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## THE ENCYCLOPÆDIA BRITANNICA A DICTIONARY OF ARTS, SCIENCES, LITERATURE AND GENERAL INFORMATION ELEVENTH EDITION

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### Cockaigne to Columbus, Christopher

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**COCKAIGNE** (COCKAYNE), **LAND OF** (O. Fr. *Coquaigne*, mod. Fr. *cocagne*, "abundance," from Ital. *Cocagna*; "as we say 'Lubberland,' the epicure's or glutton's home, the land of all delights, so taken in mockerie": Florio), an imaginary country, a medieval Utopia where life was a continual round of luxurious idleness. The origin of the Italian word has been much disputed. It seems safest to connect it, as do Grimm and Littré, ultimately with Lat. *coquere*, through a word meaning "cake," the literal sense thus being "The Land of Cakes." In Cockaigne the rivers were of wine, the houses were built of cake and barley-sugar, the streets were paved with pastry, and the shops supplied goods for nothing. Roast geese and fowls wandered about inviting folks to eat them, and buttered larks fell from the skies like manna. There is a 13th-century French *fabliau*, *Cocaigne*, which was possibly intended to ridicule the fable of the mythical Avalon, "the island of the Blest." The 13th-century English poem, *The Land of Cockayne*, is a satire on monastic life. The term has been humorously applied to London, and by Boileau to the Paris of the rich. The word has been frequently confused with Cockney (*q.v.*).

See D. M. Méon, *Fabliaux et contes* (4 vols., 1808), and F. J. Furnivall, *Early English Poems* (Berlin, 1862).

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**COCKATOO** (*Cacatuidae*), a family of parrots characterized among Old World forms by their usually greater size, by the crest of feathers on the head, which can be raised or depressed at will, and by the absence of green in their coloration. They inhabit the Indian Archipelago, New Guinea and Australia, and are gregarious, frequenting woods and feeding on seeds, fruits and the larvae of insects. Their note is generally harsh and unmusical, and although they are readily tamed when taken young, becoming familiar, and in some species showing remarkable intelligence, their powers of vocal imitation are usually limited. Of the true cockatoos (*Cacatua*) the best known is the sulphur-crested cockatoo (*Cacatua galerita*), of a pure white plumage with the exception of the crest, which is deep sulphur yellow, and of the ear and tail coverts, which are slightly tinged with yellow. The crest when erect stands 5 in. high. These birds are found in Australia in flocks varying from 100 to 1000 in number, and do great damage to newly-sown grain, for which reason they are mercilessly destroyed by farmers. They deposit their eggs—two in number, and of a pure white colour—in the hollows of decayed trees or in the fissures of rocks, according to the nature of the locality in which they reside. This is one of the species most usually kept in Europe as a cage bird. Leadbeater's Cockatoo (*Cacatua Leadbeateri*), an inhabitant of South Australia, excels all others in the beauty of its plumage, which consists in great part of white, tinged with rose colour, becoming a deep salmon colour under the wings, while the crest is bright crimson at the base, with a yellow spot in the centre and white at the tip. It is exceedingly shy and difficult of approach, and its note is more plaintive while less harsh than that of the preceding species. In the cockatoos belonging to the genus *Calyptorhynchus* the general plumage is black or dark brown, usually with a large spot or band of red or yellow on the tail. The largest of these is known as the funereal cockatoo (*Calyptorhynchus funereus*), from the lugubrious note or call which it utters, resembling the two syllables Wy—la—, the native name of the species. It deposits its eggs in the hollows of the large gum-trees of Australia, and feeds largely on the larvae of insects, in search of which it peels off the bark of trees, and when thus employed it may be approached closely. The cockateel (*Calopsittacus novaehollandiae*), the only species in the family smaller than a pigeon, and with a long pointed tail, is a common aviary bird, and breeds freely in captivity.

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**COCKATRICE**, a fabulous monster, the existence of which was firmly believed in throughout ancient and medieval times,—descriptions and figures of it appearing in the natural history works of such writers as Pliny and Aldrovandus, those of the latter published so late as the beginning of the 17th century. Produced from a cock's egg hatched by a serpent, it was believed to possess the most deadly powers, plants withering at its touch, and men and animals dying poisoned by its look. It stood in awe, however, of the cock, the sound of whose crowing killed it, and consequently travelers were wont to take this bird with them in travelling over regions supposed to abound in cockatrices. The weasel alone among mammals was unaffected by the glance of its evil eye, and attacked it at all times successfully; for when wounded by the monster's teeth it found a ready remedy in rue—the only plant which the cockatrice could not wither. This myth reminds one of the real contests between the weasel-like mungoos of India and the deadly cobra, in which the latter is generally killed. The term "cockatrice" is employed on four occasions in the English translation of the Bible, in all of which it denotes nothing more than an exceedingly venomous reptile; it seems also to be synonymous with "basilisk," the mythical king of serpents.

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**COCKBURN, SIR ALEXANDER JAMES EDMUND**, 10th Bart. (1802-1880), lord chief justice of England, was born on the 24th of December 1802, of ancient Scottish stock. He was the son of Alexander, fourth son of Sir James Cockburn, 6th baronet, his three uncles, who had successively held the title, dying without heirs. His father was British envoy extraordinary and minister plenipotentiary to the state of Columbia, and married Yolande, daughter of the vicomte de Vignier. Young Alexander was at one time intended for the diplomatic service, and frequently during the legal career which he ultimately adopted he

was able to make considerable use of the knowledge of foreign languages, especially French, with which birth and early education had equipped him. He was educated at Trinity Hall, Cambridge, of which he was elected a fellow, and afterwards an honorary fellow. He entered at the Middle Temple in 1825, and was called to the bar in 1829. He joined the western circuit, and for some time such practice as he was able to obtain lay at the Devon sessions, quarter sessions at that time affording an opening and a school of advocacy to young counsel not to be found anywhere fifty years later. In London he had so little to do that only the persuasion of friends induced him to keep his London chambers open. Three years after his call to the bar, however, the Reform Bill was passed, and the petitions which followed the ensuing general election gave rise to a large number of new questions for the decision of election committees, and afforded an opening of which he promptly availed himself. The decisions of the committees had not been reported since 1821, and with M. C. Rowe, another member of the western circuit, Cockburn undertook a new series of reports. They only published one volume, but the work was well done, and in 1833 Cockburn had his first parliamentary brief.

In 1834 Cockburn was well enough thought of to be made a member of the commission to inquire into the state of the corporations of England and Wales. Other parliamentary work followed; but he had ambition to be more than a parliamentary counsel, and attended diligently on his circuit, besides appearing before committees. In 1841 he was made a Q.C., and in that year a charge of simony, brought against his uncle, William, dean of York, enabled him to appear conspicuously in a case which attracted considerable public attention, the proceedings taking the form of a motion for prohibition duly obtained against the ecclesiastical court, which had deprived Dr Cockburn of his office. Not long after this, Sir Robert Peel's secretary, Edward Drummond, was shot by the crazy Scotsman, Daniel M'Naughten, and Cockburn, briefed on behalf of the assassin, not only made a very brilliant speech, which established the defence of insanity, but also secured the full publicity of a long report in the *Morning Chronicle* of the 6th of March 1843. Another well-known trial in which he appeared a year later was that of *Wood v. Peel* (*The Times*, 2nd and 3rd of July 1844), the issue being in form to determine the winner of a bet (the Gaming Act was passed in the following year) as to the age of the Derby winner Running Rein—in substance to determine, if possible, the vexed question whether Running Rein was a four-year-old or a three-year-old when he was racing as the latter. Running Rein could not be produced by Mr Wood, and Baron Alderson took a strong view of this circumstance, so that Cockburn found himself on the losing side, while his strenuous advocacy of his client's cause had led him into making, in his opening speech, strictures on Lord George Bentinck's conduct in the case which had better have been reserved to a later stage. He was, however, a hard fighter, but not an unfair one—a little irritable at times, but on the whole a courteous gentleman, and his practice went on increasing.

In 1847 he decided to stand for parliament, and was elected without a contest Liberal M.P. for Southampton. His speech in the House of Commons on behalf of the government in the Don Pacifico dispute with Greece commended him to Lord John Russell, who appointed him solicitor-general in 1850 and attorney-general in 1851, a post which he held till the resignation of the ministry in February 1852. During the short administration of Lord Derby which followed, Sir Frederic Thesiger was attorney-general, and Cockburn was engaged against him in the case of *R. v. Newman*, on the prosecution of Achilli. This was the trial of a criminal information for libel filed against John Henry Newman, who had denounced a scandalous and profligate friar named Achilli, then lecturing on Roman Catholicism in England. Newman pleaded justification; but the jury who heard the case in the Queen's Bench, with Lord Campbell presiding, found that the justification was not proved except in one particular: a verdict which, together with the methods of the judge and the conduct of the audience, attracted considerable comment. The verdict was set aside, and a new trial ordered, but none ever took place. In December 1852, under Lord Aberdeen's ministry, Cockburn became again attorney-general, and so remained until 1856, taking part in many celebrated trials, such as the Hopwood Will Case in 1855, and the Swynfen Will Case, but notably leading for the crown in the trial of William Palmer of Rugeley in Staffordshire—an ex-medical man who had taken to the turf, and who had poisoned a friend of similar pursuits named Cook with strychnine, in order to obtain money from his estate by forgery and otherwise. Cockburn made an exhaustive study of the medical aspects of the case, and the prisoner's comment when convicted after a twelve days' trial was, alluding to the attorney-general's advocacy, "It was the riding that did it." In 1854 Cockburn was made recorder of Bristol. In 1856 he became chief justice of the common pleas. He inherited the baronetcy in 1858. In 1859 Lord Campbell became chancellor, and Cockburn became chief justice of the Queen's Bench, continuing as a judge for twenty-four years and dying in harness. On Friday,

the 19th of November 1880, he tried causes with special juries at Westminster; on Saturday, the 20th, he presided over a court for the consideration of crown cases reserved; he walked home, and on that night he died of *angina pectoris* at his house in Hertford Street.

Sir Alexander Cockburn earned and deserved a high reputation as a judge. He was a man of brilliant cleverness and rapid intuition rather than of profound and laboriously cultivated intellect. He had been a great advocate at the bar, with a charm of voice and manner, fluent and persuasive rather than learned; but before he died he was considered a good lawyer, some assigning his unquestioned improvement in this respect to his frequent association on the bench with Blackburn. He had notoriously little sympathy with the Judicature Acts. Many were of opinion that he was inclined to take an advocate's view of the cases before him, making up his mind as to their merits prematurely and, in consequence, wrongly, as well as giving undue prominence to the views which he so formed; but he was beyond doubt always in intention, and generally in fact, scrupulously fair. It is not necessary to enumerate the many *causes célèbres* at which Sir Alexander Cockburn presided as a judge. It was thought that he went out of his way to arrange that they should come before him, and his successor, Lord Coleridge, writing in 1881 to Lord Bramwell, to make the offer that he should try the murderer Lefroy as a last judicial act before retiring, added, "Poor dear Cockburn would hardly have given you such a chance." Be this as it may, Cockburn tried all cases which came before him, whether great or small, with the same thoroughness, courtesy and dignity, so that no counsel or suitor could complain that he had not been fully heard in a matter in which the issues were seemingly trivial; while he certainly gave great attention to the elaboration of his judgments and charges to juries. He presided at the Tichborne trial at Bar, lasting 188 days, of which his summing-up occupied eighteen.

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The greatest public occasion on which Sir Alexander Cockburn acted, outside his usual judicial functions, was that of the "Alabama" arbitration, held at Geneva in 1872, in which he represented the British government, and dissented from the view taken by the majority of the arbitrators, without being able to convince them. He prepared, with Mr C. F. Adams, the representative of the United States, the English translation of the award of the arbitrators, and published his reasons for dissenting in a vigorously worded document which did not meet with universal commendation. He admitted in substance the liability of England for the acts of the "Alabama," but not on the grounds on which the decision of the majority was based, and he held England not liable in respect of the "Florida" and the "Shenandoah."

In personal appearance Sir Alexander Cockburn was of small stature, but great dignity of deportment. He was fond of yachting and of sport, and was engaged in writing a series of articles on the "History of the Chase in the Nineteenth Century" at the time of his death. He was fond, too, of society, and was also throughout his life addicted to frivolities not altogether consistent with advancement in a learned profession, or with the positions of dignity which he successively occupied. At the same time he had a high sense of what was due to and expected from his profession; and his utterance upon the limitations of advocacy, in his speech at the banquet given in the Middle Temple Hall to M. Berryer, the celebrated French advocate, may be called the classical authority on the subject. Lord Brougham, replying for the guests other than Berryer, had spoken of "the first great duty of an advocate to reckon everything subordinate to the interests of his client." The lord chief justice, replying to the toast of "the judges of England," dissented from this sweeping statement, saying, amid loud cheers from a distinguished assembly of lawyers, "The arms which an advocate wields he ought to use as a warrior, not as an assassin. He ought to uphold the interests of his clients *per fas*, not *per nefas*. He ought to know how to reconcile the interests of his clients with the eternal interests of truth and justice" (*The Times*, 9th of November 1864). Sir Alexander Cockburn was never married, and the baronetcy became extinct at his death.

AUTHORITIES.—*The Times*, 22nd of November 1880; *Law Journal*; *Law Times*; *Solicitors' Journal*, 27th of November 1880; *Law Magazine*, new series, vol. xv. p. 193, 1851; Ashley's *Life of Lord Palmerston*; Nash's *Life of Lord Westbury*; "Reminiscences of Lord Chief Justice Coleridge," by Lord Russell of Killowen, in the *North American Review*, September 1894; *The Greville Memoirs*; Croker's *Correspondence and Diaries*; Justin M'Carthy's *History of Our Own Times*; Serjeant Ballantine's *Experiences*; *Bench and Bar*, by Serjeant Robinson; Fairchild's *Life of Lord Bramwell*; Manson's *Builders of Our Law*; Burke's *Peerage*, ed. 1879; Foster's *Peerage*, 1880.

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**COCKBURN, ALICIA**, or ALISON (1713-1794), Scottish poet, authoress of one of the most exquisite of Scottish ballads, the "Flowers of the Forest," was the daughter of Robert Rutherford of Fairmalee, Selkirkshire, and was born on the 8th of October 1713. There are two versions of this song,—the one by Mrs Cockburn, the other by Jean Elliot (1727-1805) of Minto. Both were founded on the remains of an ancient Border ballad. Mrs Cockburn's—that beginning "I've seen the smiling of Fortune beguiling"—is said to have been written before her marriage in 1731, though not published till 1765. Anyhow, it was composed many years before Jean Elliot's sister verses, written in 1756, beginning, "I've heard them liltin' at our ewe-milkin'." Robert Chambers states that the ballad was written on the occasion of a great commercial disaster which ruined the fortunes of some Selkirkshire lairds. Later biographers, however, think it probable that it was written on the departure to London of a certain John Aikman, between whom and Alison there appears to have been an early attachment. In 1731 Alison Rutherford was married to Patrick Cockburn of Ormiston. After her marriage she knew all the intellectual and aristocratic celebrities of her day. In the memorable year 1745 she vented her Whiggism in a squib upon Prince Charlie, and narrowly escaped being taken by the Highland guard as she was driving through Edinburgh in the family coach of the Keiths of Ravelston, with the parody in her pocket. Mrs Cockburn was an indefatigable letter-writer and a composer of parodies, squibs, toasts and "character-sketches"—then a favourite form of composition—like other wits of her day; but the "Flowers of the Forest" is the only thing she wrote that possesses great literary merit. At her house on Castle-hill, and afterwards in Crichton Street, she received many illustrious friends, among whom were Mackenzie, Robertson, Hume, Home, Monboddo, the Keiths of Ravelston, the Balcarres family and Lady Anne Barnard, the authoress of "Auld Robin Gray." As a Rutherford she was a connexion of Sir Walter Scott's mother, and was her intimate friend. Lockhart quotes a letter written by Mrs Cockburn in 1777, describing the conduct of little Walter Scott, then scarcely six years old, during a visit which she paid to his mother, when the child gave as a reason for his liking for Mrs Cockburn that she was a "virtuoso like himself." Mrs Cockburn died on the 22nd of November 1794.

See her *Letters and Memorials...*, with notes by T. Craig Brown (1900).

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**COCKBURN, SIR GEORGE**, Bart. (1772-1853), British admiral, second son of Sir James Cockburn, Bart., and uncle of Lord Chief Justice Cockburn, was born in London. He entered the navy in his ninth year. After serving on the home station, and in the East Indies and the Mediterranean, he assisted, as captain of the "Minerve" (38) at the blockade of Leghorn in 1796, and fought a gallant action with the Spanish frigate "Sabina" (40) which he took. He was present at the battle of Cape St Vincent. In 1809, in command of the naval force on shore, he contributed greatly to the reduction of Martinique, and signed the capitulation by which that island was handed over to the English; for his services on this occasion he received the thanks of the House of Commons. After service in the Scheldt and at the defence of Cadiz he was sent in 1811 on an unsuccessful mission for the reconciliation of Spain and her American colonies. He was made rear-admiral in 1812, and in 1813-14, as second in command to Warren, he took a prominent part in the American War, especially in the capture of Washington. Early in 1815 he received the order of the Bath, and in the autumn of the same year he carried out, in the "Northumberland" (74), the sentence of deportation to St Helena which had been passed upon Bonaparte. In 1818 he received the Grand Cross of his order, and was made a lord of the admiralty; and the same year he was returned to parliament for Portsmouth. He was promoted to the rank of vice-admiral in 1819, and to that of admiral in 1837; he became senior naval lord in 1841, and held office in that capacity till 1846. From 1827 he was a privy councillor. In 1851 he was made admiral of the fleet, and in 1852, a year before his death, inherited the family baronetcy from his elder brother, being himself succeeded by his brother William, dean of York, who died in 1858.

See O'Byrne, *Naval Biography*; W. James, *Naval History*; *Gentleman's Magazine* for 1853.

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**COCKBURN, HENRY THOMAS** (1779-1854), Scottish judge, with the style of Lord Cockburn, was born in Edinburgh on the 26th of October 1779. His father, a keen Tory, was a baron of the Scottish court of exchequer, and his mother was connected by marriage with Lord Melville. He was educated at the high school and the university of Edinburgh; and he was a member of the famous Speculative Society, to which Sir Walter Scott, Brougham and Jeffrey belonged. He entered the faculty of advocates in 1800, and attached himself, not to the party of his relatives, who could have afforded him most valuable patronage, but to the Whig or Liberal party, and that at a time when it held out few inducements to men ambitious of success in life. On the accession of Earl Grey's ministry in 1830 he became solicitor-general for Scotland. In 1834 he was raised to the bench, and on taking his seat as a judge in the court of session he adopted the title of Lord Cockburn. Cockburn's forensic style was remarkable for its clearness, pathos and simplicity; and his conversational powers were unrivalled among his contemporaries. The extent of his literary ability only became known after he had passed his seventieth year, on the publication of his biography of Lord Jeffrey in 1852, and from the *Memorials of his Time*, which appeared posthumously in 1856. He died on the 26th of April 1854, at his mansion of Bonaly, near Edinburgh.

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**COCKER, EDWARD** (1631-1675), the reputed author of the famous *Arithmetick*, the popularity of which has added a phrase ("according to Cocker") to the list of English proverbialisms, was an English engraver, who also taught writing and arithmetic. He is credited with the authorship and execution of some fourteen sets of copy slips, one of which, *Daniel's Copy-Book, ingraven by Edward Cocker, Philomath* (1664), is preserved in the British Museum. Pepys, in his *Diary*, makes very favourable mention of Cocker, who appears to have displayed great skill in his art. *Cocker's Arithmetick*, the fifty-second edition of which appeared in 1748, and which has passed through about 112 editions in all, was not published during the lifetime of its reputed author, the first impression bearing date of 1678. Augustus de Morgan in his *Arithmetical Books* (1847) adduces proofs, which may be held to be conclusive, that the work was a forgery of the editor and publisher, John Hawkins; and there appears to be no doubt that the *Decimal Arithmetic* (1684), and the *English Dictionary* (second edition, 1715), issued by Hawkins under Cocker's name, are forgeries also. De Morgan condemns the *Arithmetick* as a diffuse compilation from older and better works, and dates "a very great deterioration in elementary works on arithmetic" from the appearance of the book, which owed its celebrity far more to persistent puffing than to its merits. He pertinently adds,—“This same Edward Cocker must have had great reputation, since a bad book under his name pushed out the good ones.”

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**COCKERELL, CHARLES ROBERT** (1788-1863), British architect, was born in London on the 28th of April 1788. After a preliminary training in his profession, he went abroad in 1810 and studied the great architectural remains of Greece, Italy and Asia Minor. At Aegina, Phigalia and other places of interest, he conducted excavations on a large scale, enriching the British Museum with many fine fragments, and adding several valuable monographs to the literature of archaeology. Elected in 1829 an associate of the Royal Academy, he became a full member in 1836, and in 1839 he was appointed professor of architecture. On Sir John Soane's death in 1837 Cockerell was appointed architect of the Bank of England, and carried out the alterations that were judged to be necessary in that building. In addition to branch banks at Liverpool and Manchester he erected in 1840 the new library at Cambridge, and in 1845 the university galleries at Oxford, as well as the Sun and the Westminster Fire Offices in Bartholomew Lane and in the Strand; and he was joint architect of the London & Westminster Bank, Lothbury, with Sir W. Tite. On the death of Henry Lonsdale Elmes in 1847, Cockerell was selected to finish the St George's Hall, Liverpool. Cockerell's best conceptions were those inspired by classic models; his essays in the Gothic—the college at Lampeter, for instance, and the chapel at Harrow—are by no means so successful. His thorough knowledge of Gothic art, however, can be seen from his writings, *On the Iconography of Wells Cathedral*, and *On the Sculptures of Lincoln and Exeter Cathedrals*. In



his *Tribute to the Memory of Sir Christopher Wren* (1838) he published an interesting collection of the whole of Wren's works drawn to one scale.

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**COCKERILL, WILLIAM** (1759-1832), Anglo-French inventor and machinist, was born in England in 1759. He went to Belgium as a simple mechanic, and in 1799 constructed at Verviers the first wool-carding and wool-spinning machines on the continent. In 1807 he established a large machine workshop at Liège. Orders soon poured in on him from all over Europe, and he amassed a large fortune. In 1810 he was granted the rights of naturalization by Napoleon I., and in 1812 handed over the management of his business to his youngest son, JOHN COCKERILL (1790-1840).

Thanks to his own energy and ability, aided by the influence of King William I. of the Netherlands, John Cockerill largely extended his father's business. King William secured him a site at Seraing, where he built large works, including an iron-foundry and blast furnace. The construction of the Belgian railways in 1834 gave a great impetus to these works, branches of which had already been opened in France, Germany and Poland. In 1838 Cockerill met with a carriage accident which nearly proved fatal, and the prospect of his loss resulted in the credit of the firm being so badly shaken that in 1839 it was compelled to go into liquidation, the liabilities being estimated at 26 millions of francs, the assets at 18 millions. This reverse, however, was only temporary. John Cockerill had practically concluded negotiations to construct the Russian government railways, when his constitution, undermined by overwork, broke down. He died at Warsaw on the 19th of June 1840. The iron works, among the largest in Europe, are still carried on under the name of La Société Cockerill at Seraing (*q.v.*).

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**COCKERMOUTH**, a market town in the Cocker mouth parliamentary division of Cumberland, England, 27 m. S.W. of Carlisle, on the Cocker mouth, Keswick & Penrith, the London & North Western, and the Maryport & Carlisle railways. Pop. of urban district (1901) 5355. It is pleasantly situated on the river Derwent, at the junction of the Cocker, outlying hills of the Lake District sheltering it on the north, east and south. The castle has remains of Norman work in the keep, and other ancient portions (including the gateway) of later date, but is in part modernized as a residence. The grammar school was founded in 1676. The county industrial school is established in the town. The industries include the manufacture of woollens and confectionery, tanning and engineering, and there is a considerable agricultural trade. There are coal mines in the neighbourhood. A statue was erected in 1875 to the sixth earl of Mayo, who represented the borough (abolished in 1885) from 1857 to 1868. There is a Roman fort a mile west of the town, at Papcastle.

Cockermouth (*Cokermuth, Cokermue*) was made the head of the honour or barony of Allerdale when that barony was created and granted to Waltheof in the early part of the 12th century. At a later date the honour of Allerdale was frequently called the honour of Cockermouth. Waltheof probably built the castle, under the shelter of which the town grew up. Although it never received any royal charter, the earliest records relating to Cockermouth mention it as a borough. In 1295 it returned two members to parliament and then not again until 1640. By the Representation of the People Act of 1867 the representation was reduced to one member, and by the Redistribution Act of 1885 it was disfranchised. In 1221 William de Fortibus, earl of Albemarle, was granted a Saturday market, which later in the year was transferred to Monday, the day on which it has continued to be held ever since. The Michaelmas Fair existed in 1343, and an inquisition dated 1374 mentions two horse-fairs on Whit-Monday and at Michaelmas. In 1638 Algernon Percy, earl of Northumberland, obtained a grant of a fair every Wednesday from the first week in May till Michaelmas. The chief sources of revenue in Norman times were the valuable fisheries and numerous mills.

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**COCK-FIGHTING**, or **COCKING**, the sport of pitting game-cocks to fight, and breeding and training them for the purpose. The game-fowl is now probably the nearest to the Indian jungle-fowl (*Gallus ferrugineus*), from which all domestic fowls are believed to be descended. The sport was popular in ancient times in India, China, Persia and other eastern countries, and was introduced into Greece in the time of Themistocles. The latter, while moving with his army against the Persians, observed two cocks fighting desperately, and, stopping his troops, inspired them by calling their attention to the valour and obstinacy of the feathered warriors. In honour of the ensuing victory of the Greeks cock-fights were thenceforth held annually at Athens, at first in a patriotic and religious spirit, but afterwards purely for the love of the sport. Lucian makes Solon speak of quail-fighting and cocking, but he is evidently referring to a time later than that of Themistocles. From Athens the sport spread throughout Greece, Asia Minor and Sicily, the best cocks being bred in Alexandria, Delos, Rhodes and Tanagra. For a long time the Romans affected to despise this "Greek diversion," but ended by adopting it so enthusiastically that Columella (1st century A.D.) complained that its devotees often spent their whole patrimony in betting at the pit-side. The cocks were provided with iron spurs (*tela*), as in the East, and were often dosed with stimulants to make them fight more savagely.

From Rome cocking spread northwards, and, although opposed by the Christian church, nevertheless became popular in Great Britain, the Low Countries, Italy, Germany, Spain and her colonies. On account of adverse legislation cocking has practically died out everywhere excepting in Spain, countries of Spanish origin and the Orient, where it is still legal and extremely popular. It was probably introduced into England by the Romans before Caesar's time. William Fitz-Stephen first speaks of it in the time of Henry II. as a sport for school-boys on holidays, and particularly on Shrove Tuesday, the masters themselves directing the fights, or mains, from which they derived a material advantage, as the dead birds fell to them. It became very popular throughout England and Wales, as well as in Scotland, where it was introduced in 1681. Occasionally the authorities tried to repress it, especially Cromwell, who put an almost complete stop to it for a brief period, but the Restoration re-established it among the national-pastimes. Contemporary apologists do not, in the 17th century, consider its cruelty at all, but concern themselves solely with its justification as a source of pleasure. "If Leviathan took his sport in the waters, how much more may Man take his sport upon the land?" From the time of Henry VIII., who added the famous Royal Cock-pit to his palace of Whitehall, cocking was called the "royal diversion," and the Stuarts, particularly James I. and Charles II., were among its most enthusiastic devotees, their example being followed by the gentry down to the 19th century. Gervase Markham in his *Pleasures of Princes* (1614) wrote "Of the Choyce, Ordring, Breeding and Dyeting of the fighting-Cocke for Battell," his quaint directions being of the most explicit nature. When a cock is to be trained for the pit he must be fed "three or foure daies only with old Maunchet (fine white bread) and spring water." He is then set to spar with another cock, "putting a payre of hots upon each of their heeles, which Hots are soft, bumbasted roubles of Leather, covering their spurs, so that they cannot hurt each other.... Let them fight and buffet one another a good space." After exercise the bird must be put into a basket, covered with hay and set near the fire. "Then let him sweate, for the nature of this scowring is to bring away his grease, and to breed breath, and strength." If not killed in the fight, "the first thing you doe, you shall search his wounds, and as many as you can find you shall with your mouth sucke the blood out of them, then wash them with warm salt water,... give him a roule or two, and so stove him up as hot as you can."

Cocking-mains usually consisted of fights between an agreed number of pairs of birds, the majority of victories deciding the main; but there were two other varieties that aroused the particular ire of moralists. These were the "battle royal," in which a number of birds were "set," *i.e.* placed in the pit, at the same time, and allowed to remain until all but one, the victor, were killed or disabled; and the "Welsh main," in which eight pairs were matched, the eight victors being again paired, then four, and finally the last surviving pair. Among London cock-pits were those at Westminster, in Drury Lane, Jewin Street and Birdcage Walk (depicted by Hogarth). Over the royal pit at Whitehall presided the king's cockmaster. The pits were circular in shape with a matted stage about 20 ft. in diameter and surrounded by a barrier to keep the birds from falling off. Upon this barrier the first row of the audience leaned. Hardly a town in the kingdom was without its cockpit, which offered the sporting classes opportunities for betting not as yet sufficiently supplied by horse-racing. With the growth of the latter sport and the increased facilities for reaching the racing centres, cocking gradually declined, especially after parliament passed laws against it, so that gentlemen risked arrest by attending a main.

Among the best-known devotees of the sport was a Colonel Mordaunt, who, about 1780,

took a number of the best English game-cocks to India. There he found the sport in high favour with the native rulers and his birds were beaten. Perhaps the most famous main in England took place at Lincoln in 1830 between the birds of Joseph Gilliver, the most celebrated breeder, or "feeder," of his day, and those of the earl of Derby. The conditions called for seven birds a side, and the stakes were 5000 guineas the main and 1000 guineas each match. The main was won by Gilliver by five matches to two. His grandson was also a breeder, and the blood of his cocks still runs in the best breeds of Great Britain and America. Another famous breeder was Dr Bellyse of Audlem, the principal figure in the great mains fought at Chester during race-week at the beginning of the 19th century. His favourite breed was the white pile, and "Cheshire piles" are still much-fancied birds. Others were Irish brown-reds, Lancashire black-reds and Staffordshire duns.

In Wales, as well as some parts of England, cocking-mains took place regularly in churchyards, and in many instances even inside the churches themselves. Sundays, wakes and church festivals were favourite occasions for them. The habit of holding mains in schools was common from the 12th to about the middle of the 19th century. When cocking was at its height, the pupils of many schools were made a special allowance for purchasing fighting-cocks, and parents were expected to contribute to the expenses of the annual main on Shrove Tuesday, this money being called "cockpence." Cock-fighting was prohibited by law in Great Britain in 1849.

Cocking was early introduced into America, though it was always frowned upon in New England. Some of the older states, as Massachusetts, forbade it by passing laws against cruelty as early as 1836, and it is now expressly prohibited in Canada and in most states of the Union, or is repressed by general laws for the prevention of cruelty to animals.

Cocks are fought at an age of from one to two years. "Heeling," or the proper fastening of the spurs, and "cutting out," trimming the wings at a slope, and cutting the tail down by one-third of its length and shortening the hackle and rump feathers, are arts acquired by experience. The comb is cut down close, so as to offer the least possible mark for the hostile bird's bill. The cock is then provided with either "short heels," spurs 1½ in. or less in length, or with "long heels," from 2 to 2½ in. in length. The training of a cock for the pit lasts from ten days to a month or more, during which time the bird is subjected to a rigid diet and exercise in running and sparring. The birds may not be touched after being set down in the pit, unless to extricate them from the matting. Whenever a bird refuses to fight longer he is set breast to breast with his adversary in the middle of the pit, and if he then still refuses to fight he is regarded as defeated. Among the favourite breeds may be mentioned the "Irish gilders," "Irish Grays," "Shawlnecks," "Gordons," "Eslin Red-Quills," "Baltimore Topknots," "Dominiques," "War-horses" and "Claibornes."

Cock-fighting possesses an extensive literature of its own. See Gervase Markham, *Pleasures of Princes* (London, 1614); Blain, *Rural Sports* (London, 1853); "Game Cocks and Cock-Fighting," *Outing*, vol. 39; "A Modest Commendation of Cock-Fighting," *Blackwood's Magazine*, vol. 22; "Cock-Fighting in Schools," *Chambers' Magazine*, vol. 65.

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**COCK LANE GHOST**, a supposed apparition, the vagaries of which attracted extraordinary public attention in London during 1762. At a house in Cock Lane, Smithfield, tenanted by one Parsons, knockings and other noises were said to occur at night varied by the appearance of a luminous figure, alleged to be the ghost of a Mrs Kent who had died in the house some two years before. A thorough investigation revealed that Parsons' daughter, a child of eleven, was the source of the disturbance. The object of the Parsons family seems to have been to accuse the husband of the deceased woman of murdering her, with a view to blackmail. Parsons was prosecuted and condemned to the pillory. Among the crowds who visited the house was Dr Johnson, who was in consequence made the object of a scurrilous attack by the poet Charles Churchill in "The Ghost."

See A. Lang, *Cock Lane and Common Sense* (1894).

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**COCKLE, SIR JAMES** (1819-1895), English lawyer and mathematician, was born on the 14th of January 1819. He was the second son of James Cockle, a surgeon, of Great Oakley, Essex. Educated at Charterhouse and Trinity College, Cambridge, he entered the Middle Temple in 1838, practising as a special pleader in 1845 and being called in 1846. Joining the midland circuit, he acquired a good practice, and on the recommendation of Chief Justice Sir William Erle he was appointed chief justice of Queensland in 1863. He received the honour of knighthood in 1869, retired from the bench, and returned to England in 1879.

Cockle is more remembered for his mathematical and scientific investigations than as a lawyer. Like many young mathematicians he attacked the problem of resolving the higher algebraic equations, notwithstanding Abel's proof that a solution by radicles was impossible. In this field Cockle achieved some notable results, amongst which is his reproduction of Sir William R. Hamilton's modification of Abel's theorem. Algebraic forms were a favourite object of his studies, and he discovered and developed the theory of criticoids, or differential invariants; he also made contributions to the theory of differential equations. He displayed a keen interest in scientific societies. From 1863 to 1879 he was president of the Queensland Philosophical Society (now incorporated in the Royal Society of Queensland); on his return to England he became associated with the London Mathematical Society, of which he was president from 1886 to 1888, and the Royal Astronomical Society, serving as a member of the council from 1888 to 1892. He died in London on the 27th of January 1895.

A volume containing his scientific and mathematical researches made during the years 1864-1877 was presented to the British Museum in 1897 by his widow. See the obituary notice by the Rev. R. Harley in *Proc. Roy. Soc.* vol. 59.

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**COCKLE**, in zoology, a mollusc (*Cardium*) of the class Lamellibranchia (*q.v.*). A very large number of species of *Cardium* have been distinguished by conchologists. Besides the common species *Cardium edule*, two others occur in Britain, but are not sufficiently common to be of commercial importance. One of these is *C. echinatum*, which is larger than the common species, reaching 3 in. in diameter, and distinguished by the presence of spines along the ribs of the shell. The other is *C. norvegicum*, which is also somewhat larger than *C. edule*, is longer dorso-ventrally than broad, and is only faintly ribbed.

The two valves of the shell of the common cockle are similar to each other, and somewhat circular in outline. The beak or umbo of each valve is prominent and rounded, and a number of sharp ridges and furrows radiate from the apex to the free edge of the shell, which is crenated. The ligament is external, and the hinge carries cardinal teeth in each valve. The interior of the shell is remarkable for the absence of pearly lustre on its interior surface. The colour externally is reddish or yellowish. The pallial line, which is the line of attachment of the mantle parallel to the edge of the shell, is not indented by a sinus at the posterior end. In the entire animal the posterior end projects slightly more than the anterior from the region of the umbones.

The animal possesses two nearly equal adductor muscles. The edges of the mantle are united posteriorly except at the anal and branchial apertures, which are placed at the ends of two very short siphons or tubular prolongations of the mantle; the siphons bear a number of short tentacles, and many of these are furnished with eye-spots. The foot is very large and powerful; it can be protruded from the anterior aperture between the mantle edges, and its outer part is bent sharply forwards and terminates in a point. By means of this muscular foot the cockle burrows rapidly in the muddy sand of the sea-shore, and it can also when it is not buried perform considerable leaps by suddenly bending the foot. The foot has a byssus gland on its posterior surface.

On either side of the body between the mantle and the foot are two flat gills each composed of two lamellae. *Cardium* belongs to the order of Lamellibranchia in which the gills present the maximum of complexity, the original vertical filaments of which they are composed being united by interfilamentar and interlamellar junctions. In other respects the anatomy of the cockle presents no important differences from that of a typical Lamellibranch. The sexes are distinct, and the generative opening is on the side of the body above the edge of the inner lamella of the inner gill. The eggs are minute, and pass out into the sea-water through the dorsal or exhalent siphon. The breeding season is April, May and June. The larva for a time swims freely in the sea-water, having a circler of cilia round the

body in front of the mouth, forming the velum. The shell is developed on the dorsal surface behind the velum, the foot on the opposite or ventral surface behind the mouth. After a few days, when the mantle bearing the shell valves has developed so much as to enclose the whole body, the young cockle sinks to the bottom and commences to follow the habits of the adult. The usual size of the cockle in its shell is from 1 to 2 in. in breadth.

The common cockle is regularly used as food by the poorer classes. It occurs in abundance on sandy shores in all estuaries. At the mouth of the Thames the gathering of cockles forms a considerable industry, especially at Leigh. On the coast of Lancashire also the fishery, if it may be so called, is of considerable importance. The cockles are gathered by the simple process of raking them from the sand, and they are usually boiled and extracted from their shells before being sent to market. The cockle is liable to the same suspicion as the oyster of conveying the contamination of typhoid fever where the shores are polluted, but as it is boiled before being eaten it is probably less dangerous.

(J. T. C.)

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**COCKNEY**, a colloquial name applied to Londoners generally, but more properly confined to those born in London, or more strictly still to those born within the sound of the bells of St Mary-le-Bow church. The origin of the word has been the subject of many guesses, from that in John Minsheu's lexicon, *Ductor in linguas* (1617), which gives the tale of the town-bred child who, on hearing a horse neigh, asked whether a "cock neighed" too, to the confusion of the word with the name of the Utopia, the land of Cockaigne (*q.v.*). The historical examination of the various uses of "Cockney," by Sir James Murray (see *Academy*, 10th of May 1890, and the *New English Dictionary*, s.v.) clearly shows the true derivation. The earliest form of the word is *cokenay* or *cokeney*, *i.e.* the *ey* or egg, and *coken*, genitive plural of "cock," "cocks' eggs" being the name given to the small and malformed eggs sometimes laid by young hens, known in German as *Hahneneier*. An early quotation, in Langland's *Piers Plowman*, A. vii. 272, gives the combination of "cokeneyes" and bacon to make a "collop," or dish of eggs and bacon. The word then applied to a child overlong nursed by its mother, hence to a simpleton or milksop. Thus in Chaucer, *Reeve's Tale*, the word is used with *daf*, *i.e.* a fool. The particular application of the name as a term of contempt given by country folk to town-bred people, with their dandified airs and ignorance of country ways and country objects, is easy. Thus Robert Whittington or Whintont (*fl.* 1520), speaks of the "cokneys" in such "great cytees as London, York, Perusy" (Perugia), showing the general use of the word. It was not till the beginning of the 17th century that "cockney" appears to be confined to the inhabitants of London.

The so-called "Cockney" accent or pronunciation has varied in type. In the first part of the 19th century, it was chiefly characterized by the substitution of a *v* for a *w*, or vice versa. This has almost entirely disappeared, and the chief consonantal variation which exists is perhaps the change of *th* to *f* or *v*, as in "fing" for thing, or "favver" for father. This and the vowel-sound change from *ou* to *ah*, as in "abaht" for "about," are only heard among the uneducated classes, and, together with other characteristic pronunciations, phrases and words, have been well illustrated in the so-called "coster" songs of Albert Chevalier. The most marked and widely-prevalent change of vowel sound is that of *ei* for *ai*, so that "daily" becomes "dyly" and "may" becomes "my." This is sometimes so marked that it almost amounts to incapacity to distinguish the vowels *a* and *i*, and is almost universal in large classes of the population of London. The name of the "Cockney School of Poetry" was applied in 1817 to the literary circle of which Leigh Hunt was the principal representative, though Keats also was aimed at. The articles in *Blackwood's Magazine*, in which the name appeared, have generally, but probably wrongly, been attributed to John Gibson Lockhart.

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**COCK-OF-THE-ROCK**, the familiar name of the birds of the genus *Rupicola* (subfamily *Rupicolinae*) of the Cotingas (allied to the Manakins, *q.v.*), found in the Amazon valley. They are about the size of a pigeon, with orange-coloured plumage, a pronounced crest, and

orange-red flesh, and build their nests on rock. The skins and feathers are highly valued for decoration.

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**COCK-OF-THE-ROCK**, the term originally for an enclosed place in which the sport of cock-fighting (*q.v.*) was carried on. On the site of an old cockpit opposite Whitehall in London was a block of buildings used from the 17th century as offices by the treasury and the privy council, for which the old name survived till the early 19th century. The name was given also to a theatre in London, built in the early part of the 17th century on the site of Drury Lane theatre. As the place where the wounded in battle were tended, or where the junior officers consorted, the term was also formerly applied to a cabin used for these purposes on the lower deck of a man-of-war.

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**COCKROACH**<sup>1</sup> (*Blattidae*), a family of orthopterous insects, distinguished by their flattened bodies, long thread-like antennae, and shining leathery integuments. Cockroaches are nocturnal creatures, secreting themselves in chinks and crevices about houses, issuing from their retreats when the lights are extinguished, and moving about with extraordinary rapidity in search of food. They are voracious and omnivorous, devouring, or at least damaging, whatever comes in their way, for all the species emit a disagreeable odour, which they communicate to whatever article of food or clothing they may touch.

The common cockroach (*Stilopyga orientalis*) is not indigenous to Europe, but is believed to have been introduced from the Levant in the cargoes of trading vessels. The wings in the male are shorter than the body; in the female they are rudimentary. The eggs, which are 16 in number, are deposited in a leathery capsule fixed by a gum-like substance to the abdomen of the female, and thus carried about till the young are ready to escape, when the capsule becomes softened by the emission of a fluid substance. The larvae are perfectly white at first and wingless, although in other respects not unlike their parents, but they are not mature insects until after the sixth casting of the skin.

The American cockroach (*Periplaneta americana*) is larger than the former, and is not uncommon in European seaports trading with America, being conveyed in cargoes of grain and other food produce. It is very abundant in the Zoological Gardens in London, where it occurs in conjunction with a much smaller imported species *Phyllodromia germanica*, which may also be seen in some of the cheaper restaurants.

In both of these species the females, as well as the males, are winged.

In addition to these noxious and obtrusive forms, England has a few indigenous species belonging to the genus *Ectobia*, which live under stones or fallen trees in fields and woods. The largest known species is the drummer of the West Indies (*Blabera gigantea*), so called from the tapping noise it makes on wood, sufficient, when joined in by several individuals, as usually happens, to break the slumbers of a household. It is about 2 in. long, with wings 3 in. in expanse, and forms one of the most noisome and injurious of insect pests. Wingless females of many tropical species present a close superficial resemblance to woodlice; and one interesting apterous form known as *Pseudoglomeris*, from the East Indies, is able to roll up like a millipede.

The best mode of destroying cockroaches is, when the fire and lights are extinguished at night, to lay some treacle on a piece of wood afloat on a broad basin of water. This proves a temptation to the vermin too great to be resisted. The chinks and holes from which they issue should also be filled up with unslaked lime, or painted with a mixture of borax and heated turpentine.

See generally Miall and Denny, *The Structure and Life History of the Cockroach* (1887); G. H. Carpenter, *Insects: their Structure and Life* (1899); Charles Lester Marlatt, *Household Insects* (U.S. Department of Agriculture, revised edition, 1902); Leland Ossian Howard, *The Insect Book* (1902).

**COCK'S-COMB**, in botany, a cultivated form of *Celosia cristata* (natural order Amarantaceae), in which the inflorescence is monstrous, forming a flat "fasciated" axis bearing numerous small flowers. The plant is a low-growing herbaceous annual, bearing a large, comb-like, dark red, scarlet or purplish mass of flowers. Seeds are sown in March or April in pans of rich, well-drained sandy soil, which are placed in a hot-bed at 65° to 70° in a moist atmosphere. The seedlings require plenty of light, and when large enough to handle are potted off and placed close to the glass in a frame under similar conditions. When the heads show they are shifted into 5-in. pots, which are plunged to their rims in ashes or coconut fibre refuse, in a hot-bed, as before, close to the glass; they are sparingly watered and more air admitted. The soil recommended is a half-rich sandy loam and half-rotten cow and stable manure mixed with a dash of silver sand. The other species of *Celosia* cultivated are *C. pyramidalis*, with a pyramidal inflorescence, varying in colour in the great number of varieties, and *C. argentea*, with a dense white inflorescence. They require a similar cultural treatment to that given for *C. cristata*.

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**COCKTON, HENRY** (1807-1853), English humorous novelist, was born in London on the 7th of December 1807. He published a number of volumes, but is best known as the author of *Valentine Vox*, *the Ventriloquist* (1840) and *Sylvester Sound*, *the Somnambulist* (1844). He died at Bury St Edmunds on the 26th of June 1853.

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**COCKX** (or **COCK**), **HIERONYMUS** [JEROME] (1510-1570), Flemish painter and engraver, was born at Antwerp, and in 1545 was admitted to the Gild of St Luke as a painter. It is as an engraver, however, that he is famous, a number of portraits and subject-pictures by him, and reproductions of Flemish masters, being well known. His brother Matthys (1505-1552) was also a painter.

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**COCOA**,<sup>1</sup> more properly **CACAO**, a valuable dietary substance yielded by the seeds of several small trees belonging to the genus *Theobroma*, of the natural order Sterculiaceae. The whole genus, which comprises twelve species, belongs to the tropical parts of the American continent; and although the cocoa of commerce is probably the produce of more than one species, by far the greatest and most valuable portion is obtained from *Theobroma Cacao*. The generic name is derived from θεός (god) and βρῶμα (food), and was bestowed by Linnaeus as an indication of the high appreciation in which he held the beverage prepared from the seeds, which he considered to be a food fit for the gods.

The common cacao tree is of low stature, seldom exceeding 25 ft. in height, but it is taller in its native forests than it is in cultivated plantations. The leaves are large, smooth, and glossy, elliptic-oblong and tapering in form, growing principally at the ends of branches, but sometimes springing directly from the main trunk. The flowers are small, and occur in numerous clusters on the main branches and the trunk, a very marked peculiarity which gives the matured fruit the appearance of being artificially attached to the tree. Generally only a single fruit is matured from each cluster of flowers. When ripe the fruit or "pod" is

elliptical-ovoid in form, from 7 to 10 in. in length and from 3 to 4½ in. in diameter. It has a hard, thick, leathery rind of a rich purplish-yellow colour, externally rough and marked with ten very distinct longitudinal ribs or elevations. The interior of the fruit has five cells, in each of which is a row of from 5 to 12 seeds embedded in a soft delicately pink acid pulp. Each fruit thus contains from 20 to 50 or more seeds, which constitute the raw cacao or "cacao beans" of commerce.



Branch of Cocoa Tree, with Fruit in section, much reduced.

The tree appears to have been originally a native of the coast lands of the Gulf of Mexico and tropical South America as far south as the basin of the Amazon; but it can be cultivated in suitable situations within the 25th parallels of latitude. It flourishes best within the 15th parallels, at elevations ranging from near the sea-level up to about 2000 ft. in height. It is now cultivated in Mexico, Honduras, Guatemala, Nicaragua, Brazil, Peru, Ecuador, New Granada, Venezuela, Surinam, Guiana, and in many of the West Indian islands, particularly in Trinidad, San Domingo, Grenada, Cuba, Porto Rico and Jamaica. Away from America it has been introduced, and is cultivated on a large scale in West Africa, Ceylon and the Dutch East Indies.

*History.*—The value of cacao was appreciated in its native country before the discovery of America by Europeans. The Spaniards found in use in Mexico a beverage known by the Aztec name of *chocolath*, from *choco* (cacao) and *lath* (water). W. H. Prescott records that the emperor Montezuma of Mexico was "exceedingly fond of it ... no less than 50 jars or

pitchers being prepared for his own daily consumption; 2000 more were allowed for that of his household." Bags of cacao containing a specified number of beans were also a recognized form of currency in the country. The product was early introduced into Spain, and thence to other parts of Europe. The *Public Advertiser* (London) of June 16, 1657, contains an announcement that "In Bishopgate St., in Queen's Head Alley, at a Frenchman's house, is an excellent West India drink, called chocolate, to be sold, where you may have it ready at any time, and also unmade at reasonable rates." Chocolate was a very fashionable beverage in the early part of the 18th century.

*Cultivated Varieties.*—Numerous varieties of the cacao, *i.e.* of *Theobroma Cacao*, are recognized in cultivation. According to Dr P. Preuss, who has travelled extensively in the cacao producing countries of the world studying this crop, it is impossible to embody in a single table the characteristics of the world's varieties. A separate classification is needed for almost each country. In 1882 the Trinidad forms were classified by Sir D. Morris. This table was later revised by Mr J. H. Hart, and more recently Mr R. H. Lock studied the Ceylon varieties. As the Ceylon cacaos were obtained mainly from Trinidad, and as Mr Lock's results agree substantially with those of Sir D. Morris, they serve to illustrate the distinguishing characteristics of the West Indian and Ceylon forms. The main divisions are as follows:—

1. *Criollo.*—Pods relatively thin-walled and soft, rough, pointed at apex. The seeds or beans are plump and of pale colour. The ripe pods may be either red (colorado) or yellow (amarillo).

2. *Forastero.*—Pods relatively thick-walled and hard. The seeds vary in colour from pale to deep purple. Various varieties are recognized, such as cundeamor, amelonado, liso, calabacillo, differing in shape, colour and character of beans, &c., and of each of these again there may be a colorado and amarillo sub-variety. Of special interest is calabacillo, a variety with a smooth, small pod, and deep purple beans. It is considered by some to be sufficiently distinct to form a third type equivalent to criollo or forastero. Others again would raise amelonado to the rank of a distinct type. Of the above calabacillo is the hardiest and yields the least valuable beans; criollo is the most delicate and yields beans of the highest value, whilst forastero is intermediate in both respects. In general pale coloured beans are less bitter and more valuable than purple beans. Both, however, may occur in the same pod.

*Alligator, or lagarto cacao,* is the common name of a variety cultivated in Nicaragua,



Guatemala, &c. Its pods are distinctly five-angled and beset with irregular, warty protuberances. Some regard it as a distinct species, *T. pentagona*, but others only as a variety of *T. Cacao*. Its produce is of high value.

*T. bicolor*, indigenous to Central America, is another species of some interest. It bears small, hard woody pods about 6 in. long and 3 in. in diameter, with curious surface markings. The beans possess a fetid odour and a bitter flavour and are known as "tiger cacao." It is not likely to become of great commercial importance, although consumed locally where found. "*Cacao bianco*" and "*patate*" are other names for this species.

*Cultivation and Preparation.*—Cacao requires for its successful cultivation a deep, well-watered and yet well-drained soil, shelter from strong winds, and a thoroughly tropical climate, with a mean annual temperature of about 80° F., a rainfall of from 50 to 100 or more in., and freedom from long droughts. Young plants are grown from seed, which may either be sown directly in the positions the future trees are to occupy, varying according to local circumstances from 6 to 25 ft. apart in all directions, or raised in nurseries and transplanted later. The latter course is desirable when it is necessary to water and otherwise tend the seedlings. However raised, the young plants require to be shaded, and this is usually done by planting bananas, cassava or other useful crops between the rows of cacao. In some countries, but not in all, permanent shade trees are planted amongst the cacao. Various leguminous trees are commonly used, e.g. the coral tree (*Erythrina* spp.) sometimes known as *bois immortel* and *madre del cacao* or mother of cocoa, *Albizia Lebbek*, *Pithecolobium Saman*, &c. The various rubber trees have been employed with success. Wind belts are also necessary in exposed situations.

