βαλλίζειν, to dance, the word has passed through the Med. Lat. *ballare* (with *ballator* as synonymous with *saltator*) to the Ital. *ballare* and *ballata*, to the Fr. *ballet*, to the O. Eng. word *ballette*, and to *ballad*. In O. Fr., according to Rousseau, *ballet* signifies "to dance, to sing, to rejoice"; and thus it incorporates three distinct modern words, "ballet, ball and ballad." Through the gradual changes in the amusements of different ages, the meaning of the first two words has at length become limited to dancing, and the third is now confined to singing. But, although ballads are no longer the vocal accompaniments to dances round the maypole, old ballads are still sung to dance tunes. The present acceptation of the word *ballet* is—a theatrical representation in which a story is told only by gesture, accompanied by music, which should be characterized by stronger emphasis than would be employed with the voice. The dancing should be connected with the story but is more commonly incidental. The French word was found to be so comprehensive as to require further definition, and thus the above-described would be distinguished as the *ballet d'action* or pantomime ballet, while a single scene, such as that of a village festival with its dances, would now be termed a *divertissement*.

The *ballet d'action*, to which the changed meaning of the word is to be ascribed, and therewith the introduction of modern ballet, has been generally attributed to the 15th century. Novelty of entertainment was then sought for in the splendid courts of Italy, in order to celebrate events which were thought great in their time, such as the marriages of princes, or the triumphs of their arms. Invention was on the rack for novelty, and the skill of the machinist was taxed to the utmost. It has been supposed that the art of the old Roman *pantomimi* was then revived, to add to the attractions of court-dances. Under the Roman empire the *pantomimi* had represented either a mythological story, or perhaps a scene from a Greek tragedy, by mute gestures, while a chorus, placed in the background, sang *cantica* to narrate the fable, or to describe the action of the scene. The question is whether mute pantomimic action, which is the essence of modern ballet, was carried through those court entertainments, in which kings, queens, princes and princesses, took parts with the courtiers; or whether it is of later growth, and derived from professional dances upon the stage. The former is the general opinion, but the court entertainments of Italy and France were masques or masks which included declamation and song, like those of Ben Jonson with Inigo Jones for the court of James I.

The earliest modern ballet on record was that given by Bergonzio di Botta at Tortona to celebrate the marriage of the duke of Milan in 1489. The ballet, like other forms of dancing, was developed and perfected in France; it is closely associated with the history of the opera; but in England it came much later than the opera, for it was not introduced until the 18th century, and in the first Italian operas given in London there was no ballet. During the regency of Lord Middlesex a ballet-master was appointed and a *corps* of dancers formed. The ballet has had three distinct stages in its development. For a long time it was to be found only at the court, when princely entertainments were given to celebrate great occasions. At that time ladies of the highest rank performed in the ballet and spent much time in practising and perfecting themselves for it. Catherine de'Medici introduced these entertainments into France and spent large sums of money on devising performances to distract her son's attention from the affairs of the state. Baltasarini, otherwise known as Beaujoyeulx, was the composer of a famous entertainment given by Catherine in 1581 called the "Ballet Comique de la Reyne." This marks an era in the history of the opera and ballet, for we find here for the first time dance and music arranged for the display of coherent dramatic ideas. Henry IV., Louis XIII. and XIV. were all lovers of the ballet and performed various characters in them, and Richelieu used the ballet as an instrument for the expression of political purposes. Lully was the first to make an art of the composition of ballet music and he was the first to insist on the admission of women as ballet dancers, feminine characters having hitherto been assumed by men dressed as women. When Louis XIV. became too fat to dance, the ballet at court became unpopular and thus was ended the first stage of its development. It was then adopted in the colleges at prize distributions and other occasions, when the ballets of Lully and Quinault were commonly performed. The third period in the history of the ballet was marked by its appearance on the stage, where it has remained ever since. It should be added that up till the third period dramatic poems had accompanied the ballet and the dramatic meaning was helped out with speech and song; but with the advent of the third period speech disappeared and the purely pantomime performance, or *ballet d'action*, was instituted.

The father of ballet dancing as we know it at the present day was Jean Georges Noverre (*q.v.*). The *ballet d'action* was really invented by him; in fact, the ballet has never advanced beyond the stage to which he brought it; it has rather gone back. The essence of Noverre's theory was that mere display was not enough to ensure interest and life for the ballet; and some years ago Sir Augustus Harris expressed a similar opinion when he was asked wherein lay the reason of the decadence of the modern ballet. Noverre brought to a high degree of perfection the art of presenting a story by means of pantomime, and he never allowed dancing which was not the direct expression of a particular attitude of mind. Apart from Noverre, the greatest ballet-master was undoubtedly Gaetano Apolline Balthazare Vestris (*q.v.*), who modestly called himself *le dieu de la danse*, and was, indeed, the finest male dancer that Europe ever produced. Gluck composed *Iphigénie en Aulide* in conjunction with Vestris. In 1750 the two greatest dancers of the day performed together in Paris in a ballet-opera called *Léandre et Héro*; the dancers were Vestris and Madame Camargo (*q.v.*), who introduced short skirts in the ballet.

[v.03 p.0270]

The word "balette" was first used in the English language by Dryden in 1667, and the first descriptive ballet seen in London was *The Tavern Bilkers*, which was played at Drury Lane in 1702. Since then the ballet in England has been purely exotic and has merely followed on the lines of French developments. The palmy days of the ballet in England were in the first half of the 19th century, when a royal revenue was spent on the maintenance of this fashionable attraction. Some famous dancers of this period were Carlotta Grisi, Mdlle Taglioni (who is said to have turned the heads of an entire generation), Fanny Elssler, Mdlle Cerito, Miss P. Horton, Miss Lucile Grahn and Mdlle Carolina Rosati. In later years Kate Vaughan was a remarkably graceful dancer of a new type in England, and, in Sir Augustus Harris's opinion, she did much to elevate the modern art. She was the first to make skirt-dancing popular, although that achievement will not be regarded as an unmixed benefit by every student of the art. Skirt-dancing, in itself a beautiful exhibition, is a departure from true dancing in the sense that the steps are of little importance in it; and we have seen its development extend to a mere exhibition of whirling draperies under many-coloured lime-lights. The best known of Miss Vaughan's disciples and imitators (each of whom has contributed something to the art on her own account) were Miss Sylvia Grey and Miss Letty Lind. Of the older and classical school of ballet-dancing Adeline Genée became in London the finest exponent. But ballet-dancing, affected by a tendency in modern entertainment to make less and less demands on the intelligence and intellectual appreciation of the public, and more and more demands on the eye—the sense most easily affected—has gradually developed into a spectacle, the chief interest of which is quite independent of dancing. Thousands of pounds are spent on dressing a small army of women who do little but march about the stage and group themselves in accordance with some design of colour and mass; and no more is asked of the intelligence than to believe that a ballet dressed, for example, in military uniform is a compliment to or glorification of the army. Only a few out of hundreds of members of the *corps de ballet* are really dancers and they perform against a background of colour afforded by the majority. It seems unlikely that we shall see any revival of the best period and styles of dancing until a higher standard of grace and manners becomes fashionable in society. With the constantly increasing abolition of ceremony, courtliness of manner is bound to diminish; and only in an atmosphere of ceremony, courtesy and chivalry can the dance maintain itself in perfection.

LITERATURE.—One of the most complete books on the ballet is by the Jesuit, Claude François Menestrier, *Des ballets anciens et modernes*, 12mo (1682). He was the inventor of a ballet for Louis XIV. in 1658; and in his book he analyses about fifty of the early Italian and French ballets. See also Noverre, *Lettres sur la danse* (1760; new ed. 1804); Castel-Blaze, *La Danse et les ballets* (1832), and *Les Origines de l'opéra* (1869).

BALL-FLOWER, an architectural ornament in the form of a ball inserted in the cup of a flower, which came into use in the latter part of the 13th, and was in great vogue in the early part of the 14th century. It is generally placed in rows at equal distances in the hollow of a moulding, frequently by the sides of mullions. The earliest known is said to be in the west part of Salisbury cathedral, where it is mixed with the tooth ornament. It seems to have been used more and more frequently, till at Gloucester cathedral, in the south side, it is in profusion.

BALLIA, a town and district of British India, in the Benares division of the United Provinces. The town is situated on the left bank of the Ganges, below the confluence of the lesser Sarju. It is really an aggregation of rural villages. Pop. (1901) 15,278.

The district of Ballia, constituted in 1879, occupies an angle at the junction of the Gogra with the Ganges, being bordered by two districts of Behar. It contains an area of 1245 sq. m. Owing to the great pressure on the soil from the density of the population, to the reluctance to part with land characteristic of small proprietors, to the generally great productiveness of land and to the very light assessment of government revenue, land in Ballia, for agricultural purposes merely, has a market value higher than in almost any other district. It commonly brings in Rs. 200 per bigha, or £20 per acre, and sometimes double that figure. In 1901 the population was 987,768, showing a decrease of 5% in the decade. The principal crops are rice, barley, other food-grains, pulse, sugar-cane and opium. There are practically no manufactures, except that of sugar. Trade is carried on largely by way of the two bordering rivers.

BALLINA, a seaport and market-town of county Mayo, Ireland, in the north parliamentary division, on the left bank of the river Moy, with a station on the Killala branch of the Midland Great Western railway. Pop. of urban district (1901) 4505. Across the river, and therefore in county Sligo, is the suburb of Ardnaree, connected with Ballina by two bridges. In Ardnaree is the Roman Catholic cathedral (diocese of Killala), with an east window of Munich glass, and the ruins of an Augustinian abbey (1427) adjoining. There is a Roman Catholic diocesan college and the Protestant parish church is also in Ardnaree. A convent was erected in 1867. In trade and population Ballina is the first town in the county. The salmon-fishery and fish-curing are important branches of its trade; and it has also breweries and flour-mills and manufactures snuff and coarse linen. On the 25th of August 1798, Ballina was entered by the French under General Humbert, marching from their landing-place at Killala. In the neighbourhood there is the interesting cromlech of the four Maels, which, if actually erected over the criminals whose name it bears, is proved by the early annals of Ireland to belong to the 7th century A.D. Their story relates that these men, foster-brothers of Cellach, bishop of Kilmore-Moy, murdered him at the instigation of Guaire Aidhne, king of Connaught, but were themselves executed at Ardnare (*Ard-na-riaghadh*, the hill of the executions) by the bishop's brother. The Moy is a notable salmon river for rod-fishing and its tributaries and the neighbouring lakes contain trout.

BALLINASLOE, a market town of county Galway, Ireland, in the east parliamentary division, 91 m. W. of Dublin, on the Midland Great Western main line. Pop. of urban district (1901) 4904. The river Suck, an affluent of the Shannon, divides it into two parts, of which the eastern was in county Roscommon until 1898. The town contains remains of a castle of Elizabethan date. Industries include brewing, flour-milling, tanning, hat-making and carriage-building. Trade is assisted by water-communication through the Grand canal to the Shannon. The town is widely celebrated for its great annual cattle-fair held in October, at which vast numbers of cattle and sheep are offered or sale. Adjoining the town is Garbally Castle, the seat of the earl of Clancarty, into the demesne of which the great fair extends from the town.

BALLISTICS (from the Gr. βάλλειν, to throw), the science of throwing warlike missiles or projectiles. It is now divided into two parts:—*Exterior Ballistics*, in which the motion of the projectile is considered after it has received its initial impulse, when the projectile is moving freely under the influence of gravity and the resistance of the air, and it is required to determine the circumstances so as to hit a certain object, with a view to its destruction or perforation; and *Interior Ballistics*, in which the pressure of the powder-gas is analysed in the bore of the gun, and the investigation is carried out of the requisite charge of powder to secure the initial velocity of the projectile without straining the gun unduly. The calculation of the stress in the various parts of the gun due to the powder pressure is dealt with in the article ORDNANCE.

[v.03 p.0271]

I. EXTERIOR BALLISTICS.

In the ancient theory due to Galileo, the resistance of the air is ignored, and, as shown in the article on MECHANICS (§ 13), the trajectory is now a *parabola*. But this theory is very far from being of practical value for most purposes of gunnery; so that a first requirement is an accurate experimental knowledge of the resistance of the air to the projectiles employed, at all velocities useful in artillery. The theoretical assumptions of Newton and Euler (*hypotheses magis mathematicae quam*

naturales) of a resistance varying as some simple power of the velocity, for instance, as the square or cube of the velocity (the quadratic or cubic law), lead to results of great analytical complexity, and are useful only for provisional extrapolation at high or low velocity, pending further experiment.

The foundation of our knowledge of the resistance of the air, as employed in the construction of ballistic tables, is the series of experiments carried out between 1864 and 1880 by the Rev. F. Bashforth, B.D. (*Report on the Experiments made with the Bashforth Chronograph*, &c., 1865-1870; *Final Report*, &c., 1878-1880; *The Bashforth Chronograph*, Cambridge, 1890). According to these experiments, the resistance of the air can be represented by no simple algebraical law over a large range of velocity. Abandoning therefore all a priori theoretical assumption, Bashforth set to work to measure experimentally the velocity of shot and the resistance of the air by means of equidistant electric screens furnished with vertical threads or wire, and by a chronograph which measured the instants of time at which the screens were cut by a shot flying nearly horizontally. Formulae of the calculus of finite differences enable us from the chronograph records to infer the velocity and retardation of the shot, and thence the resistance of the air.

As a first result of experiment it was found that the resistance of similar shot was proportional, at the same velocity, to the surface or cross section, or square of the diameter. The resistance R can thus be divided into two factors, one of which is d^2, where d denotes the diameter of the shot in inches, and the other factor is denoted by p, where p is the resistance in pounds at the same velocity to a similar 1-in. projectile; thus $R = d^2p$, and the value of p, for velocity ranging from 1600 to 2150 ft. per second (f/s) is given in the second column of the extract from the abridged ballistic table below.

These values of p refer to a standard density of the air, of 534.22 grains per cubic foot, which is the density of dry air at sea-level in the latitude of Greenwich, at a temperature of 62° F. and a barometric height of 30 in.

But in consequence of the humidity of the climate of England it is better to suppose the air to be (on the average) two-thirds saturated with aqueous vapour, and then the standard temperature will be reduced to 60° F., so as to secure the same standard density; the density of the air being reduced perceptibly by the presence of the aqueous vapour.

It is further assumed, as the result of experiment, that the resistance is proportional to the density of the air; so that if the standard density changes from unity to any other relative density denoted by τ, then $R = \tau d^2p$, and τ is called the *coefficient of tenuity*.

The factor τ becomes of importance in long range high angle fire, where the shot reaches the higher attenuated strata of the atmosphere; on the other hand, we must take τ about 800 in a calculation of shooting under water.

The resistance of the air is reduced considerably in modern projectiles by giving them a greater length and a sharper point, and by the omission of projecting studs, a factor κ, called the *coefficient of shape*, being introduced to allow for this change.

For a projectile in which the ogival head is struck with a radius of 2 diameters, Bashforth puts $\kappa = 0.975$; on the other hand, for a flat-headed projectile, as required at proof-butts, $\kappa = 1.8$, say 2 on the average.

For spherical shot κ is not constant, and a separate ballistic table must be constructed; but κ may be taken as 1.7 on the average.

Lastly, to allow for the superior centering of the shot obtainable with the breech-loading system, Bashforth introduces a factor σ, called the *coefficient of steadiness*.

This steadiness may vary during the flight of the projectile, as the shot may be unsteady for some distance after leaving the muzzle, afterwards steadying down, like a spinning-top. Again, σ may increase as the gun wears out, after firing a number of rounds.

Collecting all the coefficients, τ, κ, σ, into one, we put

(1) $R = nd^2p = nd^2f(v)$, where
(2) $n = \kappa\,\sigma\,\tau$,

and n is called the *coefficient of reduction*.

By means of a well-chosen value of n, determined by a few experiments, it is possible, pending further experiment, with the most recent design, to utilize Bashforth's experimental results carried out with old-fashioned projectiles fired from muzzle-loading guns. For instance, $n = 0.8$ or even less is considered a good average for the modern rifle bullet.

Starting with the experimental values of p, for a standard projectile, fired under standard conditions in air of standard density, we proceed to the construction of the ballistic table. We first determine the time t in seconds required for the velocity of a shot, d inches in diameter and weighing w lb, to fall from any initial velocity V(f/s) to any final velocity v(f/s). The shot is supposed to move horizontally, and the curving effect of gravity is ignored.

If Δt seconds is the time during which the resistance of the air, R lb, causes the velocity of the shot to fall Δv (f/s), so that the velocity drops from $v+\frac{1}{2}\Delta v$ to $v-\frac{1}{2}\Delta v$ in passing through the mean velocity v, then

(3) $R\Delta t$ = loss of momentum in second-pounds,
$= w(v+\frac{1}{2}\Delta v)/g - w(v-\frac{1}{2}\Delta v)/g = w\Delta v/g$

so that with the value of R in (1),

(4) $\Delta t = w\Delta v/nd^2pg$.

We put

(5) $w/nd^2 = C$,

and call C the ballistic coefficient (driving power) of the shot, so that

(6) $\Delta t = C\Delta T$, where
(7) $\Delta T = \Delta v/gp$,

and ΔT is the time in seconds for the velocity to drop Δv of the standard shot for which C=1, and for which the ballistic table is calculated.

Since p is determined experimentally and tabulated as a function of v, the velocity is taken as the argument of the ballistic table; and taking $\Delta v = 10$, the average value of p in the interval is used to determine ΔT.

Denoting the value of T at any velocity v by $T(v)$, then

(8) $T(v)$ = sum of all the preceding values of ΔT plus an arbitrary constant, expressed by the notation
(9) $T(v) = \sum(\Delta v)/gp$ + a constant, or $\int dv/gp$ + a constant, in which p is supposed known as a function of v.

The constant may be any arbitrary number, as in using the table the difference only is required of two tabular values for an initial velocity V and final velocity v and thus $\int_V^v$

(10) $T(V) - T(v) = \sum_v^V \Delta v/gp$ or $\int_v^V dv/gp$;

and for a shot whose ballistic coefficient is C

(11) $t = C[T(V) - T(v)]$.

To save the trouble of proportional parts the value of $T(v)$ for unit increment of v is interpolated in a full-length extended ballistic table for T.

Next, if the shot advances a distance Δs ft. in the time Δt, during which the velocity falls from $v+\frac{1}{2}\Delta v$ to $v-\frac{1}{2}\Delta v$, we have

(12) $R\Delta s$ = loss of kinetic energy in foot-pounds
$= w(v+\frac{1}{2}\Delta v)^2/g - w(v-\frac{1}{2}\Delta v)^2/g = wv\Delta v/g$, so that

(13) $\Delta s = wv\Delta v/nd^2pg = C\Delta S$, where

(14) $\Delta S = v\Delta v/gp = v\Delta T$,

and ΔS is the advance in feet of a shot for which C=1, while the velocity falls Δv in passing through the average velocity v.

Denoting by $S(v)$ the sum of all the values of ΔS up to any assigned velocity v,

(15) $S(v) = \sum(\Delta S)$ + a constant, by which $S(v)$ is calculated from ΔS, and then between two assigned velocities V and v,

$$(16) \qquad S(V) - S(v) = \sum_v^V \Delta T = \sum \frac{v\Delta v}{gp} \text{ or } \int_v^V \frac{v\,dv}{gp},$$

and if s feet is the advance of a shot whose ballistic coefficient is C,

(17) $s = C[S(V) - S(v)]$.

In an extended table of S, the value is interpolated for unit increment of velocity.

A third table, due to Sir W. D. Niven, F.R.S., called the *degree* table, determines the change of direction of motion of the shot while the velocity changes from V to v, the shot flying nearly horizontally.

To explain the theory of this table, suppose the tangent at the point of the trajectory, where the velocity is v, to make an angle i radians with the horizon.

Resolving normally in the trajectory, and supposing the resistance of the air to act tangentially,

(18) $v(di/dt) = g \cos i$,

where di denotes the infinitesimal *decrement* of i in the infinitesimal increment of time dt.

[v.03 p.0272] In a problem of direct fire, where the trajectory is flat enough for cos i to be undistinguishable from unity, equation (16) becomes

(19) $v(di/dt) = g$, or $di/dt = g/v$;

so that we can put

(20) $\Delta i/\Delta t = g/v$

if v denotes the mean velocity during the small finite interval of time Δt, during which the direction of motion of the shot changes through Δi radians.

If the inclination or change of inclination in degrees is denoted by δ or $\Delta\delta$,

(21) $\delta/180 = i/\pi$, so that

$$(22) \qquad \Delta\delta = \frac{180}{\pi}\Delta i = \frac{180g}{\pi}\frac{\Delta t}{v};$$

and if δ and i change to D and I for the standard projectile,

$$(23) \qquad \Delta I = g\frac{\Delta T}{v} = \frac{\Delta v}{vp}, \quad \Delta D = \frac{180g}{\pi}\frac{\Delta T}{v}, \quad \text{and}$$

$$(24) \qquad I(V) - I(v) = \sum_v^V \frac{\Delta v}{vp} \text{ or } \int_v^V \frac{dv}{vp}, \quad D(V) - D(v) = \frac{180}{\pi}[I(V) - I(v)].$$

The differences ΔD and ΔI are thus calculated, while the values of $D(v)$ and $I(v)$ are obtained by summation with the arithmometer, and entered in their respective columns.

For some purposes it is preferable to retain the circular measure, i radians, as being undistinguishable from sin i and tan i when i is small as in direct fire.

The last function A, called the *altitude function*, will be explained when high angle fire is considered.

These functions, T, S, D, I, A, are shown numerically in the following extract from an abridged ballistic table, in which the velocity is taken as the argument and proceeds by an increment of 10 f/s; the column for p is the one determined by experiment, and the remaining columns follow by calculation in the manner explained above. The initial values of T, S, D, I, A must be accepted as belonging to the anterior portion of the table.

In any region of velocity where it is possible to represent p with sufficient accuracy by an empirical formula composed of a single power of v, say v^m, the integration can be effected which replaces the summation in (10), (16), and (24); and from an analysis of the Krupp experiments Colonel Zabudski found the most appropriate index m in a region of velocity as given in the following table, and the corresponding value of gp, denoted by $f(v)$ or v^m/k or its equivalent Cr, where r is the retardation.

ABRIDGED BALLISTIC TABLE.

v.	p.	ΔT.	T.	ΔS.	S.	ΔD.	D.	ΔI.	I.	ΔA.	A.
f/s											
1600	11.416	.0271	27.5457	43.47	18587.00	.0311	49.7729	.000543	.868675	37.77	8470.36
1610	11.540	.0268	27.5728	43.27	18630.47	.0306	49.8040	.000534	.869218	37.63	8508.13
1620	11.662	.0265	27.5996	43.08	18673.74	.0301	49.8346	.000525	.869752	37.48	8545.76
1630	11.784	.0262	27.6261	42.90	18716.82	.0296	49.8647	.000517	.870277	37.35	8583.24

1640	11.909	.0260	27.6523	42.72	18759.72	.0291	49.8943	.000508	.870794	37.21	8620.59
1650	12.030	.0257	27.6783	42.55	18802.44	.0287	49.9234	.000500	.871302	37.09	8657.80
1660	12.150	.0255	27.7040	42.39	18844.99	.0282	49.9521	.000492	.871802	36.96	8694.89
1670	12.268	.0252	27.7295	42.18	18887.38	.0277	49.9803	.000484	.872294	36.80	8731.85
1680	12.404	.0249	27.7547	41.98	18929.56	.0273	50.0080	.000476	.872778	36.65	8768.65
1690	12.536	.0247	27.7796	41.78	18971.54	.0268	50.0353	.000468	.873254	36.50	8805.30
1700	12.666	.0244	27.8043	41.60	19013.32	.0264	50.0621	.000461	.873722	36.35	8841.80
1710	12.801	.0242	27.8287	41.41	19054.92	.0260	50.0885	.000453	.874183	36.21	8878.15
1720	12.900	.0239	27.8529	41.23	19096.33	.0256	50.1145	.000446	.874636	36.07	8914.36
1730	13.059	.0237	27.8768	41.06	19137.56	.0252	50.1401	.000439	.875082	35.94	8950.43
1740	13.191	.0234	27.9005	40.90	19178.62	.0248	50.1653	.000432	.875521	35.81	8986.37
1750	13.318	.0232	27.9239	40.69	19219.52	.0244	50.1901	.000425	.875953	35.65	9022.18
1760	13.466	.0230	27.9471	40.53	19260.21	.0240	50.2145	.000419	.876378	35.53	9057.83
1770	13.591	.0227	27.9701	40.33	19300.74	.0236	50.2385	.000412	.876797	35.37	9093.36
1780	13.733	.0225	27.9928	40.19	19341.07	.0233	50.2621	.000406	.877209	35.26	9128.73
1790	13.862	.0223	28.0153	40.00	19381.26	.0229	50.2854	.000400	.877615	35.11	9163.99
1800	14.002	.0221	28.0376	39.81	19421.26	.0225	50.3083	.000393	.878015	34.96	9199.10
1810	14.149	.0219	28.0597	39.68	19461.07	.0222	50.3308	.000388	.878408	34.86	9234.06
1820	14.269	.0217	28.0816	39.51	19500.75	.0219	50.3530	.000382	.878796	34.73	9268.92
1830	14.414	.0214	28.1033	39.34	19540.26	.0216	50.3749	.000376	.879178	34.59	9303.65
1840	14.552	.0212	28.1247	39.17	19579.60	.0212	50.3965	.000370	.879554	34.46	9338.24
1850	14.696	.0210	28.1459	39.01	19618.77	.0209	50.4177	.000365	.879924	34.33	9372.70
1860	14.832	.0209	28.1669	38.90	19657.78	.0206	50.4386	.000360	.880289	34.25	9407.03
1870	14.949	.0207	28.1878	38.75	19696.68	.0203	50.4592	.000355	.880649	34.14	9441.28
1880	15.090	.0205	28.2085	38.61	19735.43	.0200	50.4795	.000350	.881004	34.02	9475.42
1890	15.224	.0203	28.2290	38.46	19774.04	.0198	50.4995	.000345	.881354	33.91	9509.44
1900	15.364	.0201	28.2493	38.32	19812.50	.0195	50.5193	.000340	.881699	33.80	9543.35
1910	15.496	.0199	28.2694	38.19	19850.82	.0192	50.5388	.000335	.882039	33.69	9577.15
1920	15.656	.0197	28.2893	38.01	19889.01	.0189	50.5580	.000330	.882374	33.55	9610.84
1930	15.809	.0196	28.3090	37.83	19927.02	.0186	50.5769	.000325	.882704	33.40	9644.39
1940	15.968	.0194	28.3286	37.66	19964.85	.0184	50.5955	.000320	.883029	33.26	9677.79
1950	16.127	.0192	28.3480	37.48	20002.51	.0181	50.6139	.000316	.883349	33.12	9711.05
1960	16.302	.0190	28.3672	37.26	20039.99	.0178	50.6320	.000311	.883665	32.94	9744.17
1970	16.484	.0187	28.3862	36.99	20077.25	.0175	50.6498	.000305	.883976	32.71	9777.11
1980	16.689	.0185	28.4049	36.73	20114.24	.0172	50.6673	.000300	.884281	32.48	9809.82
1990	16.888	.0183	28.4234	36.47	20150.97	.0169	50.6845	.000295	.884581	32.26	9842.30
2000	17.096	.0181	28.4417	36.21	20187.44	.0166	50.7014	.000290	.884876	32.05	9874.56
2010	17.305	.0178	28.4598	35.95	20223.65	.0163	50.7180	.000285	.885166	31.83	9906.61
2020	17.515	.0176	28.4776	35.65	20259.60	.0160	50.7343	.000280	.885451	31.57	9938.44
2030	17.752	.0174	28.4952	35.35	20295.25	.0158	50.7503	.000275	.885731	31.32	9970.01
2040	17.990	.0171	28.5126	35.06	20330.60	.0155	50.7661	.000270	.886006	31.07	10001.33
2050	18.229	.0169	28.5297	34.77	20365.66	.0152	50.7816	.000265	.886276	30.82	10032.40
2060	18.463	.0167	28.5466	34.49	20400.43	.0149	50.7968	.000260	.886541	30.58	10063.33
2070	18.706	.0165	28.5633	34.21	20434.92	.0147	50.8117	.000256	.886801	30.34	10093.80
2080	18.978	.0163	28.5798	33.93	20469.13	.0144	50.8264	.000251	.887057	30.10	10124.14
2090	19.227	.0160	28.5961	33.60	20503.06	.0141	50.8408	.000247	.887308	29.82	10154.24
2100	19.504	.0158	28.6121	33.34	20536.66	.0139	50.8549	.000242	.887555	29.59	10184.06
2110	19.755	.0156	28.6279	33.02	20570.00	.0136	50.8688	.000238	.887797	29.32	10213.65
2120	20.010	.0154	28.6435	32.76	20603.02	.0134	50.8824	.000234	.888035	29.10	10242.97
2130	20.294	.0152	28.6589	32.50	20635.78	.0132	50.8958	.000230	.888269	28.88	10272.07
2140	20.551	.0150	28.6741	32.25	20688.28	.0129	50.9090	.000226	.888499	28.66	10300.95
2150	20.811	.0149	28.6891	32.00	20700.53	.0127	50.9219	.000222	.888725	28.44	10329.61

[v.03 p.0273]

v.	*m.*	log *k.*	C*r* = *gp* = *f*(*v*) = v^m/k.
3600	1.55	2.3909520	$v^{1.55}\times \log^{-1}\ \overline{3}.6090480$
2600	1.7	2.9038022	$v^{1.7}\ \times \log^{-1}\ \overline{3}.0961978$
1800	2	3.8807404	$v^{2}\ \times \log^{-1}\ \overline{4}.1192596$
1370	3	7.0190977	$v^{3}\ \times \log^{-1}\ \overline{8}.9809023$
1230	5	13.1981288	$v^{5}\ \times \log^{-1}\ \overline{14}.8018712$
970	3	7.2265570	$v^{3}\ \times \log^{-1}\ \overline{8}.7734430$
790	2	4.3301086	$v^{2}\ \times \log^{-1}\ \overline{5}.6698914$

The numbers have been changed from kilogramme-metre to pound-foot units by Colonel Ingalls, and employed by him in the calculation of an extended ballistic table, which can be compared with the result of the abridged table. The calculation can be carried out in each region of velocity from the formulae:—

$$(25)\qquad T(V) - T(v) = k\int_v^V v^m\,dv, \quad S(V) - S(v) = k\int_v^V v^{m+1}\,dv, \quad I(V) - I(v) = gk\int_v^V v^{m-1}\,dv,$$

and the corresponding integration.

The following exercises will show the application of the ballistic table. A slide rule should be used for the arithmetical operations, as it works to the accuracy obtainable in practice.

Example 1.—Determine the time t sec. and distance s ft. in which the velocity falls from 2150 to 1600 f/s.

(a) of a 6-in. shot weighing 100lb, taking $n = 0.96$,
(b) of a rifle bullet, 0.303-in. calibre, weighing half an ounce, taking $n = 0.8$.

V.	v.	T(V).	T(v).	t/C.	S(V)	S(v)	s/C.
2150	1600	28.6891	27.5457	1.1434	20700.53	18587.00	2113.53

	d.	w.	C.	t/C.	t.	s/C.	s.
(a)	6	100	2.894	1.1434	3.307	2113.53	6114 (2038 yds.)
(b)	0.303	1/32	0.426	1.1434	0.486	2113.53	900 (300 yds.)

Example 2.—Determine the remaining velocity v and time of flight t over a range of 1000 yds. of the same two shot, fired with the same muzzle velocity V = 2150 f/s.

	S.	s/C.	S(V).	S(v).	v.	T(V).	T(v).	t/C.	t.
(a)	3000	1037	20700.53	19663.53	1861	28.6891	28.1690	0.5201	1.505
(b)	3000	7050	20700.53	13650.53	920*	28.6891	23.0803	5.6088	2.387

* These numbers are taken from a part omitted here of the abridged ballistic table.

In the calculation of range tables for *direct fire*, defined officially as "fire from guns with full charge at elevation not exceeding 15°," the vertical component of the resistance of the air may be ignored as insensible, and the actual velocity and its horizontal component, or component parallel to the line of sight, are undistinguishable.

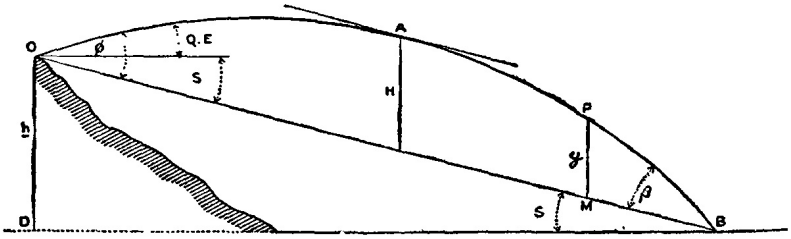


FIG. 1.

The equations of motion are now, the co-ordinates x and y being measured in feet,

$$\frac{d^2x}{dt^2} = -r = \frac{-gp}{C}, \tag{26}$$

$$\frac{d^2y}{dt^2} = -g. \tag{27}$$

The first equation leads, as before, to

$$t = C\{T(V) - T(v)\}, \tag{28}$$
$$x = C\{S(V) - S(v)\}. \tag{29}$$

The integration of (24) gives

$$\frac{dy}{dt} = \text{constant} - gt = g(\tfrac{1}{2}T - t), \tag{30}$$

if T denotes the whole time of flight from O to the point B (fig. 1), where the trajectory cuts the line of sight; so that ½T is the time to the vertex A, where the shot is flying parallel to OB.

Integrating (27) again,

$$y = g(\tfrac{1}{2}Tt - \tfrac{1}{2}t^2) = \tfrac{1}{2}gt(T - t); \tag{31}$$

and denoting T - t by t', and taking $g = 32\text{f/s}^2$,

$$y = 16tt', \tag{32}$$

which is Colonel Sladen's formula, employed in plotting ordinates of a trajectory.

At the vertex A, where $y = H$, we have $t = t' = \tfrac{1}{2}T$, so that

$$H = \tfrac{1}{8}gT^2, \tag{33}$$

which for practical purposes, taking $g = 32$, is replaced by

$$H = 4T^2, \text{ or } (2T)^2. \tag{34}$$

Thus, if the time of flight of a shell is 5 sec., the height of the vertex of the trajectory is about 100 ft.; and if the fuse is set to burst the shell one-tenth of a second short of its impact at B, the height of the burst is 7.84, say 8 ft.

The line of sight Ox, considered horizontal in range table results, may be inclined slightly to the horizon, as in shooting up or down a moderate slope, without appreciable modification of (28) and (29), and y or PM is still drawn vertically to meet OB in M.

Given the ballistic coefficient C, the initial velocity V, and a range of R yds. or X = 3R ft., the final velocity v is first calculated from (29) by

$$S(v) = S(V) - X/C, \tag{35}$$

and then the time of flight T by

$$T = C\{T(V) - T(v)\}. \tag{36}$$

Denoting the angle of departure and descent, measured in degrees and from the line of sight OB by φ and β, the total deviation in the range OB is (fig. 1)

(37) $\delta = \varphi + \beta = C\{D(V) - D(v)\}$.

To share the δ between φ and β, the vertex A is taken as the point of *half-time* (and therefore beyond *half-range*, because of the continual diminution of the velocity), and the velocity v_0 at A is calculated from the formula

(38) $T(v_0) = T(V) - \frac{½T}{C} = ½\{T(V) + T(v)\}$;

and now the degree table for D(*v*) gives

(39) $\varphi = C\{D(V) - D(v_0)\}$,
(40) $\beta = C\{D(v_0) - D(v)\}$.

This value of φ is the tangent elevation (T.E.); the quadrant elevation (Q.E.) is φ - S, where S is the angular depression of the line of sight OB; and if O is *h* ft. vertical above B, the angle S at a range of R yds. is given by

(41) $\sin S = h/3R$,

or, for a small angle, expressed in minutes, taking the radian as 3438′,

(42) $S = 1146h/R$.

So also the angle β must be increased by S to obtain the angle at which the shot strikes a horizontal plane—the water, for instance.

A systematic exercise is given here of the compilation of a range table by calculation with the ballistic table; and it is to be compared with the published official range table which follows.

A discrepancy between a calculated and tabulated result will serve to show the influence of a slight change in the coefficient of reduction *n*, and the muzzle velocity V.

Example 3.—Determine by calculation with the abridged ballistic table the remaining velocity *v*, the time of flight *t*, angle of elevation φ, and descent β of this 6-in. gun at ranges 500, 1000, 1500, 2000 yds., taking the muzzle velocity V = 2150 f/s, and a coefficient of reduction *n* = 0.96. [For Table see p. 274.]

An important problem is to determine the alteration of elevation for firing up and down a slope. It is found that the alteration of the tangent elevation is almost insensible, but the quadrant elevation requires the addition or subtraction of the angle of sight.

Example.—Find the alteration of elevation required at a range of 3000 yds. in the exchange of fire between a ship and a fort 1200 ft. high, a 12-in. gun being employed on each side, firing a shot weighing 850 lb with velocity 2150 f/s. The complete ballistic table, and the method of high angle fire (see below) must be employed.

[v.03 p.0274]

Range.	*s*.	*s*/C.	S(*v*).	*v*.	T(*v*).	*t*/C.	*t*.	T(v_0).	v_0.	D(v_0).	φ/C.	φ.	β/C.	β.
0	0	0	20700.53	2150	28.6891	0.0000	0.000	28.6891	2150	50.9219	0.0000	0.000	0.0000	0.000
500	1500	518	20182.53	1999	28.4399	0.2492	0.720	28.5645	2071	50.8132	0.1087	0.315	0.1135	0.328
1000	3000	1036	19664.53	1862	28.1711	0.5180	1.497	28.4301	1994	50.6913	0.2306	0.666	0.2486	0.718
1500	4500	1554	19146.53	1732	27.8815	0.8076	2.330	28.2853	1918	50.5542	0.3677	1.062	0.4085	1.181
2000	6000	2072	18628.53	1610	27.5728	1.1163	3.225	28.1310	1843	50.4029	0.5190	1.500	0.5989	1.734

RANGE TABLE FOR 6-INCH GUN.

Charge { weight, 13 lb 4 oz. / gravimetric density, 55.01/0.504. / nature, cordite, size 30

Projectile { Palliser shot, Shrapnel shell. / Weight, 100lb.

Muzzle velocity, 2154 f/s.

Nature of mounting, pedestal.

Jump, nil.

Remaining Velocity.	To strike an object 10 ft. high range must be known to	Slope of Descent.	5′ elevation or depression alters point of impact.		Elevation.	Range.	Fuse scale for T. and P. middle No. 54 Marks I., II., or III.	50% of rounds should fall in:			Time of Flight.	Penetratio into Wrought Iron.
			Range.	Laterally or Vertically				Length.	Breadth.	Height.		
f/s.	yds.	1 in	yds.	yds.	° ′	yds.		yds	yds	yds	secs.	i
2154	..	..	..	0.00	0 0	0	..	..	..	..	0.00	13
2122	1145	687	125	0.14	0 4	100	¼	..	0.4	..	0.16	13
2091	635	381	125	0.29	0 9	200	¾	..	0.4	..	0.31	13
2061	408	245	125	0.43	0 13	300	1	..	0.4	..	0.47	13
2032	316	190	125	0.58	0 17	400	1¼	..	0.4	..	0.62	12
2003	260	156	125	0.72	0 21	500	1¾	..	0.5	0.2	0.78	12
1974	211	127	125	0.87	0 26	600	2	..	0.5	0.2	0.95	12
1946	183	110	125	1.01	0 30	700	2¼	..	0.5	0.2	1.11	12
1909	163	98	125	1.16	0 34	800	2¾	..	0.5	0.2	1.28	12
1883	143	85	125	1.31	0 39	900	3	..	0.6	0.3	1.44	11
1857	130	78	125	1.45	0 43	1000	3¼	..	0.6	0.3	1.61	11
1830	118	71	125	1.60	0 47	1100	3¾	..	0.6	0.3	1.78	11
1803	110	66	125	1.74	0 51	1200	4	..	0.6	0.3	1.95	11
1776	101	61	125	1.89	0 55	1300	4½	..	0.7	0.4	2.12	11
1749	93	56	125	2.03	0 59	1400	4¾	..	0.7	0.4	2.30	10
1722	86	52	125	2.18	1 3	1500	5	..	0.7	0.4	2.47	10
1695	80	48	125	2.32	1 7	1600	5½	25	0.8	0.5	2.65	10
1669	71	43	125	2.47	1 11	1700	5¾	25	0.9	0.5	2.84	10
1642	67	40	100	2.61	1 16	1800	6¼	25	1.0	0.5	3.03	10
1616	61	37	100	2.76	1 22	1900	6½	25	1.1	0.6	3.23	9
1591	57	34	100	2.91	1 27	2000	7	25	1.2	0.6	3.41	9

The last column in the Range Table giving the inches of penetration into wrought iron is calculated from the remaining velocity by an empirical formula, as explained in the article ARMOUR PLATES.

High Angle and Curved Fire.—"High angle fire," as defined officially, "is fire at elevations greater than 15°," and "curved

fire is fire from howitzers at all angles of elevation not exceeding 15°." In these cases the curvature of the trajectory becomes considerable, and the formulae employed in direct fire must be modified; the method generally employed is due to Colonel Siacci of the Italian artillery.

Starting with the exact equations of motion in a resisting medium,

$$\frac{d^2x}{dt^2} = -r\cos i = -r\frac{dx}{ds}, \tag{43}$$

$$\frac{d^2y}{dt^2} = -r\sin i - g = -r\frac{dy}{ds} - g, \tag{44}$$

and eliminating r,

$$\frac{dx}{dt}\frac{d^2y}{dt^2} - \frac{dy}{dt}\frac{d^2x}{dt^2} = -g\frac{dx}{dt}; \tag{45}$$

and this, in conjunction with

$$\tan i = \frac{dy}{dx} = \frac{dy}{dt} \Big/ \frac{dx}{dt}, \tag{46}$$

$$\sec^2 i\frac{di}{dt} = \left(\frac{dx}{dt}\frac{d^2y}{dt^2} - \frac{dy}{dt}\frac{d^2x}{dt^2}\right) \Big/ \left(\frac{dx}{dt}\right)^2, \tag{47}$$

reduces to

$$\frac{di}{dt} = \frac{-g}{v}\cos i, \text{ or } \frac{d\tan i}{dt} = \frac{-g}{v\cos i}, \tag{48}$$

the equation obtained, as in (18), by resolving normally in the trajectory, but di now denoting the *increment* of i in the increment of time dt.

Denoting dx/dt, the horizontal component of the velocity, by q, so that

$$v\cos i = q, \tag{49}$$

equation (43) becomes

$$dq/dt = -r\cos i, \tag{50}$$

and therefore by (48)

$$\frac{dq}{di} = \frac{dq}{dt}\frac{dt}{di} = \frac{rv}{g}. \tag{51}$$

It is convenient to express r as a function of v in the previous notation

$$\mathrm{C}r = f(v), \tag{52}$$

and now

$$\frac{dq}{di} = \frac{vf(v)}{\mathrm{C}g}, \tag{53}$$

an equation connecting q and i.

Now, since $v = g\sec i$

$$\frac{dt}{dq} = -\mathrm{C}\frac{\sec i}{f(q\sec i)}, \tag{54}$$

and multiplying by dx/dt or q,

$$\frac{dx}{dq} = -\frac{\mathrm{C}\ q\sec i}{f(q\sec i)}, \tag{55}$$

and multiplying by dy/dx or $\tan i$,

$$\frac{dy}{dq} = -\frac{\mathrm{C}\ q\sec i\tan i}{f(q\sec i)}; \tag{56}$$

also

$$\frac{di}{dq} = \frac{\mathrm{C}g}{q\sec i\ .\ f(q\sec i)}, \tag{57}$$

$$\frac{d\tan i}{dq} = \frac{\mathrm{C}\ g\sec i}{q\ .\ f(q\sec i)}, \tag{58}$$

from which the values of t, x, y, i, and $\tan i$ are given by integration with respect to q, when $\sec i$ is given as a function of q by means of (51).

Now these integrations are quite intractable, even for a very simple mathematical assumption of the function $f(v)$, say the quadratic or cubic law, $f(v) = v^2/k$ or v^3/k.

But, as originally pointed out by Euler, the difficulty can be turned if we notice that in the ordinary trajectory of practice the quantities i, $\cos i$, and $\sec i$ vary so slowly that they may be replaced by their *mean* values, η, $\cos\eta$, and $\sec\eta$, especially if the trajectory, when considerable, is divided up in the calculation into arcs of small curvature, the curvature of an arc being defined as the angle between the tangents or normals at the ends of the arc.

Replacing then the angle i on the right-hand side of equations (54) - (56) by some mean value η, we introduce Siacci's pseudo-velocity u defined by

$$u = q\sec\eta, \tag{59}$$

so that u is a quasi-component parallel to the mean direction of the tangent, say the direction of the chord of the arc.

Integrating from any initial pseudo-velocity U,

$$t = C \int_{u}^{U} \frac{du}{f(u)}, \tag{60}$$

$$x = C \cos \eta \int \frac{u\,du}{f(u)}, \tag{61}$$

$$y = C \sin \eta \int \frac{u\,du}{f(u)}; \tag{62}$$

and supposing the inclination i to change from φ to θ radians over the arc,

$$\varphi - \theta = Cg \cos \eta \int \frac{du}{u\,f(u)}, \tag{63}$$

$$\tan \varphi - \tan \theta = Cg \sec \eta \int \frac{du}{u\,f(u)}. \tag{64}$$

But according to the definition of the functions T, S, I and D of the ballistic table, employed for direct fire, with u written for v,

$$\int_{u}^{U} \frac{du}{f(u)} = \int \frac{du}{gp} = T(U) - T(u), \tag{65}$$

$$\int \frac{u\,du}{f(u)} = S(U) - S(u), \tag{66}$$

$$\int \frac{g\,du}{u\,f(u)} = I(U) - I(u); \tag{67}$$

and therefore

$$t = C[T(U) - T(u)], \tag{68}$$
$$x = C \cos \eta\,[S(U) - S(u)], \tag{69}$$
$$y = C \sin \eta\,[S(U) - S(u)], \tag{70}$$
$$\varphi - \theta = C \cos \eta\,[I(U) - I(u)], \tag{71}$$
$$\tan \varphi - \tan \theta = C \sec \eta\,[I(U) - I(u)], \tag{72}$$

while, expressed in degrees,

$$\varphi^\circ - \theta^\circ = C \cos \eta\,[D(U) - D(u)], \tag{73}$$

The equations (66)-(71) are Siacci's, slightly modified by General Mayevski; and now in the numerical applications to high angle fire we can still employ the ballistic table for direct fire.

It will be noticed that η cannot be exactly the same mean angle in all these equations; but if η is the same in (69) and (70),

$$y/x = \tan \eta. \tag{74}$$

so that η is the inclination of the chord of the arc of the trajectory, as in Niven's method of calculating trajectories (*Proc. R.S.*, 1877): but this method requires η to be known with accuracy, as 1% variation in η causes more than 1% variation in tan η.

The difficulty is avoided by the use of Siacci's altitude-function A or A(u), by which y/x can be calculated without introducing sin η or tan η, but in which η occurs only in the form cos η or sec η, which varies very slowly for moderate values of η, so that η need not be calculated with any great regard for accuracy, the arithmetic mean ½(φ + θ) of φ and θ being near enough for η over any arc φ - θ of moderate extent.

Now taking equation (72), and replacing tan θ, as a variable final tangent of an angle, by tan i or dy/dx,

$$\tan \varphi - \frac{dy}{dx} = C \sec \eta \left[I(U) - I(u) \right], \tag{75}$$

and integrating with respect to x over the arc considered,

$$x \tan \varphi - y = C \sec \eta \left[xI(U) - \int_{0}^{x} I(u)\,dx \right], \tag{76}$$

But

$$\begin{aligned} \int_{0}^{x} I(u)\,dx &= \int_{U}^{u} I(u) \frac{dx}{du}\,du \\ &= C \cos \eta \int_{x}^{U} I(u) \frac{u\,du}{g\,f(u)} \\ &= C \cos \eta\,[A(U) - A(u)] \end{aligned} \tag{77}$$

in Siacci's notation; so that the altitude-function A must be calculated by summation from the finite difference ΔA, where

$$\Delta A = I(u) \frac{u \Delta u}{gp} = I(u) \Delta S, \tag{78}$$

or else by an integration when it is legitimate to assume that $f(v) = v^m/k$ in an interval of velocity in which m may be supposed constant.

Dividing again by x, as given in (76),

$$\tan \varphi - \frac{y}{x} = C \sec \eta \left[I(U) - \frac{A(U) - A(u)}{S(U) - S(u)} \right] \tag{79}$$

from which y/x can be calculated, and thence y.

In the application of Siacci's method to the calculation of a trajectory in high angle fire by successive arcs of small curvature, starting at the beginning of an arc at an angle φ with velocity v_φ, the curvature of the arc $\varphi - \theta$ is first settled upon, and now

$$\eta = \tfrac{1}{2}(\varphi + \theta) \tag{80}$$

is a good first approximation for η.

Now calculate the pseudo-velocity u_φ from

$$u_\varphi = v_\varphi \cos\varphi \sec\eta, \tag{81}$$

and then, from the given values of φ and θ, calculate u_θ from either of the formulae of (72) or (73):—

$$\mathrm{I}(u_\theta) = \mathrm{I}(u_\varphi) - \frac{\tan\varphi - \tan\theta}{\mathrm{C}\sec\eta}, \tag{82}$$

$$\mathrm{D}(u_\theta) = \mathrm{D}(u_\varphi) - \frac{\varphi^\circ - \theta^\circ}{\mathrm{C}\cos\eta}. \tag{83}$$

Then with the suffix notation to denote the beginning and end of the arc $\varphi - \theta$,

$$_\varphi t_\theta = \mathrm{C}[\mathrm{T}(u_\varphi) - \mathrm{T}(u_\theta)], \tag{84}$$

$$_\varphi x_\theta = \mathrm{C}\cos\eta\,[\mathrm{S}(u_\varphi) - \mathrm{S}(u_\theta)], \tag{85}$$

$$_\varphi\left(\frac{y}{x}\right)_\theta = \tan\varphi - \mathrm{C}\sec\eta\left[\mathrm{I}(u_\varphi) - \frac{\Delta\mathrm{A}}{\Delta\mathrm{S}}\right]; \tag{86}$$

Δ now denoting any finite tabular difference of the function between the initial and final (pseudo-) velocity.

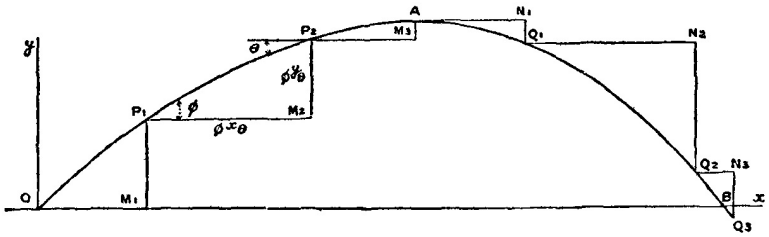


Fig. 2.

Also the velocity v_θ at the end of the arc is given by

$$v_\theta = u_\theta \sec\theta \cos\eta. \tag{87}$$

Treating this final velocity v_θ and angle θ as the initial velocity v_φ and angle φ of the next arc, the calculation proceeds as before (fig. 2).

In the long range high angle fire the shot ascends to such a height that the correction for the tenuity of the air becomes important, and the curvature $\varphi - \theta$ of an arc should be so chosen that $_\varphi y_\theta$ the height ascended, should be limited to about 1000 ft., equivalent to a fall of 1 inch in the barometer or 3% diminution in the tenuity factor τ.

A convenient rule has been given by Captain James M. Ingalls, U.S.A., for approximating to a high angle trajectory in a single arc, which assumes that the mean density of the air may be taken as the density at two-thirds of the estimated height of the vertex; the rule is founded on the fact that in an unresisted parabolic trajectory the average height of the shot is two-thirds the height of the vertex, as illustrated in a jet of water, or in a stream of bullets from a Maxim gun.

The longest recorded range is that given in 1888 by the 9.2-in. gun to a shot weighing 380 lb fired with velocity 2375 f/s at elevation 40°; the range was about 12 m., with a time for flight of about 64 sec., shown in fig. 2.

A calculation of this trajectory is given by Lieutenant A. H. Wolley-Dod, R.A., in the *Proceedings R.A. Institution*, 1888, employing Siacci's method and about twenty arcs; and Captain Ingalls, by assuming a mean tenuity-factor τ=0.68, corresponding to a height of about 2 m., on the estimate that the shot would reach a height of 3 m., was able to obtain a very accurate result, working in two arcs over the whole trajectory, up to the vertex and down again (Ingalls, *Handbook of Ballistic Problems*).

Siacci's altitude-function is useful in direct fire, for giving immediately the angle of elevation φ required for a given range of R yds. or X ft., between limits V and v of the velocity, and also the angle of descent β.

In direct fire the pseudo-velocities U and u, and the real velocities V and v, are undistinguishable, and sec η may be replaced by unity so that, putting y = 0 in (79),

$$\tan\varphi = \mathrm{C}\left[\mathrm{I}(\mathrm{V}) - \frac{\Delta\mathrm{A}}{\Delta\mathrm{S}}\right]. \tag{88}$$

Also

$$\tan\varphi - \tan\beta = \mathrm{C}\,[\mathrm{I}(\mathrm{V}) - \mathrm{L}(v)] \tag{89}$$

so that

$$\tan\beta = \mathrm{C}\left[\frac{\Delta\mathrm{A}}{\Delta\mathrm{S}} - \mathrm{I}(v)\right], \tag{90}$$

or, as (88) and (90) may be written for small angles,

$$\sin 2\varphi = 2\mathrm{C}\left[\mathrm{I}(\mathrm{V}) - \frac{\Delta\mathrm{A}}{\Delta\mathrm{S}}\right], \tag{91}$$

$$\frac{\Delta\mathrm{A}}{}$$

(92) $$\sin 2\beta = 2C \left[\Delta S^{-I(v)} \right].$$

[v.03 p.0276]

To simplify the work, so as to look out the value of sin 2φ without the intermediate calculation of the remaining velocity *v*, a double-entry table has been devised by Captain Braccialini Scipione (*Problemi del Tiro*, Roma, 1883), and adapted to yd., ft., in. and lb units by A. G. Hadcock, late R.A., and published in the *Proc. R.A. Institution*, 1898, and in *Gunnery Tables*, 1898.

In this table

(93) $$\sin 2\varphi = Ca,$$

where *a* is a function tabulated for the two arguments, V the initial velocity, and R/C the reduced range in yards.

The table is too long for insertion here. The results for φ and β, as calculated for the range tables above, are also given there for comparison.

Drift.—An elongated shot fired from a rifled gun does not move in a vertical plane, but as if the mean plane of the trajectory was inclined to the true vertical at a small angle, 2° or 3°; so that the shot will hit the mark aimed at if the back sight is tilted to the vertical at this angle δ, called the permanent angle of deflection (see Sights).

This effect is called *drift* and the reason of it is not yet understood very clearly.

It is evidently a gyroscopic effect, being reversed in direction by a change from a right to a left-handed twist of rifling, and being increased by an increase of rotation of the shot.

The axis of an elongated shot would move parallel to itself only if fired in a vacuum; but in air the couple due to a sidelong motion tends to place the axis at right angles to the tangent of the trajectory, and acting on a rotating body causes the axis to precess about the tangent. At the same time the frictional drag damps the nutation and causes the axis of the shot to follow the tangent of the trajectory very closely, the point of the shot being seen to be slightly above and to the right of the tangent, with a right-handed twist. The effect is as if there was a mean sidelong thrust *w* tan δ on the shot from left to right in order to deflect the plane of the trajectory at angle δ to the vertical. But no formula has yet been invented, derived on theoretical principles from the physical data, which will assign by calculation a definite magnitude to δ.

An effect similar to drift is observable at tennis, golf, base-ball and cricket; but this effect is explainable by the inequality of pressure due to a vortex of air carried along by the rotating ball, and the deviation is in the opposite direction of the drift observed in artillery practice, so artillerists are still awaiting theory and crucial experiment.

After all care has been taken in laying and pointing, in accordance with the rules of theory and practice, absolute certainty of hitting the same spot every time is unattainable, as causes of error exist which cannot be eliminated, such as variations in the air and in the muzzle-velocity, and also in the steadiness of the shot in flight.

To obtain an estimate of the accuracy of a gun, as much actual practice as is available must be utilized for the calculation in accordance with the laws of probability of the 50% zones shown in the range table (see Probability.)

II. Interior Ballistics

The investigation of the relations connecting the pressure, volume and temperature of the powder-gas inside the bore of the gun, of the work realized by the expansion of the powder, of the dynamics of the movement of the shot up the bore, and of the stress set up in the material of the gun, constitutes the branch of interior ballistics.

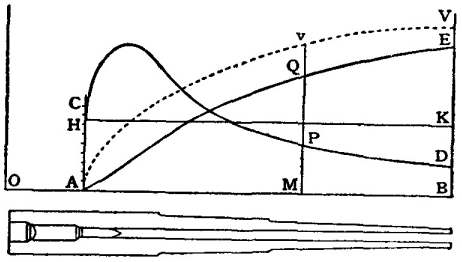


Fig. 3.

A gun may be considered a simple thermo-dynamic machine or heat-engine which does its work in a single stroke, and does not act in a series of periodic cycles as an ordinary steam or gas-engine.

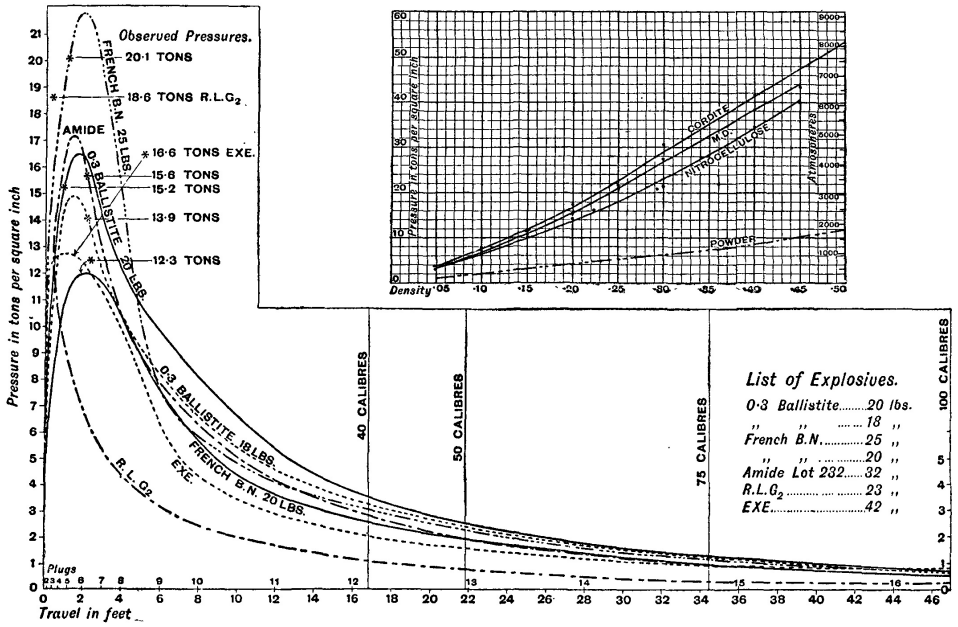


Fig. 4. Pressure Curves, from Chronoscope Experiments in 6 inch gun of 100 calibres, with various Explosives.

An indicator diagram can be drawn for a gun (fig. 3) as for a steam-engine, representing graphically by a curve CPD the relation between the volume and pressure of the powder-gas; and in addition the curves AQE of energy *e*, A*v*V of velocity *v*, and A*t*T of time *t* can be plotted or derived, the velocity and energy at the muzzle B being denoted by V and E.

After a certain discount for friction and the recoil of the gun, the net work realized by the powder-gas as the shot advances AM is represented by the area ACPM, and this is equated to the kinetic energy e of the shot, in foot-tons,

$$(1) \qquad e = \frac{w}{2240}\left(1 + \frac{4k^2}{d^2}\tan^2\delta\right)\frac{v^2}{2g},$$

in which the factor $4(k^2/d^2)\tan^2\delta$ represents the fraction due to the rotation of the shot, of diameter *d* and axial radius of gyration *k*, and δ represents the angle of the rifling; this factor may be ignored in the subsequent calculations as small, less than 1%.

The mean effective pressure (M.E.P.) in tons per sq. in. is represented in fig. 3 by the height AH, such that the rectangle AHKB is equal to the area APDB; and the M.E.P. multiplied by $\frac{1}{4}\pi d^2$, the cross-section of the bore in square inches, gives in tons the mean effective thrust of the powder on the base of the shot; and multiplied again by *l*, the length in inches of the travel AB of the shot up the bore, gives the work realized in inch-tons; which work is thus equal to the M.E.P. multiplied by $\frac{1}{4}\pi d^2 l$ = B - C, the volume in cubic inches of the rifled part AB of the bore, the difference between B the total volume of the bore and C the volume of the powder-chamber.

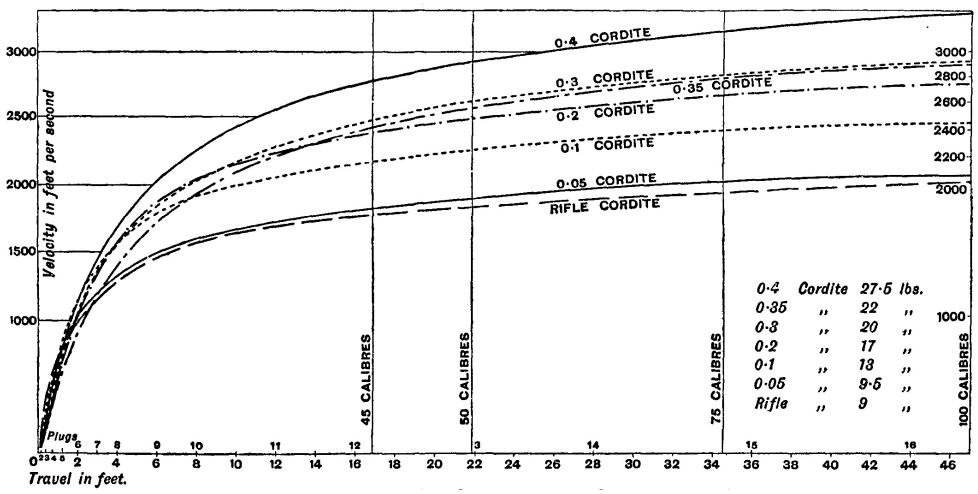


FIG. 5. Velocity Curves, from Chronoscope experiments in 6 inch gun of 100 calibres, with Cordite.

Equating the muzzle-energy and the work in foot-tons

$$(2) \qquad E = \frac{w}{2240}\frac{V^2}{2g} = \frac{B - C}{12} \times \text{M.E.P.}$$

$$(3) \qquad \text{M.E.P.} = \frac{w}{2240}\frac{V^2}{2g}\frac{12}{B - C}.$$

Working this out for the 6-in. gun of the range table, taking L = 216 in., we find B - C = 6100 cub. in., and the M.E.P. is about 6.4 tons per sq. in.

But the maximum pressure may exceed the mean in the ratio of 2 or 3 to 1, as shown in fig. 4, representing graphically the result of Sir Andrew Noble's experiments with a 6-in. gun, capable of being lengthened to 100 calibres or 50 ft. (*Proc. R.S.*, June 1894).

On the assumption of uniform pressure up the bore, practically realizable in a Zalinski pneumatic dynamite gun, the pressure-curve would be the straight line HK of fig. 3 parallel to AM; the energy-curve AQE would be another straight line through A; the velocity-curve A*v*V, of which the ordinate *v* is as the square root of the energy, would be a parabola; and the acceleration of the shot being constant, the time-curve A*t*T will also be a similar parabola.

If the pressure falls off uniformly, so that the pressure-curve is a straight line PDF sloping downwards and cutting AM in F, then the energy-curve will be a parabola curving downwards, and the velocity-curve can be represented by an ellipse, or circle with centre F and radius FA; while the time-curve will be a sinusoid.

But if the pressure-curve is a straight line F′CP sloping upwards, cutting AM behind A in F′, the energy-curve will be a parabola curving upwards, and the velocity-curve a hyperbola with center at F′.

These theorems may prove useful in preliminary calculations where the pressure-curve is nearly straight; but, in the absence of any observable law, the area of the pressure-curve must be read off by a planimeter, or calculated by Simpson's rule, as an indicator diagram.

To measure the pressure experimentally in the bore of a gun, the crusher-gauge is used as shown in fig. 6, nearly full size; it records the maximum pressure by the compression of a copper cylinder in its interior; it may be placed in the powder-chamber, or fastened in the base of the shot.

In Sir Andrew Noble's researches a number of plugs were inserted in the side of the experimental gun, reaching to the bore and carrying crusher-gauges, and also chronographic appliances which registered the passage of the shot in the same manner as the electric screens in Bashforth's experiments; thence the velocity and energy of the shot was inferred, to serve as an independent control of the crusher-gauge records (figs. 4 and 5).

As a preliminary step to the determination of the pressure in the bore of a gun, it is desirable to measure the pressure obtained by exploding a charge of powder in a closed vessel, varying the weight of the charge and thereby the density of the powder-gas.

The earliest experiments of this nature are due to Benjamin Robins in 1743 and Count Rumford in 1792; and their method has been revived by Dr Kellner, War Department chemist, who employed the steel spheres of bicycle ball-bearings as safety-valves, loaded to register the pressure at which the powder-gas will blow off, and thereby check the indications of the crusher-gauge (*Proc. R.S.*, March 1895).

Chevalier d'Arcy, 1760. also experimented on the pressure of powder and the velocity of the bullet in a musket barrel; this he accomplished by shortening the barrel successively, and measuring the velocity obtained by the ballistic pendulum;

thus reversing Noble's procedure of gradually lengthening the gun.

But the most modern results employed with gunpowder are based on the experiments of Noble and Abel (*Phil. Trans.*, 1875-1880-1892-1894 and following years).

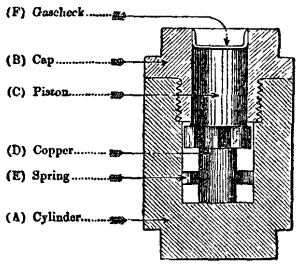


FIG. 6.

A charge of powder, or other explosive, of varying weight P lb, is fired in an explosion-chamber (fig. 7, scale about 1/5) of which the volume C, cub. in., is known accurately, and the pressure *p*, tons per sq. in., was recorded by a crusher-gauge (fig. 6).

[v.03 p.0278] The result is plotted in figs. 8 and 9, in a curve showing the relation between *p* and D the *gravimetric density*, which is the specific gravity of the P lb of powder when filling the volume C, cub. in., in a state of gas; or between *p* and *v*, the reciprocal of D, which may be called the *gravimetric volume* (G.V.), being the ratio of the volume of the gas to the volume of an equal weight of water.

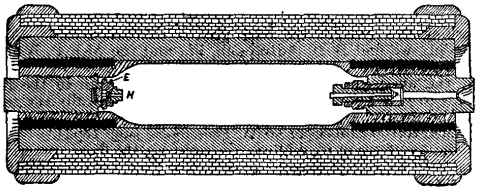


FIG. 7. Explosion Vessel.

The results are also embodied in the following Table;—

TABLE 1.

G.D.	G.V.	Pressure in Tons per sq. in.	
		Pebble Powder.	Cordite.
0.05	20.00	0.855	3.00
6	16.66	1.00	3.80
8	12.50	1.36	5.40
0.10	10.00	1.76	7.10
12	8.33	2.06	8.70
14	7.14	2.53	10.50
15	6.66	2.73	11.36
16	6.25	2.96	12.30
18	5.55	3.33	14.20
20	5.00	3.77	16.00
22	4.54	4.26	17.90
24	4.17	4.66	19.80
25	4.00	4.88	20.63
26	3.84	5.10	21.75
30	3.33	6.07	26.00
35	2.85	7.35	31.00
40	2.50	8.73	36.53
45	2.22	10.23	42.20
50	2.00	11.25	48.66
55	1.81	13.62	55.86
60	1.66	15.55	63.33

The term *gravimetric density* (G.D.) is peculiar to artillerists; it is required to distinguish between the specific gravity (S.G.) of the powder filling a given volume in a state of gas, and the specific gravity of the separate solid grain or cord of powder.

Thus, for instance, a lump of solid lead of given S.G., when formed into a charge of lead shot composed of equal spherules closely packed, will have a G.D. such that

$$(4) \qquad \frac{\text{G.D. of charge of lead shot}}{\text{S.G. of lump of solid lead}} = \frac{1}{6}\pi\sqrt{2} = 0.7403;$$

while in the case of a bundle of cylindrical sticks of cordite,

$$(5) \qquad \frac{\text{G.D. of charge of cordite}}{\text{S.G. of stick of cordite}} = \frac{1}{6}\pi\sqrt{3} = 0.9067.$$

At the standard temperature of 62° F. the volume of the gallon of 10 lb of water is 277.3 cub. in.; or otherwise, 1 cub. ft. or 1728 cub. in. of water at this temperature weighs 62.35 lb, and therefore 1 lb of water bulks 1728 ÷ 62.35 = 27.73 cub. in.

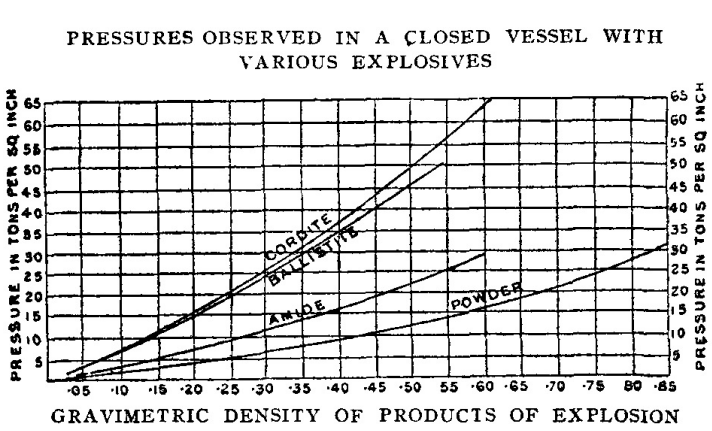


FIG. 8.

Thus if a charge of P lb of powder is placed in a chamber of volume C cub. in., the

(6) G.D.= 27.73P/C, G.V. = C/27.73 P.

Sometimes the factor 27.68 is employed, corresponding to a density of water of about 62.4 lb per cub. ft., and a temperature 12° C., or 54° F.

With metric units, measuring P in kg., and C in litres, the G.D. = P/C, G.V. = C/P, no factor being required.

From the Table I., or by quadrature of the curve in fig. 9, the work E in foot-tons realized by the expansion of 1 lb of the powder from one gravimetric volume to another is inferred; for if the average pressure is p tons per sq. in., while the gravimetric volume changes from v - ½Δv to v + ½Δv, a change of volume of 27.73Δv cub. in., the work done is 27.73pΔv inch-tons, or

(7) ΔE = 2.31 pΔv foot-tons;

and the differences ΔE being calculated from the observed values of p, a summation, as in the ballistic tables, would give E in a tabular form, and conversely from a table of E in terms of v, we can infer the value of p.

On drawing off a little of the gas from the explosion vessel it was found that a gramme of cordite-gas at 0° C. and standard atmospheric pressure occupied 700 ccs., while the same gas compressed into 5 ccs. at the temperature of explosion had a pressure of 16 tons per sq. in., or 16 × 2240 / 14.7 = 2440 atmospheres, of 14.7 lb per sq. in.; one ton per sq. in. being in round numbers 150 atmospheres.

The absolute centigrade temperature T is thence inferred from the gas equation

(8) $R = pv / T = p_0 v_0/273$,

which, with p = 2440, v = 5, p_0 = 1, v_0 = 700, makes T = 4758, a temperature of 4485° C. or 8105° F.

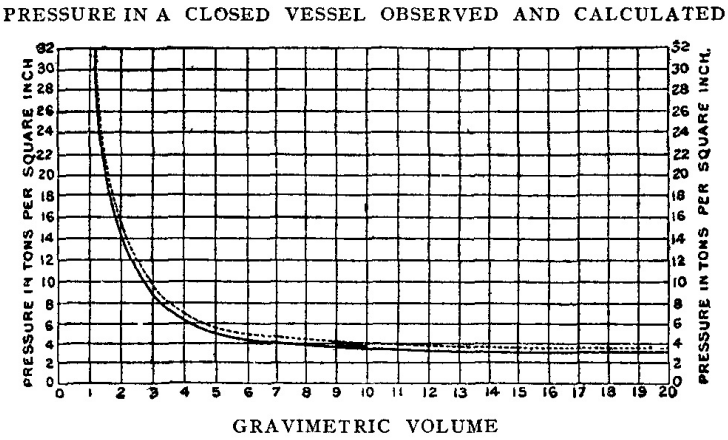


FIG. 9.

In the heading of the 6-in. range table we find the description of the charge.

Charge: weight 13 lb 4 oz.; gravimetric density 55.01/0.504; nature, cordite, size 30.

So that P = 13.25, the G.D. = 0.504, the upper figure 55.01 denoting the specific volume of the charge measured in cubic inches per lb, filling the chamber in a state of gas, the product of the two numbers 55.01 and 0.504 being 27.73; and the chamber capacity C = 13.25 × 55.01 = 730 cub. in., equivalent to 25.8 in. or 2.15 ft. length of bore, now called the equivalent length of the chamber (E.L.C.).

If the shot was not free to move, the closed chamber pressure due to the explosion of the charge at this G.D. (= 0.5) would be nearly 49 tons per sq. in., much too great to be safe.

But the shot advances during the combustion of the cordite, and the chief problem in interior ballistics is to adjust the G.D. of the charge to the weight of the shot so that the advance of the shot during the combustion of the charge should prevent the maximum pressure from exceeding a safe limit, as shown by the maximum ordinate of the pressure curve CPD in fig. 3.

Suppose this limit is fixed at 16 tons per sq. in., corresponding in Table 1. to a G.D., 0.2; the powder-gas will now occupy a volume b = 3/2 × C = 1825 cub. in., corresponding to an advance of the shot 3/2 × 2.15 = 3.225 ft.

Assuming an average pressure of 8 tons per sq. in., the shot will have acquired energy 8 × ¼πd^2 × 3.225 = 730 foot-tons, and a velocity about v = 1020 f/s, so that the time over the 3.225 ft. at an average velocity 510 f/s is about 0.0063 sec.

Comparing this time with the experimental value of the time occupied by the cordite in burning, a start is made for a fresh estimate and a closer approximation.

Assuming, however, that the agreement is close enough for practical requirement, the combustion of the cordite may be considered complete at this stage P, and in the subsequent expansion it is assumed that the gas obeys an adiabatic law in which the pressure varies inversely as some m^{th} power of the volume.

[v.03 p.0279] The work done in expanding to infinity from p tons per sq. in. at volume b cub. in. is then $pb/(m - 1)$ inch-tons, or to any volume B cub. in. is

$$(9) \qquad \frac{pb}{m-1}\left[1 - \left(\frac{b}{B}\right)^{m-1}\right].$$

It is found experimentally that $m = 1.2$ is a good average value to take for cordite; so now supposing the combustion of the charge of the 6-in. is complete in 0.0063 sec., when $p = 16$ tons per sq. in., $b = 1825$ cub. in., and that the gas expands adiabatically up to the muzzle, where

$$(10) \qquad \frac{B}{b} = \frac{216 + 25.8}{2.5 \times 25.8} = 3.75$$

we find the work realized by expansion is 2826 foot-tons, sufficient to increase the velocity from 1020 to 2250 f/s at the muzzle.

This muzzle velocity is about 5% greater than the 2150 f/s of the range table, so on these considerations we may suppose about 10% of work is lost by friction in the bore: this is expressed by saying that the *factor of effect* is $f = 0.9$.

The experimental determination of the time of burning under the influence of the varying pressure and density, and the size of the grain, is thus of great practical importance, as thereby it is possible to estimate close limits to the maximum pressure that will be reached in the bore of a gun, and to design the chamber so that the G.D. of the charge may be suitable for the weight and acceleration of the shot. Empirical formulas based on practical experience are employed for an approximation to the result.

A great change has come over interior ballistics in recent years, as the old black gunpowder has been abandoned in artillery after holding the field for six hundred years. It is replaced by modern explosives such as those indicated on fig. 4, capable of giving off a very much larger volume of gas at a greater temperature and pressure, more than threefold as seen on fig. 8, so that the charge may be reduced in proportion, and possessing the military advantage of being nearly smokeless. (See Explosives.)

The explosive cordite is adopted in the British service; it derives the name from its appearance as cord in short lengths, the composition being squeezed in a viscous state through the hole in a die, and the cordite is designated in size by the number of hundredths of an inch in the diameter of the hole. Thus the cordite, size 30, of the range table has been squeezed through a hole 0.30 in. diameter.

The thermochemical properties of the constituents of an explosive will assign an upper limit to the volume, temperature and pressure of the gas produced by the combustion; but much experiment is required in addition. Sir Andrew Noble has published some of his results in the *Phil. Trans.*, 1905-1906 and following years.

Authorities.—Tartaglia, *Nova Scientia* (1537); Galileo (1638); Robins, *New Principles of Gunnery* (1743); Euler (trans. by Hugh Brown), *The True Principles of Gunnery* (1777); Didion, Hélie, Hugoniot, Vallier, Bailly, &c., *Balistique* (French); Siacci, *Balistica* (Italian); Mayevski, Zabudski, *Balistique* (Russian); La Llave, Ollero, Mata, &c., *Balistica* (Spanish); Bashforth, *The Motion of Projectiles* (1872); *The Bashforth Chronograph* (1890); Ingalls, *Exterior and Interior Ballistics, Handbook of Problems in Direct and Indirect Fire*; Bruff, *Ordnance and Gunnery*; Cranz, *Compendium der Ballistik* (1898); *The Official Text-Book of Gunnery* (1902); Charbonnier, *Balistique* (1905); Lissak, *Ordnance and Gunnery* (1907).

(A. G. G.)

BALLOON, a globular bag of varnished silk or other material impermeable to air, which, when inflated with gas lighter than common air, can be used in aeronautics, or, according to its size, &c., for any purpose for which its ability to rise and float in the atmosphere adapts such a mechanism. "Balloon" in this sense was first used in 1783 in connexion with the invention of the brothers Montgolfier, but the word was in earlier use (derived from Ital. *ballone*, a large ball) as meaning an actual ball or ball-game, a primitive explosive bomb or firework, a form of chemical retort or receiver, and an ornamental globe in architecture; and from the appearance and shape of an air balloon the word is also given by analogy to other things, such as a "balloon skirt" in dress, "balloon training" in horticulture. (See Aeronautics, and Flight and Flying).

BALLOT (from Ital. *ballotta*, dim. of *balla*, a ball), the modern method of secret-voting employed in political, legislative and judicial assemblies, and also in the proceedings of private clubs and corporations. The name comes from the use of a little ball dropped according to choice into the right receptacle; but nowadays it is used for any system of secret-voting, even though no such ball is employed. In ancient Athens, the dicasts, in giving their verdict, generally used balls of stone (*psephi*) or of metal (*sponduli*). Those pierced in the centre, or black in colour, signified condemnation; those unpierced, or white, signified acquittal. The boxes were variously arranged; but generally a brass box received both classes of votes, and a wooden box received the unused balls. In the assembly, cases of *privilegia*, such as ostracism, the naturalization of foreigners or the release of state-debtors, were decided by secret-voting. The petalism, or voting by words on olive-leaves, practised at Syracuse, may also be mentioned. At Rome the ballot was introduced to the comitia by the *Leges Tabellariae*, of which the *Lex Gabiana* (139 B.C.) relates to the election of magistrates, the *Lex Cassia* (137 B.C.) to *judicia populi*, and the *Lex Papiria* (131 B.C.) to the enactment and repeal of laws. The wooden *tabellae*, placed in the *cista* or wicker box, were marked U. R. (*uti rogas*) and A. (*antiquo*) in the case of a proposed law; L. (*libero*) and D. (*damno*) in the case of a public trial; in the case of an election, *puncta* were made opposite the names or initials of the candidates. *Tabellae* were also used by the Roman judices, who expressed their verdict or judgment by the letters A. (*absolvo*), C. (*condemno*), and N. L. (*non liquet*). In modern times voting by ballot is usually by some form of writing, but the use of the ball still persists (especially in clubs), and a "black ball" is the regular term for a hostile vote.

Great Britain.—In Great Britain the ballot was suggested for use in parliament by a political tract of the time of Charles II. It was actually used by the Scots parliament of 1662 in proceeding on the Billeting Act, a measure proposed by Middleton to secure the ostracism of Lauderdale and other political opponents who were by secret-vote declared incapable of public office. The plan followed was this: each member of parliament wrote, in a disguised hand, on a piece of paper, the names of twelve suspected persons; the billets were put in a bag held by the registrar; the bag was then sealed, and was afterwards opened and its contents ascertained in the exchequer chamber, where the billets were immediately burned and the names of the ostracised concealed on oath. The Billeting Act was repudiated by the king, and the ballot was not again heard of till 1705, when Fletcher of Saltoun, in his measure for a provisional government of Scotland by annual parliaments in the event of Queen Anne's death, proposed secret-voting to protect members from court influence. The gradual emancipation of the British parliament from the power of the crown, and the adoption of a strictly representative system of election, not only destroyed whatever reason may once have existed for the ballot in deliberative voting, but rendered it essential that such voting should be open. It was in the agitations for parliamentary reform at the beginning of the 19th century that the demand for the ballot in parliamentary elections was first seriously made. The Benthamites advocated the system in 1817. At the so-called Peterloo Massacre (1819) several banners were inscribed with the ballot. O'Connell introduced a bill on the subject in 1830; and the original draft of Lord John Russell's Reform Bill, probably on the suggestion of Lords Durham and Duncannon, provided for its introduction. Later on the historian Grote became its chief supporter in the House of Commons; and from 1833 to 1839, in spite of the ridicule cast by Sydney Smith on the "mouse-trap," and on Grote's "dagger-box, in which you stab the card of your favourite candidate with a dagger,"[1] the

minority for the ballot increased from 106 to 217. In 1838 the ballot was the fourth point of the People's Charter. In the same year the abolition of the land qualification introduced rich commercial candidates to the constituencies. Lord Melbourne's cabinet declared the question open. The cause, upheld by Macaulay, Ward, Hume (in his resolutions, 1848)
[v.03 p.0280] and Berkeley, was strengthened by the report of Lord Hartington's Select Committee (15th March 1870), to the effect that corruption, treating and intimidation by priests and landlords took place to a large extent at both parliamentary and municipal elections in England and Ireland; and that the ballot, if adopted, would probably not only promote tranquillity at elections, but protect voters from undue influence, and introduce greater freedom and purity in voting, provided secrecy was made inviolable except in cases where a voter was found guilty of bribery, or where an invalid vote had been given.

Meanwhile in Australia the ballot had been introduced by the Constitution Act of South Australia (1856), and in other colonies at the same date. In South Australia (Electoral Act of 1858) the returning-officer put his initials on the voting-card, which the voter was directed, under pain of nullity, to fold so that the officer might not see the vote which was indicated by a cross. In Victoria, under the Electoral Act of 1865, the officer added to his initials a number corresponding to the voter's number on the register. In Tasmania the chief peculiarity was that (as in South Australia) the card was not put directly by the voter into the box, but handed to the officer, who put it there (this being thought a security against double-voting or voting with a non-official card, and also against the voter carrying away his card). In 1869, at Manchester and Stafford in England, test-ballots were taken on the Australian system as practised in Victoria—the voting-card containing the names of all the candidates, printed in different colours (for the benefit of illiterate voters), and the voter being directed to score out the names of those he did not support, and then to place the card (covered by an official envelope) in the box. It was found at Manchester that the voting was considerably more rapid, and therefore less expensive, than under the old system; that only 80 cards out of 11,475 were rejected as informal; and that, the representatives of candidates being present to check false statements of identity, and the public outside being debarred from receiving information what voters had voted, the ballot rather decreased the risk of personation. At Manchester the cards were not numbered consecutively, as in Victoria, so that (assuming the officials to be free from corruption) no scrutiny could have detected by whom particular votes were given. At Stafford the returning-officer stamped each card before giving it to the voter, the die of the stamp having been finished only on the morning of the election. By this means the possibility was excluded of what was known as "the Tasmanian Dodge," by which a corrupt voter gave to the returning-officer, or placed in the box, a blank non-official ticket, and carried out from the booth his official card, which a corrupt agent then marked for his candidate, and gave so marked to corrupt voter No. 2 (before he entered the booth) on condition that he also would bring out his official card, and so on *ad libitum*; the agent thus obtaining a security for his bribe, unless the corrupt voter chose to disfranchise himself by making further marks on the card. At the close of 1870 the ballot was employed in the election of members for the London School Board under the Education Act of that year.

In 1872 W. E. Forster's Ballot Act introduced the ballot in all parliamentary and municipal elections, except parliamentary elections for universities; and the code of procedure prescribed by the act was adopted by the Scottish Education Board in the first School Board election (1873) under the Education (Scotland) Act 1872. The Ballot Act not only abolished public nominations of candidates, but dealt with the offence of personation and the expenses of elections.

As practised in the United Kingdom, a white paper is used on which the names of the candidates are printed in alphabetical order, the voter filling up with a X the blank on the right-hand opposite the name he votes for. The paper, before being given out, is marked by the presiding-officer on both sides with an official stamp, which is kept secret, and cannot be used for a second election within seven years. The paper is marked on the back with the same number as the counterfoil of the paper which remains with the officer. This counterfoil is also marked with the voter's number on the register, so that the vote may be identified on a scrutiny; and a mark on the register shows that the voter has received a ballot-paper. The voter folds up the paper so as to conceal his mark, but to show the stamp to the officer, and deposits it in the box, which is locked and sealed, and so constructed that papers cannot be withdrawn without unlocking it. Papers inadvertently spoiled by the voters may be exchanged, the officer preserving separately the spoiled papers. If a voter is incapacitated from blindness, or other physical cause, or makes before the officer a declaration of inability to read, or when the poll is on a Saturday declares himself a Jew, the officer causes the paper to be marked as the voter directs, and keeps a record of the transaction. A voter who claims to vote after another has voted in respect of the same qualification, obtains a (green) paper which is not placed in the box, but preserved apart as a "tendered" paper. He must, however, declare his identity and that he has not already voted. The presiding-officer at the close of the poll has to account to the returning-officer for the papers entrusted to him, the number being made up by—(1) papers in the box, (2) spoiled papers, (3) unused papers and (4) tendered papers. During the voting (for which schoolrooms and other public rooms are available, and for which a separate compartment must be provided for every 150 electors entitled to vote at a station) agents of candidates are allowed to be present in the polling-station, but they, as well as the officials, are sworn to secrecy as regards who have voted, and for whom; and they are prohibited from interfering with the voter, inducing him to show his vote, or attempting to ascertain the number on the back of the paper. These agents are also present with the returning-officer when he counts the papers and the votes, rejecting those papers—(1) which want the official mark *on the back*; (2) on which votes are given for more candidates than the voter is entitled to vote for; (3) on which anything except the number on the back is marked or written by which the voter can be identified; (4) which are unmarked, or so marked that it is uncertain for whom the vote is given. The counted and rejected papers, and also the "tendered" papers, counterfoils and marked register (which have not been opened), are, in parliamentary elections, transmitted by the returning officer to the clerk of the crown in chancery in England, or the sheriff-clerk in Scotland, who destroys them at the end of one year, unless otherwise directed by an order of the House of Commons, or of some court having jurisdiction in election petitions. Such petitions either simply dispute the accuracy of the return on the ground of miscounting, or wrongous rejection or wrongous admission of papers, in which case the court examines the counted and rejected papers; or make allegations of corruption, &c. on which it may be necessary to refer to the marked counterfoils and ascertain how bribed voters have voted. Since the elections of 1874 much discontent has been expressed, because judges have rejected papers with trifling (perhaps accidental) marks other than the X upon them, and because elections have been lost through the failure of the officer to stamp the papers. For this purpose the use has been suggested of a perforating instead of an embossing stamp, while a dark-ground paper with white voting-spaces would make *misplaced* votes impossible.

The Ballot Act introduced several new offences, such as forging of papers or fraudulently defacing or destroying a paper or the official mark; supplying a paper without due authority; fraudulently putting into the box a non-official paper; fraudulently taking a paper out of the station without due authority; destroying, taking, opening or otherwise interfering with a box or packet of papers then in use for election purposes. These offences and attempts to commit them are punishable in the case of officers and clerks with imprisonment for two years, with or without hard labour. In other cases the term of imprisonment is six months.

The ballot was long criticized as leading to universal hypocrisy and deception; and Sydney Smith spoke of "voters, in dominos, going to the poll in sedan-chairs with closely-drawn curtains." The observed effect of a secret ballot has been, however, gradually to exterminate undue influence. The alarm of "the confessional" seems to be unfounded, as a Catholic
[v.03 p.0281] penitent is not bound to confess his vote, and if he did so, it would be a crime in the confessor to divulge it.

Continental Europe.—The ballot is largely employed in European countries. In France, where from 1840 to 1845 the ballot, or *scrutin*, had been used for deliberative voting in the chamber of deputies, its use in elections to the Corps Législatif was carefully regulated at the beginning of the Second Empire by the Organic Decree of the 2nd of February 1852. Under this law the voting was superintended by a bureau consisting of the deputy returning-officer (called president of the section), four unpaid assessors selected from the constituency and a secretary. Each voter presents a polling-card, with his designation, date of birth and signature (to secure identity), which he had previously got at the Mairie. This the president mutilates, and the vote is then recorded by a "bulletin," which is not official, but is generally printed with a candidate's name, and given to the voter by an agent outside, the only conditions being that the bulletin shall be "sur papier blanc, sans signes extérieurs, et préparé en dehors de l'assemblée." The total number of votes given (there being only one member in each electoral district) is checked by reference to "la feuille *d'appel* et inscription des votants," the law still supposing that each voter is publicly called on to vote. If the voter, when challenged, cannot sign his polling-card,

he may call a witness to sign for him. The following classes of bulletins are rejected:—"illisibles, blancs, ne contenant pas une désignation suffisante; sur lesquels les votants se sont fait connaître; contenant le nom d'une personne n'ayant pas prêté le serment prescrit" (*i.e.* of a person not nominated). Only the votes pronounced bad by the bureau in presence of representative scrutineers are preserved, in case these should be called for during the "Session pour vérification des Pouvoirs." Practically the French ballot did not afford secrecy, for you might observe what bulletin the voter took from the agent, and follow him up the *queue* into the polling-place; but the determined voter might conceal his vote even from the undue influence of government by scratching out the printed matter and writing his vote. This was always a good vote and scrutiny of good votes was impossible. The ballot is still used in the elections to the National Assembly, but in the Assembly itself only in special cases, as *e.g.* in the election of a "rapporteur." Under the law of 10th August 1871 the conseils généraux (departmental councils) are elected by ballot.

In Piedmont the ballot formed part of the free constitutional government introduced by Charles Albert in March 1848; it was extended to Italy in 1861. Voting for the Italian chamber of deputies takes place under the law of 20th November 1859, and in public halls (not booths), to which admission is gained by showing a certificate of inscription, issued by the mayor to each qualified voter. A stamped blue official paper, with a memorandum of the law printed on the back (*bolletino spiegato*), is then issued to the elector; on this he writes the name of a candidate (there being equal electoral colleges) or, in certain exceptional cases, gets a confidential friend to do so, and hands the paper folded-up to the president of the bureau, who puts it in the box (*urna*), and who afterwards presides at the public "squittinio dei suffragi." Greece is the only European country in which the ball-ballot is used. The voting takes place in the churches, each candidate has a box on which his name is inscribed, one half (white) being also marked "yes," the other half (black) "no." The voter, his citizenship or right to vote in the eparchy being verified, receives one ball or leaden bullet for each candidate from a wooden bowl, which a clerk carries from box to box. The voter stretches his arm down a funnel, and drops the ball into the "yes" or "no" division. The vote is secret, but there is apparently no check on "yes" votes being given for all the candidates, and the ball or bullet is imitable.

The earlier history of the ballot in Hungary is remarkable. Before 1848 secret voting was unknown there. The electoral law of that year left the regulation of parliamentary elections to the county and town councils, very few of which adopted the ballot. The mode of voting was perhaps the most primitive on record. Each candidate had a large box with his name superscribed and painted in a distinguishing colour. On entering the room alone the voter received a rod from *4 to 6 feet in length* (to prevent concealment of non-official rods on the voter's person), which he placed in the box through a slit in the lid. By the electoral law of 1874 the ballot in parliamentary elections in Hungary was abolished, but was made obligatory in the elections of town and county councils, the voting being for several persons at once.

In Prussia, Stein, by his *Städteordnung*, or municipal corporation act of 1808, introduced the ballot in the election of the municipal assembly (*Stadtverordnetenversammlung*). Under the German constitution of 1867, and the new constitution of the 1st of January 1871, the elections of the Reichstag were to be conducted by universal suffrage under the ballot in conformity with the electoral law of the 31st of May 1869.

America.—At the first elections in America voting was viva voce; but several of the colonies early provided for the use of written or printed ballots. By 1775 ballots were used in the New England states, in Pennsylvania, Delaware, North Carolina and South Carolina; they were introduced in New Jersey in 1776, and in New York in 1778, so that, at the time the constitution of the United States was adopted, viva voce voting prevailed at public elections only in Maryland, Virginia and Georgia. Of the new states which later entered the Union, only Illinois, Kentucky, Missouri and Arkansas did not have a ballot system when they became states. During the first half of the 19th century, Maryland, Georgia, Arkansas (1846) and Illinois (1848) adopted the ballot. In Missouri ballot-voting was introduced to some localities in 1845, but not until 1863 was it generally adopted in that state. Virginia did not provide for voting by ballot until 1869, and in Kentucky viva voce voting continued until 1819, but while the use of ballots was thus required in voting, and most of the states had laws prescribing the form of ballots and providing for the count of the vote, there was no provision making it the duty of any one to print and distribute the ballots at the polling-places on election day. In the primitive town meetings ballots had been written by the voters, or, if printed, were furnished by the candidates. With the development of elections, the task of preparing and distributing ballots fell to political committees for the various parties. The ballot-tickets were thus prepared for party-lists of candidates, and it was not easy for any one to vote a mixed ticket, while, as the voter received the ballot within a few feet of the polls, secrecy was almost impossible, and intimidation and bribery became both easy and frequent.

Soon after the adoption of the Australian ballot in Great Britain, it was introduced in Canada, but no serious agitation was begun for a similar system in the United States until 1885. In 1887 bills for the Australian ballot were actively urged in the legislatures of New York and Michigan, although neither became law. A Wisconsin law of that year, regulating elections in cities of over 50,000 population, incorporated some features of the Australian system, but the first complete law was enacted by Massachusetts in 1888. This Massachusetts statute provided for the printing and distribution of ballots by the state to contain the names of all candidates arranged alphabetically for each office, the electors to vote by marking the name of each candidate for whom they wished to vote. At the presidential election of 1888 it was freely alleged that large sums of money had been raised on an unprecedented scale for the purchase of votes, and this situation created a feeling of deep alarm which gave a powerful impetus to the movement for ballot reform. In 1889 new ballot laws were enacted in nine states: two states bordering on Massachusetts, Connecticut and Rhode Island; four states in the middle-west, Indiana, Michigan, Wisconsin and Minnesota; two southern states, Tennessee and Missouri; and Montana, in the far west. The Connecticut law, however, marked but little improvement over former conditions, since it provided only for official envelopes in which the unofficial party ballots should be voted. The Indiana law provided for a single or "blanket" ballot, but with the names of candidates arranged in party-groups, and a method of voting for all of the candidates in a party-
[v.03 p.0282] group by a single mark. Michigan and Missouri also adopted the party-group system. The other states followed the Massachusetts law providing for a blanket ballot with the candidates arranged by offices.

The new ballot system had its first practical demonstration at the Massachusetts election of 1889, and its success led to its rapid adoption in many other states. In 1890 ballot laws were passed in seven states: Vermont, Mississippi, Wyoming and Washington provided for the Massachusetts plan, although Vermont afterwards adopted the system of party-groups, which Maryland used from the first. The New York and New Jersey laws of 1890, however, only provided for official ballots for each party, and allowed ballots obtained outside of the polling-booths to be used. In 1891 seventeen additional states and two territories adopted the Australian ballot system. All of these provided for a blanket ballot; but while the Massachusetts arrangement was adopted in Arkansas, Nebraska, New Hampshire, North and South Dakota, Kentucky, Texas and Oregon, the system of party groups was followed in Colorado, Delaware, Illinois, Maine, Ohio, Pennsylvania and West Virginia. California had the Massachusetts arrangement of names, but added on the ballot a list of party names, by marking one of which a voter would cast his vote for all of the candidates of that party. Pennsylvania placed all the candidates not in a party-group in alphabetical order.

Iowa adopted the Australian ballot system in 1892; Alabama and Kansas in 1893; Virginia in 1894; Florida in 1895; and Louisiana and Utah in 1896. In 1895, too, New York adopted the blanket ballot in place of separate party ballots, but arranged the names of candidates in party columns. The only state to abandon the blanket ballot after once adopting it was Missouri which in 1897 returned to the system of separate ballots, with no provision for booths where the ballot might be marked in secret. (See the article, "Present Status of the Ballot Laws," by Arthur Ludington in *Amer. Pol. Science Rev.* for May 1909.)

Owing to the large number of officials chosen at one time in American elections, the form and appearance of the ballot used is very different from that in Great Britain. At the quadrennial presidential election in New York state, for example, the officers to be voted for by each elector are thirty-six presidential electors, one congressman, state-governor, lieutenant-governor and five other state officers, a member for each house of the state legislature, several judges, a sheriff, county-clerk and other county officers. The column with the list of the candidates of each party for all of these offices is 2 to 3 ft. in length; and as there are often eight to ten party-tickets in the field, the ballot-paper is usually from 18 to 20 in. in width. Each voter receives one of these "blanket" ballots on entering the polling-place, and retires to a

booth to mark either a party column or the individual candidates in different columns for whom he wishes to vote. Where, as in Massachusetts, the names of candidates are arranged by offices instead of in party-lists, every voter must mark the name of each individual candidate for whom he wishes to vote. Connecticut, New Jersey, Missouri, North and South Carolina, Georgia and New Mexico use the system of separate party ballots. (See also Voting, Voting Machines, Election, Representation.)

[1] For a description of Grote's card-frame, in which the card was punctured through a hole, and was thus never in the voter's hands, see *Spectator*, 25th February 1837.

BALLOU, HOSEA (1771-1852), American Universalist clergyman, was born in Richmond, New Hampshire, on the 30th of April 1771. He was a son of Maturin Ballou, a Baptist minister, was self-educated, early devoted himself to the ministry, became a convert to Universalism in 1789, and in 1794 became a pastor of a congregation at Dana, Massachusetts. He preached at Barnard, Vermont, and the surrounding towns in 1801-1807; at Portsmouth, New Hampshire, in 1807-1815; at Salem, Massachusetts, in 1815-1817; and as pastor of the Second Universalist Church in Boston from December 1817 until his death there on the 7th of June 1852. He founded and edited *The Universalist Magazine* (1819; later called *The Trumpet*) and *The Universalist Expositor* (1831; later *The Universalist Quarterly Review*); wrote about 10,000 sermons, many hymns, essays and polemic theological works; and is best known for *Notes on the Parables* (1804), *A Treatise on Atonement* (1805) and *Examination of the Doctrine of a Future Retribution* (1834); in these, especially the second, he showed himself the principal American expositor of Universalism. His great contribution to his Church was the body of denominational literature he left. From the theology of John Murray, who like Ballou has been called "the father of American Universalism," he differed in that he divested Universalism of every trace of Calvinism and opposed legalism and trinitarian views.

Consult the biography by Thomas Whittemore (4 vols., Boston, 1854-1855) and that by Oscar F. Safford (Boston, 1889); and J. C. Adams, *Hosea Ballou and the Gospel Renaissance* (Boston, 1904).

His grand-nephew, Hosea Ballou (1796-1861), born in Halifax, Vermont, on the 18th of October 1796, preached to Universalists in Stafford, Connecticut (1815-1821); and in Massachusetts, in Roxbury (1821-1838) and in Medford (1838-1853); and in 1853 was elected first president of Tufts College at Medford, serving in that office until shortly before his death, which took place at Somerville, Massachusetts, on the 27th of May 1861. He was the first (1847) to urge the necessity of a Universalist denominational college, and this did much towards the establishment of Tufts. He was associated with the elder Hosea Ballou in editing *The Universalist Quarterly Review*; edited an edition of Sismondi's *History of the Crusades* (1833); and wrote the *Ancient History of Universalism*, down to A.D. 553 (1829; 2nd ed., 1842).

Maturin Murray Ballou (1820-1895), son of the first Hosea, was a pioneer in American illustrated journalism, edited *Gleason's Pictorial* and *Ballou's Monthly* and many collections of quotations, and in 1872 became editor-in-chief of the *Boston Daily Globe*, of which he was one of the founders. He wrote a life of his father (1860), and a *History of Cuba* (1854).

BALLSTON SPA, a village and the county-seat of Saratoga county, New York, U.S.A., about 7 m. S. of Saratoga Springs. Pop. (1890) 3527; (1900) 3923; (1910 U.S. Census) 4138. It is served by the Delaware & Hudson railway, and is connected with Saratoga Springs, Albany, and Schenectady by electric lines. There are several manufacturing establishments, among which are one of the largest manufactories of paper-bags in the United States and a large tannery. It is, however, as a popular summer resort that Ballston Spa is best known. Many fine chalybeate and other springs rising through solid rock from a depth of about 650 ft. furnish a highly effervescent water of considerable medicinal and commercial value. The village has the Ballston Spa public library, the Saratoga county law library and the Saratoga county court house. Ballston Spa, which was named in honour of the Rev. Eliphalet Ball, an early settler, was settled about 1787 by the grandfather of Stephen A. Douglas, and was incorporated in 1855.

See E. F. Prose, *Centennial Hist. of Ballston Spa*, 1908.

BALLYCASTLE, a seaport and watering-place on the north coast of Co. Antrim, Ireland, in the north parliamentary division, situated on a bay of the same name opposite Rathlin Island. Pop. (1901) 1481. It is connected with the Northern Counties (Midland) railway at Ballymoney by the Ballycastle light railway. The town consists of two divisions, about a quarter of a mile apart and connected by a fine avenue. Towards the close of the 18th century Mr Hugh Boyd, obtaining the estate, devoted himself to the extension and improvement of the town, establishing manufactures, endowing charities and building churches; and succeeded in producing a temporary vitality. Upwards of £150,000, including a large government grant, is said to have been expended upon the pier and harbour; but the violence of the sea overthrew the one and the other became filled with sand. To the east of the town are the remains of Bonamargy Abbey, the burial-place of many of the MacDonnell family. The Carey brook, by the side of which the abbey stands, was formerly called the Margy, and on its waters according to tradition dwelt the four children of Lir, changed to swans by their step-mother until St Columba released them from enchantment. (See P. W. Joyce, *Old Celtic Romances*.) With this well-known romance is connected the wide-spread belief in Ireland of ill-fortune following the killing of a swan. Coal-seams, formerly extensively worked, and from an unknown period of antiquity, appear in the cliffs towards Fair Head, and the fisheries are important. The coast-scenery and the view from the hill of Knocklayd are notable.

[v.03 p.0283]

BALLYMENA, a town of Co. Antrim, Ireland, in the mid parliamentary division, on the Braid, an affluent of the Maine, 2 m. above their junction. Pop. of urban district (1901) 10,886. It is 33 m. N.N.W. of Belfast on the Northern Counties (Midland) railway. Branch lines run to Larne and to Parkmore on the east coast. The town owes its prosperity chiefly to its linen trade, introduced in 1733, which gives employment to the greater part of the inhabitants. Brown linen is a specialty. Iron ore is raised in the neighbourhood. Antiquities in the neighbourhood are few and the present buildings of Ballymena Castle and Galgorm Castle are modern. Gracehill, however, a Moravian settlement, was founded in 1746.

BALLYMONEY, a market town of Co. Antrim, Ireland, in the north parliamentary division, 53 m. N.N.W. from Belfast by the Northern Counties (Midland) railway. Pop. of urban district (1901) 2952. The Ballycastle railway joins the main line here. The trade of the town is prosperous, brewing, distilling and tanning being carried on, besides the linen manufacture common to the whole county. Soap, candles and tobacco are also manufactured, and the town is a centre for local agricultural trade. Near the neighbouring village of Dervock (4½ m. N.) is a cottage shown by an inscription to have been the home of the ancestors of William McKinley, president of the United States.

BALLYMOTE, a market town of Co. Sligo, Ireland, in the south parliamentary division, 14 m. S. of Sligo by the Midland Great Western railway. Pop. (1901) 997. It is a centre for some agricultural trade and has carriage-building works. There are remains of a strong castle, built by the powerful earl of Ulster, Richard de Burgh, in 1300, and the scene of hostilities in 1641 and 1652. Ruins are also seen of a Franciscan foundation attributed to the 13th century; it was a celebrated seat of learning and an extant memorial of the work of its monks is the *Book of Ballymote* (*c.* 1391) in the possession of the Royal Irish Academy, a miscellaneous collection in prose and verse of historical, genealogical and romantic writings. There are also, near the town, ruins of a house of the Knights of St John (1303).

BALLYSHANNON, a seaport and market-town of Co. Donegal, Ireland, in the south parliamentary division, at the mouth of the Erne; on the Bundoran branch of the Great Northern railway. Pop. (1901) 2359. The river is here crossed by a bridge of twelve arches, which connects the town with the suburb of The Port. Below the bridge the river forms a beautiful cascade, 150 yds. wide, with a fall at low water of 16 ft. Here is the salmon leap, where the fish are trapped in large numbers, but also assisted to mount the fall by salmon-ladders. The fisheries are of great value, and there is an export trade to England in salmon, which are despatched in ice. The harbour is a small exposed creek of Donegal Bay, and is only accessible to small vessels owing to a bar. Previous to the Union Ballyshannon returned two members to the Irish parliament and it was incorporated by James I. There are slight remains of a castle of the O'Donnells, earls of Tyrconnell, where the English, on attempting to besiege it, were defeated and lost heavily in their retreat across the river, in 1597. There are numerous raths or encampments in the vicinity and other remains. Coolmore, 3 m. N.W., is a bathing-resort.

BALM, a fragrant herb, *Melissa officinalis*, of the Deadnettle order (*Labiatae*) with opposite, ovate, crenulated leaves, which are wrinkled above, and small white or rose-spotted flowers. It is a native of central and southern Europe; it is often grown in gardens and has become naturalized in the south of England and grows apparently wild as a garden escape in North America. The name is from the Greek μέλισσα, the plant being visited by bees. Bastard Balm is an allied plant, *Melittis Melissophyllum*, a southern European species, found in the south and south-west of England.

BALMACEDA, JOSÉ MANUEL (1838-1891), president of the republic of Chile, was born in Santiago in 1838. His parents were wealthy, and in his early days he was chiefly concerned in industrial and agricultural enterprise. In 1865 he was one of the representatives of the Chilean government at the general South American congress at Lima, and after his return obtained great distinction as an orator in the national assembly. After discharging some diplomatic missions abroad, he became successively minister of foreign affairs and of the interior under the presidency of Señor Santa Maria, and in the latter capacity carried compulsory civil marriage and several other laws highly obnoxious to the clergy. In 1886 he was elected president; but, in spite of his great capacity, his imperious temper little fitted him for the post. He was soon irreconcilably at variance with the majority of the national representatives, and on the 1st of January 1891 he sought to terminate an intolerable situation by refusing to convoke the assembly and ordering the continued collection of the taxes on his own authority. This led to the Chilean Civil War of 1891, which ended in the overthrow of Balmaceda, who committed suicide on the 18th of September, the anniversary of his elevation to the presidency.

BALMAIN, a town of Cumberland county, N.S.W., Australia, on the western shore of Darling Harbour, Port Jackson, 2 m. by water from Sydney and suburban to it. Pop. (1901) 30,881. It is the home of great numbers of the working classes of Sydney and some of the largest factories and most important docks are situated here. Saw-mills, iron foundries, chemicals, glass and soap works, shipbuilding yards and a cocoanut-oil factory in connexion with the soap-manufacture at Port Sunlight, England, are among the chief industrial establishments. Balmain became a municipality in 1860.

BALMERINO, JAMES ELPHINSTONE, 1st Baron (*c.* 1553-1612), Scottish politician, was the third son of Robert, 3rd Lord Elphinstone (d. 1602). Rising to power under James VI. he became a judge and a royal secretary; he accompanied the king to London in 1603 and was made Lord Balmerino, or Balmerinoch, in 1604. In 1605 he became president of the court of session, but his ardour for the Roman Catholic religion brought about his overthrow. In 1599 on the king's behalf, but without the king's knowledge, he had sent a letter to Clement VIII. in which he addressed the pope in very cordial terms. A copy of this letter having been seen by Elizabeth, the English queen asked James for an explanation, whereupon both the king and the secretary declared it was a forgery. There the matter rested until 1608, when the existence of the letter was again referred to during some controversy between James and Cardinal Bellarmine. Interrogated afresh Balmerino admitted that he had written the compromising letter, that he had surreptitiously obtained the king's signature, and that afterwards he had added the full titles of the pope. In March 1609 he was tried, attainted and sentenced to death, but after a brief imprisonment he was released and he died at Balmerino in July 1612.

Balmerino's elder son John (d. 1649) was permitted to take his father's title in 1613. In 1634 he was imprisoned for his opposition to Charles I. in Scotland, and by a bare majority of the jury he was found guilty of "leasing-making" and was sentenced to death. But popular sympathy was strongly in his favour; the poet Drummond of Hawthornden and others interceded for him, and after much hesitation Charles pardoned him. Balmerino, however, did not desist from his opposition to the king. A chief among the Covenanters and a trusted counsellor of the marquess of Argyll, he presided over the celebrated parliament which met in Edinburgh in August 1641, and was one of the Scottish commissioners who visited England in 1644. He died in February 1649 and was succeeded as 3rd lord by his son John (1623-1704), who in 1669 inherited from his uncle James the title of Lord Coupar. John's son John, 4th Lord Balmerino (1652-1736), was a lawyer of some repute and, although a sturdy opponent of the Union, was a Scottish representative peer in 1710 and 1713. John's son Arthur (1688-1746) who became 6th Lord Balmerino on the death of his half-brother John in January 1746, is famous as a Jacobite. He joined the partisans of James Edward, the Old Pretender, after the battle of Sheriffmuir
[v.03 p.0284]
in November 1713, and then lived for some time in exile, returning to Scotland in 1733 when his father had secured for him a pardon. He was one of the first to join Charles Edward in 1745; he marched with the Jacobites to Derby, fought at Falkirk and was captured at Culloden. Tried for treason in Westminster Hall he was found guilty, and was beheaded on the 11th of August 1746, behaving both at his trial and at his execution with great constancy and courage. On his death without issue his titles became extinct.

BALMÈS, JAIME LUCIANO (1810-1848), Spanish ecclesiastic, eminent as a political writer and a philosopher, was born at Vich in Catalonia, on the 28th of August 1810, and died there on the 9th of July 1848. Having attacked the regent Espartero and been exiled he founded and edited on his return the *El Pensamiento de la Nacion*, a Catholic and Conservative weekly; but his fame rests principally on *El Protestantismo comparado con el Catolicismo en sus relaciones con la Civilisacion Europea* (3 vols., 1842-1844, 6th edition, 1879; Eng. trans. London, 1849), an able defence of Catholicism on the ground that it represents the spirit of obedience or order, as opposed to Protestantism, the spirit of revolt or anarchy. From the historical standpoint it is of little value. The best of his philosophical works, which are clear expositions of the scholastic system of thought, are the *Filosofia Fondamental* (4 vols., 1846, Eng. trans. by H. F. Brownson, 2 vols. New York, 1856), and the *Curso de Filosofia Elemental* (4 vols., 1847), which he translated into Latin for use in seminaries.

See A. de Blanche-Raffin, *Jacques Balmès, sa vie et ses ouvrages* (Paris, 1849); and E. Bullón Fernández, *Jaime Balmès y sus oberas* (Madrid, 1903).

BALMORAL CASTLE (Gaelic, "the majestic dwelling"), a private residence of the British sovereign, in the parish of Crathie and Braemar, Aberdeenshire, Scotland, on the right bank of the Dee (here spanned by a fine suspension bridge), 9 m. W. of Ballater and at a height of 900 ft. above the sea. The property formerly belonged to the Farquharsons of Inverey, from whom it was acquired by Sir Robert Gordon, whose trustees disposed of the lease in 1848 to the prince consort, by whom the whole estate was purchased in 1852 and bequeathed to Queen Victoria. The castle is built of granite in the Scots baronial style, with an eastern tower 100 ft. high commanding a superb view—Ballochbuie and Braemar to the W., Glen Gairn to the N., Lochnagar and the beautiful valley of the Dee to the S. On Craig Gowan (1319 ft.), a hill 1 m. to the south, have been erected memorial cairns to Queen Victoria, the prince consort, Princess Alice and other members of the royal family of Great Britain. The parish church of Crathie (1903), replacing the kirk of 1806, is 1½ m. to the W., and about 2 m. farther west stands Abergeldie Castle, another Highland royal residence, an ancient building to which modern additions have been made, inhabited by King Edward VII. when prince of Wales, and after his accession to the throne used as a shooting-lodge.

BALNAVES, HENRY (1512?-1579), Scottish politician and reformer, born at Kirkcaldy about 1512, was educated at St Andrews and on the continent, where he adopted Protestant views. Returning to Scotland, he continued his legal studies and in 1538 was appointed a lord of session. He married about the same time Christian Scheves, and in 1539 was granted the estate of Halhill in Fife, after which he is generally named. Before 1540 he was sworn of James V's. privy council, and was known as one of the party in favour of the English alliance and of an ecclesiastical reformation. He is also described as treasurer to James (*Letters and Papers*, 1543, i. 64), but the regent Arran appointed him secretary in the new government of the infant Queen Mary (January 1543). He promoted the act permitting the reading of the Scriptures in the vulgar tongue, and was one of the commissioners appointed to arrange a marriage treaty between the little queen and the future Edward VI. In London he was not considered so complaisant as some of the other commissioners, and was not made privy to all the engagements taken by his colleagues (*ib.* i. 834). But Beton "loved him worst of all," and, when Arran went over to the priestly party, Balnaves was, in November 1543, deprived of his offices and imprisoned in Blackness Castle.

Thence he was released by the arrival of Hertford's fleet in the following May, and from this time he became a paid agent of the English cause in Scotland. He took no part in the murder of Beton, but was one of the most active defenders of the castle of St Andrews. He received £100 from Henry VIII. in December 1546, was granted an annuity of £125 by Protector Somerset in 1547 and was made English paymaster of the forces in St Andrews. When that castle surrendered to the

French in July Balnaves was taken prisoner to Rouen. Somerset made vain efforts to procure his release and continued his pension. He made himself useful by giving information to the English government, and even Mary Tudor sent him £50 as reward in June 1554. Balnaves also busied himself in writing what Knox calls "a comfortable treatise of justification," which was found in MS. with a preface by Knox, among the reformer's papers, and was published at Edinburgh in 1584 under the title *The Confession of Faith*.

In 1557 Balnaves was permitted to return to Scotland and regain his property; probably it was thought that Mary Tudor's burnings would have cooled the ardour of his English affections, and that in the war threatening between two Catholic countries, Balnaves would serve his own. The accession of Queen Elizabeth changed the situation, and Mary of Guise had reasons for accusing him of "practices out of England" (*Salisbury MSS.* i. 155). He took, in fact, an active part in the rising of 1559 and was commissioned by the Congregation to solicit the help of the English government through Sir Ralph Sadleir at Berwick. He was also selected one of the Scots representatives to negotiate with the duke of Norfolk in February 1560. In 1563 he was restored to his office as lord of session, and was one of those appointed by the General Assembly to revise the *Book of Discipline*. He was one of Bothwell's judges for the murder of Darnley in 1567, and in 1568 he accompanied Moray to the York inquiry into Queen Mary's guilt. He resigned his judicial office in 1574, and died in 1579 at Edinburgh. He has been claimed as a Scots bard on the strength of one ballad, "O gallandis all, I cry and call," which is printed in Allan Ramsay's *Evergreen* (2 vols. 1724-1727).

See *Letters and Papers of Henry VIII.* (1540-1545); Bain's and Thorp's *Cal. of Scottish State-Papers*; English *Domestic and Foreign Cals.*; *Acts of Engl. Privy Council*; *Reg. P.C.*, Scotland; *Reg. Great Seal of Scotland*; *Hamilton Papers*; *Border Papers*; Knox, *Works*; Burnet, *Reformation*; Froude, *Hist.*

(A. F. P.)