Cacao comes into bearing when about five years old, the small pink flowers and the succeeding large pods being borne directly on the trunk and main branches. The pods are carefully picked when ripe, broken open, and the slimy mass of contained seeds and their enveloping mucilaginous pulp extracted. The "beans" are next fermented or "sweated," often in special houses constructed for the purpose, or by placing them in heaps and covering with leaves or earth, or in baskets, barrels, &c., lined with banana leaves. During fermentation the beans should be stirred once daily or oftener. The time of fermentation varies from one to twelve or even more days. Pale-coloured beans usually require less time than the deep purple and bitter kinds. The method adopted also considerably modifies the time required. The process of fermenting destroys the mucilage; the seeds lose to some degree their bitter flavour and their colour also changes: the pale criollo seeds, for example, developing a cinnamon-brown colour. The "fracture" of the beans also characteristically alters. Fermentation is not universally practised; the purple colour and bitter taste of unfermented cacao being wanted in some markets.

After the fermentation is completed the beans may or may not be washed, opinion as to the desirability of this process varying in different countries. In any case, however, they have to be dried and cured. When climatic conditions are favourable this is commonly done by spreading the beans in thin layers on barbecues, or stone drying floors, or otherwise exposing them to the sun. Sliding roofs or other means of rapidly affording shelter are desirable in case of showers, excessive heat, and also for protection at night. Artificial drying is now often resorted to and various patterns of drying houses are in use.

The appearance of the beans may often be improved by "claying," a very slight coating of red earth or clay being added. Polishing the beans also gives them a brighter appearance, removes mildew, and remnants of dried mucilage, &c. This may be done by "dancing the cacao," i.e. treading a heap with the bare feet, or by the use of special polishing machines. The cacao is now ready for shipment, and is usually packed in bags. Hamburg is the chief port in the world for cacao. Until quite recently, however, this position was held by Havre, which is now second in Europe. New York imports about the same amount as Havre. London follows next in importance.

*Cacao-producing Countries.*—In the following table the production in tons (of 1000 kilos = 2205 lbs) of the principal producing countries, arranged under continents, is given for 1905 and 1901. During this period the total world's production has increased by about 40%, as indicated in the summary below. Study of the table will show where the increase has taken place, but attention is directed especially to the rapid development in West Africa.

	<i>America.</i>	
	1905 (tons).	1901 (tons).
Ecuador	21,128	22,896

Brazil	21,091	18,324
Trinidad	20,018	11,943
San Domingo	12,785	6,850
Venezuela	11,700	7,860
Grenada	5,456	4,865
Cuba and Porto Rico	3,000	1,750
Haiti	2,343	1,950
Surinam	1,612	3,163
Jamaica	1,484	1,350
French West Indies	1,200	825
St. Lucia	700	765
Dominica	597	..
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Total, America	103,114	82,541

*Africa.*

	1905 (tons).	1901 (tons).
San Thomé	25,379	16,983
Gold Coast and Lagos	5,666	997
Cameroons	1,185	528
Congo Free State	195	..
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Total, Africa	32,425	18,508

*Asia.*

	1905 (tons).	1901 (tons).
Ceylon	3543	2697
Dutch East Indies	1492	1277
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Total, Asia	5035	3974
Other countries	800	700

*World's Production.*

	1905 (tons).	1901 (tons).
Tropical America and West Indies	103,114	82,541
West Africa	32,425	18,508
Asia	5,035	3,974
Other countries	800	700
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Total	141,374	105,723

*Composition.*—The relative weights of the various parts of a whole cacao pod are given thus by Prof. J. B. Harrison for British Guiana specimens:—

	Calabacillo.	Forastero.
Husk	80.59	89.87
Pulp	7.61	4.23
Cuticles of the beans	1.77	0.50
Kernels of the beans	10.03	5.40
	-----	-----
	100.00	100.00

The husk is composed mainly of water and cellulose woody tissue, with their usual mineral constituents, and has a low manurial value. The pulp contains sugars which become converted into alcohol during fermentation. Fibrous elements and water compose about six-tenths of the cuticles, which also contain approximately: albuminoids (6%), alkaloids (2%), fat (2%), sugars (6%), starch (7%), colouring matter (4%), tartaric acid (3%) and small quantities of various mineral constituents. The average composition of the kernels, according to Payen, is:—

	Per cent.
Fat (cacao butter)	50
Starch	10
Albuminoids	20
Water	12
Cellulose	2

Mineral matter	4
Theobromine	2
Colouring matter (cacao-red)	
trace	
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	100.00

*Manufacture of Cocoa and Chocolate.*—The beans are cleaned and sorted to remove foreign bodies of all kinds and also graded into sizes to secure uniformity in roasting. The latter process is carried out in rotating iron drums in which the beans are heated to a temperature of about 260° to 280° F., and results in developing the aroma, partially converting the starch into dextrin, and eliminating bitter constituents. The beans also dry and their shells become crisp. In the next process the beans are gently crushed and winnowed, whereby the light shells are removed, and after removal by sifting of the “germs” the beans are left in the form of the irregular cocoa-nibs occasionally seen in shops. Cocoa-nibs may be infused with water and drunk, but for most people the beverage is too rich, containing the whole of the cacao-fat or cacao-butter. This fat is extracted from the carefully ground nibs by employing great hydraulic pressure in heated presses. The fat exudes and solidifies. When fresh it is yellowish-white, but becomes quite white on keeping. It is very valuable for pharmaceutical purposes and is a constituent of many pomades. With care it can be kept for a long time without going rancid.

After the extraction of the fat the resulting mass is ground to a fine powder when it is ready for use in the ordinary way. Many preparations on the market are of course not pure cocoa but contain admixtures of various starchy and other bodies.

The shells of the beans separated by the winnowing process contain theobromine, and their infusion with water is sometimes used as a substitute for coffee, under the name “miserabile.” More recently they have been put to good account as a cattle food.

In the preparation of chocolate the preliminary processes of cleaning, sorting, roasting and removing the shells, and grinding the nibs, are followed as for cocoa. The fat, however, is not extracted, but sugar, and sometimes other materials also, are added to the ground pasty mass, together with suitable flavouring materials, as for example vanilla. The greatest care is taken in the process and elaborate grinding and mixing machinery employed. The final result is a semi-liquid mass which is moulded into the familiar tablets or other forms in which chocolate comes on the market.

Cocoa as a beverage has a similar action to tea and coffee, inasmuch as the physiological properties of all three are due to the alkaloids and volatile oils they contain. Tea and coffee both contain the alkaloid caffeine, whilst cocoa contains theobromine. In tea and coffee, however, we only drink an infusion of the leaves or seeds, whilst in cocoa the whole material is taken in a state of very fine suspension, and as the preceding analysis indicates, the cocoa bean, even with the fat extracted, is of high nutritive value.

*Cacao-consuming Countries.*—The principal cacao-consuming countries are indicated below, which gives the imports into the countries named for 1905. These figures, as also those on production, are taken from *Der Gordian*.

	Tons (1000 kilos).
United States of America	34,958
Germany	29,663
France	21,748
United Kingdom	21,106
Holland	19,295
Spain	6,102
Switzerland	5,218
Belgium	3,019
Austria Hungary	2,668
Russia	2,230
Denmark	1,125
Italy	971
Sweden	900
Canada	700
Australia	600
Norway, Portugal and Finland	692

— — — —  
Total  
150,995

During recent years the use of cocoa has increased rapidly in some countries. The following table gives the increase per cent in consumption in 1905 over that in 1901 for the five chief consumers:—

	Per cent.	
United States	70	
Germany	61	
France	21	
United Kingdom	11	
Holland	34	(A. B. R.; W. G. F.)

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- 1 As a matter of nomenclature it is unfortunate that the corrupt form "cocoa," from a confusion with the coco-nut (*q.v.*), has become stereotyped. When introduced early in the 18th century it was as a trisyllable *co-co-a*, a mispronunciation of *cacao* or *cocoa*, the Spanish adaptation from the Mexican *cacauatl*.
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**COCO DE MER**, or DOUBLE COCO-NUT, a palm, *Lodoicea Sechellarum*, which is a native of the Seychelles Islands. The flowers are borne in enormous fleshy spadices, the male and female on distinct plants. The fruits, which are among the largest known, take ten years to ripen; they have a fleshy and fibrous envelope surrounding a hard nut-like portion which is generally two-lobed, suggesting a large double coco-nut. The contents of the nut are edible as in the coco-nut. The empty fruits (after germination of the seed) are found floating in the Indian Ocean, and were known long before the palm was discovered, giving rise to various stories as to their origin.

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**COCOMA**, or CUCAMAS, a tribe of South American Indians living on the Marañon and lower Huallaga rivers, Peru. In 1681, at the time of the Jesuit missionaries' first visit, they had the custom of eating their dead and grinding the bones to a powder, which was mixed with a fermented liquor and drunk. When expostulated with by the Jesuits they said "it was better to be inside a friend than to be swallowed up by the cold earth." They are a provident, hard-working people, partly Christianized, and bolder than most of the civilized Indians. Their languages show affinity to the Tupi-Guarani stock.

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**COCO-NUT<sup>1</sup> PALM** (*Cocos nucifera*), a very beautiful and lofty palm-tree, growing to a height of from 60 to 100 ft., with a cylindrical stem which attains a thickness of 2 ft. The tree terminates in a crown of graceful waving pinnate leaves. The leaf, which may attain to 20 ft. in length, consists of a strong mid-rib, whence numerous long acute leaflets spring, giving the whole the appearance of a gigantic feather. The flowers are arranged in branching spikes 5 or 6 ft. long, enclosed in a tough spathe, and the fruits mature in bunches of from 10 to 20. The fruits when mature are oblong, and triangular in cross section, measuring from 12 to 18 in. in length and 6 to 8 in. in diameter. The fruit consists of a thick external husk or rind of a fibrous structure, within which is the ordinary coco-nut of commerce. The nut has a very hard, woody shell, enclosing the nucleus or kernel, the true seed, within which again is a milky liquid called coco-nut milk. The palm is so widely disseminated throughout tropical countries that it is impossible to distinguish its original habitat. It flourishes with equal vigour on the coast of the East Indies, throughout the tropical islands

of the Pacific, and in the West Indies and tropical America. It, however, attains its greatest luxuriance and vigour on the sea shore, and it is most at home in the innumerable small islands of the Pacific seas, of the vegetation of which it is eminently characteristic. Its wide distribution, and its existence in even the smallest coral islets of the Pacific, are due to the character of the fruit, which is eminently adapted for distribution by sea. The fibrous husk renders the fruit light and the leathery skin prevents water-logging. The seed will germinate readily on the sea-shore, the seedling growing out through the soft germ-pore on the upper end of the hard nut. The fruits dropping into the sea from trees growing on any shores would be carried by tides and currents to be cast up and to vegetate on distant coasts.

The coco-nut palm, being the most useful of its entire tribe to the natives of the regions in which it grows, and furnishing many valuable and important commercial products, is the subject of careful cultivation in many countries. On the Malabar and Coromandel coasts of India the trees grow in vast numbers; and in Ceylon, which is peculiarly well suited for their cultivation, it is estimated that twenty millions of the trees flourish. The wealth of a native in Ceylon is estimated by his property in coco-nut trees, and Sir J. Emerson Tennent noted a law case in a district court in which the subject in dispute was a claim to the 2520th part of ten of the precious palms. The cultivation of coco-nut plantations in Ceylon was thus described by Sir J. E. Tennent. "The first operation in coco-nut planting is the formation of a nursery, for which purpose the ripe nuts are placed in squares containing about 400 each; these are covered an inch deep with sand and seaweed or soft mud from the beach, and watered daily till they germinate. The nuts put down in April are sufficiently grown to be planted out before the rains of September, and they are then set out in holes 3 ft. deep and 20 to 30 ft. apart.... Before putting in the young plant it is customary to bed the roots with soft mud and seaweed, and for the first two years they must be watered and protected from the glare of the sun under shades made of the plaited fronds of the coco-nut palm, or the fan-like leaves of the palmyra." The palm begins to bear fruit from the fifth to the seventh year of its age, each stock carrying from 5 to 30 nuts, the tree maturing on an average 60 nuts yearly.

The uses to which the various parts of the coco-nut palm are applied in the regions of their growth are almost endless. The nuts supply no inconsiderable proportion of the food of the natives, and the milky juice enclosed within them forms a pleasant and refreshing drink. The juice drawn from the unexpanded flower spathes forms "toddy," which may be boiled down to sugar, or it is allowed to ferment and is distilled, when it yields a spirit which, in common with a like product from other sources, is known as "arrack." As in other palms, the young bud cut out of the top of the tree forms an esculent vegetable, "palm cabbage." The trunk yields a timber (known in European commerce as porcupine wood) which is used for building, furniture, firewood, &c.; the leaves are plaited into cajan fans and baskets, and used for thatching the roofs of houses; the shell of the nut is employed as a water-vessel; and the external husk or rind yields the coir fibre, with which are fabricated ropes, cordage, brushes, &c. The coco-nut palm also furnishes very important articles of external commerce, of which the principal is coco-nut oil. It is obtained by pressure or boiling from the kernels, which are first broken up into small pieces and dried in the sun, when they are known as copperah or *copra*. It is estimated that 1000 full-sized nuts will yield upwards of 500 lb. of copra, from which 25 gallons of oil should be obtained. The oil is a white solid substance at ordinary temperatures, with a peculiar, rather disagreeable odour, from the volatile fatty acids it contains, and a mild taste. Under pressure it separates into a liquid and a solid portion, the latter, coco-stearin, being extensively used in the manufacture of candles. Coco-nut oil is also used in the manufacture of marine soap, which forms a lather with sea-water. Coir is also an important article of commerce, being in large demand for the manufacture of coarse brushes, door mats and woven coir-matting for lobbies and passages. A considerable quantity of fresh nuts is imported, chiefly from the West Indies, into Britain and other countries; they are familiar as the reward of the popular English amusement of "throwing at the coco-nuts"; and the contents are either eaten raw or used as material for cakes, &c., or sweetmeats ("coker-nut").

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1 The spelling "cocoa-nut," which introduces a confusion with cocoa (*q.v.*) or cacao, is a corruption of the original Portuguese form, dating from (and largely due to) Johnson's *Dictionary*. The spelling "coker-nut," introduced to avoid the same ambiguity, is common in England.

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**COCYTUS** (mod. *Vuvo*), a tributary of the Acheron, a river of Thesprotia (mod. *pashalik* of Iannina), which flows into the Ionian Sea about 20 m. N. of the Gulf of Arta. The name is also applied in Greek mythology to a tributary of the Acheron or of the Styx, a river in Hades. The etymology suggested is from κωκύειν, to wail, in allusion to the cries of the dead. Virgil describes it as the river which surrounds the underworld (*Aen.* vi. 132).

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**COD**, the name given to the typical fish of the family *Gadidae*, of the Teleostean suborder Anacanthini, the position of which has much varied in our classifications. Having no spines to their fins, the Gadids used, in Cuvierian days, to be associated with the herrings, Salmonids, pike, &c., in the artificially-conceived order of Malacopterygians, or soft-finned bony fishes. But, on the ground of their air-bladder being closed, or deprived of a pneumatic duct communicating with the digestive canal, such as is characteristic of the Malacopterygians, they were removed from them and placed with the flat-fishes, or *Pleuronectidae*, in a suborder Anacanthini, regarded as intermediate in position between the Acanthopterygians, or spiny-finned fishes, and the Malacopterygians. It has, however, been shown that the flat-fishes bear no relationship to the Gadids, but are most nearly akin to the John Dories (see [DORY](#)).

The suborder Anacanthini is, nevertheless, maintained for the *Muraenolepididae* Gadids and two related families, *Macruridae* and *Muraenolepididae*, and may be thus defined:—Air-bladder without open duct. Parietal bones separated by the supra-occipital; prootic and exoccipital separated by the enlarged opisthotic. Pectoral arch suspended from the skull: no mesocoracoid arch. Ventral fins below or in front of the pectorals, the pelvic bones posterior to the clavicular symphysis and only loosely attached to it by ligament. Fins without spines; caudal fin, if present, without expanded hypural, perfectly symmetrical, and supported by the neural and haemal spines of the posterior vertebrae, and by basal bones similar to those supporting the dorsal and anal rays. This type of caudal fin must be regarded as secondary, the *Gadidae* being, no doubt, derived from fishes in which the homocercal fin of the typical Teleostean had been lost.

About 120 species of Gadids are distinguished, mostly marine, many being adapted to life at great depths; all are carnivorous. They inhabit chiefly the northern seas, but many abyssal forms occur between the tropics and in the southern parts of the Atlantic and Pacific. They are represented in British waters by eight genera, and about twenty species, only one of which, the burbot (*Lota vulgaris*), is an inhabitant of fresh waters. Several of the marine species are of first-rate economic importance. The genus *Gadus* is characterized by having three dorsal and two anal fins, and a truncated or notched caudal fin. In the cod and haddock the base of the first anal fin is not, or but slightly, longer than that of the second dorsal fin; in the whiting, pout, coal-fish, pollack, hake, ling and burbot, the former is considerably longer than the latter.

The cod, *Gadus morrhua*, possesses, in common with the other members of the genus, three dorsal and two anal fins, and a single barbel, at least half as long as the eye, at the chin. It is a widely-distributed species, being found throughout the northern and temperate seas of Europe, Asia and America, extending as far south as Gibraltar, but not entering the Mediterranean, and inhabits water from 25 to 50 fathoms deep, where it always feeds close to the bottom. It is exceedingly voracious, feeding on the smaller denizens of the ocean—fish, crustaceans, worms and molluscs, and greedily taking almost any bait the fisherman chooses to employ. The cod spawns in February, and is exceedingly prolific, the roe of a single female having been known to contain upwards of eight millions of ova, and to form more than half the weight of the entire fish. Only a small proportion of these get fertilized, and still fewer ever emerge from the egg. The number of cod is still further reduced by the trade carried on in roe, large quantities of which are used in France as ground-bait in the sardine fishery, while it also forms an article of human food. The young are about an inch in length by the end of spring, but are not fit for the market till the second year, and it has been stated that they do not reach maturity, as shown by the power of reproduction, till the end of their third year. They usually measure about 3 ft. in length, and weigh from 12 to 20 lb, but specimens have been taken from 50 to 70 lb in weight.

As an article of food the cod-fish is in greatest perfection during the three months preceding Christmas. It is caught on all parts of the British and Irish coasts, but the Dogger

Bank, and Rockall, off the Outer Hebrides, have been specially noted for their cod-fisheries. The fishery is also carried on along the coast of Norfolk and Suffolk, where great quantities of the fish are caught with hook and line, and conveyed to market alive in "well-boats" specially built for this traffic. Such boats have been in use since the beginning of the 18th century. The most important cod-fishery in the world is that which has been prosecuted for centuries on the Newfoundland banks, where it is not uncommon for a single fisherman to take over 500 of these fish in ten or eleven hours. These, salted and dried, are exported to all parts of the world, and form, when taken in connexion with the enormous quantity of fresh cod consumed, a valuable addition to the food resources of the human race.

The air-bladder of this fish furnishes isinglass, little, if at all, inferior to that obtained from the sturgeon, while from the liver is obtained cod-liver oil, largely used in medicine as a remedy in scrofulous complaints and pulmonary consumption (see [COD-LIVER OIL](#)). "The Norwegians," says Cuvier, "give cod-heads with marine plants to their cows for the purpose of producing a greater proportion of milk. The vertebrae, the ribs, and the bones in general, are given to their cattle by the Icelanders, and by the Kamtchatdales to their dogs. These same parts, properly dried, are also employed as fuel in the desolate steppes of the Icy Sea."

At Port Logan in Wigtonshire cod-fish are kept in a large reservoir, scooped out of the solid rock by the action of the sea, egress from which is prevented by a barrier of stones, which does not prevent the free access of the water. These cod are fed chiefly on mussels, and when the keeper approaches to feed them they may be seen rising to the surface in hundreds and eagerly seeking the edge. They have become comparatively tame and familiar. Frank Buckland, who visited the place, states that after a little while they allowed him to take hold of them, scratch them on the back, and play with them in various ways. Their flavour is considered superior to that of the cod taken in the open sea.

(G. A. B.)

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**CODA** (Ital. for "tail"; from the Lat. *cauda*), in music, a term for a passage which brings a movement or a separate piece to a conclusion. This developed from the simple chords of a cadence into an elaborate and independent form. In a series of variations on a theme or in a composition with a fixed order of subjects, the "coda" is a passage sufficiently contrasted with the conclusions of the separate variations or subjects, added to form a complete conclusion to the whole. Beethoven raised the "coda" to a feature of the highest importance.

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**CODE** (Lat. *codex*), the term for a complete and systematic body of law, or a complete and exclusive statement of some portion of the law; and so by analogy for any system of rules or doctrine; also for an arrangement in telegraphy, signalling, &c., by which communications may be made according to rules adopted for brevity or secrecy.

In jurisprudence the question of the reduction of laws to written codes, representing a complete and readily accessible system, is a matter of great historical and practical interest. Many collections of laws, however, which are commonly known as codes,<sup>1</sup> would not correspond to the definition given above. The Code of Justinian (see [JUSTINIAN I.](#); [ROMAN LAW](#)), the most celebrated of all, is not in itself a complete and exclusive system of law. It is a collection of imperial constitutions, just as the Pandects are a collection of the opinions of jurisconsults. The Code and the Pandects together being, as Austin says, "digests of Roman law in force at the time of their conception," would, if properly arranged, constitute a code. Codification in this sense is merely a question of the *form* of the laws, and has nothing to do with their goodness or badness from an ethical or political point of view. Sometimes codification only means the changing of unwritten into written law; in the stricter sense it means the changing of unwritten or badly-written law into law well written.

The same causes which made collections of laws necessary in the time of Justinian have led to similar undertakings among modern peoples. The actual condition of laws until the period when they are consciously remodelled is one of confusion, contradiction, repetition

and disorder; and to these evils the progress of society adds the burden of perpetually increasing legislation. Some attempt must be made to simplify the task of learning the laws by improving their expression and arrangement. This is by no means an easy task in any country, but in England it is surrounded with peculiar difficulties. The independent character of English law has prevented an attempt to do what has already been done for other systems which have the basis of the Roman law to fall back upon.

The most celebrated modern code is the French. The necessity of a code in France was mainly caused by the immense number of separate systems of jurisprudence existing in that country before 1789, justifying Voltaire's sarcasm that a traveller in France had to change laws about as often as he changed horses. At first published under the title of *Code Civil des Français*, it was afterwards entitled the *Code Napoléon (q.v.)*—the emperor Napoleon wishing to attach his name to a work which he regarded as the greatest glory of his reign. The code, it has been said, is the product of Roman and customary law, together with the ordinances of the kings and the laws of the Revolution. In form it has passed through several changes caused by the political vicissitudes of the country, and it has of course suffered from time to time important alterations in substance, but it still remains virtually the same in principle as it left the hands of its framers. The code has produced a vast number of commentaries, among which may be named those of A. Duranton, R. T. Troplong and J. C. F. Demolombe. The remaining French codes are the *Code de procédure civile*, the *Code de commerce*, the *Code d'instruction criminelle* and the *Code pénal*. The merits of the French code have entered into the discussion on the general question of codification. Austin agrees with Savigny in condemning the ignorance and haste with which it was compiled. "It contains," says Austin, "no definitions of technical terms (even the most leading), no exposition of the *rationale* of distinctions (even the most leading), no exposition of the broad principles and rules to which the narrower provisions expressed in the code are subordinate; hence its fallacious brevity." Codes modelled on the French code have, however, taken firm root in most of the countries of continental Europe and in other parts of the world as well, such as Latin America and several of the British colonies.

The Prussian code (*Code Frédéric*) was published by Frederick the Great in 1751. It was intended to take the place of "Roman, common Saxon and other foreign subsidiary laws and statutes," the provincial laws remaining in force as before. One of the objects of the king was to destroy the power of the advocates, whom he hoped to render useless. This, with other systems of law existing in Germany, has been replaced by the Civil Code of 1900 (see [GERMANY](#)).

The object of all these codes has been to frame a common system to take the place of several systems of law, rather than to restate in an exact and exhaustive form the whole laws of a nation, which is the problem of English codification. The French and Prussian codes, although they have been of great service in simplifying the law, have failed to prevent outside themselves that accumulation of judiciary and statute law which in England has been the chief motive for codification. A more exact parallel to the English problem may be found in the *Code of the State of New York*. The revised constitution of the state, as adopted in 1846, "ordered the appointment of two commissions, one to reduce into a written and a systematic code the whole body of the law of the state, and the other to revise, reform, simplify and abridge the rules and practice, pleadings, &c., of the courts of record." By an act of 1847, the state legislature declared that the body of substantive law should be contained in three codes—the Political, the Civil and the Penal. The works of both commissions, completed in 1865, filled six volumes, containing the Code of Civil Procedure (including the law of evidence), the Book of Forms, the Code of Criminal Procedure, the Political Code, the Penal Code and the Civil Code. In the introduction to the Civil Code it was claimed that in many departments of the law the codes "provided for every possible case, so that when a new case arises it is better that it should be provided for by new legislation." The New York code was defective in the important points of definition and arrangement. It formed the basis, however, of the present codes of civil and criminal procedure in the state of New York. Much interest has attached to the Penal Code drawn up by Edward Livingston (*q.v.*) for the state of Louisiana. The system consists of a Code of Crime and Punishments, a Code of Procedure, a Code of Evidence, a Code of Reform and Prison Discipline, and a Book of Definitions. "Though the state for which the codes were prepared," said Chief Justice Chase, "neglected to avail itself of the labours assigned and solicited by itself, they have proved, together with their introductions, a treasure of suggestions to which many states are indebted for useful legislation." Most of the other states in the United States have codes stating the law of pleading in civil actions, and such states are often described as code states to distinguish them from those adhering to the older forms of action, divided between those at law and those at equity. A few states have general codes of political and civil rights.



The general drift of legislation and of public sentiment in the United States is towards the extension of the principle of codification, but the contrary view has been ably maintained (see J. C. Carter, *Provinces of the Written and the Unwritten Law*, New York, 1889).

Since the time of Bentham, the codification of the law of England has been the dream of the most enlightened jurists and statesmen. In the interval between Bentham and our own time there has been an immense advance in the scientific study of law, but it may be doubted whether the problem of codification is at all nearer solution. Interest has mainly been directed to the historical side of legal science, to the phenomena of the evolution of laws as part of the development of society, and from this point of view the question of remodelling the law is one of minor interest. To Bentham the problem presented itself in the simplest and most direct form possible. What he proposed to do was to set forth a body of laws, clearly expressed, arranged in the order of their logical connexion, exhibiting their own *rationale* and excluding all other law. On the other hand the problem has in some respects become easier since the time of Bentham. With the Benthamite codification the conception of reform in the substantive law is more or less mixed up. If codification had been possible in his day, it would, unless it had been accompanied by the searching reforms which have been effected since, and mainly through his influence, perhaps have been more of an evil than a good. The mere dread that, under the guise of codification or improvement in form, some change in substance may secretly be effected has long been a practical obstacle in the way of legal reform. But the law has now been brought into a state of which it may be said that, if it is not the best in all respects that might be desired, it is at least in most respects as good as the conditions of legislation will permit it to be. Codification, in fact, may now be treated purely as a question of form. What is proposed is that the law, being, as we assume, in substance what the nation wishes it to be, should be made as accessible as possible, and as intelligible as possible. These two essential conditions of a sound system of law are, we need hardly say, far from being fulfilled in England. The law of the land is embodied in thousands of statutes and tens of thousands of reports. It is expressed in language which has never been fixed by a controlling authority, and which has swayed about with every change of time, place and circumstance. It has no definitions, no rational distinctions, no connexion of parts. Until the passing of the Judicature Act of 1873 it was pervaded throughout its entire sphere by the flagrant antinomy of law and equity, and that act has only ordered, not executed, its consolidation. No lawyer pretends to know more than a fragment of it. Few practical questions can be answered by a lawyer without a search into numberless acts of parliament and reported cases. To laymen, of course, the whole law is a sealed book. As there are no authoritative general principles, it happens that the few legal maxims known to the public, being apprehended out of relation to their authorities, are as often likely to be wrong as to be right. It is hopeless to think of making it possible for every man to be his own lawyer, but we can at least try to make it possible for a lawyer to know the whole law. The earlier advocates of codification founded their case mainly on the evils of judiciary law, *i.e.* the law contained in the reported decisions of the judges. Bentham's bitter antipathy to judicial legislation is well known. Austin's thirty-ninth lecture (*Lectures*, ed. 1869) contains an exhaustive criticism of the tenable objections to judiciary law. All such law is embedded in decisions on particular cases, from which it must be extracted by a tedious and difficult process of induction. Being created for particular cases it is necessarily uncomprehensive, imperfect, uncertain and bulky. These are evils which are incident to the nature of judiciary laws. The defective form of the existing statute law, moreover, has also given rise to loud complaints. Year by year the mass of legislation grows larger, and as long as the basis of a system is judiciary law, it is impossible that the new statutes can be completely integrated therewith. The mode of framing acts of parliament, and especially the practice of legislating by reference to previous acts, likewise produce much uncertainty and disorder. Some progress has, however, been made by the passing from time to time of various acts codifying branches of law, such as the Bills of Exchange Act 1882, the Partnership Act 1890, the Trusts Act 1893, and the Interpretation Act 1889.

The Statute Law Revision Committee also perform a useful work in excising dead law from the statute-book, partly by repeal of obsolete and spent acts and parts of acts, and partly by pruning redundant preambles and words. The construction of a section of an act may depend on the preamble and the context, and the repeal of the preamble and certain parts of the act may therefore affect the construction of what is left. This is provided for by a clause which is said to have been settled by Lord Westbury. It provides (in effect) that the repeal of any words or expressions of enactment shall not affect the construction of any statute or part of a statute. The lawyer, therefore, cannot rely on the revised edition of the statutes alone, and it is still necessary for him to consult the complete act as it was originally enacted.

The process of gradual codification adopted in India has been recommended for imitation in England by those who have had some experience of its working. The first of the Indian codes was the Penal Code (see [CRIMINAL LAW](#)), and there are also codes of civil and criminal procedure.

Whether any attempt will ever be made to supersede this vast and unarranged mass by a complete code seems very doubtful. Writers on codification have for the most part insisted that the work should be undertaken as a whole, and that the parts should have relation to some general scheme of the law which should be settled first. The practical difficulties in the way of an undertaking so stupendous as the codification *uno coëtu* of the whole mass of the law hardly require to be stated.

In discussions on codification two difficulties are insisted on by its opponents, which have some practical interest—(1) What is to be done in those cases for which the code has not provided? and (2) How is new law to be incorporated with the code? The objection that a code will hamper the opinions of the court, destroy the flexibility and elasticity of the common law, &c., disappears when it is stated in the form of a proposition, that law codified will cover a smaller number of cases, or will be less easily adapted to new cases, than law uncodified. The French system ordered the judges, under a penalty, to give a decision on all cases, whether contemplated or not by the code, and referred them generally to the following sources:—(1) Équité naturelle, loi naturelle; (2) loi romain; (3) loi coutumier; (4) usages, exemples, jugements, jurisprudence; (5) droit commun; (6) principes généraux, maximes, doctrine, science. The Prussian code, on the other hand, required the judges to report new cases to the head of the judicial department, and they were decided by the legislative commission. No provision was made in either case for incorporating the new law with the code, an omission which Austin justly considers fatal to the usefulness of codification. It is absurd to suppose that any code can remain long without requiring substantial alteration. Cases will arise when its meaning must be extended and modified by judges, and every year will produce its quota of new legislation by the state. The courts should be left to interpret a code as they now interpret statutes, and provision should be made for the continual revision of the code, so that the new law created by judges or directly by the state may from time to time be worked into the code.

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1 The most ancient code known, that of Khammurabi, is dealt with in the article [BABYLONIAN LAW](#).

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**CODE NAPOLÉON**, the first code of the French civil law, known at first as the *Code civil des Français*, was promulgated in its entirety by a law of the 30th Ventose in the year XII. (31st of March 1804). On the 3rd of September 1807 it received the official name of Code Napoléon, although the part that Napoleon took in framing it was not very important. A law of 1818 restored to it its former name, but a decree of the 27th of March 1852 re-established the title of Code Napoléon. Since the 4th of September 1870 the laws have quoted it only under the name of the Code Civil.

Never has a work of legislation been more national in the exact sense of the word. Desired for centuries by the France of the *ancien régime*, and demanded by the *cahiers* of 1789, this "code of civil laws common to the whole realm" was promised by the constitution of 1791. However, the two first assemblies of the Revolution were able to prepare only a few fragments of it. The preparation of a coherent plan began with the Convention. The *ancien régime* had collected and adjusted some of the material. There was, on the one hand, a vast juridical literature which by eliminating differences of detail, had disengaged from the various French "customs" the essential part which they had in common, under the name of "common customary law"; on the other hand, the Roman law current in France had in like manner undergone a process of simplification in numerous works, the chief of which was that of Domat; while certain parts had already been codified in the *Grandes Ordonnances*, which were the work of d'Aguesseau. This legacy from the past, which it was desired to preserve within reason, had to be combined and blended with the laws of the Revolution, which had wrought radical reforms in the conditions affecting the individual, the tenure of real property, the order of inheritance and the system of mortgages. Cambacérès, as the representative of a commission of the Convention, brought forward two successive schemes for the Code Civil. As a member of one of the councils, he drew up a third under the

Directory, and these projected forms came in turn nearer and nearer to what was to be the ultimate form of the code. So great was the interest centred in this work, that the law of the 19th Brumaire, year VIII., which, in ratification of the previous day's *coup d'état* nominated provisional consuls and two legislative commissions, gave injunctions to the latter to draw up a scheme for the Code Civil. This was done in part by one of the members, Jacqueminot, and finally under the constitution of the year VIII., the completion of the work was taken in hand. The legislative machinery established by this constitution, defective as it was in other respects, was eminently suited for this task. Indeed, all projected laws emanated from the government and were prepared by the newly established council of state, which was so well recruited that it easily furnished qualified men, mostly veterans of the revolution, to prepare the final scheme. The council of state naturally possessed in its legislative section and its general assembly bodies both competent and sufficiently limited to discuss the texts efficiently. The *corps législatif* had not the right of amendment, so could not disturb the harmony of the scheme. It was in the discussions of the general assembly of the council of state that Napoleon took part, in 97 cases out of 102 in the capacity of chairman, but, interesting as his observations occasionally are, he cannot be considered as a serious collaborator in this great work.

Those responsible for the scheme have in the main been very successful in their work; they have generally succeeded in fusing the two elements which they had to deal with, namely ancient French law, and that of the Revolution. The point in which their work is comparatively weak is the system of hypothec (*q.v.*), because they did not succeed in steering a middle course between two opposite systems, and the law of the 23rd of March 1855 (*sur la transcription en matière hypothécaire*) was necessary to make good the deficiency. A fault frequently found with the Code Civil is that its general divisions show a lack of logic and method, but the division is practically that of the Institutes of Justinian, and is about as good as any other: persons, things, inheritance, contracts and obligations, and finally, in place of actions, which have no importance for French law except from the point of view of procedure, privileges and hypothecs, as in the ancient *coutumes* of France, and prescription. It is, *mutatis mutandis*, practically the same division as that of Blackstone's Commentaries.

Of late years other objections have been expressed; serious omissions have been pointed out in the Code; it has not given to personal property the importance which it has acquired in the course of the 19th century; it makes no provision for dealing with the legal relations between employers and employed which modern complex undertakings involve; it does not treat of life insurance, &c. But this only proves that it could not foretell the future, for most of these questions are concerned with economic phenomena and social relations which did not exist at the time when it was framed. The Code needed revising and completing, and this was carried out by degrees by means of numerous important laws. In 1904, after the celebration of the centenary of the Code Civil, an extra-parliamentary commission was nominated to prepare a revision of it, and at once began the work.

The influence of the Code Civil has been very great, not only in France but also abroad. Belgium has preserved it, and the Rhine provinces only ceased to be subject to it on the promulgation of the civil code of the German empire. Its ascendancy has been due chiefly to the clearness of its provisions, and to the spirit of equity and equality which inspires them. Numerous more recent codes have also taken it as a model: the Dutch code, the Italian, and the code of Portugal; and, more remotely, the Spanish code, and those of the Central and South American republics. In the present day it is rivalled by the German civil code, which, having been drawn up at the end of the 19th century, naturally does not show the same lacunae or omissions. It is inspired, however, by a very different spirit, and the French code does not suffer altogether by comparison with it either in substance or in form.

See *Le Code Civil, livre du centenaire* (Paris, 1904), a collection of essays by French and foreign lawyers.

(J. P. E.)

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**CODIAEUM**, a small genus of plants belonging to the natural order Euphorbiaceae. One species, *C. variegatum*, a native of Polynesia, is cultivated in greenhouses, under the name of croton, for the sake of its leaves, which are generally variegated with yellow, and are

often twisted or have the blades separated into distinct portions.

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**CODICIL** (Lat. *codicillus*, a little book or tablet, diminutive of *codex*), a supplement to a will (*q.v.*), containing anything which a testator desires to add, or which he wishes to retract, to explain or to alter. In English law a codicil requires to be executed with the same formalities as a will under the Wills Act 1837.

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**CODILLA**, the name given to the broken fibres which are separated from the flax during the scutching process. On this account it is sometimes termed scutching tow. Quantities of this material are used along with heckled tow in the production of tow yarns.

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**CODINUS, GEORGE** [GEORGIOS KODINOS], the reputed author of three extant works in Byzantine literature. Their attribution to him is merely a matter of convenience, two of them being anonymous in the MSS. Of Codinus himself nothing is known; it is supposed that he lived towards the end of the 15th century. The works referred to are the following:—

1. *Patria* (Τὰ Πάτρια τῆς Κωνσταντινουπόλεως), treating of the history, topography, and monuments of Constantinople. It is divided into five sections: (*a*) the foundation of the city; (*b*) its situation, limits and topography; (*c*) its statues, works of art, and other notable sights; (*d*) its buildings; (*e*) the construction of the church of St Sophia. It was written in the reign of Basil II. (976-1025), revised and rearranged under Alexius I. Comnenus (1081-1118), and perhaps copied by Codinus, whose name it bears in some (later) MSS. The chief sources are: the *Patria* of Hesychius Illustrius of Miletus, an anonymous (*c.* 750) brief chronological record (Παραστάσεις σύντομοι χρονικά), and an anonymous account (διήγησις) of St Sophia (ed. T. Preger in *Scriptores originum Constantinopolitanarum*, fasc. i., 1901, to be followed by the *Patria* of Codinus). Procopius, *De Aedificiis* and the poem of Paulus Silentarius on the dedication of St Sophia should be read in connexion with this subject.

2. *De Officiis* (Περὶ τῶν Ὀφφικίων), a sketch, written in an unattractive style, of court and higher ecclesiastical dignities and of the ceremonies proper to different occasions. It should be compared with the *De Cerimoniis* of Constantine Porphyrogenitus.

3. A chronological outline of events from the beginning of the world to the taking of Constantinople by the Turks (called Agarenes in the MS. title). It is of little value.

Complete editions are (by I. Bekker) in the Bonn *Corpus scriptorum Hist. Byz.* (1839-1843, where, however, some sections of the *Patria* are omitted), and in J. P. Migne, *Patrologia graeca*, clvii.; see also C. Krumbacher, *Geschichte der byzantinischen Litteratur* (1897).

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**COD-LIVER OIL** (*Oleum Morrhae*, or *Oleum Jecoris Aselli*), the oil obtained from the liver of the common cod (*Gadus morrhua*). In the early process for extracting the oil the livers were allowed to putrefy in wooden tubs, when oils of two qualities, one called "pale oil," and the other "light brown oil," successively rose to the surface and were drawn off. A third oil was obtained by heating the liver-residues to above the boiling-point of water, whereupon a black product, technically called "brown oil," separated. The modern practice consists in heating the perfectly fresh, cleaned livers by steam to a temperature above that

of boiling water, or, in more recent practice, to a lower temperature, the livers being kept as far as possible from contact with air. The oils so obtained are termed "steamed-liver oils." The "pale" and "light brown" oils are used in pharmacy; the "brown" oil, the cod oil of commerce, being obtained from putrid and decomposing livers, has an objectionable taste and odour and is largely employed by tanners. By boiling the livers at a somewhat high temperature, "unracked" cod oil is obtained, containing a considerable quantity of "stearine"; this fat, which separates on cooling, is sold as "fish stearine" for soap-making, or as "fish-tallow" for currying. The oil when freed from the stearine is known as "racked oil." "Coast cod oil" is the commercial name for the oil obtained from the livers of various kinds of fish, *e.g.* hake, ling, haddock, &c. The most important centres of the cod-liver oil industry are Lofoten and Romsdal in Norway; the oil is also prepared in the United States, Canada, Newfoundland, Iceland and Russia; and at one time a considerable quantity was prepared in the Shetland Islands and along the east coast of Scotland.

Cod-liver oil contains palmitin, stearin and other more complex glycerides; the "stearine" mentioned above, however, contains very little palmitin and stearin. Several other acids have been identified: P. M. Meyer Dahl obtained 4% of palmitic acid, 20% of jecoleic acid,  $C_{19}H_{36}O_2$ , and 20% of therapeutic acid,  $C_{17}H_{26}O_2$ ; other investigators have recognized jecoric acid,  $C_{18}H_{30}O_2$ , asellic acid,  $C_{17}H_{32}O_2$ , and physetoleic acid,  $C_{16}H_{30}O_2$ , but some uncertainty attends these last three acids. Therapeutic and jecoleic acids apparently do not occur elsewhere in the animal kingdom, and it is probable that the therapeutic properties of the oil are associated with the presence of these acids, and not with the small amount of iodine present as was at one time supposed. Other constituents are cholesterol (0.46-1.32%), traces of calcium, magnesium, sodium, chlorine and bromine, and various aliphatic amines which are really secondary products, being formed by the decomposition of the cellular tissue.

Cod-liver oil is used externally in medicine when its internal administration is rendered impossible by idiosyncrasy or the state of the patient's digestion. The oil is very readily absorbed from the skin and exerts all its therapeutic actions when thus exhibited. This method is often resorted to in the case of infants or young children suffering from abdominal or other forms of tuberculosis. Its only objection is the odour which the patient exhales. When taken by the mouth, cod-liver oil shares with other liver-oils the property of ready absorption. It often causes unpleasant symptoms, which must always be dealt with and not disregarded, more harm than good being done if this course is not followed. Fortunately a tolerance is soon established in the majority of cases. It has been experimentally proved that this is more readily absorbed than any other oil—including other liver-oils. Much attention has been paid to the explanation of this fact, since knowledge on this point might enable an artificial product, without the disadvantages of this oil, to be substituted for it. Very good results have been obtained from a preparation named "lipanin," which consists of six parts of oleic acid and ninety-four of pure olein. Cod-liver oil has the further peculiarity of being more readily oxidizable than any other oil; an obviously valuable property when it is remembered that the entire food-value of oils depends on their oxidation.

Cod-liver oil may be given in all wasting diseases, and is occasionally valuable in cases of chronic rheumatoid arthritis; but its great therapeutic value is in cases of tuberculosis of whatever kind, and notably in pulmonary tuberculosis or consumption. Its reputation in this is quite inexpugnable. It is essential to remember that "in phthisis the key of the situation is the state of the alimentary tract," and the utmost care must be taken to obviate the nausea, loss of appetite and diarrhoea, only too easily induced by this oil. It is best to begin with only one dose in the twenty-four hours, to be taken just before going to sleep, so that the patient is saved its unpleasant "repetition" from an unaccustomed stomach. In general, it is therefore wise to order a double dose at bedtime. The oil may be given in capsules, or in the form of an emulsion, with or without malt-extract, or success may be obtained by adding, to every two drachms of the oil, ten minims of pure ether and a drop of peppermint oil. The usual dose, at starting, is one or two drachms, but the oil should be given eventually in the largest quantities that the patient can tolerate.

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**CODRINGTON, CHRISTOPHER** (1668-1710), British soldier and colonial governor, whose father was captain-general of the Leeward Isles, was born in the island of Barbados, West Indies, in 1668. Educated at Christ Church, Oxford, he was elected a fellow of All Souls, and subsequently served with the British forces in Flanders, being rewarded in 1695

with a captaincy in the Guards. In the same year he attended King William III. on his visit to Oxford, and, in the absence of the public orator, was chosen to deliver the University oration. In 1697, on the death of his father, he was appointed captain-general and commander-in-chief of the Leeward Isles. In 1703 he commanded the unsuccessful British expedition against Guadeloupe. After this he resigned his governorship, and spent the rest of his life in retirement and study on his Barbados estates. He died on the 7th of April 1710, bequeathing these estates to the Society for the Propagation of the Gospel in Foreign Parts for the foundation of a college in Barbados. This college, known as the Codrington college, was built in 1714-1742. To All Souls College, Oxford, he bequeathed books worth £6000 and £10,000 in money, out of which was built and endowed the Codrington library there.

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**CODRINGTON, SIR EDWARD** (1770-1851), British admiral, belonged to a family long settled at Dodington in Gloucestershire. He was the youngest of three brothers, who were left orphans at an early age, and were educated by an uncle, Mr Bethell. Edward Codrington was sent for a short time to Harrow, and entered the navy in July 1783. He served on the American station, in the Mediterranean and at home, till he was promoted lieutenant on the 28th of May 1783. Lord Howe selected him to be signal lieutenant on the flagship of the Channel fleet at the beginning of the revolutionary war with France. In that capacity he served in the "Queen Charlotte" (100) during the operations which culminated in the battle of the 1st of June 1794. The notes he wrote on Barrow's account of the battle in his *Life of Howe*, and the reminiscences he dictated to his daughter, which are to be found in her memoir of him, are of great value for the history of the action. On the 7th of October 1794 he was promoted commander, and on the 6th of April 1795 attained the rank of post-captain and the command of the "Babet" (22). He continued to serve in the Channel, and was present at the action off L'Orient on the 23rd of June 1795. Codrington wrote notes on this encounter also, which are to be found in the memoir. They are able and valuable, but, like all his correspondence throughout his life, show that he was of a somewhat censorious disposition, was apt to take the worst view of the conduct of others, and was liable to be querulous. He next commanded the "Druid" (32) in the Channel and on the coast of Portugal, till she was paid off in 1797. Codrington now remained on shore and on half-pay for some years. In December 1802 he married Jane, daughter of Jasper Hall of Kingston, Jamaica.

On the renewal of the war after the breach of the peace of Amiens he was appointed (May 1805) to the command of the "Orion" (74) and was attached to the fleet on the coast of Spain, then blockading Villeneuve in Cadiz. The "Orion" took a conspicuous part in the battle of Trafalgar. Codrington's correspondence contains much illuminative evidence as to the preliminaries and the events of the victory. From 1805 till 1813 he continued to serve first in the "Orion" and then (1808) in the "Blake" (74) in European waters. He was present on the Walcheren expedition, and was very actively employed on the Mediterranean coast of Spain in co-operating with the Spaniards against the French. In 1814 he was promoted rear-admiral, at which time he was serving on the coast of North America as captain of the fleet to Sir Alexander Cochrane during the operations against Washington, Baltimore and New Orleans. In 1815 he was made K.C.B., and was promoted vice-admiral on the 10th of July 1821. In December 1826 he was appointed to the Mediterranean command, and sailed on the 1st of February 1827. From that date until his recall on the 21st of June 1828 he was engaged in the arduous duties imposed on him by the Greek War of Independence, which had led to anarchy and much piracy in the Levant. On the 20th of October 1827 he destroyed the Turkish and Egyptian naval forces at Navarino (*q.v.*), while in command of a combined British, French and Russian fleet. As the battle had been unforeseen in England, and its result was unwelcome to the ministry of the day, Codrington was entangled in a correspondence to prove that he had not gone beyond his instructions, and he was recalled by a despatch, dated the 4th of June.

After the battle Codrington went to Malta to refit his ships. He remained there till May 1828, when he sailed to join his French and Russian colleagues on the coast of the Morea. They endeavoured to enforce the evacuation of the peninsula by Ibrahim peacefully. The Pasha made diplomatic difficulties, and on the 25th of July the three admirals agreed that Codrington should go to Alexandria to obtain Ibrahim's recall by his father Mehemet Ali. Codrington had heard on the 22nd of June of his own supersession, but, as his successor had

not arrived, he carried out the arrangement made on the 25th of July, and his presence at Alexandria led to the treaty of the 6th of August 1828, by which the evacuation of the Morea was settled. His services were recognized by the grant of the grand cross of the Bath, but there is no doubt that he was treated as a scape-goat at least to some extent. After his return home he was occupied for a time in defending himself, and then in leisure abroad. He commanded a training squadron in the Channel in 1831 and became admiral on the 10th of January 1837. From November 1839 to December 1842 he was commander-in-chief at Portsmouth. He died on the 28th of April 1851.

Sir Edward Codrington left two sons, Sir William (1804-1884), a soldier who commanded in the Crimea, and Sir John Henry (1808-1877), a naval officer, who died an admiral of the fleet.

See *Memoir of the Life of Admiral Sir Edward Codrington*, by his daughter Jane, Lady Bouchier, wife of Sir T. Bouchier, R.N. (London, 1873).

(D. H.)

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**CODRUS**, in Greek legend, the last king of Athens. According to the story, it was prophesied at the time of the Dorian invasion of Peloponnesus (*c.* 1068 B.C.) that only the death of their king at the enemy's hands could ensure victory to the Athenians. Devoting himself to his country, Codrus, in the disguise of a peasant, made his way into the enemy's camp, and provoked a quarrel with some Dorian soldiers. He fell, and the Dorians, on discovering that Codrus had been slain, retreated homeward, despairing of success. No one being thought worthy to succeed Codrus, the title of king was abolished, and that of archon (*q.v.*) substituted for it.

See Lycurgus, *Leocr.* xx. [=84-87]; Justin ii. 6; Vell. Pat. i. 2; Grote, *Hist. of Greece*, pt. i. ch. 18; Busolt, *Griechische Geschichte*, i.

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**CODY, WILLIAM FREDERICK** (1846- ), American scout and showman, known under the name of "Buffalo Bill," was born in 1846 in Scott county, Iowa. He first became known as one of the riders of the "Pony Express," a mail service established in the spring of 1860 by the Central Overland California and Pike's Peak Express Company to carry the mails overland from Saint Joseph, Missouri, to Sacramento, California, a distance of 1950 m., by means of relays of ponies, each rider being expected to cover about 75 m. daily. Owing to the wildness of the country and the hostility of the Indians, both the riders and the station-keepers led lives of great hardship and danger. The "Pony Express" was discontinued in 1861 upon the completion of the Pacific Telegraph company's line, and young Cody became a scout and guide for the United States army. In 1863 he formally enlisted in the 7th regiment of Kansas cavalry, in which he served until the close of the Civil War. In 1867 he made a contract with the Kansas Pacific railway to furnish its employees with buffalo meat while the line was being extended through the wilderness, and his name of "Buffalo Bill" was given him from this circumstance. In 1868-1872 he was again an army scout and guide, serving against the Sioux and Cheyennes; and in 1872 was a member of the Nebraska house of representatives. During the Sioux-Cheyenne War of 1876 he served in the 5th United States Cavalry, and at the battle of Indian Creek killed the Cheyenne chief Yellow Hand in single combat. In 1883 he organized his "Wild West Show," a spectacular performance on a large scale, his first European tour taking place in 1887. In the Nebraska national guard he again served against the Sioux in 1890-1891.

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**CO-EDUCATION**, the term applied to the instruction and training of boys and girls, or of

young people of both sexes, in the same school or institution, in the same classes and through the same courses of study. Examples of the thoroughgoing application of this principle can be found in every grade of education from the elementary school to the university. But the term "Co-education" is sometimes used in a wider sense, in order to include cases in which boys and girls, or young men and young women of university age, are admitted to membership of the same school or college but receive instruction wholly or in part in separate classes and in different subjects. Other variable factors in co-educational systems are the extent to which men and women are mixed on the teaching staff, and the freedom of intercourse permitted between pupils of the two sexes in class, in games and in other activities of school life. In another form of combined education (preferred by Comte, *Système de politique positive*, iv. 266), pupils of the two sexes are taught successively by the same teacher. By the English Board of Education, a distinction is drawn between mixed schools and dual schools. "Mixed schools" are those in which, for most subjects of the curriculum, boys and girls are taught together by the same teachers: in "dual schools" there are separate boys' and girls' departments under a single principal, but with separate entrances, classrooms and playgrounds for the two sexes.