BALNEOTHERAPEUTICS (Lat. *balneum*, a bath, and Gr. θεραπεύειν, to treat medically). The medical treatment of disease by internal and external use of mineral waters is quite distinct from "hydrotherapy," or the therapeutic uses of pure water. But the term "balneotherapeutics" has gradually come to be applied to everything relating to spa treatment, including the drinking of waters and the use of hot baths and natural vapour baths, as well as of the various kinds of mud and sand used for hot applications. The principal constituents found in mineral waters are sodium, magnesium, calcium and iron, in combination with the acids to form chlorides, sulphates, sulphides and carbonates. Other substances occasionally present in sufficient quantity to exert a therapeutic influence are arsenic, lithium, potassium, manganese, bromine, iodine, &c. The chief gases in solution are oxygen, nitrogen, carbonic acid and sulphuretted hydrogen. Argon and helium occur in some of the "simple thermal" and "thermal sulphur waters." There are few doctors who would deny the great value of special bathing and drinking cures in certain morbid conditions. In the employment of the various mineral waters, many of the spas adopt special means by which they increase or modify their influence, *e.g.* the so-called "aromatic" or "medicated" baths, in which substances are mixed to exert a special influence on the skin and peripheral nerves. Of these the "pine-needle" bath has the greatest repute; it is made by adding a decoction of the needles or young shoots of firs and pines. Fir wood oil (a mixture of ethereal oils) or the tincture of an alcoholic extract acts equally well. [v.03 p.0285] The volatile ethereal constituents are supposed to penetrate the skin and to stimulate the cutaneous circulation and peripheral nerves, being eliminated later by the ordinary channels. Similar effects follow the addition to the bath of aromatic herbs, such as camomile, thyme, &c. For a full-sized bath 1½ to 2 lb of herbs are tied in a muslin bag and infused in a gallon of boiling water; the juices are then expressed and the infusion added to the bath. Astringent baths are prepared in a similar way from decoctions of oak bark, walnut leaves, &c. In many spas on the European continent baths are prepared from peat or mud mixed with hot mineral water. Mineral peat consists of decomposing vegetable soil that has been so long in the neighbourhood of the medicinal spring that it has undergone peculiar and variable chemical changes. This is mixed with the hot mineral water until the bath has the desired consistency, the effect on the patient being in almost direct proportion to the density. These baths vary greatly in composition. Mud baths are chiefly prepared from muddy deposits found in the neighbourhood of the springs, as at St Amand. They act like a large poultice applied to the surface of the body, and in addition to the influence of the temperature, they exert a considerable mechanical effect. The pulse is accelerated some 6 to 12 beats a minute, the respiration number rises, and the patient is thrown into a profuse perspiration. They have very great value in gouty and rheumatic conditions and in some of the special troubles of women.

There are certain conditions in which mineral water treatment is distinctly contra-indicated. Advanced cardiac disease and cardiac cases with failure of compensation must pre-eminently be treated at home, not at a spa. Advanced arterio-sclerosis, any form of serious organic visceral disease, advanced cirrhosis, pulmonary tuberculosis with a tendency to haemoptysis, much elevation of temperature or emaciation, are all entirely unsuited for this form of treatment. Serious organic nervous diseases, great nervous depression and old cases of paralysis are all contra-indicated. Any trouble, however suited in itself for spa treatment, must be considered inapplicable if complicated with pregnancy.

In advising balneotherapeutic treatment in any case, all the conditions and habits of the patient—pecuniary, physical and psychical—must be considered, as the spa must be fitted to the patient, not the patient to the spa. Besides the particular disease, the idiosyncrasy of the patient must be considered, the same morbid condition in different people requiring very different treatment. Retarded convalescence is a condition often treated at the spas, although hygienic surroundings, both mental and physical, are usually all that is necessary to ensure complete recovery. After rheumatic fever, however, if the joints remain painful and the heart is dilated, the thermal gaseous saline water of Nauheim, augmented by Schott's resistance movements, will often appear to work wonders. Chronic rheumatism, where there is much exudation round a joint or incipient stiffness of a joint, may be relieved by hot thermal treatment, especially when combined with various forms of massage and exercises. Simple thermal waters, hot sulphur springs and hot muriated waters are all successful in different cases. Chronic muscular rheumatism can also be benefited in a similar manner. Diseases of the nervous system are on the whole treated by these means with small success. Mental diseases other than very mild cases of depression should be considered inapplicable. Neurasthenics are sometimes treated at chalybeate or thermal muriated saline spas; but such treatment is entirely secondary to the general management of the case. Neuralgic affections and the later stages of neuritis, especially when dependent on gout or rheumatism, are often relieved or cured. Abdominal venosity (abdominal plethora), a feature of obesity, glycosuria, &c., are extremely well fitted for this form of treatment. The alkaline sulphated waters, the bitter waters and the common salt waters can all be prescribed, and after a short course can be supplemented with various forms of active and passive exercises. Diseases of the respiratory organs are far more suited for climatic treatment than for treatment by baths. Anaemia can usually be better or equally well treated at home, or by seaside residence or a sea voyage, though many physicians prescribe chloride of sodium waters, followed by a course of iron waters at some suitably situated spa. In the anaemia dependent on malarial infection, the muriated or alkaline sulphated waters at spas of considerable elevation and combined with iron and arsenic are often very beneficial. Gravel and stone, if of the uric acid variety, can be treated with the alkaline waters, but the case must be under constant observation lest the urine become too alkaline and a deposition of phosphates take place on the already formed uric acid stone. Gout is so variable both in cause and effect that much discrimination is required in its treatment. Where the patient is of "full habit," with portal stagnation, the sulphated alkaline or mild bitter waters are indicated, especially those of Carlsbad and Marienbad; but the use of these strong waters must be followed by a long rest under strict hygienic conditions. Where this is impossible, a milder course must be advised, as at Homburg, Kissingen, Harrogate, Wiesbaden, Baden-Baden, &c. For very delicate patients, and where time is limited, the simple thermal waters are preferable.

For radiant heat and light baths and electric baths of all kinds, see Electrotherapeutics; and for compressed air baths, Aerotherapeutics. (See also Baths, Therapeutics, and the articles on diseases.)

BALQUHIDDER (Gaelic, "the farm in the back-lying country"), a village and parish of Perthshire, Scotland. Pop. of parish (1901) 605. The village lies 2 m. W. of the station of the same name on the Caledonian railway from Callander to Oban, and 27¾ m. N.W. of Stirling. It is situated at the east end of Loch Voil, a lake at the foot of the Braes of Balquhidder. The Maclaurins acquired the district as early as the 9th century and occupied it for several hundred years until ousted by the Macgregors, a neighbouring clan, who had repeatedly raided their lands, and in 1558 slew the chief and many of his

followers. Balquhidder was the scene of some of the exploits of Rob Roy, who died there in 1734. His grave in the old kirkyard is marked by a stone ornamented with rude carving, executed probably centuries before his time. Another ancient stone is said traditionally to cover the grave of Angus, the Columban missionary, who was the first to carry on Christian work in this part of the Highlands.

BALRAMPUR, a town of British India near the river Rapti, 28 m. from Gonda, in the Gonda district of the United Provinces. Pop. (1901) 16,723. It gives its name to one of the largest *talukdari* estates in the province. The raja, Sir Drigbijai Singh K.C.S.I., was conspicuously loyal during the Mutiny, and was rewarded with accessions of territory and hereditary privileges. His death in 1882 gave rise to prolonged litigation and the estate was thrown into chancery. The income is estimated at £120,000, paying a revenue of £46,000. Numerous schools and hospitals are supported. Balrampur contains a large palace, a handsome modern temple and an Anglo-vernacular school.

BALSAM (from Gr. βάλσαμον, through Lat. *balsamum*, contracted by popular use to O. Fr. *basme*, mod. Fr. *bâme*; Eng. balm), a term properly limited to such resins or oleo-resins as contain benzoic acid or cinnamic acid or both. Those balsams which conform to this definition make up a distinct class, allied to each other by their composition, properties and uses. Those found in commerce are the balsam of Peru, balsam of Tolu, liquid storax and liquidambar. *Balsam of Peru* is the produce of a lofty leguminous tree, *Myroxylon Pereirae*, growing within a limited area in San Salvador, Central America and introduced into Ceylon. It is a thick, viscid oleo-resin of a deep brown or black colour and a fragrant balsamic odour. It is used in perfumery. Though contained in the pharmacopeias it has no special medicinal virtues. *Balsam of Tolu* is produced from *Myroxylon toluiferum*. It is of a brown colour, thicker than Peru balsam, and attains a considerable degree of solidity on keeping. It also is a product of equatorial America, but is found over a much wider area than is the balsam of Peru. It is used in perfumery and as a constituent in cough syrups and lozenges. *Liquid storax* or *styrax preparatus*, is a balsam yielded by *Liquidambar orientalis*, a native of Asia Minor. It is a soft resinous substance, with a pleasing balsamic odour, especially after it has been kept for some time. It is used in medicine as an external application in some parasitic skin diseases, and internally as an expectorant. An analogous substance is derived from *Liquidambar Altingia* in Java. *Liquidambar balsam* is derived from *Liquidambar styraciflua*, a tree found in the United States and Mexico. It contains cinnamic acid, but not benzoic acid.

[v.03 p.0286]

Of so-called balsams, entirely destitute of cinnamic and benzoic constituents, the following are found in commerce: —*Mecca balsam* or *Balm of Gilead*, from *Commiphora opobalsamum*, a tree growing in Arabia and Abyssinia, is supposed to be the balm of Scripture and the βάλσαμον of Theophrastus. When fresh it is a viscid fluid, with a penetrating odour, but it solidifies with age. It was regarded with the utmost esteem among the nations of antiquity and to the present day it is peculiarly prized among the people of the East. For *balsam of copaiba* see Copaiba. Under the name of *wood oil*, or *Gurjun balsam*, an oleo-resin is procured in India and the Eastern Archipelago from several species of *Dipterocarpus*, chiefly *D. turbinatus*, which has the odour and properties of copaiba and has been used for the same purposes. Wood oil is also used as a varnish in India and forms an effective protection against the attacks of white ants. *Canada balsam* or *Canada turpentine* is the oleo-resin yielded by *Abies balsamea*, a tree that grows in Canada and the northern parts of the United States. It is a very transparent substance, somewhat fluid when first run, but thickening considerably with age, possessed of a delicate yellow colour and a mild terebinthous odour. It contains 24% of essential oil, 60% of resin soluble in alcohol, and 16% of resin soluble only in ether. Its chief uses are for mounting preparations for the microscope and as a cement for glass in optical work.

The garden balsam is an annual plant, *Impatiens balsamina*, and the balsam apple is the fruit of *Momordica balsamina*, nat. order Cucurbitaceae.

BALSHAM, HUGH DE (d. 1286), English churchman, appears first as sub-prior of the monastery of Ely. On the death of William of Kilkenny in 1256 the monks elected him bishop of Ely, to the annoyance of Henry III. who had handed over the temporalities of the see to John de Waleran. The election was confirmed by the pope in 1257 and Hugh set to work to repair the harm done to the diocese by the intruder. In 1280 the bishop obtained a charter allowing him to replace the secular brethren residing in his hospital of St John at Cambridge by "studious scholars"; a second charter four years later entirely differentiated these scholars from the brethren of the hospital, and for them Hugh de Balsham founded and endowed the college of Peterhouse.

BALTA, a town in the Russian government of Podolia, between the Dniester and the Bug, 131 m. by rail N.N.W. of Odessa. It carries on a large trade in cattle, horses and grain, and has two annual fairs, held at Whitsuntide and in June. A variety of industries, such as tallow-melting, soap-boiling, tile-making and brewing, are carried on. The Jews form a very considerable part of the population, which in 1867 numbered 14,528, and in 1897, 23,393. Balta was in great part destroyed by the Russians in 1780.

BALTARD, LOUIS PIERRE (1764-1846), French architect and engraver, was born in Paris on the 9th of July 1764. He was originally a landscape painter, but in his travels through Italy was so much struck with the beauty of the Italian buildings, that he changed his profession and devoted himself to architecture. In his new occupation he achieved great success, and was selected to prepare the plans for some of the largest public edifices in Paris. His reputation, however, is chiefly based on his great skill in engraving. Among the best known of his plates are the drawings of Paris (*Paris et ses monuments*, 2 vols. fol., 1803), the engravings for Denon's *Égypte*, the illustrations of Napoleon's wars (*La Colonne de la grande armée*), and those contained in the series entitled the *Grand prix de l'architecture*, which for some time he carried on alone. He also gained distinction as an engraver of portraits. Baltard died in Paris on the 22nd of January 1846.

Two of his children were also architects. Of these the more important was Victor Baltard (1805-1874), who was born in Paris on the 19th of June 1805. In 1833 he gained the *prix de Rome* at the École des beaux-arts for designing a military school. He was largely instrumental in introducing a regular scheme of fresco decoration by modern artists in the churches of Paris, to take the place of the heterogeneous collections of pictures of all kinds with which their walls had been promiscuously decorated. He built many additions to existing churches, and also the church of St Augustin, in which he united the structural values of stone and steel. His most popular achievement was, however, the building of the central market in Paris. Victor Baltard also built the slaughter houses and the cattle market of La Villette. He died in Paris on the 13th of January 1874, after a life of great activity in his profession.

BALTIC SEA (Scand. and Ger. *Ostsee*; Russ. *Baltiyskoe More*), a sea extending between 54° and 66° N. lat., and 9° and 30° E. long., surrounded by the territories of Sweden, Russia, Germany and Denmark. Its greatest length is about 960 m.; greatest breadth about 400 m.; and length of coast-line, 5000 m.; the central axis runs approximately from south-west to north-east. The Baltic is connected with North Sea by the winding channel between the south of Scandinavia and the Cimbrian peninsula. This channel is usually included in the Baltic. The part of it west of a line joining the Skaw with Christiania fjord receives the name of Skagerrak; the part east of this line is called the Kattegat. At its southern end the Kattegat is blocked by the Danish islands, and it communicates with the Baltic proper by narrow channels called the Sound, the Great Belt and the Little Belt. The real physical boundary between the North Sea and the Baltic is formed by the plateau on which the islands Zealand, Fünen and Laaland are situated, and its prolongation from the islands Falster and Möen to the coasts of Mecklenburg and Rügen.

East of this plateau the Baltic proper forms a series of hollows or troughs. The first, or Bornholm deep, lies east of the island of Bornholm, and is separated from the next, or Gotland deep, by the Middelbank. Beyond the Middelbank the Danziger Tiefe, an isolated depression, lies to the south-east, while to the northeast the Gotland basin, the largest and deepest of all, extends north-eastwards to the Gulf of Finland. Along the Swedish coast a deep channel runs northward from outside the island of Öland; this is entirely cut off to the south and east by a bank which sweeps eastward and northward from near Karlskrona, and on which the island of Gotland stands, but it communicates at its northern end with the Gotland deep, and near the junction opposite Landsort is the deepest hole in the Baltic (420 metres = 230 fathoms).

An unbroken ridge, extending from Stockholm to Hangö in Finland, separates the Baltic basin proper from the depression

between Sweden and the Åland Isles, to which the name Åland Haf has been given. North of the Åland Haf a ridge defines the southern edge of another depression, the Bothnian Sea, which in turn is separated from the most northerly division, the Gulf of Bothnia, by a ridge across the narrow Quarken or Kvarken Strait. The Gotland deep may be said to extend directly into the Gulf of Finland, an arm of the Baltic, running eastwards for about 250 m., and separating Finland from Esthonia. Between Esthonia and Courland is the Gulf of Riga, a shallow inlet of roughly circular form, about 100 m. in diameter, and nowhere more than 27 fathoms deep.

According to recent computations the total area of the Baltic, including the Skagerrak and Kattegat, is 166,397 sq. m., and its volume 6907 cub. m., giving a mean depth of 36 fathoms, which is markedly less than that of any other arm of the sea of similar area.

In the deeper hollows in the south part of the Baltic the bottom consists almost invariably of either soft brown or grey mud or hard clay, while on the shallow banks and near the low coasts fine sand, of white, yellow or brown colour with small pebbles, is usually found.

[v.03 p.0287]

Coasts—changes and character.

At the time of the last great subsidence, in glacial times, an arm of the sea extended across Sweden, submerging a great part of the littoral up to the Gulf of Bothnia, and including the present lakes Vener, Hjelmar and Mälar. During this period the waters of the northern Baltic were sufficiently salt for oysters to flourish. The subsequent upheaval restricted direct communication with the open sea to the Danish channels, and the Baltic waters became fresher: the oyster disappeared, but a number of cold salt-water fishes and crustaceans, and even seals, became acclimatized. It has been suggested that the presence of the remains of these animals indicates a communication to the north with the Arctic Ocean; but in view of the severe climatic conditions still prevailing at the time, this seems an unnecessary assumption. In the next stage of its history the Baltic is transformed by further elevation into a vast freshwater lake, the *Ancylus* lake of G. de Geer (named from the remains of the mollusc *Ancylus fluviatilis*), which is supposed to have covered an area of about 220,000 sq. m., including the whole of the present Baltic area and a large part of Finland, with Lake Ladoga. Then followed a subsidence, which not only re-established communication through the Danish channels, but allowed the Baltic to become sufficiently salt for such forms as *Cardium edule* and *Littorina littorea*. At this time the Gulf of Bothnia must have suffered greater depression than the Baltic proper, for the deposits of that epoch show a thickness of 100 metres (328 ft.) near Hernösand, but of only 25 metres (82 ft.) in the neighbourhood of Gotland. After this period of subsidence the process of elevation set in which gave the Baltic its present form and physical condition, and appears to be still in progress. Dr R. Sieger has traced a series of isobasic lines, or lines of equal rate of elevation, for portions of Sweden and Finland; these indicate that the movement is now almost *nil* along the axial lines of the Baltic and the Gulf of Finland, but increases in amplitude northwards to the Gulf of Bothnia and in the direction of the main ridge of the *massif* of southern Sweden. At Stockholm the rate of elevation is approximately 0.47 metre (= 1.54 ft.) in a century.

The coast of the Baltic is rocky only in the island-studded region at the head of the Baltic basin proper—a submerged lake-district—and the littoral generally is a typical morainic land, the work of the last great Baltic glacier. The southern margin of the Baltic is of peculiar interest. From Schleswig eastwards to Lübeck Bay the coast is pierced by a number of narrow openings or *Fohrden*, the result of encroachment of the sea caused by subsidence. East of Lübeck, as far as the mouth of the Oder, these give place to *Bodden*, ramified openings studded with islands: the structure here resembles that of Scania in southern Sweden, a region once joined to both Denmark and Pomerania by an isthmus which was severed by tectonic movements. Beyond the Oder the coast-line is unbroken as far as the Gulf of Danzig. It is then cut into by the estuaries of the Vistula, the Pregel and the Memel. Here the westerly winds have full play, and the coast is rimmed by a continuous line of dunes, which cut off the two great lagoons of the *Frisches Haff* and *Kurisches Haff* by sandspits or *Nehrungen*.

The drainage area of the Baltic is relatively large. According to the measurements of Sir J. Murray it extends to 461,450 sq. sea m. (= 611,700 sq. English m.) The largest river-basin included in it is that of the Neva in the east, and next in size come the Vistula and the Oder in the south. The narrow parallel troughs, at right angles to the coast, which form the drainage-system of Sweden and western Finland, are a remarkable feature.

Level.

Levellings from Swinemünde show that the mean level of the surface of the Baltic at that point is 0.093 metres (= .305 ft.) below the surface of the North Sea at Amsterdam, and 0.066 metres (= .216 ft.) below its level at Ostend. A line of levels from Swinemünde through Eger to the Adriatic showed the mean level of the surface of the Baltic to be 0.499 metres (1.6 ft.) above that of the Adriatic Sea. The mean level of the surface of the Baltic rises about 0.5 metres (1.6 ft.) from the coast of Holstein to Memel, probably as a result of the prevailing westerly winds; this mean difference is exceeded with strong westerly winds, and disappears or is reversed with easterly winds. The waves of the Baltic are usually short and irregular, often dangerous to navigation. Destructive waves, probably caused by distant earthquakes, called *Seebaren* (cf. English "bores") have been recorded.

The range of the tides is about one foot at Copenhagen; within the Baltic proper ordinary tides are scarcely perceptible. There is, however, a distinctly marked annual rise and fall due to meteorological influences having a mean range of about 11.4 cm. (0.37 ft.), at Travemünde, and 13.9 cm. (0.46 ft.) at Swinemünde, the maximum occurring at the end of the summer rainy period in August.

Circulation.

The circulation of water in the Baltic proper must be considered apart from the circulation in the channels connecting it with the North Sea; and in this relation the plateau connecting the islands Falster and Möen with the coast of Mecklenburg and Rügen must be taken as the dividing line. In the great basins and hollows from Rügen to the Gulfs of Bothnia and Finland the upper layers of water, from 30 to 70 metres (16 to 38 fathoms) in thickness, have almost the same salinity throughout. In these waters a vertical circulation is kept up by convection currents. Beneath these layers are masses of salter water, through which a thermal wave of small amplitude is slowly propagated to the bottom by conduction. These strata are practically stagnant, deficient in oxygen and surcharged with carbonic acid. Their salter waters must have been originally derived from outside, and must therefore have passed over the plateau between Falster and Mecklenburg, but their horizontal extension is checked by the ridges separating the deep hollows in the Baltic from each other. The inflow to the deep basins is intermittent, probably with a long period of flux and reflux.

The circulation in the channels connecting the Baltic proper with the North Sea is of a complex character. It is necessary in the first place to distinguish clearly between outflowing and inflowing waters; in practice this is easily done, as the outflowing water always contains less than 30 parts *pro mille* of salt, and the inflowing water more than 32 *pro mille*. The Baltic receives much more water by rainfall, discharge of rivers, &c., than it loses by evaporation; hence a surplus must be got rid of by an outflowing current which may be named the "Baltic Stream." The following general laws may be laid down with regard to this:—

1. That the Baltic Stream must be a surface current, because it originates from a redundancy of fresh water.

2. That, on account of the earth's rotation, the main part of the Baltic Stream must keep close to the coast of the Scandinavian peninsula.

3. That it must be a periodic stream, because the discharge of the rivers into the Baltic varies with the season of the year. In spring and summer the water from the Baltic is sufficiently abundant to inundate the whole surface of the Kattegat and Skagerrak, but in winter the sources of the Baltic current are for the most part dried up by the freezing of the land water.

All the waters which enter the Skagerrak or Kattegat as undercurrents can be found at the surface of the North Sea (*q.v.*). They may be divided according to their origin and salinity as follows:—

(*a*) *Ocean water* of 35 *pro mille* salinity or more.

(*b*) *North Sea water*, the predominant water in the North Sea area, of 34 to 35 *pro mille* salinity.

(*c*) *Bank water*, 32 to 34 *pro mille*, which forms a broad edging covering the coast banks of Holland, Germany, Denmark and Norway.

The deepest water stratum in the Skagerrak is certainly of oceanic origin; it has been found to suffer changes of long period, and it is probably not always composed of water derived from the same part or the same depth of the North Atlantic; this water is, as a rule, deficient in oxygen. The "North Sea" water, of 34 to 35 *pro mille* salinity, does not appear at the surface in the Skagerrak, except as a strip along part of the coast of Jutland, but it is always found as an undercurrent overlying the oceanic water. It enters into all the deep coast channels, and into the Christiania fjord, but it is not always found in the deep channels of the Kattegat. The principal time of inflow of North Sea water is during spring and summer. The bank-water of 32 to 34 *pro mille* salinity is found all along the continental coast of the North Sea and North Atlantic, and it may therefore enter the Skagerrak either from the North Sea or from the north along the coast of Norway. It is probable indeed that an influx of this water occurs from both directions—in August and September from the south, and in the late winter and early spring from the north. The seasonal changes in the distribution of the bank-waters in different parts of the coast are too complex to be briefly explained; their relations to the times of occurrence of various fisheries of the region present many remarkable features, which have been investigated in recent years by the Swedish Commission.

On the west and south coasts of Sweden, and in the Skagerrak south-east of Norway, navigation is interfered with by ice only in severe winters, and then the ice is usually drifting, compact sea-ice being very rare. Between Stockholm and Visby navigation usually ceases at the end of December and begins again about the 10th of April. During very severe winters the Åland Sea is covered with thick ice available for traffic. The south part of the Gulf of Bothnia is covered with ice every winter along the coasts, but rarely, if ever, in its central part. Navigation is interrupted by drifting ice from about the middle of November to the beginning of May, though the port of Hernösand has been known to remain open during a whole winter. The northern Quarken is covered with traversable ice every third or fourth year. The northern part of the Gulf of Bothnia is frozen every winter. In the Gulf of Finland the sea is closed to navigation by ice for about 150 days in the year; but navigation is rendered possible throughout the winter by the use of ice-breakers.

See references to different parts of the subject in the standard books of A. Penck, A. de Lapparent, E. Suess and others. Also Credner, *Die Entstehung der Ostsee* (Leipzig, 1895); G. de Geer, *Om Skandinaviens nivåförändringar under quartärperioden* (Stockholm, 1888); R. Sieger, *Seeenschwankungen und Strandverschiebungen in Skandinavien* (Berlin, 1893); O. Pettersson, "Review of Swedish Hydrographic Research," *Scottish Geographical Magazine* (1894); N. Ekholm, *Om klimatets ändringar i geologisk och historisk tid. Ymer* (Stockholm, 1899); *Publications of the International Council for the Study of the Sea* (Copenhagen, since 1902).

(H. N. D.)

[v.03 p.0288]

BALTIMORE, GEORGE CALVERT, 1ST BARON (*c.* 1580-1632), English statesman, son of Leonard Calvert, and Alice, daughter of John Crosland of Crosland, was born at Kipling in Yorkshire and educated at Trinity College, Oxford. After travelling on the continent, he entered the public service as secretary to Robert Cecil, afterwards earl of Salisbury. In 1606 he was appointed clerk of the crown in Connaught and Clare, in 1608 a clerk of the council, and was returned to parliament for Bossiney in 1609. He assisted James I. in his discourse against Vorstius, the Arminian theological professor of Leiden, and in 1613 took charge of the Spanish and Italian correspondence. The same year he was sent on a mission to Ireland to investigate grievances. For these services he was rewarded by knighthood in 1617, followed by a secretaryship of state in 1619 and a pension of £2000 a year in 1620. He represented successively Yorkshire (1621) and Oxford University (1624) in the House of Commons, where it fell to him in his official capacity to communicate the king's policy and to obtain supplies. He was distrusted by the parliament, and was in favour of the unpopular alliance with Spain and the Spanish marriage. Shortly after the failure of the scheme he declared himself a Roman Catholic, and on the 12th of February 1625 threw up his office, when he was created Baron Baltimore of Baltimore and received a grant of large estates in Ireland. Henceforth he was seen little in public life and his attention was directed to colonial enterprise, with which his name will be always associated. He had established a small settlement in Newfoundland in 1621, for which under the name of Avalon he procured a charter in 1623, and which he himself visited in 1627. In consequence of disputes and the unsuitable nature of the climate he sailed thence for Virginia, but was forbidden to settle there unless he took the oaths of allegiance and supremacy. He returned home, and died on the 15th of April 1632 before a new concession was secured, the charter of Maryland passing the great seal on the 20th of June 1632 in favour of his son Cecilius, second Lord Baltimore, who founded the colony. Baltimore married Anne, daughter of George Mynne of Hurlingfordbury, Hertfordshire, by whom he had six sons and five daughters. He wrote *Carmen funebre in D. Hen. Untonum* (1596); *The Answer to Tom Tell-Troth ...* (1642) is also attributed to him, and Wood mentions Baltimore as having composed "something concerning Maryland." His letters are to be found in various publications, including Strafford's *Letters*, *Clarendon State Papers* and the *Calendars of State Papers*.

BIBLIOGRAPHY.—*George and Cecilius Calvert* by William Hand Browne (1890); article by C. H. Firth in the *Dict. of Nat. Biog.* with references there given; Wood's *Athenae Oxonienses* (Bliss) ii. 522; Doyle's, *The English in America*; *Discourse on the Life and Character of Sir G. Calvert* by J. P. Kennedy (1845), with the *Review* and the *Reply* to the same; *London Magazine*, June 1768; "Sir G. Calvert," by L. W. Wilhelm (*Maryland Hist. Soc.*, 14th April 1884); *The Nation*, vol. 70, p. 95; *American Historical Review*, vol. 5, p. 577.

BALTIMORE, a city and seaport, and the metropolis of Maryland, U.S.A., the 7th city in population in the United States. It is at the head of tide-water on the Patapsco river and its middle and north-west branches where they form an estuary 12 m. from the entrance of their waters into Chesapeake Bay, in lat. 39° 17′ N. and long. 76° 37′ W., about 172 m. by water from the Atlantic Ocean, 40 m. by rail N.W. from Washington, 26 m. N. by W. from Annapolis, 97 m. S.W. from Philadelphia, and 184 m. from New York. Pop. (1890) 434,439; (1900) 508,957 of whom 79,258 were negroes, and 68,600 foreign-born (of these 33,208 were natives of Germany, 10,493 of Russia, 9690 of Ireland, 2841 of England, 2811 of Poland, 2321 of Bohemia and 2042 of Italy); (1910, census) 558,485. It is served by the Baltimore & Ohio, the Philadelphia, Baltimore & Washington (the Pennsylvania system), the Baltimore & Annapolis Short Line, the Baltimore, Chesapeake & Atlantic; the Northern Central; the Western Maryland and the Maryland & Pennsylvania railways; and by steamship lines running directly to all the more important ports on the Atlantic coast of the United States, to ports in the West Indies and Brazil, to London, Liverpool, Southampton, Bristol, Leith, Glasgow, Dublin, Belfast, Havre, Antwerp, Rotterdam, Bremen, Hamburg and other European ports.

The city extends nearly 6½ m. from E. to W., and except on the W. side a little more than 5 m. from N. to S., covering an area of about 32 sq. m. The ground on which it is built is for the most part gently rolling; originally some portions were swampy and others were marked by precipitous heights, but the swamps have been drained and filled and the heights rounded off. Jones's Falls, a small stream shut in between granite walls several feet in height, crosses the N. boundary line a short distance W. of its middle, flows S.E. to the S.E. corner of the main business quarter, and there meets the north-west branch of the Patapsco, in which lies the harbour, defended at its entrance by the historic Fort McHenry, built at the S.E. extremity of Locust Point, an irregular peninsula extending S.E., on which are grain-elevators and a number of wharves, including those of the Baltimore & Ohio railway.

That part of the city which lies E. of Jones's Falls is known as East Baltimore, and is in turn nominally divided into Fells' Point to the S. and E., now a shipbuilding and manufacturing quarter, and Old Town to the N. and W. In the Old Town still remain a few specimens of eighteenth century architecture, including several old-fashioned post-houses, which used to furnish entertainment for travellers starting for the Middle West by way of the old Cumberland Road beginning at Fort Cumberland, and from Baltimore to Fort Cumberland by a much older turnpike. The more inviting portion of the modern city lies on the western side of Jones's Falls, and the principal residential districts are in the northern half of the city. A little S. from the centre of the city, Baltimore Street, running E. and W., and Charles Street, running N. and S., intersect; from this point buildings on these two streets are numbered N., S., E. and W., while buildings on other streets are numbered N. and S. from Baltimore Street and E. and W. from Charles Street. Baltimore Street is the chief business

thoroughfare; S. of it as well as a little to the N. is the wholesale, financial and shipping district; while West Lexington Street, a short distance to the N., and North Howard and North Eutaw Streets, between Fayette and Franklin Streets, have numerous department and other retail stores. In North Gay Street also, which runs N.E. through East Baltimore, there are many small but busy retail shops. North Charles Street, running through the district in which the more wealthy citizens live, is itself lined with many of the most substantial and imposing residences in the city. Mount Vernon Place and Washington Place, intersecting near the centre of the city, Eutaw Place farther N.W., and Broadway running N. and S. through the middle of East Baltimore, are good examples of wide streets, having squares in the middle, adorned with lawns, flower-beds and fountains.

The buildings of the principal business quarter have been erected since 1904, when a fire which broke out on Sunday the 7th of February destroyed all the old ones within an area of 150 acres. Within a year after the fire, however, 225 places of business were again occupied and 170 more were building. A city ordinance prohibited the erection of any building more than 185 ft. in height, and prescribed a uniform height for those in the same neighbourhood; a large portion of the new buildings are of either three or four storeys, but a few tall ones range from ten to sixteen. The principal materials of which they are built are limestone, granite, marble and bricks, and terra-cotta of various colours.

The city hall, the post-office and the court-house, standing in a row, and each occupying a separate block along E. Fayette Street in almost the exact centre of the city, are three of Baltimore's most imposing buildings, and all of them narrowly escaped destruction by the great fire. The city hall, completed in 1875, in the Renaissance style, consists of a centre structure of four storeys surmounted by an iron dome 260 ft. high, and two connecting wings of three storeys surmounted by a mansard roof; the entire outer facing is of white Maryland marble. The post-office, completed in 1890, is built of Maine granite. The court-house, completed in 1899, is of white marble, with mural paintings by La Farge, E. H. Blashfield and C. Y. Turner. Two of the principal library buildings—the Peabody and the Enoch Pratt—are faced with white marble. [v.03 p.0289] Among the churches may be mentioned the Roman Catholic cathedral, surmounted by a dome 125 ft. high—Baltimore being the seat of a Roman Catholic archbishopric, the highest in rank in the United States; the First Presbyterian church (decorated Gothic), with a spire 250 ft. high; the Grace Episcopal church—Baltimore being the seat of a Protestant Episcopal bishopric; the First Methodist Episcopal church; and the synagogues of the Baltimore Hebrew Congregation and the Oheb Shalom Congregation. Other notable buildings are the custom-house, the Masonic Temple, the Maryland Clubhouse, the Mount Royal station of the Baltimore & Ohio railway, and the buildings of the Johns Hopkins hospital. There are several good bridges across Jones's Falls.

On an elevated site at the intersection of Washington Place—a continuation of N. Charles Street—with Mount Vernon Place stands a white marble monument in honour of George Washington, the eldest of the monuments in his honour in the United States. The corner-stone was laid in 1815 and the monument was completed in 1829. The base is 50 ft. sq. and 24 ft. high; on this stands a Doric column, 25 ft. in diameter at the base and 130 ft. high, which is surmounted by a statue of Washington 16 ft. high. A winding stairway in the interior leads to a parapet at the top. In the square by which the monument is surrounded are also statues of George Peabody by W. W. Story (a replica of the one in London), Roger Brooke Taney by W. H. Rinehart, and John Eager Howard by Emmanuel Frémiet; and bronze pieces representing Peace, War, Force and Order, and a figure of a lion by Antoine L. Barye. The Henry Walters collection of paintings, mostly by modern French artists, and of Chinese and Japanese bronzes, ivory carvings, enamels, porcelain and paintings is housed in the Walters Art Gallery at the S. end of Washington Place; at the south-east corner of the square is the Peabody Institute with its conservatory of music and collection of rare books, of American paintings, and of casts, including the Rinehart collection of the works of William H. Rinehart who was a native of Maryland. In Monument Square near the post-office and the court-house is the white marble Battle Monument, erected in 1815 to the memory of those who had fallen in defence of the city in the previous year; it is 52 ft. high, the column being in the form of a bundle of Roman fasces, upon the bands of which are inscribed the names of those whom it commemorates; and the whole is surmounted by a female figure, the emblematical genius of the city. To this monument and the one in honour of Washington, Baltimore owes the name "The Monumental City," frequently applied to it. A small monument erected to the memory of Edgar Allan Poe stands in the Westminster Presbyterian churchyard, where he is buried; there is another monument to his memory in Druid Hill Park. In Greenmount Cemetery in the north central part of the city are the graves of Junius Brutus Booth, Mme Elizabeth Patterson Bonaparte (1785-1879), the wife of Jerome Bonaparte, Johns Hopkins, John McDonogh and Sidney Lanier.

In 1908 there were in the city under the jurisdiction of the department of public parks and squares 13 parks of 10 acres or more each and 33 squares, and the total acreage of parks was 2188 acres and of squares 86.53 acres. Chief among the parks is Druid Hill Park in the N.W. containing 672.78 acres and famous for its natural beauty. Clifton Park, of 311.26 acres, 2 m. E. of Druid Hill and formerly a part of the Johns Hopkins estate, passed into the possession of the city in 1895. Patterson Park in the extreme S.E., of 125.79 acres, is a favourite resort for the inhabitants of East Baltimore.

Education.—Baltimore ranks high as an educational centre. Johns Hopkins University (*q.v.*) is a leading institution of the United States for graduate study. The Peabody Institute, founded in 1859 by George Peabody, who was for some years a resident of Baltimore, is an important factor in the promotion of science, literature and the fine arts. Goucher College (Methodist, 1888) for women, is one of the best institutions of the kind in southern United States. The older of the two state normal schools, opened in 1867, is located here. Morgan College (Methodist), opened in 1876, offers the advantages of a college education to the coloured young people. Loyola College, founded in 1852, and various other institutions are for the training of the Catholics.

The McDonogh farm school, about 12 m. N.W., with a farm of 835 acres, a printing-office, and carpenter and machine shops prepares poor boys to enter any college in the country. The institution owes its origin to a bequest left by John McDonogh. Among the professional schools are the university of Maryland and Baltimore University—each of which offers courses in law, medicine and dentistry—the Baltimore Medical College, the College of Physicians and Surgeons, the Woman's Medical College, the Baltimore College of Dental Surgery, the Maryland College of Pharmacy (since 1904 part of the university of Maryland), the Baltimore Law School, St Joseph's Seminary and St Mary's Seminary, which, established by the Society of St Sulpice in 1791, is said to be the oldest Catholic theological seminary in the United States. The city also has a Polytechnic Institute, as well as high schools for white and for coloured pupils. The principal libraries are those of Johns Hopkins University, Peabody Institute, Maryland Historical Society, and the Bar Association; and the Enoch Pratt, the New Mercantile, and Maryland Diocesan (Protestant Episcopal).

The charitable institutions of Baltimore are numerous. Several such institutions supported wholly or in part by the state of Maryland (*q.v.*) are located here, and besides these there are scores of others. A representative list includes:— the Charity Organization Society, the primary object of which is to organize the work of the others; the Baltimore Association for the Improvement of the Condition of the Poor, which seeks to discourage indiscriminate alms-giving; the Bay View asylum or city poorhouse; the Children's Aid Society; the Thomas Wilson Fuel-Saving Society, for furnishing coal at low rates; the Woman's Industrial Exchange, for assisting women in need to support themselves; Johns Hopkins hospital, noted for the excellence of its equipment especially for heating and ventilating; Saint Joseph's general hospital; hospital for the women of Maryland of Baltimore city; nursery and child's hospital; Baltimore eye, ear and throat charity hospital; Maryland hospital for the insane; the Sheppard asylum, intended especially for the cure of the insane; the Sheppard and Enoch Pratt hospital; the Baltimore orphan asylum; Saint Vincent's infant asylum; the Thomas Wilson sanatorium for children, intended for children under three years of age, who are suffering from disease, during the warm summer months; the Free Summer Excursion Society, for affording a change of air to the indigent sick; home for the incurables; homes for the aged; homes for friendless children; institutions for the blind; and institutions for the deaf and dumb.

Water for the city taken from Jones's Falls and Gunpowder river a few miles N. of the city limits, is brought through tunnels, and is stored in eight reservoirs having an aggregate capacity of 2275 million gallons. The whole system is owned by the municipality and can furnish about 300 million gallons daily. After the fire $10,000,000 was appropriated for a new sewage system (begun 1906). In 1900 the Maryland legislature empowered the city to borrow $1,350,000 to establish a municipal lighting plant, but in 1909 private concerns still supplied the streets with light.

Commerce.—The harbour, which consists of three parts, is excellent. Its entrance at Fort McHenry is a channel 600 ft. wide, with a minimum draft (1907) of 31 ft. of water. The depth is continued with an increased width for a mile and a quarter to near Fells' Point, where the width is contracted to one-fourth of a mile with a depth of 16 ft. Above this entrance it widens into an ellipse a mile long, half a mile broad and 15 ft. deep. The third or inner harbour has a depth of 14 ft. and penetrates far into the city. Vessels of the largest class can lie at the Locust Point wharves and Canton, and vessels of 4000 tons can use the inner harbour W. of the mouth of Jones's Falls. By 1905 $5,000,000 had been appropriated since the great fire for new docks. In 1908 the city ranked fourth among the Atlantic ports of the United States in the amount of its exports ($82,113,496), and fourth in the amount of its imports ($23,722,045).

[v.03 p.0290] That Baltimore has grown rapidly as a manufacturing city since 1880 is seen from the fact that in that year there were but 3683 manufacturing establishments, with a total annual product valued at $78,417,304, as compared with 6359 establishments (of which 2274 were under the factory system) in 1900 producing commodities valued at $161,249,240 ($135,107,626 under the factory system); in 1905 there were 2163 establishments under the factory system with a total annual product valued at $151,546,580, an increase of 12.2% in the five years. The city ranked eighth among the manufacturing centres of the United States, as regards the value of products, in the three successive censuses of 1880, 1890 and 1900. In 1905 it was ninth. Baltimore is noted particularly as the most important centre in the United States of the canning and preserving industry. The output in 1905 ($5,981,541) of the city's establishments for the canning and preserving of fruits and vegetables was 7.7% of that of the whole United States; in 1900 it had been 15% of the country's total. What seems to have been the first oyster-canning establishment in America was built in Baltimore (by a Thomas Kensett) in 1820, and oyster-canning as a distinct industry on a permanent footing was begun here in 1850. The term "cove oysters," now applied to canned oysters everywhere, was originally applied to the oysters found in the coves on the W. side of the Chesapeake Bay, above the mouth of the Potomac. Up to 1900, after which year oyster canneries began to be built in the southern states, especially in Mississippi, Baltimore was the centre of the oyster-canning industry. Baltimore is also a well-known centre for the manufacture of clothing, in which in 1905 ($22,684,656) it ranked fourth among the cities of the United States; for cigar and cigarette-making (1905, $4,360,366); for the manufacture of foundry and machine shop products (1905, $6,572,925), of tinware (1905, $5,705,980), of shirts (1905, $5,710,783), of cotton-duck (the output of sail-duck being about three-fourths of the total for the United States), bricks (about 150,000,000 annually), and fertilizers; it also manufactures furniture, malt liquors, and confectionery, and many other commodities in smaller amounts. The markets, especially the Lexington market, are noted for the abundance and great variety of their produce. The proximity of coal-mines, the abundance and variety of food supplies furnished by the state, the great quantity and variety of the city's manufactured goods, the excellent shipping facilities, and the consequent low cost of living, are prominent features of the physical life of the city.

Government.—Although the charter under which Baltimore is governed came into effect as late as 1898, it is only the second one for the city, the first one having been in force for 101 years. The mayor is now elected for a term of four years; he must be at least twenty-five years of age and must have property in the city valued at $2000 or more, on which he shall have paid taxes for two years preceding his election. Great responsibility is centred upon him by giving him power to appoint the heads of departments and sub-departments, subject to the approval of the second branch of the council, and permitting him to remove at pleasure for six months after an appointment; in appointing a board or commission, however, he is required to choose the members from more than one political party. He has five days in which to veto an ordinance, and an affirmative vote of three-fourths of the members of each branch of the council is required to pass an ordinance over his veto. The council, constituting the legislative department, consists of two branches. The first branch is composed of one member from each ward, elected for a term of four years; the second branch of two members from each of four districts, and a president elected by the city at large, all for a term of four years; a property qualification is prescribed for members of each branch. All municipal officers are elected in May in order to separate municipal from state and national elections. No street franchise can be granted for a longer term than twenty-five years, and the right to regulate the exercise of each and every franchise is reserved to the mayor and council. A board of estimate, composed of the mayor, the city solicitor, the comptroller, the president of the second branch of the city council, and the president of the board of public improvements, has control over appropriations, the council having power to decrease the amount of any item but not to enlarge it. To create a debt for any purpose other than to meet a temporary deficiency, the mayor and council must first obtain the consent of both the state legislature and the city electorate. The department of education is intrusted to an unsalaried board of nine commissioners, appointed by the mayor with the approval of the second branch of the council for a term of six years, three retiring every two years. This board appoints a superintendent, six or more assistant superintendents, and the teachers of the high schools and the Polytechnic Institute, also the other teachers, but only according to the superintendent's recommendation on the basis of merit.

History.—Baltimore was named in honour of the Lords Baltimore, the founders of the province of Maryland, but no settlement was made here until nearly 100 years after the planting of the colony; meanwhile at least two other town-sites, on which it was hoped permanent towns might be established, had received the same name, but nothing came of either. Finally, however, while the provincial legislature was still engaged in the practice of directing places to be laid out for towns, where, as events proved there was nothing to give these towns more than a mere paper existence, that body in 1729 directed seven commissioners to purchase 60 acres of land on the N. side of the Patapsco and lay it out in sixty equal lots as the town of Baltimore. Three years later, at the instance of the same body, Jones-Town (Old Town) was laid out on the opposite side of Jones's Falls, and in 1745 these two towns were consolidated. About the same time the resources of the interior, for which Baltimore was to become a trade centre, were being rapidly developed by the Germans. Prior to 1752, in which year there were only twenty-five houses with two hundred inhabitants, the growth of the city had indeed been slow; but only a year or two later wheat loaded in its harbour was for the first time shipped to Scotland; during the war between the French and the English at this time some of the unfortunate Acadians found new homes here; in 1767 Baltimore was made the county seat; by the beginning of the War of Independence its population had grown to 6755; and in 1780 it was made a port of entry. The city early became an important shipping centre; during both the War of Independence and the War of 1812 many privateers were sent out from it, and in the interval between these wars, the ship-owners of Baltimore had their share in the world's carrying trade, the "Baltimore clippers" becoming famous. In 1797 Baltimore received its first charter, having been governed until then from Annapolis and through commissions with very limited powers; at the same time the Fells' Point settlement, founded about 1730 by William Fells, a ship carpenter, was annexed. During the War of Independence, the Continental Congress, frightened from Philadelphia in 1776, sat for several weeks in a hall in W. Baltimore Street near Liberty Street; during the same war also fortifications were first erected on the site of the present Fort M^{c}Henry. This fort effectively protected the city in 1814 when attacked by the British, and it was during the attack that Francis Scott Key, detained on one of the British attacking vessels, composed the "Star Spangled Banner." In 1860 all three of the candidates opposed to Lincoln—Douglas, Breckinridge and Bell—were nominated here, and here in 1864 President Lincoln was nominated for a second term. The city has been the meeting-place of other important conventions, and is sometimes called "The Convention City." At the outbreak of the Civil War on the 19th of April 1861, the Sixth Massachusetts regiment, while passing through Baltimore, was attacked by a mob and several men were killed on both sides; in the following month the city was subjected to military rule and so continued until the close of the war. From 1856 to 1860 Baltimore was under the control of the American or Know-Nothing party, and suffered greatly from election riots and other disorders, until as a remedy the control of the police system was taken from the mayor and council and exercised by the state government. Soon after the Civil War a Democratic "machine" got firm
[v.03 p.0291] control of the city, and although a struggle to overthrow the machine was begun in earnest in 1875 by a coalition of the reform element of the Democratic party with the Republican party, it was not till 1895 that the coalition won its first decisive victory at the polls. Even then the efforts of the Republican mayor were at first thwarted by the council, which passed an ordinance over his veto, taking from him the power of appointment and vesting it in themselves; the Maryland court of appeals, however, soon decided that the council had exceeded its powers, and an important outcome of the reform movement was the new charter of 1898. Annexations of suburban territory in 1888 and 1890 greatly increased the area of the city.

Authorities.—J. H. Hollander, *Guide to the City of Baltimore* (Baltimore, 1893); T. P. Thomas, "The City Government of

Baltimore" (in *Johns Hopkins University Studies in Historical and Political Science*, Baltimore, 1896); St G. L. Sioussat, "Baltimore, the Monumental City" (in L. P. Powell, *Historic Towns of the Southern States*, New York, 1900); J. T. Scharf, *Chronicles of Baltimore* (Baltimore, 1874).

BALTZAR, THOMAS (*c.* 1630-1663), German violinist, was born at Lübeck. He visited England in 1656 and made a great impression on Evelyn and Anthony Wood. In 1661 he was appointed leader of the king's famous band of twenty-four violins, but his intemperate habits cut short his career within two years. Nothing like his violin-playing had ever been heard in England before, and in all probability the instrumental music of Henry Purcell owes much to its influence.

BA-LUBA, a Bantu negroid race with several subdivisions; one of the most important and cultivated peoples of Central Africa. They are distributed over eight degrees of longitude between Lakes Tanganyika, Mweru and Bangweulu in the east, and the Kasai in the west. In the east, where they are found in the greatest racial purity, they founded the states of Katanga, Urua and Uguha; in the west they have intermixed to some extent with the Ba-Kete aborigines, whom they have partially dispossessed, dividing them into two portions, one to the north, the other to the south. To the western Ba-Luba the name Ba-Shilange has been given. With the Ba-Luba are connected the founders of the great Lunda empire—now divided between Belgian Congo and Angola—ruled by a monarch entitled Muata Yanvo (Jamvo). The westward movement of the Ba-Luba took place in comparatively recent times, the end of the 18th century or the beginning of the 19th. Shortly afterwards a chief named Kalamba Mukenge founded a large state. There followed in 1870 a remarkable politico-religious revolution, the result of which was the establishment of a cult of hemp-smoking, connected with a secret society termed *Bena Riamba*; the members of this abandoned their old fetish worship and adopted a form of communism of which the central idea was the blood-brotherhood of all the members. Towards the east hemp-smoking becomes less common.

The Ba-Luba practise circumcision and scar-tattooing is common; tooth-filing is very frequent in the east, though in the west it is comparatively rare; the fashion of dressing the hair is very varied and often extremely fantastic. Their houses, which are built by the women, are rectangular; on the Lulua, however, pile-houses, square in shape, are found. They are an agricultural people, but work in the fields is relegated to the women and slaves; the men are admirable craftsmen and are renowned for their wood-carving, cloth-weaving and iron-work. In the west, bows and arrows are the chief weapons, in the east spears principally are used. The old form of religion still obtains in the east, which was untouched by the communistic movement mentioned, and charms of all sorts, as well as carved anthropomorphic figures, are extremely common. The Ba-Luba are a fine race physically and seem very prosperous, though in the extreme west considerable deterioration, physical, moral and cultural, has taken place.

BALUCHISTAN, a country within the borders of British India which, like Afghanistan, derives its name from its dominant race of inhabitants. It extends from the Gomal river to the Arabian Sea, and from the borders of Persia and Afghanistan to those of the Punjab and Sind. It is divided into two main divisions, British Baluchistan, which is a portion of British India under the chief commissioner, and the foreign territories under the administration or superintendence of the same officer as agent to the governor-general. The former portion, with an area of 9403 sq. m., consists principally of tracts ceded to the British government by Afghanistan under the treaty of Gandamak (1879), and formally declared to be part of British India in 1887. The second class comprises three subdivisions, namely areas directly administered, native states and tribal areas. The directly-administered districts include areas acquired in various ways. Some portions are held on lease from the khan of Kalat; while others are tribal areas in which it has been decided for various reasons that revenue shall be taken. They include the whole of the Zhob and Chagai political agencies, the eastern portion of the Quetta tahsil and other tracts, among which may be mentioned the Bolan Pass, comprising 36,401 sq. m. in all. The whole of the northern boundary, with the north-eastern corner and the railway which traverses Baluchistan through Quetta up to New Chaman on the Afghan-Baluch frontier, is therefore in one form or other under direct British control. The remainder of the territory (79,382 sq. m.) belongs to the native states of Kalat (including Makran and Kharan) and Las Bela. Tribal areas, in the possession of the Marri and Bugti tribes, cover 7129 sq. m.

Baluchistan as a whole is a sparsely populated tract covering a larger area than any Indian province save Burma, Madras and Bengal. Three hundred miles of its mountain walls facing the Indus are south of the railway from the Indus to Quetta, and about 250 north of it. The railway with the passes and plains about it, and the dominant hills which surround Quetta, divide Baluchistan into two distinct parts. North of the railway line, hedged in between Afghanistan and the plains of the Indus, stretch the long ridges of rough but picturesque highlands, which embrace the central ranges of the Suliman system (the prehistoric home of the Pathan highlander), where vegetation is often alpine, and the climate clear and bracing and subject to no great extremes of temperature. The average breadth of this northern Pathan district is 150 m., but it narrows to less than 100 m. on the line of the Gomal, and expands to more than 200 m. on the line of the railway. Here all the main drainage either runs northwards to the Gomal, passing through the uplands that lie west of the Suliman Range; or it gathers locally in narrow lateral valleys at the back of these mountains and then bursts directly eastwards through the limestone axis of the hills, making for the Indus by the shortest transverse route. South of the railway lies a square block of territory, measuring roughly 300 m. by 300, primarily the home of the Brahui and the Baluch; but within that block are included almost every conceivable phase of climate and representatives of half the great races of Asia. Here, throughout the elevated highlands of the Kalat plateau which are called Jalawan, the drainage gathers into channels which cut deep gorges in the hills, and passes eastwards into the plains of Sind. Beyond and south of the hydrographical area of the Jalawan highlands the rivers and streams of the hills either run in long straight lines to the Arabian Sea, north of Karachi, or, curving gradually westwards, they disappear in the inland swamps which form so prominent a feature in this part of south-west Asia. A narrow width of the coast districts collects its waters for discharge into the Arabian Sea direct. This section includes Makran. Baluchistan thus becomes naturally divided into two districts, north and south, by an intervening space which contains the Sind-Pishin railway. This intervening space comprises the wedge-shaped desert of Kach Gandava (Gandava), which is thrust westwards from the Indus as a deep indentation into the mountains, and, above it, the central uplands which figure on the map as "British Baluchistan"—where lies Quetta. All Baluchistan has now been surveyed. From the great Indus series of triangles bases have been selected at intervals which have supported minor chains of triangulation reaching into the heart of the country. These again have been connected by links of more or less regularity, so that, if the Baluchistan triangulation lacks the rigid accuracy of a "first class" system, it at least supports good topography on geographical scales.

[v.03 p.0292]

Northern.

From Domandi, at the junction of the Gomal and Kundar rivers, the boundary between Baluchistan and Afghanistan follows the Kundar stream for about 40 m. to the south-west. It then leaves the river and diverges northwards, so as to include a section of the plain country stretching away towards Lake Ab-i-Istada, before returning to the skirts of the hills. After about 100 m. of this divergence it strikes the Kadanai river, turning the northern spurs of the Toba plateau (the base of the Kwaja Amran (Kojak) Range), and winds through the open plains west of the Kojak. Here, however, the boundary does not follow the river. It deserts it for the western edge of the Toba plateau (8000 ft. high at this point), till it nears the little railway station of New Chaman. It then descends to the plains, returns again to the hills 40 m. south of Chaman, and thenceforward is defined by hill ranges southwards to Nushki. The eastern boundary of this northern section of Baluchistan is the "red line" at the foot of the frontier hills, which defines the border of British India. This part of Baluchistan thus presents a buffer system of independent tribes between the British frontier and Afghanistan. But the independence of the Pathan people south of the Gomal is not as the independence of the Pathans (Waziris, Afridis, &c.) who live north of it. It is true that the Indian government interferes as little with the internal jurisdiction of the tribal chiefs amongst the Pathans of the Suliman Range as it does with that of the northern chiefs; but the occupation of a line of posts on the Zhob river, which flanks that range almost from end to end on the west, places the doors of communication with Afghanistan in British hands, and gives command of their hills. It thus tends to the maintenance of peace and order on the southern frontier to a degree that does not exist in the north.

The central range of the Suliman hills is the dominant feature in the geography of northern Baluchistan. The central line or axis of the range lies a little east of the meridian of 70° E., and it is geologically composed of one or more great folds of the Cretaceous series. Towards the northern extremity of the range occur a group of peaks, which together form an

oblong block or "massif" amongst the neighbouring ridges known as "Kaisargarh" amongst the Sherani clansmen who occupy it; and as the "Takht-i-Suliman" (Solomon's throne), generally, on the frontier, from the fact of a celebrated shrine of that name existing near its southern abutment. The massif of the Takht is a high tableland (about 8000 ft. above sea-level), bounded on its eastern and western edges by high, rugged and steep parallel ridges. The western ridge culminates on the north in the peak of Kaisargarh (11,300 ft.), and the eastern in a block, or detached headland, on the south, where rests the immortal "zirat" or shrine (11,070 ft.). This tableland is formed by a huge cap of coral limestone, estimated by Griesbach at from 4000 to 5000 ft. in thickness. At each end the tableland is rent by gorges which deepen, amidst stupendous precipices, to the channel of the Draband or "Gat" on the north, and of the Dhana on the south. These two channels carry the rush of mountain streams from the western slopes of the massif right across the axis of the mountains and through the intervening barrier of minor ridges to the plains of the Indus. The plateau is covered with a fairly thick growth of the chilghosa or "edible" pine, and a sprinkling of juniper, on the higher slopes. It was ascended and surveyed for the first time in 1883.

From the summit of the Kaisargarh peak a magnificent view is obtained which practically embraces the whole width of northern Baluchistan. Westwards, looking towards Afghanistan, line upon line of broken jagged ridges and ranges, folds in the Cretaceous series overlaid by coarse sandstones and shales, follow each other in order, preserving their approximate parallelism until they touch the borders of Baluchistan. Immediately on the west of the Kaisargarh there towers the Shingarh Mountain, a geological repetition of the Kaisargarh ridge, black with pines towards the summit and crowned with crags of coral limestone. Beyond it are the grey outlines of the close-packed ridges which enclose the lower reaches of the Zhob and the Kundar. As they pass away southwards this grid-iron formation strikes with a gentle curve westwards, the narrow enclosed valleys widening out towards the sources of the rivers, where ages of denudation have worn down the folds and filled up the hollows with fruitful soil, until at last they touch the central water-divide, the key of the whole system, on the Quetta plateau. Thus the upper parts of the Zhob valley are comparatively open and fertile, with flourishing villages, and a cultivation which has been greatly developed under British rule, and are bounded by long, sweeping, gentle spurs clothed with wild olive woods containing trees of immense size. The lower reaches of the Zhob and Kundar are hemmed in by rugged limestone walls, serrated and banded with deep clefts and gorges, a wilderness of stony desolation. Looking eastwards from the Kaisargarh, one can again count the backs of innumerable minor ridges, smaller wrinkles or folds formed during a process of upheaval of the Suliman Mountains, at the close of a great volcanic epoch which has hardly yet ceased to give evidence of its existence. On the outside edge, facing the Indus plains, is a more strictly regular, but higher and more rugged, ridge of hills which marks the Siwaliks. The Baluch Siwaliks afford us strange glimpses into a recent geological past, when the same gigantic mammals roamed along the foot of these wild hills as once inhabited the tangled forests below the Himalaya. Between the Takht Mountain and the Siwaliks, the intervening belt of ridge and furrow has been greatly denuded by transverse drainage—a system of drainage which we now know to have existed before the formation of the hills, and to have continued to cut through them as they gradually rose above the plain level. Where this intervening band is not covered by recent gravel deposits, it exhibits beds of limestone, clays and sandstone with fossils, which, in age, range from the Lower Eocene to the Miocene. Beyond the Siwaliks, still looking eastwards, are the sand waves of the Indus plain; a yellow sea broken here and there with the shadow of village orchards and the sheen of cultivation, extending to the long black sinuous line which denotes the fringe of trees bordering the Indus. Such is the scene which Solomon is said to have invited his Indian bride to gaze upon for the last time, as they rested on the crags of the southern buttress of the Takht—where his shrine exists to this day. To that shrine thousands of pilgrims, Mahommedans and Hindus alike, resort on their yearly pilgrimages, in spite of its dangerous approach. All this country, so far, is independent Baluchistan within the jurisdiction of the Baluchistan Agency, with the exception of certain clans of the Sheranis on the eastern slopes of the Takht-i-Suliman, north of the Vihowa, who are under the North-West Frontier Province administration. Wedged in between the railway and the Indus, but still north of the railway, is a curious mass of rough mountain country, which forms the southern abutment of the Suliman system. The strike of the main ridges forming that system is almost due north and south till it touches 30° N. lat. Here it assumes a westerly curve, till it points north-west, and finally merges into the broad band of mountains which hedge in the Quetta and Pishin uplands on the north and east.

At this point, as might be expected, are some of the grandest peaks and precipices in Baluchistan. Khalifat on the east of Quetta, flanking the Harnai loop of the Sind-Pishin railway; Takatu to the north; Chahiltan (Chiltan) on the south-west; and the great square-headed Murdar to the south—all overlook the pretty cantonment from heights which range from 10,500 to 11,500 ft. Lying in the midst of them, on an open plain formed by the high-level tributaries of the Lora (which have also raised the Pishin valley to the north), 5500 ft. above the sea, is Quetta. The mass of twisted flexures, the curved wrinkles that end the Suliman system, is occupied by true Baluchis, the Marri and Bugti sections of the great Rind confederation of tribes owning an Arabic origin. There are no Pathans here. To the north of them are the Bozdars, another Rind clan; and these Rind tribes form the exception to the general rule of Pathan occupation of northern Baluchistan. Amongst the Pathans, the Kakars and Dumars of Pishin, with the Mando Khel of Zhob, are the most prominent tribal divisions.

Central.

The curved recession of the Suliman Ranges to the north-west leaves a space of flat alluvial desert to the south, which forms a sort of inlet or bay striking into the Baluchistan mountain system. The point of this desert inlet receives the drainage of two local basins, the Bolan and the Nari. Both drain south-eastwards from the central Quetta-Pishin plateau and both have served for railway alignment. Being fed by tributaries which for the most part drain narrow valleys where gradual denudation has washed bare the flat-backed slopes of limestone ridges, and which consequently send down torrents of rapidly accumulating rainfall, both these central lines of water-course are liable to terrific floods. The drainage of the Bolan and Nari finally disappears in the irrigated flats of the alluvial bay (Kach Gandava), which extends 130 m. from the Indus to Sibi at the foot of the hills, and which offers (in spite of periodic Indus floods) an opportunity for railway approach to Baluchistan such as occurs nowhere else on the frontier. Kach Gandava, whilst its agricultural development has in no way receded, is now rivalled by many of the valleys of the highlands. Its climate debars it from European occupation. It is a land of dust-storms and poisonous winds; a land where the thermometer never sinks below 100° F. in summer, and drops below freezing-point in winter; where there is a deadly monotony of dust-coloured scenery for the greater part of the year, with the minimum of rain and the maximum of heat. The Quetta and Pishin plateau to which it leads is the central dominant water-divide of Baluchistan and the base of the Kandahar highway.

British.

An irregularly-shaped block of upland territory, which includes all the upper Lora tributaries, and the Toba plateau beyond them; resting on the Kwaja Amran (Kojak) Range (with an advanced loop to include the Chaman railway terminus) on the west; reaching south through Shorarud to Nushki; including the basins of the Bolan and Nari as far as Sibi to the south-east; stretching out an arm to embrace the Thal Chotiali valley on the east, and following the main water-divide between the Zhob and Lora on the north, is called British Baluchistan. It is leased from Kalat, and forms a distinctive province, being brought under the ordinary forms of civil administration in British India. Beyond it, north and south, lies independent Baluchistan, which is under British political control. Its administrative staff is usually composed of military officers. The degree of independence enjoyed by the various districts of Baluchistan may be said to vary in direct proportion to their distance from Quetta. No part of Baluchistan is beyond the reach of the political officer, but there are many parts where he is not often seen. The climate of British Baluchistan is dry and bracing—even exhilarating—but the extremes of temperature lead to the development of fever in very severe forms. On the whole it is favourable to European existence.

[v.03 p.0293]

Southern.

South-west of the dividing railway lies the great block of Southern Baluchistan. Within this area the drainage generally trends south and west, either to the Arabian Sea or to the central swamps of Lora and Mashkel. The Hab river, which forms the boundary west of Karachi; the Purali (the ancient *Arabus*), which drains the low-lying flats of Las Bela; the Hingol (the ancient *Tomerus*) and the Dasht, which drain Makran, are all considerable streams, draining into the Arabian Sea and forming important arteries in the network of internal communication. An exception to the general rule is found in the Mulla, which carries the floods of the Kalat highlands into the Gandava basin and forms one of the most important of the ancient highways from the Indus plains

to Kandahar. The fortress of Kalat is situated about midway between the sources of the Bolan and the Mulla, near a small tributary of the Lora (the river of Pishin and Quetta), about 6800 ft. above sea-level, on the western edge of a cultivated plain in the very midst of hills. (See KALAT.) To the north are the long sweeping lines of the Sarawan ridges, enclosing narrow fertile valleys, and passing away to the south-west to the edge of the Kharan desert. East and south are the rugged bands of Jalawan, amongst which the Mulla rises, and through which it breaks in a series of magnificent defiles in order to reach the Gandava plain. Routes which converge on Kalat from the south pass for the most part through narrow wooded valleys, enclosed between steep ridges of denuded hills, and, following the general strike of these ridges, they run from valley to valley with easy grades. Kalat is the "hub" or centre, from which radiate the Bolan, the Mulla and the southern Lora affluents; but the Lora drains also the Pishin valley on the north; the two systems uniting in Shorawak, to lose themselves in the desert and swamps to the west of Nushki, on the road to Seistan. Sixty miles south of Kalat, and beyond the Mulla sources, commences another remarkable hydrographic system which includes all southern and south-western Baluchistan. To the west lies the Kharan desert, with intermittent river channels enclosed and often lost in sand-waves ere they reach the Mashkel swamps on the far borders of Persia. To the south-west are the long sweeping valleys of Rakshan and Panjgur, which, curving northwards, likewise discharge their drainage into the Mashkel. Directly south are the beginnings of the meridional arteries, the Hab, the Purali and the Hingol, which end in the Arabian Sea, leaving a space of mountainous seaboard (Makran) south of the Panjgur and west of the Hingol, which is watered (so far as it is watered at all) by the long lateral Kej river and several smaller mountain streams. Thus southern Baluchistan comprises four hydrographical sections. First is the long extension from Kalat, southwards, of that inconceivably wild highland country which faces the desert of Sind, the foot of which forms the Indian frontier. This is the land of the Brahui, and the flat wall of its frontier limestone barrier is one of the most remarkable features in the configuration of the whole line of Indian borderland. For the first 60 m. from the sea near Karachi the Hab river is the boundary of Sind, and here, across the enclosing desolation of outcropping ridges and intervening sand, a road may be found into Makran. But from the point where the boundary leaves the Hab to follow the Kirthar range not a break occurs (save one) in 150 m. of solid rock wall, rising many thousands of feet straight from the sandy plain. The one break, or gorge, which allows the Kej waters to pass, only forms a local gateway into a mass of impracticable hills. Secondly, to the west of this mountain wilderness, stretching upwards from the sea in a wedge form between the Brahui highlands and the group of towering peaks which enclose the Hingol river and abut on the sea at Malan, are the alluvial flats and delta of the Purali, forming the little province of Las Bela, the home of the Las Rajput. In this hot and thirsty corner of Baluchistan, ruled by the Jam or Cham, there is a fairly wide stretch of cultivation, nourished by the alluvial detritus of the Purali and well irrigated. In a little garden to the south of the modern town of Bela (the ancient *Armabel*) is the tomb of Sir Robert Sandeman, who spent the best part of an energetic and active life in the making of Baluchistan.

Western boundary.

The boundary between Baluchistan and Afghanistan, starting from Nushki, cuts across the Lora hamun, leaving the frontier post of Chagai to Baluchistan, and from this point to the Malik Siah Koh it is based partly on the central mountainous water-divide already referred to, and partly runs in straight lines through the desert south of the salt swamps of the Gaud-i-Zirreh. It thus passes 50 m. to the south of the Helmund, entirely shutting off that valley and the approach to Seistan between the Helmund and the Gaud-i-Zirreh (the only approach from the east in seasons of flood) from Baluchistan. But it leaves a connected line of desert route between Nushki and Seistan, which is open in all ordinary seasons, to the south, and this route has been largely developed, posts or serais having been established at intervals and wells having been dug. There is already a promising khafila traffic along it and the railway has been extended from Quetta to Nushki.

Geology.[1]—The mountain ranges of Baluchistan consist chiefly of Cretaceous and Tertiary beds, which are thrown into a series of folds running approximately parallel to the mountain ridges. The folds are part of an extensive system arranged as if in a festoon hanging southwards between Peshawar and Mount Ararat, but with the outer folds looped up at Sibi so as to form the subsidiary festoon of the Suliman and Bugti Hills. Outside the folds lie the horizontal deposits of the Makran coast, and within them lies the stony desert of north-western Baluchistan. In the broader depressions between the mountain ridges the beds are said to be but little disturbed. Besides the Cretaceous and Tertiary beds, Jurassic rocks are known to take a considerable part in the formation of the hills of British Baluchistan. Triassic beds lie along the south side of the upper Zhob, and *Fusulina* limestone has also been found there. With the exception of the later Tertiary beds the deposits are mostly marine. But in the upper Cretaceous and lower Tertiary, especially in north-western Baluchistan, there is an extensive development of volcanic tuffs and conglomerates, which are probably contemporaneous with the Deccan Traps of India. Great masses of syenite and diorite were intruded during the Tertiary period, and within the curve of the folded belt a line of recent volcanic cones stretches from western Baluchistan into eastern Persia. In Baluchistan these volcanoes appear to be extinct; though the Koh-i-Tafdan, beyond the Persian frontier, still emits vapours at frequent intervals. The lavas and ashes which form these cones are mostly andesitic. Mud "volcanoes" occur upon the Makran coast, but it is doubtful whether these are in any way connected with true volcanic agencies.

So far as is known, the mineral wealth of Baluchistan is inconsiderable. Coal has been worked in the Tertiary beds along the Harnai route to Quetta, but the seams are thin and the quality poor. A somewhat thick and viscid form of mineral oil is met with at Khattan in the Marri country; and petroleum of excellent quality has been found in the Sherani hills and probably occurs in other portions of the Suliman Range. Sulphur has long been worked on a small scale in the Koh-i-Sultan, the largest of the volcanoes of western Baluchistan.

Races.—Within the Baluchistan half of the desert are to be found scattered tribes of nomads, called Rekis (or desert people), the Mohamadani being the most numerous. They are probably of Arab origin. This central desert is the Kir, Kej, Katz or Kash Kaian of Arabic medieval geography and a part of the ancient Kaiani kingdom; the prefix Kej or Kach always denoting low-level flats or valleys, in contradistinction to mountains or hills. The Mohamadani nomads occupy the central mountain region, to the south of which lie the Mashkel and Kharan deserts, inhabited by a people of quite different origin, who possess something approaching to historical records. These are the Naushirwanis, a purely Persian race, who passed into Baluchistan within historic times, although the exact date is uncertain. The Naushirwanis appear to be identical with the Tahuki or Tahukani who are found in Perso-Baluchistan. (A place Taoce is mentioned by Nearchus, by Strabo and by Ptolemy.) They are a fine manly race of people, in many respects superior to their modern compatriots of Iran. Between the Naushirwanis of the Kharan desert and Mashkel, and the fish-eating population of the coast, enclosed in the narrow valleys of the Rakshan and Kej tributaries, or about the sources of the Hingol, are tribes innumerable, remnants of races which may be recognized in the works of Herodotus, or may be traced in the records of recent immigration. Equally scattered through the whole country, and almost everywhere recognizable, is the underlying Persian population (Tajik), which is sometimes represented by a locally dominant tribe, but more frequently by the agricultural slave and bondsman of the general community. Such are the Dehwars or Dehkans, and the Durzadas (*Derusiaei* of Herod. i. 125), who extend all through Makran, and, as slaves, are called Nakibs. The Arabs have naturally left their mark most strongly impressed on the ethnography of Baluchistan. All Rind tribes claim to be of Arab origin and of Koraish extraction. As the Arabs occupied all southern Baluchistan and Seistan from a very early date, and finally spread through the Sind valley, where they remained till the 12th century, their genealogical records have become much obscured and it is probable that there is not now a pure Arab in the country. It is as builders or engineers that they have established their most permanent records, Makran being full of the relics of their irrigation works constructed in times when the climatic conditions of Baluchistan must have been very different from what they are now. Lower Sind also contains a great wealth of architectural remains, which may be found to the west of the Indus as well as in the delta. One particular tribe (the Kalmats), who left their name on the Makran coast and subsequently dominated Bela and Sind, west of the Indus, for a considerable period, exhibit great power of artistic design in their sepulchral monuments. The Dravidian races (Brahuis), who are chiefly represented by the Kambaranis and Mingals or Mongals (the latter are doubtless of Tatar origin), spread through southern Baluchistan as well as the eastern hills, and are scattered irregularly through the mountain tracts south of Kharan. The ancient Oreitae mentioned by Arrian are probably represented by the tribe of Hot, who, as original masters of the soil, are exempt from taxation. The name Brahui is (according to Bellew) but a corruption of Ba-rohi (or "hillmen") in a language derived from Sanskrit which would represent the same term by Parva-ka. So that the Παρικάνιοι (Herod, iii. 92) may be recognized as surviving in the Brahui, and in the name (Parkan) of a mountain-bred stream which is a tributary of the Hingol.

Amongst other aboriginal tribes to whom reference is made by very early writers are the Bolédi, who give their name to the Bolida valley, a tributary of the Kej. The Bolédi were once the ruling race of southern Baluchistan, which was originally called Boledistan, and it seems possible that this may be the real origin of the much-disputed name of the country generally. Bola was an Assyrian term for Bael or Bel, the god of the Phoenicians and Druids. The Bolédi ruling family were in 1906 represented by but one living member, a lady, who was a government pensioner. The fast-diminishing Sajidis (Sajittae) and Saka (Sacae) are others of the more ancient races of Baluchistan easily recognizable in classical geography. Most recent of all are the Gitchkis. The Gitchkis derive from a Rajput adventurer who flourished in the early part of the 17th century. They are now the dominant race in Panjgur and Kej, from whence they ousted the Boledis. For three generations they remained Hindus; since then there has arisen amongst them a strange new sect called Zikari, with exceedingly loose notions of morality. The sect, however, appears to be fast merging into orthodox Mahommedanism. A Baluch (or rather Makran) race which deserves attention is that of the Gadaras, who once gave the name Gadrosia to Southern Baluchistan. According to Tate the Gadaras are now represented by Sidi half-castes—those Makrani "boys" who are so well known in the mercantile marine as stokers and firemen. It seems unlikely that this modern admixture of Asiatic and African blood represents the "Asiatic Ethiopian" of Herodotus, which was more probably a direct connexion of the Himyaritic Arab builders of "bunds" and revetments who spread eastwards from Arabia. Bellew finds in the Gadara the Garuda (eagles) of Sanskrit, who were ever in opposition to the Naga (snakes) of Scythic origin. Southern Baluchistan affords a most interesting field for the ethnographer. It has never yet been thoroughly explored in the interests of ethnographical science.

The Baluch character is influenced by its environment as much as by its origin, so that it is impossible to select any one section of the general community as affording a satisfactory sample of popular Baluch idiosyncrasies. They are not a homogeneous race. Peoples of Arab extraction intermixed with people of Dravidian and Persian stock are all lumped together under the name of Baluch. The Marri and Bugti tribes, who occupy the most southern buttresses of the Suliman Mountains, are Rind Baluchis, almost certainly of Arab extraction. They came to Sind either with the Arab conquerors or after them, and remained there mixed up with the original Hindu inhabitants. The Arab type of Baluch extends through the whole country at intervals, and includes all the finest and best of Baluch humanity. Taking the Rind Baluch as the type opposed to the Afridi Pathan, the Baluch is easier to deal with and to control than the Pathan, owing to his tribal organization and his freedom from bigoted fanaticism or blind allegiance to his priest. The Baluch is less turbulent, less treacherous, less bloodthirsty and less fanatical than the Pathan. His frame is shorter and more spare and wiry than that of his neighbour to the north, though generations have given to him too a bold and manly bearing. It would be difficult to match the stately dignity and imposing presence of a Baluch chief of the Marri or Bugti clans. His Semitic features are those of the Bedouin and he carries himself as straight and as loftily as any Arab gentleman. Frank and open in his manners, fairly truthful, faithful to his word, temperate and enduring, and looking upon courage as the highest virtue, the true Baluch of the Derajat is a pleasant man to have dealings with. As a revenue payer he is not so satisfactory, his want of industry and the pride which looks upon manual labour as degrading making him but a poor husbandman. He is an expert rider; horse-racing is his national amusement, and the Baluch breed of horses is celebrated throughout northern India. Like the Pathan he is a bandit by tradition and descent and makes a first-rate fighting man, but he rarely enlists in the Indian army. He is nominally a Mahommedan, but is neglectful of the practices of his religion. The relations of the modern Baluch with the government of India were entirely transformed by the life work of Sir Robert Sandeman. (*q.v.*).

Strategic interest.

The strategical position of Great Britain in Baluchistan is a very important factor in the problem of maintaining order and good administration in the country. The ever-restless Pathan tribes of the Suliman hills are held in check by the occupation of the Zhob valley; whilst the central dominant position at Quetta safeguards the peace and security of Kalat, and of the wildest of the Baluch hills occupied by the Marris and Bugtis, no less than it bars the way to an advance upon India by way of Kandahar. Nominally all the provinces and districts of Baluchistan, with the exception of the ceded territory which we call British Baluchistan, are under the khan of Kalat, and all chiefs acknowledge him as their suzerain. But it may be doubted if this suzerainty was ever complete, or could be maintained at all but for the assistance of the British government. The Baluch is still essentially a robber and a raider (a trait which is common to all tribes), and the history of Baluchistan is nothing but a story of successful robberies, of lawless rapine and bloodshed, for which plunder and devastation were accounted a worthy and honourable return.

Climate.

Extensive changes have taken place in the climatic condition of the country—changes which are some of them so recent as to be noted by surveyors who have found the remains of forests in districts now entirely desiccated. Possibly the ordinary processes of denudation and erosion, acting on those recent deposits which overlie the harder beds of the older series, may have much to say to these climatic changes, and the wanton destruction of forests may have assisted the efforts of nature; but it is difficult to understand the widespread desiccation of large areas of the Baluch highlands, where evidences of Arab irrigation works and of cultivation still attest to a once flourishing agricultural condition, without appealing to more rapidly destructive principles for the change. There is ample proof throughout the country of alterations of level within recent geologic periods; and there have even been compressions, resulting in a relative rise of the ground, over the crests of anticlinal folds, within historic record. "Proof that this compression is still going on was given on 20th December 1892, when a severe earthquake resulted from the sudden yielding of the earth's crust along what appears to be an old line of fault, west of the Kawaja Amran range, whereby an adjustment took place indicated by a shortening of some 2½ ft. on the railway line which crossed the fault." Nor should the evidences of active volcanic agency afforded by the mud volcanoes of the coast be overlooked. It is probably to climatic changes (whatever their origin may have been), rather than to the effects of tribal disturbances, that the Arab's disappearance from the field of trade and agriculture must be attributed.

Population.

The total area of Baluchistan is 132,315 sq. m. and its population in 1901 was 914,551. The population is largely nomadic. The fact that so many as 15,000 camels have been counted in the Bolan Pass during one month of the annual Brahui migration indicates the dimensions which the movement assumes. The religion of the country is so overwhelmingly Mahommedan that out of every 100,000 inhabitants 94,403 are Mussulman, and only 4706 Hindus, while the balance is made up by Christians, Sikhs and other denominations. Out of the total number 280 in the thousand are literates. The chief languages spoken are vernaculars of Baluchistan, Pushtu, Panjabi, Urdu and Sindhi, The Baluchi language belongs to the Iranian branch of the Aryan subfamily of the Indo-European family. It is divided into two main dialects which are so different that speakers of the one are almost unintelligible to speakers of the other. These two dialects are separated by the belt of Brahui and Sindhi speakers who occupy the Sarawan and Jalawan hills, and Las Bela. Owing probably to the fact that Makran was for many generations under the rule of the Persian kings, the Baluchi spoken on the west of the province, which is also called Makrani, is more largely impregnated with Persian words and expressions than the Eastern dialect. In the latter the words in use for common objects and acts are nearly all pure Baluchi, the remainder of the language being borrowed from Persian, Sindhi and Panjabi. There is no indigenous literature, but many specimens of poetry exist in which heroes and brave deeds are commemorated, and a good many of these have been collected from time to time. The philological classification of the Brahui dialect has been much disputed, but the latest enquiries, conducted by Dr G. A. Grierson, have resulted in his placing it among the Dravidian languages. It is remarkable to find in Baluchistan a Dravidian tongue, surrounded on all sides by Aryan languages, and with the next nearest branch of the same family located so far away as the Gond hills of central India. Brahui has no literature of its own, and such knowledge as we possess of it is due to European scholars, such as Bellew, Trumpp and Caldwell. Numerically the Brahuis are the strongest race in Baluchistan. They number nearly 300,000 souls. Next to them and numbering nearly 200,000 are Pathans. After this there is a drop to 80,000 mixed Baluchis and less than 40,000 Lasis (Lumris) of Las Bela. There are thirteen indigenous tribes of Pathan origin, of which the Kakars (*q.v.*) are by far the most important, numbering more than 100,000 souls. They are to be found in the largest numbers in Zhob, Quetta, Pishin and Thal-Chotiali, but there are a few of them in Kalat and Chagai also. The most important Baluch tribes are the Marris, the Bughtis, the Boledis, the Domkis, the Magassis and the Rinds. Owing partly to the tribal system, and partly to the levelling effect of Islam, nothing similar to the Brahmanical system of social precedent is to be found in Baluchistan.

History.—Of the early history of this portion of the Asiatic continent little or nothing is known. The poverty and natural strength of the country, combined with the ferocious habits of the natives, seem to have equally repelled the friendly visits of inquisitive strangers and the hostile incursions of invading armies. The first distinct account which we have is from Arrian, who, with his usual brevity and severe veracity, narrates the march of Alexander through this region, which he calls the country of the Oreitae and Gadrosii.[2] He gives a very accurate account of this forlorn tract, its general aridity and the necessity of obtaining water by digging in the beds of torrents; describes the food of the inhabitants as dates and fish; and adverts to the occasional occurrence of fertile spots, the abundance of aromatic and thorny shrubs and fragrant plants, and the violence of the monsoon in the western part of Makran. He notices also the impossibility of supporting a large army, and the consequent destruction of the greater part of the men and beasts which accompanied the expedition of Alexander. In the 8th century this country was traversed by an army of the Caliphate.

The precise period at which the Brahuis gained the mastery cannot be accurately ascertained; but it was probably about two and a half centuries ago. The last raja of the Hindu dynasty found himself compelled to call for the assistance of the mountain shepherds, with their leader, Kambar, in order to check the encroachments of a horde of depredators, headed by an Afghan chief, who infested the country and even threatened to attack the seat of government. Kambar successfully performed the service for which he had been engaged; but having in a few years quelled the robbers against whom he had been called in, and finding himself at the head of the only military tribe in the country, he formally deposed the raja and assumed the government.

The history of the country after the accession of Kambar is as obscure as during the Hindu dynasty. It would appear, however, that the sceptre was quietly transmitted to Abdulla Khan, the fourth in descent from Kambar, who, being an intrepid and ambitious soldier, turned his thoughts towards the conquest of Kach Gandava, then held by different petty chiefs under the authority of the nawabs of Sind.

After various success, the Kambaranis at length possessed themselves of the sovereignty of a considerable portion of that fruitful plain, including the chief town, Gandava. It was during this contest that the famous Nadir Shah advanced from Persia to the invasion of Hindustan; and while at Kandahar he despatched several detachments into Baluchistan and established his authority in that province. Abdulla Khan, however, was continued in the government of the country by Nadir's orders; but he was soon after killed in a battle with the forces of the nawabs of Sind. He was succeeded by his eldest son, Haji Mahommed Khan, who abandoned himself to the most tyrannical and licentious way of life and alienated his subjects by oppressive taxation. In these circumstances Nasir Khan, the second son of Abdulla Khan, who had accompanied the victorious Nadir to Delhi, and acquired the favour and confidence of that monarch, returned to Kalat and was hailed by the whole population as their deliverer. Finding that expostulation had no effect upon his brother, he one day entered his apartment and stabbed him to the heart. As soon as the tyrant was dead, Nasir Khan mounted the *musnud* amidst the universal joy of his subjects; and immediately transmitted a report of the events which had taken place to Nadir Shah, who was then encamped near Kandahar. The shah received the intelligence with satisfaction, and despatched a firman, by return of the messenger, appointing Nasir Khan beglar begi (prince of princes) of all Baluchistan. This event took place in the year 1739.

Nasir Khan proved an active, politic and warlike prince. He took great pains to re-establish the internal government of all the provinces in his dominions, and improved and fortified the city of Kalat. On the death of Nadir Shah in 1747, he acknowledged the title of the king of Kabul, Ahmad Shah (Durani). In 1758 he declared himself entirely independent; upon which Ahmad Shah despatched a force against him under one of his ministers. The khan, however, raised an army and totally routed the Afghan army. On receiving intelligence of this discomfiture, the king himself marched with strong reinforcements, and a pitched battle was fought in which Nasir Khan was worsted. He retired in good order to Kalat, whither he was followed by the victor, who invested the place with his whole army. The khan made a vigorous defence; and, after the royal troops had been foiled in their attempts to take the city by storm or surprise, a negotiation was proposed by the king which terminated in a treaty of peace. By this treaty it was stipulated that the king was to receive the cousin of Nasir Khan in marriage; and that the khan was to pay no tribute, but only, when called upon, to furnish troops to assist the armies, for which he was to receive an allowance in cash equal to half their pay. The khan frequently distinguished himself in the subsequent wars of Kabul; and, as a reward for his services, the king bestowed upon him several districts in perpetual and entire sovereignty. Having succeeded in quelling a dangerous rebellion headed by his cousin Behram Khan, this able prince at length died in extreme old age in the month of June 1795, leaving three sons and five daughters. He was succeeded by his eldest son, Mahmud Khan, then a boy of about fourteen years. During the reign of this prince, who has been described as a very humane and indolent man, the country was distracted by sanguinary broils; the governors of several provinces and districts withdrew their allegiance; and the dominions of the khans of Kalat gradually so diminished that they now comprehend only a small portion of the provinces formerly subject to Nasir Khan.

In 1839, when the British army advanced through the Bolan Pass towards Afghanistan, the conduct of Mehrab Khan, the ruler of Baluchistan, was considered so treacherous and dangerous as to require "the exaction of retribution from that chieftain," and "the execution of such arrangements as would establish future security in that quarter." General Willshire was accordingly detached from the army of the Indus with 1050 men to assault Kalat. A gate was knocked in by the field-pieces, and the town and citadel were stormed in a few minutes. Above 400 Baluches were slain, among them Mehrab Khan himself; and 2000 prisoners were taken. Subsequent inquiries have, however, proved that the treachery towards the
[v.03 p.0296] British was not on the part of Mehrab Khan, but on that of his vizier, Mahommed Hussein, and certain chiefs with whom he was in league, and at whose instigation the British convoys were plundered in their passage through Kach Gandava and in the Bolan Pass. The treacherous vizier, however, made our too credulous political officers believe that Mehrab Khan was to blame; his object being to bring his master to ruin and to obtain for himself all power in the state, knowing that Mehrab's successor was only a child. How far he succeeded in his object history has shown. In the following year Kalat changed hands, the governor established by the British, together with a feeble garrison, being overpowered. At the close of the same year it was reoccupied by the British under General Nott. In 1841 Nasir Khan II., the youthful son of the slain Mehrab Khan, was recognized by the British, who soon after evacuated the country.

From the conquest of Sind by the British troops under the command of General Sir Charles Napier in 1843 up to 1854 no diplomatic intercourse occurred worthy of note between the British and Baluch states. In the latter year, however, under the governor-generalship of the marquess of Dalhousie, General John Jacob, C.B., at the time political superintendent and commandant on the Sind frontier, was deputed to arrange and conclude a treaty between the Kalat state, then under the chieftainship of Nasir Khan and the British government. This treaty was executed on the 14th of May 1854 and was to the following effect:—

> "That the former offensive and defensive treaty, concluded in 1841 by Major Outram between the British government and Nasir Khan II., chief of Kalat, was to be annulled.
>
> "That Nasir Khan II., his heirs and successors, bound themselves to oppose to the utmost all the enemies of the British government, and in all cases to act in subordinate co-operation with that government, and to enter into no negotiations with other states without its consent.
>
> "That should it be deemed necessary to station British troops in any part of the territory of Kalat, they shall occupy such positions as may be thought advisable by the British authorities.
>
> "That the Baluch chief was to prevent all plundering on the part of his subjects within or in the neighbourhood of British territory.
>
> "That he was further to protect all merchants passing through his territory, and only to exact from them a transit duty, fixed by schedule attached to the treaty; and that, on condition of a faithful performance of these duties, he was to receive from the British government an annual subsidy of Rs.50,000 (£5000)."

The provisions of the above treaty were most loyally performed by Nasir Khan up to the time of his death in 1856. He was

succeeded by his brother, Mir Khodadud Khan, when a youth of twelve years of age, who, however, did not obtain his position before he had put down by force a rebellion on the part of his turbulent chiefs, who had first elected him, but, not receiving what they considered an adequate reward from his treasury, sought to depose him in favour of his cousin Sher dil Khan. In the latter part of 1857, the Indian rebellion being at its height and the city of Delhi still in the hands of the rebels, a British officer (Major Henry Green) was deputed, on the part of the British government, to reside as political agent with the Khan at Kalat and to assist him by his advice in maintaining control over his turbulent tribes. This duty was successfully performed until 1863, when, during the temporary absence of Major Malcolm Green, the then political agent, Khodadad Khan was, at the instigation of some of his principal chiefs, attacked while out riding by his cousin, Sher dil Khan, and severely wounded. Khodadad fled in safety to a residence close to the British border, and Sher dil Khan was elected and proclaimed Khan. His rule was, however, a short one, for early in 1864, when proceeding to Kalat, he was murdered in the Gandava Pass; and Khodadad was again elected chief by the very men who had only the previous year caused his overthrow, and who had lately been accomplices to the murder of his cousin. After the above events Khodadad maintained his precarious position with great difficulty; but owing to his inability to govern his unruly subjects without material assistance from the British government, which they were not disposed to give, his country gradually fell into the greatest anarchy; and, consequently, some of the provisions of the treaty of 1854 having been broken, diplomatic relations were discontinued with the Kalat state after the end of 1874.

After this the chiefs of Las and Wad, the Marris and Bugtis, Kej and Makran all threw off their allegiance, and anarchy became so widespread that the British government again interfered. The treaty of 1854 was renewed in 1876 by Lord Lytton (under Sandeman's advice), and the khan received substantial aid from the government in the form of an annual subsidy of a lakh of rupees, instead of the Rs.50,000 previously assigned to him. The treaty of 1854 was a treaty of alliance offensive and defensive. The treaty of 1876 renewed these terms, but utterly changed the policy of non-intervention which was maintained by the former, by the recognition of the sirdars as well as the khan, and by the appointment of the British government as referee in cases of dispute between them. British troops were to be located in the khan's country; Quetta was founded; telegraphs and railways were projected; roads were made; and the reign of law and order established. The nebulous claims of Afghanistan to Sibi and Pishin were disposed of by the treaty of Gandamak in the spring of 1879, and the final consolidation of the existing form of Kalat administration was effected by Sandeman's expedition to Kharan in 1883, and the reconciliation of Azad Khan, the great Naushirwani chief, with the khan of Kalat. British Baluchistan was incorporated with British India by the resolution of 1st November 1887, and divided into two districts—Quetta-Pishin and Thai Chotiali—to be administered by a deputy-commissioner and a regular staff.

In 1890 and 1891 were carried out that series of politico-military expeditions which resulted in the occupation of the Zhob valley, the foundation of the central cantonment of Fort Sandeman, and the extension of a line of outposts which, commencing at Quetta, may be said to rest on Wana north of the Gomal. The effect of these expeditions, and of this extension of military occupation, has been to reduce the independent Pathan tribes of the Suliman mountains to effective order, and to put a stop to border raiding on the Indus plains south of the Gomal. In 1893 serious differences arose between the khan of Kalat and Sir James Browne, who succeeded Sir Robert Sandeman as agent to the governor-general in Baluchistan, arising out of Mir Khodadad Khan's outrageous conduct in the management of his own court, and the treatment of his officials. Finally, the khan was deposed, and his son Mir Mahmud Khan succeeded in November 1893. Since then the most important change in Baluch administration has been the perpetual lease and transfer of management to British agency of the Nushki district and Niabat, with all rights, jurisdiction and administrative power, in lieu of a perpetual rent of Rs.9000 per annum. This was effected in July 1899. This secures the direct control of the great highway to Seistan which has been opened to khafila and railway traffic.

The revenues of the khan of Kalat consist partly of subsidies and partly of agricultural revenue, the total value being about Rs.500,000 per annum. Since 1882 he has received Rs.25,000 as government rent for the Quetta district, besides Rs.30,000 in lieu of transit duties in the Boian; this has been increased lately by Rs.9000 as already stated. In 1899 the total imports of Kalat were valued at Rs.700,000, and the exports at Rs.505,000.

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(T. H. H.*)

[1] See W. T. Blanford, "Geological Notes on the Hills in the neighbourhood of the Sind and Punjab Frontier between Quetta and Dera Ghazi Khan," *Mem. Geol. Surv. India*, vol. xx. pt. 2 (1883); E. Vredenburg, "A Geological Sketch of the Baluchistan Desert, and part of Eastern Persia," *Mem. Geol. Surv. India*, vol. xxxi. pt. 2 (1901); E. Vredenburg, "On the Occurrence of a Species of Halorites in the Trias of Baluchistan," *Rec. Geol. Surv. India*, vol. xxxi. (1904), pp. 162-166, pls. 17, 18.

[2] See V. A. Smith, *Early Hist. of India* (ed. 1908), p. 103 seq.

BALUCHISTAN, a province of Persia consisting of the western part of Baluchistan (*q.v.*) in a wider sense. Persian Baluchistan has an area of about 60,000 sq. m., and lying along the northern shore of the Arabian Sea, is bounded E. by British and independent Baluchistan, N. by Seistan and the central Persian desert, and W. by Kerman. The country has little water and only a small part of it is under cultivation, the remainder being composed of arid, waterless plains, deserts —some stony, others with moving sands—barren hills and mountains. The principal rivers are the Mashkid and that of Bampur which flow away from the sea and are lost in depressions called *hamuns*. The rivers which flow into the sea are unimportant and dry during the greater part of the year. Persian Baluchistan forms an administrative division of the province of Kerman and is subdivided into the following twenty districts:—(1) Bampur; (2) Serhad; (3) Dizek; (4) Jalk; (5) Sib; (6) Irafshan; (7) Magas; (8) Serbaz; (9) Lashar; (10) Champ; (11) Fannuj; (12) Bazman; (13) Aptar; (14) Daman; (15) Aprandagan; (16) Asfehgeh; (17) Surmij; (18) Meskutan; (19) Pushteh; (20) Makran, the country of the Ichthyophagi, with the subdistricts Kasrkand, Geh, Bint, Dasht, Kucheh and Bahu. The total population of Baluchistan is under 200,000. The province was practically independent until the occupation of Bampur by Persian troops in 1849, and over some of the extreme eastern districts Persian supremacy was not recognized until 1872.

[v.03 p.0297]

BALUE, JEAN (*c.* 1421-1491), French cardinal and minister of Louis XI., was born of very humble parentage at Angle in Poitou, and was first patronized by the bishop of Poitiers. In 1461 he became vicar-general of the bishop of Angers. His activity, cunning and mastery of intrigue gained him the appreciation of Louis XI., who made him his almoner. In a short time Balue became a considerable personage. In 1465 he received the bishopric of Évreux; the king made him *le premier du grant conseil*, and, in spite of his dissolute life, obtained for him a cardinalate (1468). But in that year Balue was compromised in the king's humiliation by Charles the Bold at Péronne and excluded from the council. He then intrigued with Charles against his master: their secret correspondence was intercepted, and on the 23rd of April 1469 Balue was thrown into prison, where he remained eleven years, but not, as has been alleged, in an iron cage. In 1480, through the intervention of Pope Sixtus IV., he was set at liberty, and from that time lived in high favour at the court of Rome. He received the bishopric of Albano and afterwards that of Palestrina. In 1484 he was even sent to France as legate *a latere*. He died at Ancona in 1491.

See Henri Forgeot, "Jean Balue, cardinal d'Angers" (1895), in the *Bibliothèque de l'école des hautes études*.

BALUSTER (through the Fr. from the Ital. *balaustro*, so-called from a supposed likeness to the flower of the βαλαύστιον, or wild pomegranate; the word has been corrupted in English into "banister"), a small moulded shaft, square or circular,

in stone or wood and sometimes in metal, supporting the coping of a parapet or the rail of a staircase, an assemblage of them being known as a balustrade. The earliest examples are those shown in the bas-reliefs representing the Assyrian palaces, where they were employed as window balustrades and apparently had Ionic capitals. They do not seem to have been known to either the Greeks or the Romans, but early examples are found in the balconies in the palaces at Venice and Verona. In the hands of the Italian revivalists they became features of the greatest importance, and were largely employed for window balconies and roof parapets.

The term "baluster shaft" is given to the shaft dividing a window in Saxon architecture. In the south transept of the abbey at St Albans, England, are some of these shafts, supposed to have been taken from the old Saxon church. Norman bases and capitals have been added, together with plain cylindrical Norman shafts.

BALUSTRADE, a parapet or low screen consisting of a coping or rail supported on balusters (*q.v.*). Sometimes it is employed purely as a decorative feature beneath the sill of a window which was not carried down to the ground. Sometimes flowing foliage takes the place of the parapet, and sometimes so-called balustrades are formed of vertical slabs of stone, pierced as in the Ca' d'oro at Venice and the balconies of the minarets at Cairo.

BALUZE, ÉTIENNE (1630-1718), French scholar, was born at Tulle on the 24th of November 1630. He was educated at his native town and took minor orders. As secretary to Pierre de Marca, archbishop of Toulouse, he won the appreciation of that learned prelate to such a degree that at his death Marca left him all his papers. Thus it came about that Baluze produced the first complete edition of Marca's treatise *De libertatibus Ecclesiae Gallicanae* (1663), and brought out his *Marca hispanica* (1688 f.). About 1667 Baluze entered Colbert's service, and until 1700 was in charge of the invaluable library belonging to that minister and to his son the marquis de Seignelai. He enriched it prodigiously (see the history of the Colbertine library in the *Cabinet des Manuscrits* by M. Léopold Delisle, vol. i.), and Colbert rewarded him by obtaining various benefices for him, and the post of king's almoner (1679). Subsequently Baluze was appointed professor of Canon law at the Collège de France on the 31st of December 1689, and directed that great institution from 1707 to 1710.

The works which place him in the first rank of the scholars of his time are the *Capitularia Regum Francorum* (1674; new edition enlarged and corrected in 1780); the *Nova Collectio Conciliorum* (4 vols., 1677); the *Miscellanea* (7 vols., 1678-1715; new edition revised by Mansi, 4 vols. f., 1761-1764); the *Letters of Pope Innocent III.* (1682); and, finally, the *Vitae Paparum Avenionensium, 1305-1394* (1693). But he was unfortunate enough to take up the history of Auvergne just at the time when the cardinal de Bouillon, inheritor of the rights, and above all of the ambitious pretensions of the La Tour family, was endeavouring to prove the descent of that house in the direct line from the ancient hereditary counts of Auvergne of the 9th century.

As authentic documents in support of these pretensions could not be found, false ones were fabricated. The production of spurious genealogies had already been begun in the *Histoire de la maison d'Auvergne* published by Christophe Justel in 1645; and Chorier, the historian of Dauphiny, had included in the second volume of his history (1672) a forged deed which connected the La Tours of Dauphiny with the La Tours of Auvergne. Next a regular manufactory of forged documents was organized by a certain Jean de Bar, an intimate companion of the cardinal. These rogues were skilful enough, for they succeeded in duping the most illustrious scholars; Dom Jean Mabillon, the founder of Diplomatics, Dom Thierry Ruinart and Baluze himself, called as experts, made a unanimously favourable report on the 23rd of July 1695. But cardinal de Bouillon had many enemies, and a war of pamphlets began. In March 1698 Baluze in reply wrote a *Letter* which proved nothing. Two years later, in 1700, Jean de Bar and his accomplices were arrested, and after a long and searching inquiry were declared guilty in 1704. Baluze, nevertheless, was obstinate in his opinion. He was convinced that the incriminated documents were genuine and proposed to do Justel's work anew. Encouraged and financially supported by the cardinal de Bouillon, he first produced a *Table généalogique* in 1705, and then in 1709 a *Histoire généalogique de la maison d'Auvergne*, with "Proofs," among which, unfortunately, we find all the deeds which had been pronounced spurious. In the following year he was suddenly engulfed in the disgrace which overtook his intriguing patron: deprived of his appointments, pensions and benefices, he was exiled far from Paris. None the less he continued to work, and in 1717 published a history of his native town, *Historiae Tutelensis libri tres*. Before his death he succeeded in returning to Paris, where he died unconvinced of his errors on the 28th of July 1718. Was he dupe or accomplice? The study of his correspondence with the cardinal gives the impression that he was the victim of clever cheats.

The history of the forgeries committed in the interests of the house of Bouillon forms a curious and instructive episode in the history of French scholarship in the time of Louis XIV. It is to be found in the *Manuel de diplomatique* by A. Giry; and above all in a note to the *Œuvres de Saint-Simon* by M. de Boislisle (vol. xiv. pp. 533-558). The bibliography of Baluze's researches has been made by M. René Fage (1882, 1884) and his *Life* told by M. Émile Fage (1899). To these we must add
[v.03 p.0298] an amusing book by G. Clément-Simon, *La Gaieté de Baluze; documents biographiques et littéraires* (1888). Baluze's will has been published by M. Léopold Delisle (*Bibliothèque de l'École de Chartes*, 1872); his papers are now in the Bibliothèque Nationale in Paris, and in the Bibliothèque de l'Arsenal (*Revue historique*, t. xcviii. p. 309). See also the article by Arthur de Boislisle in the *Revue des questions historiques* for October 1908.

(C. B.*)

BALZAC, HONORÉ DE (1799-1850), French novelist, was born at Tours on the 20th of May 1799. His father, Bernard François, never called himself *de* Balzac and Honoré only assumed the particle after 1830. But the father had equally little right to the name of Balzac at all, for his birth-certificate has been recently discovered. The true name was "Balssa," and this in various forms ("Balsa," "Balsas") has been traced for more than a century before the novelist's birth as that of a family of day-labourers or very small peasant proprietors in the parish of Canezac, department of the Tarn. It is probable that the novelist himself was not aware of this, and his father appears to have practised some mystification as to his own professional career. In and after the Revolution, however, he actually attained positions of some importance in the commissariat and hospital departments of the army, and he married in 1797 Anne Charlotte Laure Sallambier, who was a beauty, an heiress, and a woman of considerable faculty. She survived her son; the father died in 1829. There were two sisters (the elder, Laure, afterwards Madame Surville, was her brother's favourite and later his biographer), and a younger brother, Henri, of whom we hear little and that little not very favourable.

Honoré was put out to nurse till he was four years old, and in 1806, when he was seven, was sent to the *collège* (grammar school) of Vendôme, where he remained till April 1813 as a strict boarder without any holidays. From this he passed as a day-boy to the *collège* of Tours. His father's official work was transferred to Paris the year after, and Balzac came under the teaching of a royalist private schoolmaster, M. Lepitre, and others. He left school altogether in 1816, being then between seventeen and eighteen. His experiences at Vendôme served as base for much of *Louis Lambert*, and he seems to have been frequently in disgrace. Later, his teachers appear to have found him remarkable neither for good nor for evil. He was indeed never a scholar; but he must have read a good deal, and as he certainly had no time for it later, much of this reading must have been done early.

The profession which Balzac's father chose for him was the law; and he not only passed through the schools thereof, and duly obtained his *licence*, but had three years' practical experience in the offices of a notary and a solicitor (*avoué*), for the latter of whom, M. Guillonnet-Merville, he seems to have had a sincere respect. But though no man of letters has ever had, in some ways, such a fancy for business, no man of business could ever come out of such a born man of letters. And when in 1820 (the *licence* having been obtained and M. Balzac, senior, having had some losses) the father wished the son to become a practising lawyer in one or another branch, Honoré revolted. His family had left Paris, and they tried to starve him into submission by establishing him in a garret with a very small allowance. Here he began to write tragedies, corresponded (in letters which have fortunately been preserved) with his sister Laure, and, most important of all, attempted something in prose fiction. The tragedy *Cromwell* was actually completed and read to friends if not to others; nay more, the manuscript exists in the hands of M. Spoelberch de Lovenjoul, the great authority on Balzac's life and bibliography; but it has never been published. The novels, *Cocqsigrue* and *Stella*, proved abortions, but were only the first of many attempts at his true way until he found it. Drama he never abandoned; but for him it was always an error.

The garret-period from 1820 to 1822 was succeeded by another of equal length at home, but before it had finished (1821) he found his way into print with the first of the singular productions which (and that not entirely or finally) have taken a sort of outside place in his works under the title of *Œuvres de jeunesse*. The *incunabula* of Balzac were *Les Deux Hector, ou Les Deux Families bretonnes*, and *Charles Pointel, ou Mon Cousin de la main gauche*. They were followed next year by six others:—*L'Héritière de Birague*; *Jean Louis, ou La Fille trouvée*; *Clotilde de Lusignan, ou Le Beau Juif*; *Le Centenaire, ou Les Deux Beringheld*; *Le Vicaire des Ardennes*; *Le Tartare, ou Le Retour de l'exilé*. And these were again followed up in 1823 by three more: *La Dernière Fée, ou La Nouvelle Lampe merveilleuse*; *Michel et Christine et la suite*; *L'Anonyme, ou Ni père ni mère*. In 1824 came *Annette et le criminel*, a continuation of the *Vicaire*; in 1825, *Wann-Chlore*, which afterwards took the less extravagant title of *Jane la pâle*. These novels, which filled some two score volumes originally, were published under divers pseudonyms ("Lord R'hoone," an anagram of "Honoré," "Horace de Saint Aubin," &c.), and in actual collaboration with two or three other writers. But though there is not yet in them anything more than the faintest dawn of the true Balzac, though no one of them is good as a whole, and very few parts deserve that word except with much qualification, they deserve far more study than they have usually received, and it is difficult to apprehend the true Balzac until they have been studied. They ceased for a time, not because of the author's conviction of their badness (though he entertained no serious delusions on this subject), nor because they failed of a certain success in actual money return, but because he had taken to the earliest, the most prolonged, and the most disastrous of his dabblings in business —this time as a publisher to some extent and still more as a printer and type-founder. Not very much was known about his experiences in this way (except their general failure, and the result in hampering him with a load of debt directly for some ten years and indirectly for the whole of his life) till in 1903 MM. Hanotaux and Vicaire published the results of their inquiries into the actual accounts of the concern. There seems to have been no reason why it should not have succeeded, and there has been claimed for it first, that it provided Balzac with a great amount of actual detail which he utilized directly in the novels, and secondly, that it gave him at whatever cost a still more valuable experience of practical life—the experience which has so often been wanting to men of letters. Anyhow, from 1825 to 1828, the future author of the *Comédie humaine* was a publisher, printer and type-founder; and in the last year he had to abscond, or something like it, under pressure of debts which were never fully settled till 1838, and then by a further obligation of ninety thousand francs, chiefly furnished by his mother and never repaid to her.

It was Balzac's habit throughout his life to relieve the double pressure of debt and of work by frequent excursions into the country and abroad. On this occasion he fled to Brittany with an introduction to a M. and Mme. de Pommereul, who received him hospitably in their château near Fougères. Here he obtained some of the direct material, and most of the scenery and atmosphere, for what he himself recognized as his first serious attempt in novel-writing, *Les Chouans*, or, as it was at first called, *Le Dernier Chouan*. This book (obviously written in direct following of Scott, of whom Balzac was a lifelong admirer) has been very variously judged—those who lay most stress on his realism thinking little of it, while those who maintain that he was always a romantic "with a difference" place it higher. It has at any rate brilliant colouring, some very vivid scenes, and almost more passion as well as "curtain" at its ending than any other of his books. Though not without a touch of melodrama it differs utterly from the confused and tedious imitations of Mrs Radcliffe, M. G. Lewis and C. R. Maturin which fill most of the *Œuvres de jeunesse*. At the same time Balzac was engaged on a very different work, the analytic-satirical sketches which compose the *Physiologie du mariage*, and which illustrate his other and non-romantic side, again with some crudity, but again also with a vast advance on his earlier productions. Both were published in the year 1829, from which his real literary career unquestionably starts. It had exactly twenty-one years to run.

The history of these twenty-one years, though (in consequence mainly of the diligence and luck as a collector of the above-named M. de Lovenjoul) the materials for it are large and constantly accumulating, has never been arranged in a really standard biography, and there seems to be an increasing habit of concentrating the attention on parts of it. It divides itself
[v.03 p.0299]
under three heads mainly, the history of Balzac's business affairs, that of his loves and friendships and that of his actual work. The first has some small resemblance to Scott's similar experiences, though in Balzac's case there was no great crash but a lifelong pressure; on the other hand, his debts were brought upon him by a long course not so much of extravagance in actual expenditure (though there was something of this) as of financial irregularities of almost every description,—anticipations of earnings, costly methods of production (he practically wrote his novels on a succession of printed revises), speculations, travel, and lastly the collection of curiosities. As regards the second, although his fashion of life made him by turns a hermit and a vagrant, he was on good terms with most of the famous men of letters of his day from Hugo downwards, and seems never to have quarrelled with any man, except with some of his editors and publishers, by his own fault. Balzac was indeed, in no belittling sense of the word, one of the most good-natured of men of genius. But his friendships with the other sex are of much more importance, and not in the least matters of mere gossip. His sister Laure, as has been said, and a school-friend of hers, Mme Zulma Carraud, played important and not questionable parts as his correspondents. But at least three ladies, all of a rank higher than his own, figure as his "Egerias" to such an extent that it is hardly extravagant to say that Balzac would not have been Balzac without them. These are Madame de Berny, a lady connected with the court of the *ancien régime*, much older than himself and the mother of nine children, to whom he was introduced in 1821, who became to him *La dilecta*, who was the original of Mme de Mortsauf in *Le Lys dans la vallée*, and who seems to have exercised an excellent influence on him in matters of taste till her death in 1836; the marquise de Castries, who took him up for a time and dropped him, and who has been supposed to have been his model for his less impeccable ladies of fashion; and lastly, the Polish-Russian countess Evelina Hanska, who after addressing, as *l'Étrangère*, a letter to him as early as 1832, became his idol, rarely seen but constantly corresponded with, for the last eighteen years, and his wife for the last few months of his life. Some of his letters to her have long been known, but the bulk of them constituted the greatest recent addition to our knowledge of him as given in the two volumes of *Lettres à l'étrangère*. Of hers we have practically none and it is exceedingly hard to form any clear idea of her, but his devotion is absolutely beyond question.

Business, friendship and love, however, much more other things, were in Balzac's case always connected with and on the whole quite secondary to work. He would even sometimes resist the commands by which at long intervals Mme. Hanska would summon him to see her, and abstract the greater part of his actual visits to her in order to serve this still more absorbing mistress. He had, as we have seen, worked pretty hard, even before 1829, and his work had partly taken forms not yet mentioned—political pamphlets and miscellaneous articles which are now accessible in the *Édition définitive* of his works, and hardly one of which is irrelevant to a just conception of him. Nor did he by any means abandon these by-works after 1829; indeed, he at one time started and almost entirely wrote, a periodical called the *Revue parisienne*. He wrote some dramas and planned many more, though the few which reached the stage left it again promptly. Balzac's dramas, as they appear in his works, consist of *Vautrin, Les Ressources de Quinola, Paméla Giraud* (arranged for the stage by others), *La Marâtre* and *Mercadet le faiseur*, the last of which has, since his death, been not unsuccessful. But on the whole he did devote himself to his true vocation, with a furious energy beside which even Scott's, except in his sadder and later days, becomes leisurely. Balzac generally wrote (dining early and lightly, and sleeping for some hours immediately after dinner) from midnight till any hour in the following day—stretches of sixteen hours being not unknown, and the process being often continued for days and weeks. Besides his habit of correcting a small printed original into a long novel on the proofs, he was always altering and re-shaping his work, even before, in 1842, he carried out the idea of building it all into one huge structure—the *Comédie humaine* with its subdivisions of *Scènes de la vie parisienne, Études philosophiques, &c.* Much pains have been spent upon this title and Balzac's intentions in selecting it. But the "Human Comedy," as a description for mere studies of life as his, will explain itself at once or else can never be explained.

Of its constituents, however, some account must be given, and this can be best done through an exact and complete list of the whole work by years, with such abbreviated notes on the chief constituents as may lead up to a general critical summary. Of the two capital works of 1829, we have spoken. 1830, the epoch year, saw part (it was not fully published till the next) of *La Peau de chagrin*, one of the crudest, but according to some estimates, one of the greatest of the works, full of romantic extravagance and surplusage, but with an engrossing central idea—the Nemesis of accomplished desire—powerfully worked out; *La Maison du chat qui pelote*, a triumph of observation and nature, together with a crowd of things less in bulk but sometimes of the first excellence—*El Verdugo*, *Étude de femme*, *La Paix du ménage*, *Le Bal de sceaux*, *La Vendetta*, *Gobseck*, *Une Double Famille*, *Les Deux Rêves*, *Adieu*, *L'Élixir de longue vie*, *Sarrazine*, *Une Passion*

dans le désert and *Un Épisode sous la Terreur*. In 1831, *La Peau de chagrin* appeared complete, accompanied by *Le Réquisitionnaire*, *Les Proscrits*, *Le Chef-d'œuvre inconnu* (a masterpiece fortunately not unrecognized), *Jésus Christ en Flandre* and *Maître Cornélius*. 1832 gave *Madame Firmiani*, *Le Message*, *Le Colonel Chabert* and *Le Curé de Tours* (two stories of contrasted but extraordinary excellence), *La Bourse*, *La Femme abandonnée*, *Louis Lambert* (autobiographical and philosophic), *La Grenadière* and *Les Marana* (a great favourite with the author). In 1833 appeared *Ferragus, chef des dévorants*, the first part of *L'Histoire des treize* (a collection in the more extravagant romantic manner, very popular at the time, and since a favourite with some, but few, good judges), *Le Médecin de campagne* (another pet of the author's, and a kind of intended document of his ability to support the cause of virtue, but, despite certain great things, especially a wonderful popular "legend of Napoleon," a little heavy as a whole), the universally admitted masterpiece of *Eugénie Grandet*, and *L'Illustre Gaudissart* (very amusing). 1833 also saw the beginning of a remarkable and never finished work-out of his usual scope but exceedingly powerful in parts—the *Contes drolatiques*, a series of tales of Old France in Old (or at least Rabelaisian) French, which were to have been a hundred in number but never got beyond the third batch of ten. They often borrow the licence of their 15th and 16th century models; but in *La Succube* and others there is undoubted genius and not a little art. 1834 continued the *Treize* with *La Duchesse de Langeais* and added *La Recherche de l'absolu* (one of Balzac's great studies of monomania, and thought by some to be the greatest, though others prefer *Le Chef-d'œuvre inconnu*), *La Femme de trente ans* (the chief example of the author's caprice for re-handling, and very differently judged as a whole), with yet another of the acknowledged triumphs, *Le Père Goriot*. On the whole, this year's work, though not the author's largest, is perhaps his most unique. Next year (1835) followed *Melmoth réconcilié* (a tribute to the great influence which Maturin exercised, not over Balzac only, at this time in France), *Un Drame au bord de la mer*, the brilliant, if questionable, conclusion of *Les Treize*, *La Fille aux yeux d'or*, *Le Contrat de mariage* and *Séraphita*. This last, a Swedenborgian rhapsody of great beauty in parts, has divided critics almost more than anything else of its writer's, some seeing in it (with excuse) nothing but the short description given above in three words, the others (with justice) reckoning it his greatest triumph of style and his nearest attempt to reach poetry through prose. 1836 furnished *La Messe de l'athée*, *Interdiction*, *Facino Cane*, *Le Lys dans la vallée* (already referred to and of a somewhat sickly sweetness), *L'Enfant maudit*, *La Vieille Fille* and *Le Secret des Ruggieri* (connected with the earlier *Les deux Rêves* under the general title, *Sur Cathérine de Médicis*, and said to have been turned out by Balzac in a single night, which is hardly possible). In 1837 were published *Les Deux Poètes*, destined to form part of *Illusions perdues*, *Les Employés*, *Gambara* and another capital work,
[v.03 p.0300]
Histoire de la grandeur et de la décadence de César Birotteau, where Balzac's own unlucky experiences in trade are made thoroughly matter of art. 1838 was less fruitful, contributing only *Le Cabinet des antiques*, which had made an earlier partial appearance, *La Maison Nucingen* and *Une Fille d'Ève*. But 1839 made amends with the second part of *Illusions perdues*, *Un Grand Homme de province à Paris* (one of Balzac's minor diploma-pieces), *Le Curé de village* (a very considerable thing), and two smaller stories, *Les Secrets de la princesse de Cadignan* and *Massimilla Doni*. *Pierrette*, *Z. Marcas*, *Un Prince de la Bohème* and *Pierre Grassou* followed in 1840, and in 1841 *Une Ténébreuse Affaire* (one of his most remarkable workings-up of the minor facts of actual history), *Le Martyr Calviniste* (the conclusion of *Sur Cathérine de Médicis*), *Ursule Mirouet* (an admirable story), *La Fausse Maîtresse* and *Mémoires de deux jeunes mariées*, on which again there have been very different opinions. 1842 supplied *Albert Savarus* (autobiographical largely), *Un Début dans la vie*, the very variously named and often rehandled *Rabouilleuse* (which, since Taine's exaltation of it, has often been taken as a Balzacian quintessence), and *Autre étude de femme*, yet another rehandling of earlier work. In 1843 came the introduction of the completed *Sur Cathérine de Médicis*, *Honorine* and *La Muse du département* (almost as often reconstructed as *La Femme de trente ans*), with *Comment aiment les jeunes filles* (a similar rehandling intended to start the collected *Splendeurs et misères des courtisanes*), and a further instalment of *Illusions perdues*, *Les Souffrances d'un inventeur*. Three out of the next four years were astonishingly fruitful. 1844 gave *Modeste Mignon* (a book with a place to itself, and said to be founded on a story actually written by Madame Hanska), *Gaudissart II.*, *A combien l'amour revient aux vieillards* (a second part of the *Splendeurs*), *Béatrix* (one of the most powerful if not of the most agreeable), and the first and very promising part of *Les Paysans*. Only *Un Homme d'affaires* came out in 1845, but this was made up in 1846 by *Les Comédiens sans le savoir* (sketched earlier), another part of the *Splendeurs*, *Où mènent les mauvais chemins*, the first part of *Les Parents pauvres*, *La Cousine Bette* (sometimes considered the topmost achievement of Balzac's genius), and the final form of a work first issued fifteen years earlier and often retouched, *Petites misères de la vie conjugale*. 1847 was even richer, with *Le Cousin Pons* (the second part of *Les Parents pauvres*, and again a masterpiece), the conclusion of the *Splendeurs*, *La Dernière Incarnation de Vautrin*, *L'Envers de l'histoire contemporaine* (which had been on and off the stocks for five years), and the unfinished *Député d'Arcis*. This was the last scene of the comedy that appeared in the life of its author. The conclusion of the *Député d'Arcis*, published in 1853, and those of *Les Paysans* and *Les Petits Bourgeois* which appeared, the first in this year, the second wholly in 1855, are believed or known to be by Balzac's friend, Charles Rabou (1803-1871).