*History.*—Co-education in early times was occasional and sporadic. For example, women were admitted by Plato to the inner circle of the Academy on terms of equality with men. The educational endowments of Teos provided that the professors of literature should teach both boys and girls. It is uncertain whether the Roman schools in classical times were attended by both sexes. A tombstone found at Capua represents a schoolmaster with a boy on one side and a girl on the other. Probably co-education was practised in country districts for economical reasons; and also in the home schools organized by wealthier families (Wilkins, *Roman Education*, pp. 42-43). At Charles the Great's Palace School at Aachen (A.D. 782 onwards), Alcuin taught together the young princes and their sisters, as well as grown men and women. The Humanists of the Renaissance made the full development of personality a chief aim of education, and held up literary accomplishment as a desirable mark of personal distinction both for men and women. This led to the scholarly education of girls along with boys in the home schools of some great families. Thus, at Mantua (1423 onwards), Vittorino da Feltre taught Cecilia Gonzaga with her brothers and the other boy pupils at his boarding-school; but there is no evidence that the latter was otherwise co-educational. Luther and other Reformers urged that girls as well as boys should be taught to read the Bible. Hence came the tendency to co-education of boys and girls in some elementary schools in Protestant lands. This tendency can be traced both in Scotland and in the northern parts of England. It is believed that, in the early days of New England, district schools in smaller American towns were open to boys and girls alike, but that few girls advanced beyond reading and writing (Martin, *Massachusetts Public School System*, p. 130). At Dorchester, Mass., it was left to the discretion of the elders and schoolmen whether maids should be taught with the boys or not; but in practice the girls seem to have been educated apart. In 1602 the council of Ayr, Scotland, ordained that the girls who were learning to read and write at the Grammar School should be sent to the master of the Song School, "because it is not seemly that sic lasses should be among the lads" (Grant, *History of the Burgh and Parish Schools of Scotland*, p. 526 ff.). Meriden, Connecticut, seems to have made common provision for the elementary education of boys and girls in 1678. Northampton, Mass., did the same in 1680. Deerfield, Mass., in 1698 voted that "all families having children either male or female between the ages of six and ten years shall pay by the poll for their schooling"—presumably in the common school.

Thus the beginnings of co-education in its modern organized form may be traced back partly to Scotland and partly to the United States. The co-education of boys and girls, carried through in varying degrees of completeness, was not uncommon in the old Endowed Schools of Scotland, and became more frequent as increasing attention was given to the education of girls. At the Dollar Institution, founded by John McNabb for the benefit of the poor of the parish of Dollar and shire of Clackmannan (date of will, 1800), boys and girls have been educated together in certain classes since the beginning of the school in 1818. In the eastern parts of the United States, where the Puritan tradition also prevailed, co-education struck firm root, and spread chiefly for reasons of convenience and economy (Dexter, *History of Education in United States*, p. 430). But throughout the west, co-education was strongly preferred in elementary and secondary schools and in universities on the further ground that it was believed to be more in accordance with the democratic principle of equal educational opportunity for the two sexes.

It should be added, however, that the leaven of Pestalozzi's thought has worked powerfully both in Europe and America in favour of the idea of co-education. His view was that all educational institutions should, as far as possible, be modelled upon the analogy of the



family and of the home. At Stanz (1798-1799) he educated together in one household boys and girls ranging in age from five to fifteen. At Burgdorf (1799-1804) his work was in part co-educational. At Yverdon (1804-1825) Pestalozzi established a school for girls close to his school for boys. The girls received instruction from some of the masters of the boys' school, and girls and boys met at evening worship, in short excursions and at other times.

In England, the Society of Friends have been the pioneers of co-education in boarding schools, both for younger children and for pupils up to fifteen or sixteen years of age. The practice of the society, though not exclusively co-educational, has long been favourable to co-education, either in its complete or restricted form, as being more in harmony with the conditions of family life. Ackworth school was established by the London Yearly Meeting in 1779 for the education of boys and girls; but the school has never been fully co-educational, the boys and girls being taught separately except in a few classes. At Sidcot school, which was founded in 1808 by the Associated Quarterly Meetings in the west of England for the education of children of Friends, boys and girls are taught together, except in certain handicraft subjects. Several other co-educational schools were founded by the Society of Friends during the first half of the 19th century.

Since that time the movement towards co-education in secondary schools and universities has steadily gained strength in England. It has been furthered by the diffusion of Pestalozzian ideas and also by the influence of American example. In England, private schools have made some of the most valuable co-educational experiments. A private boarding and day secondary school on co-educational lines was instituted by Mr W. A. Case in Hampstead in 1865. A co-educational boarding-school was founded in 1869 by Miss Lushington at Kingsley near Alton, Hants. In 1873 Mr W. H. Herford began the Ladybarn school for boys and girls at Withington in the suburbs of Manchester. The passing of the Welsh Intermediate Education Act 1889 led to the establishment of a considerable number of new mixed or dual secondary day-schools in Wales. Many English teachers gained experience in these schools and subsequently influenced English education. The work and writings of Mr J. H. Badley at Bedales, Petersfield, a co-educational boarding-school of the first grade, gave greatly increased weight to the principle of co-education. Important additions have also been made to the fund of co-educational experience by the King Alfred's school (Hampstead), Keswick school, and West Heath school (Hampstead). In 1907 a Public Co-educational Boarding School was opened at Harpenden.

Since the Education Act 1902 became law, there has been a rapid increase of co-educational secondary day-schools of the lower grade, under county or borough education authorities, in all parts of England. This increase is due to two chief causes, viz. (1) The co-educational tradition of some of the higher grade board schools, many of which have become secondary schools; and (2) the economy effected by establishing one co-educational secondary school, in place of two smaller schools for boys and girls separately.

The idea of co-education in secondary schools has spread in several other European countries, especially in Holland, Norway, Sweden and Denmark. In Scandinavia, the new practice appears to have begun with the establishment of a private higher secondary school, the Palmgremiska Samskolan, in Stockholm, in 1876. A similar school, Nya Svenska Läroverket, was founded upon the same model in Helsingfors, Finland, in 1880. In Norway, the law of 1896 introduced co-education in all state schools. In Denmark, as in Norway, co-education was begun in private schools; on its proving a success there, it was introduced into the state schools, with two exceptions; and it is now obligatory in most state schools but optional in private schools (J. S. Thornton, *Schools Public and Private in the North of Europe*, 1907, p. 97). In Holland, there is now a good deal of co-education in lower secondary schools of the modern type. For example, at Utrecht, the state higher burgher school provides the same course of instruction, except in gymnastics, for boys and girls. At Almelo, the municipal higher burgher school, though co-educational, differentiates the classes in several subjects. In Belgium, France, Germany and Austria, co-education, though frequent in elementary schools, is regarded as undesirable in secondary; but the movement in its favour in many parts of Germany seems to be gathering strength. All over Europe the Roman Catholic populations prefer the older ideal of separate schools for boys and girls.

Co-education in colleges and universities, which began at Oberlin, Ohio, in 1833, was adopted almost without exception by the state universities throughout the west of America from 1862 onwards. Since that time the idea has spread rapidly throughout Europe, and the presence of women students at universities originally confined to men is one of the most striking educational facts of the age.

*Co-education in the United Kingdom, (a) England and Wales.*—The Board of Education

does not possess any summary showing the number of pupils in mixed public elementary schools or in mixed departments of such schools. In 1901, out of 31,502 departments of public elementary schools in England and Wales, nearly half (15,504) were mixed departments, in which boys and girls were educated together. But as the departments were of unequal size, it must not be inferred from this that half the children in public elementary schools in that year (5,883,762) were receiving co-education. Of the total number of departments in public elementary schools in England and Wales, the percentage of mixed schools fell from 51.6 in 1881 to 49.4 in 1891 and 49.2 in 1901. But these percentages must not be taken to prove an absolute decline in the number of children in mixed departments.

In England, out of 492 public secondary schools which were recognized by the Board of Education for the receipt of government grant for the school year ending July 31, 1905, and which contained 85,358 pupils, 108 schools, with 21,720 pupils, were mixed; and 20 schools, with 8980 pupils, were dual schools.

Thus, of the total number of pupils in the secondary schools referred to above, a little over 25% were in mixed schools, and about 10% were in dual schools. It is not safe to assume, however, that all the mixed schools were completely co-educational in their work, or that the dual schools were not co-educational in respect of certain subjects or parts of the course. It should also be remembered that, besides the secondary schools recognized by the Board of Education for the receipt of government grant, there is a considerable number of great endowed secondary boarding-schools ("public schools" in the English use of that expression) which are for boys only. There are also at least 5000 private secondary schools, of which, in 1897 (since when no comprehensive statistical inquiry has been made), 970, with 26,027 pupils, were mixed schools. But the great majority of the children in these mixed schools were under twelve years of age. The number of boys and girls over twelve years of age, in the mixed private secondary schools which were included in the 1897 return, was only 5488.

In Wales, for the school year ending July 31, 1905, out of 84 state-aided public secondary schools, 11 were mixed and 44 were dual schools. The number of scholars in the Welsh schools referred to above was 9340. Of these, 1457, or 15%, were in mixed schools, and 5085, or 54%, were in dual schools. The managers of dual schools in Wales have the power to arrange that boys and girls shall be taught together in any or all the classes; and, as a matter of fact, nearly all the dual schools are worked as mixed schools, though they appear in these figures under dual.

*(b) Scotland.*—In the public elementary schools, including the higher grade schools of Scotland, co-education is the almost universal rule. The exceptions, which for the most part are Roman Catholic or Episcopal Church schools, tend to diminish year by year. In 1905, out of 3843 departments in the Scotch public elementary and higher grade schools, 3783 were mixed. These include the infant departments. Out of the total number of children in the public elementary and higher grade schools, including infants' departments, 98.43% were receiving co-education.

In the secondary schools of Scotland there has been in recent years little perceptible movement either towards co-education or away from it. What movement there is, favours the establishment of separate secondary schools for girls in the large centres of population. Out of 109 public secondary schools in Scotland in 1905-1906, 29 schools were for boys only and 40 schools for girls only. One school had boys and girls in separate departments. In the remaining 39 schools, boys and girls were taken together to an extent which varied with the subjects taken; but there was nothing of the nature of a strict separation of the sexes as regards the ordinary work of the school.

*(c) Ireland.*—In Ireland, the percentage of pupils on the rolls of mixed national schools (*i.e.* schools attended by boys and girls), to the total number of pupils on the rolls of all national schools, has slowly increased. In 1880 the percentage was 57.5; in 1898, 59.4; in 1905, 60.9.

The Commissioners of Intermediate Education in Ireland had on their list in 1906, 38 secondary schools which were classified by them as mixed schools. These schools were attended by 640 boys and 413 girls between 13 and 19 years of age. The commissioners do not know to what extent the boys and girls in these schools received instruction in the same classes. As, however, the schools are small, they believe that in the great majority of cases the boys and girls were taught together. In one large school not classified as mixed, the boys (117) and girls (60) were taught in the same classes.

*Universities and University Colleges in the United Kingdom.*—Women are admitted as members of the universities of London, Durham, Manchester, Liverpool, Birmingham, Leeds, Sheffield, Wales, Edinburgh, Aberdeen, St Andrews, Glasgow, Dublin and the Royal

University of Ireland. At Oxford and Cambridge women are not admitted as members of the university, but by courtesy enjoy entrance to practically all university lectures and examinations. The social life of the men and women students is more separate in the old than in the new universities. In no grade of education in the United Kingdom has the principle of co-education made more rapid advance than in the universities. The university education of women began in London (Queen's College 1848, Bedford College 1849, both being preceded by classes in earlier years). The University of London in 1878 decided to accept from the crown a supplemental charter making every degree, honour and prize awarded by the university accessible to students of both sexes on perfectly equal terms. By charter in 1880, the Victoria University (now broken up into the universities of Manchester, Liverpool and Leeds) received power to grant degrees to women as well as to men. The charter of the university of Wales (1893) provides that "Women shall be eligible equally with men for admittance to any degree which our university is authorized to confer; every office created in the university, and the membership of every authority constituted by the charter shall be open to women equally with men." In 1889 the Universities (Scotland) Act empowered the commissioners to make ordinances, enabling each university to admit women in graduation in one or more faculties and to provide for their instruction. At all the university colleges in the United Kingdom women are educated as well as men.

*United States.*—Co-education is a characteristic feature of the educational system of the different states of the American Union. Of elementary school pupils at least 96%, and of secondary school pupils 95%, are in mixed schools. In 1903, out of a total enrolment of 15,990,803 pupils in public elementary and secondary schools and training colleges, 15,387,734 were in schools attended by pupils of both sexes. Out of 550,600 pupils on the rolls of public secondary schools (high schools) in 1902, 523,300 were in co-educational schools. The same was true of 43% of the pupils (numbering over 100,000) in private secondary schools. In colleges and universities 62% of all undergraduates were in co-educational institutions, to which category thirty-four American universities belong (U.S. Commissioner of Education, *Report for 1903*, p. 2454). In America opinion is thus predominantly in favour of co-education, but there is a current of adverse criticism, especially among some who have had experience of school conditions in large cities.

*General Review of the Question.*—In schools for infants and younger children co-education is approved by all authorities. It is increasingly favoured on educational grounds in smaller schools for children up to 12 or 13 years of age or thereabouts. But where elementary schools have to be large, separate departments for boys and girls are generally preferable, though mixed schools are often established for reasons of economy. At the other end of the educational scale, viz. in the universities, the co-education of men and women in the same institution is fast becoming the rule. This is due partly to the prohibitive cost of duplicating teaching staff, laboratories, libraries and other equipment, partly to the desire of women to qualify themselves for professional life by passing through the same courses of training as are prescribed for men. The degree, however, to which social intercourse is carried on between men and women students differs widely in the different co-educational universities. There are occasional signs, *e.g.* at Chicago, of a reaction against the fullest form of academic co-education. And it is probable that the universities will provide, among many courses common to men and women, some (like engineering) suitable for men only, and others (like advanced instruction in home-science, or certain courses of professional preparation for teachers of young children) which will rarely be attended by any but women. Common use of the same university institutions is compatible with much differentiation in courses of study and with separately organized forms of collegiate life. It is with regard to the part of education which lies between the elementary schools and the universities that the sharpest division of opinion upon the principle of co-education now exists. In Europe, with the exception of Scandinavia, those who advocate co-education of the sexes in secondary schools up to 18 or 19 years of age are at present in a distinct minority, even as regards day schools, and still more when they propose to apply the same principle to boarding schools. But the application of the co-educational principle to all schools alike is favoured by an apparently increasing number of men and women. This movement in opinion is connected with the increase in the number of girls desiring access to secondary schools, a demand which can most easily and economically be met by granting to girls access to some of the existing schools for boys. The co-educational movement is also connected with a strong view of sex equality. It is furthered by the rapidly increasing number of women teachers who are available for higher educational work. Mixed secondary schools with mixed staffs are spreading for reasons of economy in smaller towns and rural districts. In large towns separate schools are usually recommended in preference, but much depends upon the social tradition of the neighbourhood. Those who advocate co-education for boys

and girls in secondary schools urge it mainly on the ground of its naturalness and closer conformity to the conditions of healthy, unselfconscious home life. They believe it to be a protective against uncleanness of talk and school immorality. They point to its convenience and economy. They welcome co-education as likely to bring with it a healthy radicalism in regard to the older tradition of studies in boys' secondary schools. They approve it as leading to mixed staffs of men and women teachers, and as the most effectual way of putting girls in a position of reasonable equality with boys in respect of intellectual and civic opportunity. On the other hand, those who oppose co-education in secondary schools rest their case upon the danger of the intellectual or physical overstrain of girls during adolescence; and upon the unequal rate of development of boys and girls during the secondary school period, the girls being more forward than the boys at first, but as a rule less able to work as hard at a somewhat later stage. The critics further complain that co-education is generally so organized that the girls' course of study is more or less assimilated to that of the boys, with the result that it cannot have the artistic and domestic character which is suitable for the majority of girls. Complaint is also made that the head of a co-educational school for pupils over the age of 10 is usually a man, though the health and character of girls need the care and control of a woman vested with complete authority and responsibility. While demurring to the view that co-education of the sexes would be a moral panacea, the critics of the system admit that the presence of the girls would exert a refining influence, but they believe that on the whole the boys are likely to gain less from co-education than the girls are likely to lose by it. In all these matters carefully recorded observation and experiment are needed, and it may well be found that co-education is best for some boys and for some girls, though not for all. Temperaments and dispositions differ. Some boys seem by nature more fitted for the kind of training generally given to girls; some girls are by nature fitted for the kind of training generally given to boys. The sex division does not mark off temperaments into two sharply contrasted groups. The introduction of girls into boys' secondary schools may remove or mitigate coarse traditions of speech and conduct where such persist. But it would be unfortunate if stiff and pedantic traditions of secondary education were now fixed upon girls instead of being reconsidered and modified in the interests of boys also. In any case, if co-education in secondary schools is to yield the benefits which some anticipate from it, great vigilance, careful selection of pupils and very liberal staffing will be necessary. Without these securities the results of co-education in secondary schools might be disappointing, disquieting or even disastrous.

BIBLIOGRAPHY.—Plato in the *Republic* (v. 452-456) and *Laws* (vii. 804-805) argues that women should share as far as possible in education with men. Mary Wollstonecraft, *A Vindication of the Rights of Women* (1792), contends that "both sexes ought, not only in private families but in public schools, to be educated together." J. G. Spurzheim, *Principles of Education*, pp. 272-288 (Edinburgh, 1821), replies to this argument. In the Board of Education *Special Reports on Educational Subjects*, vol. vi. (Wyman & Sons, 1900), J. H. Badley, writing on *The Possibility of Co-education in English Preparatory and other Secondary Schools*, is strongly in favour. "In co-education ... half-heartedness means failure. The more completely both sexes can be brought together upon an equal and natural footing the less the difficulties grow." In the Board of Education *Special Reports*, vol. xi. (Wyman & Sons, 1902), Rev. Cecil Grant, writing on *Can American Education be grafted upon the English Public School System?* answers strongly in the affirmative; co-education is recommended on eight grounds:—(1) Vast economy of expenditure; (2) return to the natural system; (3) discipline made easier; (4) intellectual stimulus; (5) a better balance in instruction; (6) improved manners; (7) prevention of extremes of masculinity or femininity; (8) a safeguard against the moral danger.

*Co-education: a series of Essays* (London, 1903), edited by Alice Woods, is in favour of co-education, nine practical workers recording their experience; this is one of the best books on the subject. J. H. Badley's *Co-education after Fifteen: its Value and Difficulties. Child Life* (London, January, 1906), is candid, judicious and practical. M. E. Sadler in *Reports on Secondary Education in Hampshire, Derbyshire and Essex* (1904, 1905 and 1906 respectively) gives details of the curriculum of many co-educational secondary schools. In the U.S. Commissioner of Education *Report for 1903*, vol. i. pp. 1047-1078, Anna Tolman Smith, writing on *Co-education in the Schools and Colleges of the United States*, gives an historical review of the subject with bibliography (compare bibliography in *Report of U.S. Commissioner of Education for 1900-1901*, pp. 1310-1325). G. Stanley Hall on *Adolescence, its Psychology and its Relations to Physiology, Anthropology, Sociology, Sex, Crime, Religion and Education*, vol. ii. chap. xvii., on Adolescent Girls and their education (New York, D. Appleton & Co., 1904), is strongly against co-education during adolescence. In W. Rein's *Encyklopädisches Handbuch der Pädagogik* (Langensalza, Beyer), art. "Gemeinsame Erziehung für Knaben und Mädchen," K. E. Palmgren is in favour of co-education (vol. iii. of 2nd ed. 1905). See also W. Rein, *Über gemeinsame Erziehung von Knaben und Mädchen*

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**COEFFETEAU, NICOLAS** (1574-1623), French theologian, poet and historian, was born at Saint-Calais. He entered the Dominican order and lectured on philosophy at Paris, being also "ordinary preacher" to Henry IV., and afterwards ambassador at Rome. In 1606 he was vicar-general of the congregation of France, and received from Marie de' Medici the revenues of the sees of Lombez and Saintes. He also administered the diocese of Metz, and was nominated to that of Marseilles in 1621, but ill-health obliged him here to take a coadjutor. Coeffeteau won considerable distinction in the controversy against the Protestant reformers and also wrote a *History of Rome from Augustus to Constantine*. Many of his theological writings were collected in one volume (Paris, 1622), and at the time of his death in 1623 he was engaged on a translation of the New Testament which is still in manuscript.

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**COEHOORN, MENNO, BARON VAN** (1641-1704), Dutch soldier and military engineer, of Swedish extraction, was born at Leeuwarden in Friesland. He received an excellent military and general education, and at the age of sixteen became a captain in the Dutch army. He took part in the defence of Maastricht in 1673 and in the siege of Grave in the same year, where the small mortars (called coehorns) invented by him caused the French garrison considerable trouble (Seydel, *Nachrichten über Festungskriege*, Leipzig, 1818). He was made a colonel for his gallant conduct at the battle of Seneff (1674), and was present also at the battles of Cassel (1677) and Saint Denis (1678).

The circumstances of the time and the country turned Coehoorn's attention to the art of fortification, and the events of the late war showed him that existing methods could no longer be relied upon. His first published work, *Versterckinge de Vijfhoek met alle syne Buytenwerken* (Leeuwarden, 1682), at once aroused attention, and involved the author in a lively controversy with a rival engineer, Louys Paan (Leeuwarden, 1682, 1683; copies are in the library of the Dutch ministry of war). The military authorities were much interested in this, and entrusted Coehoorn with the reconstruction of several fortresses in the Netherlands. This task he continued throughout his career; and his experience in the work made him the worthy rival of his great contemporary Vauban. He formulated his ideas a little later in his chief work, *Nieuwe Vestingbouw op en natte of lage horizont, &c.* (Leeuwarden, 1685), in which he laid down three "systems," the characteristic feature of which was the multiplicity and great saliency of the works, which were calculated and in principle are still eminently suited for flat and almost marshy sites such as those of the Low Countries. He borrowed many of the details from the works of his Dutch predecessor Freytag, of Albrecht Dürer, and of the German engineer Speckle, and in general he aimed rather at the adaptation of his principles to the requirements of individual sites than at producing a geometrically and theoretically perfect fortress; and throughout his career he never hesitated to depart from his own rules in dealing with exceptional cases, such as that of Groningen. Subsequent editions of *Nieuwe Vestingbouw* appeared in Dutch (1702, and frequently afterwards), English (London, 1705), French (Wesel, 1705), and German (Düsseldorf, 1709).

From 1688 to the treaty of Ryswick Coehoorn served as a brigadier. At the battle of Fleurus he greatly distinguished himself, and in 1692 he defended Namur, a fortress of his own creation. Namur was taken by Vauban; but the Dutch engineer had his revenge three years later, when the place, on which in the meantime Vauban had lavished his skill, fell to his attack. Coehoorn became lieutenant-general and inspector-general of the Netherlands fortresses, and the high-German peoples as well as his own countrymen honoured him. He commanded a corps in the army of the duke of Marlborough from 1701 to 1703, and in the constant siege warfare of these campaigns in the Low Countries his technical skill was of the highest value. The swift reduction of the fortress of Bonn and the siege of Huy in 1703 were

his crowning successes. At the opening of his following campaign he was on his way to confer with Marlborough when he died of apoplexy at Wijkel on the 17th of March 1704.

His "first system" was applied to numerous places in Holland, notably Nijmegen, Breda and Bergen-op-Zoom. Mannheim in Germany was also fortified in this way, while the "second system" was applied to Belgrade and Temesvár in eastern Europe.

His son, Gosewijn Theodor van Coehoorn, wrote his life (re-edited Syperstein, Leeuwarden, 1860). See also v. Zastrow, *Geschichte der beständigen Befestigung* (Leipzig, 1828); von Brese-Winiari, *Über Entstehen und Wesen der neueren Befestigungsmethode* (1844); Cosseran de Villenoisy, *Essai historique sur la fortification* (1869); Mandar, *Architecture des forteresses* (1801); Krayenhoff, *Verhandeling over de eerste versterkingsmanier van Coehoorn* (Hague, 1823); Bosscha, *Nederlandsche heldend te Land* (Amsterdam, 1838); Dewez, *Histoire de Belgique* (Brussels, 1823); Ypey, *Narratio de rebus gestis Mennonis Cohorni* (1771); Hennert, *Dissertation sur la fortification permanente* (1795); Böhms, *Gründliche Anleitung zur Kriegsbaukunst* (1776); *Axiomatas of algemeene bekentnisse over de Vestingbouw door Menno Baron van Coehoorn, Uytgewerkt door E. W. Berg* (MS. in Dutch Ministry of War); Bousmard, *Essai général de fortification* (1797); also the article [FORTIFICATION AND SIEGECRAFT](#).

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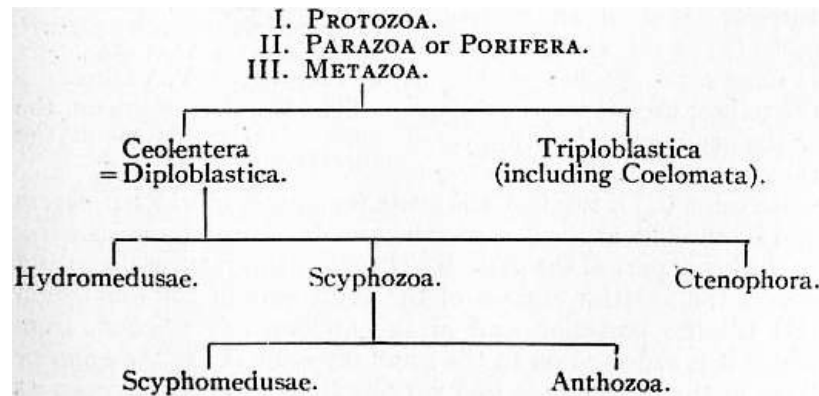
**COELENTERA**, a group or grade of the animal kingdom, the zoological importance of which has risen considerably since the time (1887) of the publication of the first article under that heading in the *Ency. Brit.* (9th edit.), even though their numbers have been reduced by the elevation of the Sponges or Porifera to the rank of an independent Phylum under the title Parazoa (W. J. Sollas, 1884). For the Coelentera thus restricted, the term Enterocoela, in contrast to Coelomocoela (the old Coelomata), was suggested by E. R. Lankester (1900).

From the more complex colonial Protozoa the Coelentera are readily separated by their possession of two distinct sets of cells, with diverse functions, arranged in two definite layers,—a condition found in no Protozoan. The old criterion by which they and other Metazoa were once distinguished from Protozoa, namely, the differentiation of large and small sexual cells from each other and from the remaining cells of the body, has been broken down by the discovery of numerous cases of such differentiation among Protozoa. The Coelentera, as contrasted with other Metazoa (but not Parazoa), consist of two layers of cells only, an outer layer or ectoderm, an inner layer or endoderm. They have hence been described as Diploblastica. In the remaining Metazoa certain cells are budded off at an early stage of development from one or both of the two original layers, to form later a third layer, the mesoderm, which lies between the ectoderm and endoderm; such forms have therefore received the name Triploblastica. At the same time it is necessary to observe that it is by no means certain that the mesoderm found in various groups of Metazoa is a similar or homologous formation in all cases. A second essential difference between Coelentera and other Metazoa (except Parazoa) is that in the former all spaces in the interior of the body are referable to a single cavity of endodermal origin, the "gastro-vascular cavity," often termed the coelenteron: the spaces are always originally continuous with one another, and are in almost every case permanently so. This single cavity and its lining serve apparently for all those functions (digestion, excretion, circulation and often reproduction) which in more complex organisms are distributed among various cavities of independent and often very diverse origin.

In the Coelentera the ectoderm and endoderm are set apart from one another at a very early period in the life-history; generally either by delamination or invagination, processes described in the article EMBRYOLOGY. Between these two cell-layers a mesogloea (G. C. Bourne, 1887) is always intercalated as a secretion by one or both of them; this is a gelatinoid, primitively structureless lamella, which in the first instance serves merely as a basal support for the cells. In many cases, as, for example, in the Medusae or jelly-fish, the mesogloea may be so thick as to constitute the chief part of the body in bulk and weight. The ectoderm rarely consists of more than one layer of cells: these are divisible by structure and function into nervous, muscular and secretory cells, supported by interstitial cells. The endoderm is generally also an epithelium one cell in thickness, the cells being digestive, secretory and sometimes muscular. Reproductive sexual cells may be found in either of these two layers, according to the class and sub-class in question. The mesogloea is in itself

an inert non-cellular secretion, but the immigration of muscular and other cells into its substance, from both ectoderm and endoderm, gives it in many cases a strong resemblance to the mesoderm of Triploblastica,—a resemblance which, while probably superficial, may yet serve to indicate the path of evolution of the mesoderm.

The Coelentera may thus be briefly defined as Metazoa which exhibit two embryonic cell-layers only,—the ectoderm and endoderm,—their body-cavities being referable to a single cavity or coelenteron in the endoderm. Their position in the animal kingdom and their main subdivisions may be expressed in the following table:—



In the above-given classification, the Scyphomedusae, formerly included with the Hydromedusae as Hydrozoa, are placed nearer the Anthozoa. The reasons for this may be stated briefly.

The HYDROMEDUSAE are distinguished from the Scyphozoa chiefly by negative characters; they have no stomodaeum, that is, no ingrowth of ectoderm at the mouth to form an oesophagus; they have no mesenteries (radiating partitions) which incompletely subdivide the coelenteron; and they have no concentration of digestive cells into special organs. Their ectodermal muscles are mainly longitudinal, their endodermal muscles are circularly arranged on the body-wall. Their sexual cells are (probably in all cases) produced from the ectoderm, and lie in those radii which are first accentuated in development. They typically present two structural forms, the non-sexual hydroid and the sexual medusoid; in such a case there is an alternation of generations (metagenesis), the hydroid giving rise to the medusoid by a sexual gemmation, the medusoid bearing sexual cells which develop into a hydroid. In some other cases medusoid develops directly from medusoid (hypogenesis), whether by sexual cells or by gemmation. The medusoids have a muscular velum of ectoderm and mesogloea only.

The SCYPHOZOA have the following features in common:—They typically exhibit an ectodermal stomodaeum; partitions or mesenteries project into their coelenteron from the body-wall, and on these are generally concentrated digestive cells (to form mesenterial filaments, phacellae or gastric filaments, &c.); the external musculature of the body-wall is circular (except in *Cerianthus*); the internal, longitudinal; and the sexual cells probably always arise in the endoderm.

The SCYPHOMEDUSAE, like the Hydromedusae, typically present a metagenesis, the non-sexual scyphistomid (corresponding to the hydroid) alternating with the sexual medusoid. In other cases the medusoid is hypogenetic, medusoid producing medusoid. The sexual cells of the medusoid lie in the endoderm on interradii, that is, on the second set of radii accentuated in the course of development. The medusoids have no true velum; in some cases a structure more or less resembling this organ, termed a velarium, is present, permeated by endodermal canals.

The ANTHOZOA differ from the Scyphomedusae in having no medusoid form; they all more or less resemble a sea-anemone, and may be termed actinioid. They are (with rare exceptions, probably secondarily acquired) hypogenetic, the offspring resembling the parent, and both being sexual. The sexual cells are borne on the mesenteries in positions irrespective of obvious developmental radii.

The CTENOPHORA are so aberrant in structure that it has been proposed to separate them from the Coelentera altogether: they are, however, theoretically deducible from an ancestor common to other Coelentera, but their extreme specialization precludes the idea of any

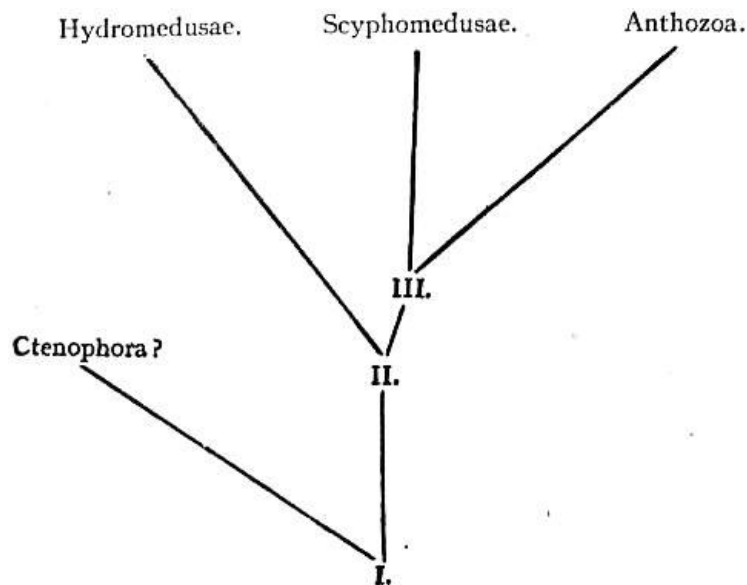
close relationship with the rest.

As regards the other three groups, however, it is easy to conceive of them as derived from an ancestor, represented to-day to some extent by the planula-larva, which was Coelenterate in so far as it was composed of an ectoderm and endoderm, and had an internal digestive cavity (I. of the table).

At the point of divergence between Scyphozoa and Hydromedusae (II. of the table of hypothetical descent), we may conceive of its descendant as tentaculate, capable of either floating (swimming) or fixation at will like *Lucernaria* to-day; and exhibiting incipient differentiation of myoepithelial cells (formerly termed neuro-muscular cells). At the parting of the ways which led, on the one hand, to modern Scyphomedusae, on the other to Anthozoa (III.), it is probable that the common ancestor was marked by incipient mesenteries and by the limitation of the sexual cells to endoderm. The lines of descent—II. to Hydromedusae, and III. to Scyphomedusae—represent periods during which the hypothetical ancestors II. and III., capable of either locomotion or fixation at will, were either differentiated into alternating generations of fixed sterile nutritive hydroids (scyphistomoids) and locomotor sexual medusoids, or abandoned the power of fixation in hypogenetic cases. During the period represented by the line of descent—III. to Anthozoa—this group abandoned its power of adult locomotion by swimming. During these periods were also attained those less important structural characters which these three groups present to-day.

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(G. H. Fo.)



**COELLO, ALONSO SANCHEZ** (1515-1590), Spanish painter, according to some authorities a native of Portugal, was born, according to others, at Benifacio, near the city of Valencia. He studied many years in Italy; and returning to Spain in 1541 he settled at Madrid, and worked on religious themes for most of the palaces and larger churches. He was a follower of Titian, and, like him, excelled in portraits and single figures, elaborating the textures of his armours, draperies, and such accessories in a manner so masterly as strongly to influence Velazquez in his treatment of like objects. Many of his pictures were destroyed in the fires that consumed the Madrid and Prado palaces, but many good examples are yet extant, among which may be noted the portraits of the infantes Carlos and Isabella, now in the Madrid gallery, and the St Sebastian painted in the church of San Gerónimo, also in Madrid. Coello left a daughter, Isabella Sanchez, who studied under him, and painted excellent portraits.



**COELLO, ANTONIO** (1610?-1652), Spanish dramatist and poet, was born at Madrid about the beginning of the 17th century. He entered the household of the duke de Albuquerque, and after some years of service in the army received the order of Santiago in 1648. He was a favourite of Philip IV., who is reported to have collaborated with him; this rumour is not confirmed, but there is ample proof of Coello's collaboration with Calderón, Rojas Zorrilla, Solís and Velez de Guevara, the most distinguished dramatists of the age. The best of his original plays, *Los Empeños de seis horas*, has been wrongly ascribed to Calderón; it was adapted by Samuel Tuke, under the title of *The Adventures of five Hours*, and was described by Pepys as superior to *Othello*. It is an excellent example of stagecraft and animated dialogue. Coello died on the 20th of October 1652, shortly after his nomination to a post in the household of Philip IV.

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**COELOM AND SEROUS MEMBRANES.** In human anatomy the body-cavity or coelom (Gr. κοῖλος, hollow) is divided into the *pericardium*, the two *pleurae*, the *peritoneum* and the two *tunicae vaginales*.

The *pericardium* is a closed sac which occupies the central part of the thorax and contains the heart. Like all the serous membranes it has a visceral and a parietal layer, the former of which is closely applied to the heart and consists of endothelial cells with a slight fibrous backing: to it is due the glossy appearance of a freshly removed heart. The parietal layer is double; externally there is a strong fibrous protective coat which is continuous with the other fibrous structures in the neighbourhood, especially with the sheaths of the great vessels at the root of the heart, with prolongations of the fascia of the neck, and with the central tendon of the diaphragm, while internally is the serous layer which is reflected from the surface of the heart, where the great vessels enter, so that everywhere the two layers of the serous membrane are in contact, and the only thing within the cavity is a drop or two of the fluid secreted by the serous walls. When the parietal layer is laid open and the heart removed by cutting through the great vessels, it will be seen that there are two lines of reflection of the serous layer, one common to the aorta and pulmonary artery, the other to all the pulmonary veins and the two venae cavae.

The *pleurae* very closely resemble the pericardium except that the fibrous outer coat of the parietal layer is not nearly as strong; it is closely attached to the inner surface of the chest walls and mesially to the outer layer of the pericardium; above it is thickened by a fibrous contribution from the scalene muscles, and this forms the *dome of the pleura* which fits into the concavity of the first rib and contains the apex of the lung. The reflection of the serous layer of the pleura, from the parietal to the visceral part, takes place at the root of the lung, where the great vessels enter, and continues for some distance below this as the *ligamentum latum pulmonis*. The upper limit of the pleural cavity reaches about half an inch above the inner third of the clavicle, while, below, it may be marked out by a line drawn from the twelfth thoracic spine to the tenth rib in the mid axillary line, the eighth rib in the nipple line, and the sixth rib at its junction with the sternum. There is probably very little difference in the lower level of the pleurae on the two sides.

The *peritoneum* is a more extensive and complicated membrane than either the pericardium or pleura; it surrounds the abdominal and pelvic viscera, and, like the other sacs, has a parietal and visceral layer. The line of reflection of these, though a continuous one, is very tortuous. The peritoneum consists of a *greater* and *lesser sac* which communicate through an opening known as the *foramen of Winslow*, and the most satisfactory way of understanding these is to follow the reflections first in a vertical median (sagittal) section and then in a horizontal one, the body being supposed to be in the upright position. If a median sagittal section be studied first, and a start be made at the umbilicus (see fig. 1), the parietal peritoneum is seen to run upward, lining the anterior abdominal wall, and then to pass along the under surface of the diaphragm till its posterior third is reached; here there is a

reflection on to the liver (L), forming the anterior layer of the *coronary ligament* of that viscus, while the membrane now becomes visceral and envelops the front of the liver as far back as the transverse fissure on its lower surface; here it is reflected on to the stomach (St) forming the anterior layer of the *gastro-hepatic* or *lesser omentum*. It now covers the front of the stomach, and at the lower border runs down as the anterior layer of an apron-like fold, the *great omentum*, which in some cases reaches as low as the pubes; then it turns up again as the posterior or fourth layer of the great omentum until the transverse colon (C) is reached, the posterior surface of which it covers and is reflected, as the posterior layer of the *transverse meso-colon*, to the lower part of the pancreas (P); after this it turns down and covers the anterior surface of the third part of the duodenum (D) till the posterior wall of the abdomen is reached, from which it is reflected on to the small intestine (I) as the anterior layer of the *mesentery*, a fold varying from 5 to 8 in. between its attachments. After surrounding the small intestine it becomes the posterior layer of the mesentery and so again reaches the posterior abdominal wall, down which it runs until the rectum (R) is reached. The anterior surface of this tube is covered by peritoneum to a point about 3 in. from the anus, where it is reflected on to the uterus and vagina (V) in the female and then on to the bladder (B); in the male, on the other hand, the reflection is directly from the rectum to the bladder. At the apex of the bladder, after covering the upper surface of that organ, it is lifted off by the urachus and runs up the anterior abdominal wall to the umbilicus, from which the start was made. All this is the greater sac. The tracing of the lesser sac may be conveniently started at the transverse fissure of the liver, whence the membrane runs down to the stomach (St) as the posterior layer of the lesser omentum, lines the posterior surface of the stomach, passes down as the second layer of the great omentum and up again as the third layer, covers the anterior surface of the transverse colon (C) and then reaches the pancreas (P) as the anterior layer of the transverse mesocolon. After this it covers the front of the pancreas and in the middle line of the body runs up below the diaphragm to within an inch of the anterior layer of the coronary ligament of the liver; here it is reflected on to the top of the Spigelian lobe of the liver to form the posterior layer of the coronary ligament, covers the whole Spigelian lobe, and so reaches the transverse fissure, the starting-point.

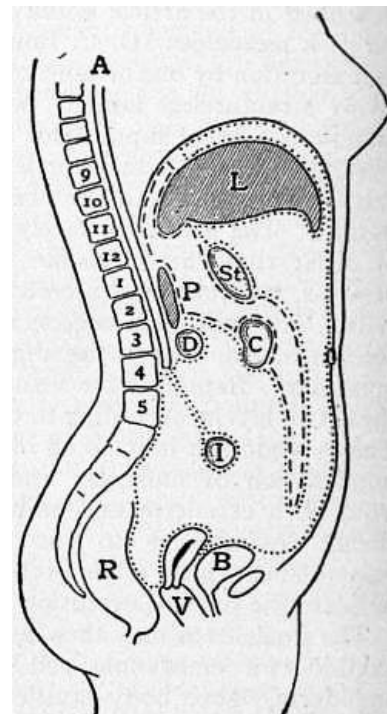


FIG. 1.—Diagram of vertical median section of Abdomen.

- |               |              |
|---------------|--------------|
| A, Aorta.     | D, Duodenum. |
| P, Pancreas.  | B, Bladder.  |
| I, Intestine. | St, Stomach. |
| R, Rectum.    | C, Colon.    |
| L, Liver.     | V, Vagina.   |

(The fine dots represent the great sac of the peritoneum, the coarse dots the lesser sac.)

This section, therefore, shows two completely closed sacs without any visible communication. In the female, however, the great sac is not absolutely closed, for the Fallopian tubes open into it by their minute *ostia abdominalia*, while at the other ends they communicate with the cavity of the uterus and so with the vagina and exterior.

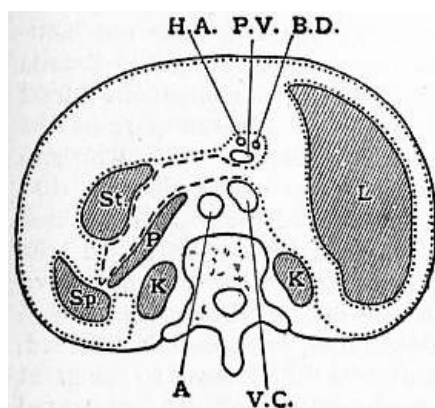


FIG. 2.—Diagram of Horizontal Section through upper part of 1st Lumbar Vertebra.

- |                 |                      |
|-----------------|----------------------|
| A, Aorta.       | H.A, Hepatic Artery. |
| Sp, Spleen.     | K, Kidney.           |
| B.D, Bile duct. | L, Liver.            |
| V.C, Vena Cava. | St, Stomach.         |
| P, Pancreas.    | P.V, Portal Vein.    |

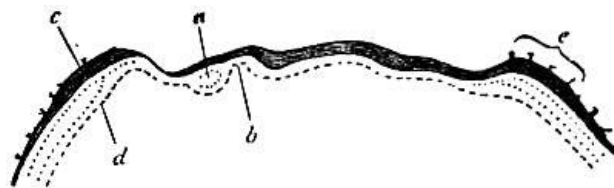
The dotting of the peritoneum is as in fig. 1.

A horizontal section through the upper part of the first lumbar vertebra will, if a fortunate one (see fig. 2), pass through the foramen Winslow and show the communication of the two sacs. A starting-point may be made from the mid-ventral line and the parietal peritoneum traced round the left side of the body wall until the outer edge of the left kidney (K) is reached; here it passes in front of the kidney and is soon reflected off on to the spleen, which it nearly surrounds; just before it reaches the hilum of that organ, where the vessels enter, it is reflected on to the front of the stomach (St), forming the anterior layer of the *gastro-splenic omentum*; it soon reaches the lesser curvature of the stomach and then

becomes the anterior layer of the lesser omentum, which continues until the bile duct (B.D) and portal vein (P.V) are reached at its right free extremity; here it turns completely round these structures and runs to the left again, as the posterior layer of the lesser omentum, behind the stomach (St) and then to the spleen (Sp) as the posterior layer of the gastro-splenic omentum. From the spleen it runs to the right once more, in front of the pancreas (P), until the inferior vena cava (V.C) is reached, and this point is just behind the portal vein and is the place where the lesser and greater sacs communicate, known as the foramen of Winslow. From this opening the lesser sac runs to the left, while all the rest of the peritoneal cavity in the section is greater sac. From the front of the vena cava the parietal peritoneum passes in front of the right kidney (K) and round the right abdominal wall to the mid-ventral line. The right part of this section is filled by the liver (L), which is completely surrounded by a visceral layer of peritoneum, and no reflection is usually seen at this level between it and the parietal layer. Some of the viscera, such as the kidneys and pancreas, are retro-peritoneal; others, such as the small intestines and transverse colon, are surrounded, except at one point where they are attached to the dorsal wall by a *mesentery* or *mesocolon* as the reflections are called; others again are completely surrounded, and of these the caecum is an example; while some, like the liver and bladder, have large uncovered areas, and the reflections of the membrane form ligaments which allow considerable freedom of movement.

The *tunica vaginalis* is the remains of a process of the peritoneum (*processus vaginalis*) which descends into the scrotum during foetal life some little time before the testis itself descends. After the descent of the testis the upper part usually becomes obliterated, while the lower part forms a serous sac which nearly surrounds the testis, but does not quite do so. Posteriorly the epididymis is in close contact with the testis, and here the visceral layer is not in contact; there is, however, a pocket called the *digital fossa* which squeezes in from the outer side between the testis and epididymis. The parietal layer lines the inner wall of its own side of the scrotum.

For a full description of the topography of the serous membranes see any of the standard text-books of anatomy, by Gray, Quain, Cunningham or Macalister. Special details will be found in Sir F. Treves' *Anatomy of the Intestinal Canal and Peritoneum* (London, 1885); C. B. Lockwood, *Hunterian Lectures on Hernia* (London, 1889); C. Addison, "Topographical Anatomy of the Abdominal Viscera in Man," *Jour. Anat.*, vols. 34, 35; F. Dixon and A. Birmingham, "Peritoneum of the Pelvic Cavity," *Jour. Anat.* vol. 34, p. 127; W. Waldeyer, "Das Becken" (1899), and "Topographical Sketch of the Lateral Wall of the Pelvic Cavity," *Jour. Anat.* vol. 32; B. Moynihan, *Retroperitoneal Hernia* (London, 1899). A complete bibliography of the subject up to 1895 will be found in *Quain's Anatomy*, vol. 3, part 4, p. 69.



After Young and Robinson, Cunningham's *Text-Book of Anatomy*.

FIG. 3.—Diagram of Longitudinal Section, showing the different areas of the Blastodermic Vesicle.

- |                           |                    |              |
|---------------------------|--------------------|--------------|
| a, Pericardium.           | c, Ectoderm.       | d, Entoderm. |
| b, Bucco-pharyngeal area. | e, Placental area. |              |

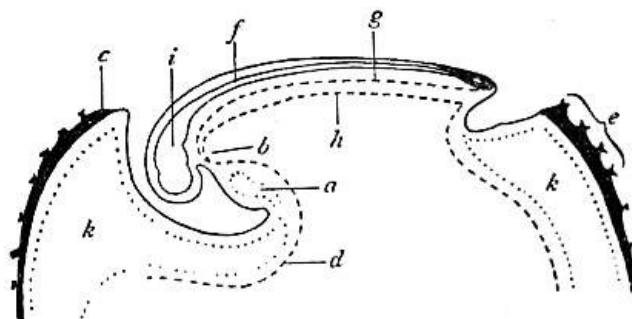


FIG. 4.—Diagram of a Developing Ovum, seen in Longitudinal Section.

<i>f</i> , Spinal cord.	<i>i</i> , Brain.
<i>g</i> , Notochord.	<i>k</i> , Extra embryonic coelom.
<i>h</i> , Dorsal wall of alimentary canal.	Other numbers as in fig. 3.

*Embryology*.—As the mesoderm is gradually spreading over the embryo it splits into two layers, the outer of which is known as the *somatopleure* and lines the parietal or ectodermal wall, while the inner lines the entoderm and is called the *splanchnopleure*; between the two is the coelom. The pericardial area is early differentiated from the rest of the coelom and at first lies in front of the neural and bucco-pharyngeal area; here the mesoderm stretches right across the mid-line, which it does not in front and behind. As the head fold of the embryo is formed the pericardium is gradually turned right over, so that the dorsal side becomes the ventral and the anterior limit the posterior; this will be evident on referring to the two accompanying diagrams.

The two primitive aortae lie at first in the ventral wall of the pericardium, but with the folding over they come to lie in the dorsal wall and gradually bulge into the cavity as they coalesce to form the heart, so that the heart drops into the dorsal side of the pericardium and draws down a fold of the membrane called the *dorsal mesocardium*. In mammals A. Robinson (*Jour. Anat. and Phys.*, xxxvii. 1) has shown that no ventral mesocardium exists, though in more lowly vertebrates it is present. Laterally the pericardial cavity communicates with the general cavity of the coelom, but with the growth of the Cuvierian ducts (see development of veins) these communications disappear. Originally the mesocardium runs the whole length of the pericardium from before backward, but later on the middle part becomes obliterated, and so the two separate reflections from the parietal to the visceral layer, already noticed, are accounted for.

Just behind the pericardium and in front of the umbilicus, which at first are close together, the mesoderm forms a mass which is called the *septum transversum*, and into this the developing lungs push bag-like protrusions of the coelom, consisting of visceral and parietal layers, and these eventually lose their connexion with the rest of the coelom, as the diaphragm develops, and become the pleural cavities. After the pericardium and pleurae have been separated off the remainder of the coelom becomes the peritoneum. At first the stomach and intestine form a straight tube, which is connected to the dorsum of the embryo by a *dorsal mesentery* and to the mid-ventral wall in front of the umbilicus by a *ventral mesentery*. Into the ventral mesentery the liver grows as diverticula from the duodenum, so that some of the mesentery remains as the *falciform ligament* of the liver and some as the lesser omentum. Into the dorsal mesentery the pancreas grows, also as diverticula, from the duodenum, while the spleen is developed from the mesoderm contained in the same fold. As the stomach turns over so that its left side becomes ventral, the dorsal mesentery attached to it becomes pulled out, in such a way that part of it forms the great omentum and part the gastro-splenic omentum. After the caecum is formed as a diverticulum from the intestine it is situated close to the liver and gradually travels down into the right iliac fossa. This passage to the right is accompanied by a throwing over of the duodenal loop to the right, so that the right side of its mesentery becomes pressed against the dorsal wall of the abdomen and obliterated. This accounts for the fact that the pancreas and duodenum are only covered by peritoneum on their anterior surfaces in man. The formation of the lesser sac is due to the turning over of the stomach to the right, with the result that a cave, known sometimes as the *bursa omentalis*, is formed behind it. Originally, of course, the whole colon had a *dorsal mesocolon* continuous with the mesentery, but in the region of the ascending and descending colon this usually disappears and these parts of the gut are uncovered by peritoneum posteriorly. The transverse mesocolon persists and at first is quite free from the great omentum, but later, in man, the two structures fuse<sup>1</sup> and the fourth layer of the great omentum becomes continuous with the posterior layer of the transverse mesocolon.

For further details see Quain's *Anatomy* (London, 1908).

*Comparative Anatomy*.—In the *Amphioxus* the coelom is developed in the embryo as a series of bilateral pouches, called *enterocoeles*, from the sides of the alimentary canal; these are therefore entodermal in their origin, as in *Sagitta* and the *Echinodermata* among the invertebrates. In the adult the development of the atrium causes a considerable reduction of the coelom, represented by two dorsal coelomic canals communicating with a ventral canal by means of branchial canals which run down the outer side of the primary gill bars. Into the dorsal canals the nephridia open. In the intestinal region the coelom is only present on the

left side.

In the higher vertebrates (*Craniata*) the coelom is developed by a splitting of the mesoderm into two layers, and a pericardium is constricted off from the general cavity. In all cases the ova burst into the coelom before making their way to the exterior, and in some cases, *e.g.* amphioxus, lamprey (*Cyclostomata*), eels and mud-fish (*Dipnoi*), the sperm cells do so too. The *Cyclostomata* have a pair of *genital pores* which lead from the coelom into the urino-genital sinus, and so to the exterior.