This immense and varied total stands to its author in a somewhat different relation from that of any other work to any other writer. It has been well said that the whole of Balzac's production was always in his head together; and this is the main justification for his syllabus of it as the "Comedy." Some part never came out of his head into print; we have numerous titles of work (sometimes spoken of in his letters as more or less finished) of which no trace remains, or only fragmentary MS. sketches. One apparently considerable book, *La Bataille*, which was to be devoted to the battle of Essling, and for which he actually visited the ground, is frequently referred to as in progress from the time of his early letters to Madame Hanska onwards; but it has never been found. Another result of this relation was the constant altering, re-shaping, re-connecting of the different parts. That if Balzac had lived as long as Hugo, and had preserved his faculties as well, he could never have finished the *Comédie*, is of course obvious: the life of Methuselah, with the powers of Shakespeare, would not suffice for that. But that he never would—even if by some impossibility he could—is almost equally certain. Whether there is any mark of decline in his latest work has been disputed, but there could hardly have been farther advance, and the character of the whole, not easy to define, is much less hard to comprehend, if prejudice be kept out of the way. That character was put early, but finally, by Victor Hugo in his funeral discourse on Balzac, whose work he declared, with unusual terseness, among other phrases of more or less gorgeous rhetoric, to be "observation and imagination." It may be doubted whether all the volumes written on Balzac (a reasoned catalogue of the best of which will be found below) have ever said more than these three words, or have ever said it more truly if the due stress be laid upon the "and." On the other side, most of the mistakes about him have arisen from laying undue stress on one of the two qualities, or from considering them separately rather than as inextricably mixed and blended. It is this blending which gives him his unique position. He is an observer of the most exact, the most minute, the most elaborate; but he suffuses this observation with so strange and constant an imaginative quality that he is, to some careful and experienced critics, never quite "real"—or almost always something more than real. He seems accustomed to create in a fashion which is not so much of the actual world as of some other, possible but not actual—no matter whether he deals with money or with love, with Paris or with the provinces, with old times or with new. A further puzzle has arisen from the fact that though Balzac has virtuous characters, he sees humanity on the whole "in black": and that, whether he actually prefers the delineation of vice, misfortune, failure, or not, he produces as a rule in his readers the sensation familiarly described as "uncomfortable." His morality has been fiercely attacked and valiantly defended, but it is absolutely certain that he wrote with no immoral intention, and with no indifference to morality. In the same way there has been much discussion of his style, which seldom achieves beauty, and sometimes falls short of correctness, but which still more seldom lacks force and adequacy to his own purpose. On the whole, to write with the shorthand necessary here, it is idle to claim for Balzac an absolute supremacy in the novel, while it may be questioned whether any single book of his, or any scene of a book, or even any single character or situation, is among the very greatest books, scenes, characters, situations in literature. But no novelist has created on the same scale, with the same range; none has such a cosmos of his own, pervaded with such a sense of the originality and power of its creator.

Balzac's life during these twenty years of strenuous production has, as regards the production itself, been already outlined, but its outward events, its distractions or avocations—apart from that almost weekly process of "raising the wind," of settling old debts by contracting new ones, which seems to have taken up no small part of it—must now be shortly dealt with. Besides constant visits to the Margonne family at Sache in Touraine, and to the Carrauds at Frapesle in Berry, he travelled frequently in France. He went in 1833 to Neuchatel for his first meeting with Madame Hanska, to

Geneva later for his second, and to Vienna in 1835 for his third. He took at least two flights to Italy, in more or less curious circumstances. In 1838, he went on a journey to Sardinia to make his fortune by melting the silver out of the slag-heaps of Roman mines—a project, it seems, actually feasible and actually accomplished, but in which he was anticipated. The year before, tired of Paris apartments, he had bought ground at Ville d'Avray, and there constructed, certainly at great, though perhaps exaggerated expense, his villa of Les Jardies, which figures largely in the Balzacian legend. His rash and complicated literary engagements, and (it must be added) his disregard of them when the whim took him, brought him into frequent legal difficulties, the most serious of which was a law-suit with the *Revue de Paris* in 1836. In 1831, and again in 1834, he had thought of standing for election as Deputy, and in the latter year he actually did so both at Cambrai and Angoulême; but it is not certain that he received any votes. He also more than once took steps to become a candidate for the Academy, but retired on several occasions before the voting, and when at last, in 1849, he actually stood, he only obtained two votes.

[v.03 p.0301] As early as the Genevan meeting of 1833, Madame Hanska had formally promised to marry Balzac in the case of her husband's death, and this occurred at the end of 1841. She would not, however, allow him even to visit her till the next year had expired, and then, though he travelled to St Petersburg and the engagement was renewed after a fashion, its fulfilment was indefinitely postponed. For some years Balzac met his beloved at Baden, Wiesbaden, Brussels, Paris, Rome and elsewhere. Only in September 1847 was he invited on the definite footing of her future husband to her estate of Wierzschovnia in the Ukraine; and even then the visit, interrupted by one excursion to Paris and back, was prolonged for more than two years before (on the 14th of March 1850) the wedding actually took place. But Balzac's own *Peau de chagrin* was now reduced to its last morsel. His health, weakened by his enormous labours, had been ruined by the Russian cold and his journeyings across Europe. The pair reached the house at Paris in the rue Fortunée, which Balzac had bought for his wife and filled with his collections, at the end of May. On Sunday, the 17th of August, Victor Hugo found Balzac dying, attended by his mother, but not by his wife. He actually died at half-past eleven that night and was buried on the 20th, the pall-bearers being Hugo himself, Dumas, Sainte-Beuve (an enemy, but in this case a generous one) and the statesman Baroche, in Père La Chaise, where Hugo delivered the speech cited above.

Bibliography.—The extraordinarily complicated bibliography of Balzac will be found all but complete in the *Histoire des œuvres* (1875 and later), attached by M. Spoelberch de Lovenjoul to the *Édition définitive*, and supplemented by him in numerous smaller works, *Autour de Balzac*, *Une Page perdue de Balzac*, &c. Summaries of it will be found appended to the introductory critical notices of each volume of the English translation edited by Saintsbury (London, 1895-1898), which also contains a short Memoir and general criticism. Before the *Édition définitive* (1869 onwards), the works had been issued during the author's life in various forms and instalments, the earliest *Comédie humaine* being of 1842 to 1846 in sixteen volumes. For many years, however, the edition best known was that referred to in Browning as "all Balzac's novels fifty volumes long," really fifty-five small and closely printed 24mos kept stereotyped with varying dates by Michel (Calmann) Lévy, which did not contain the miscellaneous works and was not arranged according to the author's last disposition, but did include the *Œuvres de jeunesse*. These were not reprinted in the *Édition définitive*, but this gives the miscellaneous works in four volumes, an invaluable volume of correspondence, and the *Histoire des œuvres* as cited. To this was added, in 1893, another volume, *Répertoire des œuvres de Balzac*, in which the history of the various personages of the *Comédie* is tracked throughout and ranged under separate articles by MM. Cerfbeer and Christophe with extraordinary pains, and with a result of usefulness which should have protected it from some critical sneers. In 1899 appeared, as the first volume of *Œuvres posthumes*, an instalment of the *Lettres à l'étrangère*, and in 1906 a second (up to 1844) with a portrait of Madame Hanska, and other illustrations.

Works on Balzac are very numerous, and some of them are of much importance. Sainte-Beuve and Balzac fell out, and a furious diatribe by the novelist on the critic is preserved; but the latter's postmortem examination in *Causeries du lundi*, vol. ii., is not unfair, though it could hardly be cordial. Gautier, who was a very intimate and trusty friend of Balzac, has left an excellent study, mainly personal, reprinted in his *Portraits contemporains*. Lamartine produced a volume, not of much value, on Balzac in 1866; and minor contemporaries—Gozlan, Lemer, Champfleury—supplied something. But the series of important studies of Balzac, based on the whole of his work and not biased by friendship or enmity, begins with Taine's Essay of 1858, reprinted in volume form, 1865. Even then the *Œuvres diverses* were accessible only by immense labour in the scattered originals, and the invaluable *Correspondance* not at all. It was not till the reunion of all in the *Édition définitive* was completed, that full study of man and work was possible. To this edition itself was attached a sort of official critical introduction, *L'Œuvre de Balzac*, by M. Marcel Barrière (1890). But this is largely occupied by elaborate analyses of the different books, and the purely critical part is small, and not of the first value. Better are M. Paul Flat's *Essais sur Balzac* (2 vols., 1893-1894), which busy themselves especially with tracing types of character. Important and new biographical details (including the proper spelling of the name) were given in M. Edmond Biré's *Honoré de Balzac* (1897). The *Balzac ignoré* of A. Cabanes (1899) is chiefly remarkable for its investigations of Balzac's fancy for occult studies, and the first part (*Balzac imprimeur*) of MM. Hanotaux and Vicaire's *La Jeunesse de Balzac* (1903) mentioned above, for its dealing with the printing business and the intimacy with Madame de Berny. Two most important studies of Balzac in French, are those of M. A. Le Breton, *Balzac, l'homme et l'œuvre* (1905), a somewhat severe, but critical and very well-informed examination, and M. Ferdinand Brunetière's *Honoré de Balzac* (1906), a brilliant but rather one-sided panegyric on the subject as the evolver of the modern novel proper, and a realist and observer *par excellence*. In English, translations of separate books are innumerable; of the whole, besides that mentioned above, but containing a few things there omitted, an American version by Miss Wormeley and others may be mentioned. The most elaborate monograph in English, till recently, was F. Wedmore's *Balzac* (1887), with a useful bibliography up to the time. The recent additions to our knowledge are utilized in Miss Mary F. Sandars' *Balzac* (1904), a rather popular, but full and readable summary, chiefly of the life, from all but the latest documents, and W. H. Helm's *Aspects of Balzac* (1905), which is critical as well as anecdotic. The present writer, besides the critical and biographical essays referred to above, prefixed a shorter one to a translation of *Les Chouans* executed by himself in 1890.

(G. Sa.)

BALZAC, JEAN LOUIS GUEZ DE (1594-1654), French author, was born at Angoulême in 1594. At the age of eighteen he travelled in Holland with Théophile de Viaud, with whom he later exchanged bitter recriminations. He was early befriended by the duc d'Épernon and his son Louis, Cardinal de la Valette, who took him to Rome. His letters written to his acquaintances and to many who held a high position at the French court gained for him a great reputation. Compliments were showered upon him, he became an habitué of the Hôtel de Rambouillet, and his head appears to have been turned a little by his success. Richelieu was lavish of praise and promises, but never offered Balzac the preferment he expected. In 1624 a collection of his *Lettres* was published, and was received with great favour. From the château of Balzac, whither he had retired, he continued to correspond with Jean Chapelain, Valentin Conrart and others. In 1634 he was elected to the Academy. He died at Angoulême on the 18th of February 1654. His fame rests chiefly upon the *Lettres*, a second collection of which appeared in 1636. *Recueil de nouvelles lettres* was printed in the next year. His letters, though empty and affected in matter, show a real mastery of style, introducing a new clearness and precision into French prose and encouraging the development of the language on national lines by emphasizing its most idiomatic elements. Balzac has thus the credit of executing in French prose a reform parallel to Malherbe's in verse. In 1631 he published an eulogy of Louis XIII. entitled *Le Prince*; in 1652 the *Socrate chrétien*, the best of his longer works; *Aristippe ou de la Cour* in 1658; and several dissertations on style.

His *Œuvres* were collected (2 vols.) in 1665 by Valentine Conrart. There are numerous English translations from Balzac, dating from the 17th century.

BAM, a town of Persia in the province of Kerman, situated 115 m. S.E. of the city of Kerman at an elevation of 3600 ft. on both banks of the river Bam. Pop. about 13,000. It is the capital of the Bam-Narmashir district and has extensive groves of date-palms and gardens. Outside the town stands the famous citadel with walls 40 ft. in height. This citadel was, even as late as the beginning of the 19th century, the strongest fortified place in Persia, and owed its strength to the Afghans who took Bam in 1719 and were not finally expelled until 1801. Post and telegraph offices have been established there since

1903.

BAMBERG, a town and archiepiscopal see of Germany, in the kingdom of Bavaria. Pop. (1885) 31,521; (1905) 45,308. It lies on an open plain on the river Regnitz, 2 m. above its junction with the Main, and 39 m. north of Nuremberg by railway. The upper town is built on seven hills, each crowned by a church, while the lower, still partially surrounded by walls and ditches, is divided by the river and Ludwigskanal into three districts. The cathedral is a noble late Romanesque building with four imposing towers. It was founded in 1004 by the emperor Henry II., finished in 1012, afterwards partially burnt, and rebuilt in the 13th century. Of its many works of art may be mentioned the magnificent marble tomb of the founder and his wife, the empress Cunigunde, carved by Tilman Riemenschneider between 1499 and 1513, and an equestrian statue of the emperor Conrad III. Other noteworthy churches are the Jakobskirche, an 11th-century Romanesque basilica; the St Martinskirche; the Marienkirche or Obere Pfarrkirche (1320-1387), which has now been restored to its original pure Gothic style. The Michaelskirche, 12th-century Romanesque (restored), on the Michaelsberg, was formerly the church of a Benedictine monastery secularized in 1803, which now contains the Bürgerspital, or alms-house, and the museum and municipal art collections. Of the bridges connecting the sections of the lower town the most interesting is the *Obere Brücke*, completed in 1455. Halfway across this, on an artificial island, is the Rathaus (rebuilt 1744-1756). The royal lyceum, formerly a Jesuit college, contains notable collections and the royal library of over 300,000 volumes. The picturesque Old Palace (*Alte Residenz*) was built in 1591 on the site of an old residence of the counts of Babenberg. The New Palace (1698-1704) was formerly occupied by the prince-bishops, and from 1864 to 1867 by the deposed King Otto of Greece. Noteworthy among the monuments of the town is the Maximilian fountain (1880), with statues of Maximilian I. of Bavaria, the emperor Henry II. and his wife, Conrad III. and St Otto, bishop of Bamberg. At a short distance from the town is the Altenburg (1266 ft.), a castle occupied from 1251 onwards by the bishops of Bamberg. It was destroyed in 1553 by Albert, margrave of Brandenburg, but has been partly restored. The schools include the lyceum for philosophy and Catholic theology (a survival of the university suppressed in 1803), a seminary, two gymnasia, a Realschule, and several technical schools, including one for porcelain-painting. The industries of the town include cotton spinning and weaving, silk spinning, the manufacture of tobacco, ropes, metal-ware, furniture, &c. The market gardens of the neighbourhood are famous, and there is a considerable shipping trade by the river and the Ludwigskanal.

[v.03 p.0302]

Bamberg, first mentioned in 902, grew up by the castle (Babenberch) which gave its name to the Babenberg family (*q.v.*). On their extinction it passed to the Saxon house, and in 1007 the emperor Henry II. founded the see. From the middle of the 13th century onward the bishops were princes of the Empire. The see was secularized in 1802 and in 1803 assigned to Bavaria.

A brief history of the bishopric is given in the *Catholic Encyclopaedia* (London and New York, 1909), with bibliography. For general and special works on the town see Ulysse Chevalier, *Topobibliographie* (Montbéliard, 1894-1899), s.v.

BAMBERGER, LUDWIG (1823-1899), German economist and politician, was born of Jewish parents on the 22nd of July 1823 at Mainz. After studying at Giessen, Heidelberg and Göttingen, he entered on the practice of the law. When the revolution of 1848 broke out he took an active part as one of the leaders of the republican party in his native city, both as popular orator and as editor of one of the local papers. In 1849 he took part in the republican rising in the Palatinate and Baden; on the restoration of order he was condemned to death, but he had escaped to Switzerland. The next years he spent in exile, at first in London, then in Holland; in 1852 he went to Paris, where, by means of private connexions, he received an appointment in the bank of Bischoffheim & Goldschmidt, of which he became managing director, a post which he held till 1866. During these years he saved a competence and gained a thorough acquaintance with the theory and practice of finance. This he put to account when the amnesty of 1866 enabled him to return to Germany. He was elected a member of the Reichstag, where he joined the National Liberal party, for like many other exiles he was willing to accept the results of Bismarck's work. In 1868 he published a short life of Bismarck in French, with the object of producing a better understanding of German affairs, and in 1870, owing to his intimate acquaintance with France and with finance, he was summoned by Bismarck to Versailles to help in the discussion of terms of peace. In the German Reichstag he was the leading authority on matters of finance and economics, as well as a clear and persuasive speaker, and it was chiefly owing to him that a gold currency was adopted and that the German Imperial Bank took its present form; in his later years he wrote and spoke strongly against bimetallism. He was the leader of the free traders, and after 1878 refused to follow Bismarck in his new policy of protection, state socialism and colonial development; in a celebrated speech he declared that the day on which it was introduced was a *dies nefastus* for Germany. True to his free trade principles he and a number of followers left the National Liberal party and formed the so-called "Secession" in 1880. He was one of the few prominent politicians who consistently maintained the struggle against state socialism on the one hand and democratic socialism on the other. In 1892 be retired from political life and died in 1899. Bamberger was a clear and attractive writer and was a frequent contributor on political and economic questions to the *Nation* and other periodicals. His most important works are those on the currency, on the French war-indemnity, his criticism of socialism and his apology for the Secession.

An edition of his collected works (including the French life of Bismarck) was published in 1894 in five volumes. After his death in 1899 appeared a volume of reminiscences, which, though it does not extend beyond 1866, gives an interesting picture of his share in the revolution of 1848, and of his life in Paris.

(J. W. He.)

BAMBINO, IL (Ital. for "the Babe"), the name given in art to the image of the infant Jesus in swaddling clothes common in Roman Catholic churches. The most famous is the miracle-working *Santissimo Bambino* in the church of Ara Coeli at Rome, the festival of which is celebrated on the feast of the Epiphany (January 6).

BAMBOO, the popular name for a tribe of grasses, *Bambuseae*, which are large, often tree-like, with woody stems. The stems spring from an underground root-stock and are often crowded to form dense clumps; the largest species reach 120 ft. in height. The slender stem is hollow, and, as generally in grasses, has well-marked joints or nodes, at which the cavity is closed by a strong diaphragm. The branches are numerous and in some species spiny; the narrow, often short, leaf-blade is usually jointed at the base and has a short stalk, by which it is attached to the long sheath. The spikelets are usually many-flowered and variously arranged in racemes or panicles. The flower differs from that of the majority of grasses in having usually three lodicules and six stamens. Many species bloom annually, but others only at intervals sometimes of many years, when the individuals of one and the same species are found in bloom over large areas. Thus on the west coast of India the simultaneous blooming of *Bambusa arundinacea* (fig. 1), one of the largest species, has been observed at intervals of thirty-two years. After ripening of the seed, the leafless flowering culms always die down.

The *Bambuseae* contain twenty-three genera and occur throughout the tropical zone, but very unevenly distributed; they also extend into the sub-tropical and even into the temperate zone. Tropical Asia is richest in species; in Africa there are very few. In Asia they extend into Japan and to 10,000 ft. or more on the Himalayas; and in the Andes of South America they reach the snow-line.

[v.03 p.0303]

The fruit in *Bambusa*, *Arundinaria* and other genera resembles the

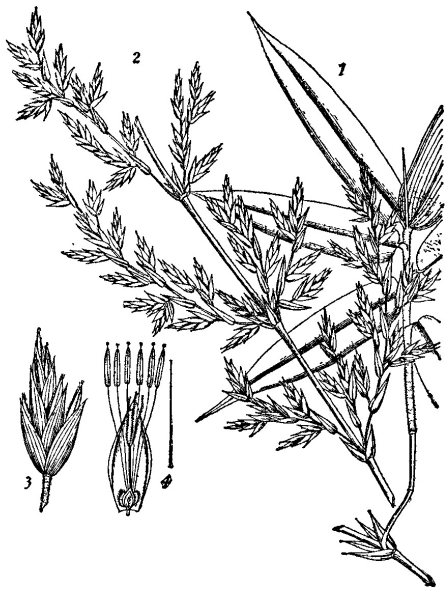


Fig. 1.—*Bambusa arundinacea*, an Indian bamboo. 1, Leafy

grain generally characteristic of grasses, but in *Dendrocalamus* and others it is a nut, while rarely, as in *Melocanna*, it is fleshy and suggests an apple in size and appearance. The uses to which all the parts and products of the bamboo are applied in Oriental countries are almost endless. The soft and succulent shoots, when just beginning to spring, are cut off and served up at table like asparagus. Like that vegetable, also, they are earthed over to keep them longer fit for consumption; and they afford a continuous supply during the whole year, though it is more abundant in autumn. They are also salted and eaten with rice, prepared in the form of pickles or candied and preserved in sugar. As the plant grows older, a species of fluid is secreted in the hollow joints, in which a concrete substance once highly valued in the East for its medicinal qualities, called *tabaxir* or *tabascheer*, is gradually developed. This substance, which has been found to be a purely siliceous concretion, is possessed of peculiar optical properties. As a medicinal agent the bamboo is entirely inert, and it has never been received into the European materia medica.

shoot. 2, Branch of inflorescence. 3, Spikelet. 4, Flower.

The grains of the bamboo are available for food, and the Chinese have a proverb that it produces seed more abundantly in years when the rice crop fails, which means, probably, that in times of dearth the natives look more after such a source of food. The Hindus eat it mixed with honey as a delicacy, equal quantities being put into a hollow joint, coated externally with clay, and thus roasted over a fire. The fleshly fruit of *Melocanna* is baked and eaten. The plant is a native of India, but is sometimes cultivated as in Mauritius. It is, however, the stem of the bamboo which is applied to the greatest variety of uses. Joints of sufficient size form water buckets; smaller ones are used as bottles, and among the Dyaks of Borneo they are employed as cooking vessels. Bamboo is extensively used as a timber wood, and houses are frequently made entirely out of the products of the plant; complete sections of the stem form posts or columns; split up, it serves for floors or rafters; and, interwoven in lattice-work, it is employed for the sides of rooms, admitting light and air. The roof is sometimes of bamboo solely, and when split, which is accomplished with the greatest ease, it can be formed into laths or planks. It is employed in shipping of all kinds; some of the strongest plants are selected for masts of boats of moderate size, and the masts of larger vessels are sometimes formed by the union of several bamboos built up and joined together.

Fig. 2.—Bamboo (*Bambusa vulgaris*), very much reduced. Grows 20 to 50 ft high.

The bamboo is employed in the construction of all kinds of agricultural and domestic implements and in the materials and implements required in fishery. Bows are made of it by the union of two pieces with many bands; and, the septa being bored out and the lengths joined together, it is employed, as we use leaden pipes, in transmitting water to reservoirs or gardens. From the light and slender stalks shafts for arrows are obtained; and in the south-west of Asia there is a certain species of equally slender growth, from which writing-pens or reeds are made. A joint forms a holder for papers or pens, and it was in a joint of bamboo that silk-worm eggs were carried from China to Constantinople during the reign of Justinian. The outer cuticle of Oriental species is so hard that it forms a sharp and durable cutting edge, and it is so siliceous that it can be used as a whetstone. This outer cuticle, cut into thin strips, is one of the most durable and beautiful materials for basket-making, and both in China and Japan it is largely so employed. Strips are also woven into cages, chairs, beds and other articles of furniture, Oriental wicker-work in bamboo being unequalled for beauty and neatness of workmanship. In China the interior portions of the stem are beaten into a pulp and used for the manufacture of the finer varieties of paper. Bamboos are imported to a considerable extent into Europe for the use of basket-makers, and for umbrella and walking-sticks. In short, the purposes to which the bamboo is applicable are almost endless, and well justify the opinion that "it is one of the most wonderful and most beautiful productions of the tropics, and one of Nature's most valuable gifts to uncivilized man" (A. R. Wallace, *The Malay Archipelago*).

A number of species of bamboo are hardy under cultivation in the British Isles. A useful and interesting account of these and their cultivation will be found in the *Bamboo Garden*, by A. B. Freeman-Mitford. They are mostly natives of China and Japan and belong to the genera *Arundinaria*, *Bambusa* and *Phyllostachys*; but include a few Himalayan species of *Arundinaria*. They may be propagated by seed (though owing to the rare occurrence of fruit, this method is seldom applicable), by division and by cuttings. They are described as hungry plants which well repay generous treatment, and will flourish in a rich, not too stiff loam, and for the first year or two should be well mulched. They should be sheltered from winds and well watered during the growing period. When being transplanted the roots must be disturbed as little as possible. The following may be mentioned; *Arundinaria simoni*, a fine plant which in the bamboo garden at Kew has reached 18 ft. in height, and not infrequently flowers and fruits in Britain; *A. japonica*, a tall and handsome plant generally grown in gardens under the name *Bambusa métaké*; *A. nitida*, "by far the daintiest and most attractive of all its genus, and remarkably hardy"; *Bambusa palmata*, with leaves a foot or more long and three inches broad; *B. tesselata*; *B. quadrangularis*, remarkable for its square stems; *Phyllostachys mitis*, growing to 60 ft. high in its native home, China and Japan; and *P. nigra*, so called from the black stem, a handsome species.

BAMBURGH, or Bamborough, a village in the Berwick-upon-Tweed parliamentary division of Northumberland, England, on the sea-coast, 2½ m. E. of Belford station on the North Eastern railway, and 54 m. N. of Newcastle. It was a royal borough previous to the Norman Conquest and returned two members to parliament in the reign of Edward I. Its ancient castle occupies a magnificent position close to the sea on an almost perpendicular rock, 150 ft. in height, accessible only on the south-east side.

The first erection is ascribed by the Saxon chronicles to King Ida of Northumberland. The castle buildings are of various dates from the Norman period and are of great strength and dignity. They include a massive keep and the remains of an apsidal chapel dedicated to St Peter. In the village, the church is dedicated to St Aidan, who was bishop of Lindisfarne or Holy Island, which lies off the coast to the north, about 634. It is a fine cruciform building, mainly of Early English date, with a crypt beneath the chancel. In the churchyard is a monument to Grace Darling (1815-1842), the brave rescuer of some of the crew of the ship "Forfarshire" in 1838. The Longstone Lighthouse, where her father was keeper, stands on an outer rock of the Farne Islands, which stretch north-eastward for 6 m. from the coast at Bamburgh.

The town of Bamburgh (*Bebbanburgh*) sprang up round the ancient castle. During the struggle for the crown between William Rufus and Robert of Normandy, Bamburgh was besieged by William, who, finding the defence too strong, erected and garrisoned a new castle before Bamburgh called "Malveisin" or "Evil neighbour." Earl Robert of Northumberland, who was in command of Bamburgh, having been defeated in a sally, the castle surrendered to William in November 1095. The first mention of Bamburgh as a borough does not occur until 1169, when the men paid 2½ marks to an aid. Henry III. by charter of 1254-1255 granted the burgesses their town at an annual fee farm rent of 26 marks, of which they were acquitted in 1318 and 1327 "on account of the robberies and fires inflicted on them by the Scots." Edward III. in 1332 confirmed the charter of Henry III., and granted further that the town should be a free borough governed by four bailiffs, that it should be enclosed by a wall and that the burgesses should have a gild merchant. He also altered the market-day from Sunday to Wednesday, and gave licence for the fairs, which had been held "from time immemorial" on the feasts of SS. Oswald and Aidan, to continue for three extra days. During the Scottish wars of the reign of Henry V., Bamburgh again suffered severely, so much so that in 1439 the burgesses had decreased in number from 120 to 13. These again petitioned for a remission of their farm, which in 1446 was reduced to £10 yearly. Bamburgh was twice taken by the Yorkists in the Wars of the Roses and twice recovered by Queen Margaret. In 1463, after it had been recovered a second time by the queen, Henry VI. stayed there for a year, but after the battle of Hexham it was again taken by the Yorkists, and the castle and town were then so much injured that from that time there is no mention of the burgesses or their privileges. Bamburgh returned two members to parliament in 1295 and again in Edward III.'s reign, but since then has never been represented. In 1384 Lord Neville received licence to dig for sea-coal in Bamburgh, and mines of coal and lead existed there as late as 1681.

BAMBUTE (sometimes incorrectly called BATWA), a race of pygmies of the Semliki Forest, on the western borders of the Uganda Protectorate between Albert Nyanza and Albert Edward Nyanza. They probably form merely a branch of the pygmy race of Equatorial Africa, represented farther west by H. von Wissmann's Batwa (*q.v.*). Their complexion varies from reddish-yellow to brownish-black, with head-hair often of a russet-brown, and body-hair, black and bristly on upper lip, chin, chest, axillae and pubes, yellowish and fleecy on cheeks, back and limbs. Their average height is 4 ft. 9 in. Even when forced to keep clean, their skins give out a rancid odour, something (Sir H. H. Johnston says) between the smell of a monkey and a negro. Their faces are remarkable for the long upper lip, and the bridgeless nose with enormous alae (the cartilage of the nose above the nostrils). Like the Batwa they are nomad hunters, building only huts of sticks and leaves, and living in the forest, where they hunt the largest game with no weapon but a tiny bow from which they shoot poisoned arrows. Sir H. H. Johnston states that the Bambute have a good idea of drawing, and with a sharpened stick can sketch in sand or mud the beasts and birds known to them. The Bambute do not tattoo or scar, nor have they any love of ornament, wearing no ear-rings, necklets, anklets, &c. The upper incisors and canines are sharpened to a point. In the forests they go quite naked. They speak a corrupted form of the dialects of their negro neighbours. They have a peculiar way of singing their words. Their voices are low and musical and the pronunciation is singularly staccato, every syllable being separately uttered. They show no trace of spirit or ancestor worship, but have some idea that thunder, lightning and rain are manifestations of an Evil Power, and that the dead are reincarnated in the red bush-pig. They have no tribal government, accepting as temporary lawgiver some adept hunter. Marriage is by purchase; polygamy seems to exist, but the domestic affections are strong. The dead are buried in dug graves, and food, tobacco and weapons are often placed with the corpse. The Bambute are very musical, though they are uninventive as regards instruments. They have many songs which they sing well and they dance with spirit.

See A. de Quatrefages, *The Pygmies* (Eng. edit. 1895); Sir H. H. Johnston, *Uganda Protectorate* (1902).

BAMFORD, SAMUEL (1788-1872), English labour politician, was born at Miston, near Middleton, Lancashire, on the 28th of February 1788. Himself a stalwart weaver, he was opposed to physical force movements and did all he could to restrain the violent resistance to trade oppression which was so common; yet through attending and speaking at the meeting (1819) at Peterloo, Manchester (*q.v.*), which was intended to be a peaceful gathering to petition for Parliamentary reform and a repeal of the Corn Law but ended in a massacre, he was arrested for a breach of the law, convicted and sentenced to twelve months' imprisonment. He was the author of several widely popular poems (principally in the Lancashire dialect) showing sympathy with the conditions of his class, and his *Passages in the Life of a Radical* (1840-1844) is an authoritative history of the condition of the working classes in the years succeeding the battle of Waterloo. He died at Harpurhey on the 13th of April 1872, and was accorded a public funeral, attended by thousands.

BAMIAN, a once renowned city of Afghanistan, situated about 80 m. N.W. of Kabul. Its remains lie in a valley of the Hazara country, on the chief road from Kabul towards Turkestan, and immediately at the northern foot of that prolongation of the Indian Caucasus now called Koh-i-Baba. The passes on the Kabul side are not less than 11,000 and 12,000 ft. in absolute height, and those immediately to the north but little inferior. The height of the valley was fixed at about 8500 ft., and the surrounding country carefully surveyed by Major Pelham J. Maitland and the Hon. M. G. Talbot, during the progress of the Russo-Afghan Boundary Commission in November 1885. The river draining the valley is one of the chief sources of the Sarkhab (Surkhab) or Aksarai, an important tributary of the Upper Oxus. The prominences of the cliffs which line the valley are crowned by the remains of numerous massive towers, whilst their precipitous faces are for 6 or 7 m. pierced by an infinity of ancient cave-dwellings, some of which are still occupied. The actual site of the old city is marked by mounds and remains of walls, and on an isolated rock in the middle of the valley are considerable ruins of what appears to have been the acropolis, now known to the people as Ghulgulah. But the most famous remains at Bamian are two colossal standing idols, carved in the cliffs on the north side of the valley. They are 173 ft. and 120 ft. high respectively. These images, which have been much injured, apparently by cannon-shot, are cut in niches in the rock, and both images and niches have been coated with stucco. There is an inscription, not yet interpreted, over the greater idol, and on each side of its niche are staircases leading to a chamber near the head, which shows traces of elaborate ornamentation in azure and gilding. These chambers are used by the amir as store-houses for grain. The surface of the niches also has been painted with figures. In one of the branch valleys is a similar colossus, somewhat inferior in size to the second of these two; and there are indications of other niches and idols. Chahilburj, 28 m. from Zari, on the road to Balkh by the Balkhab, at the east end of the Sokhtagi valley; Shahr-i-Babar, about 45 m. above Chahilburj; and Gawargin, 6 m. above Shahr-i-Babar, are all fortified sites of about the same age as the relics at Bamian. At Haibak there is a very perfect excavation called the Takht-i-Rustam (a general name for all incomprehensible constructions amongst the modern inhabitants of Afghan Turkestan), which consists of an annular ditch enclosing a platform, with a small house about 21 ft. square above it, all cut out of the solid rock. There are hundreds of caves in this neighbourhood, all pointing to a line of Buddhist occupation connecting Balkh with Kabul. As seen from the rock of Ghulgulah, Bamian, with its ruined towers, its colossi, its innumerable grottos, and with the singular red colour of its barren soil, presents an impressive aspect of desolation and mystery.

That the idols of Bamian, about which so many conjectures have been uttered, were Buddhist figures, is ascertained from the narrative of the Chinese pilgrim, Hsüan-Tsang, who saw them in their splendour in A.D. 630, and was verified by the officers above named, who discovered other Buddhist caves and excavations in the valleys of the Balkhab and Sarikol.

[v.03 p.0305]

Still vaster than these was a recumbent figure, 2 m. east of Bamian, representing Sakya Buddha entering *Nirvāna*, *i.e.* in act of death. This was "about 1000 ft. in length." No traces of this are alluded to by modern travellers, but in all likelihood it was only formed of rubble plastered (as is the case still with such *Nirvāna* figures in Indo-China) and of no durability. For a city so notable Bamian has a very obscure history. It does not seem possible to identify it with any city in classical geography; *Alexandria ad Caucasum* it certainly was not. The first known mention of it seems to be that by Hsuan-Tsang, at a time when apparently it had already passed its meridian, and was the head of one of the small states into which the empire of the White Huns had broken up. At a later period Bamian was for half a century, ending A.D. 1214, the seat of a branch of the Ghori dynasty, ruling over Tokharistan, or the basin of the Upper Oxus. The place was long besieged, and finally annihilated (1222) by Jenghiz Khan, whose wrath was exasperated at the death of a favourite grandson by an arrow from its walls. There appears to be no further record of Bamian as a city; but the character of ruins at Ghulgulah agrees with traditions on the spot in indicating that the city must have been rebuilt after the time of the Mongols and again perished. In 1840, during the British occupation of Kabul, Bamian was the scene of an action in which Colonel William H. Dennie with a small force routed Dost Mahommed Khan, accompanied by a number of Uzbeg chiefs.

See Hon. M. G. Talbot, "The Rock-cut Caves and Statues of Bamian," *Journal R. Austral. Soc.* vol. xviii. part 3; and J. A. Gray, *At the Court of the Amir* (1895).

(T. H. H.*)

BAMPTON, JOHN (*c.* 1690-1751), English divine, was a member of Trinity College, Oxford, where he graduated M.A. in 1712, and for some time canon of Salisbury. He died on the 2nd of June 1751, aged 61. His will directs that eight lectures shall be delivered annually at Oxford in the University Church on as many Sunday mornings in full term, "between the commencement of the last month in Lent term and the end of the third week in Act term, upon either of the following subjects:—to confirm and establish the Christian faith, and to confute all heretics and schismatics; upon the divine authority of the Holy Scriptures; upon the authority of the writings of the primitive fathers, as to the faith and practice of the primitive Church; upon the divinity of our Lord and Saviour Jesus Christ; upon the divinity of the Holy Ghost; upon the articles of the Christian faith as comprehended in the Apostles' and Nicene Creeds." The lecturer, who must be at least a Master of Arts of Oxford or Cambridge, was formerly chosen yearly by the heads of colleges, on the fourth Tuesday in Easter term, and no one can be chosen a second time. The series of lectures began in 1780, and is still continued, though since 1895 elections are only made in alternate years through a depreciation of the revenue of the fund. The endowment provides £120 for each lecturer, and the lectures have to be published within two months of their delivery. Among the lecturers have been Heber in 1815 (*The Personality and Office of the Christian Comforter*); R. Whately in 1822 (*Party*

Feeling in Religion); R. D. Hampden in 1832 (*The Scholastic Philosophy in relation to Christian Theology*); E. M. Goulburn in 1850 (*The Resurrection of the Body*); H. L. Mansel in 1858 (*The Limits of Religious Thought*); H. P. Liddon in 1866 (*The Divinity of our Lord*); E. Hatch in 1880 (*The Organization of the Early Christian Churches*); C. Bigg in 1886 (*Christian Platonists of Alexandria*); C. Gore in 1891 (*The Incarnation*); W. Sanday in 1893 (*Inspiration*); J. R. Illingworth in 1894 (*Personality, Human and Divine*); W. R. Inge in 1899 (*Christian Mysticism*), &c. A complete list is given in the *Oxford Historical Register*. The institution has done much to preserve a high standard in English theology; and the lectures as a whole form a historically interesting collection of apologetic literature.

BAMPŪR, a town of Persia, in the province of Baluchistan, 330 m. S.E. of Kerman, in 27° 12′ N., 60° 24′ E., at an elevation of 1720 ft. Pop. about 2000. It is the capital of the province and situated on the banks of the Bampūr river which flows from east to west and empties itself about 70 m. W. into a *hamun*, or depression, 50 m. in length, and called Jazmorian. The old citadel of Bampūr which crowned an elevation about 100 ft. in height, 3 m. north of the river, having completely fallen in ruins, a new fort called Kalah Nāsseri, was built at Fahraj, 15 m. further east, in the eighties; and Fahraj, which now has a population of about 2500, has become more important than Bampūr. Fahraj, which is also known as Pahura, Paharu, Puhra, is by some identified as the Poura where Alexander the Great halted on his march from India, but others are more in favour of another Fahraj near Bam, or even of Bampūr itself.

BAMRA, a feudatory state of India, in the province of Bengal. Area 1988 sq. m.; pop. (1901) 123,378; estimated revenue £5000; tribute £100. Most of the country is forest, producing only timber and lac but said to be rich in iron ore. The northern border is touched by the Bengal-Nagpur railway, with a station at Bamra town. The state is one of the five Uriya feudatories, which were transferred from the Central Provinces to Bengal, on the reconstitution of that province in October 1905. The capital is Deogarh.

BAN, a word taken from the root of a verb common to many Teutonic languages and meaning originally "to proclaim" or "to announce." The Late Lat. form of the word is *bannum*.

In the laws of the Franks and kindred tribes the word had three main uses: first in the general sense of a proclamation, secondly, for the fine incurred for disobeying such proclamation, and thirdly for the district over which proclamations were issued.

It was the frequent use of proclamations or bans, commanding or forbidding certain actions under a threat of punishment, which caused the second of these uses to arise out of the first, as the idea of wrong-doing became associated with the proclamation or ban. This *bannum dominicum*, as it was called, was employed by all feudal lords, from the king downwards, against offenders, and played an important part in the administration of justice in feudal times. It usually took the form of an order to make some amend for wrong-doing, which, if not complied with, was followed by the withdrawal of all protection from the offender, *i.e.* by outlawry.

After the break-up of the Carolingian empire another use of the word arose in France. "Ban" had occasionally been used in a restricted sense referring only to the summons calling out the host; and as France became separated from the Empire, French law and custom seized upon this use, and soon the men liable to military service were known as "the ban." A variant form of this word was *heriban* or *ariban*, and it is possible that some confusion between the early syllables of this word and the word *arrière* led to a distinction between the *ban* and the *arrière-ban* or *retro-bannum*. At all events this distinction arose; the *ban* referring to the vassals called out by the king, and the *arrière-ban* to the sub-vassals called upon by the vassals in their turn. As in England, the liability to military service was often commuted for a monetary payment, and there were various exemptions. In the 17th and 18th centuries the ban and arrière-ban were lacking in discipline when called out, and were last summoned in 1758. Local levies, however, called out between this date and the Revolution were sometimes referred to by these names.

In the medieval Empire and in Germany the word "ban" retained the special sense of punishment. The German equivalent of ban is *Acht*, and the sentence soon became practically one of outlawry. Connected possibly with the power enjoyed in earlier times by the assemblies of freemen of outlawing an offender, it was frequently used by the emperor, or German king, and the phrase "under the ban" is very common in medieval history. The execution of this sentence of placing an offender under the imperial ban, or *Reichsacht*, was usually entrusted to some prince or noble, who was often rewarded with a portion of the outlaw's lands. It was, however, only a serious punishment when the king or his supporters were strong enough to enforce its execution. Employed not only against individuals but also against towns and districts, it was sometimes divided into the *Acht* and the *Oberacht*, *i.e.* partial or complete outlawry. Documents of the time show that the person placed under the imperial ban drew down absolute destitution upon his relatives and frequently death upon himself. At first this sentence was the act of the emperor or king himself, but as the Empire became more German, and its administration less personal, it was entrusted to the imperial aulic council (*Reichshofrat*), and to the imperial court of justice or imperial chamber (*Reichskammergericht*). These courts were deprived of this power in 1711, retaining only the right of suggesting its use. The imperial ban had, however, been used for the last time in 1706, when Maximilian Emanuel, elector of Bavaria, was placed under it.

[v.03 p.0306]

There are many other uses of the word in the sense of a prohibition. In earlier French law the ban of wine or *bannum vini*, was the exclusive right of a lord to sell wine during a stated number of days, and the ban of March and April forbade the pasturing of cattle in certain fields during these months. There were also other similar uses dating from feudal times. In modern French law the phrase *rupture de ban* described, previous to 1885, the departure without notice of any released criminal living under the special surveillance of the police. The French government still retains the rights of appointing an obligatory place of residence for any criminal, and any escape from this place is a *rupture de ban*. A Scandinavian use of the word gives it the sense of a curse. This usage mingling with the use which spiritual lords shared with temporal lords of issuing the ban over their dependents, has become in a special sense ecclesiastical, and the sentence of excommunication is frequently referred to as "under the papal ban." The word is also used in this way by Shakespeare and Milton. The modern English use of the phrase "under the ban" refers to any line of conduct condemned by custom or public opinion. In its earlier and general sense as a proclamation, the ban may be said to have been suspended by the writ. The word, however, survives in the sense of a proclamation in the "banns of marriage" (*q.v.*).

The Persian word *ban*, meaning lord or master, was brought into Europe by the Avars. It was long used in many parts of south-eastern Europe, especially in southern Hungary, to denote the governors of military districts called *banats*, and is almost equivalent to the German *margrave*. After enjoying very extensive powers the bans were gradually reduced, both in numbers and importance. Since 1868, however, the governor of Croatia and Slavonia has been known as the ban of Croatia, Slavonia and Dalmatia, but his duties are civil and not military. He is appointed by the emperor of Austria, as king of Hungary, and has a seat in the upper house of the Hungarian parliament.

See Du Cange, *Glossarium*, tome i. (Niort, 1883); H. Brunner, *Grundzuge der deutschen Rechtsgeschichte* (Leipzig, 1901); E. P. Boutaric, *Institutions militaires de la France* (Paris, 1863); Père G. Daniel, *Histoire de la milice française* (Paris, 1721).

BANANA, a gigantic herbaceous plant belonging to the genus *Musa* (nat. ord. Musaceae). It is perennial, sending up from an underground root-stock an apparent stem 15 or 20 ft. high, consisting of the closely-enveloped leaf-sheaths, the corresponding blades, each sometimes 10 ft. in length, forming a spreading crown. A true stem develops at the flowering period; it grows up through the hollow tube formed by the sheaths, emerges above and bears a large number of inconspicuous tubular flowers closely crowded in the axils of large, often brightly-coloured, protecting bracts. The fruits form dense clusters.

The genus *Musa* contains about 40 species, widely distributed throughout the tropics of the Old World, and in some cases introduced into the New World. In many parts of the tropics they are as important to the inhabitants as are the grain plants to those living in cooler regions. They are most successfully cultivated in a hot, damp, tropical climate. The northern limit of their cultivation (usually *Musa Cavendishii*) is reached in Florida, south of 29° lat., the Canary Islands,

Egypt and south Japan, the southern limit in Natal and south Brazil. There has been considerable discussion as to whether the banana was growing in America before the discovery of the New World. It has been suggested that it may have been carried by ocean currents or in some earlier intercourse between the Old and New Worlds. The evidence, however, of its existence in America at the time of the discovery of the new continent is not very definite. The unripe fruit is rich in starch, which in ripening changes into sugar. The most generally used fruits are derived from *Musa paradisiaca*, of which an enormous number of varieties and forms exist in cultivation. The sub-species *sapientum* (formerly regarded as a distinct species *M. sapientum*) is the source of the fruits generally known in England as bananas, and eaten raw, while the name plantain is given to forms of the species itself *M. paradisiaca*, which require cooking. The species is probably a native of India and southern Asia. Other species which are used as fruits are *M. acuminata* in the Malay Archipelago, *M. Fehi* in Tahiti, and *M. Cavendishii*, the so-called Chinese banana, in cooler countries; the fruit of the last-named has a thinner rind and a delicate, fragrant flesh. The species, the fruits of which require cooking, are of much greater importance as an article of food. These often reach a considerable size; forms are known in East Africa which attain nearly 2 ft. in length with the thickness of a man's arm. A form of *M. corniculata*, from Cochin China and the Malay Archipelago, produces only a single fruit, which, however, affords an adequate meal for three men. The hardly-ripe fruit is stewed whole or cut in slices and roasted or baked.

Banana (*Musa sapientum*).

Banana-meal is an important food-stuff; the fruit is peeled and cut in strips, which are then dried and pounded in a mortar. In East Africa and elsewhere, an intoxicating drink is prepared from the fruit. The root-stock which bears the leaves is, just before the flowering period, soft and full of starch, and is sometimes used as food, as in the case of the Abyssinian species, *M. Ensete*.

The leaves cut in strips are plaited to form mats and bags; they are also largely used for packing and the finer ones for cigarette papers. Several species yield a valuable fibre, the best of which is "Manila hemp" (*q.v.*) from *M. textilis*.

The following is the composition of the flour, according to Hutchison: water, 13%; proteid, 4%; fat, 0.5%; carbohydrates, 80%; salts, 2.5%. It would require about eighty bananas of average size to yield the amount of energy required daily, and about double that number to yield the necessary amount of proteid. Hence the undue abdominal development of those who live mainly on this article of diet (Hutchison). In recent years the cultivation of the banana in Jamaica for the American and also for the English market has been greatly developed.

BANAS, or Bunas, the name of three rivers of India. (1) A river of Rajputana, which rises in the Aravalli range in Udaipur, drains the Udaipur valley, and after a course of 300 m. flows into the Chambal. (2) A river of the Shahabad district of Bengal, which forms the drainage channel between the Arrah canal and the Sone canals system, and finally falls into the Gangi nadi. (3) A river of Chota Nagpur in Bengal, which rises in the state of Chang Bhakar and falls into the Sone near Rampur.

BANAT (Hungarian Bánság), a district in the south-east of Hungary, consisting of the counties of Torontál, Temes and Krasso-Szörény. The term, in Hungarian, means generally a frontier province governed by a *ban* and is equivalent to the German term *Mark*. There were in Hungary several banats, which disappeared during the Turkish wars, as the banat of Dalmatia, of Slavonia, of Bosnia and of Croatia. But when the word is used without any other qualification, it indicates the Temesvár banat, which strangely acquired this title after the peace of Passarowitz (1718), though it was never governed by a *ban*. The Banat is bounded E. by the Transylvanian Alps, S. by the Danube, W. by the Theiss and N. by the Maros, and has an area of 11,260 sq. m. It is mountainous in the south and south-east, while in the north, west and south-west it is flat and in some places marshy. The climate, except in the marshy parts, is generally healthy. It is well-watered, and forms one of the most fertile districts of Hungary. Wheat, barley, oats, rye, maize, flax, hemp and tobacco are grown in large quantities, and the products of the vineyards are of a good quality. Game is plentiful and the rivers swarm with fish. The mineral wealth is great, including copper, tin, lead, zinc, iron and especially coal. Amongst its numerous mineral springs, the most important are those of Mehadia, with sulphurous waters, which were already known in the Roman period as the *Thermae Herculis*. The Banat had in 1900 a population of 1,431,329 inhabitants. According to nationality there were 578,789 Rumanians, 362,487 Germans, 251,938 Servians and 170,124 Magyars. The chief town is Temesvár (pop. 53,033), and other places of importance are Versecz (25,199), Lugos (16,126), Nagybecskerek (26,407), Nagykikinda (24,843) and Pancsova (19,044).

[v.03 p.0307]

The Banat was conquered by the Turks in 1552, and remained a Turkish sanjak (province) till 1716, when Prince Eugene of Savoy liberated it from the Turkish yoke. It received the title of Banat after the peace of Passarowitz (1718), and remained under a military administration until 1751, when Maria Theresa introduced a civil administration. During the Turkish occupation the district was nearly depopulated, and allowed to lie almost desolate in marsh and heath and forest. Count Claudius Mercy (1666-1734), who was appointed governor of Temesvár in 1720, took numerous measures for the regeneration of the Banat. The marshes near the Danube and Theiss were cleared, roads and canals were built at great expense of labour, German artisans and other settlers were attracted to colonize the district, and agriculture and trade encouraged. Maria Theresa also took a great interest in the Banat, colonized the land belonging to the crown with German peasants, founded many villages, encouraged the exploitation of the mineral wealth of the country, and generally developed the measures introduced by Mercy. In 1779 the Banat was again incorporated with Hungary. After the revolution of 1848-1849, the Banat together with another county (Bács) was separated from Hungary, and created into a distinctive Austrian crown land, but in 1860 it was definitely incorporated with Hungary.

See Leonhard Böhm, *Geschichte des Temeser Banats* (2 vols., Leipzig, 1861); Johann Heinrich Schwicker, *Geschichte des Temeser Banats* (Pest, 1872).

BANATE (a corruption of Panaiti, their real name), or Bannock, as they are now usually called, a tribe of North American Indians of Shoshonean stock. They were sometimes known as "Robber Indians." Their former range was southern Idaho and eastern Oregon. They are now divided between the Fort Hall and Lemhi reservations, Idaho. They were generally friendly with the whites, but in 1866 and in 1877-78 there were serious outbreaks. They number about 500.

BANBRIDGE, a town of Co. Down, Ireland, in the west parliamentary division, on the Bann, 23 m. S.W. of Belfast on a branch of the Great Northern railway, standing on an eminence. Pop. of urban district (1901) 5006. To mitigate a steep ascent, a central carriage-way, 200 yds, long, is cut along the main street to a depth of 15 ft., the opposite terraces being connected by a bridge. Banbridge is an entirely modern town. It is the principal seat of the linen trade in the county, and has extensive cloth and thread factories, bleachfields and chemical works. A memorial in Church Square commemorates the Franklin expedition to the discovery of the North-West Passage, and in particular Captain Francis Crozier, who was born at Banbridge in 1796 and served on the expedition.

BANBURY, a market-town and municipal borough in the Banbury parliamentary division of Oxfordshire, England, on the river Cherwell and the Oxford canal, 86 m. N.W. of London by the northern line of the Great Western railway. Pop. (1901) 12,968. The canal communicates northward with the Grand Junction and Warwick canals, and there are branch lines of the Great Central railway to the main line at Woodford, and of the London & North-Western railway to Bletchley. The town is the centre of a rich agricultural district, and there is a large manufacture of agricultural implements; while other industries include rope and leather works and brewing. Banbury cakes, consisting of a case of pastry containing a mixture of currants, have a reputation of three centuries' standing. A magnificent Gothic parish church was destroyed by fire and gunpowder in 1790 to make way for a building of little merit in Italian style. The ancient Banbury Cross, celebrated in a familiar nursery rhyme, was destroyed by Puritans in 1610. During the 17th century the inhabitants of Banbury seem to

have been zealous Puritans, and are frequently satirized by contemporary dramatists. At a somewhat earlier period the grammar school, now extinct, was of such repute as to be chosen as the model for the constitution of the school of St Paul's. A school of science was erected in 1861, and there is a municipal secondary and technical school. Some fine old timbered houses remain in the streets. Of the castle built in 1125 there are only the barest traces. Wroxton Abbey, 2 m. N.W., shows slight remains of the original Augustinian priory; but the present beautiful gabled building, picturesquely situated, dates mainly from 1618. Broughton Castle, 2½ m. S.W., is the most noteworthy house in the county. The oblong block of buildings, fronted by lawns, is surrounded by a moat and protected by a gate-house, part of which dates from 1301, at which date the chapel and a part of the house were also built. There is also work of the 15th century and the Elizabethan period. The house is the seat of Lord Saye and Sele, having been in the Fiennes family since the reign of Henry VII. (1485-1509). Here Pym and Hampden and other leaders of the Parliamentarians were wont to meet in 1640. Without the gate is a fine Decorated church. Banbury is governed by a mayor, 6 aldermen and 18 councillors. Area, 4633 acres.

In the year 556 Banbury (Beranbyrig, Banesberie) was the scene of a battle between Cynric and Ceawlin and Britons. It was assessed at 50 hides in the Domesday survey and was then held by the bishop of Lincoln. Allusions to the market occur as early as 1138, and Henry II. by charter confirmed a market on Thursday and granted a fair at Whitsun. The first charter of incorporation was granted by Queen Mary in 1553, and instituted a common council consisting of a bailiff, 12 aldermen and 12 chief burgesses; a court of record, one justice of the peace, a Thursday market and two annual fairs. James I. confirmed this charter in 1608. with some additions, including a weekly wool-market, a horse-market and two additional annual fairs. Both these charters were surrendered in 1683 in favour of a new charter, but were resumed in 1688. In 1718 George I. granted a new charter, which held until the Municipal Corporations Act of 1835. From the date of Queen Mary's charter until the Redistribution of Seats Act of 1885 the borough was represented by one member in parliament.

See Alfred Beesley, *History of Banbury* (London, 1841).

BANCHIERI, ADRIANO (*c.* 1557-1634), Bolognese composer for church and stage, organist, writer on music and poet. He founded the Accademia Florida of Bologna. Like Orazio Vecchi he was interested in converting the madrigal to dramatic purposes. He disapproved of the monodists with all their revolutionary harmonic tendencies, about which he expressed himself vigorously in his *Moderna Practica Musicale* (Venice, 1613), while systematizing the legitimate use of the monodic art of thorough-bass.

BANCROFT, GEORGE (1800-1891), American historian and statesman, was born in Worcester, Mass., on the 3rd of October 1800. His family had been in America since 1632, and his father, Aaron Bancroft, was distinguished as a revolutionary soldier, clergyman and author. The son was educated at Phillips Academy, Exeter, at Harvard University, at Heidelberg, Göttingen and Berlin. At Göttingen he studied Plato with Heeren, New Testament Greek with Eichhorn and natural science with Blumenbach. His heart was in the work of Heeren, easily the greatest of historical critics then living, and the forerunner of the modern school; it was from this master that Bancroft caught his enthusiasm for minute pains-
[v.03 p.0308]
taking erudition. He concluded his years of preparation by a European tour, in the course of which he received kind attention from almost every distinguished man in the world of letters, science and art; among others, from Goethe, Humboldt, Schleiermacher, Hegel, Byron, Niebuhr, Bunsen, Savigny, Cousin, Constant and Manzoni. Bancroft's father was a Unitarian, and he had devoted his son to the work of the ministry; but the young man's first experiments at preaching, shortly after his return from Europe in 1822, were unsatisfactory, the theological teaching of the time having substituted criticism and literature for faith. His first position was that of tutor in Harvard. Instinctively a humanist, he had little patience with the narrow curriculum of Harvard in his day and the rather pedantic spirit with which classical studies were there pursued. Moreover, he had brought from Europe a new manner, full of the affections of ardent youth, and this he wore without ease in a society highly satisfied with itself; the young knight-errant was therefore subjected to considerable ridicule. A little volume of poetry, translations and original pieces, published in 1823 gave its author no fame. As time passed, and custom created familiarity, his style, personal and literary, was seen to be the outward symbol of a firm resolve to preserve a philosophic calm, and of an enormous underlying energy which spent itself in labour, "ohne Hast, aber auch ohne Rast." He found the conventional atmosphere of Cambridge uncongenial, and with a friend he established the Round Hill school at Northampton, Mass. This was the first serious effort made in the United States to elevate secondary education to the plane on which it belonged.

Although born into a Whig family, yet Bancroft's studies carried him irresistibly into the Democratic party. While a teacher in his own school he was elected to the state legislature as a Democrat, but under pressure from the family of his first wife, who were ardent Whigs, he refused to serve. In 1831 he likewise declined the nomination of the Massachusetts Democrats for secretary of state. By this time he was influential in the councils of his party, and President Van Buren appointed him collector of the port of Boston, a position which he filled with success. Two of his appointees were Orestes Brownson and Nathaniel Hawthorne. In 1844 he was the Democratic candidate for the governorship, but he was defeated. In 1845 he entered Polk's cabinet as secretary of the navy, serving until 1846, when for a month he was acting secretary of war. During this short period in the cabinet he established the naval academy at Annapolis, gave the orders which led to the occupation of California, and sent Zachary Taylor into the debatable land between Texas and Mexico. He also continued his pleadings for the annexation of Texas, as extending "the area of freedom," and though a Democrat, took high moral ground as to slavery; he likewise made himself the authority on the North-Western Boundary question. In 1846 he was sent as minister to London, where he lived in constant companionship with Macaulay and Hallam. On his return in 1849 he withdrew from public life, residing in New York. In 1866 he was chosen by Congress to deliver the special eulogy on Lincoln; and in 1867 he was appointed minister to Berlin, where he remained until his resignation in 1874. Thenceforward he lived in Washington and Newport, dying at Washington on the 17th of January 1891. His latest official achievements were the greatest. In the San Juan arbitration he displayed great versatility and skill, winning his case before the emperor with brilliant ease. The naturalization treaties which he negotiated successively with Prussia and the other north German states were the first international recognition of the right of expatriation, a principle since incorporated in the law of nations.

In spite of the exacting and severe routine of the Round Hill school, Bancroft contributed frequently to the *North American Review* and to Walsh's *American Quarterly*; he also made a translation of Heeren's work on *The Politics of Ancient Greece*. In 1834 appeared the first volume of the *History of the United States*. The second followed in 1837, and others as the exigencies of public life permitted. Supplementary to the first volume was an article published by him in the *North American Review* for 1835 on "The Documentary History of the Revolution." This article not merely brought the new method to the notice of the reading public, but revealed to it the wealth of material available. The nature and extent of his studies, the solidity of his work, and the philosophic spirit which animates both, explain the enthusiasm with which the earlier volumes of Bancroft were received. Their sale at home was very large; they were reprinted in England and translated immediately into Danish, Italian, German and French. The latest volumes were considered by all competent judges quite as important as their predecessors. When the author was preparing to return from Berlin, the Royal Academy made him their guest at a public dinner, an unprecedented honour; and the universities of Berlin, Heidelberg and Munich united in a testimonial of regard. At Washington he was the confidential advisor of statesmen to the end of his life and the unofficial dean of the best society.

Bancroft's historical creed is best set forth in the address he delivered on the semi-centennial of the New York Historical Society in 1854. In philosophy he found the basis for positing a collective human will, revealing in its activities the materials for determining ethical laws. Since there must be the same conservation of energy in morals as elsewhere, the eternal reason is the divine Logos. History, therefore, is God working in examples. It must be a unit, its forces constant and its totality an organic whole. Within this the individual moves and acts with liberty and responsibility; for each, in will, affection and intellect is consubstantial with the rest. Truth, morals and justice are subject to no evolution; but the collective man evolves better forms of knowledge and behaviour. The organization of society, therefore, produces successive states, in each of which the principle of freedom is better established than in the antecedent. Permanency in

republican government is, therefore, based upon corresponding experience and culture, and its possibilities grow ever stronger. The relation of American democracy to the systems which have preceded it forms the latest proof of these contentions. As Heeren's pupil, he laid enormous stress on the importance of original authorities. In dealing with documentary evidence he sought to apply very stringent rules:—(1) Carefully distinguish between original authority and historical memorials or aids; for example, between a fact recorded at first- or second-hand knowledge, and a decision of principle by authority. (2) Represent every man from his own standpoint; judge him from your own. His collections of original materials were vast; beginning with his residence in England, he brought together at enormous pains and expense the authenticated copies of archives, family papers, and personal journals written by historic personages, which now constitute an invaluable treasure in the New York public library. They are from every land and from every people with which American origins are connected. His use of this material was not always according to accepted standards. To avoid dryness and prolixity he condensed quotations, and occasionally employed the Thucydidean method of abridgment or representation in place of fact catalogues. During his long life enormous strides were made by others in collecting the materials of American history, and while in the main he kept pace with them by ruthless revision, yet even the latest edition of his work disregards some minor facts which others knew for the insertion of much which the author alone knew.

Bancroft's imagination and enthusiasm were alike exuberant. His pages abound in fine and acute insight. His generalizations are vivid and enlightening. He spared no pains to acquire true style, frequently rewriting his chapters, and sometimes testing passages of philosophy and description in eight different forms. Yet to a certain extent he lacked the representative power and often failed to conceal his art, many pages ringing with artificial tones. But, after making all allowances, it remains true that he had a perfect sense of proportion, sound maxims and thorough common-sense. He was of that greatest human type: a man of the present, valuing justly the past and no dreamer. In the nature and extent of his studies, in the solidity of his work, and in the philosophic spirit which animated his life he ranks as the foremost historian
[v.03 p.0309] of the United States, and as an American historian second to none of his European contemporaries in the same line. He displayed the heroic, epic value of American history, its unity with the great central stream, and dispelled for ever the extravagant conceptions of a sentimental world just emerging from the visionary philosophy of the 18th century.

See M. A. de Wolfe Howe, *The Life and Letters of George Bancroft* (New York, 1908).

(W. M. S.)

BANCROFT, HUBERT HOWE (1832-), American historical writer, was born at Granville, Ohio, on the 5th of May 1832. From 1852 to 1868 he was a bookseller in San Francisco. During this period he accumulated a great library of historical material, and at last gave up business in order to devote himself to the publication of his *Native Races of the Pacific States* (5 vols. 1874-1876), *History of the Pacific States of North America* (21 vols. 1882-1890), and other works. For the collection of data he necessarily relied upon the labours of a corps of assistants, and the publications named represent, properly speaking, an encyclopaedia rather than a unified history; but as a storehouse of material their value is great and is likely to be enduring. In 1905 Bancroft's vast collection was acquired by the university of California. An account of his methods of work is given in his *Literary Industries* (1890).

BANCROFT, RICHARD (1544-1610), archbishop of Canterbury, was born at Farnworth in Lancashire in 1544. He was educated at Cambridge, first at Christ's College and afterwards at Jesus College. He took his degree of B.A. in 1567 and that of M.A. in 1570. Ordained about that time, he was named chaplain to Richard Cox, then bishop of Ely, and in 1575 was presented to the rectory of Teversham in Cambridgeshire. The next year he was one of the preachers to the university, and in 1584 was presented to the rectory of St Andrew's, Holborn. His abilities, and his zeal as a champion of the church, secured him rapid promotion. He graduated B.D. in 1580 and D.D. five years later. In 1585 he was appointed treasurer of St Paul's cathedral, London, and in 1586 was made a member of the ecclesiastical commission. On the 9th of February 1589 he preached at Paul's Cross a sermon on 1 John iv. 1, the substance of which was a passionate attack on the Puritans. He described their speeches and proceedings, caricatured their motives, denounced the exercise of the right of private judgment, and set forth the divine right of bishops in such strong language that one of the queen's councillors held it to amount to a threat against the supremacy of the crown. In the following year Bancroft was made a prebendary of St Paul's; he had been canon of Westminster since 1587. He was chaplain successively to Lord Chancellor Hatton and Archbishop Whitgift. In June 1597 he was consecrated bishop of London; and from this time, in consequence of the age and incapacity for business of Archbishop Whitgift, he was virtually invested with the power of primate, and had the sole management of ecclesiastical affairs. Among the more noteworthy cases which fell under his direction were the proceedings against "Martin Mar-Prelate," Thomas Cartwright and his friends, and John Penry, whose "seditious writings" he caused to be intercepted and given up to the lord keeper. In 1600 he was sent on an embassy, with others, to Embden, for the purpose of settling certain matters in dispute between the English and the Danes. This mission, however, failed. Bancroft was present at the death of Queen Elizabeth. He took a prominent and truculent part in the famous conference of prelates and Presbyterian divines held at Hampton Court in 1604. By the king's desire he undertook the vindication of the practices of confirmation, absolution, private baptism and lay excommunication; he urged, but in vain, the reinforcement of an ancient canon, "that schismatics are not to be heard against bishops"; and in opposition to the Puritans' demand for certain alterations in doctrine and discipline, he besought the king that care might be taken for a *praying clergy*; and that, till men of learning and sufficiency could be found, godly homilies might be read and their number increased. In March 1604 Bancroft, on Whitgift's death, was appointed by royal writ president of convocation then assembled; and he there presented a book of canons collected by himself. It was adopted and received the royal approval, but was strongly opposed and set aside by parliament two months afterwards. In the following November he was elected successor to Whitgift in the see of Canterbury. He continued to show the same zeal and severity as before, and with so much success that Lord Clarendon, writing in his praise, expressed the opinion that "if Bancroft had lived, he would quickly have extinguished all that fire in England which had been kindled at Geneva." He was as lenient with the offences of the orthodox as he was rigid in suppressing heresy and schism. In 1605 he was sworn a member of the privy council. The same year he engaged in a contest with the judges, and exhibited articles of complaint against them before the lords of the council; but these complaints were overruled. His aim was really to make the ecclesiastical courts independent of the law by speciously magnifying the royal authority over them. He enforced discipline and exact conformity within the church with an iron hand; and over 200 clergymen were deprived of their livings for disobedience to the *ex animo* form of subscription. In 1608 he was chosen chancellor of the university of Oxford. One of his latest public acts was a proposal laid before parliament for improving the revenues of the church, and a project for a college of controversial divinity at Chelsea. In the last few months of his life he took part in the discussion about the consecration of certain Scottish bishops, and it was in pursuance of his advice that they were consecrated by several bishops of the English church. By this act were laid the foundations of the Scottish Episcopal church. Bancroft was "the chief overseer" of the authorized version of the Bible. He died at Lambeth Palace on the 2nd of November 1610. His literary remains are not extensive, but show him to have been an able writer.

BANCROFT, SIR SQUIRE (1841-), English actor and manager, was born near London on the 14th of May 1841. His first appearance on the stage was in 1861 at Birmingham, and he played in the provinces with success for several years. His first London appearance was in 1865 in Wooler's *A Winning Hazard* at the Prince of Wales's theatre off Tottenham Court Road, then under the management of Effie Marie Wilton (b. 1840), whom he married in 1868. Mr and Mrs Bancroft were associated in the production of all the Robertson comedies:—*Society* (1865), *Ours* (1866), *Caste* (1867), *Play* (1868), *School* (1869) and *M.P.* (1870), and, after Robertson's death, in revivals of the old comedies, for which they surrounded themselves with an admirable company. Lytton's *Money* (1872), Boucicault's *London Assurance* (1877), and *Diplomacy*—an adaptation of Sardou's *Dora*—were among their *premières*, which helped to make the little playhouse famous. The Bancroft management at the Prince of Wales's constituted a new era in the development of the English stage, and had the effect of reviving the London interest in modern drama. In 1879 they moved to the Haymarket, where Sardou's *Odette* (for which they engaged Madame Modjeska) and *Fédora*, W. S. Gilbert's *Sweethearts* and Pinero's *Lords and Commons*, with revivals of previous successes, were among their productions. Having made a considerable fortune, they retired in 1885, but Mr Bancroft (who was knighted in 1897) joined Sir Henry Irving in 1889 to play the abbé Latour in a revival of Watts Phillips's *Dead Heart*.

See *Mr and Mrs Bancroft, on and off the Stage* (1888), and *The Bancrofts: Recollections of Sixty Years* (1909), by themselves.

BAND, something which "binds" or fastens one thing to another, hence a cord, rope or tie, *e.g.* the straps fastening the sheets to the back in book-binding. The word is a variant of "bond," and is from the stem of the Teutonic *bindan*, to bind. From the same source comes "bend," properly to fasten the string to the bow, so as to constrain and curve it, hence to make into the shape of a "bent" bow, to curve. In the sense of "strap," a flat strip of material, properly for fastening anything, the word is ultimately of the same origin but comes directly into English from the French *bande*. In architecture the term is applied to a sort of flat frieze or fascia running horizontally round a tower or other parts of a building, particularly the base tables in perpendicular work, commonly used with the long shafts characteristic of the 13th century. [v.03 p.0310] It generally has a bold, projecting moulding above and below, and is carved sometimes with foliages, but in general with cusped circles or quatrefoils, in which frequently are shields of arms.

The two small strips of linen, worn at the neck as part of legal, clerical and academic dress, are known as "bands"; they are the survival of the falling collar of the 17th century. These bands are usually of white linen, but the secular clergy of the Roman Church wear black bands edged with white. The light cardboard or chip boxes now used to carry millinery were formerly made to carry the neck-bands, whence the name of "band-box."

In the sense of company or troop, "band" is probably also connected with *bindan*, to bind. It came into English from the French. The meaning seems to have originated in Romanic, cf. Italian, Spanish and Portuguese *banda*, and thence came into Teutonic. It has usually been taken (see Ducange, *Gloss.* s.v. *banda*) to be due to the "band" or sash of a particular colour worn as a distinctive mark by a troop of soldiers. Others refer it to the medieval Latin *bandum*, banner, a strip or "band" of cloth fastened to a pole. In this sense the chief application is to a company of musicians (see Orchestra), particularly when used in armies or navies, a military band.

Military Bands.—In all countries bands are organized and maintained in each infantry regiment or battalion if the latter is the unit. The strength of these bands and the number and nature of their instruments vary considerably, as also do the rank and status of the bandmaster. The buglers and drummers belonging to the companies are generally massed under the sergeant-drummer and on the march play alternately with the band. In action the British custom is to use the bandsmen as stretcher-bearers, but on the continent of Europe the bands are as far as possible kept in hand under the regimental commanders and play the troops into action; and in all countries the available bands, drums and bugles are ordered to play during the final assault. The training of bandmasters for the British service is carried out at Kneller Hall, Hounslow, an institution founded in 1857 and placed under direct control of the war office in 1867. The average strength of the various classes of instrument in the band of a British line regiment has been stated as—twenty flutes, oboes, clarinets and bassoons, four horns, eight saxhorns, six trumpets and cornets, three trombones, two drums. The buglers and drummers are in the proportion of one of each per company. The saxophone, which is the characteristic instrument of military bands in other countries, has not found favour with the British authorities. Another specially military instrument, universal in the Russian army and more or less common to others, is the so-called "Jingling Johnny," a frame of small bells that is sharply shaken in the accented parts of the music. The "glockenspiel" is also fairly common. The peculiar instrument of Scottish regiments is the bagpipes. Cavalry, and more rarely artillery corps in the various armies, have small bands. The mounted arms, however, have little need of music as compared with the infantry, the order and ease of whose marching powers are immensely enhanced by the music of a good regimental band. In the navies of various countries bands are maintained on board flag-ships and sometimes on board other large ships.

BANDA, a town and district of British India, in the Allahabad division of the United Provinces. The town is near the right bank of the river Ken, 95 m. S.W. of Allahabad. The population in 1901 was 22,565. The town possesses 65 mosques and 168 Hindu temples. It was formerly, but is no longer, a military cantonment.

The district is the most barren and backward portion of the province. It contains an area of 3061 sq. m. In some parts it rises into irregular uplands and elevated plains, interspersed with detached rocks of granite; in others it sinks into marshy lowlands, which frequently remain under water during the rainy season. The sloping country on the bank of the Jumna is full of ravines. To the S.E. the Vindhya chain of hills takes its origin in a low range not exceeding 500 ft. in height, and forming a natural boundary of the district in that direction. The principal river of the district is the Jumna, which flows from north-west to south-east, along the N.E. boundary of the district, for 125 m. In 1901 the population was 631,058, showing a decrease of 11% in the decade, due to the effects of famine. The black soil of the district yields crops of which the principal are millet, other food-grains, pulse, rice, cotton and oil-seeds. Banda cotton enjoys a high repute in the market. A branch railway from Manikpur to Jhansi traverses the length of the district, which is also crossed by the East Indian main line to Jubbulpore.

Banda, which forms one of the districts included under the general name of Bundelkhand, has formed an arena of contention for the successive races who have struggled for the sovereignty of India. Kalinjar town, then the capital, was unsuccessfully besieged by Mahmud of Ghazni in A.D. 1023; in 1196 it was taken by Kutab-ud-din, the general of Muhammad Ghori; in 1545 by Shere Shah, who, however, fell mortally wounded in the assault. About the year 1735 the raja of Kalinjar's territory, including the present district of Banda, was bequeathed to Baji Rao, the Mahratta peshwa; and from the Mahrattas it passed by the treaties of 1802-1803 to the Company. At the time of the Mutiny the district, which was poverty-stricken and over-taxed, joined the rebels. The town of Banda was recovered by General Whitlock on the 20th of April 1858. The fiscal system was remodelled, and the district has since enjoyed a greater degree of prosperity only interrupted by famine.

BANDA ISLANDS, a group of the Dutch East Indies, consisting of three chief and several lesser islands in the Banda Sea, south of Ceram, belonging to the residency of Amboyna. The main islands are Great Banda or Lontor; Banda Neira to its north; Gunong Api, west of Banda Neira; Wai or Ai still farther west, with Run on its south-west; Pisang, north of Gunong Api; and Suwangi, north-west again. The total land area is about 16 sq. m. A volcanic formation is apparent in Lontor, a sickle-shaped island which, with Neira and Gunong Api, forms part of the circle of a crater. The arrangement is comparable with Santorin in the Aegean Sea. Gunong Api (Fire Mountain), 2200 ft. high, is an active volcano, and its eruptions and earthquakes have frequently brought destruction, as notably in 1852, when the damage was chiefly due to a huge wave of the sea. Banda, the chief town, on Neira, is a pleasant settlement, commanded by two Dutch forts of the early 17th century, Nassau and Belgica. The largest island, Lontor, was found too unhealthy to be the site of the principal settlement; but the climate of the islands generally, though hot, is not unhealthy. In the space between Lontor, Neira and Gunong Api there is a good harbour, with entrances on either side, which enable vessels to enter on either of the monsoons. Between Gunong Api and Neira there is a third channel, but it is navigable for small vessels only. The principal articles of commerce in the Banda group are nutmegs and mace. The nutmeg is indigenous. The native population having been cleared off by the Dutch, the plantations were worked by slaves and convicts till the emancipation of 1860. The introduction of Malay and Chinese labourers subsequently took place. The plantations (*perken*) were originally held by the conquerors of the natives, the government monopolizing the produce at a fixed rate; but in 1873 the government monopoly was abolished. The production amounts annually to nearly 1,500,000 lb of nutmegs, and 350,000 lb of mace. The nutmegs are grown, in accordance with natural conditions, under the shade of other trees, usually the *canari*. Jalti or jatti wood is cultivated on the small island of Rosingen. The total population of the islands is about 9500, of which some 7000 are descendants of the natives introduced as slaves from neighbouring islands, and are Christians or Mahommedans.

The Banda Islands were discovered and annexed by the Portuguese Antonio D'Abreu in 1512; but in the beginning of the 17th century his countrymen were expelled by the Dutch. In 1608 the British built a factory on Wai, which was demolished by the Dutch as soon as the English vessel left. Shortly after, however, Banda Neira and Lontor were resigned by the natives to the British, and in 1620 Run and Wai were added to their dominions; but in spite of treaties into which they had [v.03 p.0311] entered the Dutch attacked and expelled their British rivals. In 1654 they were compelled by Cromwell to restore Run, and to make satisfaction for the massacre of Amboyna; but the English settlers not being adequately supported from home, the island was retaken by the Dutch in 1664. They remained in undisturbed possession until 1796, when the Banda

Islands were taken by the British. They were restored by the treaty of Amiens in the year 1800, again captured, and finally restored by the treaty of Paris concluded in 1814.

BANDANA, or Bandanna, a word probably derived through the Portuguese from the Hindustani *bāndhnū*, which signified a primitive method of obtaining an effect in dyeing by tying up cloth in different places to prevent the particular parts from receiving the dye. The name was given to richly coloured silk handkerchiefs produced by this process, of which bright colours were characteristic. Bandanas are now commonly made of cotton and produced in Lancashire, whence they are exported. The effect is also produced by a regular process in calico printing, in which the pattern is made by discharging the colour.

BANDELIER, ADOLPH FRANCIS ALPHONSE (1840-), American archaeologist, was born in Bern, Switzerland, on the 6th of August 1840. When a youth he emigrated to the United States. After 1880 he devoted himself to archaeological and ethnological work among the Indians of the south-western United States, Mexico and South America. Beginning his studies in Sonora (Mexico), Arizona and New Mexico, he made himself the leading authority on the history of this region, and—with F. H. Cushing and his successors—one of the leading authorities on its prehistoric civilization. In 1892 he abandoned this field for Ecuador, Bolivia and Peru, where he continued ethnological, archaeological and historical investigations. In the first field he was in a part of his work connected with the Hemenway Archaeological Expedition and in the second worked for Henry Villard of New York, and for the American Museum of Natural History of the same city. Bandelier has shown the falsity of various historical myths, notably in his conclusions respecting the Inca civilization of Peru. His publications include: three studies "On the Art of War and Mode of Warfare of the Ancient Mexicans," "On the Distribution and Tenure of Lands and the Customs with respect to Inheritance among the Ancient Mexicans," and "On the Social Organization and Mode of Government of the Ancient Mexicans" (Harvard University, Peabody Museum of American Archaeology and Ethnology, *Annual Reports*, 1877, 1878, 1879); *Historical Introduction to Studies among the Sedentary Indians of New Mexico, and Report on the Ruins of the Pueblo of Pecos* (1881); *Report of an Archaeological Tour in Mexico in 1881* (1884); *Final Report of Investigations among the Indians of the South-western United States* (1890-1892, 2 vols.); *Contributions to the History of the South-western Portion of the United States carried on mainly in the years from 1880 to 1885* (1890),—all these in the *Papers* of the Archaeological Institute of America, American Series, constituting vols. i.-v.; "The Romantic School of American Archaeologists" (New York Historical Society, 1885); *The Gilded Man (El Dorado) and other Pictures of the Spanish Occupancy of America* (1893); and a report *On the Relative Antiquity of Ancient Peruvian Burials* (American Museum of Natural History, Bulletin, v. 30, 1904). He also edited *The Journey of Alvar Nuñez Cabeza de Vaca ... from Florida to the Pacific*, 1528-1536 (1905), translated into English by his wife.

BANDELLO, MATTEO (1480-1562), Italian novelist, was born at Castelnuovo, near Tortona, about the year 1480. He received a very careful education, and entered the church, though he does not seem to have prosecuted his theological course with great zeal. For many years he resided at Mantua, and superintended the education of the celebrated Lucrezia Gonzaga, in whose honour he composed a long poem. The decisive battle of Pavia, which gave Lombardy into the hands of the emperor, compelled Bandello to fly; his house at Milan was burnt and his property confiscated. He took refuge with Cesare Fregoso, an Italian general in the French service, whom he accompanied into France. In 1550 he was raised to the bishopric of Agen, a town in which he resided for many years before his death in 1562. Bandello wrote a number of poems, but his fame rests entirely upon his extensive collection of *Novelle*, or tales (1554, 1573), which have been extremely popular. They belong to that species of literature of which Boccaccio's *Decameron* and the queen of Navarre's *Heptameron* are, perhaps, the best known examples. The common origin of them all is to be found in the old French *fabliaux*, though some well-known tales are evidently Eastern, and others classical. Bandello's novels are esteemed the best of those written in imitation of the *Decameron*, though Italian critics find fault with them for negligence and inelegance of style. They have little value from a purely literary point of view, and many of them are disfigured by the grossest obscenity. Historically, however, they are of no little interest, not only from the insight into the social life of the period which they afford, but from the important influence they exercised on the Elizabethan drama. The stories on which Shakespeare based several of his plays were supplied by Bandello, probably through Belleforest or Paynter.

BANDER ABBĀSI (also Bender Abbas, and other forms), a town of Persia, on the northern shore of the Persian Gulf in 27° 11′ N., and 56° 17′ E., forming part of the administrative division of the "Persian Gulf ports," whose governor resides at Bushire. It has a population of about 10,000, an insalubrious climate and bad water.

Bander Abbāsi was called Gombrun (Gombroon, Gamaroon; Cambarão, Comorão of Portuguese writers) until 1622, when it received its present name (the "port of Abbas") in honour of the reigning shah, Abbas I., who had expelled the Portuguese in 1614, and destroyed the fort built by them in 1612. The English, however, were permitted to build a factory there, and about 1620 the Dutch obtained the same privilege. On the capture of the island of Hormuz (Ormus) in 1622 by the English and Persians a large portion of its trade was transferred to Bander Abbāsi. During the remainder of the 17th century the traffic was considerable, but in the 18th prosperity declined and most of the trade was removed to Bushire. In 1759 the English factory was destroyed by the French, and though afterwards re-established it has long been abandoned. The ruins of the factory and other buildings lie west of the present town. About 1740 Nadir Shah granted the town and district with the fort of Shamil and the town of Mināb, together with the islands of Kishm, Hormuz (Ormus) and Lārak, to the Arab tribe of the Beni Maʿīni in return for a payment of a yearly rent or tribute. About 40 years later Sultan bin Ahmad, the ruler of Muscat, having been appealed to for aid by the Arab inhabitants of the place against Persian misrule, occupied the town, and obtained a firman from the Persian government confirming him in his possession on the condition of his paying a yearly rent of a few thousand tomans. The islands were considered to be the property of Muscat. In 1852 the Persians expelled the Muscat authorities from Bander Abbāsi and its district, but retired when Muscat agreed to pay an increased rent. By a treaty concluded between Persia and Muscat in 1856 it was stipulated that Bander Abbāsi town and district and the islands were to be considered Persian territory and leased to Muscat at an annual rent of 14,000 tomans (£6000). The treaty was to have been in force for twenty years, but in 1866 the Persians took advantage of the assassination of Seyed Thuweini, the sultan of Muscat, to instal as governor of Bander Abbāsi and district a nominee of their own who agreed to pay a rent of 20,000 tomans per annum. Further difficulties arising between Persia and Muscat, and the ruler of the latter, then in possession of a powerful fleet, threatening to blockade Bander Abbāsi, the Persian government solicited the good offices of the British government, and the lease was renewed for another eight years upon payment of 30,000 tomans per annum (then about £12,000). This was in 1868. In the same year, however, the sultan of Muscat was expelled by a successful revolt, and the Persian government, in virtue of a clause in the lease allowing them to cancel the contract if a conqueror obtained possession of Muscat, installed their own governor at Bander Abbāsi and have retained possession of the place ever since (see Curzon, *Persia*, ii. 424).

[v.03 p.0312]

Bander Abbāsi has a lively trade, exporting much of the produce of central and south-eastern Persia and supplying imports to those districts and Khorasan. It has telegraph and post offices, and the mail steamers of the British India Steam Navigation Company call at the port weekly. Great Britain and Russia are represented there by consuls. From 1890-1905 the total value of the exports and imports from and into Bander Abbāsi averaged about £660,000 per annum, £260,000 (£155,000 British) being for exports, £400,000 (£340,000 British) imports. Of the 255,000 tons of shipping which in 1905 entered Bander Abbāsi 237,000 were British.

(A. H.-S.)

BANDER LINGAH, or Linga, a town of Persia on the northern shore of the Persian Gulf and about 300 m. by sea from Bushire, in 26° 33′ N., 54° 54′ E. Pop. about 10,000. It forms part of the administrative divisions of the "Persian Gulf ports," whose governor resides at Bushire. The annual value of the exports and imports from and into Bander Lingah from 1890 to 1905 averaged about £800,000, but nearly half of that amount is represented by pearls which pass in transit from the fisheries on the Arab coast to Bombay. Like many other Persian Gulf ports, Bander Lingah was for many generations a hereditary patrimony of the Sheikh of an Arab tribe, in this case the Juvasmi tribe, and it was only in 1898 that the Arabs were expelled from the place by a Persian force. It is the chief port for the Persian province of Láristan (under Fars), and has a thriving trade with Bahrein and the Arab coast. It has a British post office, and the steamers of the British India

Company call there weekly. Of the 133,000 tons of shipping which in 1905 entered the port 104,500 were British.

BANDEROLE (Fr. for a "little banner"), a small flag or streamer carried on the lance of a knight, or flying from the mast-head of a ship in battle, &c.; in heraldry, a streamer hanging from beneath the crook of a bishop's crosier and folding over the staff; in architecture, a band used in decorative sculpture of the Renaissance period for bearing an inscription, &c. Bannerol, in its main uses the same as banderole, is the term especially applied to the square banners carried at the funerals of great men and placed over the tomb.

BANDICOOT, any animal of the marsupial genus *Perameles*, which is the type of a family *Peramelidae*. The species, about a dozen in number, are widely distributed over Australia, Tasmania, New Guinea and several of the adjacent islands. They are of small size and live entirely on the ground, making nests of dried leaves, grass and sticks in hollow places and forming burrows in which they pass a great part of the day. Though feeding largely on worms and insects they ravage gardens and fields, on which account they are detested by the colonists. The name is often extended to the family.

BANDICOOT-RAT, the Anglo-Indian name for a large rat (*Nesocia bandicota*), inhabiting India and Ceylon, which measures from 12 to 15 in. to the root of the tail, while the tail itself measures from 11 to 13 in. The name is said to be a corruption of the Telegu *pandi-koku*. It differs from typical rats of the genus *Mus* by its broader incisors, and the less distinct cusps on the molars. Other species of the genus are found from Palestine to Formosa, as well as in central Asia. The typical species frequents villages, towns and cultivated grounds all over India and Ceylon, but is specially common in the south of the peninsula. (See RODENTIA.)

BANDIERA, ATTILIO (1811-1844) and **EMILIO** (1819-1844), Italian patriots. The brothers Bandiera, sons of Baron Bandiera, an admiral in the Austrian navy, were themselves members of that service, but at an early age they were won over to the ideas of Italian freedom and unity, and corresponded with Giuseppe Mazzini and other members of the *Giovane Italia* (Young Italy), a patriotic and revolutionary secret society. During the year 1843 the air was full of conspiracies, and various ill-starred attempts at rising against the Italian despots were made. The Bandieras began to make propaganda among the officers and men of the Austrian navy, nearly all Italians, and actually planned to seize a warship and bombard Messina. But having been betrayed they fled to Corfu early in 1844. Rumours reached them there of agitation in the Neapolitan kingdom, where the people were represented as ready to rise *en masse* at the first appearance of a leader; the Bandieras, encouraged by Mazzini, consequently determined to make a raid on the Calabrian coast. They got together a band of about twenty men ready to sacrifice their lives for an idea, and set sail on their desperate venture on the 12th of June 1844. Four days later they landed near Cotrone, intending to go to Cosenza, liberate the political prisoners and issue their proclamations. But they did not find the insurgent band which they had been told awaited them, and were betrayed by one of their party, the Corsican Boccheciampe, and by some peasants who believed them to be Turkish pirates. A detachment of gendarmes and volunteers was sent against them, and after a short fight the whole band were taken prisoners and escorted to Cosenza, where a number of Calabrians who had taken part in a previous rising were also under arrest. First the Calabrians were tried by court-martial, and a large number condemned to death or the galleys. The raiders' turn came next, and the whole party, save the traitor Boccheciampe, were condemned to be shot, but in the case of eight of them the sentence was commuted to the galleys. On the 23rd of July the two Bandieras and their nine companions were executed; they cried *Viva l'Italia!* as they fell.

The Neapolitan government was undoubtedly within its right in executing the Bandieras, and the material results of this heroic but unpractical attempt were nil. But the moral effect was enormous throughout Italy, the action of the authorities was universally condemned, and the martyrdom of the Bandieras bore fruit in subsequent revolutions. It also created a great impression in England, where it was believed that the Bandieras' correspondence with Mazzini (*q.v.*) had been tampered with, and that information as to the proposed expedition had been forwarded to the Austrian and Neapolitan governments by the British foreign office; recent publications, however, especially the biography of Sir James Graham, tend to exculpate the British government.

See G. Ricciardi, *Storia dei Fratelli Bandiera* (Florence, 1863); F. Venosta, *I Fratelli Bandiera* (Milan, 1863); and Carlo Tivaroni's *L'Italia durante il dominio austriaco*, vol. iii. p. 149 (Turin, 1894).

(L. V.*)

BANDINELLI, BARTOLOMMEO or **BACCIO** (1493-1560), Florentine sculptor, was the son of an eminent goldsmith, and from him Bandinelli obtained the first elements of drawing. Showing a strong inclination for the fine arts, he was early placed under Rustici, a sculptor, and a friend of Leonardo da Vinci, with whom he made rapid progress. The ruling motive in his life seems to have been jealousy both of Benvenuto Cellini and of Michelangelo, one of whose cartoons he is said to have torn up and destroyed. He is regarded by some as inferior in sculpture only to Michelangelo, with whom a comparison unfavourable to Bandinelli is tempted in such works as the marble colossal group of Hercules and Cacus in the Piazza del Gran Duco, and the group of Adam and Eve in the Bargello. Among his best works must be reckoned the *bassi-rilievi* in the choir of the cathedral of Florence; his copy of the Laocoon; and the figures of Christ and Nicodemus on his own tomb.

BANDINI, ANGELO MARIA (1726-1800), Italian author, was born at Florence on the 25th of September 1726. Having been left an orphan in his infancy, he was supported by his uncle, Giuseppe Bandini, a lawyer of some note. He received his education among the Jesuits, and showed a special inclination for the study of antiquities. His first work was a dissertation, *De Veterum Saltationibus* (1749). In 1747 he undertook a journey to Vienna, in company with the bishop of Volterra, to whom he acted in the capacity of secretary. He was introduced to the emperor and took the opportunity of dedicating to that monarch his *Specimen Litteraturae Florentinae*, which was then printing at Florence. On his return he took orders, and settled at Rome, passing the whole of his time in the library of the Vatican, and in those of the cardinals
[v.03 p.0313] Passionei and Corsini. The famous obelisk of Augustus, at that time disinterred from the ruins of the Campus Martius, was described by Bandini in a learned folio volume *De Obelisco Augusti*. Shortly after he was compelled to leave Rome on account of his health and returned to Florence, where he was appointed librarian to the valuable library bequeathed to the public by the abbé Marucelli. In 1756 he was preferred by the emperor to a prebend at Florence, and appointed principal librarian to the Laurentian library. During forty-four years he continued to discharge the duties of this situation, and died in 1800, generally esteemed and regretted. On his deathbed he founded a public school, and bequeathed the remainder of his fortune to other charitable purposes. The most important of his numerous works are the *Catalogus Codd. MSS. Graec., Lat., Ital., Bib., Laurent.*, 8 vols (1767-1778), and the *Vita e Lettere d'Amerigo Vespucci*, 1745.

BANDOLIER, or BANDOLEER (from Fr. *bandoulière*, Ital. *bandoliera*, a little band), a belt worn over the shoulder, particularly by soldiers to carry cartridges. In the 17th century wooden cases were hung to the belt to contain powder charges. The modern bandolier carries the cartridges either in loops sewn to the belt, or in small pouches, similarly attached, containing strips of several cartridges. It has been extensively adopted in the British army, especially for mounted troops.

BANDON, or BANDONBRIDGE, a market-town of county Cork, Ireland, in the south-east parliamentary division, picturesquely situated in a broad open valley on both sides of the river Bandon. Pop. (1901) 2830. It is 20 m. S.W. of the city of Cork by the Cork, Bandon & South Coast railway. It is an important agricultural centre and there are distilleries, breweries and flour-mills. The open park of Castle Bernard (earl of Bandon), on the riverside, is attractive, and 2 m. below Bandon on the river is Innishannon, the head of navigation. Bandon was founded early in the 17th century by Richard Boyle, earl of Cork, and was incorporated by James I. It returned two members to the Irish parliament and thereafter one to the Imperial parliament until 1885. After the destruction of the walls by the Irish in 1689, Bandon long resisted the admission of Catholic inhabitants.

BANEBERRY, or HERB CHRISTOPHER, popular names for *Actaea spicata* (nat. ord. *Ranunculaceae*), a poisonous herb with long-stalked compound leaves, small white flowers and black berries, found wild in copses in limestone districts in the north of England. It is widely distributed in the north temperate zone.

BANÉR (BANNER, BANIER), **JOHAN** (1596-1641), Swedish soldier in the Thirty Years' War, was born at Djursholm Castle on the 23rd of June 1596. Entering the Swedish army, he served with distinction in the wars with Russia and Poland, and had reached high rank when, in 1630, Gustavus Adolphus landed in Germany. As one of the king's chief subordinates, Banér served in the campaign of north Germany, and at the first battle of Breitenfeld he led the right wing of Swedish horse. He was present at the taking of Augsburg and of Munich, and rendered conspicuous service at the Lech and at Donauwörth. At the unsuccessful assault on Wallenstein's camp at the Alte Veste Banér received a wound, and, soon afterwards, when Gustavus marched towards Lützen, his general was left in command in the west, where he was opposed to the imperial general Aldringer. Two years later, as Swedish field-marshal, Banér, with 16,000 men, entered Bohemia, and, combined with the Saxon army, marched on Prague. But the complete defeat of Bernhard of Saxe-Weimar in the first battle of Nördlingen stopped his victorious advance. After this event the peace of Prague placed the Swedish army in a very precarious position, but the victories won by the united forces of Banér, Wrangel and Torstensson, at Kyritz and Wittstock (4th Oct. 1636), restored the paramount influence of Sweden in central Germany. Even the three combined armies, however, were decidedly inferior in force to those they defeated, and in 1637 Banér was completely unable to make headway against the enemy. Rescuing with great difficulty the beleaguered garrison of Torgau, he retreated beyond the Oder into Pomerania. In 1639, however, he again overran northern Germany, defeated the Saxons at Chemnitz and invaded Bohemia itself. The winter of 1640-1641 Banér spent in the west. His last achievement was an audacious *coup-de-main* on the Danube. Breaking camp in mid-winter (a very rare event in the 17th century) he united with the French under the comte de Guébriant and surprised Regensburg, where the diet was sitting. Only the break-up of the ice prevented the capture of the place. Banér thereupon had to retreat to Halberstadt. Here, on the 10th of May 1641, he died, after designating Torstensson as his successor. He was much beloved by his men, who bore his body with them on the field of Wölfenbuttel. Banér was regarded as the best of Gustavus's generals, and tempting offers (which he refused) were made him by the emperor to induce him to enter his service. His son received the dignity of count.

See *Banérs Bref till Axel Oxenstjerna* (Stockholm, 1893); B. P. von Chemnitz, *Königlichen Schwedscher in Deutschland geführten Kriegs*; Martin Veibull, *Sveriges Storhedsted* (Stockholm, 1881); Lundblad, *Johan Banér* (Stockholm, 1823); Ardwisson, *Trittioariga Krigets maerkvaerdigaste personer* (Stockholm, 1861).

BANFF, a royal, municipal and police burgh, seaport and capital of Banffshire, Scotland. Pop. (1901) 7161. It is beautifully situated on high ground, on the left bank of the mouth of the Deveron, 50 m. N.W. of Aberdeen by the Great North of Scotland railway. It is a place of great antiquity, its first charter having been granted by Malcolm IV. in 1163, and further privileges were conferred by Robert Bruce in 1324 and Robert II. in 1372. Of the old castle on the hill by the sea, in which Archbishop Sharp was born, scarcely a trace remains; but upon its site was erected the modern Banff Castle, belonging to the earl of Seafield. The chief public edifices include the county buildings; town hall, surmounted by a spire 100 ft. high; Chalmers hospital (founded by Alexander Chalmers of Clunie, a merchant and shipowner of the town); a masonic hall of tasteful design; and the academy, a modern structure in the Grecian style, to which there is attached an extensive museum, containing examples of the early mechanical genius of James Ferguson, the astronomer. Of the museum, which originally belonged to the defunct Banff Institution and was afterwards taken over by the town council, Thomas Edward—the "working naturalist," whose life was so sympathetically written by Samuel Smiles—was curator for a few years. The principal manufactures comprise woollens, leather, rope and sails, and there are also breweries, distilleries, iron foundries, brick-yards and timber-yards, besides some ship-building. The fishing trade is also important. The exports mainly consist of grain, cattle, fish, dairy produce and potatoes; the imports of coal and timber. There is a railway station at Bridge of Banff communicating, via Inveramsay, with Aberdeen, and another at the harbour, communicating with Portsoy and Keith. The burgh is under the jurisdiction of a provost and council, and unites with Macduff, Elgin, Cullen, Inverurie, Kintore and Peterhead in returning one member to parliament. The Cassie Gift arose out of a bequest by Alexander Cassie of London, a native of Banff, who left £20,000 to the poor of the town—the interest being divided twice a year. Duff House, immediately adjoining the town, is a seat of the duke of Fife. It was built in 1740-1745, after designs by Robert Adam, at a cost of £70,000. The duke of Cumberland rested here on the way to Culloden. The house contains a fine collection of pictures and an interesting armoury. The park is nearly ten miles in circumference. The house, together with that portion of the park immediately surrounding it (about 140 acres), was presented to the towns of Banff and Macduff by the duke of Fife in November 1906.

BANFFSHIRE, a north-eastern county of Scotland, bounded N. by the Moray Firth, E. and S. by Aberdeenshire, and W. by Elgin and Inverness. It has an area of 403,364 acres, or 633½ sq. m. The surface is diversified. The northern half is mostly a fine, open, undulating country of rich, highly-cultivated soil. The southern is mountainous, but extensive farms are found in its fertile glens. Some of the mountains are thick with forests, some present a beautiful intermixture of rock and copse, while others are covered with brown heath. The principal mountains are all in the south; among them are Cairngorm, on the confines of the shires of Banff and Inverness (4084 ft.), famous for its amber-coloured quartz crystals, the "cairngorms" of Scots jewelry; Ben Rinnes (2775 ft.); Corryhabbie (2563); Cook's Cairn (2478); Carn an t-Saidhe (2401); and the Buck of Cabrach (2368). No great rivers belong wholly to Banffshire. For a considerable part of their courses the Spey forms the western and the Deveron the eastern boundary of the county. But Banffshire streams are comparatively short, the chief being the Avon, Fiddich, Isla, Buckie, Deskford—with a series of cascades—and Livet. Most of them are stocked with trout and the Spey and Deveron are famous for their salmon. The great glens are distinguished for their romantic scenery, the chief being Glen Avon, Glen Barry, Glen Fiddich, Glen Isla, Glen Livet, and Glen Rinnes. The largest lochs are in the extreme south: Loch Avon (2300 ft. above the sea), Loch Builg (1586) and Loch Etchachan (3100).

[v.03 p.0314]

Geology.—The geology of Banffshire is closely connected with that of the neighbouring counties of Aberdeen and Elgin, from which it is divided by no natural boundaries. The greater portion is occupied by crystalline schists of sedimentary origin belonging to the Eastern Highland sequence. The groups which are typically developed comprise (1) slates, black schists and phyllites with thin black limestone, sometimes containing tremolite, (2) the main limestone, (3) the quartzite (Schiehallion). These form subparallel belts trending north-east and south-west from the seacoast between Cullen and Portsoy southwards by Keith and Dufftown to the head waters of the Avon beyond Tomintoul. Some excellent sections of the phyllites are to be seen on the shore between Sandend, near Portsoy, and Findlater Castle, near Cullen, and in the railway cutting near Mulben, west of Keith. The main limestone has been worked at Fordyce, near Grange east of Keith, and at Keith and Dufftown. The quartzite, which is regarded as probably the highest member of the series, forms prominent ridges due to the more rapid erosion of the phyllites, mica-schists and limestones occupying the intervening hollows. It appears on the coast between Cullen and Buckie, it forms the Durn Hill near Portsoy, the Binn of Cullen, the Knock Hill, Ben Aigan and various ridges trending southwards from Grange by Glen Fiddich towards Tomintoul. In the north-east part of the county there is a large development of slate with interbedded greywackes and pebbly grits, which occupies the coast section between Macduff and Troup Head except a small part at Gamrie. The slate has been quarried for roofing purposes. No fossils have been found in these strata and their age is uncertain. The metamorphic sediments have been pierced by acid and basic igneous intrusions, partly before and partly after the folding and metamorphism of the strata. The older acid and basic materials appear as sheets injected along the lines of bedding of the sediments and are traceable for considerable distances. They are foliated in places, the planes of schistosity being more or less parallel with the planes of bedding in the schists. The older acid rocks are represented by the sills of granite and augen-gneiss occurring west of Portsoy, south of Fordyce and near Keith, while the older basic rocks are illustrated by the belt of gabbro, epidiorite and hornblende-schist which stretches southwards from the coast at Portsoy, by Rothiemay to Huntly in Aberdeenshire. Veins and bosses of serpentine are associated with these basic intrusions at Portsoy and near Grange, one of the veins being traceable at intervals from the shore southwards in the direction of Knock Hill. The later intrusions are represented by the Ben Rinnes mass of granite and its basic modification, the Netherly diorite, east of Rothes. Various mineral localities occur throughout the county, of which some of the most important occur on the shore at Portsoy, as for example the gabbro masses in Portsoy Bay with enstatite, hypersthene and labradorite, the graphic granite with microcline, muscovite and tourmaline at East Head, the chiastolite-schist west of the marble quarry, the mottled serpentine with strings of chrysotile. Resting unconformably on these metamorphic rocks, Old Red sandstone strata are met with in a few places. Thus, they cross the Spey and appear in the Tynet Burn east of Fochabers, and extend eastwards

to Buckie. Outliers of these beds appear on the shore near Cullen and south of Fordyce, while the largest area extends from Gamrie east by Pennan on the north coast of Aberdeenshire to Aberdeen. The strata consist mainly of conglomerates and red sandstones, which, at Gamrie and at Tynet, are associated with a band of limestone nodules embedded in a clayey matrix, containing fish remains. The more abundant species occurring at Gamrie, as determined by Dr R. H. Traquair, are *Diplacanthus striatus*, *Rhadinacanthus*, *Cheiracanthus Murchisoni*, *Pterichthys Milleri*, *Coccosteus decipiens*. In view of the fossil evidence these beds have been referred to the middle or Orcadian division of this formation. In the interior near Tomintoul, another large deposit, composed of conglomerate and sandstone, occurs, which may be of the same age, though no fossils have as yet been obtained from these beds. There is a widespread covering of boulder clay especially in the northern part bordering the shore, where it contains fragments of shells and includes numerous boulders which have been carried eastwards from the high grounds west of the Moray Firth. In the brickclays at Blackpots to the north-west of Banff, fragments of shells also occur together with Jurassic fossils. Shelly sands have been recorded near the Ord south of Tillynaught near Portsoy, and shells have been found in stratified deposits on the shore near Gamrie.

Agriculture.—The soil is in general rich and productive, yielding fair crops of wheat, and excellent crops of barley, oats, &c.; and the grass and green crops are equally abundant. Oats is the predominant crop, but the demands of distillers keep up the acreage of barley. The cattle and stock hold a high character and form the staple agricultural industry. There is also a considerable amount of dairy farming. Among landlords who did much to encourage agricultural enterprise and to plant and reclaim lands, were the earls of Fife and the earls of Findlater, afterwards earls of Seafield. It was a Seafield who, in 1846, received the honorary gold medal of the Highland and Agricultural Society of Scotland, for his immense and thriving plantations of useful timber-trees, in the counties of Banff, Moray and Nairn. From the year 1811 to 1845, he had planted 18,938,224 Scots firs, 11,904,798 larches, 843,450 hardwoods; making the enormous aggregate of 31,686,472 forest trees, planted in 8223 acres of enclosed ground. The Banffshire Agricultural Association holds shows periodically for all sorts of stock and produce and agricultural implements.

Manufactures and Trade.—Woollen factories are found in Dufftown, Rothiemay and Gollachy, and engineering works in Banff, Portsoy and Keith. Distilleries are numerous and their product has a high repute. A fishing and miscellaneous trade is done at the harbours of Banff, Macduff, Buckie, Gardenstown, Portsoy, Cullen and Port Gordon; but fishing is also carried on at numerous creeks or harbours along the coast. The herring season lasts from June to September, white fishing all the year round. The fishery districts centre in Banff and Buckie. Banffshire contains large limestone deposits, and granite is also quarried.

The systems of the Great North of Scotland and the Highland railways serve the chief towns of the county and provide communication in one direction with Aberdeen, and in another with Elgin, Nairn and Inverness.

The population of Banffshire in 1891 was 61,684, and in 1901 61,488, or 97 to the square mile. In 1901 there were 499 persons speaking Gaelic and English. The chief towns are Banff (pop. in 1901, 7161), Buckie (6549), and Keith (4753), with Cullen (1936), Portsoy (1878) and Dufftown (1823). The county returns one member to parliament; the royal burghs, Banff and Cullen, belonging to the Elgin group of parliamentary burghs. Banffshire, with Aberdeen and Kincardine shires, forms a sheriffdom, and there is a resident sheriff-substitute at Banff, who sits also at Keith, Buckie and Dufftown. Most of the schools are under school-board jurisdiction. Several of them earn grants for higher education, and the county council, out of the "residue grant," subsidizes classes in agriculture, navigation, veterinary science and cookery and laundry work. The teachers of the county, with those of the shires of Aberdeen and Elgin, benefit by the bequest of James Dick (1743-1828), a West India merchant, who left over £110,000 to promote the higher learning of the schoolmasters of these shires. The annual income of £4000 is distributed among the dominies who have qualified by examination to become beneficiaries.

History.—Of the northern Picts who originally possessed the land few remains now exist beyond the cairns that are found in the districts of Rothiemay, Ballindalloch, Boharm, Glen Livet and elsewhere. "Cairn" also occurs in many place names. The advance of the Romans was practically prevented by the mountains in the south, but what is believed to have been a Roman camp may still be made out in Glen Barry. Danish invaders were more persevering and more successful. Many bloody conflicts took place between them and the Scots. Near Cullen a fierce encounter occurred in 960, and a sculptured stone at Mortlach is said to commemorate a signal victory gained by Malcolm II. over the Norsemen in 1010. The shire was the scene of much strife after the Reformation. In Glen Livet the Roman Catholics, under the marquess of Huntly, worsted the Protestants under the earl of Argyll. From 1624 to 1645 was a period of almost incessant struggle, and the Covenanting troubles, combined with the frequent conflicts of the clans, were productive of serious evils. But the Jacobite risings of 1715 and 1745 left the county comparatively untouched, and thereafter it became settled.

See W. Cramond, *Annals of Banff* (New Spalding Club) (Aberdeen, 1891); Dr Gordon, *Chronicles of Keith, Grange, &c.* (Glasgow, 1880); *Banffshire Year-Book* (Banff); Professor Dickie, *Botanist's Guide to Aberdeen, Banff, &c.* (Aberdeen, 1860); *Inventory of Charters of Cullen* (Banff, 1887); and *Inventory of Charters of Banff* (Banff); Robertson's *Collections for a History of the Shires of Aberdeen and Banff* (Spalding Club); W. Watt, *Aberdeenshire and Banff* (Edinburgh, 1900).

[v.03 p.0315]

BÁNFFY, DEZSÖ [Desiderius], Baron (1843-), Hungarian statesman, the son of Baron Daniel Bánffy and Anna Gyárfás, was born at Klausenburg on the 28th of October 1843, and educated at the Berlin and Leipzig universities. As lord lieutenant of the county of Belsö-Szolnok, chief captain of Kövár and curator of the Calvinistic church of Transylvania, Bánffy exercised considerable political influence outside parliament from 1875 onwards, but his public career may be said to have begun in 1892, when he became speaker of the house of deputies. As speaker he continued, however, to be a party-man (he had always been a member of the left-centre or government party) and materially assisted the government by his rulings. He was a stringent adversary of the radicals, and caused some sensation by absenting himself from the capital on the occasion of Kossuth's funeral on the 1st of April 1894. On the 14th of January 1895, the king, after the fall of the Széll ministry, entrusted him with the formation of a cabinet. His programme, in brief, was the carrying through of the church reform laws with all due regard to clerical susceptibilities, and the maintenance of the Composition of 1867, whilst fully guaranteeing the predominance of Hungary. He succeeded in carrying the remaining ecclesiastical bills through the Upper House, despite the vehement opposition of the papal nuncio Agliardi, a triumph which brought about the fall of Kalnóky, the minister for foreign affairs, but greatly strengthened the ministry in Hungary. In the ensuing elections of 1896 the government won a gigantic majority. The drastic electoral methods of Bánffy had, however, contributed somewhat to this result, and the corrupt practices were the pretext for the fierce opposition in the House which he henceforth had to encounter, though the measures which he now introduced (the Honved Officers' Schools Bill) would, in normal circumstances, have been received with general enthusiasm. Bánffy's resoluteness enabled him to weather all these storms, and his subsequent negotiations with Austria as to the quota and commercial treaties, to the considerable political advantage of Hungary, even enabled him for a time to live at peace with the opposition. But in 1898 the opposition, now animated by personal hatred, took advantage of the ever-increasing difficulties of the government in the negotiations with Austria, and refused to pass the budget till a definite understanding had been arrived at. They refused to be satisfied with anything short of the dismissal of Bánffy, and passion ran so high that on the 3rd of January 1899 Bánffy fought a duel with his most bitter opponent, Horánszky. On the 26th of February Bánffy resigned, to save the country from its "ex-lex," or unconstitutional situation; he was decorated by the king and received the freedom of the city of Buda. Subsequently he contributed to overthrow the Stephen Tisza administration, and in May 1905 joined the Kossuth ministry.

See article "Bánffy," by Marczall, in *Pallas Nagy Lexikona,* Köt 17.

(R. N. B.)

BANG, HERMANN JOACHIM (1858-), Danish author, was born of a noble family in the island of Zealand. When he was twenty he published two volumes of critical essays on the realistic movement. In 1880 he published his novel *Haablöse Slaegter* ("Families without hope"), which at once aroused attention. After some time spent in travel and a successful lecturing tour in Norway and Sweden, he settled in Copenhagen, and produced a series of novels and collections of short stories, which placed him in the front rank of Scandinavian novelists. Among his more famous stories are *Faedra* (1883)

and *Tine* (1889). The latter won for its author the friendship of Ibsen and the enthusiastic admiration of Jonas Lie. Among his other works are:—*Det hvide Hus* (The White House, 1898), *Excentriske Noveller* (1885), *Stille Eksistenzer* (1886), *Liv og Död* (Life and Death, 1899), *Englen Michael* (1902), a volume of poems (1889) and of recollections (*Ti Aar,* 1891).

BANGALORE, a city of India, the capital of the native state of Mysore, and the largest British cantonment in the south of India. It is 3113 ft. above the sea, and 219 m. W. of Madras by rail. Pop. (1901) 69,447. The foundation of the present fort was laid by a descendant of Kempe-Goude, a husbandman of the neighbouring country, who, probably in the 16th century, had left his native village to avoid the tyranny of the *wadeyar* of that place, and settled on a spot a few miles to the north of Bangalore. To the peaceful occupation of a farmer he added that of a warrior, and his first exploit was the conquest of this place, where, and at Savendrug, his family subsequently erected fortresses. Bangalore, with other possessions, was, however, wrested from them by Bijapur. Somewhat later we find it enumerated among the *jagirs* of Shahji, father of Sivaji, the founder of the Mahratta sway; and at an early period of his career in the service of the Bijapur state, that adventurer seemed to have fixed his residence there. It appears to have passed into the possession of Venkaji, one of the sons of Shahji; but he having occupied Tanjore, deemed Bangalore too distant, especially under the circumstances of the times, to be safe. He accordingly, in 1687, entered into a bargain for its sale to Chikka Deva, raja of Mysore, for three lakhs of rupees; but before it could be completed, Kasim Khan, commander of the forces of Aurangzeb, marched upon the place and entered it almost without resistance. This event, however, had no other result than to transfer the stipulated price from one vendor to another; for that general, not coveting the possession, immediately delivered it over to Chikka Deva on payment of the three lakhs. In 1758, Nanjiraj, the powerful minister of the raja, caused Bangalore to be granted, as a *jagir* or fief, to Hyder Ali, afterwards usurper of Mysore, who greatly enlarged and strengthened the fort, which, in 1760, on his expulsion from Seringapatam, served as his refuge from destruction. The fort formed the traditional scene of the first captivity of Sir David Baird after Baillie's defeat at Perambakam in 1780. The prison cell of Sir David and his fellow-captive is from 12 to 15 ft. square, with so low a roof that a man can scarcely stand upright in it. In 1791 it was stormed by a British army commanded by Lord Cornwallis. In 1799 the district was included by the treaty of Seringapatam within the territory of the restored raja of Mysore. It formed the headquarters of the British administration of Mysore from 1831 to 1881. When the state of Mysore was restored to its raja in 1881, the civil and military station of Bangalore was permanently reserved under British jurisdiction as an "assigned tract." It has an area of 13 sq. m., and had in 1901 a population of 89,599, showing a decrease of 10% in the decade, due to plague. Bangalore is the headquarters of a military district, its elevation rendering it healthy for British troops, with accommodation for a strong force of all arms and an arsenal in the old fort. It is the headquarters of a brigade in the 9th division of the Indian army. A considerable number of European pensioners reside here. There is a modern palace for the maharaja. There is an aided Roman Catholic college, besides many schools for Europeans. A permanent water-supply has been introduced and there is a complete system of drainage. Bangalore is an important railway centre. There are several cotton mills. The city suffered severely from plague in 1899 and 1900.

The district of Bangalore borders on the Madras district of Salem. The main portion consists of the valley of the Arkavati river, which joins the Cauvery on the southern frontier. Its area is 3079 sq. m. In 1901 the population was 789,664, showing an increase of 15% in the decade. The district is crossed by several lines of railway. Outside Bangalore city there is a woollen mill, which turns out blankets, cloth for greatcoats, and woollen stuffs.

BANGANAPALLE, a state of southern India, surrounded by the Madras district of Kurnool. Area, 255 sq. m.; pop. (1901) 32,264, showing a decrease of 9% in the decade; estimated revenue £6400, of which a large portion is alienated in grants to junior branches of the family; no tribute. The excessive expenditure of the nawab, Syed Fateh Ali Khan, and the general inefficiency of the administration caused much anxiety to the government, and in February 1905 he was temporarily removed from the administration of the state. The town of Banganapalle is not far from the branch of the Southern Mahratta railway from Guntakal to Bezwada.

[v.03 p.0316]

BANGASH, a small tribe of Pathans in the Kohat district of the North-West Frontier Province of India. They occupy the hills between Thal and Kohat, and number 3000 fighting men. Formerly they owned the whole of Kurram, but owing to the encroachments of the Turis, they moved eastwards, dispossessed the Orakzais, drove them north and took their territory in the Kohat district, which they now occupy to the west of the Khattak country. The Khattaks and Bangashes are of exceptionally good physique and make excellent soldiers.

BANGKOK, the capital of Siam, on the river Me Nam, about 20 m. from its mouth, in 100° 30′ E., 13° 45′ N. Until modern times the city was built largely on floating pontoons or on piles at the edges of the innumerable canals and water-courses which formed the thoroughfares, but to meet the requirements of modern life, well-planned roads and streets have been constructed in all directions, crossing the old canals at many points and lined with well-built houses, for the most part of brick, in which the greater part of the erstwhile riparian population now resides. The centre of the city is the royal palace (see Siam), situated in a bend of the river and enclosed by walls. At a radius of nearly a mile is another wall within which lies the closely-packed city proper, and beyond which the town stretches away to the royal parks on the north and to the business quarter, the warehouses, rice-mills, harbour and docks on the south. The whole town covers an area of over 10 sq. m. Two companies provide Bangkok with a complete system of electric tramways, and the streets are lined with shade-trees and lit by electricity. All over the town are scattered beautiful Buddhist temples, which with their coloured tile roofs and gilded spires give it a peculiar and notable appearance. Many fine buildings are to be seen—the various public offices, the arsenal, the mint, the palaces of various princes and, in addition to these, schools, hospitals, markets and Christian churches of many denominations, chiefly Roman Catholic. There are four railway stations in Bangkok, the termini of the lines which connect the provinces with the capital.