In the Elasmobranch fish there is a *pericardio-peritoneal canal* forming a communication between these two parts of the coelom; also a large common opening for the two oviducts in the region of the liver, and two openings, called *abdominal pores*, on to the surface close to the cloacal aperture. In the Teleostomi (Teleostean and Ganoid fish) abdominal pores are rare, but in most Teleostei (bony fish) the ova pass directly down oviducts, as they do in Arthropods, without entering the peritoneal cavity; there is little doubt, however, that these oviducts are originally coelomic in origin. In the *Dipnoi* (mud-fish) abdominal pores are found, and probably serve as a passage for the sperm cells, since there are no vasa deferentia. In fishes a complete dorsal mesentery is seldom found in the adult; in many cases it only remains as a tube surrounding the vessels passing to the alimentary canal.

In the Amphibia, Reptilia and Aves, one cavity acts as pleura and peritoneum, though in the latter the lungs are not completely surrounded by a serous membrane. In many lizards the comparatively straight intestine, with its continuous dorsal mesentery and ventral mesentery in the anterior part of the abdomen, is very like a stage in the development of the human and other mammalian embryos. In the mammalia the diaphragm is complete (see [DIAPHRAGM](#)) and divides the pleuro-peritoneal cavity into its two constituent parts. In the lower mammals the derivatives of the original dorsal mesentery do not undergo as much fusion and obliteration as they do in adult man; the ascending and descending mesocolon is retained, and the transverse mesocolon contracts no adhesion to the great omentum. It is a common thing, however, to find a fenestrated arrangement of the great omentum which shows that its layers have been completely obliterated in many places.

In those animals, such as the rabbit, in which the tests are sometimes in the scrotum and sometimes in the abdomen, the communication between the peritoneum and the tunica vaginalis remains throughout life.

For further details and literature up to 1902, see R. Wiedersheim's *Vergleichende Anatomie der Wirbeltiere* (Jena, 1902).

(F. G. P.)

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- 1 Some authorities hold that this alteration is not brought about by fusion, but by a dragging away of the posterior layer of the great omentum from the dorsal wall of the abdomen.

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**COEN, JAN PIETERSZOOM** (1587-1630), fourth governor-general of the Dutch East Indies, was born at Hoorn, and spent his youth at Rome in the house of the famous merchants the Piscatori. In 1607 he sailed from Amsterdam to the Indies as second commercial agent, and remained away four years. He had proved so capable that in 1612 he was sent out a second time at the head of a trading expedition. In the following year he was made a councillor and director-general of the East Indian trade. Afterwards he became president at Bantam, and on the 31st of October 1617 he was promoted in succession to Laurens Reaal to the post of governor-general. To his vigour and intrepidity the Dutch in no small measure owed the preservation and establishment of their empire in the East. He took and destroyed Jacatra, and founded on its ruins the capital of the Dutch East Indies, to which he gave the name of Batavia. In 1622 Coen obtained leave to resign his post and return to Holland, but in his absence great difficulties had arisen with the English at Amboina (the so-called massacre of Amboina), and in 1627 under pressure from the directors of the East India Company he again returned as governor-general to Batavia. In 1629 he was able to beat off a formidable attack of the sultan of Mataram, sometimes styled emperor of Java, upon Batavia. He died the following year.

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**COENACULUM**, the term applied to the eating-room of a Roman house in which the supper (*coena*) or latest meal was taken. It was sometimes placed in an upper storey and reached by an external staircase. The Last Supper in the New Testament was taken in the Coenaculum, the "large upper room" cited in St Mark (xiv. 15) and St Luke (xxii. 12).

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**CÆNWULF** (d. 821), king of Mercia, succeeded to the throne in 796, on the death of Ecgrith, son of Offa. His succession is somewhat remarkable, as his direct ancestors do not seem to have held the throne for six generations. In 798 he invaded Kent, deposed and imprisoned Eadberht Præn, and made his own brother Cuthred king. Cuthred reigned in Kent from 798 to 807, when he died, and Cœnwulf seems to have taken Kent into his own hands. It was during this reign that the archbishopric of Lichfield was abolished, probably before 803, as the Hygeberht who signed as an abbot at the council of Cloveshoe in that year was presumably the former archbishop. Cœnwulf appears from the charters to have quarrelled with Wulfred of Canterbury, who was consecrated in 806, and the dispute continued for several years. It was probably only settled at Cloveshoe in 825, when the lawsuit of Cwœnthryth, daughter and heiress of Cœnwulf, with Wulfred was terminated. Cœnwulf may have instigated the raid of Æthelmund, earl of the Hwicce, upon the accession of Egberht. He died in 821, and was succeeded by his brother Ceolwulf I.

See Earle and Plummer's edition of the *Anglo-Saxon Chronicle*, 796, 819 (Oxford, 1892); W. de G. Birch, *Cartularium Saxonicum*, 378 (London, 1885-1893).

(F. G. M. B.)

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**COERCION** (from Lat. *coercere*, to restrain), an application of moral or physical compulsion by which a person is forced to do or refrain from doing some act or set of acts apart from his own voluntary motion. Where the coercion is direct or positive, *i.e.* where the person is compelled by physical force to do an act contrary to his will,—for example, when a man is compelled to join a rebel army, and to serve as a soldier under threats of death,—his act is not legally a crime. Where the coercion is implied, as when a person is legally under subjection to another, the person coerced, having no will on the subject, is not responsible. But this principle is applied only within narrow limits, and does not extend to the command of a superior to an inferior; of a parent to a child; of a master to his servant or a principal to his agent. Where, however, a married woman commits a crime in the presence of her husband, she is generally presumed to have acted by his coercion, and to be entitled to acquittal, but this presumption does not extend to grave crimes, nor to those in which the principal part may be supposed to be taken by the woman, such as keeping a brothel. In civil matters, such as the making of a contract, where the law requires the free assent of the person who undertakes the obligation, coercion is a ground for invalidating the instrument.

The term "coercion" is inevitably somewhat ambiguous, and depends on the circumstances of the case. In a political sense, the application of the Crimes Act of 1887 to Ireland was called "coercion" by those opposed to the English Unionist party and government, as being special legislation differing from the ordinary law applicable in the United Kingdom.

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**CŒUR, JACQUES** (*c.* 1395-1456), founder of the trade between France and the Levant, was born at Bourges, in which city his father, Pierre Cœur, was a rich merchant. Jacques is first heard of about 1418, when he married Macée de Léodepart, daughter of Lambert de Léodepart, an influential citizen, provost of Bourges, and a former valet of John, duke of Berry. About 1429 he formed a commercial partnership with two brothers named Godard; and in 1432 he was at Damascus, buying and bartering, and transporting the wares of the

Levant—gall-nuts, wools and silks, goats' hair, brocades and carpets—to the interior of France by way of Narbonne. In the same year he established himself at Montpellier, and there began those gigantic operations which have made him illustrious among financiers. Details are wanting; but it is certain that in a few years he placed his country in a position to contend not unsuccessfully with the great trading republics of Italy, and acquired such reputation as to be able, mere trader as he was, to render material assistance to the knights of Rhodes and to Venice herself.

In 1436 Cœur was summoned to Paris by Charles VII., and made master of the mint that had been established in that city. The post was of vast importance, and the duties onerous. The country was deluged with the base moneys of three reigns, charged with superscriptions both French and English, and Charles had determined on a sweeping reform. In this design he was ably seconded by the merchant, who, in fact, inspired or prepared all the ordinances concerning the coinage of France issued between 1435 and 1451. In 1438 he was made steward of the royal expenditure; in 1441 he and his family were ennobled by letters patent. In 1444 he was sent as one of the royal commissioners to preside over the new parlement of Languedoc, a dignity he bore till the day of his disgrace. In 1445 his agents in the East negotiated a treaty between the sultan of Egypt and the knights of Rhodes; and in 1447, at his instance, Jean de Village, his nephew by marriage, was charged with a mission to Egypt. The results were most important; concessions were obtained which greatly improved the position of the French consuls in the Levant, and that influence in the East was thereby founded which, though often interrupted, was for several centuries a chief commercial glory of France. In the same year Cœur assisted in an embassy to Amadeus VIII., former duke of Savoy, who had been chosen pope as Felix V. by the council of Basel; and in 1448 he represented the French king at the court of Pope Nicholas V., and was able to arrange an agreement between Nicholas and Amadeus, and so to end the papal schism. Nicholas treated him with the utmost distinction, lodged him in the papal palace, and gave him a special licence to traffic with the infidels. From about this time he made large advances to Charles for carrying on his wars; and in 1449, after fighting at the king's side through the campaign, he entered Rouen in his train.

At this moment the great trader's glory was at its height. He had represented France in three embassies, and had supplied the sinews of that war which had ousted the English from Normandy. He was invested with various offices of dignity, and possessed the most colossal fortune that had ever been amassed by a private Frenchman. The sea was covered with his ships; he had 300 factors in his employ, and houses of business in all the chief cities of France. He had built houses and chapels, and had founded colleges in Paris, at Montpellier and at Bourges. The house at Bourges (see [HOUSE](#), Plate II. figs. 7 and 8) was of exceptional magnificence, and remains to-day one of the finest monuments of the middle ages in France. He also built there the sacristy of the cathedral and a sepulchral chapel for his family. His brother Nicholas was made bishop of Luçon, his sister married Jean Bochetel, the king's secretary, his daughter married the son of the viscount of Bourges, and his son Jean became archbishop of Bourges. But Cœur's gigantic monopoly caused his ruin. Dealing in everything, money and arms, peltry and jewels, brocades and woollens—a broker, a banker, a farmer—he had absorbed the trade of the country, and merchants complained they could make no gains on account of "that Jacquet." He had lent money to needy courtiers, to members of the royal family, and to the king himself, and his debtors, jealous of his wealth, were eager for a chance to cause his overthrow.

In February 1450 Agnes Sorel, the king's mistress, suddenly died. Eighteen months later it was rumoured that she had been poisoned, and a lady of the court who owed money to Jacques Cœur, Jeanne de Vendôme, wife of François de Montberon, and an Italian, Jacques Colonna, formally accused him of having poisoned her. There was not even a pretext for such a charge, but for this and other alleged crimes the king, on the 31st of July 1451, gave orders for his arrest and for the seizure of his goods, reserving to himself a large sum of money for the war in Guienne. Commissioners extraordinary, the merchant's declared enemies, were chosen to conduct the trial, and an inquiry began, the judges in which were either the prisoner's debtors or the holders of his forfeited estates. He was accused of having paid French gold and ingots to the infidels, of coining light money, of kidnapping oarsmen for his galleys, of sending back a Christian slave who had taken sanctuary on board one of his ships, and of committing frauds and exactions in Languedoc to the king's prejudice. He defended himself with all the energy of his nature. His innocence was manifest; but a conviction was necessary, and in spite of strenuous efforts on the part of his friends, after twenty-two months of confinement in five prisons, he was condemned to do public penance for his fault, to pay the king a sum equal to about £1,000,000 of modern money, and to remain a prisoner till full satisfaction had been obtained; his sentence also

embraced confiscation of all his property, and exile during royal pleasure. On the 5th of June 1453 the sentence took effect; at Poitiers the shameful form of making honourable amends was gone through; and for nearly three years nothing is known of him. It is probable that he remained in prison; it is certain that his vast possessions were distributed among the intimates of Charles.

In 1455 Jacques Cœur, wherever confined, contrived to escape into Provence. He was pursued; but a party, headed by Jean de Village and two of his old factors, carried him off to Tarascon, whence, by way of Marseilles, Nice and Pisa, he managed to reach Rome. He was honourably and joyfully received by Nicholas V., who was fitting out an expedition against the Turks. On the death of Nicholas, Calixtus III. continued his work, and named his guest captain of a fleet of sixteen galleys sent to the relief of Rhodes. Cœur set out on this expedition, but was taken ill at Chios, and died there on the 25th of November 1456. After his death Charles VII. showed himself well disposed to the family, and allowed Jacques Cœur's sons to come into possession of whatever was left of their father's wealth.

See the admirable monograph of Pierre Clément, *Jacques Cœur et Charles VII* (1858, 2nd ed. 1874); A. Valet de Viriville, *Charles Sept et son époque* (3 vols., 1862-1865); and Louisa Costello, *Jacques Cœur, the French Argonaut* (London, 1847).

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**CŒUR D'ALÈNE** ("awl-heart," the French translation of the native name *skitswish*), a tribe of North American Indians of Salishan stock. The name is said to have been originally that of a chief noted for his cruelty. The tribe has given its name to a lake, river and range of mountains in Idaho, where on a reservation the survivors, some 400, are settled.

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**COFFEE** (Fr: *café*, Ger. *Kaffee*). This important and valuable article of food is the produce chiefly of *Coffea arabica*, a Rubiaceous plant indigenous to Abyssinia, which, however, as cultivated originally, spread outwards from the southern parts of Arabia. The name is probably derived from the Arabic K'hāwah, although by some it has been traced to Kaffa, a province in Abyssinia, in which the tree grows wild.



The genus *Coffea*, to which the common coffee tree belongs, contains about 25 species in the tropics of the Old World, mainly African. Besides being found wild in Abyssinia, the common coffee plant appears to be widely disseminated in Africa, occurring wild in the Mozambique district, on the shores of the Victoria Nyanza, and in Angola on the west coast. The coffee leaf disease in Ceylon brought into prominence Liberian coffee (*C. liberica*), a native of the west coast of Africa, now extensively grown in several parts of the world. Other species of economic importance are Sierra Leone coffee (*C. stenophylla*) and Congo coffee (*C. robusta*), both of which have been introduced into and are cultivated on a small scale in various parts of the tropics. *C. excelsa* is another species of considerable promise.

The common Arabian coffee shrub is an evergreen plant, which under natural conditions grows to a height of from 18 to 20 ft., with oblong-ovate, acuminate, smooth and shining leaves, measuring about 6 in. in length by 2½ wide. Its flowers, which are produced in dense clusters in the axils of the leaves, have a five-toothed calyx, a tubular five-parted corolla, five stamens and a single bifid style. The flowers are pure white in colour, with a rich fragrant odour, and the plants in



blossom have a lovely and attractive appearance, but the bloom is very evanescent. The fruit is a fleshy berry, having the appearance and size of a small cherry, and as it ripens it assumes a dark red colour. Each fruit contains two seeds embedded in a yellowish pulp, and the seeds are enclosed in a thin membranous endocarp (the "parchment"). Between each seed and the parchment is a delicate covering called the "silver skin." The seeds which constitute the raw coffee "beans" of commerce are plano-convex in form, the flat surfaces which are laid against each other within the berry having a longitudinal furrow or groove. When only one seed is developed in a fruit it is not flattened on one side, but circular in cross section. Such seeds form "pea-berry" coffee.

The seeds are of a soft, semi-translucent, bluish or greenish colour, hard and tough in texture. The regions best adapted for the cultivation of coffee are well-watered mountain slopes at an elevation ranging from 1000 to 4000 ft. above sea-level, within the tropics, and possessing a mean annual temperature of about 65° to 70° F.

The Liberian coffee plant (*C. liberica*) has larger leaves, flowers and fruits, and is of a more robust and hardy constitution, than Arabian coffee. The seeds yield a highly aromatic and well-flavoured coffee (but by no means equal to Arabian), and the plant is very prolific and yields heavy crops. Liberian coffee grows, moreover, at low altitudes, and flourishes in many situations unsuitable to the Arabian coffee. It grows wild in great abundance along the whole of the Guinea coast.

*History.*—The early history of coffee as an economic product is involved in considerable obscurity, the absence of fact being compensated for by a profusion of conjectural statements and mythical stories. The use of coffee (*C. arabica*) in Abyssinia was recorded in the 15th century, and was then stated to have been practised from time immemorial. Neighbouring countries, however, appear to have been quite ignorant of its value. Various legendary accounts are given of the discovery of the beneficial properties of the plant, one ascribing it to a flock of sheep accidentally browsing on the wild shrubs, with the result that they became elated and sleepless at night! Its physiological action in dissipating drowsiness and preventing sleep was taken advantage of in connexion with the prolonged religious service of the Mahommedans, and its use as a devotional antisoporific stirred up fierce opposition on the part of the strictly orthodox and conservative section of the priests. Coffee by them was held to be an intoxicating beverage, and therefore prohibited by the Koran, and severe penalties were threatened to those addicted to its use. Notwithstanding threats of divine retribution and other devices, the coffee-drinking habit spread rapidly among the Arabian Mahommedans, and the growth of coffee and its use as a national beverage became as inseparably connected with Arabia as tea is with China.

Towards the close of the 16th century the use of coffee was recorded by a European resident in Egypt, and about this epoch it came into general use in the near East. The appreciation of coffee as a beverage in Europe dates from the 17th century. "Coffee-houses" were soon instituted, the first being opened in Constantinople and Venice. In London coffee-houses date from 1652, when one was opened in St Michael's Alley, Cornhill. They soon became popular, and the role played by them in the social life of the 17th and 18th centuries is well known. Germany, France, Sweden and other countries adopted them at about the same time as Great Britain. In Europe, as in Arabia, coffee at first made its way into favour in the face of various adverse and even prohibitive restrictions. Thus at one time in Germany it was necessary to obtain a licence to roast coffee. In England Charles II. endeavoured to suppress coffee-houses on the ground that they were centres of political agitation, his royal proclamation stating that they were the resort of disaffected persons "who devised and spread abroad divers false, malicious and scandalous reports, to the defamation of His Majesty's government, and to the disturbance of the peace and quiet of the nation."

Up to the close of the 17th century the world's entire, although limited, supply of coffee was obtained from the province of Yemen in south Arabia, where the true celebrated Mocha or Mokka coffee is still produced. At this time, however, plants were successfully introduced from Arabia to Java, where the cultivation was immediately taken up. The government of Java distributed plants to various places, including the botanic garden of Amsterdam. The Portuguese introduced coffee into Ceylon. From Amsterdam the Dutch sent the plant to Surinam in 1718, and in the same year Jamaica received it through the governor Sir Nicholas Lawes. Within a few years coffee reached the other West Indian islands, and spread generally through the tropics of the New World, which now produce by far the greater portion of the world's supply.

*Cultivation and Preparation for Market.*—Coffee plants are grown from seeds, which, as in

the case of other crops, should be obtained from selected trees of desirable characteristics. The seeds may be sown "at stake," *i.e.* in the actual positions the mature plants are to occupy, or raised in a nursery and afterwards transplanted. The choice of methods is usually determined by various local considerations. Nurseries are desirable where there is risk of drought killing seedlings in the open. Whilst young the plants usually require to be shaded, and this may be done by growing castor oil plants, cassava (*Manihot*), maize or Indian corn, bananas, or various other useful crops between the coffee, until the latter develop and occupy the ground. Sometimes, but by no means always, permanent shading is afforded by special shade trees, such as species of the coral tree (*Erythrina*) and other leguminous trees. Opinions as to the necessity of shade trees varies in different countries; *e.g.* in Brazil and at high elevations in Jamaica they are not employed, whereas in Porto Rico many look on them as absolutely essential. It is probable that in many cases where shade trees are of advantage their beneficial action may be indirect, in affording protection from wind, drought or soil erosion, and, when leguminous plants are employed, in enriching the soil in nitrogen. The plants begin to come into bearing in their second or third year, but on the average the fifth is the first year of considerable yield. There may be two, three, or even more "flushes" of blossom in one year, and flowers and fruits in all stages may thus be seen on one plant. The fruits are fully ripe about seven months after the flowers open; the ripe fruits are fleshy, and of a deep red colour, whence the name of "cherry." When mature the fruits are picked by hand, or allowed to fall of their own accord or by shaking the plant. The subsequent preparation may be according to (1) the dry or (2) the wet method.

In the dry method the cherries are spread in a thin layer, often on a stone drying floor, or barbecue, and exposed to the sun. Protection is necessary against heavy dew or rain. The dried cherries can be stored for any length of time, and later the dried pulp and the parchment are removed, setting free the two beans contained in each cherry. This primitive and simple method is employed in Arabia, in Brazil and other countries. In Brazil it is giving place to the more modern method described below.

In the wet, or as it is sometimes called, West Indian method, the cherries are put in a tank of water. On large estates galvanized spouting is often employed to convey the beans by the help of running water from the fields to the tank. The mature cherries sink, and are drawn off from the tank through pipes to the pulping machines. Here they are subjected to the action of a roughened cylinder revolving closely against a curved iron plate. The fleshy portion is reduced to a pulp, and the mixture of pulp and liberated seeds (each still enclosed in its parchment) is carried away to a second tank of water and stirred. The light pulp is removed by a stream of water and the seeds allowed to settle. Slight fermentation and subsequent washings, accompanied by trampling with bare feet and stirring by rakes or special machinery, result in the parchment coverings being left quite clean. The beans are now dried on barbecues, in trays, &c., or by artificial heat if climatic conditions render this necessary. Recent experiments in Porto Rico tend to show that if the weather is unfavourable during the crop period the pulped coffee can be allowed to remain moist and even to malt or sprout without injury to the final value of the product when dried later. The product is now in the state known as parchment coffee, and may be exported. Before use, however, the parchment must be removed. This may be done on the estate, at the port of shipment, or in the country where imported. The coffee is thoroughly dried, the parchment broken by a roller, and removed by winnowing. Further rubbing and winnowing removes the silver skin, and the beans are left in the condition of ordinary unroasted coffee. Grading into large, medium and small beans, to secure the uniformity desirable in roasting, is effected by the use of a cylindrical or other pattern sieve, along which the beans are made to travel, encountering first small, then medium, and finally large apertures or meshes. Damaged beans and foreign matter are removed by hand picking. An average yield of cleaned coffee is from 1½ to 2  $\text{lb}$  per tree, but much greater crops are obtained on new rich lands, and under special conditions.

*Production.*—The centre of production has shifted greatly since coffee first came into use in Europe. Arabia formerly supplied the world; later the West Indies and then Java took the lead, to be supplanted in turn by Brazil, which now produces about three-quarters of the world's supply and controls the market.

*Brazil.*—Coffee planting is the chief industry of Brazil, and coffee the principal export. The states of São Paulo, Rio de Janeiro, Minas Geraes and Santos, contain the chief coffee-producing lands. The annual output ranges from about 10,000,000 to 16,000,000 bags (of 120  $\text{lb}$  each), whilst the world's annual consumption is more or less stationary at about 16,000,000 bags. The overwhelming importance of the Brazilian output is thus evident. Recently efforts have been made to restrict production to maintain prices, and the Coffee Convention scheme came into force in São Paulo on December 1, 1906, and in Rio de Janeiro

and Minas Geraes on January 1, 1907. The cultivation in general is very primitive in character, periodical weeding being almost all the attention the plants receive. Manuring is commonly confined to mulches of the cut weeds and addition of the coffee husks. New lands in São Paulo yield from 80 cwt. to 100 cwt. of cleaned coffee per 1000 trees (700 go to the acre); the average yield, however, is not more than 15 cwt. The plants are at their best when from 10 to 15 years old, but continue yielding for 30 years or even more.

*Other South American Countries.*—Venezuela, Colombia, Ecuador, Peru, and to a much less degree Bolivia and Paraguay, produce coffee, the annual crops of the two former countries being each of about £1,500,000 in value.

*Central America.*—Guatemala produces the most in this region; the coffee estates are mainly controlled by Germans, who have brought them to a high pitch of perfection. The crop ranges in value from about £1,000,000 to £1,500,000 per annum. Costa Rica and San Salvador produce about half this amount. In Nicaragua, Honduras and Panama, coffee is extensively cultivated, and all export the product.

*West Indies.*—Coffee is grown in most of the islands, often only for local use. Haiti produces the largest amount, the annual value of the crop being about £500,000. Porto Rico formerly had a flourishing industry, but it has declined owing to various causes. The interior is still expected to be devoted largely to coffee, and the U.S. Department of Agriculture has carried out experiments to improve methods and ensure the cultivation of better varieties. Jamaica produces the famous Blue Mountain Coffee, which compares favourably with the best coffees of the world, and also ordinary or “plain grown”; the Blue Mountain is cultivated at elevations of from 3000 to 4500 ft. Coffee usually ranks third or fourth in value amongst the exports of the island.

*Africa*, the native country of the coffees, does not now contribute any important amount to the world's output. In Liberia, the Gold Coast and elsewhere on the West Coast are many plantations, but the low prices ruling of recent years have caused coffee to be neglected for more remunerative crops. Coffee is, however, still the principal export of Nyasaland (British Central Africa), where it was introduced as recently as 1894. The area under coffee has been greatly reduced, owing partly to more attention being paid to cotton, partly to droughts and other causes. In Somaliland and Abyssinia coffee cultivation is of very ancient date. Two kinds are exported, Harrari and Habashi. The former compares favourably with Mocha coffee. The industry could be very considerably extended. In Natal, Rhodesia, &c., coffee is grown, but not in sufficient quantity to supply the local demand.

*Arabia.*—The name “Mocha” is applied generally to coffee produced in Arabia. Turkey and Egypt obtain the best grades. Traders from these countries go to Arabia, buy the crops on the trees, and supervise its picking and preparation themselves. The coffee is prepared by the “dry method.”

*India* is the principal coffee-growing region in the British empire, and produces about one-fifth of the total supply of the United Kingdom. There are some 213,000 acres under coffee, mostly in southern India. The official report states that the production of coffee is restricted for the most part to a limited area in the elevated region above the south-western coast, the coffee lands of Mysore, Coorg, and the Madras districts of Malabar and the Nilgiris, comprising 86% of the whole area under the plant in India. About one-half of the whole coffee-producing area is in Mysore. In Burma, Assam and Bombay, coffee is of minor importance. During 1904-1906 there was a reduction of the area under coffee in India by 21,554 acres.

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*Ceylon.*—The history of coffee in Ceylon is practically that of the coffee-leaf disease (see below). The Dutch introduced Arabian coffee in 1720, but abandoned its cultivation later. It was revived by the British, and developed very rapidly between 1836 and 1845, when there was a temporary collapse owing to financial crisis in the United Kingdom. In 1880 the exports of coffee were of the value of about £2,784,163. Ten years later they had fallen to £430,633, owing to the ravages of the coffee-leaf disease. The output continued to decrease, and the value of the crop in 1906 was only £17,258. Liberian coffee, which is hardier and more resistant to disease, was introduced, but met with only partial success.

*Dutch East Indies.*—Coffee from this source passes under the general name of “Java,” that island producing the greatest amount; Sumatra, Borneo and the Celebes, &c., however, also contribute. The Java plantations are largely owned by the government. Much of the coffee from these islands is of a high quality.

*Australasia.*—Coffee can be cultivated in the northern territories of Australia, but comparatively little is done with this crop; Queensland produces the largest amount.

*Hawaii, &c.*—In all the islands of the Hawaiian group coffee is grown, but nine-tenths or more is raised in Hawaii itself, the Kona district being the chief seat of production. The

exports go mostly to the United States, and there is also a large local consumption.

Coffee thrives well also in the Philippines and Guam.

*The World's Trade.*—The following figures, from the *Year-book* of the U.S. Department of Agriculture, indicate the relative importance of the coffee-exporting countries.

Country.	1904. Exports coffee in £.	1905. Exports coffee in £.
<i>America—</i>		
Brazil	1,326,027,795	1,431,328,038
Colombia	130,000,000	(est.) 70,000,000
Venezuela	128,000,000	(est.) 94,370,090
Haiti	81,407,346	45,244,232
Salvador	75,314,003	61,822,223
Guatemala	71,653,700	81,081,600
Mexico	41,855,368	42,456,491
Costa Rica	27,730,672	39,788,002
Nicaragua	21,661,621	18,171,515
Porto Rico	15,330,590	
Jamaica	5,781,440	9,046,464
<i>Asia—</i>		
Dutch East Indies	77,168,254	72,864,649
British India	36,920,464	40,340,384
Singapore (port of export)	12,367,156	11,935,034
	216,891,567	220,132,690
<i>Other countries</i>		
Total	2,268,109,976	2,238,581,412

In 1906 there was an increased total of 2,680,855,878 £, due to the Brazil export rising to 1,847,367,771 £. The aggregate value of the coffee annually entering the world's markets is about £40,000,000.

*Coffee Consumption.*—The United States of America consume nearly one half of all the coffee exported from the producing countries of the world. This might of course be due merely to the States containing more coffee-drinkers than other countries, but the average consumption per head in the country is about 11 to 12 £ per annum, an amount equalled or excelled only in Norway, Sweden and Holland. Whilst one great branch of the Anglo-Saxon stock is near the head of the list, it is interesting to note that the United Kingdom and also Canada and Australia are almost at the foot, using only about 1 £ of coffee per head each year. Germany, with a consumption of about 6 to 7 £ per person per annum uses considerably less than a quarter of the world's commercial crop. France, about 5 £ per head, takes about one eighth; and Austria-Hungary, about 2 £, uses some one-sixteenth. Holland consumes approximately as much, but with a much smaller population, the Dutch using more per head than any other people—14 £ to 15 £ per annum. Their taste is seen also in the relatively high consumption in South Africa. Sweden, Belgium and the United Kingdom, follow next in order of total amount used.

In many tropical countries much coffee is drunk, but as it is often produced locally exact figures are not available. The average consumption in the United Kingdom is about 50,000,000 lb per annum; about one-fifth only is produced in the British empire, and of this about nineteen-twentieths come from India and one-twentieth from the British West Indies.

*Coffee-leaf Disease.*—The coffee industry in Ceylon was ruined by the attack of a fungoid disease (*Hemileia vastatrix*) known as the Ceylon coffee-leaf disease. This has since extended its ravages into every coffee-producing country in the Old World, and added greatly to the difficulties of successful cultivation. The fungus is a microscopic one, the minute spores of which, carried by the wind, settle and germinate upon the leaves of the plant. The fungal growth spreads through the substance to the leaf, robbing the leaf of its nourishment and causing it to wither and fall. An infected plantation may be cleansed, and the fungus in its nascent state destroyed, by powdering the trees with a mixture of lime and

sulphur, but, unless the access of fresh spores brought by the wind can be arrested, the plantations may be readily reinfected when the lime and sulphur are washed off by rain. The separation of plantations by belts of trees to windward is suggested as a check to the spread of the disease.

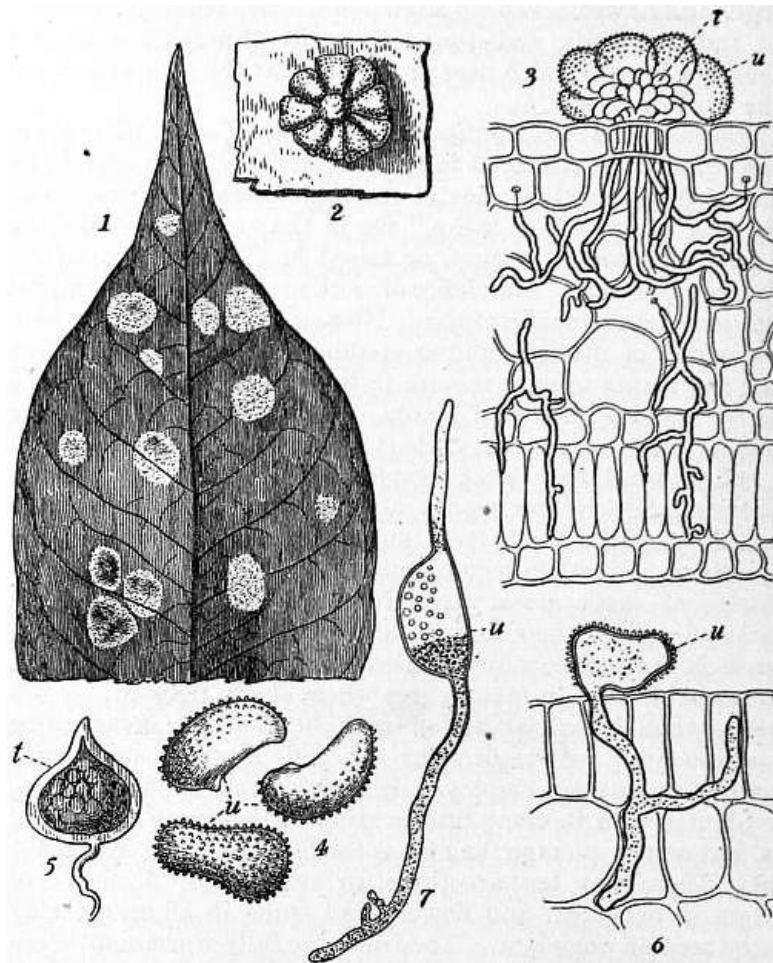


FIG. 2.—Coffee-leaf Disease, *Hemileia vastatrix*.

- |   |   |
|---|---|
| 1, Part of leaf showing diseased patches.   | 6, A uredospore germinating, the germ-tube is penetrating the leaf. |
| 2, Cluster of uredospores.  | 5, A teleutospore.  |
| 3, Transverse section of a diseased patch in the leaf showing the hyphae of the fungus pushing between the leaf-cells and tapping them for nourishment. The hyphae have broken through in the upper face and are forming a cluster of spores. | 4, Ripe uredospores.  |
|   | 7, Uredospore germinating.  |
|   | u, Uredospore.  |
|   | t, Teleutospore.  |
|   | 2-7, Highly magnified.  |

*Microscopic Structure.*—Raw coffee seeds are tough and horny in structure, and are devoid of the peculiar aroma and taste which are so characteristic of the roasted seeds. The minute structure of coffee allows it to be readily recognized by means of the microscope, and as roasting does not destroy its distinguishing peculiarities, microscopic examination forms the readiest means of determining the genuineness of any sample. The substance of the seed, according to Dr Hassall, consists “of an assemblage of vesicles or cells of an angular form, which adhere so firmly together that they break up into pieces rather than separate into distinct and perfect cells. The cavities of the cells include, in the form of little drops, a considerable quantity of aromatic volatile oil, on the presence of which the fragrance and many of the active principles of the berry depend” (see fig. 3).

*Physiological Action.*—Coffee belongs to the medicinal or auxiliary class of food substances, being solely valuable for its stimulant effect upon the nervous and vascular system. It produces a feeling of buoyancy and exhilaration comparable to a certain stage of alcoholic intoxication, but which does not end in depression or collapse. It increases the frequency of the pulse, lightens the sensation of fatigue, and it sustains the strength under prolonged and severe muscular exertion. The value

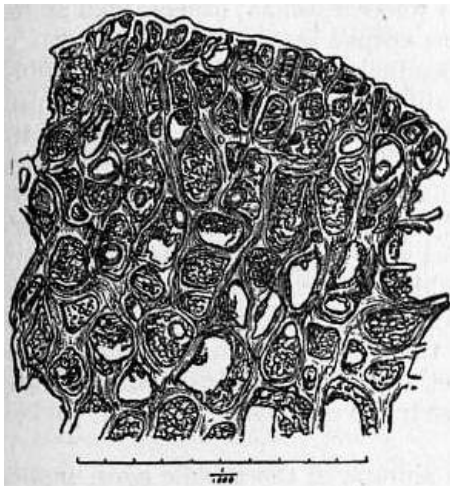


FIG. 3.—Microscopic structure of Coffee.

of its hot infusion under the rigours of Arctic cold has been demonstrated in the experience of all Arctic explorers, and it is scarcely less useful in tropical regions, where it beneficially stimulates the action of the skin.

The physiological action of coffee mainly depends on the presence of the alkaloid caffeine, which occurs also in tea, Paraguay tea, and cola nuts, and is very similar to theobromine, the active principle in cocoa. The percentage of caffeine present varies in the different species of *Coffea*. In Arabian coffee it ranges from about 0.7 to 1.6%; in Liberian coffee from 1.0 to 1.5%. Sierra Leone coffee (*C. stenophylla*) contains from 1.52 to 1.70%; in *C. excelsa* 1.89% is recorded, and as much as 1.97% in *C. canephora*. Four species have been shown by M. G. Bertrand to contain no

caffeine at all, but instead a considerable quantity of a bitter principle. All these four species are found only in Madagascar or the neighbouring islands. Other coffees grown there contain caffeine as usual. Coffee, with the caffeine extracted, has also been recently prepared for the market. The commercial value of coffee is determined by the amount of the aromatic oil, caffeone, which develops in it by the process of roasting. By prolonged keeping it is found that the richness of any seeds in this peculiar oil is increased, and with increased aroma the coffee also yields a blander and more mellow beverage. Stored coffee loses weight at first with great rapidity, as much as 8% having been found to dissipate in the first year of keeping, 5% in the second, and 2% in the third; but such loss of weight is more than compensated by improvement in quality and consequent enhancement of value.

*Roasting.*—In the process of roasting, coffee seeds swell up by the liberation of gases within their substance,—their weight decreasing in proportion to the extent to which the operation is carried. Roasting also develops with the aromatic caffeone above alluded to a bitter soluble principle, and it liberates a portion of the caffeine from its combination with the caffetannic acid. Roasting is an operation of the greatest nicety, and one, moreover, of a crucial nature, for equally by insufficient and by excessive roasting much of the aroma of the coffee is lost; and its infusion is neither agreeable to the palate nor exhilarating in its influence. The roaster must judge of the amount of heat required for the adequate roasting of different qualities, and while that is variable, the range of roasting temperature proper for individual kinds is only narrow. In continental countries it is the practice to roast in small quantities, and thus the whole charge is well under the control of the roaster; but in Britain large roasts are the rule, in dealing with which much difficulty is experienced in producing uniform torrefaction, and in stopping the process at the proper moment. The coffee-roasting apparatus is usually a malleable iron cylinder mounted to revolve over the fire on a hollow axle which allows the escape of gases generated during torrefaction. The roasting of coffee should be done as short a time as practicable before the grinding for use, and as ground coffee especially parts rapidly with its aroma, the grinding should only be done when coffee is about to be prepared.

*Adulteration.*—Although by microscopic, physical and chemical tests the purity of coffee can be determined with perfect certainty, yet ground coffee is subjected to many and extensive adulterations (see also [ADULTERATION](#)). Chief among the adulterant substances, if it can be so called, is chicory; but it occupies a peculiar position, since very many people on the European continent as well as in Great Britain deliberately prefer a mixture of chicory with coffee to pure coffee. Chicory is indeed destitute of the stimulant alkaloid and essential oil for which coffee is valued; but the facts that it has stood the test of prolonged and extended use, and that its infusion is, in some localities, used alone, indicate that it performs some useful function in connexion with coffee, as used at least by Western communities. For one thing, it yields a copious amount of soluble matter in infusion with hot water, and thus gives a specious appearance of strength and substance to what may be really only a very weak preparation of coffee. The mixture of chicory with coffee is easily detected by the microscope, the structure of both, which they retain after torrefaction, being very characteristic and distinct. The granules of coffee, moreover, remain hard and angular when mixed with water, to which they communicate but little colour; chicory, on the other hand, swelling up and softening, yields a deep brown colour to water in which it is thrown. The specific gravity of an infusion of chicory is also much higher than that of coffee. Among the numerous other substances used to adulterate coffee are roasted and ground roots of the

dandelion, carrot, parsnip and beet; beans, lupins and other leguminous seeds; wheat, rice and various cereal grains; the seeds of the broom, fenugreek and iris; acorns; "negro coffee," the seeds of *Cassia occidentalis*, the seeds of the ochro (*Hibiscus esculentus*), and also the soja or soy bean (*Glycine Soya*). Not only have these with many more similar substances been used as adulterants, but under various high-sounding names several of them have been introduced as substitutes for coffee; but they have neither merited nor obtained any success, and their sole effect has been to bring coffee into undeserved disrepute with the public.

Not only is ground coffee adulterated, but such mixtures as flour, chicory and coffee, or even bran and molasses, have been made up to simulate coffee beans and sold as such.

The leaves of the coffee tree contain caffeine in larger proportion than the seeds themselves, and their use as a substitute for tea has frequently been suggested. The leaves are actually so used in Sumatra, but being destitute of any attractive aroma such as is possessed by both tea and coffee, the infusion is not palatable. It is, moreover, not practicable to obtain both seeds and leaves from the same plant, and as the commercial demand is for the seed alone, no consideration either of profit or of any dietetic or economic advantage is likely to lead to the growth of coffee trees on account of their leaves.

(A. B. R.; W. G. F.)

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**COFFER** (Fr. *coffre*, O. Fr. *cofre* or *cofne*, Lat. *cophinus*, cf. "coffin"), in architecture, a sunk panel in a ceiling or vault; also a casket or chest in which jewels or precious goods were kept, and, if of large dimensions, clothes. The marriage coffers in Italy were of exceptional richness in their carving and gilding and were sometimes painted by great artists.

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**COFFERDAM**, in engineering. To enable foundations (*q.v.*) to be laid in a site which is under water, the engineer sometimes surrounds it with an embankment or dam, known as a cofferdam, to form an enclosure from which the water is excluded. Where the depth of water is small and the current slight, simple clay dams may be used, but in general cofferdams consist of two rows of piles, the space between which is packed with clay puddle. The dam must be sufficiently strong to withstand the exterior pressure to which it is exposed when the enclosed space is pumped dry.

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**COFFEYVILLE**, a city of Montgomery county, Kansas, U.S.A., on the Verdigris river, about 150 m. S. of Topeka and near the southern boundary of the state. Pop. (1890) 2282; (1900) 4953, of whom 803 were negroes; (1905) 13,196; (1910) 12,687. Coffeyville is served by the Missouri Pacific, the Atchison, Topeka & Santa Fé, the Missouri, Kansas & Texas, and the Saint Louis, Iron Mountain & Southern railways, and by inter-urban electric railway to Independence. It is in the Kansas natural-gas field, ships large quantities of grain, and has a large zinc oxide smelter and a large oil refinery, and various manufactures, including vitrified brick and tile, flour, lumber, chemicals, window glass, bottles, pottery and straw boards. The municipality owns and operates its water-works and electric lighting plant. Coffeyville, named in honour of A. M. Coffey, who was a member of the first legislature of the territory of Kansas, was founded in 1869, but in 1871 it was removed about 1 m. from its original site, now known as "old town." It was incorporated as a city of the third class in 1872 and received a new charter in 1887. Coffeyville became a station on the Leavenworth, Lawrence & Galveston railway (now part of the Atchison, Topeka & Santa Fé), and for several years large numbers of cattle were driven here from Indian Territory and Texas for

shipment; in fact, the city's chief importance was as a trade centre for the north part of Indian Territory until natural gas was found here in large quantities in 1892.

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**COFFIN** (from Lat. *cophinus*, Gr. κόφινος, a coffer, chest or basket, but never meaning "coffin" in its present sense), the receptacle in which a corpse is confined. The Greeks and Romans disposed of their dead both by burial and by cremation. Greek coffins varied in shape, being in the form of an urn, or like the modern coffins, or triangular, the body being in a sitting posture. The material used was generally burnt clay, and in some cases this had obviously been first moulded round the body, and so baked. Cremation was the commonest method of disposing of the dead among the Romans, until the Christian era, when stone coffins came into use. Examples of these have been frequently dug up in England. In 1853, during excavations for the foundations of some warehouses in Hayden Square, Minories, London, a Roman stone coffin was found within which was a leaden shell. Others have been found at Whitechapel, Stratford-le-Bow, Old Kent Road and Battersea Fields, and in great numbers at Colchester, York, Southfleet and Kingsholme near Gloucester. In early England stone coffins were only used by the nobles and the wealthy. Those of the Romans who were rich enough had their coffins made of a limestone brought from Assos in Troas, which it was commonly believed "ate the body"; hence arose the name sarcophagus (*q.v.*).

The coffins of the Chaldaeans were generally clay urns with the top left open, resembling immense jars. These, too, must have been moulded round the body, as the size of the mouth would not admit of its introduction after the clay was baked. The Egyptian coffins, or sarcophagi, as they have been improperly called, are the largest stone coffins known and are generally highly polished and covered with hieroglyphics, usually a history of the deceased. Mummy chests shaped to the form of the body were also used. These were made of hard wood or *papier mâché* painted, and like the stone coffins bore hieroglyphics. The Persians, Parthians, Medes and peoples of the Caspian are not known to have had any coffins, their usual custom being to expose the body to be devoured by beasts and birds of prey. Unhewn flat stones were sometimes used by the ancient European peoples to line the grave. One was placed at the bottom, others stood on their edges to form the sides, and a large slab was put on top, thus forming a rude cist. In England after the Roman invasion these rude cists gave place to the stone coffin, and this, though varying much in shape, continued in use until the 16th century.

The most primitive wooden coffin was formed of a tree-trunk split down the centre, and hollowed out. The earliest specimen of this type is in the Copenhagen museum, the implements found in it proving that it belonged to the Bronze Age. This type of coffin, more or less modified by planing, was used in medieval Britain by those of the better classes who could not afford stone, but the poor were buried without coffins, wrapped simply in cloth or even covered only with hay and flowers. Towards the end of the 17th century, coffins became usual for all classes. It is worth noting that in the Burial Service in the Book of Common Prayer the word "coffin" is not used.

Among the American Indians some tribes, *e.g.* the Sacs, Foxes and Sioux, used rough hewn wooden coffins; others, such as the Seris, sometimes enclosed the corpse between the carapace and plastron of a turtle. The Seminoles of Florida used no coffins, while at Santa Barbara, California, canoes containing corpses have been found buried though they may have been intended for the dead warrior's use in the next world. Rough stone cists, too, have been found, especially in Illinois and Kentucky. In their tree and scaffold burial the Indians sometimes used wooden coffins, but oftener the bodies were simply wrapped in blankets. Canoes mounted on a scaffold near a river were used as coffins by some tribes, while others placed the corpse in a canoe or wicker basket and floated them out into the stream or lake (see [FUNERAL RITES](#)). The aborigines of Australia generally used coffins of bark, but some tribes employed baskets of wicker-work.

Lead coffins were used in Europe in the middle ages, shaped like the mummy chests of ancient Egypt. Iron coffins were more rare, but they were certainly used in England and Scotland as late as the 17th century, when an order was made that upon bodies so buried a heavier burial fee should be levied. The coffins used in England to-day are generally of elm or oak lined with lead, or with a leaden shell so as to delay as far as possible the process of disintegration and decomposition. In America glass is sometimes used for the lids, and the



inside is lined with copper or zinc. The coffins of France and Germany and the continent generally, usually differ from those of England in not being of the ordinary hexagonal shape but having sides and ends parallel. Coffins used in cremation throughout the civilized world are of some light material easily consumed and yielding little ash. Ordinary thin deal and *papier mâché* are the favourite materials. Coffins for what is known as Earth to Earth Burial are made of wicker-work covered with a thin layer of *papier mâché* over cloth.

See also [FUNERAL RITES](#); [CREMATION](#); [BURIAL AND BURIAL ACTS](#); [EMBALMING](#); [MUMMY](#), &c.

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**COG.** (1) (From an older *cogge*, a word which appears in various forms in Teutonic languages, as in O. Ger. *kogge* or *kocke*, and also in Romanic, as in O. Fr. *cogue*, or *coque*, from which the Eng. "cock-boat" is derived; the connexion between the Teutonic and the Romanic forms is obscure), a broadly built, round-shaped ship, used as a trader and also as a ship of war till the 15th century. (2) (A word of obscure origin, possibly connected with Fr. *coche*, and Ital. *cocca*, a notch; the Celtic forms *cog* and *cocas* come from the English), a tooth in a series of teeth, morticed on to, or cut out of the circumference of a wheel, which works with the tooth in a corresponding series on another wheel (see [MECHANICS](#)). (3) (Also of quite obscure origin), a slang term for a form of cheating at dice. The early uses of the word show that this was done not by "loading" the dice, as the modern use of the expression of "cogged dice" seems to imply, but by sleight of hand in directing the fall or in changing the dice.

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**COGERS HALL**, a London tavern debating society. It was instituted in 1755 at the White Bear Inn (now St Bride's Tavern), Fleet Street, moved about 1850 to Discussion Hall, Shoe Lane, and in 1871 finally migrated to the Barley Mow Inn, Salisbury Square, E.C., its present quarters. The name is often wrongly spelt Codgers and Coggers; the "o" is really long, the accepted derivation being from Descartes' *Cogito, ergo sum*, and thus meaning "The society of thinkers." The aims of the Cogers were "the promotion of the liberty of the subject and the freedom of the Press, the maintenance of loyalty to the laws, the rights and claims of humanity and the practice of public and private virtue." Among its early members Cogers Hall reckoned John Wilkes, one of its first presidents, and Curran, who in 1773 writes to a friend that he spent a couple of hours every night at the Hall. Later Dickens was a prominent member.

See Peter Rayleigh, *History of Ye Antient Society of Cogers* (London, 1904).

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**COGHLAN, CHARLES FRANCIS** (1841-1899), Irish actor, was born in Paris, and was educated for the law. He made his first London appearance in 1860, and became the leading actor at the Prince of Wales's. He went to America in 1876, where he remained for the rest of his life, playing first in Augustin Daly's company and then in the Union Square stock company, during the long run of *The Celebrated Case*. He also played with his sister, and in support of Mrs Langtry and Mrs Fiske, and in 1898 produced a version of Dumas' *Kean*, called *The Royal Box*, in which he successfully starred during the last years of his life. He died in Galveston, Texas, on the 27th of November 1899.

His sister, the actress ROSE COGHLAN (1853- ), went to America in 1871, was again in England from 1873 to 1877, playing with Barry Sullivan, and then returned to America, where she became prominent as Countess Zicka in *Diplomacy*, and Stephanie in *Forget-me-not*. She was at Wallack's almost continuously until 1888, and subsequently appeared in melodrama in parts like the title-rôle of *The Sporting Duchess*.

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**COGNAC**, a town of south-western France, capital of an arrondissement in the department of Charente, on the left bank of the river Charente, 32 m. W. of Angoulême on the Ouest-État railway, between Angoulême and Saintes. Pop. (1906) 18,389. The streets of the old town—which borders the river—are narrow and tortuous, but the newer parts are well provided with open spaces. The chief of these is the beautiful Parc François 1er overlooking the Charente. In one of the squares there is a statue of Francis I., who was born here. The chief building is a church of the 12th century dedicated to St Leger, which preserves a fine Romanesque façade and a tower of the 15th century. A castle of the 15th and 16th centuries, once the residence of the counts of Angoulême, now a storehouse for brandy, and a medieval gate stand in the older part of the town. Cognac is the seat of a subprefect and has tribunals of first instance and of commerce, a council of trade arbitrators, a chamber of commerce, and consulates of the United States, Spain and Portugal. Its most important industry is the distillation of the brandy (*q.v.*) to which the town gives its name. Large quantities are carried, by way of the river, to the neighbouring port of Tonnay-Charente. The industries subsidiary to the brandy trade, such as the making of cases and bottles, occupy many hands. Ironware is also manufactured, and a considerable trade is maintained in grain and cattle. In 1526 Cognac gave its name to a treaty concluded against Charles V. by Francis I., the pope, Venice and Milan. Its possession was contested during the wars of religion, and in 1570 it became one of the Huguenot strongholds. In 1651 it successfully sustained a siege against Louis II., prince of Condé, leader of the Fronde.

See *Le Pays du Cognac*, by L. Ravaz, for a description of the district and its viticulture.

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**COGNITION** (Latin *cognitio*, from *cognoscere*, to become acquainted with), in psychology, a term used in its most general sense for all modes of being conscious or aware of an object, whether material or intellectual. It is an ultimate mode of consciousness, strictly the presentation (through sensation or otherwise) of an object to consciousness; in its complete form, however, it seems to involve a judgment, *i.e.* the separation from other objects of the object presented. The psychological theory of cognition takes for granted the dualism of the mind that knows and the object known; it takes no account of the metaphysical problem as to the possibility of a relation between the ego and the non-ego, but assumes that such a relation does exist. Cognition is therefore distinct from emotion and conation; it has no psychological connexion with feelings of pleasure and pain, nor does it tend as such to issue in action.

For the analysis of cognition-reactions see O. Külpe, *Outlines of Psychology* (Eng. trans., 1895), pp. 411 foll.; E. B. Titchener, *Experimental Psychology* (1905), ii. 187 foll. On cognition generally, G. F. Stout's *Analytic Psychology and Manual of Psychology*; W. James's *Principles of Psychology* (1890), i. 216 foll.; also article [PSYCHOLOGY](#).

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**COGNIZANCE** (Lat. *cognoscere*, to know), knowledge, notice, especially judicial notice, the right of trying or considering a case judicially, the exercise of jurisdiction by a court of law. In heraldry a "cognizance" is an emblem, badge or device, used as a distinguishing mark by the body of retainers of a royal or noble house.

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**COHEN** (Hebrew for “priest”), a Jewish family name, implying descent from the ancient Hebrew priests. Many families claiming such descent are, however, not named Cohen. Other forms of the name are Cohn, Cowen, Kahn.

See J. Jacobs, *Jewish Encyclopedia*, iv. 144.