The climate of Bangkok has without doubt recently changed. It has become hotter and less humid. Though a minimum temperature below 60° F. is still recorded in January and December, a maximum of over 100° is reached during the hot weather months and at the beginning of the rains, whereas up to the year 1900 a maximum of 93° was considered unusually high. The cause of this change is not known, but it is attributed to extensive drainage and removal of vegetation in the immediate neighbourhood of the town. The annual rainfall amounts to rather over 50 in.

A four-mile reach of the Me Nam, immediately below the city proper, forms the port of Bangkok. From 250 to 400 yds. broad and of good depth right up to the banks, the river offers every convenience for the berthing and loading of ships, though a bar at its mouth, which prevents the passage of vessels drawing more than 12 ft., necessitates in the case of large ships a partial loading and unloading from lighters outside. The banks of the port are closely lined with the offices, warehouses and wharves of commercial houses, with timber yards and innumerable rice-mills, while the custom house, the harbour master's office and many of the foreign legations and consulates are also situated here. Of the 750 steamships which cleared the port in 1904, three out of every seven were German, two were Norwegian and one was British, but in 1905 two new companies, one British and the other Japanese, arranged for regular services to Bangkok, thereby altering these proportions. It is notable that the heavy trade with Singapore shows a tendency to decrease in favour of direct trade with Europe. A fleet of small steamers, schooners and junks, carries on trade with the towns and districts on the east and west coasts of the Gulf of Siam. The trade of Bangkok is almost entirely in the hands of Europeans and Chinese. The principal exports are rice and teak, and the principal imports, cotton and silk goods and gold-leaf. The value of trade, which more than doubled between the years 1900 and 1907, amounted in the latter year to £5,600,000 imports and £7,100,000 exports. Of the total trade, 75% is with the British empire. Many of the best known mercantile firms and banks of the Far East have branches in Bangkok. The unit of currency is the *tical* (see Siam).

The government of Bangkok is entrusted to the minister of the capital, a member of the cabinet. Under this minister are the police, sanitary, harbour master's and revenue offices. The police force is an efficient and well-organized body of 3000 men headed by a European commissioner of police. The sanitary department consists of a board of health, a bacteriological laboratory and an engineer's office, all managed with expert European assistance. Under the act of 1905, the want of which was long felt, the port and the city water-ways are controlled by the harbour master. Local revenues are collected by the revenue office. The ordinary law courts are under the control of the ministry of justice, but in accordance

with the extra-territorial rights enjoyed by foreign powers in Siam, each consulate has attached to it a court, having jurisdiction in all cases in which a subject of the power represented by such consulate is defendant.

The population, which is estimated at 450,000, is mixed. Mingling with Siamese and Chinese, who form the major part, may be seen persons of almost every race to be found between Bombay and Japan, while Europeans of different nationalities number over 1000. The death-rate is high, especially among children, owing to the prevalence of cholera, smallpox and fevers during the dry weather. Sanitation, however, is improving and much good has resulted from the boring of numerous artesian wells which yield good water.

Before 1769 Bangkok was nothing but an agricultural village with a fort on the river bank. In that year, however, it was seized by the warrior, Paya Tak, as a convenient point from which to attack the Burmese army then in occupation of Siam, and upon his becoming king it was chosen as the capital of the country. (See SIAM.)

(W. A. G.)

BANGOR, a seaport and market-town of Co. Down, Ireland, in the north parliamentary division, on the south side of Belfast Lough, 12m. E.N.E. of Belfast, on a branch of the Belfast & County Down railway. Pop. of urban district (1901) 5903. It carries on a considerable trade in cotton and linen and embroidered muslin. It is greatly frequented as a watering-place, especially by the people of Belfast, and there are golf links and important regattas held by the Royal Ulster Yacht Club. Slight remains are to be seen of an abbey of Canons Regular, founded in the middle of the 6th century by St Comgall, and rebuilt, on a scale of magnificence which astonished the Irish, by St Malachy O'Morgair in the first half of the 12th century. Bangor was incorporated by James I. and returned two members to the Irish parliament.

BANGOR, a city, port of entry, and the county-seat of Penobscot county, Maine, U.S.A., at the confluence of the Kenduskeag stream with the Penobscot river, and at the head of navigation on the Penobscot, about 60 m. from the ocean, and about 75 m. N.E. of Augusta. Pop. (1890) 19,103; (1900) 21,850, of whom 3726 were foreign-born and 176 were negroes; (1910, census) 24,803. A bridge (about 1300 ft. long) across the Penobscot connects Bangor with Brewer (pop. in 1910, 5667). Bangor is served directly by the Maine Central railway, several important branches radiating from the city, and by the Eastern Steamship line; the Maine Central connects near the city with the Bangor & Aroostook railway (whose general offices are here) and with the Washington County railway. The business portion of the city lies on both sides of the Kenduskeag and for about 3 m. along the W. bank of the Penobscot, which is here quite low, while many fine residences are on the hillsides farther back. Bangor is the seat of three state institutions—the Eastern Maine general hospital, the Eastern Maine insane hospital and the law school of the University of Maine—and of the Bangor Theological Seminary (Congregational), incorporated in 1814, opened at Hampden in 1816, removed to Bangor in 1819, and empowered in 1905 to confer degrees in divinity. The city has several public parks, a public library and various charitable institutions, among which are a children's home, a home for aged men, a home for aged women and a deaconesses' home. Among the
[v.03 p.0317]
principal buildings are the county court house, the Federal building, the city hall and the opera house. The Eastern Maine Music Festival is held in Bangor in October of each year. The rise of the tide here to a height of 17 ft. makes the Penobscot navigable for large vessels; the Kenduskeag furnishes good water-power; and the city is the trade centre for an extensive agricultural district. The Eastern Maine State Fair is held here annually. Bangor is one of the largest lumber depots in the United States, and also ships considerable quantities of ice. The city's foreign trade is of some importance; in 1907 the imports were valued at $2,720,594, and the exports at $1,272,247. Bangor has various manufactures, the most important of which (other than those dependent upon lumber) are boots and shoes (including moccasins); among others are trunks, valises, saws, stoves, ranges and furnaces, edge tools and cant dogs, saw-mill machinery, brick, clothing, cigars, flour and dairy products. In 1905 the city's factory products were valued at $3,408,355. The municipality owns and operates the water-works (the water-supply being drawn from the Penobscot by the Holly system) and an electric-lighting plant; there is also a large electric plant for generation of electricity for power and for commercial lighting, and in Bangor and the vicinity there were in 1908 about 60 m. of electric street-railway.

Bangor has been identified by some antiquarians as the site of the mythical city of *Norumbega*, and it was reported in 1656 that Fort Norombega, built by the French, was standing here; but the authentic history of Bangor begins in 1769 when the first settlers came. The settlement was at first called Conduskeag and for a short time was locally known as Sunbury. In 1791 the town was incorporated, and through the influence of the Rev. Seth Noble, the first pastor, the name was changed to Bangor, the name of one of his favourite hymn-tunes. During the war of 1812 a British force occupied Bangor for several days (in September 1814), destroying vessels and cargoes. Bangor was chartered as a city in 1834. In 1836 a railway from Bangor to Old Town was completed; this was the first railway in the state; Bangor had, also, the first electric street-railway in Maine (1889), and one of the first iron steamships built in America ran to this port and was named "Bangor."

BANGOR (formerly BANGOR FAWR, as distinguished from several other towns of this name in Wales, Ireland, Brittany, &c.), a city, municipal (1883) and contributory parliamentary borough (Carnarvon district), seaport and market-town of Carnarvonshire, N. Wales, 240 m. N.W. of London by the London & North Western railway. Pop. (1901) 11,269. It consists of Upper and Lower, the Lower practically one street. Lying near the northern entrance of the Menai Straits, it attracts many visitors. Buildings include the small cathedral, disused bishop's palace, deanery, small Roman Catholic church and other churches, the University College of N. Wales (1883), with female students' hall, Independent, Baptist, Normal and N. Wales Training Colleges. The cruciform cathedral, with a low pinnacled tower, stands on the site of a church which the English destroyed in 1071 (dedicated to, and perhaps founded, about 525, by St Deiniol). Sir G. Scott restored the present cathedral, 1866-1875, after it had been burned in the time of Owen Glendower, destroyed in 1211, and, in 1102 and 1212, severely handled. Bishop Dean (*temp*. Henry VII.) rebuilt the choir, Bishop Skevyngton (1532) added tower and nave. Lord Penrhyn's slate-quarries, at Bethesda, 6 m. off, supply the staple export from Port Penrhyn, at the mouth of the stream Cegid.

The *Myvyrian Archaeology* (408-484) gives the three principal *bangor* (college) institutions as follows:—the *bangor* of Illtud Farchawg at Caer Worgorn (Wroxeter); that of Emrys (Ambrosius) at Caer Caradawg; *bangor wydrin* (glass) in the *glass isle*, Afallach; *bangor Illtud*, or Llanilltud, or Llantwit major (by corruption), being a fourth. In each of the first three were 420 saints, succeeding each other (by hundreds), day and night, in their pious offices.

BANGORIAN CONTROVERSY, a theological dispute in the early 18th century which originated in 1716 with the posthumous publication of George Hickes's (bishop of Thetford) *Constitution of the Christian Church, and the Nature and Consequences of Schism*, in which he excommunicated all but the non-juring churchmen. Benjamin Hoadly (*q.v.*), the newly-appointed bishop of Bangor, scented the opportunity and wrote a speedy and able reply, *Preservative against the Principles and Practices of Non-Jurors*, in which his own Erastian position was recommended and sincerity proposed as the only test of truth. This was followed by his famous sermon, preached before George I. on the 31st of March 1717, on *The Nature of the Kingdom or Church of Christ*. In this discourse "he impugned the idea of the existence of any visible church at all, ridiculed the value of any tests of orthodoxy, and poured contempt upon the claims of the church to govern itself by means of the state." He identified the church with the kingdom of Heaven—it was therefore "not of this world," and Christ had not delegated His authority to any representatives. Both book and sermon were reported on by a committee appointed by the Lower House of Convocation in May, and steps would have been taken by the archbishop and bishops had not the government stepped in (Hoadly denied that this was at his request) and prorogued Convocation till November. Hoadly himself wrote *A Reply to the Representations of Convocation* and also answered his principal critics, among whom were Thomas Sherlock (*q.v.*), then dean of Chichester, Andrew Snape, provost of Eton, and Francis Hare, then dean of Worcester. These three men, and another opponent, Robert Moss, dean of Ely, were deprived of their royal chaplaincies. Hoadly was shrewd enough not to answer the most brilliant, though comparatively unknown, of his antagonists, William Law. Though the controversy went on, its most important result had already been achieved in the silencing of Convocation, for that body, though it had just "seemed to be settling down to its proper work in dealing with the real exigencies of the church" when the Hoadly dispute arose, did not meet again for the despatch of business for nearly a century and a half. (See CONVOCATION.)

BANGWEULU, a shallow lake of British Central Africa, formed by the head streams of the Congo. It lies between 10° 38′ and 11° 31′ S. and is cut by 30° E. Bangweulu occupies the north-west part of a central basin in an extensive plateau, and is about 3700 ft. above the sea. The land slopes gently to the depression from the south, east and north, and into it drain a considerable number of streams, turning the greater part into a morass of reeds and papyrus. The term Bangweulu is sometimes applied to the whole depression, but is properly confined to the area of clear water. Only on its south-west and western sides are the banks of the lake clearly defined. The greatest extent of open water is about 60 m. N. to S. and 40 m. E. to W. Long narrow sandbanks almost separate Chifunawuli, the western pan of the lake, from the main body of water, while the water surface is further diminished by a number of islands. The largest of these islands, Kirui (Chiru), lies on the east side of the lake close to the swamp. Kisi (Chishi) is a small island occupying a central position just south of 11° S., and Mbawali, 20 m. long by 3 broad, lies south of Kisi. South of Bangweulu the swamp extends to 12° 10′ S. Into this swamp on its east side flows the Chambezi, the most remote head stream of the Congo. Without entering the lake the Chambezi mingles its waters in the swamp with those of the Luapula. The Luapula, which leaves Bangweulu at its most southern point, is about a mile wide at the outflow, but soon narrows to 300 or so yds. West of the Luapulu and near its outflow lies Lake Kampolombo, 20 m. long and 8 broad at its southern end. A sandy track separates Bangweulu from Kampolombo, and a narrow forest-clad tongue of land called Kapata intervenes between the Luapula and Kampolombo. Various channels lead, however, from the river to the lake. The Luapula flows south through the swamp some 50 m. and then turns west and afterwards north (see Congo). The flood waters of the Chambezi and other streams, which deposit large quantities of alluvium, are gradually solidifying the swamp, while the Luapula is believed to be, though very slowly, draining Bangweulu. The waters of the lake do not appear to be anywhere more than 15 ft. deep.

[v.03 p.0318]

Though heard of by the Portuguese traveller, Francisco de Lacerda, in 1798, Bangweulu was first reached in 1868 by David Livingstone, who died six years later among the swamps to the south. It was partially surveyed in 1883 by the French traveller, Victor Giraud, and first circumnavigated by Poulett Weatherley in 1896.

See P. Weatherley in *Geog. Journ.* vol. xii. (1898) and vol. xiv. p. 561 (1899); L. A. Wallace in *Geog. Journ.* vol. xxix. (1907), with map by O. L. Beringer. Giraud's *Les Lacs de l'Afrique équatoriale* (Paris, 1890) and Livingstone's *Last Journals* (1874) may also be consulted.

BANIM, JOHN (1798-1842), Irish novelist, sometimes called the "Scott of Ireland," was born at Kilkenny on the 3rd of April 1798. In his thirteenth year he entered Kilkenny College and devoted himself specially to drawing and painting. He pursued his artistic education for two years in the schools connected with the Royal Society at Dublin, and afterwards taught drawing in Kilkenny, where he fell in love with one of his pupils. His affection was returned, but the parents of the young lady interfered and removed her from Kilkenny. She pined away and died in two months. Her death made a deep impression on Banim, whose health suffered severely and permanently. In 1820 he went to Dublin and settled finally to the work of literature. He published a poem, *The Celts' Paradise*, and his *Damon and Pythias* was performed at Covent Garden in 1821. During a short visit to Kilkenny he married, and in 1822 planned in conjunction with his elder brother Michael (1796-1874), a series of tales illustrative of Irish life, which should be for Ireland what the Waverley Novels were for Scotland. He then set out for London, and supported himself by writing for magazines and for the stage. A volume of miscellaneous essays was published anonymously in 1824, called *Revelations of the Dead Alive*. In April 1825 appeared the first series of *Tales of the O'Hara Family*, which achieved immediate and decided success. One of the most powerful of them, *Crohoore of the Bill Hook*, was by Michael Banim. In 1826 a second series was published, containing that excellent Irish novel, *The Nowlans*. John's health had given way, and the next effort of the "O'Hara family" was almost entirely the production of his brother Michael. *The Croppy, a Tale of 1798* (1828) is hardly equal to the earlier tales, though it contains some wonderfully vigorous passages. *The Denounced*, *The Mayor of Windgap*, *The Ghost Hunter* (by Michael Banim), and *The Smuggler* followed in quick succession, and were received with considerable favour. John Banim, meanwhile, had become much straitened in circumstances. In 1829 he went to France, and while he was abroad a movement to relieve his wants was set on foot by the English press, headed by John Sterling in *The Times*. A sufficient sum was obtained to remove him from any danger of actual want, and to this government added in 1836 a pension of £150. He returned to Ireland in 1835, and settled in Windgap Cottage, a short distance from Kilkenny; and there, a complete invalid, he passed the remainder of his life, dying on the 13th of August 1842. Michael Banim had acquired a considerable fortune which he lost in 1840 through the bankruptcy of a firm with which he had business relations. After this disaster he wrote *Father Connell* (1842), *Clough Fionn* (1852), *The Town of the Cascades* (1862). Michael Banim died at Booterstown on the 30th of August 1874.

The true place of the Banims in literature is to be estimated from the merits of the *O'Hara Tales*; their later works, though of considerable ability, are sometimes prolix and are marked by too evident an imitation of the Waverley Novels. The *Tales*, however, are masterpieces of faithful delineation. The strong passions, the lights and shadows of Irish peasant character, have rarely been so ably and truly depicted. The incidents are striking, sometimes even horrible, and the authors have been accused of straining after melodramatic effect. The lighter, more joyous side of Irish character, which appears so strongly in Samuel Lover, receives little attention from the Banims.

See P. J. Murray, *Life of John Banim* (1857).

BANJALUKA (sometimes written Banialuka, or Bainaluka), the capital of a district bearing the same name, in Bosnia. Pop. (1895) 13,666, of whom about 7000 were Moslems. Banjaluka lies on the river Vrbas, and at the terminus of a military railway which meets the Hungarian state line at Jasenovac, 30 m. N.N.W. Banjaluka is the seat of Roman Catholic and Orthodox bishops, a district court, and an Austrian garrison. It is at the head of a narrow defile, shut in by steep hills on the east and west but expanding on the north to meet the valley of the Save. A small stream called the Crkvina enters the Vrbas from the north-east and in the angle thus formed stand the citadel and barracks, with the 16th-century Ferhadiya Jamia, largest and most beautiful of more than 40 mosques in the city. The celebrated Roman baths are all in ruins, except one massive, domed building, dating from the 6th century and still in use, although modern baths are also open, for the development of the hot springs. Other noteworthy buildings are the Franciscan and Trappist monasteries, a girls' school, belonging to the Sisterhood of the Sacred Blood of Nazareth, a real-school and a Turkish bazaar. Coal, iron, silver and other minerals are found in the adjoining hills; and the city possesses a government tobacco factory, a brewery, cloth-mills, gunpowder-mills, a model farm and many corn-mills, worked by the two rapid rivers.

Banjaluka is probably the Roman fort, marked, in the *Tabula Peutingeriana*, as *Castra*, on the river Urbanus and the road from Salona on the Adriatic to Servitium in Pannonia. The origin of its later name, meaning the "Baths of St Luke," is uncertain. In the 15th century, the fall of Jajce, a rival stronghold 22 m. S., led to the rapid rise of Banjaluka, which was thenceforward the scene of many encounters between Austrians and Turks; notably in 1527, 1688 and 1737. No Bosnian city had greater prosperity or importance in the last half of the 18th century. In 1831, Hussein Aga Borberli, called the "Dragon of Bosnia," or *Zmaj Bosanski*, set forth from Banjaluka on his holy war against the sultan Mahmud II. (See Bosnia.)

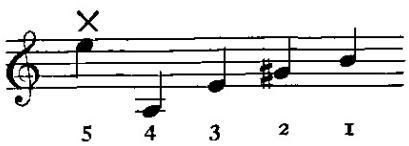
BANJERMASIN (Dutch *Bandjermasin*), the chief town in the Dutch portion of the island of Borneo, East Indies, on the river Martapura, near its junction with the Barito, 24 m. from the mouth of the Barito in a bay of the south coast. The town is the seat of the Dutch resident of South and East Borneo. Its buildings stand on either bank of the river, but many of the inhabitants (who number nearly 50,000) occupy houses either floating on, or built on piles in the river. As large vessels can sail up to the town, it is a trade centre for the products of the districts along the banks of the Barito and Martapura, such as benzoin, rattans, wax, gold, diamonds, iron and weapons. In 1700 the East Indian Company established a factory here; but the place was found to be unhealthy, and the Company's servants were finally attacked by the natives, whom they repulsed with great difficulty. The settlement was abandoned. The English again seized Banjermasin in 1811, but restored it in 1817. Of the commercial community the Chinese are a very important portion, and there is also a considerable number of Arabs. The district of Banjermasin was incorporated by the Dutch in consequence of the war of 1860, in regard to the succession in the sultanate, which had been under their protection since 1787. The town of Martapura was the seat of the sultan from 1771. The inland portion of the district is covered with forest, while the flat and

swampy seaboard is largely occupied by rice-fields. The inhabitants are mostly Dyaks.

BANJO, a musical instrument with strings plucked by fingers or plectrum, popular among the American negroes and introduced by them into Europe. The word is either a corruption of "bandore" or "pandura" (*q.v.*), an instrument of the guitar type, or is derived from "bania," the name of a similar primitive Senegambian instrument.

The banjo consists of a body composed of a single piece of vellum stretched like a drum-head over a wooden or metal hoop to ensure the requisite degree of resonance; the parchment may be tightened or slackened by means of a series of screws disposed round the circumference of the hoop. Attached to the body, which has no back, is a long neck, terminating in a flat head acting as a peg-box and bent back slightly at an obtuse angle from the neck. There are five, six or nine strings to the banjo; they are fastened to a tail-piece as in the violin, pass over a low bridge, on the body, and are strained over the nut or ridge at the end of the neck, where they are threaded through holes and wound round the tuning-pegs fixed in the back of the head in Oriental fashion, as in the lute (*q.v.*). The strings are stopped by the pressure of the fingers against the finger-board which lies over the front of the neck; the correct positions for the formation of the intervals of the scale are indicated in some banjos by frets consisting of metal or wooden bands inlaid in the finger-board. The vibrating length of the strings from bridge to nut is 24 in. for all except the highest in pitch, known as the "chanterelle," "melody" or "thumb string," which is only 16 in. long; its tuning peg is inserted half-way up the neck. The chanterelle is not, as in other stringed instruments, in its position as the highest in pitch, but is placed next the lowest string for convenience in playing it with the thumb. In the tables of accordance here given, the chanterelle is indicated by a X. The five-stringed banjo is tuned either

[v.03 p.0319]



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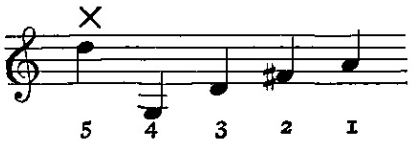
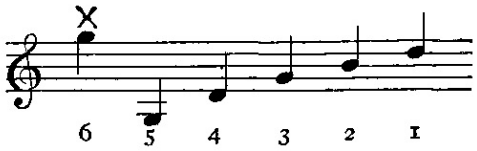
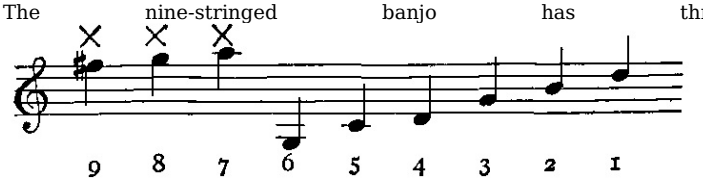


The six-stringed is tuned



The nine-stringed banjo has three thumb strings thus



The G clef is used in notation, but the notes sound an octave lower than they are written. The banjo is usually a transposing instrument in the sense that, when playing with other instruments, the A corresponds to the C of the piano or violin; the key of A major is therefore the first to be mastered. The chanterelle does not lie over the finger-board and is always played open by the thumb.

The banjo is held so that the neck is even with the left shoulder and the body rests on the right thigh; the front of the instrument is held inclined at an angle, allowing the performer to see all the strings. When played as a solo instrument, a plectrum may be used with good effect to produce rapid scale and arpeggio passages, or to produce the tremolo or sustained notes as on the mandoline (*q.v.*). The best results are obtained by means of a tortoise-shell plectrum about the size of a shilling,[1] having the contact-edges highly polished, bevelled and terminating in a point. The tone of the banjo is louder and harder than that of the guitar. Chords of two, three and four notes can be played on it.

The banjo or bania of the African negro having grass strings is still in use on the coast of Guinea. The banjo was made known in England through companies of coloured minstrels from the United States, one of which came over to London as early as 1846.

(K. S.)

[1] See A. H. Nassau-Kennedy, I.S.M., *Banjo-Plectring*.

BANK,[1] known also as "Polish Bank" and "Russian Bank" a card-game. An ordinary pack is used. Five or six players is a convenient number. Each contributes an arranged stake to the pool. The dealer gives three cards to each player and turns up another; if this is not lower than an eight (ace is lowest) he goes on till such a card is exposed. The player on the dealer's left, without touching or looking at his cards, can bet the amount of the pool, or any part of it, that among his cards is one that is higher (of the same suit) than the turn-up. If he wins, he takes the amount from the pool; if he loses, he pays it to the pool. Each player does the same in turn, the dealer last. Whenever the pool is exhausted, a fresh stake is put into the pool. After a round is over the deal passes. No player may touch his cards until he has made his bet; the penalty is a fine to the pool of twice the stake, and the loss of his right to bet during that round.

[1] For the commercial "bank" see Banks and Banking.

BANKA (Banca, Bangka), an island of the Dutch East Indies, off the east coast of Sumatra, from which it is separated by Banka Strait, which is about 9 m. wide at its narrowest point. On the east, the broader, island-studded Gaspar Strait separates Banka from Billiton. Banka is 138 m. in length; its extreme breadth is 62 m., and its area, including a few small adjacent islands, 4460 sq. m. The soil is generally dry and stony, and the greater part of the surface is covered with forests, in which the logwood tree especially abounds. The hills, of which Maras in the north is the highest (2760 ft.), are covered with vegetation to their summits. Geologically, Banka resembles the Malay Peninsula, its formations being mainly granite, Silurian and Devonian slate, frequently covered with sandstone, laterite (red ironstone clay) of small fertility, and alluvium. The granite extends from W.N.W. to S.S.E., forming the short, irregular hill-chains. As these lie generally near the east coast, it follows that the rivers of the west coast are the longer. There are no volcanoes. The chief rivers (Jering, Kotta and Waringin) are navigable for some 19 m. from their mouths and are used for the transport of tin. Banka is principally noted for the production of this mineral, which was discovered here in 1710 and is a government monopoly. It occurs in lodes and as stream-tin, and is worked by Chinese in large numbers who inhabit villages of their own. The island is divided into nine mining districts, including about 120 mines, under government control, with 12,000 workmen, which have produced as much as 12,000 tons of tin in a year. From May to August, the period of the south-east monsoon, the climate of Banka is dry and hot; but the mean annual rainfall reaches 120 in. annually, rain occurring on an average on 168 days each year. The wet, cool season proper is from November to February, accompanying the north-west monsoon. The heavy rainfall is of great importance to the tin-streaming industry. The total population of the island (1905) is 115,189, including 40,000 Chinese and 70,000 natives. These last are mainly composed of immigrant Malayan peoples. The aborigines are represented by a few rude hill-tribes, who resemble in physique the Battas of Sumatra. Rice, pepper, gambier, coffee and palms are cultivated, and fishing and the collection of forest produce are further industries, but none of these is of importance. The chief town is Muntok at the north end of Banka Strait.

See H. Zondervan, *Banka en Zijne bewoners* (Amsterdam, 1895), with bibliography; T. Posewitz, *Die Zinn-inseln im Indischen Ocean*. For geology and the tin-mines, *Jaarboek vor het Mijnwezen in Ned. Ind.* (Amsterdam, 1877-1884).

BANKER-MARKS, or Masons' Marks. The "banker" is the stone bed or bench upon which a mason works, hence the term (so well known to the trade) of banker-marks, which, as Mr Whitley has pointed out, is more appropriate than that of masons' marks, since the setters, who are usually selected from amongst the best workmen, make no marks upon the stone (*Leamington Spa Courier*, 11th of August 1888). These must not be confused with other marks sometimes cut on stones as directions to the setters, and so used and employed to the present time. Banker-marks are met with throughout the civilized world, and in fact are to be found on all old buildings of consequence, ecclesiastical or otherwise. Professor T. Hayter Lewis well observed, "Go where you will, in England, France, Sicily, Palestine, you will find all through the buildings of the 12th century the same carefully worked masonry, the same masons' tool-marks, the same way of making them." Such masons' marks are to be traced graved on all the chief stones of what is known as Norman work. Norman tooling, so far as Hayter Lewis could discover, came from the north and west of Europe. Since then we get marks made with a "toothed chisel," but however or wherever chiselled the intention was the same. The system followed provided an infallible means of connecting the individual craftsman with his work, an evidence of identity that could not be gainsaid.

Naturally, because of their simplicity, certain designs were followed much more frequently than others, while occasionally some of a very elaborate character are to be detected. Undoubtedly not a few were suggestive of the initials of the names of the masons, and others were reminiscent of certain animals, objects, &c., but no proof has yet been offered of their being alphabetical in design, or arranged so as to distinguish the members of different lodges or companies; the journeymen selected any design they cared to adopt.

[v.03 p.0320] Singular to state, marks were chosen by gentlemen and others who joined the operative masonic lodges of the 16th and later centuries, and they were as carefully registered in the mark-books as those selected by operatives for trade purposes. The same marks are to be seen in the registers used by fathers and sons, and not always with a slight difference, as some have stated, to secure identification. What should be noted also is that other trades used precisely similar marks and for a like object, so that the idea of their having a mystical meaning, or being utilized for any other object but the one named, seems groundless.

The late George Godwin, F.R.S., F.S.A., &c., drew attention to the subject of "masons' marks in various countries" in a communication to the Society of Antiquaries in 1841, and also at a little later period (vide *Archaeologia*, vol. xxx. p. 113). To him is the credit due of first drawing attention to "these signs" in England. It is noteworthy how little such marks are noticed, even in buildings which are visited by archaeologists quite frequently, until a few are pointed out, and then they meet the eye to an astonishing number. In the *Sessional Papers*, 1868-1869, of the Royal Institute of British Architects, No. 9, may be found numerous samples of the marks from various parts of Europe in illustration of the paper by Godwin.

No better plan has been followed in modern times to connect the work done with the worker in stone, and it is probable that a second mark, observable on some blocks, may serve to indicate the overseer. There are even three or more sometimes.

The same system was adopted at the building of Truro cathedral, only the marks were inserted on the bed of each stone instead of at the side as usual, the result being that they ceased to be seen after being placed *in situ*. Mr Hughan obtained copies of these marks from Mr James Bubb, the first clerk of the works, and from his successor, Mr Robert Swain, and had them published in the *Freemason*, 13th of November 1886. He remarked at the same time that "many of these designs will be familiar to students of ancient ecclesiastical and other buildings at home and abroad." Some are interesting specimens.

A Historical Treatise on Early Builders' Marks (Philadelphia, U.S.A., 1885) by Mr G. F. Fort, and *Masons' Marks from Buildings in the Counties of Lancaster and Chester, with Notes on the General History of Masons' Marks* (Historic Society of Lancashire and Cheshire, vol. vii. N.S.), by W. Harry Rylands, F.S.A., may be consulted with advantage. The latter declares that "the Runic theory is as unlikely and as untenable as that which places the origin of these marks in the absurd alphabets given by Cornelius Agrippa, who died early in the 16th century." Victor Didron copied some 4000 during a tour in France in 1836 and pointed out their value (*Ann. Arch.*, 1845).

(W. J. H.*)

BANKET, a South African mining term, applied to the beds of auriferous conglomerate, chiefly occurring in the Witwatersrand gold-fields (see GOLD). The name was given to these beds from their resemblance to a sweetmeat, known in Dutch as "banket," resembling almond hard-bake. The word is the same as "banquet," and is derived ultimately from "bank" or "bench," meaning table-feast, hence applied to any delicacy or to various kinds of confectionery, a use now obsolete in English.

BANK HOLIDAYS, in the United Kingdom, those days which by the Bank Holidays Act 1871 are kept as close holidays in all banks in England and Ireland and Scotland respectively. Before the year 1834, the Bank of England was closed on certain saints' days and anniversaries, about thirty-three days in all. In 1834 these were reduced to four—Good Friday, 1st of May, 1st of November and Christmas Day. By the act of 1871, carried through the House of Commons by Sir J. Lubbock (afterwards Lord Avebury), the following were constituted bank holidays in England and Ireland—Easter Monday, the Monday in Whitsun week, the first Monday of August, the 26th of December if a week-day; and by the Bank Holiday (Ireland) Act 1903, March 17th as a special bank holiday for Ireland (see FEASTS AND FESTIVALS). In Scotland—New Year's Day, Christmas Day, Good Friday, the 1st Monday of May, the 1st Monday of August. If Christmas Day and New Year's Day fall on a Sunday, the next Monday following is the bank holiday. No person is compelled to make any payment or to do any act upon a bank holiday which he would not be compelled to do or make on Christmas Day or Good Friday, and the making of a payment or the doing of an act on the following day is equivalent to doing it on the holiday. By the same act it was made lawful for the sovereign from time to time, as it should seem fit, to appoint by proclamation, in the same manner as public fasts or days of public thanksgiving, any day to be observed as a bank holiday throughout the United Kingdom or any part of it, or to substitute another day when in any special case it appears inexpedient to the sovereign in council to keep the usual bank holiday. (See further HOLIDAY.)

BANKIPUR, an ancient village on the Hugli river in the Bengal Presidency, near the modern Palta above Barrackpore. It has disappeared from the map, but is famous as the principal settlement of the ill-fated Ostend Company, the one great effort made by Germany to secure a foothold in India. The Ostend Company was formed in 1722-1723, and with a capital of less than a million sterling founded two settlements, one at Coblom (Covelong) on the Madras coast between the English Madras and the Dutch Sadras, and the other on the Hugli between the English Calcutta and the Dutch Chinsura. Both English and Dutch were offended and in 1727, in order to obtain the European guarantee for the Pragmatic Sanction, the court of Vienna resolved to sacrifice the Company and suspended its charter. It became bankrupt in 1784 and ceased to exist in 1793. But in the meantime in 1733 the English and Dutch stirred up the Mahommedan general at Hugli to pick a quarrel. He attacked Bankipur and the garrison of only fourteen persons set sail for Europe. Thus German interests disappeared from India.

BANK-NOTES. For our present purpose we include in this description all paper substitutes for metallic currency whether issued by banks, governments or other financial institutes.

Early bank-notes were simply printed forms in which the amounts were written by hand. They were usually for large amounts (£40 and upwards) and were printed upon water-marked paper; and, although no precautions were taken in the engraving to prevent fraudulent imitation, forgeries were comparatively rare. But, when at the end of the 18th century small notes for £1 and £2 were put in circulation, forgery became rife, as many as 352 persons being convicted of this crime in England in a single year; and from that time to the present a constant trial of skill has been going on between the makers of bank-notes and the counterfeiters. Engine-turned ornaments and emblematical figures or views introduced in the engraving, in conjunction with special water-marks in the paper, held the forgers somewhat in check until the

discovery of photography put into the hands of the counterfeiter a most dangerous weapon, by the aid of which complicated patterns and vignettes could be perfectly reproduced. To prevent such reproduction Henry Bradbury in 1856 introduced anti-photographic bank-note printing, in which the essential portions of the note were printed in one colour and over this another protective colour was placed. A photograph of a note printed in this way presented a confused mingling of the two colours; but with the advance of photographic knowledge means were found of obtaining a photograph of either colour separate from the other, and it consequently became necessary to introduce a third colour and to secure a special photographic relation between the three colours to prevent their separation.

Photography, however, although the most dangerous weapon of the counterfeiter, is not the only means of imitation available, a fact which is sometimes overlooked. A note may be perfectly secure against photographic reproduction, but from the absence of other necessary features may be easily copied by an engraver of ordinary skill. There are two systems of engraving employed in bank-notes:—(1) line-engraving in which the lines are cut into the steel or copper plates; and (2) relief-engraving in which the lines stand up above the plate as in wood-engraving. In the former, adapted to the process called plate-printing, the ink is delivered from the lines in the plate to the paper pressed upon it; in the latter, adapted to surface-printing, the ink is spread upon the face of the lines and printed as in typography. Plate-printing gives by far the finer and sharper impression, but as there is a perceptible body of ink transferred to the paper from the cut lines, it has been supposed that an impression from plate would be more easily photographed than one from surface where only a film of ink is spread upon the top of the raised lines. But surface-printing being much less sharp and distinct than plate-printing, imperfect copies of notes for which that process is used are the more likely to escape detection. The plates upon which the early notes were engraved being of copper quickly wore out and had to be constantly replaced. The result was great difference in the appearance of the notes, those printed from new plates being sharp and clear, while others, printed from old plates, were pale and blurred. These differences were a great assistance to the forger, as the public, being accustomed to variations of appearance between different genuine notes, were less apt to remark the difference between these and counterfeits.

[v.03 p.0321]

In the early part of the 19th century, Jacob Perkins (1766-1849) introduced into England from America what is known as the transfer-process, in which the original engraving on steel is hardened and an impression taken from it on a soft steel cylinder, which in its turn is hardened and pressed into a soft printing-plate. By this means as many absolutely identical plates can be produced as may be required, and being hardened they will yield a very large number of prints without any appreciable deterioration. Another method of securing uniformity is the multiplication of plates by electro-deposition, the surface of the copper-electrotype plates being protected by the deposit of a film of steel which effectually prevents the wearing of the copper and can be renewed at will.

The water-mark of the paper, on which formerly reliance was placed almost exclusively, puts a difficulty in the way of the counterfeiter, but experience has shown that in ordinary circumstances it does not in itself afford adequate protection. The means by which it can be imitated are well known, and, since a distinct water-mark is incompatible with strong paper, the life of a water-marked note is much shorter than that of one printed upon plain paper. The best bank-note paper is made from pure linen rags and was formerly made by hand. Machine-made paper is however now largely used, as it possesses all the strength of hand-made and is much more uniform in thickness and texture.

In documents which pass current as money it is obviously the duty of the bank or government issuing them to take all reasonable means to prevent the public from being defrauded by the substitution of counterfeits; and a bank whose circulation depends upon the confidence of the public must do so in its own interests to insure the acceptance of its notes. This principle is now recognized by all issuing institutions, but in practice there is room for improvement in the issues of many important establishments, partly because of the disinclination of the directors of a bank to change the form of an issue to which the public is accustomed, partly because of the difficulty of deciding what is really a secure note, and in certain cases because, owing to exceptional circumstances, an issue may be practically immune from forgery although the notes themselves present little or no difficulty in imitation. The features essential to the security of an issue are (1) absolute identity in appearance of all notes of the issue; (2) adequate protection by properly-selected colours against photographic reproduction; and (3) high-class engraving comprising geometric lathe work and well-executed vignettes. In addition it is important that the design of the note should be striking and pleasing to the eye, and the inscription legible.

The notes of the Bank of England are printed in the bank from surface-plates in black without colour or special protection except the water-mark in the paper. They are never reissued after being once returned to the bank, and their average life is very short, about six weeks, so that a dirty or worn Bank of England note is practically never seen. This arrangement, coupled with the difficulty of negotiating forged notes in England, the lowest denomination being £5, accounts for the comparative immunity from forgery of the bank's issues.

BANK RATE, a term used in financial circles to designate the rate of discount charged in the chief monetary centres by the state or leading bank, as opposed to the open-market rate. (See Market: *Money market*.)

BANKRUPTCY (from Lat. *bancus* or Fr. *banque*, table or counter, and Lat. *ruptus*, broken), the status of a debtor who has been declared by judicial process to be unable to pay his debts. Although the terms "bankruptcy" and "insolvency" are sometimes used indiscriminately, they have in legal and commercial usage distinct significations. When a person's financial liabilities are greater than his means of meeting them, he is said to be "insolvent"; but he may nevertheless be able to carry on his business affairs by means of credit, paying old debts by incurring new ones, and he may even, if fortunate, regain a position of solvency without his creditors ever being aware of his true condition. And even when his insolvency becomes public and default occurs, a debtor may still avert bankruptcy if he is able to effect a voluntary arrangement with his creditors. A debtor may thus be insolvent without becoming bankrupt, but he cannot be a bankrupt without being insolvent, for bankruptcy is a legal declaration of his insolvency and operates as a statutory system for the administration of his property, which is thereby taken out of his personal control.

Definition.

In primitive communities bankruptcy systems were unknown. Individual creditors were left to pursue their remedies by such means as the law or practice of the community might sanction, and these were generally of a very drastic character. Under the Roman law of the Twelve Tables, the creditors might, as a last resort, cut the debtor's body into pieces, each of them taking his proportionate share; and although Blackstone in quoting this law appears to cast some doubt upon its too literal interpretation, there can be no doubt that the power of selling the debtor and his family into slavery was one which was habitually exercised in Greece, Rome, and generally among the nations of antiquity. Even among the Jews, whose legislation was of a comparatively humane character, this practice is illustrated by the Old Testament story of the woman who sought the help of Elisha, saying, "Thy servant my husband is dead ... and the creditor is come to take unto him my two children to be bondmen." The savage severity of these earlier laws was, however, found to be inconsistent with the development of more humane ideas and the growth of popular rights; and tended, as in the case of Greece and Rome, to create serious disturbance in political relations between the patricians, who generally composed the wealthier or creditor class, and the plebeians, in whose ranks the majority of debtors were to be found. Later legislation consequently substituted imprisonment in a public prison for the right of selling the person of the debtor. Under the feudal systems of Europe the state generally insisted on its subjects being left free for military service, and debts could not therefore be enforced against the person of the debtor; but as trade began to develop it was found necessary to provide some means of bringing personal pressure to bear upon debtors for the purpose of compelling them to meet their obligations, and under the practice of the English courts of law the right of a creditor to enforce his claims by the imprisonment of his debtor was gradually evolved (although no express legal enactment to that effect appears at any time to have existed), and this practice continued until comparatively recent times.

Early methods.

Without some system of enforcing payment of debts it would have been impossible for the commerce of the world to have attained its present proportions; for modern commerce is necessarily founded largely on credit, and credit could not have existed without the power of

Commercial objects.

enforcing the fulfilment of financial contracts. On the other hand remedies against a debtor's person, and still more against the persons of his family, are not only inconsistent with the growth of opinion among civilized communities, but are in themselves worse than futile, inasmuch as they strike at the root of all personal effort on the part of a debtor to retrieve his position and render a return to solvency impossible. Hence the necessity of devising some system which is just to creditors while not unduly harsh upon debtors, which discriminates between involuntary inability to meet obligations
[v.03 p.0322] and wilful refusal or neglect, and which secures to creditors as between themselves an equitable share of such of the debtor's assets as may be available for the payment of his liabilites. These are the objects which the bankruptcy laws have primarily in view. Another object, which has not always been so fully recognized as it might appear to deserve, has marked the most recent legislation, namely, the fostering of a higher tone of commercial morality and the protection of the trading community at large from the evils arising through the reckless abuse of credit and the unnatural trade competition thereby engendered. It must be admitted that these objects are of a somewhat conflicting character, and wherever the state has interfered with the view of securing an efficient system of bankruptcy legislation the task has been found to be extremely difficult. Not only have the conflicting interests of the debtor and his creditors to be taken into account, but the method to be adopted in dealing with his property has also given rise to much conflict of opinion, and to a lack of uniformity and consistency in the legislation which dealt with it. The debtor's property was naturally regarded as belonging to the creditors, but it could not be distributed among them until it was realized, and until their respective right and interests were determined by competent authority. In some cases claims to rank as creditors are of doubtful validity. In others the creditor holds securities, the value of which requires investigation, or he claims a preference to which he may or may not be legally entitled. Creditors have thus conflicting interests as between themselves, and are therefore incapable of acting together as a homogeneous body. Hence the necessity for calling in the aid of professional assignees or trustees, solicitors and other agents, who made it their special business to deal with such matters, exercising both administrative and quasi-judicial functions, in return for the remuneration which they receive out of the property for their services. Professional interests, which are not always identical with the interests of the debtor or the creditors, are thus called into existence, and these interests have from time to time exercised a powerful influence in shaping the course of legislation.

While the law of bankruptcy has therefore been largely the product of commercial development, it has necessarily been of slow and gradual growth, tentative in its character, and subject to oscillation between the extremes of conflicting interests according to the temporary and varying predominance of each of these interests from time to time. No intelligible grasp of the principles which underlie the history of bankruptcy legislation in England, and no satisfactory explanation of the fluctuating tendencies which have marked its progress, are possible without bearing these considerations in view.

Bankruptcy in England.

History.

The subject was originally dealt with in the sole interest of creditors; it was considered fraudulent for a debtor to procure his own bankruptcy. Thus the earliest English statute on the subject, 34 & 35 Henry VIII. c. 4 (A.D. 1542), was directed against fraudulent debtors, and gave power to the lord chancellor and other high officers to seize their estates and divide them among the creditors, but afforded no relief to the debtor from his liabilities. Subsequent legislation modified this attitude and introduced the principle of granting relief to the bankrupt with or without the consent of the creditors, where he conformed to the provisions of the bankruptcy law, and under the act of 1825 the debtor was allowed himself to initiate proceedings. Since 1542 about forty acts of parliament have been passed, dealing with the many aspects of the subject, and slowly expanding, modifying and building up the highly complex system of administration which now exists.

Court of 1831.

The courts exercising jurisdiction originally, consisted of commissioners appointed by the lord chancellor. But in 1831 a special court of bankruptcy was established, consisting of six commissioners with four judges as a court of review, and official assignees attached to the court for the purpose of getting in the distributing the bankrupt's assets. Non-traders were originally excluded from the bankruptcy court, and a special court called the "court for relief of insolvent debtors" was instituted for their benefit, in which relief from the liability to imprisonment could be obtained on surrender of their property, but they were not discharged from their debts, subsequently-acquired property remaining liable. Both of these courts were subsequently abolished, non-traders were permitted to obtain the benefit of the bankruptcy laws, including a discharge, and in 1869 the system of official assignees was swept away, and a new court of bankruptcy created with one of the vice-chancellors at its head as chief judge, and a number of subordinate registrars or inferior judges under him. This court has also now been abolished, and the business is administered by a judge of the high court specially appointed for the purpose by the lord chancellor, with registrars of the high court, who deal with the ordinary judicial routine of bankruptcy procedure in the London district, while similar duties are performed by the county-court judges throughout the country.

Rights of creditors.

But the questions which have proved the most difficult to deal with, and which more than any others have been the cause of fluctuating and inconsistent legislation, have undoubtedly been those relating to the share which the creditors ought to have in the administration of the proceedings, and to special arrangements effected between a debtor and his creditors under conditions more or less beyond the control of the court. These two questions are largely intermixed, and the history of English legislation on these points and its results throw much light on the causes of the failure of the many attempts which have been made by the most eminent legal authorities to bring the law into a satisfactory condition. The right of creditors to exercise some control in bankruptcy over the realization of the debtor's property through an assignee chosen by themselves was recognized at an early date, but this right was exercised subject to the supervision of the court which investigated the claims of creditors and determined who were entitled to take part in the proceedings. Provision was also made for the interim protection of the debtor's property by official assignees attached to the court, who took possession until the creditors could be consulted, and under the supervision of the court audited the accounts of the creditor's assignee. So long as this system continued substantial justice was generally secured; the claims of creditors were strictly investigated and only those who clearly proved their right before a competent court were entitled to take part in the proceedings. The bankrupt was released from his obligations, but only after strict inquiries into his conduct and under the exercise of judicial discretion. The accounts of assignees were also strictly investigated, and the costs of solicitors and other agents were taxed by officers of the court. But the system was found to be cumbrous, to lead to delay and too often to the absorption of a large part of the estate in costs, over the incurring of which there was a very ineffective control. Hence arose a demand for larger powers on the part of creditors, and the introduction into the bankruptcy procedure of the system of "arrangements" between the debtor and his creditors, either for the payment of a composition, or for the liquidation of the estate *free from the control of the court*. At first these arrangements were carefully guarded. Under the act of 1825 a proposal for payment of a composition might be adopted only after the debtor had passed his examination in court, and with the consent of nine-tenths in number and value of his creditors assembled at a meeting. Upon such adoption the bankruptcy proceedings were superseded. Dissenting creditors, however, were not bound by the resolution, but could still take action against the debtor's subsequently-acquired property. These powers were not found to be sufficiently elastic and the act failed to give public satisfaction. Attempts were made by the acts of 1831 and 1842 to remedy the defects complained of by a reconstitution of the bankruptcy court and its official system. But these measures also failed because
[v.03 p.0323] they were based on the assumption that judicial bodies could exercise effective control over administrative action, a control for which they are naturally unsuited, and which they could only carry out by cumbrous and expensive methods of procedure. Under the act of 1849 a totally new principle was introduced by the provision that a deed of arrangement executed by six-sevenths in number and value of the creditors for £10 and upwards should be binding upon *all* the creditors without any proceedings in or supervision by the court. But the determination of the question who were or were not creditors was practically left to the debtor himself, without any opportunity for testing by independent investigation the claims of those who signed the deed to control the administration of the estate. It is not difficult to see, in the light of subsequent experience, how likely this provision was to encourage fraudulent arrangements, and to introduce laxity in the administration of debtors' estates. A modification of the too stringent conditions of the act of 1825, which would have

Acts of 1825, 1831, 1842, 1849.

enabled a bankrupt to pay a composition on his debts, with the consent of a large proportion of his bona-fide creditors, and subject to the approval of the court, after hearing the objections of dissenting creditors, would doubtless have proved a beneficial reform, but the act of 1849 proceeded on a very different principle. Instead of reforming, it practically abolished judicial control. By avoiding Scylla it fell into Charybdis. To give *any* majority of creditors the power to release a debtor from his obligations to non-assenting creditors without full disclosure of his affairs, and without any exercise of judicial discretion or any investigation into the causes of the failure, or the conduct of the debtor, would in any circumstances have been to introduce a new and mischievous principle into legislation, for it would necessarily destroy the essential feature of such arrangements, that they are *voluntary* contracts, the responsibility for which lies solely with the parties entering into them. But to give such a power to creditors whose claims were subject to no independent investigation was to invite inevitable confusion and failure.

1861.

Yet this was the dominating principle of English bankruptcy legislation for nearly thirty-five years. Its effect under the act of 1849 was, however, to some extent modified by subsequent decisions of the courts that to make a composition arrangement binding it must be accompanied by a complete *cessio bonorum*; but this qualification was removed by the act of 1861 which made such arrangements binding without a *cessio* and reduced the majority required to make a deed of arrangement binding on all the creditors, to a majority in number and three-fourths in value of those whose claims amounted to £10 and upwards. The result was an enormous increase in fraudulent arrangements. The then attorney-general, Sir Robert Collier, in introducing an amending act in 1869, described the abuses which had grown up under the 1849 and 1861 acts, as having the effect of enabling a bankrupt to "defraud those to whom he was indebted and to set them at defiance"; while Lord Cairns, the lord chancellor, in the House of Lords expressed the opinion that the large increase which had taken place in the annual insolvency of the country during the preceding years could not "be attributed to depression of trade but must be traced to the enormous facilities which are given to debtors who wish to be released from their debts on easy terms." And yet in the legislation which ensued these facts were entirely ignored or lost sight of.

1869.

It is indeed a curious illustration of the difficulties which have attended bankruptcy legislation in England that the very measure (the act of 1869) which was introduced to remedy this deplorable condition of affairs, was twelve years afterwards denounced in parliament by the president of the Board of Trade (Mr Joseph Chamberlain) as "the most unsatisfactory and most unfortunate of the many attempts which had been made to deal with the subject" and as "the object of the almost unanimous condemnation of all classes." How was this? Under the act of 1869, the procedure under a bankruptcy petition was certainly rendered effective. Meetings of creditors were presided over and creditors' claims were, for voting purposes, adjudicated upon by the registrar of the court; the bankrupt had to pass a public examination in court, which although chiefly left to the trustee appointed by the creditors, afforded some opportunity for investigation; and the bankrupt could not obtain his discharge without the approval of the court and in certain circumstances the consent of the creditors. An independent official, the comptroller in bankruptcy, was appointed, whose duty it was to examine the accounts of trustees, call them to account for any misfeasance, neglect or omission, and refer the matter to the court for the exercise of disciplinary powers where necessary. These provisions were well calculated to promote sound administration, but they were, unfortunately, rendered nugatory by provisions relating to what were practically private arrangements on similar lines to those which had rendered previous legislation ineffective. In some respects the evil was aggravated. Deeds of arrangements were nominally abolished, but under sections 125 and 126 of the act a debtor was empowered to present a petition to the court for liquidation of his affairs by "arrangement," or for payment of a composition, whereupon a meeting of creditors was summoned from a list furnished by the debtor, and without any judicial investigation of claims, a majority in number and three-fourths in value of those who lodged proofs of debt, and who were present in person or by proxy at the meeting, might by resolution agree to liquidation by arrangement or to the acceptance of the composition. Such resolution thereupon became binding upon all the creditors, without any act of approval by the court, any judicial examination of the debtor, or any official supervision over the trustee's accounts. The debtor was not permitted to present a bankruptcy petition against himself, and consequently his only method of procedure was that which thus removed the matter from the supervision and control of the court, and as about nine-tenths of all the proceedings under the act of 1869 were initiated by debtors, it followed that only about one-tenth was submitted to proper investigation. It is true that the creditors might refuse to assent to the debtor's proposal, and that any creditor for £50 or upwards could present a petition in bankruptcy, but even where this course was adopted, the proceedings under the petition were, as a rule, stayed by the court if the debtor subsequently presented a proposal for liquidation or composition, and the creditor was left to pay the expenses of his petition if the requisite majority voted for the debtor's proposal. So far, therefore, as the act was concerned, every inducement was held out to the adoption of a course which took the examination of the debtor, the conditions of his discharge and the audit of the trustee's accounts, out of the control of the court.

Causes of failures of Acts.

The establishment of a bankruptcy court, with its searching powers of investigation and its power of enforcing penalties on misconduct, can only be defended on the ground that the administration of justice is a matter affecting the interests of the community at large. But apart from the injury done to these interests by reducing the administration of justice to a question of barter and arrangement between the individuals immediately concerned, one of the chief reasons why the acts of 1849, 1861 and 1869 proved failures, lies in the obvious fact that the creditors of a particular estate are not, as appears to have been assumed, a homogeneous or organized body capable of acting together in the administration of a bankrupt estate. In the case of a few special and highly organized trades it may be otherwise, but in the great majority of cases the creditors have but little knowledge of each other or means of organized action, while they have neither the time nor the inclination to investigate the complicated questions which frequently arise, and which are therefore left in the hands of professional trustees or legal agents. But the appointment of trustees under these acts, instead of being the spontaneous act of the creditors, was frequently due to touting on the part of such agents themselves, or to individual creditors whose interests were not always identical with those of the general body. According to G. Y. Robson, the author of a standard work on the subject, the arbitrary powers conferred by the act of 1861 "led to great abuses, and in many cases creditors were forced to accept a composition, the approval of which had been obtained by a secret understanding between the debtor and favoured creditors, and not unfrequently by the creation of fictitious debts." These evils were greatly aggravated by the decisions of the court relating to proofs on bills of exchange, under which it was held that the holder of a current bill could prove on the bankrupt estate of an indorser, although the bill was not yet due, and the acceptor was perfectly solvent and able to meet it at maturity. Thus in large mercantile failures, bankers and other holders of first-class bills could prove and vote on the estates of their customers, for whom the bills had been discounted, and thus control the entire proceedings, although they had no ultimate interest in the estate. But probably the greatest source of the abuses which arose under the act of 1869 was the proxy system established by the act and by the rules which were subsequently made to carry it out. The introduction of proxies was no doubt intended to give absent creditors an opportunity of expressing their opinions upon any question which might arise. But the system was too often used for the purpose of stifling the views of those who took an independent part in the proceedings. The form of proxy prescribed by the rules contained no limitation of the powers of the proxy-holder and no impression of the opinion of the creditor. It simply appointed the person named in it as "my proxy," and these magic words gave the holder power to act in the creditor's name on all questions that might be raised at any time during the bankruptcy. Hence arose a practice of canvassing for proxies, which were readily given under the influence of plausible representations, such as the holding out of the prospect of a large composition, but which, when once obtained, could be used for any purpose whatsoever except the receipt of a dividend. Thus it frequently happened that the entire proceedings were controlled by professional proxy-holders, in whose hands these documents acquired a marketable value. They were not only used to vote for liquidation by arrangement instead of bankruptcy proceedings, but not infrequently the matter took the form of a bargain between an accountant and a solicitor, under which the former became trustee and the latter the solicitor in the liquidation, without any provision for control over expenditure or for any audit of the accounts. Even where a committee of inspection was appointed to exercise functions of control and audit, they too were often appointed by the proxy-holders, and not infrequently shared in the benefits. On the other hand, where the amount of debts represented by the proxy-holder was insufficient to carry the appointment of a trustee and committee, the votes could be sold to swell the chances of some other candidate. Hence ensued a system of

trafficking in these instruments, the cost of which had in the long run to come out of the estate. The result was that undesirable persons were too frequently appointed, whose main object was to extract from the estate as much as possible in the shape of costs of administration. The debtor was practically powerless to prevent this result. If he attempted to do so he sometimes became a target for the exercise of revenge. His discharge, which under liquidation by arrangement was entirely a matter for the creditors, might be refused indefinitely; and so largely and harshly was this power exercised under the proxy system, especially where it was supposed that the debtor had friends who could be induced to come to his aid, that a special act of parliament was passed in 1887, authorizing the court to deal with cases where, under the act of 1869, a debtor had not been able to obtain a release from his creditors. On the other hand, the complaisant debtor, although he had incurred large obligations in the most reckless manner, often succeeded in stifling investigation and obtaining his release without difficulty as a return for his aid in carrying out the arrangement.

The result of such a system could not be other than a failure. After the act of 1869 had been in operation for ten years, the comptroller in bankruptcy reported that out of 13,000 annual failures in England and Wales, there were only 1000 cases (or about 8%) "to which the more important provisions of the act for preventing abuses by insolvent debtors and professional agents applied; the other 12,000 cases (or 92%) escaping the provisions which refer to the examination and discharge of bankrupts, and to the accounts, charges and conduct of the agents employed." It is not to be supposed that all the cases in the latter class were marked by the abuses which have been here described. In a large number the proceedings were conducted by agents of high character and standing, and with a due regard to the interests of the creditors. But the facilities for fraudulent and collusive arrangements afforded by the act, and the want of effective control over administration, inevitably tended to lower the morale of the latter, and to throw it into the hands of the less scrupulous members of the profession. The demand for reform, therefore, came from all classes of the business community. No fewer than thirteen bills dealing with the subject were introduced into the House of Commons during the ten years succeeding 1869. At length in 1879 a memorial, which was authoritatively described as "one of the most influential memorials ever presented to any government," was forwarded to the prime minister by a large body of bankers and merchants in the city of London. The matter was then referred to the president of the Board of Trade (Mr Chamberlain), who made exhaustive inquiries, and in 1881 introduced a measure which, with some amendments, finally became law under the title of the Bankruptcy Act 1883.

Act of 1883.