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**COHN, FERDINAND JULIUS** (1828-1898), German botanist, was born on the 24th of January 1828 at Breslau. He was educated at Breslau and Berlin, and in 1859 became extraordinary, and in 1871 ordinary, professor of botany at Breslau University. He had a remarkable career, owing to his Jewish origin. He was contemporary with N. Pringsheim, and worked with H. R. Goepfert, C. G. Nees von Esenbeck, C. G. Ehrenberg and Johannes Müller. At an early date he exhibited astonishing ability with the microscope, which he did much to improve, and his researches on cell-walls and the growth and contents of plant-cells soon attracted attention, especially as he made remarkable advances in the establishment of an improved cell-theory, discovered the cilia in, and analysed the movements of, zoospores, and pointed out that the protoplasm of the plant-cell and the sarcode of the zoologists were one and the same physical vehicle of life. Although these early researches were especially on the Algae, in which group he instituted marked reforms of the rigid system due to F. T. Kützing, Cohn had already displayed that activity in various departments which made him so famous as an all-round naturalist, his attention at various times being turned to such varied subjects as *Aldorovanda*, torsion in trees, the nature of waterspouts, the effects of lightning, physiology of seeds, the proteid crystals in the potato, which he discovered, the formation of travertin, the rotatoria, luminous worms, &c.

It is, however, in the introduction of the strict biological and philosophical analysis of the life-histories of the lower and most minute forms of life that Cohn's greatest achievements consist, for he applied to these organisms the principle that we can only know the phases of growth of microscopic plants by watching every stage of development under the microscope, just as we learn how different are the youthful and adult appearances of an oak or a fern by direct observation. The success with which he attempted and carried out the application of cultural and developmental methods on the Algae, Fungi and Bacteria can only be fully appreciated by those familiar with the minute size and elusive evolutions of these organisms, and with the limited appliances at Cohn's command. Nevertheless his account of the life-histories of *Protococcus* (1850), *Stephanosphaera* (1852), *Volvox* (1856 and 1875), *Hydrodictyon* (1861), and *Sphaeroplea* (1855-1857) among the Algae have never been put aside. The first is a model of what a study in development should be; the last shares with G. Thuret's studies on *Fucus* and Pringsheim's on *Vaucheria* the merit of establishing the existence of a sexual process in Algae. Among the Fungi Cohn contributed important researches on *Pilobolus* (1851), *Empusa* (1855), *Tarichium* (1869), as well as valuable work on the nature of parasitism of Algae and Fungi.

It is as the founder of bacteriology that Cohn's most striking claims to recognition will be established. He seems to have been always attracted particularly by curious problems of fermentation and coloration due to the most minute forms of life, as evinced by his papers on *Monas prodigiosa* (1850) and “Über blutähnliche Färbungen” (1850), on infusoria (1851 and 1852), on organisms in drinking-water (1853), “Die Wunder des Blutes” (1854), and had already published several works on insect epidemics (1869-1870) and on plant diseases, when his first specially bacteriological memoir (*Crenothrix*) appeared in the journal, *Beiträge zur Biologie*, which he then started (1870-1871), and which has since become so renowned. Investigations on other branches of bacteriology soon followed, among which “Organismen der Pockenlymphe” (1872) and “Untersuchungen über Bacterien” (1872-1875) are most important, and laid the foundations of the new department of science which has now its own laboratories, literature and workers specially devoted to its extension in all directions. When it is remembered that Cohn brought out and helped R. Koch in publishing his celebrated paper on *Anthrax* (1876), the first clearly worked out case of a bacterial disease, the significance of his influence on bacteriology becomes apparent.

Among his most striking discoveries during his studies of the forms and movements of the Bacteria may be mentioned the nature of Zoogloea, the formation and germination of true spores—which he observed for the first time, and which he himself discovered in *Bacillus subtilis*—and their resistance to high temperatures, and the bearing of this on the fallacious experiments supposed to support abiogenesis; as well as works on the bacteria of air and water, the significance of the bright sulphur granules in sulphur bacteria, and of the iron oxide deposited in the walls of *Crenothrix*. His discoveries in these and in other departments all stand forth as mementoes of his acute observation and reasoning powers, and the thoughtful (in every sense of the word) consideration of the work of others, and suggestive ideas attached to his principal papers, bear the same characteristics. If we overcome the always difficult task of bridging in imagination the interval between our present platform of knowledge and that on which bacteriologists stood in, say, 1870, we shall not undervalue the important contributions of Cohn to the overthrow of the then formidable bugbear known as the doctrine of “spontaneous generation,” a dogma of despair calculated to impede progress as much in its day as that of “vitalism” did in other periods. Cohn had also clear perceptions of the important bearings of Mycology and Bacteriology in infective diseases, as shown by his studies in insect-killing fungi, microscopic analysis of water, &c. He was a foreign member of the Royal Society and of the Linnean Society, and received the gold medal of the latter in 1895. He died at Breslau on the 25th of June 1898.

Lists of his papers will be found in the *Catalogue of Scientific Papers of the Royal Society*, and in *Ber. d. d. bot. Gesellsch.*, 1899, vol. xvii. p. (196). The latter also contains (p. (172)) a full memoir by F. Rosen.

(H. M. W.)

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**COHN, GUSTAV** (1840- ), German economist, was born on the 12th of December 1840 at Marienwerder, in West Prussia. He was educated at Berlin and Jena universities. In 1869 he obtained a post at the polytechnic in Riga, and in 1875 was elected a professor at the polytechnic at Zürich. In 1873 he went to England for a period of study, and as a result published his *Untersuchungen über die englische Eisenbahnpolitik* (Leipzig, 1874-1875). In 1884 he was appointed professor of political science at Göttingen. Cohn's best-known works are *System der Nationalökonomie* (Stuttgart, 1885); *Finanzwissenschaft* (1889); *Nationalökonomische Studien* (1886), and *Zur Geschichte und Politik des Verkehrswesens* (1900).

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**COHOES**, a city of Albany county, New York, U.S.A., about 9 m. N. of Albany, at the confluence of the Mohawk and Hudson rivers. Pop. (1890) 22,509; (1900) 23,910, of whom 7303 were foreign-born; (1910) 24,709. It is served by the New York Central & Hudson River and the Delaware & Hudson railways, by electric lines to Troy and Albany, and by the Erie and Champlain canals. It is primarily a manufacturing city. Hosiery and knit goods, cotton cloth, cotton batting, shoddy, underwear and shirts and collars are the principal products, but there are also extensive valve works and manufactories of pulp, paper and paper boxes, beer, pins and needles, tools and machinery, and sash, doors and blinds. The value of the factory products in 1905 was \$10,289,822, of which \$4,126,873, or 40.1%, was the value of hosiery and knit goods, Cohoes ranking fifth among the cities of the United States (of 20,000 inhabitants or more) in this industry, and showing a higher degree of specialization in it than any other city in the United States except Little Falls, N.Y. The Falls of the Mohawk, which furnish power for the majority of the manufacturing establishments, are 75 ft. high and 900 ft. broad, a large dam above the falls storing the water, which is conveyed through canals to the mills. Below the falls the river is crossed by two fine iron bridges. The city has a public library, a normal training school and the St Bernard's (Roman Catholic) Academy. Cohoes was a part of the extensive manorial grant made to Killian Van Rensselaer in 1629 and it was probably settled very soon afterwards. It was incorporated as a village in 1848 and was chartered as a city in 1870.

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**COHORT** (Lat. *cohors*), originally a place enclosed: in the Roman army, the name of a unit of infantry. The troops of the first grade, the legions, were divided into cohorts, of which there were ten in each legion: the cohort thus contained 600 men. Among the troops of the second grade (the *auxilia*) the cohorts were independent foot regiments 500 or 1000 strong, corresponding to the *alae*, which were similar regiments of cavalry; they were generally posted on the frontiers of the Empire in small forts of four to eight acres, each holding one cohort or *ala*. The special troops of Rome itself, the Praetorian Guard, the Urbanæ Cohortes, and the Vigiles (fire brigade), were divided into cohorts (see further [ROMAN ARMY](#)). The phrase *cohors praetoria* or *cohors amicorum* was sometimes used, especially during the Roman republic, to denote the suite of the governor of a province; hence developed the Praetorian cohorts which formed the emperor's bodyguard.

In biology, "cohort" is a term for a group of allied orders or families of plants or animals.

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**COIF** (from Fr. *coiffe*, Ital. *cuffia*, a cap), a close-fitting covering for the head. Originally it was the name given to a head-covering worn in the middle ages, tied like a night-cap under the chin, and worn out of doors by both sexes; this was later worn by men as a kind of night-cap or skull-cap. The coif was also a close-fitting cap of white lawn or silk, worn by English serjeants-at-law as a distinguishing mark of their profession. It became the fashion to wear on the top of the white coif a small skull-cap of black silk or velvet; and on the introduction of wigs at the end of the 17th century a round space was left on the top of the wig for the display of the coif, which was afterwards covered by a small patch of black silk edged with white (see A. Pulling, *Order of the Coif*, 1897). The random conjecture of Sir H. Spelman (*Glossarium archaologicum*) that the coif was originally designed to conceal the ecclesiastical tonsure has unfortunately been quoted by annotators of Blackstone's *Commentaries* as well as by Lord Campbell in his *Lives of the Chief Justices*. It may be classed with the curious conceit, recorded in Brand's *Popular Antiquities*, that the coif was derived from the child's caul, and was worn on the advocate's head for luck.

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**COIMBATORE**, a city and district of British India, in the Madras presidency. The city is situated on the left bank of the Noyil river, 305 m. from Madras by the Madras railway. In 1901 it had a population of 53,080, showing an increase of 14% in the decade. The city stands 1437 ft. above sea-level, is well laid out and healthy, and is rendered additionally attractive to European residents by its picturesque position on the slopes of the Nilgiri hills. It is an important industrial centre, carrying on cotton weaving and spinning, tanning, distilling, and the manufacture of coffee, sugar, manure and saltpetre. It has two second-grade colleges, a college of agriculture, and a school of forestry.

The DISTRICT OF COIMBATORE has an area of 7860 sq. m. It may be described as a flat, open country, hemmed in by mountains on the north, west and south, but opening eastwards on to the great plain of the Carnatic; the average height of the plain above sea-level is about 900 ft. The principal mountains are the Anamalai Hills, in the south of the district, rising at places to a height of between 8000 and 9000 ft. In the west the Palghat and Vallagiri Hills form a connecting link between the Anamalai range and the Nilgiris, with the exception of a remarkable gap known as the Palghat Pass. This gap, which completely intersects the Ghats, is about 20 m. wide. In the north is a range of primitive trap-hills known as the Cauvery chain, extending eastwards from the Nilgiris, and rising in places to a height of 4000 ft. The principal rivers are the Cauvery, Bhavani, Noyil, and Amravati. Numerous canals are cut from the rivers for the purpose of affording artificial irrigation, which has proved of immense benefit to the country. Well and tank water is also largely used for irrigation purposes. Coimbatore district was acquired by the British in 1799 at the close of the war

which ended with the death of Tippoo. In 1901 the population was 2,201,782, showing an increase of 10% in the preceding decade. The principal crops are millet, rice, other food grains, pulse, oilseeds, cotton and tobacco, with a little coffee. Forests cover nearly 1½ million acres, yielding valuable timber (teak, sandalwood, &c.), and affording grazing-ground for cattle. There are several factories for pressing cotton, and for cleaning coffee, oil-cake presses, tanneries and saltpetre refineries. Cereals, cotton, forest products, cattle and hides, and brass and copper vessels are the chief exports from the district. The south-west line of the Madras railway runs through the district, and the South Indian railway (of metre gauge) joins this at Erode.

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**COIMBRA**, the capital of an administrative district formerly included in the province of Beira, Portugal; on the north bank of the river Mondego, 115 m. N.N.E. of Lisbon, on the Lisbon-Oporto railway. Pop. (1900) 18,144. Coimbra is built for the most part on rising ground, and presents from the other side of the river a picturesque and imposing appearance; though in reality its houses have individually but little pretension, and its streets are, almost without exception, narrow and mean. It derives its present importance from being the seat of the only university in the kingdom—an institution which was originally established at Lisbon in 1291, was transferred to Coimbra in 1306, was again removed to Lisbon, and was finally fixed at Coimbra in 1527. There are five faculties—theology, law, medicine, mathematics and philosophy—with more than 1300 students. The library contains about 150,000 volumes, and the museums and laboratories are on an extensive scale. In connexion with the medical faculty there are regular hospitals; the mathematical faculty maintains an observatory from which an excellent view can be obtained of the whole valley of the Mondego; and outside the town there is a botanic garden (especially rich in the flora of Brazil), which also serves as a public promenade. Among the other educational establishments are a military college, a royal college of arts, a scientific and literary institute, and an episcopal seminary.

The city is the seat of a bishop, suffragan to the archbishop of Braga; its new cathedral, founded in 1580, is of little interest; but the old is a fine specimen of 12th-century Romanesque, and retains portions of the mosque which it replaced. The principal churches are Santa Cruz, of the 16th century, and San Salvador, founded in 1169. On the north bank of the Mondego stand the ruins of the once splendid monastery of Santa Clara, established in 1286; and on the south bank is the celebrated *Quinta das lagrimas*, or Villa of Tears, where Inez de Castro (*q.v.*) is believed to have been murdered in 1355. The town is supplied with water by means of an aqueduct of 20 arches. The Mondego is only navigable in flood, and the port of Figueira da Foz is 20 m. W. by S., so that the trade of Coimbra is mainly local; but there are important lamprey fisheries and manufactures of pottery, leather and hats.

A Latin inscription of the 4th century identifies Coimbra with the ancient Aeminium; while Condeixa (3623), 8 m. S.S.W., represents the ancient Conimbriga or Conembrica. In the 9th century, however, when the bishopric of Conimbriga was removed hither, its old title was transferred to the new see, and hence arose the modern name Coimbra. The city was for a long time a Moorish stronghold, but in 1064 it was captured by Ferdinand I. of Castile and the Cid. Until 1260 it was the capital of the country, and no fewer than six kings—Sancho I. and II., Alphonso II. and III., Pedro and Ferdinand—were born within its walls. It was also the birthplace of the poet Francisco Sá de Miranda (1495-1558), and, according to one tradition, of the more famous Luiz de Camoens (1524-1580), who was a student at the university between 1537 and 1542. In 1755 Coimbra suffered considerably from the earthquake. In 1810 it was sacked by the French under Marshal Masséna. In 1834 Dom Miguel made the city his headquarters; and in 1846 it was the scene of a Miguelist insurrection.

The administrative district of Coimbra coincides with the south-western part of Beira; pop. (1900) 332,168; area 1508 sq. m.

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**COÍN**, a town of southern Spain in the province of Málaga; 18 m. W.S.W. of the city of Málaga. Pop. (1900) 12,326. Coín is finely situated on the northern slope of the Sierra de Mijas, overlooking the small river Séco and surrounded by vineyards and plantations of oranges and lemons. There are marble quarries in the neighbourhood, and, despite the lack of a railway, Coín has a thriving agricultural trade. The population increased by more than half between 1880 and 1900.

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**COIN** (older forms of the word are *coyne*, *quoin* and *coign*, all derived through the O. Fr. *coing*, and *cuigne* from Lat. *cuneus*, a wedge), properly the term for a wedge-shaped die used for stamping money, and so transferred to the money so stamped; hence a piece of money. The form "quoin" is used for the external angle of a building (see [QUOINS](#)), and "coign," also a projecting angle, survives in the Shakespearean phrase "a coign of vantage."

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**COINAGE OFFENCES.** The coinage of money is in all states a prerogative of the sovereign power; consequently any infringement of that prerogative is always severely punished, as being an offence likely to interfere with the well-being of the state.

In the United Kingdom the statute law against offences relating to the coin was codified by an act of 1861. The statute provides that whoever falsely makes or counterfeits any coin resembling or apparently intended to resemble or pass for any current gold or silver coin of the realm (s. 2), or gilds, silvers, washes, cases over or colours with materials capable of producing the appearance of gold or silver a coin or a piece of any metal or mixture of metals, or files or alters it, with intent to make it resemble or pass for any current gold or silver coin (s. 3), or who buys, sells, receives or pays a false gold or silver coin at a lower rate than its denomination imports, or who receives into the United Kingdom any false coin knowing it to be counterfeit (ss. 6, 7), or who, without lawful authority or excuse, knowingly makes or mends, buys or sells, or has in his custody or possession, or conveys out of the Royal Mint any coining moulds, machines or tools, is guilty of felony (ss. 24, 25). The punishment for such offences is either penal servitude for life or for not less than three years, or imprisonment for not more than two years, with or without hard labour. Whoever impairs, diminishes or lightens current gold or silver coin, with intent to pass same, is liable to penal servitude for from three to fourteen years (s. 4), and whoever has in his possession filings or clippings obtained by impairing or lightening current coin is liable to the same punishment, or to penal servitude for from three to seven years. The statute also makes provision against tendering or uttering false gold or silver coin, which is a misdemeanour, punishable by imprisonment with or without hard labour. Provision is also made with respect to falsely making, counterfeiting, tendering or uttering copper coin, exporting false coin, or defacing current coin by stamping names or words on it, and counterfeiting, tendering or uttering coin resembling or meant to pass as that of some foreign state. The act of 1861 applies to offences with respect to colonial coins as well as to those of the United Kingdom.

By the constitution of the United States, Congress has the power of coining money, regulating the value thereof and of foreign coin (Art. i. s. viii.), and the states are prohibited from coining money, or making anything but gold and silver money a tender in payment of debts (Art. i. s. x.). The counterfeiting coin or money, uttering the same, or mutilating or defacing it, is an offence against the United States, and is punishable by fine and imprisonment with hard labour for from two to ten years. It has also been made punishable by state legislation.

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**COIRE** (Ger. *Chur* or *Cur*, Ital. *Coira*, Lat. *Curia Raetorum*, Romansch *Cuera*), the capital of the Swiss canton of the Grisons. It is built, at a height of 1949 ft. above the sea-level, on the right bank of the Plessur torrent, just as it issues from the Schanfigg valley, and about a mile above its junction with the Rhine. It is overshadowed by the Mittenberg (east) and Pizokel (south), hills that guard the entrance to the deep-cut Schanfigg valley. In 1900 it contained 11,532 inhabitants, of whom 9288 were German-speaking, 1466 Romansch-speaking, and 677 Italian-speaking; while 7561 were Protestants, 3962 Romanists and one a Jew. The modern part of the city is to the west, but the old portion, with all the historical buildings, is to the east. Here is the cathedral church of St Lucius (who is the patron of Coire, and is supposed to be a 2nd-century British king, though really the name has probably arisen from a confusion between Lucius of Cyrene—miswritten "*curiensis*"—with the Roman general Lucius Munatius Plancus, who conquered Raetia). Built between 1178 and 1282, on the site of an older church, it contains many curious medieval antiquities (especially in the sacristy), as well as a picture by Angelica Kaufmann, and the tomb of the great Grisons political leader (d. 1637) Jenatsch (*q.v.*). Opposite is the Bishop's Palace, and not far off is the Episcopal Seminary (built on the ruins of a 6th-century monastic foundation). Not far from these ancient monuments is the new Raetian Museum, which contains a great collection of objects relating to Raetia (including the geological collections of the Benedictine monk of Disentis, Placidus a Spescha (1752-1833), who explored the high snowy regions around the sources of the Rhine). One of the hospitals was founded by the famous Capuchin philanthropist, Father Theodosius Florentini (1808-1865), who was long the Romanist curé of Coire, and whose remains were in 1906 transferred from the cathedral here to Ingenbohl (near Schwyz), his chief foundation. Coire is 74 m. by rail from Zürich, and is the meeting-point of the routes from Italy over many Alpine passes (the Lukmanier, the Splügen, the San Bernardino) as well as from the Engadine (Albula, Julier), so that it is the centre of an active trade (particularly in wine from the Valtelline), though it possesses also a few local factories.

The episcopal see is first mentioned in 452, but probably existed a century earlier. The bishop soon acquired great temporal powers, especially after his dominions were made, in 831, dependent on the Empire alone, of which he became a prince in 1170. In 1392 he became head of the league of God's House (originally formed against him in 1367), one of the three Raetian leagues, but, in 1526, after the Reformation, lost his temporal powers, having fulfilled his historical mission (see [GRISONS](#)). The bishopric still exists, with jurisdiction over the Cantons of the Grisons, Glarus, Zürich, and the three Forest Cantons, as well as the Austrian principality of Liechtenstein. The gild constitution of the city of Chur lasted from 1465 to 1839, while in 1874 the *Bürgergemeinde* was replaced by an *Einwohnergemeinde*.

AUTHORITIES.—A. Eichhorn, *Episcopatus Curiensis* (St Blasien, 1797); W. von Juvalt, *Forschungen über die Feudalzeit im Curischen Raetien*, 2 parts (Zürich, 1871); C. Kind, *Die Reformation in den Bisthümern Chur und Como* (Coire, 1858); Conradin von Moor, *Geschichte von Curraetien* (2 vols., Coire, 1870-1874); P. C. von Planta, *Das alte Raetien* (Berlin, 1872); *Idem*, *Die Curraetischen Herrschaften in der Feudalzeit* (Bern, 1881); *Idem*, *Verfassungsgeschichte der Stadt Cur im Mittelalter* (Coire, 1879); *Idem*, *Geschichte von Graubünden* (Bern, 1892).

(W. A. B. C.)

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**COKE, SIR EDWARD** (1552-1634), English lawyer, was born at Mileham, in Norfolk, on the 1st of February 1552. From the grammar school of Norwich he passed to Trinity College, Cambridge; and in 1572 he entered Lincoln's Inn. In 1578 he was called to the bar, and in the next year he was chosen reader at Lyon's Inn. His extensive and exact legal erudition, and the skill with which he argued the intricate libel case of Lord Cromwell (4 Rep. 13), and the celebrated real property case of Shelley (1 Rep. 94, 104), soon brought him a practice



never before equalled, and caused him to be universally recognized as the greatest lawyer of his day. In 1586 he was made recorder of Norwich, and in 1592 recorder of London, solicitor-general, and reader in the Inner Temple. In 1593 he was returned as member of parliament for his native county, and also chosen speaker of the House of Commons. In 1594 he was promoted to the office of attorney-general, despite the claims of Bacon, who was warmly supported by the earl of Essex. As crown lawyer his treatment of the accused was marked by more than the harshness and violence common in his time; and the fame of the victim has caused his behaviour in the trial of Raleigh to be lastingly remembered against him. While the prisoner defended himself with the calmest dignity and self-possession, Coke burst into the bitterest invective, brutally addressing the great courtier as if he had been a servant, in the phrase, long remembered for its insolence and its utter injustice—"Thou hast an English face, but a Spanish heart!"

In 1582 Coke married the daughter of John Paston, a gentleman of Suffolk, receiving with her a fortune of £30,000; but in six months he was left a widower. Shortly after he sought the hand of Lady Elizabeth Hatton, daughter of Thomas, second Lord Burghley, and granddaughter of the great Cecil. Bacon was again his rival, and again unsuccessfully; the wealthy young widow became—not, it is said, to his future comfort—Coke's second wife.

In 1606 Coke was made chief justice of the common pleas, but in 1613 he was removed to the office of chief justice of the king's bench, which gave him less opportunity of interfering with the court. The change, though it brought promotion in dignity, caused a diminution of income as well as of power; but Coke received some compensation in being appointed a member of the privy council. The independence of his conduct as a judge, though not unmixed with the baser elements of prejudice and vulgar love of authority, has partly earned forgiveness for the harshness which was so prominent in his sturdy character. Full of an extreme reverence for the common law which he knew so well, he defended it alike against the court of chancery, the ecclesiastical courts, and the royal prerogative. In a narrow spirit, and strongly influenced, no doubt, by his enmity to the chancellor, Thomas Egerton (Lord Brackley), he sought to prevent the interference of the court of chancery with even the unjust decisions of the other courts. In the case of an appeal from a sentence given in the king's bench, he advised the victorious, but guilty, party to bring an action of praemunire against all those who had been concerned in the appeal, and his authority was stretched to the utmost to obtain the verdict he desired. On the other hand, Coke has the credit of having repeatedly braved the anger of the king. He freely gave his opinion that the royal proclamation cannot make that an offence which was not an offence before. An equally famous but less satisfactory instance occurred during the trial of Edmund Peacham, a divine in whose study a sermon had been found containing libellous accusations against the king and the government. There was nothing to give colour to the charge of high treason with which he was charged, and the sermon had never been preached or published; yet Peacham was put to the torture, and Bacon was ordered to confer with the judges individually concerning the matter. Coke declared such conference to be illegal, and refused to give an opinion, except in writing, and even then he seems to have said nothing decided. But the most remarkable case of all occurred in the next year (1616). A trial was held before Coke in which one of the counsel denied the validity of a grant made by the king to the bishop of Lichfield of a benefice to be held *in commendam*. James, through Bacon, who was then attorney-general, commanded the chief justice to delay judgment till he himself should discuss the question with the judges. At Coke's request Bacon sent a letter containing the same command to each of the judges, and Coke then obtained their signatures to a paper declaring that the attorney-general's instructions were illegal, and that they were bound to proceed with the case. His Majesty expressed his displeasure, and summoned them before him in the council-chamber, where he insisted on his supreme prerogative, which, he said, ought not to be discussed in ordinary argument. Upon this all the judges fell on their knees, seeking pardon for the form of their letter; but Coke ventured to declare his continued belief in the loyalty of its substance, and when asked if he would in the future delay a case at the king's order, the only reply he would vouchsafe was that he would do what became him as a judge. Soon after he was dismissed from all his offices on the following charges,—the concealment, as attorney-general, of a bond belonging to the king, a charge which could not be proved, illegal interference with the court of chancery and disrespect to the king in the case of commendams. He was also ordered by the council to revise his book of reports, which was said to contain many extravagant opinions (June 1616).

Coke did not suffer these losses with patience. He offered his daughter Frances, then little more than a child, in marriage to Sir John Villiers, brother of the favourite Buckingham. Her mother, supported at first by her husband's great rival and her own former suitor, Bacon, objected to the match, and placed her in concealment. But Coke discovered her hiding-

place; and she was forced to wed the man whom she declared that of all others she abhorred. The result was the desertion of the husband and the fall of the wife. It is said, however, that after his daughter's public penance in the Savoy church, Coke had heart enough to receive her back to the home which he had forced her to leave. Almost all that he gained by his heartless diplomacy was a seat in the council and in the star-chamber.

In 1620 a new and more honourable career opened for him. He was elected member of parliament for Liskeard; and henceforth he was one of the most prominent of the constitutional party. It was he who proposed a remonstrance against the growth of popery and the marriage of Prince Charles to the infanta of Spain, and who led the Commons in the decisive step of entering on the journal of the House the famous petition of the 18th of December 1621, insisting on the freedom of parliamentary discussion, and the liberty of speech of every individual member. In consequence, together with Pym and Sir Robert Philips, he was thrown into confinement; and, when in the August of the next year he was released, he was commanded to remain in his house at Stoke Poges during his Majesty's pleasure. Of the first and second parliaments of Charles I. Coke was again a member. From the second he was excluded by being appointed sheriff of Buckinghamshire. In 1628 he was at once returned for both Buckinghamshire and Suffolk, and he took his seat for the former county. After rendering other valuable support to the popular cause, he took a most important part in drawing up the great Petition of Right. The last act of his public career was to bewail with tears the ruin which he declared the duke of Buckingham was bringing upon the country. At the close of the session he retired into private life; and the six years that remained to him were spent in revising and improving the works upon which, at least as much as upon his public career, his fame now rests. He died at Stoke Poges on the 3rd of September 1634.

Coke published *Institutes* (1628), of which the first is also known as *Coke upon Littleton; Reports* (1600-1615), in thirteen parts; *A Treatise of Bail and Mainprize* (1635); *The Complete Copyholder* (1630); *A Reading on Fines and Recoveries* (1684).

See Johnson, *Life of Sir Edward Coke* (1837); H. W. Woolrych, *The Life of Sir Edward Coke* (1826); Foss, *Lives of the Judges*; Campbell, *Lives of the Chief Justices*; also [ENGLISH LAW](#).

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**COKE, SIR JOHN** (1563-1644), English politician, was born on the 5th of March 1563, and was educated at Trinity College, Cambridge. After leaving the university he entered public life as a servant of William Cecil, Lord Burghley, afterwards becoming deputy-treasurer of the navy and then a commissioner of the navy, and being specially commended for his labours on behalf of naval administration. He became member of parliament for Warwick in 1621 and was knighted in 1624, afterwards representing the university of Cambridge. In the parliament of 1625 Coke acted as a secretary of state; in this and later parliaments he introduced the royal requests for money, and defended the foreign policy of Charles I. and Buckingham, and afterwards the actions of the king. His actual appointment as secretary dates from September 1625. Disliked by the leaders of the popular party, his speeches in the House of Commons did not improve the king's position, but when Charles ruled without a parliament he found Coke's industry very useful to him. The secretary retained his post until 1639, when a scapegoat was required to expiate the humiliating treaty of Berwick with the Scots, and the scapegoat was Coke. Dismissed from office, he retired to his estate at Melbourne in Derbyshire, and then resided in London, dying at Tottenham on the 8th of September 1644. Coke's son, Sir John Coke, sided with the parliament in its struggle with the king, and it is possible that in later life Coke's own sympathies were with this party, although in his earlier years he had been a defender of absolute monarchy. Coke, who greatly disliked the papacy, is described by Clarendon as "a man of very narrow education and a narrower mind"; and again he says, "his cardinal perfection was industry and his most eminent infirmity covetousness."

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**COKE, THOMAS** (1747-1814), English divine, the first Methodist bishop, was born at

Brecon, where his father was a well-to-do apothecary. He was educated at Jesus College, Oxford, taking the degree of M.A. in 1770 and that of D.C.L. in 1775. From 1772 to 1776 he was curate at South Petherton in Somerset, whence his rector dismissed him for adopting the open-air and cottage services introduced by John Wesley, with whom he had become acquainted. After serving on the London Wesleyan circuit he was in 1782 appointed president of the conference in Ireland, a position which he frequently held, in the intervals of his many voyages to America. He first visited that country in 1784, going to Baltimore as "superintendent" of the Methodist societies in the new world and, in 1787 the American conference changed his title to "bishop," a nomenclature which he tried in vain to introduce into the English conference, of which he was president in 1797 and 1805. Failing this, he asked Lord Liverpool to make him a bishop in India, and he was voyaging to Ceylon when he died on the 3rd of May 1814. Coke had always been a missionary enthusiast, and was the pioneer of such enterprise in his connexion. He was an ardent opponent of slavery, and endeavoured also to heal the breach between the Methodist and Anglican communions. He published a *History of the West Indies* (3 vols., 1808-1811), several volumes of sermons, and, with Henry Moore, a *Life of Wesley* (1792).

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**COKE** (a northern English word, possibly connected with "colk," core), the product obtained by strongly heating coal out of contact with the air until the volatile constituents are driven off; it consists essentially of carbon, the so-called "fixed carbon," together with the incombustible matters or ash contained in the coal from which it is derived. In addition to these it almost invariably contains small quantities of hydrogen, oxygen and nitrogen, the whole, however, not exceeding 2 or 3%. It also contains water, the amount of which may vary considerably according to the method of manufacture. When produced rapidly and at a low heat, as in gas-making, it is of a dull black colour, and a loose spongy or pumice-like texture, and ignites with comparative ease, though less readily than bituminous coal, so that it may be burnt in open fire-places; but when a long-continued heat is used, as in the preparation of coke for iron and steel melting, the product is hard and dense, is often prismatic in structure, has a brilliant semi-metallic lustre and silvery-grey colour, is a conductor of heat and electricity, and can only be burnt in furnaces provided with a strong chimney draught or an artificial blast. The strength and cohesive properties are also intimately related to the nature and composition of the coals employed, which are said to be caking or non-caking according to the compact or fragmentary character of the coke produced.

Formerly coke was made from large coal piled in heaps with central chimneys like those of the charcoal burner, or in open rectangular clamps or kilns with air flues in the enclosing walls; but these methods are now practically obsolete, closed chambers or ovens being generally used. These vary considerably in construction, but may be classified into three principal types:—(1) direct heated ovens, (2) flue-heated ovens, (3) condensing ovens. In the first class the heating is done by direct contact or by burning the gases given off in coking within the oven, while in the other two the heating is indirect, the gas being burned in cellular passages or flues provided in the walls dividing the coking chambers, and the heat transmitted through the sides of the latter which are comparatively thin. The arrangement is somewhat similar to that of a gas-works retort, whence the name of "retort ovens" is sometimes applied to them. The difference between the second and third classes is founded on the treatment of the gases. In the former the gas is fired in the side flues immediately upon issuing from the oven, while in the latter the gases are first subjected to a systematic treatment in condensers, similar to those used in gas-works, to remove tar, ammonia and condensable hydrocarbons, the incondensable gases being returned to the oven and burned in the heating flues. These are generally known as "by-product ovens."

The simplest form of coke oven, and probably that still most largely used, is the so-called "beehive oven." This is circular in plan, from 7 to 12 ft. in diameter, with a cylindrical wall about 2½ ft. high and a nearly hemispherical roof with a circular hole at the top. The floor, made of refractory bricks or slabs, is laid with a slight slope towards an arched opening in the ring wall, which is stopped with brickwork during the coking but opened for drawing the finished charge. The ovens are usually arranged in rows or banks of 20 to 30 or more, with their doors outwards, two rows being often placed with a longitudinal flue between them connected by uptakes with the individual ovens on either side. A railway along the top of the bank brings the coal from the

screens or washery. The largest ovens take a charge of about 5 tons, which is introduced through the hole in the roof, the brickwork of the empty oven being still red hot from the preceding charge, and when levelled fills the cylindrical part nearly to the springing of the roof. The gas fires as it is given off and fills the dome with flame, and the burning is regulated by air admitted through holes in the upper part of the door stopping. The temperature being very high, a proportion of the volatile hydrocarbons is decomposed, and a film of graphitic carbon is deposited on the coke, giving it a semi-metallic lustre and silvery grey colour. When the gas is burned off, the upper part of the door is opened and the glowing charge cooled by jets of water thrown directly upon it from a hose, and it is subsequently drawn out through the open door. The charge breaks up into prisms or columns whose length corresponds to the depth of the charge, and as a rule is uniform in character and free from dull black patches or "black ends." The time of burning is either 48 or 72 hours, the turns being so arranged as to avoid the necessity of drawing the ovens on Sunday. The longer the heat is continued the denser the product becomes, but the yield also diminishes, as a portion of the finished coke necessarily burns to waste when the gas is exhausted. For this reason the yield on the coal charged is usually less than that obtained in retort ovens, although the quality may be better. Coals containing at most about 35% of volatile matter are best suited for the beehive oven. With less than 25% the gas is not sufficient to effect the coking completely, and when there is a higher percentage the coke is brittle and spongy and unsuited for blast furnace or foundry use. The spent flame from the ovens passes to a range of steam boilers before escaping by the chimney.

The retort oven, which is now generally displacing the beehive form in new installations, is made in a great variety of forms, the differences being mainly in the arrangement of the heating flues, but all have the central feature, the coking chamber, in common. This is a tubular chamber with vertical sides and cylindrical roof, about 30 ft. long, from 17 to 20 in. wide, and 6 or 7 ft. high, and closed at both ends by sliding doors which are raised by crab winches when the charge is to be drawn. The general arrangements of such an oven are shown in fig. 1, which represents one of the earliest and most popular forms, that of Evence Coppée of Brussels. The coking chambers A B connect by rectangular posts at the springing of the roof, where the gas given off from the top of the charge is fired by air introduced through *c c*. The flames pass downwards through the parallel flues *f f* along the bottom flue of one oven, and return in the opposite direction under the next to the chimney flue, a further part of the heat being intercepted by placing a range of steam boilers between the ovens and the chimney stack. The charging of the oven is done through the passages D D in the roof from small wagons on transverse lines of rails, the surface being raked level before the doors are closed and luted up. The time of coking is much less than in the beehive ovens and may be from 24 to 36 hours, according to the proportion of volatile matter present. When the gas is completely given off the doors are lifted and the charge is pushed out by the ram—a cast-iron plate of the shape of the cross section of the oven, at the end of a long horizontal bar, which is driven by a rack and pinion movement and pushes the block of coke out of the oven on to the wharf or bank in front where it falls to pieces and is immediately quenched by jets of water from a hose pipe. When sufficiently cooled it is loaded into railway wagons or other conveyances for removal. The ram, together with its motor, and boiler when steam is used, is mounted upon a carriage running upon a line of rails of about 2 ft. gauge along the back of the range of ovens, so that it can be brought up to any one of them in succession.

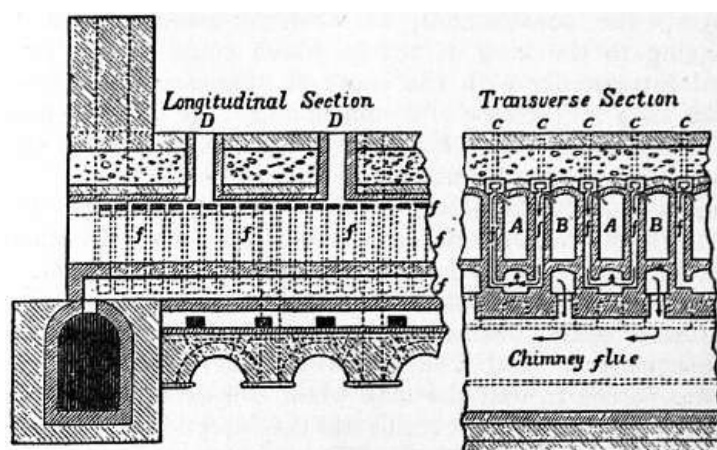


FIG. 1.—Coppée's Coke Oven.

In some cases, instead of the small coal being charged through the roof of the oven and levelled by hand, it is formed into blocks by being stamped in a slightly moistened condition in a mould consisting of a bottom plate or peel on a racked rod like that of the ram, with

movable sides and ends. This, when the ends are removed, is pushed forward into the oven, and the bottom plate is withdrawn by reversing the rack motion. The moulding box is mounted on a carriage like that of the ram, the two being sometimes carried on the same framing. The moulding is done at a fixed station in the centre of the range of ovens by a series of cast-iron stampers driven by an electric motor. This system is useful for coals low in volatile matter, which do not give a coherent coke under ordinary conditions.

In the distilling or by-product ovens the gases, instead of being burned at the point of origin, pass by an uptake pipe in the roof about the centre of the oven into a water-sealed collecting trough or hydraulic main, whence they are drawn by exhausters through a series of air and water cooled condensers and scrubbers. In the first or atmospheric condensers the tar is removed, and in the second ammoniacal water, which is further enriched by a graduated system of scrubbing with weak ammoniacal liquor until it is sufficiently concentrated to be sent to the ammonia stills. The first treatment by scrubbing with creosote or heavy tar oil removes benzene, after which the permanent gaseous residue consisting chiefly of hydrogen and marsh gas is returned to the ovens as fuel.

**Condensing ovens.**

In the Otto-Hoffmann oven, one of the most generally used forms, vertical side flues like those of Coppée are adopted. The returned gas enters by a horizontal flue along the bottom of the coking chamber, divided into two parts by a mid-feather wall, and is fired by heated air from a Siemens regenerator on the substructure at one end, and the flame rising through one half of the side flues to a parallel collector at the top returns downwards through the flues of the other half and passes out to the chimney through a similar regenerator at the other end. The course of the gases is reversed at intervals of about an hour, as in the ordinary Siemens furnace, each end of the oven having its own gas supply. In the later modification known as the Otto-Hilgenstock, the regenerators are abandoned, but provision is made for more perfect distribution of the heat by a line of sixteen Bunsen burners in each wall; each of these serves two flues, the course of the flame being continuously upwards without reversal. In the newest Otto ovens the same system of burners is combined with regenerators. In the Bauer system, another vertical flue oven, each flue has its own burner, which is of a simplified construction.

In the Carvés oven, the earliest of the by-product ovens, the heating flues are arranged horizontally in parallel series along the entire length of the side walls, the gas being introduced from both ends but at different levels. This system was further developed by H. Simon of Manchester, who added a continuous air "recuperator" heated by the spent flame; this Simon-Carvés system has been extensively adopted in Great Britain. Another horizontal flue oven, the Semet-Solvay, is distinguished by the structure of the flues, which are independent of the dividing walls of the ovens, so that the latter can be made with thinner sides than those of the earlier systems, and are more readily repaired. In the horizontal ovens it is sometimes difficult to maintain the heat when the flues are continuous along the whole length of the wall, especially when the heating value of the gas is reduced by the removal of the heavy hydrocarbons. This difficulty is met by dividing the flues in the middle so as to shorten the length of travel of the flame, and working each end independently. The Hüssener and Koppers systems are two of the best-known examples of this modification.

Coke from retort ovens is not so dense or brilliant as that made in beehive ovens, but the waste being less there is a decided saving, apart from the value of the condensed products. In one instance the coke was found to be about 5% less efficient in the blast furnace, while the yield on the coal charged was increased 10%. In the further treatment of the condensed products by distillation the tar gives burning oil and pitch, the benzene is separated from the creosote oil by steam-heated stills, and the ammoniacal liquor, after some lime has been added to decompose fixed ammonium compounds, is heated to vaporize the ammonia, which is condensed in lead or copper-lined tanks containing strong sulphuric acid to produce a crystalline powder of ammonium sulphate, which accumulates in the receiver and is fished out from time to time. The yield of by-products averages about 1% of ammonium sulphate, about 3½% of tar, and 0.6 to 0.9% of benzene, of the weight of the coal carbonized. After the ovens have been heated and steam supplied for the machinery of the condensing plant and the coke ovens, there is usually a surplus of gas, which may be used for lighting or driving gas-engines. For the latter purpose, however, it is necessary to remove the last traces of tar, which acts very prejudicially in fouling the valves when the gas is not completely purified. The gas given off during the earlier part of the coking process is richer in heavy hydrocarbons and of a higher illuminating value than that of the later period when the temperature is higher. This property is utilized in several large coking plants in America, where the gas from the first ten hours' working is drawn off by a second hydraulic main and sent directly to town gas-works, where it passes through the ordinary purifying treatment, the gas from the second period being alone used for heating the ovens.

Coke is essentially a partially graphitized carbon, its density being about midway between

that of coal and graphite, and it should therefore occupy less space than the original coal; but owing to the softening of the charge a spongy structure is set up by the escaping gases, which acts in the other direction, so that for equal bulk coke is somewhat lighter than coal. It is this combination of properties that gives it its chief value in iron smelting, the substance being sufficiently dense to resist oxidation by carbon dioxide in the higher regions of the furnace, while the vesicular structure gives an extended surface for the action of heated air and facilitates rapid consumption at the tuyeres. Compact coke, such as that formed on the inner sides of gas retorts (retort carbon), can only be burned with great difficulty in small furnaces of special construction, but it gives out a great amount of heat.

The most deleterious constituents of coke are ash, sulphur and volatile constituents including water. As the coke yield is only from two-thirds to three-quarters of that of the coal, the original proportion of ash is augmented by one-third or one-half in the product. For this reason it is now customary to crush and wash the coal carefully to remove intermingled patches of shale and dirt before coking, so that the ash may not if possible exceed 10% in the coke. About one-half of the sulphur in the coal is eliminated in coking, so that the percentage in the coke is about the same. It should not be much above 1%. According to the researches of F. Wuest (*Journ. Iron and Steel Inst.*, 1906) the sulphur is retained in a complex carbon compound which is not destroyed until the coke is actually consumed.

The older methods of coking and the earlier forms of retort ovens are described in J. Percy, *Metallurgy*, Jordan, *Album du cours de metallurgie*; Phillips and Bauerman, *Handbook of Metallurgy*, and other text-books. A systematic series of articles on the newer forms will be found in *The Engineer*, vol. 82, pp. 205-303 and vol. 83, pp. 207-231; see also Dürre, *Die neuern Koksöfen* (Leipzig, 1892); D. A. Louis, "Von Bauer and Brünck Ovens," *Journ. Iron and Steel Inst.*, 1904, ii. p. 293; C. L. Bell, "Hüssener Oven," *id.*, 1904, i. p. 188; Hurez, "A Comparison of Different Systems of Vertical and Horizontal Flue Ovens," *Bull. soc. industrie minérale*, 1903, p. 777. A well-illustrated description of the Otto system in its American modification was issued by the United Gas & Coke Company of New York, in 1906.

(H. B.)

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**COL** (Fr. for "neck," Lat. *collum*), in physical geography, generally any marked depression upon a high and rugged water-parting over which passage is easy from one valley to another. Such is the Col de Balme between the Trient and Chamounix valleys, where the great inaccessible wall crowned with aiguilles running to the massif of Mt. Blanc is broken by a gentle downward curve with smooth upland slopes, over which a footpath gives easy passage. The col is usually formed by the head-waters of a stream eating backward and lowering the water-parting at the head of its valley. In early military operations, the march of an army was always over a col, which has at all times considerable commercial importance in relation to roads in high mountain regions.

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**COLBERT, JEAN BAPTISTE** (1619-1683), French statesman, was born at Reims, where his father and grandfather were merchants. He claimed to be the descendant of a noble Scottish family, but the evidence for this is lacking. His youth is said to have been spent in a Jesuit college, in the office of a Parisian banker, and in that of a Parisian notary, Chapelain, the father of the poet. But the first fact on which we can rely with confidence is that, when not yet twenty, he obtained a post in the war-office, by means of the influence that he possessed through the marriage of one of his uncles to the sister of Michel Le Tellier, the secretary of state for war. During some years he was employed in the inspection of troops and other work of the kind, but at length his ability, his extraordinary energy and his untiring laboriousness induced Le Tellier to make him his private secretary. These qualities, combined, it must be confessed, with a readiness to seize every opportunity of advancement, soon brought Colbert both wealth and influence. In 1647 we find him receiving the confiscated goods of his uncle Pussort, in 1648 obtaining 40,000 crowns with his wife Marie Charron, in 1649 appointed councillor of state.

It was the period of the wars of the Fronde; and in 1651 the triumph of the Condé family drove Cardinal Mazarin from Paris. Colbert, now aged thirty-two, was engaged to keep him acquainted with what should happen in the capital during his absence. At first Colbert's position was far from satisfactory; for the close wary Italian treated him merely as an ordinary agent. On one occasion, for example, he offered him 1000 crowns. The gift was refused somewhat indignantly; and by giving proof of the immense value of his services, Colbert gained all that he desired. His demands were not small; for, with an ambition mingled, as his letters show, with strong family affection, he aimed at placing all his relatives in positions of affluence and dignity; and many a rich benefice and important public office was appropriated by him to that purpose. For these favours, conferred upon him by his patron with no stinted hand, his thanks were expressed in a most remarkable manner; he published a letter defending the cardinal from the charge of ingratitude which was often brought against him, by enumerating the benefits that he and his family had received from him (April 1655). Colbert obtained, besides, the higher object of his ambition; the confidence of Mazarin, so far as it was granted to any one, became his, and he was entrusted with matters of the gravest importance. In 1659 he was giving directions as to the suppression of the revolt of the gentry which threatened in Normandy, Anjou and Poitou, with characteristic decision arresting those whom he suspected, and arranging every detail of their trial, the immediate and arbitrary destruction of their castles and woods, and the execution of their chief, Bonnesson. In the same year we have evidence that he was already planning his great attempt at financial reform. His earliest tentative was the drawing up of a *mémoire* to Mazarin, showing that of the taxes paid by the people not one-half reached the king. The paper also contained an attack upon the superintendent Nicholas Fouquet (*q.v.*), and being opened by the postmaster of Paris, who happened to be a spy of Fouquet's, it gave rise to a bitter quarrel, which, however, Mazarin repressed during his lifetime.

In 1661 the death of Mazarin allowed Colbert to take the first place in the administration, and he made sure of the king's favour by revealing to him some of Mazarin's hidden wealth. It was some time before he assumed official dignities; but in January 1664 he obtained the post of superintendent of buildings; in 1665 he was made controller-general; in 1669 he became minister of the marine; and he was also appointed minister of commerce, the colonies and the king's palace. In short, he soon acquired power in every department except that of war.

A great financial and fiscal reform at once claimed all his energies. Not only the nobility, but many others who had no legal claim to exemption, paid no taxes; the weight of the burden fell on the wretched country-folk. Colbert sternly and fearlessly set about his task. Supported by the young king, Louis XIV., he aimed the first blow at the greatest of the extortioners—the bold and powerful superintendent, Fouquet; whose fall, in addition, secured his own advancement.

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The office of superintendent and many others dependent upon it being abolished the supreme control of the finances was vested in a royal council. The sovereign was its president; but Colbert, though for four years he only possessed the title of intendant, was its ruling spirit, great personal authority being conferred upon him by the king. The career on which Colbert now entered must not be judged without constant remembrance of the utter rottenness of the previous financial administration. His ruthlessness in this case, dangerous precedent as it was, was perhaps necessary; individual interests could not be respected. Guilty officials having been severely punished, the fraudulent creditors of the government remained to be dealt with. Colbert's method was simple. Some of the public loans were totally repudiated, and from others a percentage was cut off, which varied, at first according to his own decision, and afterwards according to that of the council which he established to examine all claims against the state.

Much more serious difficulties met his attempts to introduce equality in the pressure of the taxes on the various classes. To diminish the number of the privileged was impossible, but false claims to exemption were firmly resisted, and the unjust direct taxation was lightened by an increase of the indirect taxes, from which the privileged could not escape. The mode of collection was at the same time immensely improved.

Order and economy being thus introduced into the working of the government, the country, according to Colbert's vast yet detailed plan, was to be enriched by commerce. Manufactures were fostered in every way he could devise. New industries were established, inventors protected, workmen invited from foreign countries, French workmen absolutely prohibited to emigrate. To maintain the character of French goods in foreign markets, as well as to afford a guarantee to the home consumer, the quality and measure of each article were fixed by law, breach of the regulations being punished by public exposure of the

delinquent and destruction of the goods, and, on the third offence, by the pillory. But whatever advantage resulted from this rule was more than compensated by the disadvantages it entailed. The production of qualities which would have suited many purposes of consumption was prohibited, and the odious supervision which became necessary involved great waste of time and a stereotyped regularity which resisted all improvements. And other parts of Colbert's schemes deserve still less equivocal condemnation. By his firm maintenance of the corporation system, each industry remained in the hands of certain privileged bourgeois; in this way, too, improvement was greatly discouraged; while to the lower classes opportunities of advancement were closed. With regard to international commerce Colbert was equally unfortunate in not being in advance of his age; the tariffs he published were protective to an extreme. The interests of internal commerce were, however, wisely consulted. Unable to abolish the duties on the passage of goods from province to province, he did what he could to induce the provinces to equalize them. The roads and canals were improved. The great canal of Languedoc was planned and constructed by Pierre Paul Riquet (1604-1680) under his patronage. To encourage trade with the Levant, Senegal, Guinea and other places, privileges were granted to companies; but, like the more important East India Company, all were unsuccessful. The chief cause of this failure, as well as of the failure of the colonies, on which he bestowed so much watchful care, was the narrowness and rigidity of the government regulations.

The greatest and most lasting of Colbert's achievements was the establishment of the French marine. The royal navy owed all to him, for the king thought only of military exploits. For its use, Colbert reconstructed the works and arsenal of Toulon, founded the port and arsenal of Rochefort, and the naval schools of Rochefort, Dieppe and Saint-Malo, and fortified, with some assistance from Vauban (who, however, belonged to the party of his rival Louvois), among other ports those of Calais, Dunkirk, Brest and Havre. To supply it with recruits he invented his famous system of classes, by which each seaman, according to the class in which he was placed, gave six months' service every three or four or five years. For three months after his term of service he was to receive half-pay; pensions were promised; and, in short, everything was done to make the navy popular. There was one department, however, that was supplied with men on a very different principle. Letters exist written by Colbert to the judges requiring them to sentence to the oar as many criminals as possible, including all those who had been condemned to death; and the convict once chained to the bench, the expiration of his sentence was seldom allowed to bring him release. Mendicants also, against whom no crime had been proved, contraband dealers, those who had been engaged in insurrections, and others immeasurably superior to the criminal class, nay, innocent men—Turkish, Russian and negro slaves, and poor Iroquois Indians, whom the Canadians were ordered to entrap—were pressed into that terrible service. By these means the benches of the galleys were filled, and Colbert took no thought of the long unrelieved agony borne by those who filled them.