Hitherto the question had been dealt with as one of legal procedure; it was now treated as an act of commercial legislation, the main object of which, while providing by carefully framed regulations for the equitable distribution of a debtor's assets, was to promote and enforce the principles of commercial morality in the general interests of the trading community. One of the chief features of the act of 1883 is the separation which it has effected between the judicial and the administrative functions which had previously been exercised by the court, and the transfer of the latter to the Board of Trade as a public department of the state directly responsible to parliament. Under the powers conferred by the act a new department was subsequently created under the title of the bankruptcy department of the Board of Trade, with an officer at its head called the inspector-general in bankruptcy. This department exercises, under the direction of the Board of Trade, a general supervision over all the administrative work arising under the act. It has extensive powers of control over the appointment of trustees, and conducts an audit of their accounts; and it may, subject to appeal to the court, remove them from office for misconduct, neglect or unfitness. A report upon the proceedings under the act is annually presented to parliament by the Board of Trade, and although the department is practically self-supporting, a nominal vote is each year placed upon the public estimates, thus bringing the administration under direct parliamentary criticism and control. The act also provides for the appointment and removal by the Board of Trade of a body of officers entitled official receivers, with certain prescribed duties having relation both to the conduct of bankrupts and to administration of their estates, including the interim management of the latter until the creditors can be consulted. These officers act in their respective districts under the general authority and directions of the Board of Trade, being also clothed with the status of officers of the courts to which they are attached. While effecting this supervision and control by a public department directly responsible to parliament, the main objects of the measure were to secure—(1) An independent and public investigation of the debtor's conduct; (2) The punishment of commercial misconduct and fraud in the interests of public morality; (3) The summary and inexpensive administration of small estates where the assets do not exceed £300 by the official receiver, unless a majority in number and three-fourths in value of the creditors voting resolve to appoint a trustee; (4) Full control in other cases by a majority in value, over the appointment of a trustee and a committee of inspection; (5) Strict investigation of proofs of debt, with regulations as to proxies and votes of creditors; (6) An independent audit and general supervision of the proceedings and control of the funds in all cases. Besides amending and consolidating previous bankruptcy legislation, the measure also contains special provisions for the administration under bankruptcy law of the estates of persons dying insolvent (§ 125); and for enabling county courts to make administration orders for payment by instalments in lieu of immediate committal
[v.03 p.0325]
to prison, in the case of judgment debtors whose total indebtedness does not exceed £50 (§ 122). It also provides for the getting in and administration by the Board of Trade of unclaimed dividends and undistributed balances on estates wound up under previous bankruptcy acts (§ 162). Lastly, it amends the procedure under the Debtors Act of 1869, dealing with criminal offences committed by bankrupts (which, prior to 1869, had been treated as part of the bankruptcy law), by enacting that when the court orders a prosecution of any person for an offence under that act, it shall be the duty of the director of public prosecutions to institute and carry on the prosecution.

Act of 1890.

An amending act, under the title of the Bankruptcy Act 1890 was passed in that year, mainly with the view of supplementing and strengthening some of the provisions of the act of 1883, more particularly with regard to the conditions under which a bankrupt should be discharged or schemes of arrangement or composition be approved by the court. It also dealt with a variety of matters of detail which experience had shown to require amendment, with the view of more fully carrying out the intentions of the legislature as embodied in the principal act. These two acts are to be construed as one and may be cited collectively as the Bankruptcy Acts 1883 and 1890. They are further supplemented by a large body of general rules made by the lord chancellor with the concurrence of the president of the Board of Trade, which may be added to, revoked or altered from time to time by the same authority. These rules are laid before parliament and have the force of law.

Special Acts.

Besides these general acts, various measures dealing with special interests connected with bankruptcy procedure have from time to time been passed since 1883, the chief of which are as follows, *viz.*, the Bankruptcy Appeals (County Courts) Act 1884; the Preferential Payments in Bankruptcy Act 1888, regulating the priority of the claims of workmen and clerks, &c. for wages and salaries; and the Bankruptcy (Discharge and Closure) Act 1887, dealing with unclosed bankruptcies under previous acts.

Inquiry of 1906.

It would be out of place in this article to attempt to answer the question how far later legislation has solved the difficult problems which prior to 1883 were found so intractable, but it may be mentioned that in 1906 the Board of Trade appointed a committee to inquire into and report upon the effect of the provisions of the laws in force at the time in the United Kingdom in relation to bankruptcy, deeds of arrangement and composition by insolvent debtors with their creditors, and the prevention and punishment of frauds by debtors on their creditors, and any points and matters upon which the existing laws seemed to require amendment. The committee received a vast amount of evidence as well as documents and memoranda from chambers of commerce, trade protection societies and influential public bodies. The scope of the inquiry was not limited to English law and procedure, but also embraced that of Germany, France, Australia, Scotland and Ireland. The report of the committee was issued in 1908 (Cd. 4068), and reference may be made to it for much valuable information. The committee reported that the result of their inquiry did not disclose any dissatisfaction on the part of the commercial community with the main features of the existing law and procedure. But there were certain special incidents of the law and branches of its administration upon which the committee made recommendations. One was the prosecution and punishment of debtors who had committed fraud on their creditors or caused loss to them by improper and reckless trading. The existing procedure was complained of as being dilatory, cumbersome and expensive, and the committee were of an opinion that where a debtor had committed an offence for which he could and ought to be prosecuted, prosecution and conviction, with adequate punishment, ought to follow speedily and decisively, and the chief recommendation of the committee was that, while the

existing procedure should be left untouched, offences ought also to be punishable on summary conviction before magistrates and justices, and the provisions of the Summary Jurisdiction Acts applied to them, and that where an order for a prosecution is made on an application by the official receiver of a bankruptcy court and based on his report, that court should have power to order the official receiver to conduct the prosecution before the court of summary jurisdiction. The committee also reported that numerous delinquencies by insolvent debtors in the conduct of their affairs, or which had contributed to the losses sustained by their creditors, were not punishable or even cognizable by courts having bankruptcy jurisdiction unless or until a debtor who had a receiving order against him, or became a bankrupt, applied for an order sanctioning a composition or scheme of arrangement with his creditors, or for an order discharging him from his debts. The most prominent of these delinquencies which were brought to the notice of the committee were—failure by a debtor to keep any books or any proper or adequate books of account in his business; trading with knowledge of insolvency; gambling and speculation leading to, or contributing to, the debtor's insolvency or bankruptcy; failure properly to account for any substantial deficiency of assets. The committee received a large body of evidence in favour of making delinquencies such as have been described punishable by imprisonment. Evidence was also given as to the laws in force in Germany, France and Scotland, from which it appeared that such delinquencies, especially that of keeping no books of account, can be severely dealt with as criminal offences.

After carefully weighing the evidence on both sides the committee recommended that the failure or omission by a debtor who becomes bankrupt to have kept any books of account, or proper books of account, within two years next preceding his bankruptcy, in a trade or business carried on by him, if without excuse, should be made by law an offence punishable on summary conviction by imprisonment, subject to four important limitations, namely, that the law should define what books of account a person carrying on a trade or business must keep, following in this respect the law in force in France and Germany; that failure or omission by a debtor to have kept the required books should only be punishable in the event of a debtor becoming bankrupt and of the liquidated debts proved in the bankruptcy exceeding £200 in amount; that no prosecution of a debtor for failure or omission to keep books of account should take place before the lapse of two years from the passing of the law; that a debtor should not be punished if he could show that his failure or omission to keep proper books was honest and excusable and did not contribute to his insolvency, and that no prosecution should be instituted for the offence except by order of the bankruptcy court. The committee made recommendations of much the same character with regard to punishing some of the other delinquencies mentioned above. There were also recommendations by the committee as to trading by undischarged bankrupts, as to the realization of estate on bankruptcy, as to the operation of the law of relation back of a bankruptcy trustee's title, as to the law relating to the after-acquired property of an undischarged bankrupt, and dealings with such property, and with respect to married women and their liabilities under bankruptcy law. The committee also reported on the law and practice relating to voluntary deeds of arrangement between a debtor and his creditors and on the compulsory regulation of assignments of book debts, and of agreements for the hire and purchase of chattels.

Results of legislation.

In addition to this report the annual reports of the Board of Trade, which are accompanied by elaborate tables of statistics, and by copious illustrations both of the working of the system and of the characteristic features and causes of current insolvency, are published as parliamentary papers, and may be usefully consulted by those interested in the subject. It appears from these reports that the total number of insolvencies dealt with under the bankruptcy acts during the ten years ending 31st December 1905, was 43,141, involving estimated liabilities amounting to £61,685,678, and estimated assets amounting to £26,001,417. It may also be pointed out that according to the official figures, the cost of bankruptcy administration under the present system has very considerably decreased as compared with that under the act of 1869. Estates are also closed at much shorter
[v.03 p.0326]
intervals, and, what is more important from a public point of view, it appears that while the estimated liabilities of bankrupt estates during the ten years ending 1883 amounted on an average to £22,380,000 per annum, the estimated liabilities during the ten years ending 1905 only averaged £6,168,567 per annum. But during the latter period there was an annual average of 3426 private arrangements involving a further estimated annual liability of £4,166,354 entered into outside of the Bankruptcy Acts by insolvent debtors. There are no means of ascertaining the corresponding amount of liabilities on private arrangements outside of the Bankruptcy Acts prior to 1883, and therefore a complete comparison is impossible; but it is evident that on any method of computation there has been a very great diminution in the trading insolvency of England and Wales, while it is also clear as a matter of general knowledge in commercial circles, that a great decrease in the proportion of fraudulent trade and reckless speculation has been a marked feature of private trading during the period in question.

The cost of bankruptcy administration is provided for: (1) by fees charged to bankrupt estates, (2) by interest on balances at the credit of such estates with the bankruptcy estates account, and (3) by interest on unclaimed funds at the credit of estates under former Bankruptcy Acts.

Out of this are paid the salaries of all the officers of the department, including the official receivers; the remuneration due in respect of bankruptcy services to the county court registrars; pensions, &c., payable to retired officers under the present and previous Bankruptcy Acts; cost of bankruptcy prosecutions; and rents, stationery, travelling and other incidental expenses. The system is self-supporting and involves no charge upon the tax-payers of the country. It has been objected that inasmuch as the act professes to be based on the principle of enforcing commercial morality in the interests of the general community, the cost of administering it should not be charged entirely to the bankruptcy estates concerned. But when it is considered that a large part of the revenue of the department is derived from funds to which estates administered under the present act have contributed nothing, this objection does not appear to be well founded.

Summary of procedure.

For the convenience of readers who may require more detailed information, the accompanying summary of some of the more important provisions of the law relating to bankruptcy procedure is submitted. It must be borne in mind, however, that the subject is in some of its branches extremely intricate, and that both the law and the procedure are being constantly affected by a considerable body of judicial interpretation, while the acts also contain detailed provisions with regard to many questions incident to the administration of bankruptcy. A reference to the latest textbooks or competent professional advice will always be advisable for those who have the misfortune to be practically interested either as debtors or as creditors in bankruptcy proceedings.

Deeds of arrangement.

The Deeds of Arrangement Act 1887, although not falling strictly within the scope of the bankruptcy law, may also, in consequence of its important bearing upon the question of insolvency in England and Wales, be here noticed. It has been pointed out that, under the Bankruptcy Acts of 1849 and 1861, non-official arrangements by deed between a debtor and the general body of his creditors were not only officially recognized, but were in certain circumstances made binding on all the creditors, including those who refused to assent to them. Under the act of 1869, although such deeds were no longer recognized or made binding on non-assenting creditors, the proceedings under the "liquidation by arrangement" and "composition" clauses were practically private arrangements by resolution instead of deed, and were proved by experience to be open to the same abuses. It has also been shown that under the act of 1883 no arrangements either by deed or by resolution have any force against dissenting creditors, unless confirmed after full investigation and approval of the bankruptcy courts. Private arrangements, therefore, cease to form any part of the bankruptcy system. But they are, nevertheless, binding as voluntary contracts between the debtor and such creditors as assent to them. Being, however, in the nature of assignments of the debtor's property, they are either deemed fraudulent if the benefit of the assignment is limited to a portion of the creditors, or, if it is extended to all they become acts of bankruptcy, and, like any other voluntary assignment, are liable to be invalidated if made within three months prior to the petition on which a receiving order is made against the debtor. Treated as voluntary assignments, which are not binding on those who do not assent to them, such arrangements, where honestly entered into and carried out by capable administration, in many cases form a useful and expeditious method of liquidating a debtor's affairs, and where the debtor's insolvency has been brought about without any gross misconduct they will probably always be largely resorted to. The danger attending them is that even in cases where the debtor has been guilty of misconduct, a private arrangement may be used to screen his conduct from

investigation, while in many cases it may be made the medium for the concealment of fraudulent preferences. The absence of any independent audit of the trustees' accounts may also encourage or conceal irregularities in administration. Previous to 1887, however, much inconvenience arose from the fact that the execution of these private arrangements was frequently kept secret, and fresh credit was obtained by the debtor without any opportunity being afforded for the new creditors becoming acquainted with the fact that they were dealing with an insolvent person, and that in many cases they were simply supplying the means for meeting past obligations in respect of which the debtor had already committed default. The Deeds of Arrangement Act 1887 was therefore passed to compel the disclosure of such arrangements, by declaring them void unless registered within seven days after the first execution by the debtor or by any creditor. Registration is effected by lodging with the registrar of bills of sale at the central office of the Supreme Court a true copy of the deed and of every inventory and schedule attached thereto, together with an affidavit by the debtor, stating the total estimated amount of property and liabilities, the total amount of composition, if any, and the names and addresses of the creditors. Where the debtor's residence or place of business is outside the London bankruptcy district, the registrar is required to forward a copy of the deed to the registrar of the county court of the district where the debtor's residence or place of business is situated. Both the central and the local registers are open to public inspection on payment of a small fee and general publicity is secured by the action of various trade agencies, which make a practice of extracting and publishing the information for the benefit of those interested. By section 25 of the Bankruptcy Act 1890, every trustee under a deed of arrangement is required to transmit to the Board of Trade within thirty days of the 1st of January in each year an account of his receipts and payments and such accounts are open to the inspection of any creditor on payment of a small fee. They are not, however, subject to any kind of audit or control by the department. The registrar is also required to make periodical returns of the deeds thus registered to the Board of Trade, in order that a report of proceedings under the Deeds of Arrangement Act may be included in the annual report which the department is required to make on proceedings under the Bankruptcy Acts. Full statistics of such proceedings are accordingly included in these reports, from which it appears that during the ten years ended 31st December 1905 the total number of registered deeds of arrangement was 34,273, with estimated liabilities amounting to £41,663,541, and estimated assets to £23,020,483.

Summary of Bankruptcy Procedure.—Subject to certain special provisions in the case of what are termed "small bankruptcies" (see below), the following summary sets forth some of the more important provisions of the various acts and rules relating to bankruptcy administration grouped under convenient heads to facilitate reference. In some cases the effect of legal decisions has been embodied in the summary.

Preliminary Proceedings.

[v.03 p.0327]

Petition and Receiving Order.—Any court exercising bankruptcy jurisdiction in the district in which he resides or carries on business in England or Wales may make a receiving order against a debtor, whether a trader or not, either on his own petition or on that of a creditor or creditors whose claims aggregate not less than £50. In the case of a creditor's petition proof must be given of the debt, and of the commission of an act of bankruptcy within three months preceding the date of the petition. An act of bankruptcy is committed if the debtor fails to satisfy the creditor's claim upon a bankruptcy notice; if he makes an assignment for the benefit of his creditors generally; if he absconds or keeps house; if he gives notice of suspension of payments; if his goods are sold or seized under execution; if he files in court a declaration of inability to pay his debts; or if he grants a fraudulent preference or conveyance. These acts are here enumerated in the order in which they most frequently occur in practice.

Object and Effect of Receiving Order.—The object of the order is to protect the debtor's property until the first meeting of creditors, and to bring the debtor and his affairs within the jurisdiction of the court. Its effect is to stay all separate action against the debtor, and to constitute the official receiver attached to the court receiver of the debtor's property, although the legal title still remains in the debtor. Where there is an estate or business to be managed the official receiver may appoint a special manager, who receives such remuneration as the creditors, or failing them the Board of Trade, may determine. As a consequence of the order the following obligations are imposed upon the debtor:—He must make out and submit to the official receiver within a prescribed period a statement of his affairs, containing the names and addresses of his creditors, the amount of their claims and the securities held by them, and the nature and value of his assets; and accounting for his deficiency. Any material omission or false statement of his losses or expenses is a misdemeanour under the Debtors Act, unless he can prove that he had no intention to defraud. The statement is open to the inspection of creditors. He must also in every case submit to a public examination in court, in which the official receiver, the trustee and any creditor who has proved his debt may take part. His evidence may be used against him. He may further be specially examined by the court at any time with reference to his dealings or property. He must attend the first meeting of creditors, wait upon the official receiver, trustee and special manager, and give all necessary information, and generally do all acts which may reasonably be required of him with the view of securing a full investigation of his affairs. He may be arrested if there is reasonable ground for believing that he is about to abscond, destroy papers or remove goods, or if he fails without good cause to attend any examination ordered by the court. The court may also for a period of three months order his letters to be re-addressed by the post-office to the official receiver or trustee. With regard to persons other than the debtor, any person capable of giving information respecting the debtor, his dealings or property, may be examined by the court, and a summary order may be made against such person for delivery of any property belonging to the debtor.

First Meeting of Creditors.

This meeting is summoned by the official receiver, notice being given in the *London Gazette* and in a local paper, and sent by post to each creditor. A summary of the statement of affairs should accompany the notice, with any observations by the official receiver which he may think fit to make. The object of the meeting is to decide whether any proposal for payment of a composition or for a scheme of arrangement submitted by the debtor is to be entertained, or whether an application should be made to the court to adjudicate the debtor bankrupt. In the latter case the meeting may by an ordinary resolution appoint a trustee with or without a committee of inspection. It may also give any directions as to the administration of the estate. The meeting should be held at the place most convenient for the majority of the creditors. It is presided over by the official receiver or his deputy, who, subject to appeal to the court, admits or rejects proofs for the purpose of voting. For the transaction of business three creditors qualified to vote, or all the creditors if fewer than three, must be present or represented. Only persons who have proved their debts are entitled to vote, and detailed regulations respecting proofs and the valuation of securities are laid down in the first and second schedules to the act of 1883. One of the chief alterations in the law on this point is the condition imposed on creditors on bills of exchange to deduct from their claims the value of the liability of prior obligants before voting, thus cancelling the power of controlling the proceedings previously possessed by persons who had no real interest in the estate. Votes may be given in person or by proxy, and stringent regulations are laid down with the view of preventing the abuse of proxies. General proxies entitling the holder to exercise all the powers which the creditor could exercise if present may be given to the official receiver or to any person in the regular employment of the creditor. Special proxies may be given to any person to vote for specified resolutions, or for the appointment of specified persons as trustee and committee. Only official forms can be used, and the blanks must be filled up in the handwriting of the creditor or some person in his regular employment, including the authorized agent of a creditor resident abroad. A proxy must be lodged with the official receiver not later than four o'clock on the day before the meeting or adjourned meeting at which it is to be used. Resolutions are ordinary, special or extraordinary. An ordinary resolution is carried by a majority in value of the creditors voting; a special resolution by a majority in number and three-fourths in value of such creditors. The only instance of a resolution other than these is that required for the approval of a composition or scheme which requires a majority in number and three-fourths in value of all the creditors who have proved. The majority of questions arising at a meeting are decided by an ordinary resolution.

Adjudication.

If the creditors so resolve, or if a composition or scheme of arrangement is not proposed by the debtor or entertained by the creditors, or if entertained is not approved by the court, or if without reasonable excuse the debtor fails to furnish a proper statement of his affairs, or if his public examination is adjourned *sine die*, the court adjudicates the debtor

bankrupt and thereupon his property vests in a trustee, and, subject to the payment of the costs and fees of administration, is divisible among his creditors until all his debts are paid in full with interest at the rate of 4% per annum.

Effect on Bankrupt.—The bankrupt is bound to aid the trustee in his administration, and if he wilfully fails to deliver up any part of his property he is guilty of contempt of court. He is also liable to criminal prosecution under the Debtors Act if with intent to defraud he conceals or removes property to the value of £10 or upwards; or if he fails to deliver to the trustee all his property, books, documents, &c.; or if he knowingly permits false debts to be proved on his estate without disclosure; or mutilates, falsifies, destroys or parts with books or accounts; or attempts to account for his property by fictitious losses; or if within four months next before presentation of a bankruptcy petition, he obtains property on credit by false representation; or pledges or disposes of, otherwise than in the ordinary way of his trade, any property which has not been paid for; or by misrepresentation obtains the assent of his creditors to any agreement with reference to his affairs. He is also under the act of 1883, guilty of misdemeanour if before his discharge he obtains credit for more than £20 from any person without informing such person that he is an undischarged bankrupt. It is the duty of the official receiver to report any such facts to the court, and if the court is satisfied that there is a reasonable probability of conviction, it is required to order a prosecution which is then conducted by the director of public prosecutions.

Disqualifications.—A bankrupt cannot during his bankruptcy or until five years after his discharge, unless the bankruptcy is annulled or he obtains his discharge with a certificate by the court that the bankruptcy was caused by misfortune without misconduct, act as a member of the legislature, or as a justice of the peace, mayor, alderman, councillor, guardian or overseer of the poor, member of a sanitary authority, school, highway or burial board, or select vestry in any part of the United Kingdom.

Annulment.—An order of adjudication may be annulled if the court is of opinion that it should not have been made, or that the bankrupt's debts are paid in full, or if a composition or scheme of arrangement is approved by the court after adjudication.

Discharge.—The court may also at any time after the conclusion of the bankrupt's public examination, and after hearing the official receiver, the trustee and any creditor, to all of whom previous notice of the application must be given, grant the bankrupt a discharge either absolutely or under conditions, but subject to the following qualifications, viz.:—(1) If the bankrupt has committed a criminal offence connected with the bankruptcy, the application must be refused unless for special reasons the court determines otherwise. (2) If the assets are not equal in value to ten shillings in the pound of the unsecured liabilities (unless the bankrupt can show that he is not responsible); or if proper books have not been kept; or if the bankrupt has traded after knowledge of insolvency; or has contracted debts without reasonable probability of payment; or failed to account for his deficiency; or contributed to the bankruptcy by rash speculation, gambling, culpable neglect or by unjustifiable expenses; or has taken or defended legal proceedings on frivolous grounds; or has within three months preceding the receiving order given an undue preference; or has increased his liabilities with the view of making his assets equal to ten shillings in the pound; or has previously been bankrupt or made an arrangement with creditors; or has been guilty of any fraud or fraudulent breach of trust; then the court shall, on proof of any of these facts, either (*a*) refuse the discharge, or (*b*) suspend it for a period of not less than two years, or until a dividend of not less than ten shillings in the pound has been paid; or (*c*) qualify the order by the condition that judgment is entered up against the bankrupt for payment of any unpaid balance of his debts, or of part of such balance out of his future earnings or property. The bankrupt may, however, after two years apply to the court to modify the conditions if he is unable to comply with them. An order of discharge releases the debtor from all his obligations except debts due to the crown, and other obligations of a public character which can only be discharged with the consent of the Treasury, debts incurred by fraud, and judgment debts in an action for seduction or as a co-respondent in a matrimonial suit or under an affiliation order, which are only released to such extent and subject to such conditions as the court may expressly order. The release of the bankrupt does not operate as a release of any partner or co-obligant with him. Neither does it release the bankrupt from liability to criminal prosecution.

[v.03 p.0328]

Composition or Scheme of Arrangement.

After a receiving order has been made the debtor may submit a proposal for the payment of a composition, or for the liquidation of his affairs, by a trustee or otherwise, without adjudication. The proposal must be lodged with the official receiver in sufficient time to allow notice, together with a report by that officer, to be sent to the creditors before the meeting is held at which it is to be considered. If the proposal is entertained at the meeting by a majority in number and three-fourths in value of all the creditors who have proved their debts, and if it is thereafter approved by the court, it becomes binding upon all creditors who would be bound by an order of discharge had the debtor been adjudicated bankrupt. A similar proposal may be made after adjudication, and if entertained by the creditors and approved by the court, the adjudication may be annulled. The debtor's release will be subject to the terms of the scheme, but his future acquired property will not pass to the creditors unless there is an express stipulation to that effect. If default is made in carrying out the scheme, or if it is found that it cannot proceed without injustice or undue delay, the court may at any time adjudicate the debtor bankrupt, in which case the scheme will fall to the ground, except in respect of past transactions under it. The approval of a composition or scheme does not release the debtor from his liabilities under the criminal law, nor from the necessity of undergoing a public examination which must, in fact, be held and concluded before the approval of the court is applied for. Also before such approval is given a report must be filed by the official receiver upon its terms and on the conduct of the debtor, and the court must be satisfied after hearing that officer and any creditor, that the proposal is reasonable and calculated to benefit the creditors, and that no criminal offences connected with the bankruptcy have been committed by the debtor. Further, if any fact is proved which would have prevented the debtor from obtaining an absolute or unconditional order of discharge had he been adjudged bankrupt, the composition or scheme cannot be approved unless it provides reasonable security for the payment of not less than seven shillings and sixpence in the pound on all the unsecured debts. Where a trustee is appointed to carry out the composition or scheme, all the provisions of the act with reference to the remuneration of the trustee, the custody of funds, the audit of his accounts and the control exercised by the Board of Trade apply in the same manner as they would under an adjudication. Further, the provisions relating to the administration of property, proof of debts, dividends, &c., will also apply, so far as the nature of the case and the terms of the arrangement admit.

Property divisible among the Creditors.

No part of the law of bankruptcy is more intricate, or has been the subject of more litigation than this, and any detailed view of the effect of legal decisions can only be gathered by a perusal of the cases; but the following general principles may be stated:—The term "property" includes not only property of which the bankrupt is the true owner, but property in his possession, order or disposition in his trade or business with the consent of the true owner, in such circumstances that he is the reputed owner thereof. The application of the doctrine of reputed ownership has been considerably restricted in recent years by the growth of alleged trade customs, in accordance with which property is frequently lent under a contract of "hire and purchase" or otherwise; and by the decisions of the courts that where such custom is sufficiently proved the doctrine does not apply. Further, the trustee's title not only includes property in the actual possession of the bankrupt, but relates back to the date of the first act of bankruptcy committed by him within the three months preceding the presentation of the bankruptcy petition, and thus invalidates all payments and assignments to creditors made during that period with knowledge on the part of the creditor or assignee of the commission of the act of bankruptcy. In such cases the trustee may, therefore, require the money or property to be restored to the estate. And even where no prior act of bankruptcy is proved, any payment made to a creditor with the view of giving such creditor a preference over the other creditors, within the three months preceding the presentation of the petition on which the payer is made bankrupt, is rendered void as against his trustee. Settlements of property within the two years preceding the bankruptcy, unless made before and in consideration of marriage, or made in good faith for valuable consideration, are also void, as are similar settlements within ten years, unless it is proved that the settlor was (independently of the settled property) solvent at the date of the settlement, and that the interest in the property passed to the trustees on the execution of the deed. The same

rule applies to covenants to settle in consideration of marriage future-acquired property in which the debtor had no interest at the date of the marriage (other than property acquired by the bankrupt through his wife), if such property is not actually transferred before the bankruptcy. Executions by a creditor not completed at the date of the receiving order are also void, and the proceeds of an execution in the hands of the sheriff must, with certain exceptions and subject to deduction of costs, be handed over to the trustee. But all property held by the bankrupt on trust, and tools of trade, wearing apparel and bedding to a total value not exceeding £20, are excluded from the property divisible among the creditors. With respect to property acquired by the bankrupt, whether by gift or legacy, or consisting of accumulations of business or other profits after the commencement of the bankruptcy, and before he obtains his discharge, the trustee's title also prevails; but bona-fide transactions by the debtor for value, other than transactions relating to freehold property, appear to be valid. Where the bankrupt is a beneficed clergyman the trustee may, subject to certain provisions for the due discharge of the duties of the office, apply for the sequestration of the profits of the benefice; and where he is in receipt of a salary, income or pension, &c., the court may order any part thereof to be paid to the trustee, but where he is an officer of the army, navy or civil service, such order is only to be made with the consent of the chief of the department concerned.

Claims of Creditors and Dividends.

In the distribution of the debtor's property certain claims are entitled to priority over others. Thus the landlord, although not entitled to a preference out of the funds in the hands of the trustee, can distrain for unpaid rent on the goods and effects of the debtor remaining on the landlord's premises, but where the distraint is levied after the commencement of the bankruptcy this right is limited by the act of 1890 to six months' rent due before adjudication, the remainder of his claim ranking for dividend with the claims of other creditors. Various gas and water companies have also statutory powers of distraint under special acts, but the policy of recent legislation has been to discourage any extension of such privileges. Where the bankrupt holds an office of trust in any savings bank or friendly society, any balance in his hands due to such bank or society has been held under the acts relating to these bodies to be payable in preference to any other claim against the estate. Other preferential claims are regulated by the Bankruptcy Acts and by the Preferential Payments in Bankruptcy Act of 1888, and include taxes, parochial and other local rates for not more than one year, wages and salaries for four months, but not exceeding £50 (limited in the case of ordinary labourers and workmen to two months' wages not exceeding £25), and agricultural labourers' claims not exceeding one year's wages, if hired by special contract for payment of a lump sum at the end of a year. These claims are entitled to preference not only over funds in the hands of the trustee, but also over the proceeds of any distraint levied by the landlord within the three months prior to the receiving order, the latter in that case becoming a preferred creditor for the amount so paid. Articled clerks and apprentices may also be allowed repayment of a proportion of the premium on their unexpired agreements. On the other hand, usual trade discounts (exceeding 5%) must be deducted from traders' proofs, and the following claims are postponed until the general creditors are paid in full, viz. claims by a married woman for loans to the husband for the purposes of his business, claims for loans advanced to any person in business at a rate of interest varying with the profits, and claims for interest in excess of 5% per annum. Subject to these exceptions all debts proved in the bankruptcy must be paid *pari passu*. Any surplus after payment of 20s. in the pound and interest at the rate of 4% per annum, from the date of the receiving order, is payable to the bankrupt.

Proofs of Debt.—All claims and liabilities present or future, certain or contingent, arising out of obligations incurred before the date of the receiving order are provable in the bankruptcy, an estimate of the liability in the case of contingent debts being made by the trustee subject to appeal to the court. But demands in the nature of unliquidated damages arising otherwise than by reason of a contract, promise or breach of trust are not provable. A secured creditor if he proves must either surrender his security, or value the security and prove for the balance; and the trustee can thereupon, subject to the creditor's power in certain circumstances to amend the valuation, take over the security by paying the amount of the valuation, or may require it to be realized. He may be required by the creditor to elect which of these courses he will adopt, failing which the equity of redemption will vest in the creditor. For further regulations as to proofs, the time within which they must be lodged for voting and for dividend, and the manner of dealing with them, reference should be made to the first and second schedules of the act of 1883 and the rules relating thereto.

Dividends.—After payment of costs of administration and preferential debts, it is the duty of the trustee to distribute the estate with all convenient speed,—the first dividend within four months after the first meeting of creditors, and subsequent dividends at intervals of not more than six months, but the declaration may be postponed for sufficient reason by the committee of inspection. Notice of the intention to declare a dividend is gazetted and sent to each creditor mentioned in the bankrupt's statement of affairs who has not proved. The notice should state the last day for proving in order to participate in the distribution, and should be given not more than two months before the declaration. When the dividend is declared, notice of the amount due, and of the place where the same is payable, is sent to each creditor who has proved, with a statement showing particulars of the estate. And provision must be made for creditors at a distance, who have not had time to prove, for disputed claims, and for debts the subject of claims not yet determined. Creditors who fail to prove before the declaration of a dividend are entitled to receive their dividends on proving before any subsequent dividend is declared, but cannot disturb the distribution of any dividend already declared. Before distributing a final dividend notice is sent to every creditor whose claim has been notified to the trustee, but not finally established, with an intimation that unless so established within a specified period he will be excluded from participation in the estate. In the case of a bankrupt firm the joint creditors are not entitled to receive a dividend out of the separate property of the bankrupts until all the separate creditors are paid in full.

[v.03 p.0329]

Trustee's Administration.

While the interim preservation and management of the estate is conducted by or under the direct supervision of officers appointed by and responsible to the Board of Trade, the ultimate realization and distribution of the assets devolve upon the trustee appointed by the creditors. But besides acting as receiver prior to the first meeting of creditors, the official receiver also becomes trustee by operation of law on the making of an order of adjudication. He vacates the office when a trustee is appointed by the creditors, and certified by the Board of Trade, but again becomes trustee on the creditors' trustee being released, dying, resigning or being removed from office. As the bankrupt's property vests in the trustee for the time being, and passes from trustee to trustee by operation of law, and without any formal act of conveyance, the continuity of the office is thus secured.

Appointment of Trustee.—A trustee may be appointed by a majority in value of the creditors voting, at the first or any subsequent meeting, or the appointment may be left to the committee of inspection. In either case the appointment is subject to confirmation by the Board of Trade, who may object on the ground that the creditors have not acted in good faith in the interests of the general body, or that the person appointed is not fit to act, or occupies such a position in relation to the debtor, to any creditor, or to the estate, as makes it difficult for him to act with impartiality, or that in any previous case he has been removed from office for misconduct or for failure without good cause to render his accounts for audit. An appeal from such objection to the High Court lies at the instance of a majority in value of the creditors, but in the absence of an appeal it is fatal to the appointment. Before being confirmed, the trustee-elect must also furnish security to the satisfaction of the Board of Trade, and such security must be kept up to the amount originally fixed, or to such lesser amount as that department may require throughout the tenure of the trusteeship, failing which the trustee is liable to be removed from office. Where the creditors fail to appoint a trustee, the Board of Trade may do so, but such appointment may at any time be superseded by the creditors.

Removal.—The trustee may be removed by the creditors at a meeting summoned for the purpose without reason assigned, or by the Board of Trade for misconduct, or for incapacity or failure to perform his duties, or on either of the other personal grounds of objection to which the appointment is open. But the removal is in like manner subject to appeal at the instance of creditors. If a receiving order is made against a trustee he thereby vacates office. He may also, with the consent of a general meeting of creditors, resign, but his resignation does not operate as a release from his liability to account for his administration.

Powers and Duties.—The trustee is required to take immediate possession of the bankrupt's property, including deeds, books and accounts, and has the powers of a receiver in the High Court for the purpose of enforcing delivery. After payment of the costs of administration it is his duty to distribute the estate in dividends as speedily as possible. He may also, and with the sanction of the committee, or, where there is none, with that of the Board of Trade, carry on the business so far as is necessary to a beneficial winding-up, institute or defend legal proceedings, employ a solicitor to do any business previously sanctioned by the same authority, compromise debts and claims, raise money on mortgage, sell property on credit, or divide the estate where practicable among the creditors in its existing form. He may, without special sanction, but subject to any directions which may be given by the creditors in general meeting, or failing them by the committee, sell the property or any part of it for cash, including business goodwill and book debts, and either by public auction or private treaty, and generally exercise all the powers which the bankrupt might before adjudication have exercised in relation to the property, or which are by the Bankruptcy Act conferred on the trustee.

Where any part of the property is held subject to onerous obligations, such as the payment of rent, &c., the trustee may disclaim the same, subject in certain cases to the leave of the court, and the disclaimer operates to determine all interest in or liability in respect of the property on the part of the estate. The trustee is required to keep a record book (which is commenced by the official receiver), containing minutes of the proceedings in the bankruptcy, and a cash book in the prescribed form, in which all receipts and payments by him must be entered. All monies received must forthwith be paid into an account at the Bank of England, entitled the "Bankruptcy Estates Account," which is under the control of the Board of Trade, unless where in special circumstances the sanction of that department is obtained to the opening of a local banking account, but in no circumstances must estate monies be paid to the trustee's private account. When monies are required for the purpose of the estate, special cheques or money orders are issued by the Board of Trade on the application of the trustee.

Control over Trustee.—In his administration of the estate the trustee is subject to control by the committee of inspection, the creditors, the court and the Board of Trade. The committee is appointed by the creditors, and must consist of not more than five nor less than three creditors or authorized representatives of creditors. It acts by a majority present at a meeting, and should be convened once a month unless it otherwise directs. If no committee is appointed, the Board of Trade may give any direction or permission which might have been given by a committee. Directions given by the committee, if not inconsistent with the provisions of the act, are binding on the trustee, unless contrary to or overruled by those of the creditors or of the court. The official receiver or trustee may summon a meeting of the creditors at any time to ascertain their wishes, and must do so when so required by one-sixth in value of the creditors or when directed by the court. The Board of Trade may also direct the official receiver to summon a meeting for the purpose of reviewing any act done by the trustee or any resolution of the committee of inspection. Further, the trustee may apply to the court for directions in any particular matter, and the court may also, on the application of any person aggrieved reverse or modify any act of the trustee, or make such order as it deems just. The directions of the court override those of the creditors. The Board of Trade is required to take general cognizance of the conduct of trustees, to inquire into any complaints by creditors, and in the event of any trustee not faithfully performing his duties, to take such action, including the power of removal, as may be expedient. It may also direct a local investigation of the trustee's books and accounts, and may require him to answer any inquiries, or may apply to the court to examine him on oath. If any loss has arisen to the estate from any misfeasance, neglect or omission of the trustee, it may require him to make it good. The orders of the Board of Trade under the powers conferred by the act may be enforced by the court by committal of the trustee or otherwise.

Audit of Accounts.—The trustee's accounts must be audited by the committee of inspection not less than once in every three months; and once in every six months, as well as at the close of the administration, the record and cash books must also be submitted with the vouchers, and the committee's certificate of audit to the Board of Trade for final audit. If it appears that the trustee has retained more than £50 in hand for more than ten days without a satisfactory explanation, he may be removed from office, surcharged with interest at the rate of 20% per annum and lose all claim to remuneration.

Remuneration.—The trustee's remuneration is fixed by the creditors or by the committee if so authorized by them. It must be in the nature of a percentage on the amount of the realization and on the dividends. If one-fourth of the creditors in number or value dissent from the resolution, or if the bankrupt satisfies the Board of Trade that the remuneration is excessive, the Board may review the same and fix the remuneration. A trustee may not receive any remuneration for services rendered in any other capacity, *e.g.* as solicitor, auctioneer, &c., beyond that voted to him as trustee; nor may he share his remuneration with the bankrupt, the solicitor or other person employed about the bankruptcy; or receive from any person any gift, or other pecuniary or personal benefit in connexion therewith.

Costs.—A trustee receiving remuneration is not allowed the costs of any other person in respect of duties which ought to be performed by himself. All bills of solicitors and other agents employed must be taxed before payment, as being in accordance with the prescribed scales of costs; and the taxing master must satisfy himself that the employment has been properly authorized before the work was done. All bills of costs must be delivered to the trustee within seven days of the request for the same, otherwise the estate may be distributed without regard to such costs.

Release.—When the property, so far as it is capable of realization, has been realized and distributed, the trustee must apply to the Board of Trade for his release, forwarding to each creditor a notice of his having done so, together with a copy of his final accounts, and the Board of Trade, after preparing and considering a report on the same, and the objections of any person interested, may, subject to appeal to the High Court, grant or withhold the release. If a release is withheld, the court may, on the application of any person interested, make such order against the trustee as it thinks just. The release when granted operates as a removal from office, and thereupon the official receiver again becomes trustee, and is thus in a position, even after the nominal close of the bankruptcy, to deal with any circumstances which may arise, or which have not been foreseen and provided for.

Small Bankruptcies.

When the official receiver reports, or the court is otherwise satisfied that the debtor's property is not likely to realize more than £300, the court may make an order for the summary administration of the estate, in which case, if the debtor is adjudged bankrupt, the official receiver in the ordinary course becomes and remains trustee, and certain other modifications are effected with the view of simplifying and accelerating the procedure. The chief of these modifications are as follows, viz. the Board of Trade acts as committee of inspection; there is no advertisement of the proceedings in a local paper; in legal proceedings all questions of law and fact are determined by the court without a jury; adjudication may be made on a report by the official receiver before the first meeting of creditors where no composition or scheme is proposed; meetings of creditors may be held in the town where the court sits or the official receiver's office is situated; notice to creditors of meetings other than the first meeting, or of application by a debtor for his discharge, are dispensed with in the case of creditors for amounts not exceeding £2. Costs, other than a solicitor's charges, may be paid without taxation; and the time for declaring the first dividend is extended to six months, but the whole estate must be realized and distributed within this period if practicable. No modification, however, is permitted in the procedure relating to the public examination and discharge of the bankrupt. Notwithstanding that an order has been made for summary administration, the creditors may at any time by a resolution passed by a majority in number and three-fourths in value of those voting at the meeting, appoint a trustee in place of the official receiver, in which case the summary order ceases to be operative.

[v.03 p.0330]

Scottish Bankruptcy Legislation.

In Scotland, as in England, the law of bankruptcy arose as a remedy against the frauds of insolvent debtors. It was declared by an act of the Scottish parliament (1621, c. 18) that no debtor after insolvency should fraudulently diminish the fund belonging to his creditors, and if a deed of assignment was gratuitously executed after the contracting of debt in favour of a near relation or a confidential friend, fraudulent dealing was to be presumed. The act 1696, c. 5, settled the definition of a notour or notorious bankrupt, a question which had previously engaged the attention of the judges of the court of session. The statute defines "a notour bankrupt" to be any debtor who, being under diligence by horning or

caption, at the instance of his creditors, shall be either imprisoned, or retire to the abbey or any other privileged place, or flee or abscond for his personal security, or defend his person by force, and who shall afterwards be found, by sentence of the lords of session, to be insolvent. Bankruptcy as thus defined was, it is said, intended to afford a remedy against fraudulent preference by debtors, and not as the ground-work of a general process of distribution, although by later statutes it became a necessary requisite of every such process. The exceptions recognized in the act of 1696, of persons absent from Scotland and therefore not liable to imprisonment, or of persons exempted therefrom by special privileges, were removed by later legislation. The old English distinction between traders and non-traders, it will be observed, is not recognized in Scottish law. The statute made null and void all voluntary dispositions, assignations and other deeds made after or within sixty days before bankruptcy.

In 1856 was passed the Bankruptcy (Scotland) Act, by which the law of bankruptcy in Scotland is mainly regulated. By this act, notour (*i.e.* legally declared) bankruptcy was constituted:—

1. By sequestration (or adjudication in England and Ireland); and

2. By insolvency concurring either—(*a*) with a duly executed charge for payment or (*b*) with sale of effects belonging to the debtor under a poinding or under a sequestration for rent, or making application for the benefit of *cessio bonorum*.

Notour bankruptcy continues, in cases of sequestration, until the debtor has obtained his discharge and in other cases until insolvency ceases. Sequestration may be awarded of the estate of any person in the following cases:—

1. Living debtor subject to jurisdiction of Scottish courts—(*a*) on his own petition with concurrence of qualified creditors, or (*b*) on petition of qualified creditors, provided he be a notour bankrupt, and have had a dwelling-house or place of business in Scotland within the previous year.

2. In the case of a deceased debtor, subject at his death to the jurisdiction of the court—(*a*) on the petition of his mandatory; or (*b*) on the petition of qualified creditors (§ 13).

Sequestration may be awarded either by the court of session or by the sheriff. A sequestration may be recalled by a majority in number and four-fifths in value of the creditors, who may prefer to wind up the estate by private arrangement. If the sequestration proceeds, the creditors hold a meeting, and by a majority *in value* elect a trustee to administer the estate, and three commissioners (being creditors or their mandatories) to assist and control the administration and declare the dividends. The bankrupt (under pain of imprisonment) must give all the information in his power regarding his estate and he must be publicly examined on oath before the sheriff; and "conjunct and confident persons" may likewise be examined. The bankrupt may be discharged either by composition or without composition. In the latter case (1) by petition with concurrence of all the creditors, or (2) after six months with concurrence of a majority and four-fifths in value of the creditors, or (3) after eighteen months with concurrence of a bare majority in number and value, or (4) after two years without concurrence. In the last case the judge may refuse the application if he thinks the bankrupt has fraudulently concealed his effects or wilfully failed to comply with the law. This act was amended by the Bankruptcy and Real Securities Act 1857, which deals with the cost of competition for trusteeships; the Bankruptcy Amendment (Scotland) Act 1860, which enables the court to recall a sequestration where it is more convenient that the estate should be wound up in England or Ireland; and the Bankruptcy Amendment Act (Scotland) 1875, which makes the wages of clerks, shopmen and servants preferential claims for a period not exceeding four months and an amount not exceeding £50, while the claims of workmen are placed on a similar footing for a period not exceeding two months. Some important changes were subsequently introduced, one of the principal being that effected by the Debtors (Scotland) Act 1880, which abolished imprisonment for debt, but which, like its English prototype (the Debtors Act 1869), contains a series of important provisions for the punishment of fraudulent bankrupts. Under these provisions the laws of the two countries on that subject are practically assimilated, although some minor differences still survive. One of the most important of these differences is, that while the Scottish act makes the failure, within the three years prior to the sequestration, to keep "such books and accounts as, according to the usual course of any trade or business in which he (the debtor) may have been engaged, are necessary to exhibit or explain his transactions" a criminal offence, the English act contains no provision of an analogous character; the non-keeping of such books being treated as a fact to be taken into account in dealing with the debtor's application for his discharge but not coming within the scope of the criminal law. On the other hand, there are a few minor trading irregularities dealt with in the English act which are not specifically included in that of Scotland. Another important distinction is that under the Scottish act the same offences may be treated differently, according as they are brought for trial before the court of justiciary or a sheriff and jury, in which case the maximum penalty is two years' imprisonment; or before a sheriff without a jury, in which case the penalty is limited to imprisonment for a period not exceeding sixty days. This distinction admits of a useful elasticity in the administration of the law, having regard to the comparative importance of the case, which is hardly possible under the English act.

Another most important modification of the law is effected by the Debtors Act 1880, combined with the Bankruptcy and Cessio Act 1881, and the Act of Sederunt anent Cessios of the 22nd of December 1882. Under the law existing prior to these enactments, the process of *cessio bonorum* operated chiefly as a means for obtaining release from imprisonment for debt on a formal surrender by a debtor of all his goods and estate. But under this process the debtor was not entitled to a discharge, and his future-acquired property was still subject to diligence at the instance of unsatisfied creditors. By abolishing imprisonment for debt (except in regard to crown debts and public rates and assessments), the legislature also practically abolished this use of the process of cessio, and the process itself would probably have become obsolete, but for certain changes effected by the act of 1881, which have given it a different and more extended scope. Among these
[v.03 p.0331]
changes may be noted (1) the extension to "any creditor of a debtor who is notour bankrupt," without reference to the amount of his debt, of the right hitherto limited to the debtor himself, to petition the court for a decree of cessio, the prayer of the petition, whether presented by the debtor or by a creditor, being "to appoint a trustee to take the management and disposal of the debtor's estate for behoof of his creditors"; (2) the discretionary power given to the court upon such petition to award sequestration under the bankruptcy act, in any case where the liabilities of the debtor exceed £200; and (3) the right of the debtor to apply for his discharge under similar conditions to those obtaining in the case of sequestration. An important modification of the law relating to discharge which equally affects a debtor under the Bankruptcy and Cessio Acts, is also effected by the provision of the act of 1881, which requires, in addition to the concurrence of creditors, the fulfilment of one of the following conditions, viz., "(*a*) That a dividend of five shillings in the pound has been paid out of the estate of the debtor, or that security for payment thereof has been found to the satisfaction of the creditors; or (*b*) that the failure to pay five shillings in the pound has, in the opinion of the sheriff, arisen from circumstances for which the debtor cannot justly be held responsible." Orders of cessio are only made in the sheriff courts, and when made, the court also appoints a trustee, who conducts the proceedings without the control exercised by the creditors in a sequestration. Under these conditions it will be seen that the original purpose and constitution of the process of cessio has entirely disappeared, and it has now become a modified form of official bankruptcy procedure, with a less elaborate routine than in the case of sequestration, and one perhaps more suitable to the smaller class of cases, to which in practice it is limited.

The Bankruptcy Frauds and Disabilities (Scotland) Act 1884 applies to sequestrations and decrees of cessio the criminal provisions of § 31 of the English Bankruptcy Act 1883, relating to the obtaining of credit for £20 and upwards by an undischarged bankrupt, without disclosure of his position. It also places the law relating to the disqualifications attaching to such bankrupts on a similar footing to that of the English act.

The Judicial Factors Act of 1889 contains a provision calculated to check excessive costs of administration, by requiring that where the remuneration of a trustee under a sequestration is to be fixed by the commissioners, intimation of the rate of remuneration is to be given to the creditors and to the accountant of court before being acted on, and the latter officer is empowered, subject to appeal, to modify the same if he deems it expedient.

It may be pointed out that the Deeds of Arrangement Act 1887, which applies to England and Ireland, does not apply to Scotland, and there is no analogous provision requiring registration of private deeds of assignment for the benefit of

creditors as a condition of their validity in that country.

Finally, it is to be noted that the office of accountant in bankruptcy, which was established by the Bankruptcy Act of 1856, has under the Judicial Factors Act 1889 been abolished, the duties being merged in those of the office of accountant of the court of session.

Irish Bankruptcy Legislation.

The Irish law of bankruptcy is regulated by the two leading Irish statutes of 1857 and 1872, together with the Irish Debtors Act 1872, and corresponds in its main features to some of the older English enactments, with modifications adopted from the English act of 1869. It may be pointed out, however, that the system of liquidation by arrangement and composition without the approval or control of the court, which proved fatal to the success of the latter, has not at any time been imported into the Irish law. A special act was passed in 1888 for establishing local bankruptcy courts in certain districts in Ireland, and an act was also passed in 1889, applying the main provisions of the English Act of 1888, relating to preferential payments in bankruptcy, to Ireland.

The Deeds of Arrangement Act 1887, which has been already discussed above under the head of English bankruptcy legislation, also applies in its main provisions to Ireland, and as supplemented by the Irish Deeds of Arrangement Amendment Act 1890, places the law relating to this branch of insolvency procedure upon a similar footing in both countries, so far as regards the publicity of such deeds. The last-mentioned act also requires a similar registration of all petitions for arrangement under the Bankruptcy Act 1857.

(J. Sm.*)

Comparative Law

British Empire.—In most parts of the British empire the law of bankruptcy has been modelled upon the English system. This is particularly the case in Australia and New Zealand. Victoria, South Australia, Western Australia and New Zealand follow the lines of the existing English acts. In Queensland, Tasmania and New South Wales the system is rather that of the English act of 1869, leaving more to the creditors' management and less to officialism.

One point may be mentioned in which the Australian colonies have improved on the English system. Under the English acts a bankrupt is under no obligation to apply for his discharge. The result is that the United Kingdom contains a population of 70,000 undischarged bankrupts—a manifest danger to the trading community. Under the bankruptcy systems of New South Wales, Victoria and New Zealand, a bankrupt is bound to apply for his discharge within a fixed period, otherwise he is guilty of a contempt of court.

In Canada, under the British North America Act 1867, the Dominion parliament has exclusive legislative power in regard to bankruptcy and insolvency: but there is no existing Dominion act on the subject. A Dominion act was passed in 1875, but repealed in 1880. The failure of this act may perhaps be ascribed to the diversity of the pre-existing provincial systems, embracing such contrasts as the English law of Ontario, and the French code based on *cessio bonorum*—which ruled in Quebec. Bankruptcy is dealt with in a fragmentary way by the provincial legislatures by acts regulating such matters as priority of execution creditors, fraudulent assignments and preferences, imprisonment of debtors, administration of estates of deceased insolvents.

In Cape Colony and Natal English law is substantially followed. In the Transvaal, where Roman-Dutch law prevails, the law governing the subject is the Insolvency Law, No. 13 of 1895. It provides for voluntary surrender and compulsory sequestration. The law of the Orange River Colony is similar.

In British Guiana, Gambia, Jamaica, Hong Kong, Mauritius, Grenada, Trinidad, Tobago and the Straits Settlements the law is modelled on the English pattern.

In India insolvency is regulated by the Indian Insolvency Act 1848, extended by the Act XI. of 1889.

An English bankrupt, it may be added, is entitled to plead his discharge in England as a defence in a colonial court. The explanation is this. The English act vests all the bankrupt's property, whether in the United Kingdom or in the colonies, in his trustee in bankruptcy. Having thus denuded him of everything, it has been held to follow that the bankrupt's discharge must also receive recognition in a colonial court.

France.—Bankruptcy in France is regulated by the Commercial Code of 1807, amended and supplemented by the law of 9th June 1838. By Article 437 of the code bankruptcy is defined as the state of a trader who is unable to meet his commercial engagements. Simple insolvency of this kind is known in France as *faillite*. Insolvency attended with circumstances of misconduct or fraud is known as *banqueroute simple* or *banqueroute frauduleuse*. Only a trader can become bankrupt. The debt, too, for obtaining adjudication must be a commercial debt, the laws regulating bankruptcy being designed exclusively for the protection of commerce. To be made a bankrupt a trader need not be insolvent: it is sufficient that he has suspended payment. Commercial companies of all kinds are liable to be declared bankrupt in the same manner as individual traders. A trader-debtor can be adjudicated bankrupt upon his own petition, or upon the petition of a creditor, or by the court itself *proprio motu*. A petitioning debtor must within fifteen days file at the office of the Tribunal of Commerce of the district, a declaration of suspension, with a true account of his conduct and of the state of his affairs, showing his assets, debts, profits and losses and personal expenses. On adjudication the Tribunal of Commerce appoints a person, called a *syndic provisoire*, to manage the bankrupt's estate, and a *juge commissaire* is also named to supervise the syndic. A bankruptcy terminates by an ordinary composition (*concordat*), a sale of the debtor's assets (*union*), or a composition by relinquishment of assets. It is a striking feature of the French system, and highly creditable to French commercial integrity, that a discharge in bankruptcy, even when accompanied by a *declaration d'excusabilité*, leaves the unpaid balance a debt of honour. At the time of the French Revolution the National Convention passed a resolution that any man who contracted a debt should never be free from liability to pay it. The spirit of this resolution still survives, for until a trader has paid every penny that he owes he is not rehabilitated and remains under the stigma of various disabilities: he has no political rights, he cannot hold any public office, or act as a stockbroker, or sit on a jury. *Banqueroute simple* is where the bankrupt has been guilty of grave faults in the conduct of his business, such as extravagance in living, hazardous speculation or preferring creditors. *Banqueroute frauduleuse* involves the worse delinquency of fraud. Both *banqueroute simple* and *banqueroute frauduleuse* are punishable,—the latter with penal servitude ranging from five to twenty years.

[v.03 p.0332]

Germany.—Bankruptcy in Germany is governed by a code passed in 1877. Prior to this each state had its system and the law was "wholly chaotic." The same distinction is drawn in Germany as in France between mere commercial failure and bankruptcy, simple or fraudulent. Simple bankruptcy is established by such offences as gambling, dealing in "futures," disorderly book-keeping or extravagance in living: fraudulent bankruptcy, by offences of a deeper dye—the concealment of property, the falsifying of books, the manufacture of fictitious debts and the giving of illegal preferences. Both kinds of bankruptcy are punishable, fraudulent bankruptcy by penal servitude, or in case of mitigating circumstances, by imprisonment for not less than three months. Accessories in fraudulent bankruptcies are liable to penal servitude—for instance, a creditor who conspires with the debtor to secure an advantage to the prejudice of the other debtors. The creditors are called together within one month from the date of adjudication, and at their meeting they may appoint a committee of their number to advise with the trustee. It is the duty of the court to see that the trustee performs his functions. Estates are liquidated with great rapidity. In order that the creditors may receive dividends at the earliest moment, it is customary to sell the assets by auction. The creditors by a majority in number and three-fourths in value may accept a composition, but such an arrangement must have the approval of the court. The fees are very moderate: in an ordinary bankruptcy the attorney's fees do not, it is said, exceed £5.

Italy.—Bankruptcy in Italy is regulated by the Commercial Code of 1883 (Part III.). Only merchants can pass through the

bankruptcy court. Merchants are defined by the code as those who, as an habitual profession, engage in commercial business. This definition includes merchant companies. Bankruptcy proceedings may be taken either by the debtor or by a creditor for a *commercial* debt, or may be ordered by the court. The amount of the debt is immaterial: a small sum will suffice, provided its non-payment is proof of insolvency. Bankruptcy can only be declared where there is insolvency. The judgment adjudicating a debtor bankrupt deprives the bankrupt of the right to administer his affairs, and nominates a trustee to realize the property under the superintendence of a judge and a commission of creditors. All the property of the bankrupt, movable and immovable, is sold by auction and distributed in dividends. This is one way of closing the bankruptcy, but it may also be closed by an arrangement. No minimum percentage is required for such arrangement, but it must have the assent of creditors representing three-fourths of the bankrupt's indebtedness. Composition before bankruptcy is not recognized by Italian law. Bankrupts are liable to criminal proceedings involving punishments more or less heavy for offences against the law, *e.g.* for not keeping books in the way prescribed by law.

United States.—After much fragmentary legislation the bankruptcy system of the United States is now embodied in the National Bankruptcy Act of 1898, as amended by the act of 1903. The acts of bankruptcy under the act may be summarized as follows: where a debtor (1) removes any of his property to hinder or delay his creditors; (2) being insolvent, transfers property with intent to prefer a creditor; (3) suffers any creditor to obtain a preference; (4) makes a general assignment for the benefit of his creditors; (5) "admits in writing his inability to pay his debts and his willingness to be adjudicated a bankrupt on that ground." These acts of bankruptcy do not include, it will be observed, non-payment by a debtor of his debts. A debtor can therefore only be adjudicated a bankrupt on the ground of indebtedness with his own consent in writing. Presumably the legislature thought that the desire to obtain the protection and privilege of bankruptcy would be a sufficient inducement to confess insolvency, where such insolvency, in fact, exists.

To constitute a fraudulent preference it is not necessary, as it is under English law, that the payment should be made "with a view to prefer" the favoured creditor. It is enough that the creditor is preferred. This avoids the nice questions of legal casuistry which have embarrassed the English courts, and it is the more rational rule, for creditors are not concerned with a debtor's intention. Any person, trader or non-trader, may avail himself of the act, but, in the case of a corporation, there is this peculiarity: it may be petitioned against but cannot petition.

Insolvency is construed in a practical sense; that is, a person is insolvent where the aggregate of his property, at a fair valuation, is insufficient to pay his debts; but he is not necessarily insolvent because his realized assets are insufficient to meet his liabilities.

Involuntary proceedings can only be taken against debtors owing $1000 or over, with certain exceptions. A petitioning creditor's debt must amount to $500.

The administration of the law of bankruptcy is entrusted to the district courts and is exercised through the medium of certain officers appointed by the courts and called referees. The creditors appoint a trustee or trustees of the estate.

So soon as his judicial examination is over the bankrupt may offer his creditors a composition, but to take effect the composition must be approved by the court after hearing objections.

The discharge is the key to the efficiency of every bankruptcy system. By the control which the court thus holds, it is enabled to bring its moral censorship to bear on a debtor's conduct and so maintain a high standard of commercial integrity. Under the United States system the judge is to investigate the merits of the application and to discharge the bankrupt, unless he has (1) committed an offence punishable by imprisonment; (2) with intent to conceal his financial condition, destroyed, concealed, or failed to keep books of account or records from which such condition might be ascertained; or (3) *obtained property on credit from any person upon a materially false statement in writing made to such person for the purpose of obtaining such property on credit; or* (4) *at any time, subsequent to the first day of the four months immediately preceding the filing of the petition, transferred, removed, destroyed or concealed any of his property with intent to hinder, delay or defraud his creditors; or* (5) *in voluntary proceedings been granted a discharge in bankruptcy within six years; or* (6) *in the course of proceedings in bankruptcy refused to obey any lawful order of or to answer any material question approved by the court.*

It is significant that the italicized qualifications were added to the act of 1898 by the experience of five years of its working.

(E. Ma.)

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