Nor was the mercantile marine forgotten. Encouragement was given to the building of ships in France by allowing a premium on those built at home, and imposing a duty on those brought from abroad; and as French workmen were forbidden to emigrate, so French seamen were forbidden to serve foreigners on pain of death.

Even ecclesiastical affairs, though with these he had no official concern, did not altogether escape Colbert's attention. He took a subordinate part in the struggle between the king and Rome as to the royal rights over vacant bishoprics; and he seems to have sympathized with the proposal that was made to seize part of the wealth of the clergy. In his hatred of idleness, he ventured to suppress no less than seventeen fêtes, and he had a project for lessening the number of those devoted to clerical and monastic life, by fixing the age for taking the vows some years later than was then customary. With heresy he was at first unwilling to interfere, for he was aware of the commercial value of the Huguenots; but when the king resolved to make all France Roman Catholic, he followed him and urged his subordinates to do all that they could to promote conversions.

In art and literature Colbert took much interest. He possessed a remarkably fine private library, which he delighted to fill with valuable manuscripts from every part of Europe where France had placed a consul. He has the honour of having founded the Academy of Sciences (now called the Institut de France), the Observatory, which he employed Claude Perrault to build and brought G. D. Cassini (1625-1712) from Italy to superintend, the Academies of Inscriptions and Medals, of Architecture and of Music, the French Academy at Rome, and Academies at Arles, Soissons, Nîmes and many other towns, and he reorganized the Academy of Painting and Sculpture which Richelieu had established. He was a member of the French Academy; and one very characteristic rule, recorded to have been proposed by



him with the intention of expediting the great Dictionary, in which he was much interested, was that no one should be accounted present at any meeting unless he arrived before the hour of commencement and remained till the hour for leaving. In 1673 he presided over the first exhibition of the works of living painters; and he enriched the Louvre with hundreds of pictures and statues. He gave many pensions to men of letters, among whom we find Molière, Corneille, Racine, Boileau, P. D. Huet (1630-1721) and Antoine Varillas (1626-1696), and even foreigners, as Huyghens, Vossius the geographer, Carlo Dati the Dellacruscan, and Heinsius the great Dutch scholar. There is evidence to show that by this munificence he hoped to draw out praises of his sovereign and himself; but this motive certainly is far from accounting for all the splendid, if in some cases specious, services that he rendered to literature, science and art.

Indeed to everything that concerned the interests of France Colbert devoted unsparing thought and toil. Besides all that has been mentioned, he found time to do something for the better administration of justice (the codification of ordinances, the diminishing of the number of judges, the reduction of the expense and length of trials for the establishment of a superior system of police) and even for the improvement of the breed of horses and the increase of cattle. As superintendent of public buildings he enriched Paris with boulevards, quays and triumphal arches; he relaid the foundation-stone of the Louvre, and brought Bernin from Rome to be its architect; and he erected its splendid colonnade upon the plan of Claude Perrault, by whom Bernin had been replaced. He was not permitted, however, to complete the work, being compelled to yield to the king's preference for residences outside Paris, and to devote himself to Marly and Versailles.

Amid all these public labours his private fortune was never neglected. While he was reforming the finances of the nation, and organizing its navy, he always found time to direct the management of his smallest farm. He died extremely rich, and left fine estates all over France. He had been created marquis de Seignelay, and for his eldest son he obtained the reversion of the office of minister of marine; his second son became archbishop of Rouen; and a third son, the marquis d'Ormoy, became superintendent of buildings.

To carry out his reforms, Colbert needed peace; but the war department was in the hands of his great rival Louvois, whose influence gradually supplanted that of Colbert with the king. Louis decided on a policy of conquest. He was deaf also to all the appeals against the other forms of his boundless extravagance which Colbert, with all his deference towards his sovereign, bravely ventured to make.<sup>1</sup> Thus it came about that, only a few years after he had commenced to free the country from the weight of the loans and taxes which crushed her to the dust, Colbert was forced to heap upon her a new load of loans and taxes more heavy than the last. Henceforth his life was a hopeless struggle, and the financial and fiscal reform which, with the great exception of the establishment of the navy, was the most valuable service to France contemplated by him, came to nought.

Depressed by his failure, deeply wounded by the king's favour for Louvois, and worn out by overwork, Colbert's strength gave way at a comparatively early age. In 1680 he was the constant victim of severe fevers, from which he recovered for a time through the use of quinine prescribed by an English physician. But in 1683, at the age of sixty-four, he was seized with a fatal illness, and on the 6th of September he expired. It was said that he died of a broken heart, and a conversation with the king is reported in which Louis disparagingly compared the buildings of Versailles, which Colbert was superintending, with the works constructed by Louvois in Flanders. He took to bed, it is true, immediately afterwards, refusing to receive all messages from the king; but his constitution was utterly broken before, and a post-mortem examination proved that he had been suffering from stone. His body was interred in the secrecy of night, for fear of outrage from the Parisians, by whom his name was cordially detested.

Colbert was a great statesman, who did much for France. Yet his insight into political science was not deeper than that of his age; nor did he possess any superiority in moral qualities. His rule was a very bad example of over-government. He did not believe in popular liberty; the parlements and the states-general received no support from him. The technicalities of justice he never allowed to interfere with his plans; but he did not hesitate to shield his friends. He trafficked in public offices for the profit of Mazarin and in his own behalf. He caused the suffering of thousands in the galleys; he had no ear, it is said, for the cry of the suppliant. There was indeed a more human side to his character, as is shown in his letters, full of wise advice and affectionate care, to his children, his brothers, his cousins even. Yet to all outside he was "the man of marble." Madame de Sévigné called him "the North." To diplomacy he never pretended; persuasion and deceit were not the weapons he employed; all his work was carried out by the iron hand of authority. He was a great

statesman in that he conceived a magnificent yet practicable scheme for making France first among nations, and in that he possessed a matchless faculty for work, neither shrinking from the vastest undertakings nor scorning the most trivial details.

Numerous *vies* and *éloges* of Colbert have been published; but the most thorough student of his life and administration was Pierre Clément, member of the Institute, who in 1846 published his *Vie de Colbert*, and in 1861 the first of the 9 vols. of the *Lettres, instructions, et mémoires de Colbert*. The historical introductions prefixed to each of these volumes have been published by Mme. Clément under the title of the *Histoire de Colbert et de son administration* (3rd ed., 1892). The best short account of Colbert as a statesman is that in Lavissee, *Histoire de France* (1905), which gives a thorough study of the administration. Among Colbert's papers are *Mémoires sur les affaires de finance de France* (written about 1663), a fragment entitled *Particularités secrètes de la vie du Roy*, and other accounts of the earlier part of the reign of Louis XIV.

(J. T. S.)

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1 See especially a *Mémoire* presented to the king in 1666, published in the *Lettres, &c., de Colbert*, vol. ii.

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**COLBERT DE CROISSY, CHARLES**, MARQUIS (1625-1696), French diplomatist, like his elder brother Jean Baptiste Colbert, began his career in the office of the minister of war Le Tellier. In 1656 he bought a counsellorship at the parlement of Metz, and in 1658 was appointed intendant of Alsace and president of the newly-created sovereign council of Alsace. In this position he had to re-organize the territory recently annexed to France. The steady support of his brother at court gained for him several diplomatic missions—to Germany and Italy (1659-1661). In 1662 he became marquis de Croissy and *président à mortier* of the parlement of Metz. After various intendants, at Soissons (1665), at Amiens (1666), and at Paris (1667), he turned definitely to diplomacy. In 1668 he represented France at the conference of Aix-la-Chapelle; and in August of the same year was sent as ambassador to London, where he was to negotiate the definite treaty of alliance with Charles II. He arranged the interview at Dover between Charles and his sister Henrietta of Orleans, gained the king's personal favour by finding a mistress for him, Louise de Kéroualle, maid of honour to Madame, and persuaded him to declare war against Holland. The negotiation of the treaty of Nijmegen (1676-1678) still further increased his reputation as a diplomatist and Louis XIV. made him secretary of state for foreign affairs after the disgrace of Arnauld de Pomponne, brought about by his brother, 1679. He at once assumed the entire direction of French diplomacy. Foreign ambassadors were no longer received and diplomatic instructions were no longer given by other secretaries of state. It was he, not Louvois, who formed the idea of annexation during a time of peace, by means of the chambers of reunion. He had outlined this plan as early as 1658 with regard to Alsace. His policy at first was to retain the territory annexed by the chambers of reunion without declaring war, and for this purpose he signed treaties of alliance with the elector of Brandenburg (1681), and with Denmark (1683); but the troubles following upon the revocation of the edict of Nantes (1685) forced him to give up his scheme and to prepare for war with Germany (1688). The negotiations for peace had been begun again when he died, on the 28th of July 1696. His clerk, Bergeret, was his invaluable assistant.

BIBLIOGRAPHY.—His papers, preserved in the *Archives des affaires étrangères* at Paris, have been partially published in the *Recueil des instructions données aux ambassadeurs et ministres de France* (since 1884). See especially the volumes:—*Autriche* (t. i.), *Suède* (t. ii.), *Rome* (t. vi.), *Bavière* (t. viii.), *Savoie* (t. xiv.), *Prusse* (t. xvi.). Other documents have been published in Mignet's *Négociations relatives à la succession d'Espagne*, vol. iv., and in the collection of *Lettres et négociations ... pour la paix de Nimègue*, 1676-1677 (La Haye, 1710). In addition to the *Mémoires* of the time, see Spanheim, *Relation de la cour de France en 1690*, ed. E. Bourgeois (Paris and Lyons, 1900); Baschet, *Histoire du dépôt des affaires étrangères*; C. Rousset, *Histoire de Louvois* (4 vols., Paris, 1863); E. Bourgeois, "Louvois, et Colbert de Croissy," in the *Revue historique*, vol. xxxiv. (1887); A. Waddington, *Le Grand Électeur et Louis XIV* (Paris, 1905); G. Pagis, *Le Grand Électeur et Louis XIV* (Paris, 1905).

**COLBURN, HENRY** (d. 1855), British publisher, obtained his earliest experience of bookselling in London at the establishment of W. Earle, Albemarle Street, and afterwards as an assistant at Morgan's Library, Conduit Street, of which in 1816 he became proprietor. He afterwards removed to New Burlington Street, where he established himself as a publisher, resigning the Conduit Street Library to Messrs Saunders & Otley. In 1814 he originated the *New Monthly Magazine*, of which at various times Thomas Campbell, Bulwer Lytton, Theodore Hook and Harrison Ainsworth were editors. Colburn published in 1818 *Evelyn's Diary*, and in 1825 the *Diary of Pepys*, edited by Lord Braybrooke, paying £2200 for the copyright. He also issued Disraeli's first novel, *Vivian Grey*, and a large number of other works by Theodore Hook, G. P. R. James, Marryat and Bulwer Lytton. In 1829 Richard Bentley (*q.v.*) was taken into partnership; and in 1832 Colburn retired, but set up again soon afterwards independently in Great Marlborough Street; his business was taken over in 1841 by Messrs Hurst & Blackett. Henry Colburn died on the 16th of August 1855, leaving property to the value of £35,000.

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**COLBURN, ZERAH** (1804-1840), American mathematical prodigy, was born at Cabot, Vermont, on the 1st of September 1804. At a very early age he developed remarkable powers of calculating with extreme rapidity, and in 1810 his father began to exhibit him. As a performing prodigy he visited Great Britain and France. From 1816 to 1819 he studied in Westminster school, London. After the death of his father in 1824 he returned to America, and from 1825 to 1834 he was a Methodist preacher. As he grew older his extraordinary calculating powers diminished. From 1835 until his death, on the 2nd of March 1840, he was professor of languages at the Norwich University in Vermont. He published a *Memoir* of his life in 1833.

His nephew, also named ZERAH COLBURN (1832-1870), was a well-known mechanical engineer; the editor successively of the *Railroad Advocate*, in New York, *The Engineer*, in London, and *Engineering*, in London; and the author of a work entitled *The Locomotive Engine* (1851).

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**COLBY, THOMAS FREDERICK** (1784-1852), British major-general and director of ordnance survey, was born at St Margaret's, Rochester, on the 1st of September 1784, a member of a South Wales family. Entering the Royal Engineers he began in 1802 a life-long connexion with the Ordnance Survey department. His most important work was the survey of Ireland. This he planned in 1824, and was engaged upon it until 1846. The last sheets of this survey were almost ready for issue in that year when he reached the rank of major-general, and according to the rules of the service had to vacate his survey appointment. He was the inventor of the compensation bar, an apparatus used in base-measurements. He died at New Brighton on the 9th of October 1852.

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**COLCHAGUA**, a province of central Chile, bounded N. by Santiago and O'Higgins, E. by Argentina, S. by Curicó, and W. by the Pacific. Its area is officially estimated at 3856 sq. m.; pop. (1895) 157,566. Extending across the great central valley of Chile, the province has a considerable area devoted to agriculture, but much attention is given to cattle and mining. Its principal river is the Rapel, sometimes considered as the southern limit of the Inca empire. Its greatest tributary is the Cachapoal, in the valley of which, among the Andean foothills, are the popular thermal mineral baths of Cauquenes, 2306 ft. above sea-level. The state central railway from Santiago to Puerto Montt crosses the province and has two branches within its borders, one from Rengo to Peumo, and one from San Fernando via

Palmilla to Pichilemu on the coast. The principal towns are the capital, San Fernando, Rengo and Palmilla. San Fernando is one of the several towns founded in 1742 by the governor-general José de Manso, and had a population of 7447 in 1895. Rengo is an active commercial town and had a population of 6463 in 1895.

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**COLCHESTER, CHARLES ABBOT**, 1<sup>ST</sup> BARON (1757-1829), born at Abingdon, was the son of Dr John Abbot, rector of All Saints, Colchester, and, by his mother's second marriage, half-brother of the famous Jeremy Bentham. From Westminster school Charles Abbot passed to Christ Church, Oxford, at which he gained the chancellor's medal for Latin verse as well as the Vinerian scholarship. In 1795, after having practised twelve years as a barrister, and published a treatise proposing the incorporation of the judicial system of Wales with that of England, he was appointed to the office previously held by his brother of clerk of the rules in the king's bench; and in June of the same year he was elected member of parliament for Helston, through the influence of the duke of Leeds. In 1796 Abbot commenced his career as a reformer in parliament by obtaining the appointment of two committees—the one to report on the arrangements which then existed as to temporary laws or laws about to expire, the other to devise methods for the better publication of new statutes. To the latter committee, and a second committee which he proposed some years later, it is owing that copies of new statutes were thenceforth sent to all magistrates and municipal bodies. To Abbot's efforts were also due the establishment of the Royal Record Commission, the reform of the system which had allowed the public money to lie for some time at long interest in the hands of the public accountants, by charging them with payment of interest, and, most important of all, the act for taking the first census, that of 1801. On the formation of the Addington ministry in March 1801 Abbot became chief secretary and privy seal for Ireland; and in the February of the following year he was chosen speaker of the House of Commons—a position which he held with universal satisfaction till 1817, when an attack of erysipelas compelled him to retire. In response to an address of the Commons, he was raised to the peerage as Baron Colchester, with a pension of £4000, of which £3000 was to be continued to his heir. He died on the 8th of May 1829. His speeches against the Roman Catholic claims were published in 1828.

He was succeeded by his eldest son CHARLES (d. 1867), postmaster-general in 1858; and the latter by his son REGINALD CHARLES EDWARD (b. 1842), as 3rd baron.

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**COLCHESTER** a market town, river port and municipal and parliamentary borough of Essex, England; 52 m. N. E. by E. from London by the Great Eastern railway. Pop. (1901) 38,373. It lies on the river Colne, 12 m. from the open sea. Among numerous buildings of antiquarian interest the first is the ruined keep of the castle, a majestic specimen of Norman architecture, the largest of its kind in England, covering nearly twice the area of the White Tower in London. It was erected in the reign of William I. or William II., and is quadrangular, turreted at the angles. As in other ancient buildings in Colchester there are evidences of the use of material from the Roman town which occupied the site, but it is clearly of Norman construction. Here is the museum of the Essex Archaeological Society, with a remarkable collection of Roman antiquities, and a library belonging to the Round family, who own the castle. Among ecclesiastical buildings are remains of two monastic foundations—the priory of St Botolph, founded early in the 12th century for Augustinian canons, of which part of the fine Norman west front (in which Roman bricks occur), and of the nave arcades remain; and the restored gateway of the Benedictine monastery of St John, founded by Eudo, steward to William II. This is a beautiful specimen of Perpendicular work, embattled, flanked by spired turrets, and covered with panel work. The churches of Holy Trinity, St Martin and St Leonard at Hythe are of antiquarian interest; the first has an apparently pre-Norman tower and the last preserves some curious frescoes.

The principal modern buildings are the town hall, corn exchange, free library, the Eastern Counties' asylum, Essex county hospital and barracks. The town has long been an important

military centre with a large permanent camp. There are a free grammar school (founded 1539), a technical and university extension college, a literary institute and medical and other societies. Castle Park is a public ground surrounding the castle. Colchester is the centre of an agricultural district, and has extensive corn and cattle markets. Industries include founding, engineering, malting, flour-milling, rose-growing and the making of clothing and boots and shoes. The oyster fisheries at the mouth of the Colne, for which the town has been famous for centuries, belong to the corporation, and are held on a ninety-nine years' lease by the Colne Fishery Company, incorporated under an act of 1870. The harbour, with quayage at the suburb of Hythe, is controlled by the corporation. The parliamentary borough, which is co-extensive with the municipal, returns one member. The municipal corporation consists of a mayor, 8 aldermen and 24 councillors. Area 11,333 acres.

The Roman town, *Colonia Victricensis Camalodunum* (or *Camulodunum*), was of great importance. It was founded by Claudius, early in the period of the Roman conquest, as a municipality with discharged Roman soldiers as citizens, to assist the Roman dominion and spread its civilization. Under Queen Boadicea the natives burned the town and massacred the colonists; but Camalodunum soon rose to fresh prosperity and flourished throughout the Roman period. Its walls and some other remains, including the guardroom at the principal gate, can still be clearly traced, and many such relics as sculptures, inscriptions, pavements and pottery have been discovered. When the borough originated is not known, but Domesday Book mentions two hundred and seventy-six burgesses and land *in commune burgensium*, a phrase that may point to a nascent municipal corporation. The first charter given by Richard I. in 1189 granted the burghers leave to choose their bailiffs and a justice to hold the pleas of the crown within the borough, freedom from the obligation of duel, freedom of passage and pontage through England, free warren, fishery and custom as in the time of Henry I., and other privileges. An *inspeximus* of this charter by Henry III. in 1252 granted the burgesses the return of certain writs. The charters were confirmed by various kings, and new grants obtained in 1447 and 1535. In 1635 Charles I. granted a fresh charter, which replaced the bailiffs by a mayor, and in 1653 Cromwell altered it to secure a permanent majority for his party on the corporation. But his action was undone in 1659, and in 1663 Charles II. granted a new charter. In 1684 the charters were surrendered, and a new one obtained reserving to the crown power to remove the mayor and alderman, and this one was further modified by James II. But the charter of 1663 was confirmed in 1693 and remained in force till 1741, when the liberties were allowed to lapse. In 1763 George III. made the borough a renewed grant of its liberties. Colchester returned two members to parliament from 1295 until 1885. Fairs were granted by Richard I. in 1189 to the hospital of St Mary Magdalene, and by Edward II. in 1319 to the town for the eve of and feast of St Denis and the six following days—a fair which is still held. In the 13th century Colchester was sufficiently important as a port to pay a fee-farm of £46, its ships plying to Winchelsea and France. Elizabeth and James I. encouraged Flemish settlers in the manufacture of baize ("bays and says"), which attained great importance, so that a charter of Charles I. speaks of burgesses industriously exercising the manufacture of cloth. Both Camden and Fuller mention the trade in barrelled oysters and candied eringo-root. The most notable event in the history of the town was its siege by Fairfax in 1648, when the raw levies of the Royalists in the second civil war held his army at bay for nearly eleven weeks, only surrendering when starved out, and when Cromwell's victory in the north made further resistance useless. Colchester was made the see of a suffragan bishop by King Henry VIII., and two bishops were in succession appointed by him; no further appointments, however, were made until the see was re-established under Queen Victoria.

See *Victoria County History, Essex, Charters and Letters Patent granted to the Borough of Colchester* (Colchester, 1903); Morant, *History of Colchester* (1748); Harrod's *Report on the Records of Colchester* (1865); Cutts, *Colchester* (Historic Towns) 1888; J. H. Round, "Colchester and the Commonwealth" in *Eng. Hist. Rev.* vol. xv.; Benham, *Red Paper Book of Colchester* (1902), and *Oath Book of Colchester* (1907).

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**COLCHESTER**, a township of Chittenden county, Vermont, U.S.A., on Lake Champlain, immediately N.E. of Burlington, from which it is separated by the Winooski river. Pop. (1900) 5352; (1910) 6450. It is served by the Central Vermont railway. The surface is generally gently rolling, and in places along the banks of the Winooski or Onion river, the

shore of the lake, and in the valleys, it is very picturesque. At Mallett's Bay, an arm of Lake Champlain, 2 m. long and 1½ m. wide, several large private schools hold summer sessions. The soil is varied, much of it being good meadow land or well adapted to the growing of grain and fruit. The township has two villages: Colchester Centre, a small, quiet settlement, and Winooski (pop. in 1900, 3783) on the Winooski river. This stream furnishes good water power, and the village has manufactories of cotton and woollen goods, lumber, woodenware, gold and silver plated ware, carriages, wagons and screens. Within the township there is a United States military reservation, Fort Ethan Allen. The village was founded in 1772 by Ira Allen and for many years it was known as "Allen's Settlement"; but later it was called Winooski Falls, and in 1866 it was incorporated as the Village of Winooski.

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**COLCHICUM**, the Meadow Saffron, or Autumn Crocus (*Colchicum autumnale*), a perennial plant of the natural order, Liliaceae, found wild in rich moist meadow-land in England and Ireland, in middle and southern Europe, and in the Swiss Alps. It has pale-purple flowers, rarely more than three in number; the perianth is funnel-shaped, and produced below into a long slender tube, in the upper part of which the six stamens are inserted. The ovary is three-celled, and lies at the bottom of this tube. The leaves are three or four in number, flat, lanceolate, erect and sheathing; and there is no stem. Propagation is by the formation of new corms from the parent corm, and by seeds. The latter are numerous, round, reddish-brown, and of the size of black mustard-seeds. The corm of the meadow-saffron attains its full size in June or early in July. A smaller corm is then formed from the old one, close to its root; and this in September and October produces the crocus-like flowers. In the succeeding January or February it sends up its leaves, together with the ovary, which perfects its seeds during the summer. The young corm, at first about the diameter of the flower-stalk, grows continuously, till in the following July it attains the size of a small apricot. The parent corm remains attached to the new one, and keeps its form and size till April in the third year of its existence, after which it decays. In some cases a single corm produces several new plants during its second spring by giving rise to immature corms.

*C. autumnale* and its numerous varieties as well as other species of the genus, are well known in cultivation, forming some of the most beautiful of autumn-flowering plants. They are very easy to cultivate and do not require lifting. The most suitable soil is a light, sandy loam enriched with well decomposed manure, in a rather moist situation. The corms should be planted not less than 3 in. deep. Propagation is effected by seed or increase of corms; the seed should be sown as soon as it is ripe in June or July.

Colchicum was known to the Greeks under the name of Κολχικόν, from Κολχίς, or Colchis, a country in which the plant grew; and it is described by Dioscorides as a poison. In the 17th century the corms were worn by some of the German peasantry as a charm against the plague. The drug was little used till 1763, when Baron Störck of Vienna introduced it for the treatment of dropsy. Its use in febrile diseases, at one time extensive, is now obsolete. As a specific for gout colchicum was early employed by the Arabs; and the preparation known as *eau médicinale*, much resorted to in the 18th century for the cure of gout, owes its therapeutic virtues to colchicum; but general attention was first directed by Sir Everard Home to the use of the drug in gout.

For medical purposes the corm should be collected in the early summer and, after the outer coat has been removed, should be sliced and dried at a temperature of 130° to 150° F.

The chief constituents of colchicum are two alkaloids, *colchicine* and *veratrine*. Colchicine is the active principle and may be given in full form in doses of 1/32 to 1/16 grain. It is a yellow, micro-crystalline powder, soluble in water, alcohol and chloroform, and forming readily decomposed salts with acids. It is the methyl ester of a neutral body *colchicein*, which may be obtained in white acicular crystals.

The official dose of powdered colchicum is 2 to 5 grains, which may be given in a cachet. The British Pharmacopoeia contains (1) an extract of the fresh corm, having doses of 1/4 to 1 grain, and (2) the *Vinum Colchici*, made by treating the dried corm with sherry and given in doses of 10 to 30 minims. This latter is the preparation still most generally used, though the presence of veratrine both in the corm and the seeds renders the use of colchicine itself

theoretically preferable. The dried ripe seeds of this plant are also used in medicine. They are exceedingly hard and difficult to pulverize, odourless, bitter and readily confused with black mustard seeds. They contain a volatile oil which does not occur in the corm, and their proportion of colchicine is higher, for which reason the *Tinctura Colchici Seminum*—dose 5 to 15 minims—is preferable to the wine prepared from the corm. At present this otherwise excellent preparation is not standardized, but the suggestion has been made that it should be standardized to contain 0.1% of colchicine. The salicylate of colchicine is stable in water and may be given in doses of about one-thirtieth of a grain. It is often known as Colchi-Sal.

*Pharmacology.*—Colchicum or colchicine, when applied to the skin, acts as a powerful irritant, causing local pain and congestion. When inhaled, the powder causes violent sneezing, similar to that produced by veratrine itself, which is, as already stated, a constituent of the corm. Taken internally, colchicum or colchicine markedly increases the amount of bile poured into the alimentary canal, being amongst the most powerful of known cholagogues. Though this action doubtless contributes to its remarkable therapeutic power, it is very far from being an adequate explanation of the virtues of the drug in gout. In larger doses colchicum or colchicine acts as a most violent gastrointestinal irritant, causing terrible pain, colic, vomiting, diarrhoea, haemorrhage from the bowel, thirst and ultimately death from collapse. This is accelerated by a marked depressant action upon the heart, similar to that produced by veratrine and aconite. Large doses also depress the nervous system, weakening the anterior horns of grey matter in the spinal cord so as ultimately to cause complete paralysis, and also causing a partial insensibility of the cutaneous nerves of touch and pain. The action of colchicum or colchicine upon the kidneys has been minutely studied, and it is asserted on the one hand that the urinary solids are much diminished and, on the other hand, that they are markedly increased, the specific gravity of the secretion being much raised. These assertions, and the total inadequacy of the pharmacology of colchicum, as above detailed, to explain its specific therapeutic property, show that the secret of colchicum is as yet undiscovered.

The sole but extremely important use of this drug is as a specific for gout. It has an extraordinary power over the pain of acute gout; it lessens the severity and frequency of the attacks when given continuously between them, and it markedly controls such symptoms of gout as eczema, bronchitis and neuritis, whilst it is entirely inoperative against these conditions when they are not of gouty origin. Despite the general recognition of these facts, the pharmacology of colchicum has hitherto thrown no light on the pathology of gout, and the pathology of gout has thrown no light upon the manner in which colchicum exerts its unique influence upon this disease. Veratrine is useless in the treatment of gout. A further curious fact, doubtless of very great significance, but hitherto lacking interpretation, is that the administration of colchicum during an acute attack of gout may often hasten the oncoming of the next attack; and this property, familiar to many gouty patients, may not be affected by the administration of small doses after the attack. Altogether colchicum is a puzzle, and will remain so until the efficient poison of gout is isolated and defined. When that is done, colchicine may be found to exhibit a definite chemical interaction with this hitherto undiscovered substance.

In *colchicum poisoning*, empty the stomach, give white of egg, olive or salad oil, and water. Use hot bottles and stimulants, especially trying to counteract the cardiac depression by atropine, caffeine, strophanthin, &c.

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**COLCHIS**, in ancient geography, a nearly triangular district of Asia Minor, at the eastern extremity of the Black Sea, bounded on the N. by the Caucasus, which separated it from Asiatic Sarmatia, E. by Iberia, S. by the Montes Moschici, Armenia and part of Pontus, and W. by the Euxine. The ancient district is represented roughly by the modern province of Kutais (formerly Mingrelia). The name of Colchis first appears in Aeschylus and Pindar. It was inhabited by a number of tribes whose settlements lay chiefly along the shore of the Black Sea. The chief of those were the Lazi, Moschi, Apsilae, Abasci, Sagadae, Suani and Coraxi. These tribes differed so completely in language and appearance from the surrounding nations, that the ancients originated various theories to account for the phenomenon. Herodotus, who states that they, with the Egyptians and the Ethiopians, were the first to practise circumcision, believed them to have sprung from the relics of the army of Sesostris (*q.v.*), and thus regarded them as Egyptians. Apollonius Rhodius (*Argon*, iv. 279)

states that the Egyptians of Colchis preserved as heirlooms a number of wooden κύβεις (tablets) showing seas and highways with considerable accuracy. Though this theory was not generally adopted by the ancients, it has been defended, but not with complete success, by some modern writers. It is quite possible that there was an ancient trade connexion between the Colchians and the Mediterranean peoples. We learn that women were buried, while the corpses of men were suspended on trees. The principal coast town was the Milesian colony of Dioscurias (Roman Sebastopolis; mod. Sukhum Kaleh), the ancient name being preserved in the modern C. Iskuria. The chief river was the Phasis (mod. Rion). From Colchis is derived the name of the plant Colchicum (*q.v.*).

Colchis was celebrated in Greek mythology as the destination of the Argonauts, the home of Medea and the special domain of sorcery. Several Greek colonies were founded there by Miletus. At a remote period it seems to have been incorporated with the Persian empire, though the inhabitants evidently enjoyed a considerable degree of independence; in this condition it was found by Alexander the Great, when he invaded Persia. From this time till the era of the Mithradatic wars nothing is known of its history. At the time of the Roman invasion it seems to have paid a nominal homage to Mithradates the Great and to have been ruled over by Machares, his second son. On the defeat of Mithradates by Pompey, it became a Roman province. After the death of Pompey, Pharnaces, the son of Mithradates, rose in rebellion against the Roman yoke, subdued Colchis and Armenia, and made head, though but for a short time, against the Roman arms. After this Colchis was incorporated with Pontus, and the Colchians are not again alluded to in ancient history till the 6th century, when, along with the Abasci or Abasgi, under their king Gobazes, whose mother was a Roman, they called in the aid of Chosroes I. of Persia (541). The importance of the district, then generally called Lazica from the Lazi (cf. mod. Lazistan) who led the revolt, was due to the fact that it was the only remaining bar which held the Persians, already masters of Iberia, from the Black Sea. It had therefore been specially garrisoned by Justinian under first Peter, a Persian slave, and subsequently Johannes Tzibos, who built Petra on the coast as the Roman Headquarters. Tzibos took advantage of the extreme poverty of the Lazi to create a Roman monopoly by which he became a middleman for all the trade both export and import. Chosroes at once accepted the invitation of Gobazes and succeeded in capturing Petra (A.D. 541). The missionary zeal of the Zoroastrian priests soon caused discontent among the Christian inhabitants of Colchis, and Gobazes, perceiving that Chosroes intended to Persianize the district, appealed to Rome, with the result that in 549 one Dagisthaeus was sent out with 7000 Romans and 1000 auxiliaries of the Tzani (Zani, Sanni). The "Lazic War" lasted till 556 with varying success. Petra was recaptured in 551 and Archaeopolis was held by the Romans against the Persian general Mermeroes. Gobazes was assassinated in 552, but the Persian general Nachoragan was heavily defeated at Phasis in 553.

By the peace of 562 the district was left in Roman possession, but during the next 150 years it is improbable that the Romans exercised much authority over it. In 697 we hear of a revolt against Rome led by Sergius the Patrician, who allied himself with the Arabs. Justinian II. in his second period of rule sent Leo the Isaurian, afterwards emperor, to induce the Alans to attack the Abasgi. The Alans, having gained knowledge of the district by a trick, invaded Lazica, and, probably in 712, a Roman and Armenian army laid siege to Archaeopolis. On the approach of a Saracen force they retired, but a small plundering detachment was cut off. Ultimately Leo joined this band and aided by the Apsilian chief Marinus escaped with them to the coast.

From the beginning of the 14th to the end of the 17th century the district under the name Mingrelia (*q.v.*) was governed by an independent dynasty, the Dadians, which was succeeded by a semi-independent dynasty, the Chikovans, who by 1838 had submitted to Russia, though they retained a nominal sovereignty. In 1866 the district was finally annexed by Russia.

For the kings see Stokvis, *Manuel d'histoire*, i. 83.

(J. M. M.)

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**COLCOTHAR** (adapted in Romanic languages from Arabic *golgotar*, which was probably a corruption of the Gr. χάλκανθος, from χαλκός, copper, ἄνθος, flower, *i.e.* copper sulphate), a name given to the brownish-red ferric oxide formed in the preparation of fuming sulphuric



(Nordhausen) acid by distilling ferrous sulphate. It is used as a polishing powder, forming the rouge of jewellers, and as the pigment Indian red. It is also known as *Crocus Martis*.

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**COLD** (in O. Eng. *cald* and *ceald*, a word coming ultimately from a root cognate with the Lat. *gelu*, *gelidus*, and common in the Teutonic languages, which usually have two distinct forms for the substantive and the adjective, cf. Ger. *Kälte*, *kalt*, Dutch *koude*, *koud*), subjectively the sensation which is excited by contact with a substance whose temperature is lower than the normal; objectively a quality or condition of material bodies which gives rise to that sensation. Whether cold, in the objective sense, was to be regarded as a positive quality or merely as absence of heat was long a debated question. Thus Robert Boyle, who does not commit himself definitely to either view, says, in his *New Experiments and Observations touching Cold*, that "the dispute which is the *primum frigidum* is very well known among naturalists, some contending for the earth, others for water, others for the air, and some of the moderns for nitre, but all seeming to agree that there is some body or other that is of its own nature supremely cold and by participation of which all other bodies obtain that quality." But with the general acceptance of the dynamical theory of heat, cold naturally came to be regarded as a negative condition, depending on decrease in the amount of the molecular vibration that constitutes heat.

The question whether there is a limit to the degree of cold possible, and, if so, where the zero must be placed, was first attacked by the French physicist, G. Amontons, in 1702-1703, in connexion with his improvements in the air-thermometer. In his instrument temperatures were indicated by the height at which a column of mercury was sustained by a certain mass of air, the volume or "spring" of which of course varied with the heat to which it was exposed. Amontons therefore argued that the zero of his thermometer would be that temperature at which the spring of the air in it was reduced to nothing. On the scale he used the boiling-point of water was marked at 73 and the melting-point of ice at 51½, so that the zero of his scale was equivalent to about -240° on the centigrade scale. This remarkably close approximation to the modern value of -273° for the zero of the air-thermometer was further improved on by J. H. Lambert (*Pyrometrie*, 1779), who gave the value -270° and observed that this temperature might be regarded as absolute cold. Values of this order for the absolute zero were not, however, universally accepted about this period. Laplace and Lavoisier, for instance, in their treatise on heat (1780), arrived at values ranging from 1500° to 3000° below the freezing-point of water, and thought that in any case it must be at least 600° below, while John Dalton in his *Chemical Philosophy* gave ten calculations of this value, and finally adopted -3000° C. as the natural zero of temperature. After J. P. Joule had determined the mechanical equivalent of heat, Lord Kelvin approached the question from an entirely different point of view, and in 1848 devised a scale of absolute temperature which was independent of the properties of any particular substance and was based solely on the fundamental laws of thermodynamics (see [HEAT](#) and [THERMODYNAMICS](#)). It followed from the principles on which this scale was constructed that its zero was placed at -273°, at almost precisely the same point as the zero of the air-thermometer.

In nature the realms of space, on the probable assumption that the interstellar medium is perfectly transparent and diathermanous, must, as was pointed out by W. J. Macquorn Rankine, be incapable of acquiring any temperature, and must therefore be at the absolute zero. That, however, is not to say that if a suitable thermometer could be projected into space it would give a reading of -273°. On the contrary, not being a transparent and diathermanous body, it would absorb radiation from the sun and other stars, and would thus become warmed. Professor J. H. Poynting ("Radiation in the Solar System," *Phil. Trans.*, A, 1903, 202, p. 525) showed that as regards bodies in the solar system the effects of radiation from the stars are negligible, and calculated that by solar radiation alone a small absorbing sphere at the distance of Mercury from the sun would have its temperature raised to 483° Abs. (210° C), at the distance of Venus to 358° Abs. (85° C), of the earth to 300° Abs. (27° C), of Mars to 243° Abs. (-30° C), and of Neptune to only 54° Abs. (-219° C.). The French physicists of the early part of the 19th century held a different view, and rejected the hypothesis of the absolute cold of space. Fourier, for instance, postulated a fundamental temperature of space as necessary for the explanation of the heat-effects observed on the surface of the earth, and estimated that in the interplanetary regions it was little less than that of the terrestrial poles and below the freezing-point of mercury, though it was different

in other parts of space (*Ann. chim. phys.*, 1824, 27, pp. 141, 150). C. S. M. Pouillet, again, calculated the temperature of interplanetary space as  $-142^{\circ}$  C. (*Comptes rendus*, 1838, 7, p. 61), and Sir John Herschel as  $-150^{\circ}$  (*Ency. Brit.*, 8th ed., art. "Meteorology," p. 643).

To attain the absolute zero in the laboratory, that is, to deprive a substance entirely of its heat, is a thermodynamical impossibility, and the most that the physicist can hope for is an indefinitely close approach to that point. The lowest steady temperature obtainable by the exhaustion of liquid hydrogen is about  $-262^{\circ}$  C. ( $11^{\circ}$  Abs.), and the liquefaction of helium by Professor Kamerlingh Onnes in 1908 yielded a liquid having a boiling-point of about  $4.3^{\circ}$  Abs., which on exhaustion must bring us to within about  $2\frac{1}{2}$  degrees of the absolute zero. (See [LIQUID GASES.](#))

For a "cold," in the medical sense, see [CATARRH](#) and [RESPIRATORY SYSTEM: Pathology](#).

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**COLDEN, CADWALLADER** (1688-1776), American physician and colonial official, was born at Duns, Scotland, on the 17th of February 1688. He graduated at the university of Edinburgh in 1705, spent three years in London in the study of medicine, and emigrated to America in 1708. After practising medicine for ten years in Philadelphia, he was invited to settle in New York by Governor Hunter, and in 1718 was appointed the first surveyor-general of the colony. Becoming a member of the provincial council in 1720, he served for many years as its president, and from 1761 until his death was lieutenant-governor; for a considerable part of the time, during the interim between the appointment of governors, he was acting-governor. About 1755 he retired from medical practice. As early as 1729 he had built a country house called Coldenham on the line between Ulster and Orange counties, where he spent much of his time until 1761. Aristocratic and extremely conservative, he had a violent distrust of popular government and a strong aversion to the popular party in New York. Naturally he came into frequent conflict with the growing sentiment in the colony in opposition to royal taxation. He was acting-governor when in 1765 the stamped paper to be used under the Stamp Act arrived in the port of New York; a mob burned him in effigy in his own coach in Bowling Green, in sight of the enraged acting-governor and of General Gage; and Colden was compelled to surrender the stamps to the city council, by whom they were locked up in the city hall until all attempts to enforce the new law were abandoned. Subsequently Colden secured the suspension of the provincial assembly by an act of parliament. He understood, however, the real temper of the patriot party, and in 1775, when the outbreak of hostilities seemed inevitable, he strongly advised the ministry to act with caution and to concede some of the colonists' demands. When the war began, he retired to his Long Island country seat, where he died on the 28th of September 1776. Colden was widely known among scientists and men of letters in England and America. He was a life-long student of botany, and was the first to introduce in America the classification system of Linnaeus, who gave the name "Coldenia" to a newly recognized genus. He was an intimate friend of Benjamin Franklin. He wrote several medical works of importance in their day, the most noteworthy being *A Treatise on Wounds and Fevers* (1765); he also wrote *The History of the Five Indian Nations depending on the Province of New York* (1727, reprinted 1866 and 1905), and an elaborate work on *The Principles of Action in Matter* (1751) which, with his *Introduction to the Study of Physics* (c. 1756), his *Enquiry into the Principles of Vital Motion* (1766), and his *Reflections* (c. 1770), mark him as the first of American materialists and one of the ablest material philosophers of his day. I. Woodbridge Riley, in *American Philosophy* (New York, 1907), made the first critical study of Colden's philosophy, and said of it that it combined "Newtonian mechanics with the ancient hylozoistic doctrine ..." and "ultimately reached a kind of dynamic panpsychism, substance being conceived as a self-acting and universally diffused principle, whose essence is power and force."

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See Alice M. Keys, *Cadwallader Colden, A Representative 18th Century Official* (New York, 1906), a Columbia University doctoral dissertation; J. G. Mumford, *Narrative of Medicine in America* (New York, 1903); and Asa Gray, "Selections from the Scientific Correspondence of Cadwallader Colden" in *American Journal of Science*, vol. 44, 1843.

His grandson, CADWALLADER DAVID COLDEN (1769-1834), lawyer and politician, was educated in London, but returned in 1785 to New York, where he attained great distinction at the bar. He was a colonel of volunteers during the war of 1812, and from 1818 to 1821 was the successor of Jacob Radcliff as mayor of New York City. He was a member of the state

assembly (1818) and the state senate (1825-1827), and did much to secure the construction of the Erie Canal and the organization of the state public school system; and in 1821-1823 he was a representative in Congress. He wrote a *Life of Robert Fulton* (1817) and a *Memoir of the Celebration of the Completion of the New York Canals* (1825).

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**COLD HARBOR**, OLD and NEW, two localities in Hanover county, Virginia, U.S.A., 10 m. N.E. of Richmond. They were the scenes of a succession of battles, on May 31-June 12, 1864, between the Union forces under command of General U. S. Grant and the Confederates under General R. E. Lee, who held a strongly entrenched line at New Cold Harbor. The main Union attack on June 3 was delivered by the II. (Hancock), VI. (Wright), and XVIII. (W. F. Smith) corps, and was brought to a standstill in eight minutes. An order from army headquarters to renew the attack was ignored by the officers and men at the front, who realized fully the strength of the hostile position. These troops lost as many as 5,000 men in an hour's fighting, the greater part in the few minutes of the actual assault. In the constant fighting of 31st of May to 12th of June on this ground Grant lost 14,000 men. (See [WILDERNESS](#) and [AMERICAN CIVIL WAR](#).)

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**COLDSTREAM**, a police burgh of Berwickshire, Scotland. Pop. (1901) 1482. It is situated on the north bank of the Tweed, here spanned by John Smeaton's fine bridge of five arches, erected in 1763-1766, 13½ m. south-west of Berwick by the North Eastern railway. The chief public buildings are the town hall, library, mechanics' institute, and cottage hospital. Some brewing is carried on. Owing to its position on the Border and also as the first ford of any consequence above Berwick, the town played a prominent part in Scottish history during many centuries. Here Edward I. crossed the stream in 1296 with his invading host, and Montrose with the Covenanters in 1640. Of the Cistercian priory, founded about 1165 by Cospatric of Dunbar, and destroyed by the 1st earl of Hertford in 1545, which stood a little to the east of the present market-place, no trace remains; but for nearly four hundred years it was a centre of religious fervour. Here it was that the papal legate, in the reign of Henry VIII., published a bull against the printing of the Scriptures; and by the irony of fate its site was occupied in the 19th century by an establishment, under Dr Adam Thomson, for the production of cheap Bibles. At Coldstream General Monk raised in 1659 the celebrated regiment of Foot Guards bearing its name. Like Gretna Green, Coldstream long enjoyed a notoriety as the resort of runaway couples, the old toll-house at the bridge being the usual scene of the marriage ceremony. "Marriage House," as it is called, still exists in good repair. Henry Brougham, afterwards lord chancellor, was married in this clandestine way, though in an inn and not at the bridge, in 1821. Birgham, 3 m. west, was once a place of no small importance, for there in 1188 William the Lion conferred with the bishop of Durham concerning the attempt of the English Church to impose its supremacy upon Scotland; there in 1289 was held the convention to consider the question of the marriage of the Maid of Norway with Prince Edward of England; and there, too, in 1290 was signed the treaty of Birgham, which secured the independence of Scotland. Seven miles below Coldstream on the English side, though 6 m. north-east of it, are the massive ruins of Norham Castle, made famous by Scott's *Marmion*, and from the time of its building by Ranulph Flambard in 1121 a focus of Border history during four centuries.

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**COLDWATER**, a city and county-seat of Branch county, Michigan, U.S.A., on Coldwater Stream (which connects two of the group of small lakes in the vicinity), about 80 m. S.S.E. of Grand Rapids. Pop. (1890) 5247; (1900) 6216, of whom 431 were foreign-born; (1904) 6225; (1910) 5945. It is served by the Lake Shore & Michigan Southern railway. It is the seat of a

state public school and temporary home (opened in 1874) for dependent, neglected or ill-treated children, who are received at any age under twelve. The city is situated in a fine farming region, has an important flouring and grist mill industry, and also manufactures Portland cement, liniment, lumber, furniture, sashes, doors and blinds, brass castings, sleighs, shoes, &c. The municipality owns and operates the water-works and electric lighting plant. Coldwater was settled in 1829, was laid out as a town under the name of Lyons in 1832, received its present name in the following year, was incorporated as a village in 1837, was reached by railway and became the county-seat in 1851, and was chartered as a city in 1861.

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**COLE, SIR HENRY** (1808-1882), English civil servant, was born at Bath on the 15th of July 1808, and was the son of an officer in the army. At the age of fifteen he became clerk to Sir Francis Palgrave, then a subordinate officer in the record office, and, helped by Charles Buller, to whom he had been introduced by Thomas Love Peacock, and who became chairman of a royal commission for inquiry into the condition of the public records, worked his way up until he became an assistant keeper. He largely assisted in influencing public opinion in support of Sir Rowland Hill's reforms at the post office. A connexion with the Society of Arts caused him to drift gradually out of the record office: he was a leading member of the commission that organized the Great Exhibition of 1851, and upon the conclusion of its labours was made secretary to the School of Design, which by a series of transformations became in 1853 the Department of Science and Art. Under its auspices the South Kensington (now Victoria and Albert) Museum was founded in 1855 upon land purchased out of the surplus of the exhibition, and Cole practically became its director, retiring in 1873. His proceedings were frequently criticized, but the museum owes much to his energy. Indefatigable, genial and masterful, he drove everything before him, and by all sorts of schemes and devices built up a great institution, whose variety and inequality of composition seemed imaged in the anomalous structure in which it was temporarily housed. He also, though to the financial disappointment of many, conferred a great benefit upon the metropolis by originating the scheme for the erection of the Royal Albert Hall. He was active in founding the national training schools for cookery and music, the latter the germ of the Royal College of Music. He edited the works of his benefactor Peacock; and was in his younger days largely connected with the press, and the author of many useful topographical handbooks published under the pseudonym of "Felix Summerly." He died on the 18th of April 1882.

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**COLE, THOMAS** (1801-1848), American landscape painter, was born at Bolton-le-Moors, England, on the 1st of February 1801. In 1819 the family emigrated to America, settling first in Philadelphia and then at Steubenville, Ohio, where Cole learned the rudiments of his profession from a wandering portrait painter named Stein. He went about the country painting portraits, but with little financial success. Removing to New York (1825), he displayed some landscapes in the window of an eating-house, where they attracted the attention of the painter Colonel Trumbull, who sought him out, bought one of his canvases, and found him patrons. From this time Cole was prosperous. He is best remembered by a series of pictures consisting of four canvases representing "The Voyage of Life," and another series of five canvases representing "The Course of Empire," the latter now in the gallery of the New York Historical Society. They were allegories, in the taste of the day, and became exceedingly popular, being reproduced in engravings with great success. The work, however, was meretricious, the sentiment false, artificial and conventional, and the artist's genuine fame must rest on his landscapes, which, though thin in the painting, hard in the handling, and not infrequently painful in detail, were at least earnest endeavours to portray the world out of doors as it appeared to the painter; their failings were the result of Cole's environment and training. He had an influence on his time and his fellows which was considerable, and with Durand he may be said to have founded the early school of American landscape painters. Cole spent the years 1829-1832 and 1841-1842 abroad, mainly in Italy,

and at Florence lived with the sculptor Greenough. After 1827 he had a studio in the Catskills which furnished the subjects of some of his canvases, and he died at Catskill, New York, on the 11th of February 1848. His pictures are in many public and private collections. His "Expulsion from Eden" is in the Metropolitan Museum in New York.

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**COLE, TIMOTHY** (1852- ), American wood engraver, was born in London, England, in 1852, his family emigrating to the United States in 1858. He established himself in Chicago, where in the great fire of 1871 he lost everything he possessed. In 1875 he removed to New York, finding work on the *Century* (then *Scribner's*) magazine. He immediately attracted attention by his unusual facility and his sympathetic interpretation of illustrations and pictures, and his publishers sent him abroad in 1883 to engrave a set of blocks after the old masters in the European galleries. These achieved for him a brilliant success. His reproductions of Italian, Dutch, Flemish and English pictures were published in book form with appreciative notes by the engraver himself. Though the advent of new mechanical processes had rendered wood engraving almost a lost art and left practically no demand for the work of such craftsmen, Mr Cole was thus enabled to continue his work, and became one of the foremost contemporary masters of wood engraving. He received a medal of the first class at the Paris Exhibition of 1900, and the only grand prize given for wood engraving at the Louisiana Purchase Exposition at St Louis, Missouri, in 1904.

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**COLE, VICAT** (1833-1893), English painter, born at Portsmouth on the 17th of April 1833, was the son of the landscape painter, George Cole, and in his practice followed his father's lead with marked success. He exhibited at the British Institution at the age of nineteen, and was first represented at the Royal Academy in 1853. His election as an associate of this institution took place in 1870, and he became an Academician ten years later. He died in London on the 6th of April 1893. The wide popularity of his work was due partly to the simple directness of his technical method, and partly to his habitual choice of attractive material. Most of his subjects were found in the counties of Surrey and Sussex, and along the banks of the Thames. One of his largest pictures, "The Pool of London," was bought by the Chantry Fund Trustees in 1888, and is now in the Tate Gallery.

See Robert Chignell, *The Life and Paintings of Vicat Cole, R.A.* (London, 1899).

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**COLEBROOKE, HENRY THOMAS** (1765-1837), English Orientalist, the third son of Sir George Colebrooke, 2nd baronet, was born in London on the 15th of June 1765. He was educated at home; and when only fifteen he had made considerable attainments in classics and mathematics. From the age of twelve to sixteen he resided in France, and in 1782 was appointed to a writership in India. About a year after his arrival there he was placed in the board of accounts in Calcutta; and three years later he was removed to a situation in the revenue department at Tirhut. In 1789 he was removed to Purneah, where he investigated the resources of that part of the country, and published his *Remarks on the Husbandry and Commerce of Bengal*, privately printed in 1795, in which he advocated free trade between Great Britain and India. After eleven years' residence in India, Colebrooke began the study of Sanskrit; and to him was confided the translation of the great *Digest of Hindu Laws*, which had been left unfinished by Sir William Jones. He translated the two treatises *Mitacshara* and *Dayabhaga* under the title *Law of Inheritance*. He was sent to Nagpur in 1799 on a special mission, and on his return was made a judge of the new court of appeal, over which he afterwards presided. In 1805 Lord Wellesley appointed him professor of Hindu Law and Sanskrit at the college of Fort William. During his residence at Calcutta he wrote his *Sanskrit Grammar* (1805), some papers on the religious ceremonies of the Hindus,

and his *Essay on the Vedas* (1805), for a long time the standard work on the subject. He became member of council in 1807 and returned to England seven years later. He died on the 18th of March 1837. He was a director of the Asiatic Society, and many of the most valuable papers in the society's *Transactions* were communicated by him.

His life was written by his son, Sir T. E. Colebrooke, in 1873.

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**COLEMANITE**, a hydrous calcium borate,  $\text{Ca}_2\text{B}_6\text{O}_{11} + 5\text{H}_2\text{O}$ , found in California as brilliant monoclinic crystals. It contains 50.9% of boron trioxide, and is an important source of commercial borates and boracic acid. Beautifully developed crystals, up to 2 or 3 in. in length, encrust cavities in compact, white colemanite; they are colourless and transparent, and the brilliant lustre of their faces is vitreous to adamantine in character. There is a perfect cleavage parallel to the plane of symmetry of the crystals. Hardness 4-4½; specific gravity 2.42. The mineral was first discovered in 1882 in Death Valley, Inyo county, California, and in the following year it was found in greater abundance near Daggett in San Bernardino county, forming with other borates and borosilicates a bed in sedimentary strata of sandstones and clays; in more recent years very large masses have been found and worked in these localities, and also in Los Angeles county (see Special Report, 1905, of U.S. Census Bureau on *Mines and Quarries*; and *Mineral Resources of the U.S.*, 1907).

Priceite and pandermite are hydrous calcium borates with very nearly the same composition as colemanite, and they may really be only impure forms of this species. They are massive white minerals, the former friable and chalk-like, and the latter firm and compact in texture. Priceite occurs near Chetco in Curry county, Oregon, where it forms layers between a bed of slate and one of tough blue steatite; embedded in the steatite are rounded masses of priceite varying in size from that of a pea to masses weighing 200 lb. Pandermite comes from Asia Minor, and is shipped from the port of Panderma on the Sea of Marmora: it occurs as large nodules, up to a ton in weight, beneath a thick bed of gypsum.

Another borate of commercial importance found abundantly in the Californian deposits is ulexite, also known as boronatrocalcite or "cotton-ball," a hydrous calcium and sodium borate,  $\text{CaNaB}_5\text{O}_9 + 8\text{H}_2\text{O}$ , which forms rounded masses consisting of a loose aggregate of fine fibres. It is the principal species in the borate deposits in the Atacama region of South America.

(L. J. S.)

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**COLENZO, JOHN WILLIAM** (1814-1883), English bishop of Natal, was born at St Austell, Cornwall, on the 24th of January 1814. His family were in embarrassed circumstances, and he was indebted to relatives for the means of university education. In 1836 he was second wrangler and Smith's prizeman at Cambridge, and in 1837 he became fellow of St John's. Two years later he went to Harrow as mathematical tutor, but the step proved an unfortunate one. The school was just then at the lowest ebb, and Colenso not only had few pupils, but lost most of his property by a fire. He went back to Cambridge, and in a short time paid off heavy debts by diligent tutoring and the proceeds of his series of manuals of algebra (1841) and arithmetic (1843), which were adopted all over England. In 1846 he became rector of Fornsett St Mary, Norfolk, and in 1853 he was appointed bishop of Natal. He at once devoted himself to acquiring the Zulu language, of which he compiled a grammar and a dictionary, and into which he translated the New Testament and other portions of Scripture. He had already given evidence, in a volume of sermons dedicated to Maurice, that he was not satisfied with the traditional views about the Bible. The puzzling questions put to him by the Zulus strengthened him in this attitude and led him to make a critical examination of the Pentateuch. His conclusions, positive and negative, were published in a series of treatises on the Pentateuch, extending from 1862 to 1879, and, being in advance of his time, were naturally disputed in England with a fervour of conviction equal to his own. On the continent they attracted the notice of Abraham Kuenen, and furthered that scholar's investigations.

While the controversy raged in England, the South African bishops, whose suspicions Colenso had already incurred by the liberality of his views respecting polygamy among native converts and by a commentary upon the Epistle to the Romans (1861), in which he combated the doctrine of eternal punishment, met in conclave to condemn him, and pronounced his deposition (December 1863). Colenso, who had refused to appear before their tribunal otherwise than as sending a protest by proxy, appealed to the privy council, which pronounced that the metropolitan of Cape Town (Robert Gray) had no coercive jurisdiction and no authority to interfere with the bishop of Natal. No decision, therefore, was given upon the merits of the case. His adversaries, though unable to obtain his condemnation, succeeded in causing him to be generally inhibited from preaching in England, and Bishop Gray not only excommunicated him but consecrated a rival bishop for Natal (W. K. Macrorie), who, however, took his title from Maritzburg. The contributions of the missionary societies were withdrawn, but an attempt to deprive him of his episcopal income was frustrated by a decision of the courts. Colenso, encouraged by a handsome testimonial raised in England, to which many clergymen subscribed, returned to his diocese, and devoted the latter years of his life to further labours as a biblical commentator and translator. He also championed the cause of the natives against Boer oppression and official encroachments, a course by which he made more enemies among the colonists than he had ever made among the clergy. He died at Durban on the 20th of June 1883. His daughter Frances Ellen Colenso (1840-1887) published two books on the relations of the Zulus to the British (1880 and 1885), taking a pro-Zulu view; and an elder daughter, Harriette E. Colenso (b. 1847), became prominent as an advocate of the natives in opposition to their treatment by Natal, especially in the case of Dinizulu in 1888-1889 and in 1908-1909.

See his *Life* by Sir G. W. Cox (2 vols., London, 1888).

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**COLENSO**, a village of Natal on the right or south bank of the Tugela river, 16 m. by rail south by east of Ladysmith. It was the scene of an action fought on the 15th of December 1899 between the British forces under Sir Redvers Buller and the Boers, in which the former were repulsed. (See [LADYSMITH](#).)

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**COLEOPTERA**, a term used in zoological classification for the true beetles which form one of the best-marked and most natural of the orders into which the class Hexapoda (or Insecta) has been divided. For the relationship of the Coleoptera to other orders of insects see [HEXAPODA](#). The name (Gr. *κολεός*, a sheath, and *πτερά*, wings) was first used by Aristotle, who noticed the firm protective sheaths, serving as coverings for the hind-wings which alone are used for flight, without recognizing their correspondence with the fore-wings of other insects.

These firm fore-wings, or elytra (fig. 1, A), are usually convex above, with straight hind margins (*dorsa*); when the elytra are closed, the two hind margins come together along the mid-dorsal line of the body, forming a *suture*. In many beetles the hind-wings are reduced to mere vestiges useless for flight, or are altogether absent, and in such cases the two elytra are often fused together at the suture; thus organs originally intended for flight have been transformed into an armour-like covering for the beetle's hind-body. In correlation with their heavy build and the frequent loss of the power of flight, many beetles are terrestrial rather than aerial in habit, though a large proportion of the order can fly well.

Aristotle's term was adopted by Linnaeus (1758), and has been universally used by zoologists. The identification of the elytra of beetles with the fore-wings of other insects has indeed been questioned (1880) by F. Meinert, who endeavoured to compare them with the tegulae of Hymenoptera, but the older view was securely established by the demonstration in pupal elytra by J. G. Needham (1898) and W. L. Tower (1903), of nervures similar to those of the hind-wing, and by the proof that the small membranous structures present beneath the elytra of certain beetles, believed by Meinert to represent the whole of the true fore-wings, are in reality only the alulae.

*Structure.*—Besides the conspicuous character of the elytra, beetles are distinguished by the adaptation of the jaws for biting, the mandibles (fig. 1, Bb) being powerful, and the first pair of maxillae (fig. 1, Bc) usually typical in form. The maxillae of the second pair (fig. 1, Bd) are very intimately fused together to form what is called the “lower lip” or labium, a firm transverse plate representing the fused basal portions of the maxillae, which may carry a small median “ligula,” representing apparently the fused inner maxillary lobes, a pair of paraglossae (outer maxillary lobes), and a pair of palps. The feelers of beetles differ greatly in the different families (cf. figs. 2b, 9b and 26b, c); the number of segments is usually eleven, but may vary from two to more than twenty.

The head is extended from behind forwards, so that the crown (epicranium) is large, while the face (clypeus) is small. The chin (gula) is a very characteristic sclerite in beetles, absent only in a few families, such as the weevils. There is usually a distinct labrum (fig. 1, Ba).

The prothorax is large and “free,” *i.e.* readily movable on the mesothorax, an arrangement usual among insects with the power of rapid running. The tergite of the prothorax (pronotum) is prominent in all beetles, reaching back to the bases of the elytra and forming a substantial shield for the front part of the body. The tergal regions of the mesothorax and of the metathorax are hidden under the pronotum and the elytra when the latter are closed, except that the mesothoracic scutellum is often visible—a small triangular or semicircular plate between the bases of the elytra (fig. 1, A). The ventral region of the thoracic skeleton is complex, each segment usually possessing a median sternum with paired episterna (in front) and epimera (behind). The articular surfaces of the haunches (coxae) of the fore-legs are often conical or globular, so that each limb works in a ball-and-socket joint, while the hind haunches are large, displacing the ventral sclerites of the first two abdominal segments (fig. 1, C). The legs themselves (fig. 1, A) are of the usual insectan type, but in many families one, two, or even three of the five foot-segments may be reduced or absent. In beetles of aquatic habit the intermediate and hind legs are modified as swimming-organs (fig. 2, a), while in many beetles that burrow into the earth or climb about on trees the fore-legs are broadened and strengthened for digging, or lengthened and modified for clinging to branches. The hard fore-wings (elytra) are strengthened with marginal ridges, usually inflected ventrally to form epipleura which fit accurately along the edges of the abdomen. The upper surface of the elytron is sharply folded inwards at intervals, so as to give rise to a regular series of external longitudinal furrows (striae) and to form a set of supports between the two chitinous layers forming the elytron. The upper surface often shows a number of impressed dots (punctures). Along the sutural border of the elytron, the chitinous lamella forms a tubular space within which are numerous glands. The glands occur in groups, and lead into common ducts which open in several series along the suture. Sometimes the glands are found beneath the disk of the elytron, opening by pores on the surface. The hind-wings, when developed, are characteristic in form, possessing a sub-costal nervure with which the reduced radial nervure usually becomes associated. There are several curved median and cubital nervures and a single anal, but few cross nervures or areolets. The wing, when not in use, is folded both lengthwise and transversely, and doubled up beneath the elytron; to permit the transverse folding, the longitudinal nervures are interrupted.

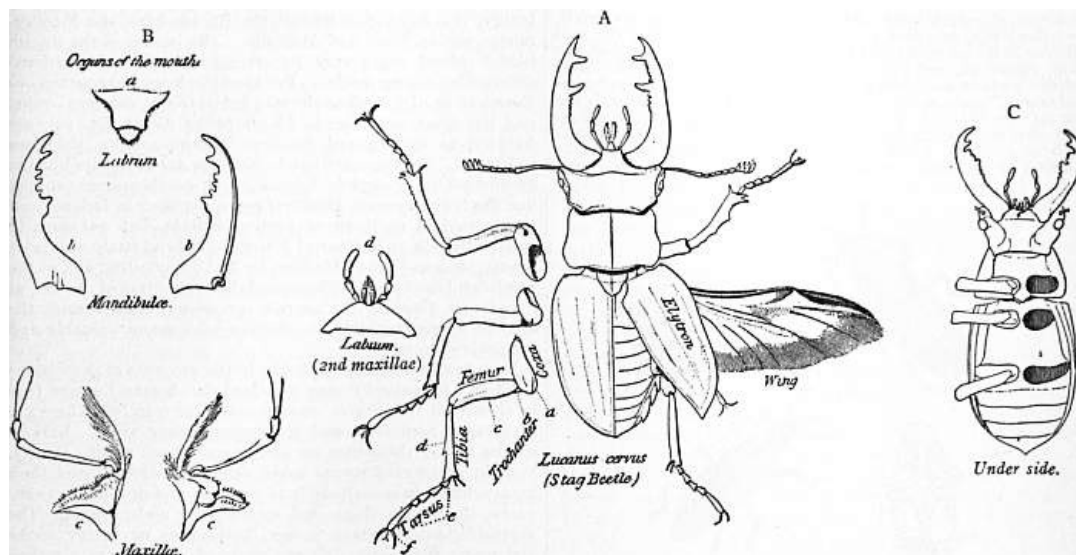


FIG. 1.—Structure of Male Stag-Beetle (*Lucanus cervus*). A, Dorsal view; B, mouth organs; C, under side.



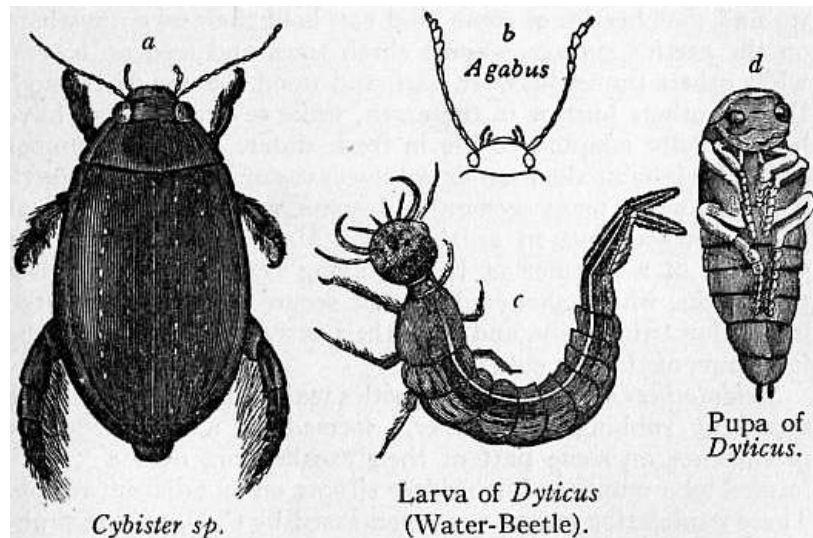
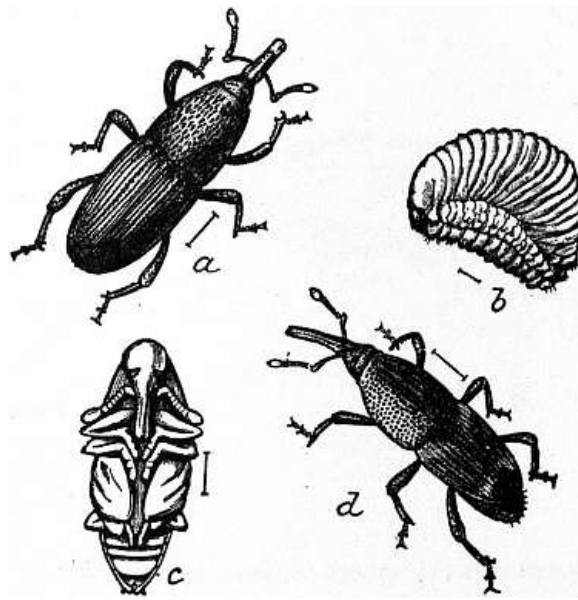


FIG. 2.—Water Beetles (*Dyticidae*). a, Beetle; b, head of beetle with feelers and palps; c, larva; d, pupa.

Ten segments can be recognized—according to the studies of K. W. Verhoeff (1804-1896)—in a beetle's abdomen, but the tenth sternite is usually absent. On account of the great extension of the metathorax and the haunches of the large hind-legs, the first abdominal sternite is wanting, and the second is usually so much reduced that the foremost apparent ventral sclerite of the abdomen represents the third sternite. From this point backwards the successive abdominal segments, as far as the seventh or eighth, can be readily made out. The ninth and tenth segments are at most times retracted within the eighth. The female can protrude a long flexible tube in connexion with the eighth segment, carrying the sclerites of the ninth at its extremity, and these sclerites may carry short hairy processes—the stylets. This flexible tube is the functional ovipositor, the typical insectan ovipositor with its three pairs of processes (see [HEXAPODA](#)) being undeveloped among the Coleoptera. In male beetles, however, the two pairs of genital processes (paramera) belonging to the ninth abdominal segment are always present, though sometimes reduced. Between them is situated, sometimes asymmetrically, the prominent intromittent organ.

In the structure of the digestive system, beetles resemble most other mandibulate insects, the food-canal consisting of gullet, crop, gizzard, mid-gut or stomach, intestine and rectum. The stomach is beset throughout its length with numerous small, finger-like caecal tubes. The excretory (malpighian) tubes are few in number, either four or six. Many beetles have, in connexion with the anus, glands which secrete a repellent acid fluid, serving as a defence for the insect when attacked. The "bombardier" ground beetles (fig. 5) have this habit. Oil-beetles (figs. 23 and 24) and ladybirds (fig. 32) defend themselves by ejecting drops of fluid from the knee-joints. The nervous system is remarkably concentrated in some beetles, the abdominal ganglia showing a tendency to become shifted forward and crowded together, and in certain chafers all the thoracic and abdominal ganglia are fused into a single nerve-centre situated in the thorax,—a degree of specialization only matched in the insectan class among the Hemiptera and some muscid flies.

*Development.*—The embryonic development (see [HEXAPODA](#)) has been carefully studied in several genera of beetles. As regards growth after hatching, all beetles undergo a "complete" metamorphosis, the wing-rudiments developing beneath the cuticle throughout the larval stages, and a resting pupal stage intervening between the last larval instar<sup>1</sup> and the imago. The coleopterous pupa (figs. 2d, 3c) is always "free," the legs, wings and other appendages not being fixed to the body as in the pupa of a moth, and the likeness of pupa to perfect insect is very close.



From Chittenden, *Yearbook*, 1894, U.S. Dept. of Agriculture.

FIG. 3.—Grain Weevils. a, *Calandra granaria*; b, larva; c, pupa; d, *C. oryzae*.

The most striking feature in the development of beetles is the great diversity noticeable in the outward form of the larva in different families. The larva of a ground-beetle or a carnivorous water-beetle (fig. 2 c) is an active elongate grub with well-armoured cuticle. The head—carrying feelers, mandibles and two pairs of maxillae—is succeeded by the three thoracic segments, each bearing a pair of strong five-segmented legs, whose feet, like those of the adult, carry two claws. Ten segments can be distinguished in the tapering abdomen, the ninth frequently bearing a pair of tail-feelers (cerci), and the tenth, attached ventrally to the ninth, having the anal opening at its extremity and performing the function of a posterior limb, supporting and temporarily fixing the tail end of the insect on the surface over which it crawls. Such a typically “campodeiform” grub, moving actively about in pursuit of prey, is the one extreme of larval structure to be noticed among the Coleoptera. The other is exemplified by the white, wrinkled, soft-skinned, legless grub of a weevil, which lives underground feeding on roots, or burrows in the tissues of plants (fig. 3 b). Between these two extremes we find various transitional forms: an active larva, as described above, but with four-segmented, single-clawed legs, as among the rove-beetles and their allies; the body well armoured, but slender and worm-like, with very short legs as in wireworms and mealworms (figs. 18, 21 b); the body shortened, with the abdomen swollen, but protected with tubercles and spines, and with longish legs adapted for an active life, as in the predaceous larvae of ladybirds; the body soft-skinned, swollen and caterpillar-like, with legs well developed, but leading a sluggish underground life, as in the grub of a chafer; the body soft-skinned and whitish, and the legs greatly reduced in size, as in the wood-feeding grub of a longhorn beetle. In the case of certain beetles whose larvae do not find themselves amid appropriate food from the moment of hatching, but have to migrate in search of it, an early larval stage, with legs, is followed by later sluggish stages in which legs have disappeared, furnishing examples of what is called hypermetamorphosis. For example, the grub of a pea or bean beetle (*Bruchus*) is hatched, from the egg laid by its mother on the carpel of a leguminous flower, with three pairs of legs and spiny processes on the prothorax. It bores through and enters the developing seed, where it undergoes a moult and becomes legless. Similarly the newly-hatched larva of an oil-beetle (*Meloe*) is an active little campodeiform insect, which, hatched from an egg laid among plants, waits to attach itself to a passing bee. Carried to the bee’s nest, it undergoes a moult, and becomes a fat-bodied grub, ready to lead a quiet life feeding on the bee’s rich food-stores.

*Distribution and Habits.*—The Coleoptera are almost world-wide in their distribution, being represented in the Arctic regions and on almost all oceanic islands. Most of the dominant families—such as the *Carabidae* (ground-beetles), *Scarabaeidae* (chafers), or *Curculionidae* (weevils) have a distribution as wide as the order. But while some large families, such as the *Staphylinidae* (rove-beetles) are especially abundant on the great northern continents, becoming scarcer in the tropics, others, the *Cicindelidae* (tiger-beetles), for example, are most strongly represented in the warmer regions of the earth, and become scarce as the collector journeys far to south or north. The distribution of many groups of beetles is restricted in correspondence with their habits; the *Cerambycidae* (longhorns), whose larvae are wood-borers, are absent from timberless regions, and most abundant in the great tropical forests. Some families are very restricted in their range. The *Amphizoidae*, for example, a small family of aquatic beetles, are known only from western

North America and Eastern Tibet, while an allied family, the *Pelobiidae*, inhabit the British Isles, the Mediterranean region, Tibet and Australia. The beetles of the British islands afford some very interesting examples of restricted distribution among species. For example, large and conspicuous European beetles, such as the stag-beetle (fig. 1, *Lucanus cervus*) and the great water-beetle (*Hydrophilus piceus*, fig. 20), are confined to eastern and southern Britain, and are unknown in Ireland. On the other hand, there are Arctic species like the ground-beetle, *Pelophila borealis*, and south-western species like the boring weevil, *Mesites Tardyi*, common in Ireland, and represented in northern or western Britain, but unknown in eastern Britain or in Central Europe. Careful study of insular faunas, such as that of Madeira by T. V. Wollaston, and of the Sandwich Islands by D. Sharp, and the comparison of the species found with those of the nearest continental land, furnish the student of geographical distribution with many valuable and suggestive facts.

Notes on habit are given below in the accounts of the various families. In general it may be stated that beetles live and feed in almost all the diverse ways possible for insects. There are carnivores, herbivores and scavengers among them. Various species among those that are predaceous attack smaller insects, hunt in packs crustaceans larger than themselves, insert their narrow heads into snail-shells to pick out and devour the occupants, or pursue slugs and earthworms underground. The vegetable-feeders attack leaves, herbaceous or woody stems and roots; frequently different parts of a plant are attacked in the two active stages of the life-history; the cockchafers, for example, eating leaves, and their grubs gnawing roots. Some of the scavengers, like the burying beetles, enter the bodies of small vertebrates to supply food for themselves and their larvae, or, like the "sacred" beetle of Egypt, collect for the same purpose stores of dung. Many beetles of different families have become the "unbidden guests" of civilized man, and may be found in dwelling-houses, stores and ships' cargoes, eating food-stuffs, paper, furniture, tobacco and drugs. Hence we find that beetles of some kind can hold their own anywhere on the earth's surface. Some climb trees and feed on leaves, while others tunnel between bark and wood. Some fly through the air, others burrow in the earth, while several families have become fully adapted to life in fresh water. A large number of beetles inhabit the deep limestone caves of Europe and North America, while many genera and some whole families are at home nowhere but in ants' nests. Most remarkable is the presence of a number of beetles along the seashore between tide-marks, where, sheltered in some secure nook, they undergo immersion twice daily, and have their active life confined to the few hours of the low ebb.

*Stridulating Organs.*—Many beetles make a hissing or chirping sound by rubbing a "scraper," formed by a sharp edge or prominence on some part of their exoskeleton, over a "file" formed by a number of fine ridges situate on an adjacent region. These stridulating organs were mentioned by C. Darwin as probable examples of the action of sexual selection; they are, however, frequently present in both sexes, and in some families also in the larvae. An account of the principal types of stridulators that have been described has been published by C. J. Gahan (1900). The file may be on the head—either upper or lower surface—and the scraper formed by the front edge of the prothorax, as in various wood-boring beetles (*Anobium* and *Scolytus*). Or ridged areas on the sides of the prothorax may be scraped by "files" on the front thighs, as in some ground-beetles. Among the longhorn beetles, the prothorax scrapes over a median file on the mid-dorsal aspect of the mesothorax. In a large number of beetles of different families, stridulating areas occur on various segments of the abdomen, and are scraped by the elytra. It is remarkable that these organs are found in similar positions in genera belonging to widely divergent families, while two genera of the same family may have them in different positions. It follows, therefore, that they have been independently acquired in the course of the evolution of the Coleoptera.

Stridulating organs among beetle-larvae have been noted, especially in the wood-feeding grub of the stag-beetles (*Lucanidae*) and their allies the *Passalidae*, and in the dung-eating grubs of the dor-beetles (*Geotrupes*), which belong to the chafer family (*Scarabaeidae*). These organs are described by J. C. Schiödte and D. Sharp; in the stag-beetle larva a series of short tubercles on the hind-leg is drawn across the serrate edge of a plate on the haunch of the intermediate legs, while in the Passalid grub the modified tip of the hind-leg acts as a scraper, being so shortened that it is useless for locomotion, but highly specialized for producing sound. Whatever may be the true explanation of stridulating organs in adult beetles, sexual selection can have had nothing to do with the presence of these highly-developed larval structures. It has been suggested that the power of stridulation would be advantageous to wood-boring grubs, the sound warning each of the position of its neighbour, so that adjacent burrowers may not get in each other's way. The root-feeding larvae of the cockchafer and allied members of the *Scarabaeidae* have a ridged area on the mandible, which is scraped by teeth on the maxillae, apparently forming a stridulating organ.

*Luminous Organs.*—The function of the stridulating organs just described is presumably to afford means of recognition by sound. Some beetles emit a bright light from a portion of their bodies, which leads to the recognition of mate or comrade by sight. In the wingless female glow-worm (*Lampyrus*, fig. 15 f) the luminous region is at the hinder end, the organ emitting the light consisting, according to H. von Wielowiejski (1882), of cells similar to those of the fat-body, containing a substance that undergoes oxidation. The illumination is intermittent, and appears to be under the control of the insect's nervous system. The well-known "fire-flies" of the tropics are large click-beetles (*Elateridae*), that emit light from paired spots on the prothorax and from the base of the ventral abdominal region. The luminous organs of these beetles consist of a specialized part of the fat-body, with an inner opaque and an outer transparent layer. Its structure has been described by C. Heinemann, and its physiology by R. Dubois (1886), who considers that the luminosity is due to the influence of an enzyme in the cells of the organ upon a special substance in the blood. The eggs and larvae of the fire-flies are luminous as well as the perfect beetles.

*Fossil History.*—The Coleoptera can be traced back farther in time than any other order of insects with complete transformations, if the structures that have been described from the Carboniferous rocks of Germany are really elytra. In the Triassic rocks of Switzerland remains of weevils (*Curculionidae*) occur, a family which is considered by many students the most specialized of the order. And when we know that the *Chrysomelidae* and *Buprestidae* also lived in Triassic, and the *Carabidae*, *Elateridae*, *Cerambycidae* and *Scarabaeidae*, in Liassic times, we cannot doubt that the great majority of our existing families had already been differentiated at the beginning of the Mesozoic epoch. Coming to the Tertiary we find the Oligocene beds of Aix, of east Prussia (amber) and of Colorado, and the Miocene of Bavaria, especially rich in remains of beetles, most of which can be referred to existing genera.

*Classification.*—The Coleoptera have been probably more assiduously studied by systematic naturalists than any other order of insects. The number of described species can now hardly be less than 100,000, but there is little agreement as to the main principles of a natural classification. About eighty-five families are generally recognized; the difficulty that confronts the zoologists is the arrangement of these families in "superfamilies" or "sub-orders." Such obvious features as the number of segments in the foot and the shape of the feeler were used by the early entomologists for distinguishing the great groups of beetles. The arrangement dependent on the number of tarsal segments—the order being divided into tribes *Pentamera*, *Tetramera*, *Heteromera* and *Trimera*—was suggested by E. L. Geoffroy in 1762, adopted by P. A. Latreille, and used largely through the 19th century. W. S. Macleay's classification (1825), which rested principally on the characters of the larvae, is almost forgotten nowadays, but it is certain that in any systematic arrangement which claims to be natural the early stages in the life-history must receive due attention. In recent years classifications in part agreeing with the older schemes but largely original, in accord with researches on the comparative anatomy of the insects, have been put forward. Among the more conservative of these may be mentioned that of D. Sharp (1899), who divides the order into six great series of families: *Lamellicornia* (including the chafers and stag-beetles and their allies with five-segmented feet and plate-like terminal segments to the feelers); *Adephaga* (carnivorous, terrestrial and aquatic beetles, all with five foot-segments); *Polymorpha* (including a heterogeneous assembly of families that cannot be fitted into any of the other groups); *Heteromera* (beetles with the fore and intermediate feet five-segmented, and the hind-feet four-segmented); *Phytophaga* (including the leaf-beetles, and longhorns, distinguished by the apparently four-segmented feet), and *Rhynchophora* (the weevils and their allies, with head prolonged into a snout, and feet with four segments). L. Ganglbauer (1892) divides the whole order into two sub-orders only, the *Caraboidea* (the *Adephaga* of Sharp and the older writers) and the *Cantharidoidea* (including all other beetles), since the larvae of *Caraboidea* have five-segmented, two-clawed legs, while those of all other beetles have legs with four segments and a single claw. A. Lameere (1900) has suggested three sub-orders, the *Cantharidiformia* (including the *Phytophaga*, the *Heteromera*, the *Rhynchophora* and most of the *Polymorpha* of Sharp's classification), the *Staphyliniformia* (including the rove-beetles, carrion-beetles and a few allied families of Sharp's *Polymorpha*), and the *Carabidiformia* (*Adephaga*). Lameere's classification is founded on the number of abdominal sterna, the nervuration of the wings, the number of malpighian tubules (whether four or six) and other structural characters. Preferable to Lameere's system, because founded on a wider range of adult characters and taking the larval stages into account, is that of H. J. Kolbe (1901), who recognizes three sub-orders: (i.) the *Adephaga*; (ii.) the *Heterophaga*, including the *Staphylinoida*, the *Actinorhabda* (*Lamellicornia*), the *Heterorhabda* (most of Sharp's *Polymorpha*), and the *Anchistopoda* (the *Phytophaga*, with the ladybirds and some

allied families which Sharp places among the *Polymorpha*; (iii.) the *Rhynchophora*.

Students of the Coleoptera have failed to agree not only on a system of classification, but on the relative specialization of some of the groups which they all recognize as natural. Lamere, for example, considers some of his *Cantharidiformia* as the most primitive Coleoptera. J. L. Leconte and G. H. Horn placed the *Rhynchophora* (weevils) in a group distinct from all other beetles, on account of their supposed primitive nature. Kolbe, on the other hand, insists that the weevils are the most modified of all beetles, being highly specialized as regards their adult structure, and developing from legless maggots exceedingly different from the adult; he regards the Adephaga, with their active armoured larvae with two foot-claws, as the most primitive group of beetles, and there can be little doubt that the likeness between larvae and adult may safely be accepted as a primitive character among insects. In the Coleoptera we have to do with an ancient yet dominant order, in which there is hardly a family that does not show specialization in some point of structure or life-history. Hence it is impossible to form a satisfactory linear series.

In the classification adopted in this article, the attempt has been made to combine the best points in old and recent schemes, and to avoid the inconvenience of a large heterogeneous group including the vast majority of the families.

ADEPHAGA.—This tribe includes beetles of carnivorous habit with five segments on every foot, simple thread-like feelers with none of the segments enlarged to form club or pectination, and the outer lobes (galea) of the first maxilla usually two-segmented and palpiform (fig. 4 b). The transverse fold of the hind-wing is towards the tip, about two-thirds of the wing-length from the base. At this fold the median nervure stops and is joined by a cross nervure to the radial, which can be distinguished throughout its length from the subcostal. There are four malpighian tubules. In the ovarian tubes of Adephaga small yolk-chambers alternate with the egg-chambers, while in all other beetles there is only a single large yolk-chamber at the narrow end of the tube. The larvae (fig. 2 c) are active, with well-chitinized cuticle, often with elongate tail-feelers (cerci), and with five-segmented legs, the foot-segment carrying two claws.

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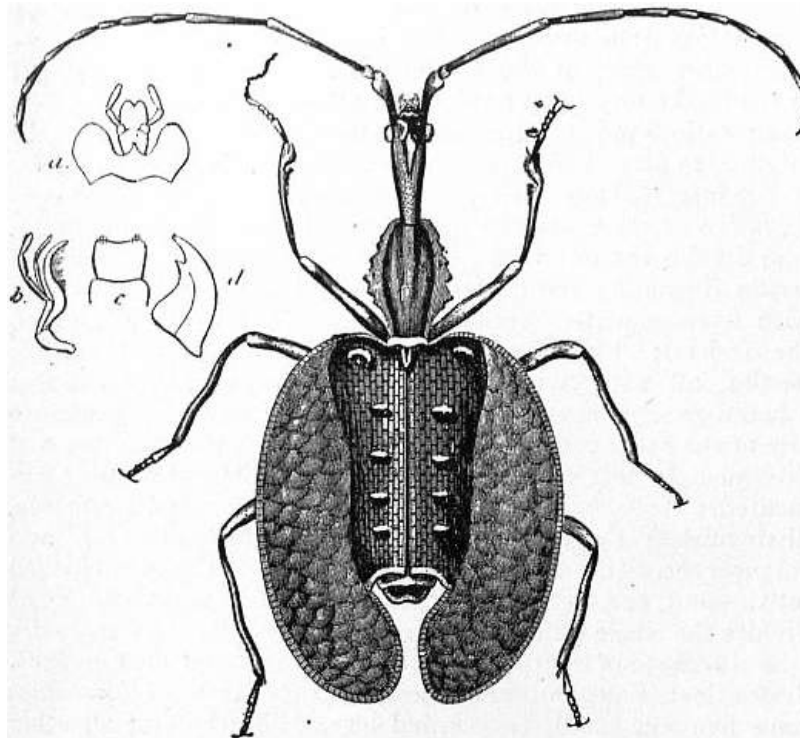


FIG. 4.—*Mormolyce phyllodes*. Java. a, Labium; b, maxilla; c, labrum; d, mandible.

The generalized arrangement of the wing-nervure and the nature of the larva, which is less unlike the adult than in other beetles, distinguish this tribe as primitive, although the perfect insects are, in the more dominant families, distinctly specialized. Two very small families of aquatic beetles seem to stand at the base of the series, the *Amphizoidae*, whose larvae are broad and well armoured with short cerci, and the *Pelobiidae*, which have elongate larvae, tapering to the tail end, where are long paired cerci and a median process, recalling the grub of a Mayfly.

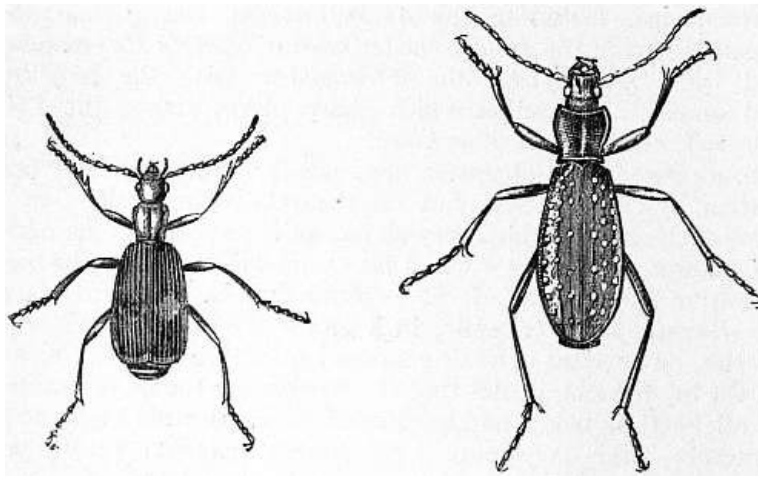


FIG. 5.—*Pheropsophus Jurinei*. W. Africa.      FIG. 6.—*Carabus rutilans*. Spain.

The *Dyticidae* (fig. 2) are Adephaga highly specialized for life in the water, the hind-legs having the segments short, broad and fringed, so as to be well adapted for swimming, and the feet without claws. The metasternum is without the transverse linear impression that is found in most families of Adephaga. The beetles are ovoid in shape, with smooth contours, and the elytra fit over the edges of the abdomen so as to enclose a supply of air, available for use when the insect remains under water. The fore-legs of many male dytids have the three proximal foot-segments broad and saucer-shaped, and covered with suckers, by means of which they secure a firm hold of their mates. Larval dytids (fig. 2 b) possess slender, curved, hollow mandibles, which are perforated at the tip and at the base, being thus adapted for sucking the juices of victims. Large dytoid larvae often attack small fishes and tadpoles. They breathe by piercing the surface film with the tail, where a pair of spiracles are situated. The pupal stage is passed in an earthen cell, just beneath the surface of the ground. Nearly 2000 species of *Dyticidae* are known: they are universally distributed, but are most abundant in cool countries. The *Haliplidae* form a small aquatic family allied to the *Dyticidae*.

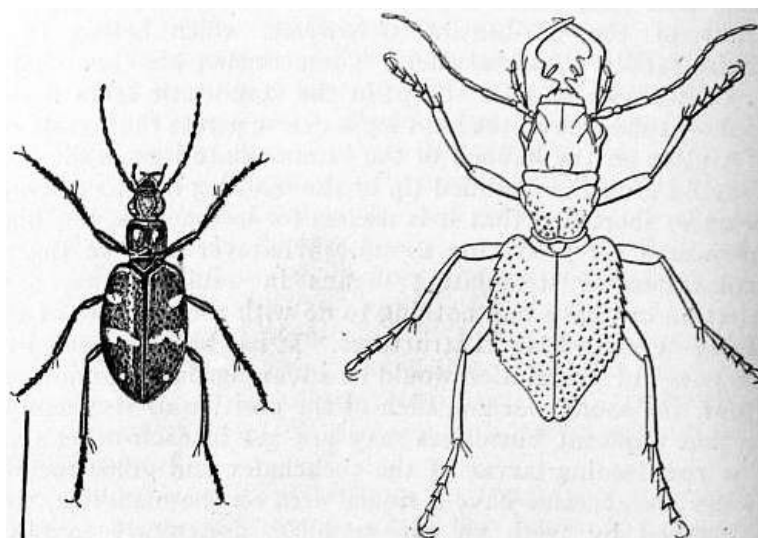


FIG. 7.—*Cicindela sylvatica* (Wood Tiger-Beetle).  
Europe.

FIG. 8.—*Manticora tuberculata*. S.  
Africa.

The *Carabidae*, or ground-beetles, comprising 13,000 species, form the largest and most typical family of the Adephaga (figs. 4, 5, 6), the legs of all three pairs being alike and adapted for rapid running. In many *Carabidae* the hind-wings are reduced or absent, and the elytra fused together along the suture. Many of our native species spend the day lurking beneath stones, and sally forth at night in pursuit of their prey, which consists of small insects, earthworms and snails. But a number of the more brightly coloured ground-beetles run actively in the sunshine. The carabid larva is an active well-armoured grub with the legs and cerci variable in length. Great differences in the general form of the body may be observed in the family. For example, the stout, heavy body of *Carabus* (fig. 6) contrasts markedly with the wonderful flattened abdomen and elytra of *Mormolyce* (fig. 4), a Malayan genus found beneath fallen trees, a situation for which its compressed shape is admirably adapted. Blind *Carabidae* form a large proportion of cave-dwelling beetles, and several species of great interest live between tide-marks along the seashore.

The *Cicindelidae*, or tiger-beetles (figs. 7, 8) are the most highly organized of all the Adepaga. The inner lobe (lacinia) of the first maxilla terminates in an articulated hook, while in the second maxillae (labium) both inner and outer lobes ("ligula" and "para-glossae") are much reduced. The face (clypeus) is broad, extending on either side in front of the insertion of the feelers. The beetles are elegant insects with long, slender legs, running quickly, and flying in the sunshine. The pronotum and elytra are often adorned with bright colours or metallic lustre, and marked with stripes or spots. The beetles are fierce in nature and predaceous in habit, their sharp toothed mandibles being well adapted for the capture of small insect-victims. The larvae are more specialized than those of other Adepaga, the head and prothorax being very large and broad, the succeeding segments slender and incompletely chitinized. The fifth abdominal segment has a pair of strong dorsal hook-like processes, by means of which the larva supports itself in the burrow which it excavates in the earth, the great head blocking the entrance with the mandibles ready to seize on any unwary insect that may venture within reach.



FIG. 9.

Two or three families may be regarded as aberrant Adepaga. The *Paussidae* are a very remarkable family of small beetles, mostly tropical, found only in ants' nests, or flying by night, and apparently migrating from one nest to another. The number of antennal segments varies from eleven to two. It is supposed that these beetles secrete a sweet substance on which the ants feed, but they have been seen to devour the ants' eggs and grubs. The *Gyrinidae*, or whirligig beetles (fig. 9), are a curious aquatic family with the feelers (fig. 9, b) short and reduced as in most *Paussidae*. They are flattened oval in form, circling with gliding motion over the surface film of the water, and occasionally diving, when they carry down with them a bubble of air. The fore-legs are elongate and adapted for clasping, while the short and flattened intermediate and hind legs form very perfect oar-like propellers. The larva of *Gyrinus* (fig. 9, c) is slender with elongate legs, and the abdominal segments carry paired tracheal gills.

STAPHYLINOIDEA.—The members of this tribe may be easily recognized by their wing-nervuration. Close to a transverse fold near the base of the wing, the median nervure divides into branches which extend to the wing-margin; there is a second transverse fold near the tip of the wing, and cross nervures are altogether wanting. There are four malpighian tubes, and all five tarsal segments are usually recognizable. With very few exceptions, the larva in this group is active and campodeiform, with cerci and elongate legs as in the Adepaga, but the leg has only four segments and one claw.

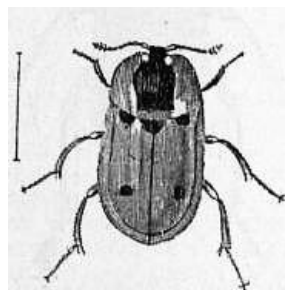


FIG. 10.—*Silpha quadripunctata*. Europe.

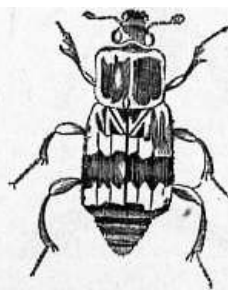


FIG. 11.—*Necrophorus vespillo* (Sexton Beetle). Europe.

The *Silphidae*, or carrion beetles, form one of the best-known families of this group. They are rotund or elongate insects with conical front haunches, the elytra generally covering (fig. 10) the whole dorsal region of the abdomen, but sometimes leaving as many as four terga exposed (fig. 11). Some of these beetles are brightly coloured, while others are dull black. They are usually found in carrion, and the species of *Necrophorus* (fig. 11) and *Necrophaga* are valuable scavengers from their habit of burying small vertebrate carcasses which may serve as food for their larvae. At this work a number of individuals are associated together. The larvae that live underground have spiny dorsal plates, while those of the *Silpha* (fig. 10)

and other genera that go openly about in search of food resemble wood-lice. About 1000 species of *Silphidae* are known. Allied to the *Silphidae* are a number of small and obscure families, for which reference must be made to monographs of the order. Of special interest among these are the *Histeridae*, compact beetles (fig. 12) with very hard cuticle and somewhat abbreviated elytra, with over 2000 species, most of which live on decaying matter, and the curious little *Pselaphidae*, with three-segmented tarsi, elongate palpi, and shortened abdomen; the latter are usually found in ants' nests, where they are tended by the ants, which take a sweet fluid secreted among little tufts of hair on the beetles' bodies; these beetles, which are carried about by the ants, sometimes devour their larvae. The *Trichopterygidae*, with their delicate narrow fringed wings, are the smallest of all beetles, while the *Platypyllidae* consist of only a single species of curious form found on the beaver.

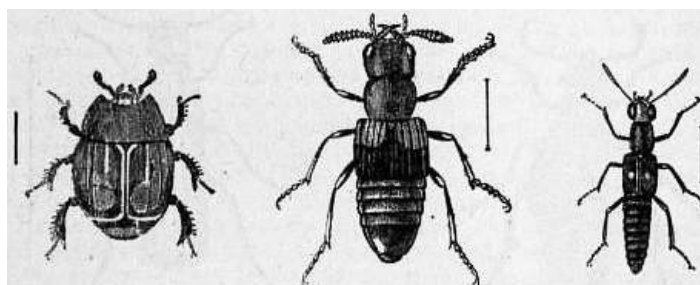


FIG. 12. *Hister iv-maculatus* (Mimic Beetle). Europe. FIG. 13. *Oxyporus rufus*. Europe. FIG. 14. *Stenus biguttatus*. Europe.

The *Staphylinidae*, or rove-beetles—a large family of nearly 10,000 species—may be known by their very short elytra, which cover only two of the abdominal segments, leaving the elongate hind-body with seven or eight exposed, firm terga (figs. 13, 14). These segments are very mobile, and as the rove-beetles run along they often curl the abdomen upwards and forwards like the tail of a scorpion. The *Staphylinid* larvae are typically campodeiform. Beetles and larvae are frequently carnivorous in habit, hunting for small insects under stones, or pursuing the soft-skinned grubs of beetles and flies that bore in woody stems or succulent roots. Many *Staphylinidae* are constant inmates of ants' nests.

MALACODERMATA.—In this tribe may be included a number of families distinguished by the softness of the cuticle, the presence of seven or eight abdominal sterna and of four malpighian tubes, and the firm, well-armoured larva (fig. 15, c) which is often predaceous in habit. The mesothoracic epimera bound the coxal cavities of the intermediate legs. The *Lymexylonidae*, a small family of this group, characterized by its slender, undifferentiated feelers and feet, is believed by Lameere to comprise the most primitive of all living beetles, and Sharp lays stress on the undeveloped structure of the tribe generally.

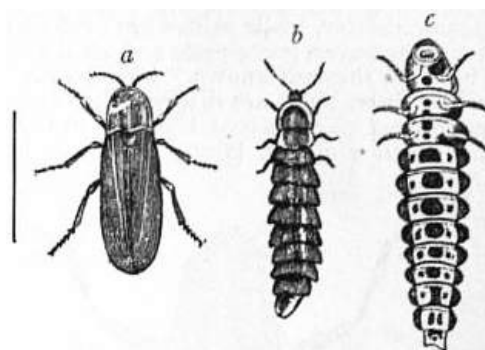


FIG. 15.—Glow-worm. *Lampyris noctiluca*. a, Male; b, female; c, larva (ventral view). Europe.

The *Lampyridae* are a large family, of which the glow-worm (*Lampyris*) and the "soldier beetles" (*Telephorus*) are familiar examples. The female "glow-worm" (fig. 15, b), emitting the well-known light (see above), is wingless and like a larva; the luminosity seems to be an attraction to the male, whose eyes are often exceptionally well developed. Some male members of the family have remarkably complex feelers. In many genera of *Lampyridae* the female can fly as well as the male; among these are the South European "fireflies."

TRICHODERMATA.—Several families of rather soft-skinned beetles, such as the *Melyridae*, *Cleridae* (fig. 16), *Corynetidae*, *Dermestidae* (fig. 17), and *Dascillidae*, are included in this tribe. They may be distinguished from the Malacodermata by the presence of only five or six abdominal sterna, while six malpighian tubes are present in some of the families. The beetles are hairy and their larvae well-armoured and often predaceous. Several species of *Dermestidae* are commonly found in



FIG. 16.—*Clerus apiarius* (Hive Beetle). Europe. FIG. 17.—*Dermestes lardarius* (Bacon Beetle).



houses, feeding on cheeses, dried meat, skins and other such substances. The "bacon beetle" (*Dermestes lardarius*), and its hard hairy larva, are well known. According to Sharp, all Dermestid larvae probably feed on dried animal matters; he mentions one species that can find sufficient food in the horsehair of furniture, and another that eats the dried insect-skins hanging in old cobwebs.

STERNOXIA.—This is an important tribe of beetles, including families with four malpighian tubes and only five or six abdominal sterna, while in the thorax there is a backwardly directed process of the prosternum that fits into a mesosternal cavity. The larvae are elongate and worm-like, with short legs but often with hard strong cuticle.

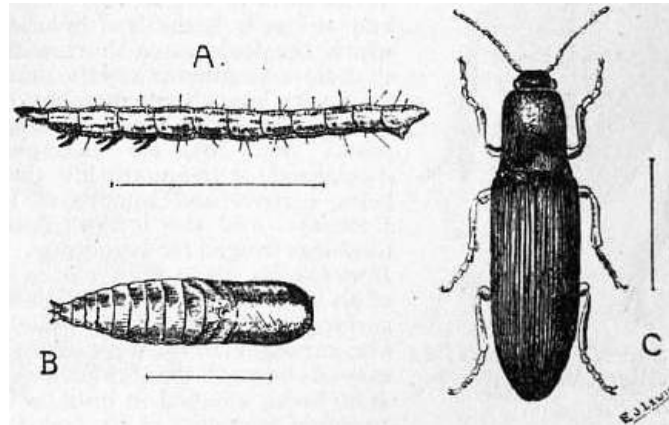


FIG. 18.—A, Wireworm; B, pupa of Click Beetle; C, adult Click Beetle (*Agriotes lineatum*).

The *Elateridae* or click beetles (fig. 18) have the prosternal process just mentioned, capable of movement in and out of the mesosternal cavity, the beetles being thus enabled to leap into the air, hence their popular name of "click-beetles" or "skip-jacks." The prothorax is convex in front, and is usually drawn out behind into a prominent process on either side, while the elytra are elongate and tapering. Many of the tropical American *Elateridae* emit light from the spots on the prothorax and an area beneath the base of the abdomen; these are "fireflies" (see above). The larvae of *Elateridae* are elongate, worm-like grubs, with narrow bodies, very firm cuticle, short legs, and a distinct anal proleg. They are admirably adapted for moving through the soil, where some of them live on decaying organic matter, while others are predaceous. Several of the elaterid larvae, however, gnaw roots and are highly destructive to farm crops. These are the well-known "wire-worms" (*q.v.*).

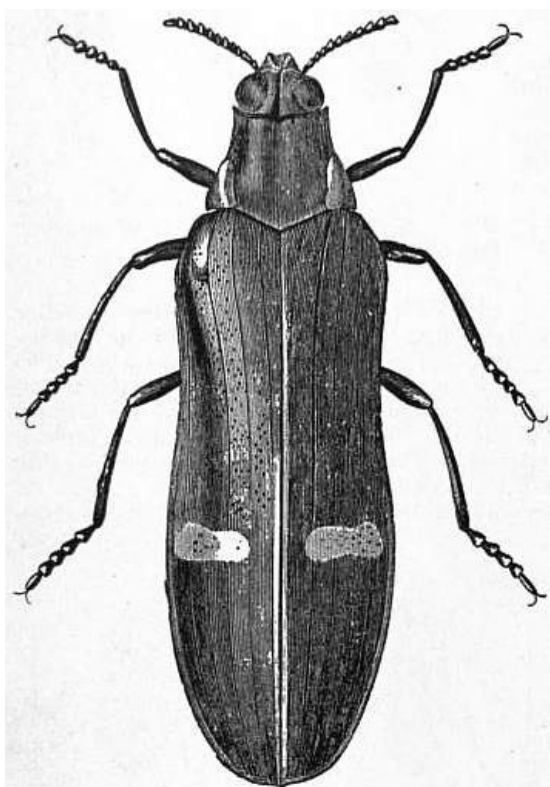


FIG. 19.—*Catoxantha bicolor*. Java.

The *Buprestidae* are distinguished from the *Elateridae* by the immobility of the prosternal process in the mesosternal cavity and by the absence of the lateral processes at the hind corners of the prothorax. Many tropical *Buprestidae* are of large size (fig. 19), and exhibit magnificent metallic colours; their elytra are used as ornaments in human dress. The larvae are remarkable for their small head, very broad thorax, with reduced legs, and narrow elongate abdomen. They feed by burrowing in the roots and stems of plants.

BOSTRYCHOIDEA.—This tribe is distinguished from the Malacoderma and allied groups by the mesothoracic epimera not bounding the coxal cavities of the intermediate legs. The downwardly directed head is covered by the pronotum, and the three terminal antennal segments form a distinct club. To this group belong the *Bostrychidae* and *Ptinidae*, well known (especially the latter family) for their ravages in old timber. The larvae are

stout and soft-skinned, with short legs in correlation with their burrowing habit. The noises made by some *Ptinidae* (*Anobium*) tapping on the walls of their burrows with their mandibles

give rise to the "death tick" that has for long alarmed the superstitious.

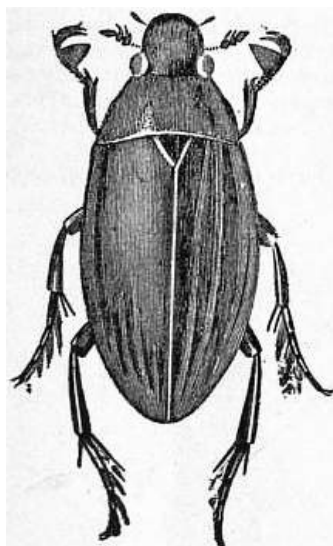


FIG. 20.—*Hydrophilus piceus* (Black Water Beetle). Europe.

CLAVICORNIA.—This is a somewhat heterogeneous group, most of whose members are characterized by clubbed feelers and simple, unbroadened tarsal segments—usually five on each foot—but in some families and genera the males have less than the normal number on the feet of one pair. There are either four or six malpighian tubes. A large number of families, distinguished from each other by more or less trivial characters, are included here, and there is considerable diversity in the form of the larvae. The best-known family is the *Hydrophilidae*, in which the feelers are short with less than eleven segments and the maxillary palpi very long. Some members of this family—the large black *Hydrophilus piceus* (fig. 20), for example—are specialized for an aquatic life, the body being convex and smooth as in the *Dyticidae*, and the intermediate and hind-legs fringed for swimming. When *Hydrophilus* dives it carries a supply of air between the elytra and the dorsal surface of the abdomen, while air is also entangled in the pubescence which extends beneath the abdomen on either side, being scooped in bubbles by the terminal segments of the feelers when the insect rises to the surface. Many of the *Hydrophilidae* construct, for the protection of their

eggs, a cocoon formed of a silky material derived from glands opening at the tip of the abdomen. That of *Hydrophilus* is attached to a floating leaf, and is provided with a hollow, tapering process, which projects above the surface and presumably conveys air to the enclosed eggs. Other *Hydrophilidae* carry their egg-cocoons about with them beneath the abdomen. Many *Hydrophilidae*, unmodified for aquatic life, inhabit marshes. The larvae in this family are well-armoured, active and predaceous. Of the numerous other families of the Clavicornia may be mentioned the *Cucujidae* and *Cryptophagidae*, small beetles, examples of which may be found feeding on stored seeds or vegetable refuse, and the *Mycetophagidae*, which devour fungi. The *Nitidulidae* are a large family with 1600 species, among which members of the genus *Meligethes* are often found in numbers feeding on blossoms, while others live under the bark of trees and prey on the grubs of boring beetles.

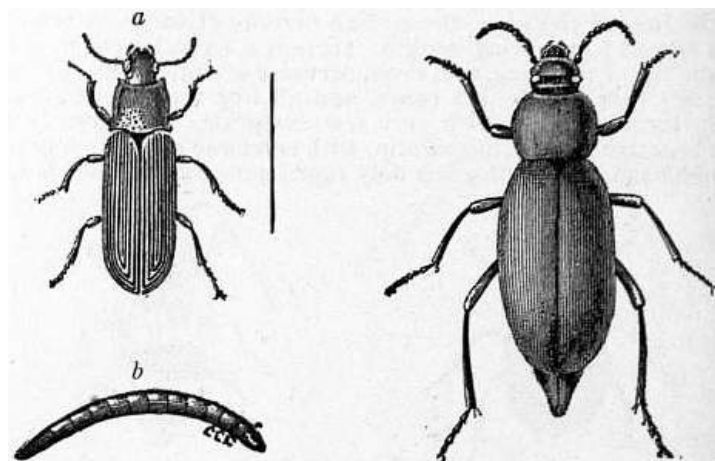


FIG. 21.—(a) *Tenebrio molitor* (Flour Beetle). Europe. (b) Larva, or mealworm.

FIG. 22.—*Blaps mortisaga* (Churchyard Beetle). Europe.

HETEROMERA.—This tribe is distinguished by the presence of the normal five segments in the feet of the fore and intermediate legs, while only four segments are visible in the hind-foot. Considerable diversity is to be noticed in details of structure within this group, and for an enumeration of all the various families which have been proposed and their distinguishing characters the reader is referred to one of the monographs mentioned below. Some of the best-known members of the group belong to the *Tenebrionidae*, a large family containing over 10,000 species and distributed all over the world. The tenebrionid larva is elongate, with well-chitinized cuticle, short legs and two stumpy tail processes, the common mealworm (fig. 21) being a familiar example. Several species of this family are found habitually in stores of flour or grain. The beetles have feelers with eleven segments, whereof the terminal few are thickened so as to form a club. The true "black-beetles" or "churchyard beetles" (*Blaps*) (fig. 22) belong to this family; like members of several allied genera they are

sooty in colour, and somewhat resemble ground beetles (*Carabi*) in general appearance.

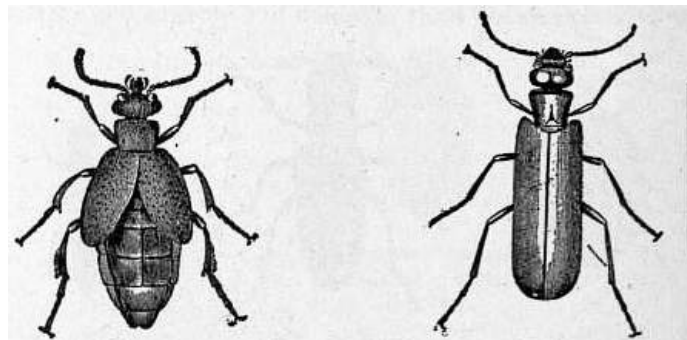


FIG. 23.—*Meloe proscarabaeus*  
(Oil Beetle). Europe.

FIG. 24.—*Lytta vesicatoria*  
(Blister Beetle). Europe.

The most interesting of the Heteromera, and perhaps of all the Coleoptera, are some beetles which pass through two or more larval forms in the course of the life-history (hypermetamorphosis). These belong to the families *Rhipidophoridae* and *Meloidae*. The latter are the oil beetles (fig. 23) or blister beetles (fig. 24), insects with rather soft cuticle, the elytra (often abbreviated) not fitting closely to the sides of the abdomen, the head constricted behind the eyes to form a neck, and the claws of the feet divided to the base. Several of the *Meloidae* (such as the "Spanish fly," fig. 24) are of economic importance, as they contain a vesicant substance used for raising medicinal blisters on the human skin. The wonderful transformations of these insects were first investigated by G. Newport in 1851, and have recently been more fully studied by C. V. Riley (1878) and J. H. Fabre. The first larval stage is the "triungulin," a tiny, active, armoured larva with long legs (each foot with three claws) and cercopods. In the European species of *Sitaris* and *Meloe* these little larvae have the instinct of clinging to any hairy object. All that do not happen to attach themselves to a bee of the genus *Anthophora* perish, but those that succeed in reaching the right host are carried to the nest, and as the bee lays an egg in the cell the triungulin slips off her body on to the egg, which floats on the surface of the honey. After eating the contents of the egg, the larva moults and becomes a fleshy grub with short legs and with paired spiracles close to the dorsal region, so that, as it floats in and devours the honey, it obtains a supply of air. After a resting (pseudo-pupal) stage and another larval stage, the pupa is developed. In the American *EPICAUTA VITTATA* the larva is parasitic on the eggs and egg-cases of a locust. The triungulin searches for the eggs, and, after a moult, becomes changed into a soft-skinned tapering larva. This is followed by a resting (pseudo-pupal) stage, and this by two successive larval stages like the grub of a chafer. The RHIPIDOPHORIDAE are beetles with, short elytra, the feelers pectinate in the males and serrate in the females. The life-history of *Metoecus* has been studied by T. A. Chapman, who finds that the eggs are laid in old wood, and that the triungulin seeks to attach itself to a social wasp, who carries it to her nest. There it feeds first as an internal parasite of the wasp-grub, then bores its way out, moults and devours the wasp larva from outside. The wasps are said to leave the larval or pupal *Metoecus* unmolested, but they are hostile to the developed beetles, which hasten to leave the nest as soon as possible.

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STREPSIPTERA.—Much difference of opinion has prevailed with regard to the curious, tiny, parasitic insects included in this division, some authorities considering that they should be referred to a distinct order, while others would group them in the family *Meloidae* just described. While from the nature of their life-history there is no doubt that they have a rather close relationship to the *Meloidae*, their structure is so remarkable that it seems advisable to regard them as at least a distinct tribe of Coleoptera.

They may be comprised in a single family, the *Stylopidae*. The males are very small, free-flying insects with the prothorax, mesothorax and elytra greatly reduced, the latter appearing as little, twisted strips, while the metathorax is relatively large, with its wings broad and capable of longitudinal folding. The feelers are branched and the jaws vestigial. The female is a segmented, worm-like creature, spending her whole life within the body of the bee, wasp or bug on which she is parasitic. One end of her body protrudes from between two of the abdominal segments of the host; it has been a subject of dispute whether this protruded end is the head or the tail, but there can be little doubt that it is the latter. While thus carried about by the host-insect, the female is fertilized by the free-flying male, and gives birth to a number of tiny triungulin larvae. The chief points in the life-history of *Stylops* and *Xenos*, which are parasitic on certain bees (*Andrena*) and wasps (*Polistes*), have been investigated by K. T. E. von Siebold (1843) and N. Nassonov (1892). The little triungulins escape on to the body of the bee or wasp; then those that are to survive must leave their host for a non-parasitized insect. Clinging to her hairs they are carried to the nest, where they

bore into the body of a bee or wasp larva, and after a moult become soft-skinned legless maggots. The growth of the parasitic larva does not stop the development of the host-larva, and when the latter pupates and assumes the winged form, the stylopid, which has completed its transformation, is carried to the outer world. The presence of a *Stylops* causes derangement in the body of its host, and can be recognized by various external signs. Other genera of the family are parasitic on Hemiptera—bugs and frog-hoppers—but nothing is known as to the details of their life-history.

LAMELLICORNIA.—This is a very well-marked tribe of beetles, characterized by the peculiar elongation and flattening of three or more of the terminal antennal segments, so that the feeler seems to end in a number of leaf-like plates, or small comb-teeth (fig. 26, b, c). The wings are well developed for flight, and there is a tendency in the group, especially among the males, towards an excessive development of the mandibles or the presence of enormous, horn-like processes on the head or pronotum. There are four malpighian tubes. The larvae are furnished with large heads, powerful mandibles and well-developed legs, but the body-segments are feebly chitinized, and the tail-end is swollen. They feed in wood or spend an underground life devouring roots or animal excrement.

The *Lucanidae* or stag beetles (figs. 1 and 25) have the terminal antennal segments pectinate, and so arranged that the comb-like part of the feeler cannot be curled up, while the elytra completely cover the abdomen. There are about 600 species in the family, the males being usually larger than the females, and remarkable for the size of their mandibles. In the same species, however, great variation occurs in the development of the mandibles, and the breadth of the head varies correspondingly, the smallest type of male being but little different in appearance from the female. The larvae of *Lucanidae* live within the wood of trees, and may take three or four years to attain their full growth. The *Passalidae* are a tropical family of beetles generally considered to be intermediate between stag-beetles and chafers, the enlarged segments of the feeler being capable of close approximation.

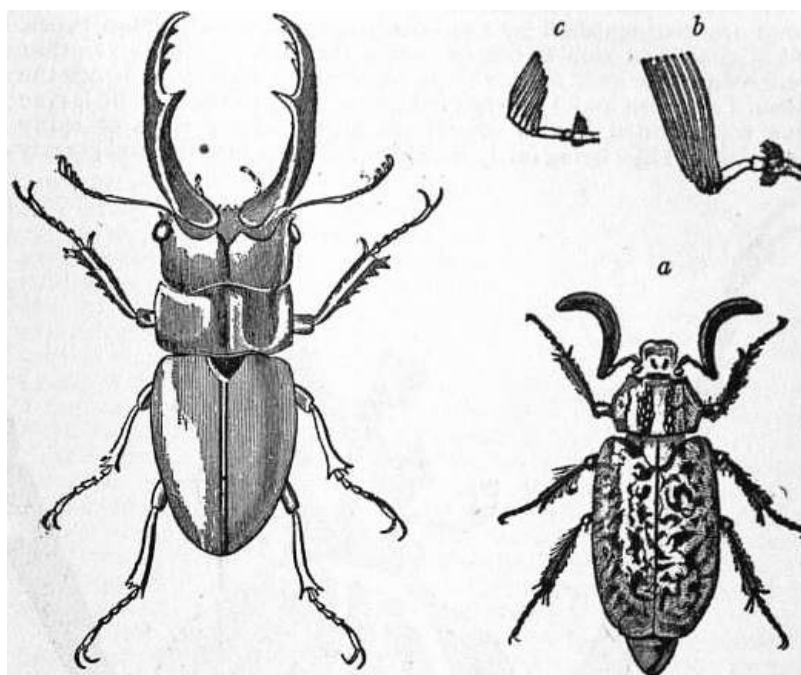


FIG. 25.—*Cladognathus cinnamomeus*.  
Java.

FIG. 26.—*Melolontha fullo* (Cockchafer).  
S. Europe, b, Antenna of male; c, antenna of female.

The *Scarabaeidae* or chafers are an enormous family of about 15,000 species. The plate-like segments of the feeler (fig. 26, b, c) can be brought close together so as to form a club-like termination; usually the hinder abdominal segments are not covered by the elytra. In this family there is often a marked divergence between the sexes; the terminal antennal segments are larger in the male than in the female, and the males may carry large spinous processes on the head or prothorax, or both. These structures were believed by C. Darwin to be explicable by sexual selection. The larvae have the three pairs of legs well developed, and the hinder abdominal segments swollen. Most of the *Scarabaeidae* are vegetable-feeders, but one section of the family—represented in temperate countries by the dor-beetles (*Geotrupes*) (fig. 28) and *Aphodius*, and in warmer regions by the "sacred" beetles of the Egyptians (*Scarabaeus*) (fig. 27), and allied genera—feed both in the adult and larval stages, on dung or decaying animal matter. The heavy grubs of *Geotrupes*, their swollen tail-ends black with the contained food-material, are often dug up in numbers in well-manured fields. The habits of *Scarabaeus* have been described in detail by J. H. Fabre. The female beetle in spring-time collects dung, which she forms into a ball by continuous rolling, sometimes

assisted by a companion. This ball is buried in a suitable place, and serves the insect as a store of food. During summer the insects rest in their underground retreats, then in autumn they reappear to bury another supply of dung, which serves as food for the larvae. Fabre states that the mother-insect carefully arranges the food-supply so that the most nutritious and easily digested portion is nearest the egg, to form the first meal of the young larva. In some species of *Copris* it is stated that the female lays only two or three eggs at a time, watching the offspring grow to maturity, and then rearing another brood.

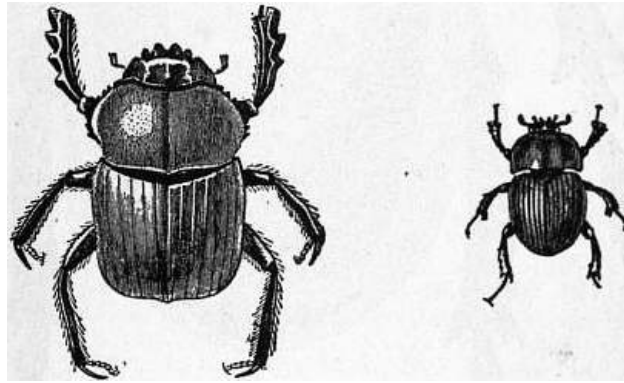


FIG. 27.—*Scarabaeus Aegyptiorum*.  
Africa.

FIG. 28.—*Geotrupes Blackburnei*.  
N. America.

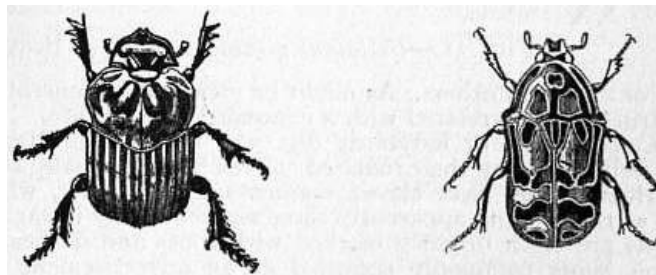


FIG. 29.—*Phanaeus Imperator*.  
S. America.

FIG. 30.—*Cetonia Baxii*.  
W. Africa.

Among the vegetable-feeding chafers we usually find that while the perfect insect devours leaves, the larva lives underground and feeds on roots. Such are the habits of the cockchafer (*Melolontha vulgaris*) and other species that often cause great injury to farm and garden crops (see [CHAFER](#)). Many of these insects, such as the species of *Phanaeus* (fig. 29) and *Cetonia* (fig. 30), are adorned with metallic or other brilliant colours. The African “goliath-beetles” (fig. 31) and the American “elephant-beetles” (*Dynastes*) are the largest of all insects.

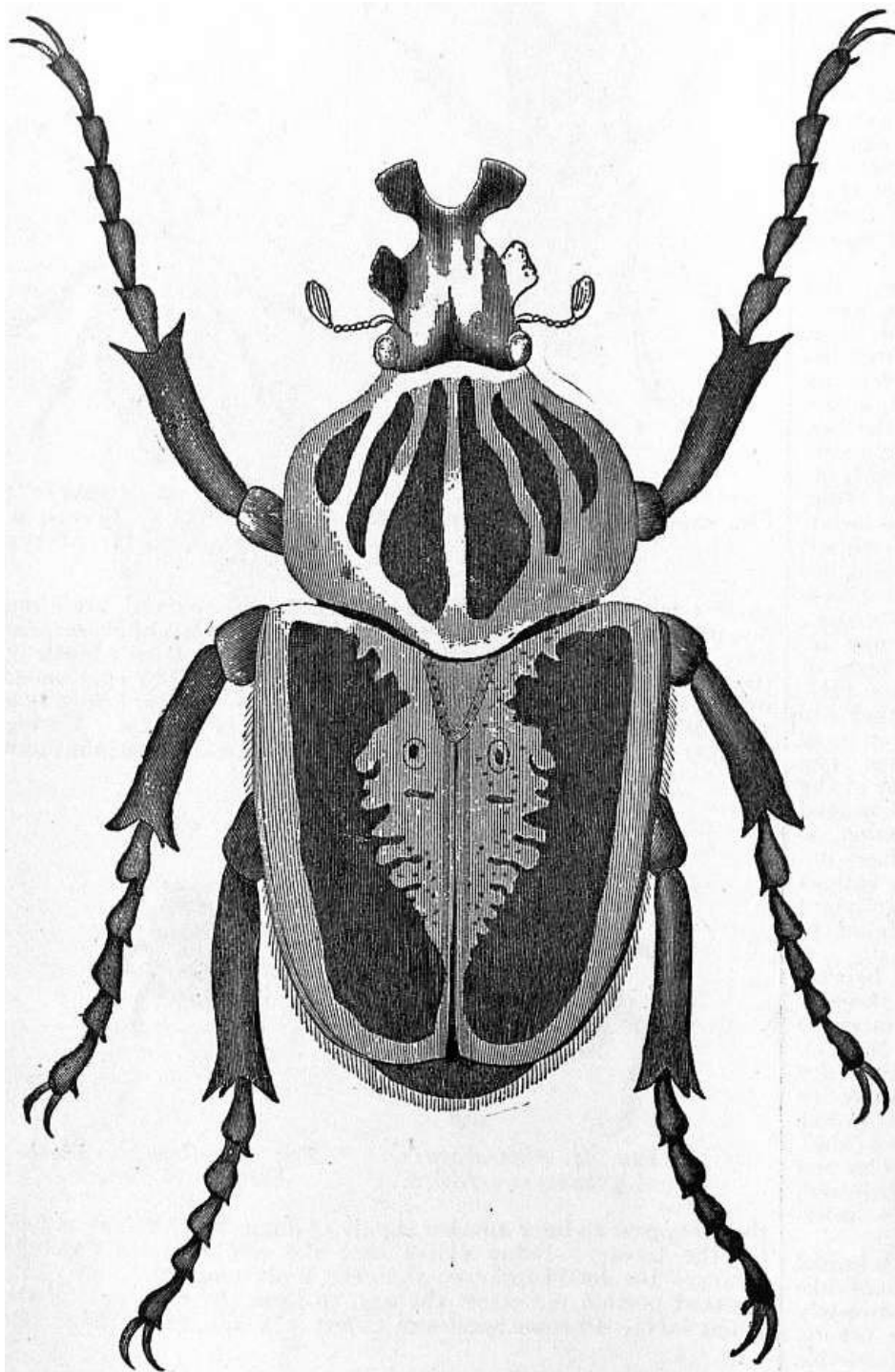


FIG. 31.—*Goliathus giganteus* (Goliath Beetle).

ANCHISTOPODA.—The families of beetles included by Kolbe in this group are distinguished by the possession of six malpighian tubes, and a great reduction in one or two of the tarsal segments, so that there seem to be only four or three segments in each foot; hence the names *Tetramera* and *Trimera* formerly applied to them. The larvae have soft-skinned bodies sometimes protected by rows of spiny tubercles, the legs being fairly developed in some families and greatly reduced or absent in others. As might be expected, degeneration in larval structure is correlated with a concealed habit of life.

The *Coccinellidae*, or ladybirds (fig. 32), are a large family of beetles, well known by their rounded convex bodies, usually shining and hairless. They have eleven segments to the feeler, which is clubbed at the tip, and apparently three segments only in each foot. Ladybirds are often brightly marked with spots and dashes, their coloration being commonly regarded as an advertisement of inedibility. The larvae have a somewhat swollen abdomen, which is protected by bristle-bearing tubercles. Like the perfect insects, they are predaceous, feeding on plant-lice (*Aphidae*) and scale insects (*Coccidae*). Their role in nature is therefore beneficial to the cultivator. The *Endomychidae* (fig. 33), an allied family, are mostly fungus-eaters. In the *Erotylidae* and a few other small related families the feet are evidently four-segmented.

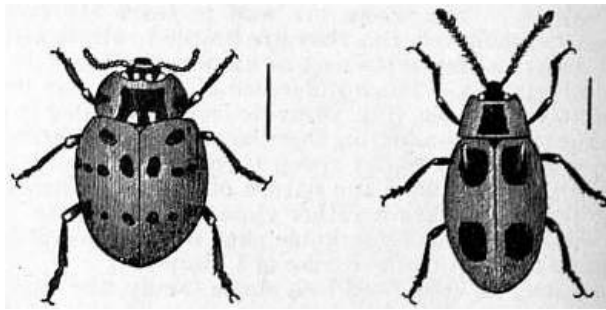


FIG. 32.—*Anatio ocellata*  
(Eyed Ladybird). Europe.

FIG. 33.—*Endomychus coccineus*.  
Europe.

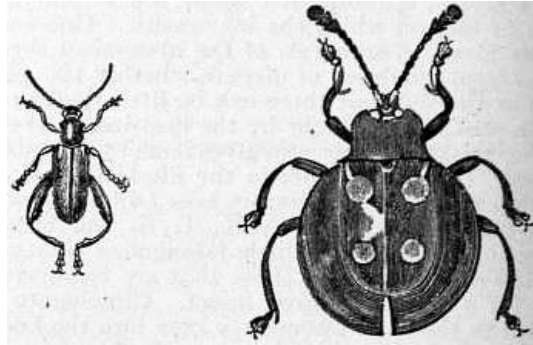


FIG. 34.—*Sagra cyanea*.  
W. Africa.

FIG. 35.—*Eumorphus ivguttatus*.  
Sumatra.

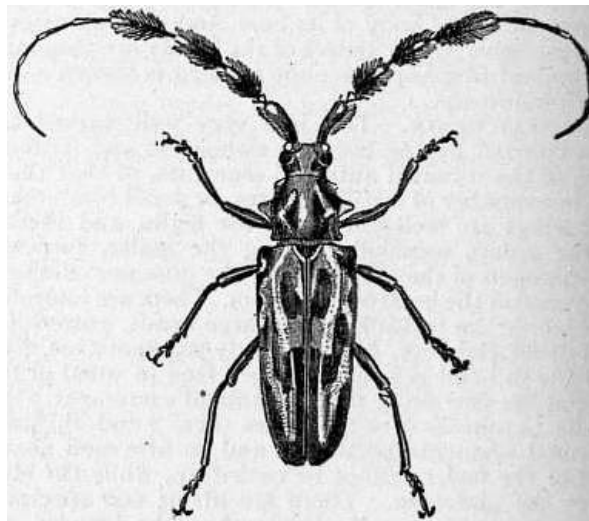


FIG. 36.—*Lophonocerus barbicornis*. S. America.

The *Chrysomelidae*, or leaf-beetles (figs. 34, 35), are a very large family, with "tetramerous" tarsi; there seem to be only four segments to the foot, but there are really five, the fourth being greatly reduced. The mandibles are strong, adapted for biting the vegetable substances on which these beetles feed, and the palps of the second maxillae have three segments. Most of the *Chrysomelidae* are metallic in colour and convex in form; in some the head is concealed beneath the prothorax, and the so-called "tortoise" beetles (*Cassidinae*) have the elytra raised into a prominent median ridge. The most active form of larva found in this family resembles in shape that of a ladybird, tapering towards the tail end, and having the trunk segments protected by small firm sclerites. Such larvae, and also many with soft cuticle and swollen abdomen—those of the notorious "Colorado beetle," for example—feed openly on foliage. Others, with soft, white, cylindrical bodies, which recall the caterpillars of moths, burrow in the leaves or stems of plants. The larvae of the tortoise-beetles have the curious habit of forming an umbrella-like shield out of their own excrement, held in position by the upturned tail-process. The larvae of the beautiful, elongate, metallic *Donaciae* live in the roots and stems of aquatic plants, obtaining thence both food and air. The larva pierces the vessels of the plant with sharp processes at the hinder end of its body. In this way it is believed that the sub-aqueous cocoon in which the pupal stage is passed becomes filled with air.

The *Cerambycidae*, or longhorn beetles, are recognizable by their slender, elongate feelers, which are never clubbed and rarely serrate. The foot has apparently four segments, as in the *Chrysomelidae*. The beetles are usually elongate and elegant in form, often adorned

with bright bands of colour, and some of the tropical species attain a very large size (figs. 36, 37). The feelers are usually longer in the male than in the female, exceeding in some cases by many times the length of the body. The larvae have soft, fleshy bodies, with the head and prothorax large and broad, and the legs very much reduced. They live and feed in the wood of trees. Consequently, beetles of this family are most abundant in forest regions, and reach their highest development in the dense virgin forests of tropical countries, South America being particularly rich in peculiar genera.

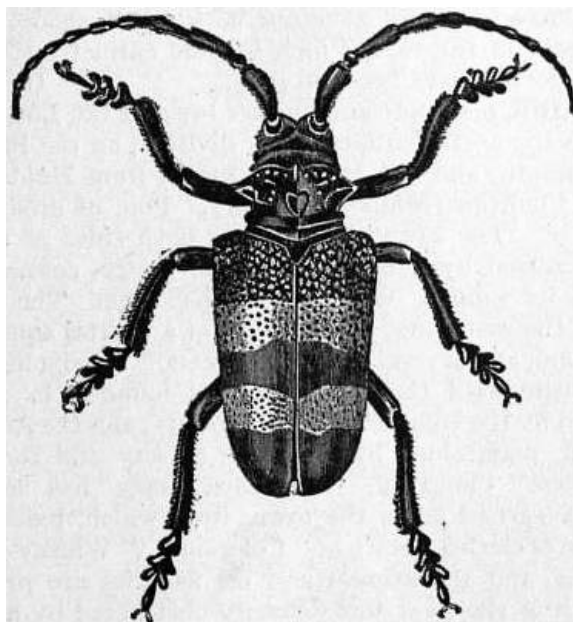


FIG. 37.—*Phryneta aurocincta*. West Africa.

The *Bruchidae*, or seed-beetles, agree with the two preceding families in tarsal structure; the head is largely hidden by the pronotum, and the elytra are short enough to leave the end of the abdomen exposed (fig. 38). The development of the pea and bean-beetles has been carefully studied by C. V. Riley, who finds that the young larva, hatched from the egg laid on the pod, has three pairs of legs, and that these are lost after the moult that occurs when the grub has bored its way into the seed. In Great Britain the beetle, after completing its development, winters in the seed, waiting to emerge and lay its eggs on the blossom in the ensuing spring.

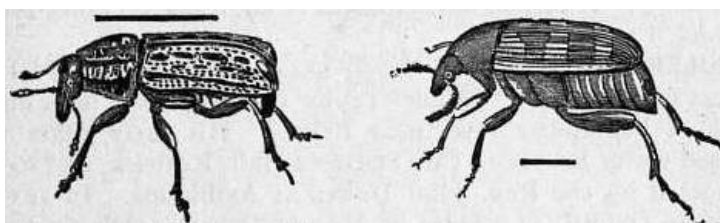


FIG. 38.—*Bruchus piei*  
(Pea Beetle.) Europe.

FIG. 39.—*Platyrhinus*  
*latirostris*. Europe.

RHYNCHOPHORA.—The *Rhynchophora* are a group of beetles easily recognized by the elongation of the head into a beak or snout, which carries the feelers at its sides and the jaws at its tip. The third tarsal segment is broad and bi-lobed, and the fourth is so small that the feet seem to be only four-segmented. There are six malpighian tubes. The ventral sclerite of the head-skeleton (gula), well developed in most families of beetles, is absent among the *Rhynchophora*, while the palps of the maxillae are much reduced. The larvae have soft, white bodies and, with very few exceptions, no legs.



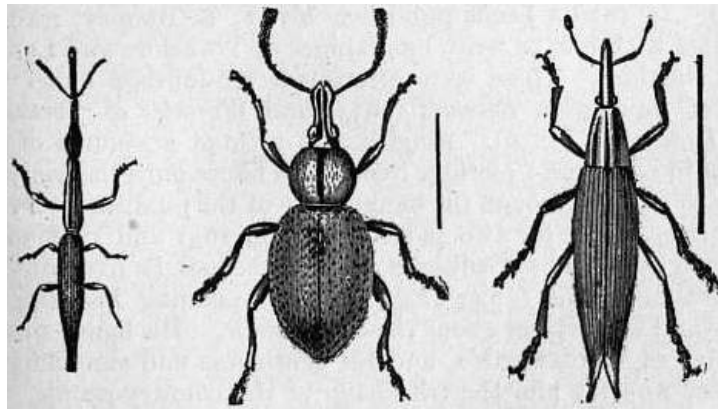


FIG. 40.—*Brenthus anchorago*.  
Tropical Countries.

FIG. 41.—*Otiorrhynchus*  
*ligustici*. Europe.

FIG. 42.—*Lixus paraplecticus*.  
Europe.

Of the four families included in this group, the *Anthribidae* (fig. 39) have jointed, flexible palps, feelers—often of excessive length—with a short basal segment, and the three terminal segments forming a club, and, in some genera, larvae with legs. There are nearly 1000 known species, most of which live in tropical countries. The *Brenthidae* are a remarkable family almost confined to the tropics; they are elongate and narrow in form (fig. 40), with a straight, cylindrical snout which in some male beetles of the family is longer than the rest of the body.

The *Curculionidae*, or weevils (*q.v.*), comprising 23,000 species, are by far the largest family of the group. The maxillary palps are short and rigid, and there is no distinct labrum, while the feelers are usually of an “elbowed” form, the basal segment being very elongate (figs. 41, 42). They are vegetable feeders, both in the perfect and larval stages, and are often highly injurious. The female uses her snout as a boring instrument to prepare a suitable place for egg-laying. The larvae (fig. 3) of some weevils live in seeds; others devour roots, while the parent-beetles eat leaves; others, again, are found in wood or under bark. The *Scolytidae*, or bark-beetles, are a family of some 1500 species, closely allied to the *Curculionidae*, differing only in the feeble development of the snout. They have clubbed feelers, and their cylindrical bodies (fig. 43) are well adapted for their burrowing habits under the bark of trees. Usually the mother-beetle makes a fairly straight tunnel along which, at short intervals, she lays her eggs. The grubs, when hatched, start galleries nearly at right angles to this, and when fully grown form oval cells in which they pupate; from these the young beetles emerge by making circular holes directly outward through the bark.

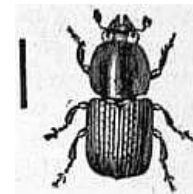


FIG. 43.  
—*Scolytus*  
*ulmi*. (Bark  
Beetle).  
Europe.

BIBLIOGRAPHY.—In addition to what may be found in numerous important works on the Hexapoda (*q.v.*) as a whole, such as J. O. Westwood’s *Modern Classification of Insects*, vol. i. (London, 1838); J. H. Fabre’s *Souvenirs Entomologiques* (Paris, 1879-1891); D. Sharp’s contribution to the Cambridge Natural History (vol. vi., London, 1899); and L. C. Miall’s *Aquatic Insects* (London, 1895), the special literature of the *Coleoptera* is enormous. Classical anatomical memoirs are those of L. Dufour (*Ann. Sci. Nat.* ii., iii., iv., vi., viii., xiv., 1824-1828); *Ib.* (ser. 2, Zool.) i., 1834; and H. E. Strauss-Dürkheim, *Anatomie comparée des animaux articulées* (Paris, 1828).

The wings of *Coleoptera* (including the elytra) are described and discussed by F. Meinert (*Entom. Tijdskr.* v., 1880); C. Hoffbauer (*Zeit. f. wissen. Zool.* liv., 1892); J. H. Comstock and J. G. Needham (*Amer. Nat.* xxxii., 1898); and W. L. Tower (*Zool. Jahrb. Anat.* xvii., 1903). The morphology of the abdomen, ovipositor and genital armature is dealt with by K. W. Verhoeff (*Ent. Nachtr.* xx., 1894, and *Arch. f. Naturg.* lxi., lxii., 1895-1896); and B. Wandolleck (*Zool. Jahrb. Anat.* xxii., 1905).

Luminous organs are described by H. von Wielowiejski (*Zeits. f. wissen. Zool.* xxxvii., 1882); C. Heinemann (*Arch. f. mikr. Anat.* xxvii., 1886); and R. Dubois (*Bull. soc. zool. France*, 1886); and stridulating organs by C. J. Gahan (*Trans. Entom. Soc.*, 1900). See also C. Darwin’s *Descent of Man and Selection in Relation to Sex* (London, 1871).

Many larvae of *Coleoptera* are described and beautifully figured by J. C. Schiödte (*Naturh. Tidsskr.* i.-xiii., 1861-1872). Hypermetamorphosis in the *Meloidae* is described by G. Newport (*Trans. Linn. Soc.* xx., xxi., 1851-1853); C. V. Riley (*Rep. U.S. Entom. Comm.* i., 1878); J. H. Fabre (*Ann. Sci. Nat.* (4), ix., xix., 1848-1853); H. Beaugregard (*Les Insectes vésicants*, Paris, 1890); and A. Chabaud (*Ann. Soc. Ent. France*, lx., 1891); in the *Bruchidae* by Riley (*Insect Life*, iv., v., 1892-1893); and in the *Strepsiptera* (*Stylopidae*) by K. T. E. von Siebold (*Arch. f. Naturg.* ix., 1843); N. Nassonov (*Bull. Univ. Narsovie*, 1892); and C. T.

For various schemes of classification of the *Coleoptera* see E. L. Geoffroy (*Insectes qui se trouvent aux environs de Paris*, Paris, 1762); A. G. Olivier (*Coléoptères*, Paris, 1789-1808); W. S. MacLeay (*Annulosa Javanica*, London, 1825); the general works of Westwood and Sharp, mentioned above; M. Gemminger and B. de Harold (*Catalogus Coleopterorum*, 12 vols., Munich, 1868-1872); T. Lacordaire and F. Chapuis (*Genera des Coléoptères*, 10 vols., Paris, 1854-1874); J. L. Leconte and G. H. Horn (*Classification of Coleoptera of N. America*, Washington, Smithsonian Inst., 1883); L. Ganglbauer (*Die Käfer von Mitteleuropa*, Vienna, 1892, &c.); A. Lameere (*Ann. Soc. Ent. Belg.* xliv., xlvii., 1900-1903); and H. J. Kolbe (*Arch. f. Naturg.* lxvii., 1901).

For the British species, W. W. Fowler (*Coleoptera of the British Islands*, 5 vols., London, 1887-1891) is the standard work; and W. F. Johnson and J. N. Halbert's "Beetles of Ireland" (*Proc. R. Irish Acad.*, 3, vi., 1902) is valuable faunistically. Among the large number of systematic writers on the order generally, or on special families, may be mentioned D. Sharp, T. V. Wollaston, H. W. Bates, G. C. Champion, E. Reitter, G. C. Crotch, H. S. Gorham, M. Jacoby, L. Fairmaire and C. O. Waterhouse.

(G. H. C.)

- 1 Instar is a convenient term suggested by D. Sharp to indicate a stage in the life-history of an insect between two successive castings of the cuticle.

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**COLEPEPER, JOHN COLEPEPER** (OF CULPEPPER), 1ST BARON (d. 1660), English politician, was the only son of Sir John Colepeper of Wigsell, Sussex. He began his career in military service abroad, and came first into public notice at home through his knowledge of country affairs, being summoned often before the council board to give evidence on such matters. He was knighted, and was elected member for Kent in the Long Parliament, when he took the popular side, speaking against monopolies on the 9th of November 1640, being entrusted with the impeachment of Sir Robert Berkeley on the 12th of February 1641, supporting Stafford's attainder, and being appointed to the committee of defence on the 12th of August 1641. He separated, however, from the popular party on the Church question, owing to political rather than religious objections, fearing the effect of the revolutionary changes which were now contemplated. He opposed the London petition for the abolition of episcopacy, the project of religious union with the Scots, and the Root and Branch Bill, and on the 1st of September he moved a resolution in defence of the prayer-book. In the following session he opposed the militia bill and the Grand Remonstrance, and finally on the 2nd of January 1642 he joined the king's party, taking office as chancellor of the exchequer. He highly disapproved of the attempt upon the five members, which was made without his knowledge, but advised the enterprise against Hull. On the 25th of August 1642 he appeared at the bar of the House of Commons to deliver the king's final proposals for peace, and was afterwards present at Edgehill, where he took part in Prince Rupert's charge and opposed the retreat of the king's forces from the battlefield. In December he was made by Charles master of the rolls. He was a leading member of the Oxford Parliament, and was said, in opposition to the general opinion, to have counselled considerable concessions to secure peace. His influence in military affairs caused him to be much disliked by Prince Rupert and the army, and the general animosity against him was increased by his advancement to the peerage on the 21st of October 1644 by the title of Baron Colepeper of Thoresway in Lincolnshire.

He was despatched with Hyde in charge of the prince of Wales to the West in March 1645, and on the 2nd of March 1646, after Charles's final defeat, embarked with the prince for Scilly, and thence to France. He strongly advocated the gaining over of the Scots by religious concessions, a policy supported by the queen and Mazarin, but opposed by Hyde and other leading royalists, and constantly urged this course upon the king, at the same time deprecating any yielding on the subject of the militia. He promoted the mission of Sir John Berkeley in 1647 to secure an understanding between Charles and the army. In 1648 he accompanied the prince in his unsuccessful naval expedition, and returned with him to the Hague, where violent altercations broke out among the royalist leaders, Colepeper going so far, on one occasion in the council, as to challenge Prince Rupert, and being himself severely assaulted in the streets by Sir Robert Walsh. He continued after the execution of the king to press the acceptance on Charles II. of the Scottish proposals. He was sent to Russia in 1650,

where he obtained a loan of 20,000 roubles from the tsar, and, soon after his return, to Holland, to procure military assistance. By the treaty, agreed to between Cromwell and Mazarin, of August 1654, Colepeper was obliged to leave France, and he appears henceforth to have resided in Flanders. He accompanied Charles II. to the south of France in September 1659, at the time of the treaty of the Pyrenees. At the Restoration he returned to England, but only survived a few weeks, dying on the 11th of June 1660.

Several contemporary writers agree in testifying to Colepeper's great debating powers and to his resources as an adviser, but complain of his want of stability and of his uncertain temper. Clarendon, with whom he was often on ill terms, speaks generally in his praise, and repels the charge of corruption levelled against him. That he was gifted with considerable political foresight is shown by a remarkable letter written on the 20th of September 1658 on the death of Cromwell, in which he foretells with uncommon sagacity the future developments in the political situation, advises the royalists to remain inactive till the right moment and profit by the division of their opponents, and distinguishes Monck as the one person willing and capable of effecting the Restoration (*Clarendon State Papers*, iii. 412). Colepeper was twice married, (1) to Philippa, daughter of Sir John Snelling, by whom he had one son, who died young, and a daughter, and (2) to Judith, daughter of Sir J. Colepeper of Hollingbourn, Kent, by whom he had seven children. Of these Thomas (d. 1719; governor of Virginia 1680-1683) was the successor in the title, which became extinct on the death of his younger brother Cheney in 1725.

(P. C. Y.)

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**COLERAINE**, a seaport and market town of Co. Londonderry, Ireland, in the north parliamentary division, on the Bann, 4 m. from its mouth, and 61½ m. N.W. by N. from Dublin by the Northern Counties (Midland) railway. Pop. of urban district (1901) 6958. The town stands upon both sides of the river, which is crossed by a handsome stone bridge, connecting the town and its suburb, Waterside or Killowen. The principal part is on the east bank, and consists of a central square called the Diamond, and several diverging streets. Among institutions may be mentioned the public schools founded in 1613 and maintained by the Honourable Irish Society, and the Academical Institution, maintained by the Irish Society and the London Clothworkers' Company. The linen trade has long been extensively carried on in the town, from which, indeed, a fine description of cloth is known as "Coleraines." Whisky-distilling, pork-curing, and the salmon and eel fisheries are prosecuted. The mouth of the river was formerly obstructed by a bar, but piers were constructed, and the harbours greatly improved by grants from the Irish Society of London and from a loan under the River Bann Navigation Act 1879. Coleraine ceased to return one member to the Imperial parliament in 1885; having previously returned two to the Irish parliament until the Union. It was incorporated by James I. It owed its importance mainly to the Irish Society, which was incorporated as the Company for the New Plantation of Ulster in 1613. Though fortified only by an earthen wall, it managed to hold out against the rebels in 1641. There are no remains of a former priory, monastery and castle. A rath or encampment of large size occupies Mount Sandel, 1 m. south-east.

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**COLERIDGE, HARTLEY** (1796-1849), English man of letters, eldest son of the poet Samuel Taylor Coleridge, was born on the 19th of September 1796, near Bristol. His early years were passed under Southey's care at Greta Hall, Keswick, and he was educated by the Rev. John Dawes at Ambleside. In 1815 he went to Oxford, as scholar of Merton College. His university career, however, was very unfortunate. He had inherited the weakness of purpose, as well as the splendid conversational powers, of his father, and lapsed into habits of intemperance. He was successful in gaining an Oriel fellowship, but at the close of the probationary year (1820) was judged to have forfeited it. The authorities could not be prevailed upon to reverse their decision; but they awarded to him a free gift of £300. Hartley Coleridge then spent two years in London, where he wrote short poems for the *London Magazine*. His next step was to become a partner in a school at Ambleside, but this scheme

failed. In 1830 a Leeds publisher, Mr. F. E. Bingley, made a contract with him to write biographies of Yorkshire and Lancashire worthies. These were afterwards republished under the title of *Biographia Borealis* (1833) and *Worthies of Yorkshire and Lancashire* (1836). Bingley also printed a volume of his poems in 1833, and Coleridge lived in his house until the contract came to an end through the bankruptcy of the publisher. From this time, except for two short periods in 1837 and 1838 when he acted as master at Sedbergh grammar school, he lived quietly at Grasmere and (1840-1849) Rydal, spending his time in study and wanderings about the countryside. His figure was as familiar as Wordsworth's, and his gentleness and simplicity of manner won for him the friendship of the country-people. In 1839 appeared his edition of Massinger and Ford, with biographies of both dramatists. The closing decade of Coleridge's life was wasted in what he himself calls "the woeful impotence of weak resolve." He died on the 6th of January 1849. The prose style of Hartley Coleridge is marked by much finish and vivacity; but his literary reputation must chiefly rest on the sanity of his criticisms, and above all on his *Prometheus*, an unfinished lyric drama, and on his sonnets. As a sonneteer he achieved real excellence, the form being exactly suited to his sensitive genius. *Essays and Marginalia*, and *Poems*, with a memoir by his brother Derwent, appeared in 1851.

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**COLERIDGE, JOHN DUKE COLERIDGE**, 1<sup>ST</sup> BARON (1820-1894), lord chief justice of England, was the eldest son of Sir John Taylor Coleridge. He was born at Heath's Court, Ottery St Mary, on the 3rd of December 1820. He was educated at Eton and Balliol College, Oxford, of which he was a scholar. He was called to the bar in 1846, and went the western circuit, rising steadily, through more than twenty years of hard work, till in 1865 he was returned as member for Exeter in the Liberal interest. The impression which he made on the heads of his party was so favourable that they determined, early in the session of 1867, to put him forward as the protagonist of their attack on the Conservative government. But that move seemed to many of their staunchest adherents unwise, and it was frustrated by the active opposition of a section, including Hastings Russell (later ninth duke of Bedford), his brother Arthur, member for Tavistock, Alexander Mitchell of Stow, A. W. Kinglake and Henry Seymour. They met to deliberate in the tea-room of the House, and were afterwards sometimes confounded with the tea-room party which was of subsequent formation and under the guidance of a different group. The protest was sufficient to prevent the contemplated attack being made, but the Liberals returned to power in good time with a large majority behind them in 1868. Coleridge was made, first solicitor-, and then attorney-general.

As early as 1863 a small body of Oxford men in parliament had opened fire against the legislation which kept their university bound by ecclesiastical swaddling clothes. They had made a good deal of progress in converting the House of Commons to their views before the general election of 1865. That election having brought Coleridge into parliament, he was hailed as a most valuable ally, whose great university distinction, brilliant success as an orator at the bar, and hereditary connexion with the High Church party, entitled him to take the lead in a movement which, although gathering strength, was yet very far from having achieved complete success. The clerically-minded section of the Conservative party could not but listen to the son of Sir John Coleridge, the godson of Keble, and the grand-nephew of the man who had been an indirect cause of the Anglican revival of 1833,—for John Stuart Mill was right when he said that the poet Coleridge and the philosopher Bentham were, so far as England was concerned, the leaders of the two chief movements of their times: "it was they who taught the teachers, and who were the two great seminal minds."

Walking up one evening from the House of Commons to dine at the Athenaeum with Henry Bruce (afterwards Lord Aberdare) and another friend, Coleridge said: "There is a trial coming on which will be one of the most remarkable *causes célèbres* that has ever been heard of." This was the Tichborne case, which led to proceedings in the criminal courts rising almost to the dignity of a political event. The Tichborne trial was the most conspicuous feature of Coleridge's later years at the bar, and tasked his powers as an advocate to the uttermost, though he was assisted by the splendid abilities and industry of Charles (afterwards Lord) Bowen. In November 1873 Coleridge succeeded Sir W. Bovill as chief justice of the common pleas, and was immediately afterwards raised to the peerage as Baron Coleridge of Ottery St Mary. In 1880 he was made lord chief justice of England on the

death of Sir Alexander Cockburn.

In jury cases his quickness in apprehending facts and his lucidity in arranging them were very remarkable indeed. He was not one of the most learned of lawyers, but he was a great deal more learned than many people believed him to be, and as an ecclesiastical lawyer had perhaps few or no superiors. His fault—a natural fault in one who had been so successful as an advocate—was that of being too apt to take one side. He allowed, also, certain political or personal prepossessions to colour the tone of his remarks from the bench. A game-preserving landlord had not to thank the gods when his case, however buttressed by generally accepted claims, came before Coleridge. Towards the end of his life his health failed, and he became somewhat indolent. On the whole, he was not so strong a man in his judicial capacity as Campbell or Cockburn; but it must be admitted that his scholarship, his refinement, his power of oratory, and his character raised the tone of the bench while he sat upon it, and that if it has been adorned by greater judicial abilities, it has hardly ever known a greater combination of varied merits. It is curious to observe that of all judges the man whom he put highest was one very unlike himself, the great master of the rolls, Sir William Grant. Coleridge died in harness on the 14th of June 1894.

Coleridge's work, first as a barrister, and then as a judge, prevented his publishing as much as he otherwise would have done, but his addresses and papers would, if collected, fill a substantial volume and do much honour to his memory. One of the best, and one most eminently characteristic of the man, was his inaugural address to the Philosophical Institution at Edinburgh in 1870; another was a paper on Wordsworth (1873). He was an exceptionally good letter-writer. Of travel he had very little experience. He had hardly been to Paris; once, quite near the end of his career, he spent a few days in Holland, and came back a willing slave to the genius of Rembrandt; but his longest absence from England was a visit, which had something of a representative legal character, to the United States. It is strange that a man so steeped in Greek and Roman poetry, so deeply interested in the past, present and future of Christianity, never saw Rome, or Athens, or the Holy Land. A subsidiary cause, no doubt, was the fatal custom of neglecting modern languages at English schools. He felt himself at a disadvantage when he passed beyond English-speaking lands, and cordially disliked the situation. No notice of Coleridge should omit to make mention of his extraordinary store of anecdotes, which were nearly always connected with Eton, Oxford, the bar or the bench. His exquisite voice, considerable power of mimicry, and perfect method of narration added greatly to the charm. He once told, at the table of Dr Jowett, master of Balliol, anecdotes through the whole of dinner on Saturday evening, through the whole of breakfast, lunch and dinner the next day, through the whole journey on Monday morning from Oxford to Paddington, without ever once repeating himself. He was frequently to be seen at the Athenaeum, was a member both of Grillion's and The Club, as well as of the Literary Society, of which he was president, and whose meetings he very rarely missed. Bishop Copleston is said to have divided the human race into three classes,—men, women and Coleridges. If he did so, he meant, no doubt, to imply that the family of whom the poet of *Christabel* was the chief example regarded themselves as a class to themselves, the objects of a special dispensation. John Duke Coleridge was sarcastic and critical, and at times over-sensitive. But his strongest characteristics were love of liberty and justice. By birth and connexions a Conservative, he was a Liberal by conviction, and loyal to his party and its great leader, Mr Gladstone.

Coleridge had three sons and a daughter by his first wife, Jane Fortescue, daughter of the Rev. George Seymour of Freshwater. She was an artist of real genius, and her portrait of Cardinal Newman was considered much better than the one by Millais. She died in February 1878; a short notice of her by Dean Church of St Paul's was published in the *Guardian*, and was reprinted in her husband's privately printed collection of poems. Coleridge remained for some years a widower, but married in 1885 Amy Augusta Jackson Lawford, who survived him. He was succeeded in the peerage by his eldest son, Bernard John Seymour (b. 1851), who went to the bar and became a K.C. in 1892. In 1907 he was appointed a judge of the Supreme Court. The two other sons were Stephen (b. 1854), a barrister, secretary to the Anti-Vivisection Society, and Gilbert James Duke (b. 1859).

His *Life and Correspondence*, edited by E. H. Coleridge, was published in 1904; see further E. Manson, *Builders of our Law* (1904); and for the history of the Coleridge family see Lord Coleridge, *The Story of a Devonshire House* (1907).

(M. G. D.)

**COLERIDGE, SIR JOHN TAYLOR** (1790-1876), English judge, the second son of Captain James Coleridge and nephew of the poet S. T. Coleridge, was born at Tiverton, Devon, and was educated at Corpus Christi College, Oxford, where he had a brilliant career. He graduated in 1812 and was soon after made a fellow of Exeter; in 1819 he was called to the bar at the Middle Temple and practised for some years on the western circuit. In 1824, on Gifford's retirement, he assumed the editorship of the *Quarterly Review*, resigning it a year afterwards in favour of Lockhart. In 1825 he published his excellent edition of *Blackstone's Commentaries*, and in 1832 he was made a serjeant-at-law and recorder of Exeter. In 1835 he was appointed one of the judges of the king's bench. In 1852 his university created him a D.C.L., and in 1858 he resigned his judgeship, and was made a member of the privy council. In 1869, although in extreme old age, he produced his pleasant *Memoir of the Rev. John Keble*, whose friend he had been since their college days, a third edition of which was issued within a year. He died on the 11th of February 1876 at Ottery St Mary, Devon, leaving two sons and a daughter; the eldest son, John Duke, 1st Baron Coleridge (*q.v.*), became lord chief justice of England; the second son, Henry James (1822-1893), left the Anglican for the Roman Catholic church in 1852, and became well-known as a Jesuit divine, editor of *The Month*, and author of numerous theological works. Sir John Taylor Coleridge's brothers, James Duke and Henry Nelson (husband of Sara Coleridge), are referred to in other articles; his brother Francis George was the father of Arthur Duke Coleridge (b. 1830), clerk of assizes on the midland circuit and author of *Eton in the Forties*, whose daughter Mary E. Coleridge (1861-1907) became a well-known writer of fiction.

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**COLERIDGE, SAMUEL TAYLOR** (1772-1834), English poet and philosopher, was born on the 21st of October 1772, at his father's vicarage of Ottery St Mary's, Devonshire. His father, the Rev. John Coleridge (1719-1781), was a man of some mark. He was known for his great scholarship, simplicity of character, and affectionate interest in the pupils of the grammar school, of which he was appointed master a few months before becoming vicar of the parish (1760), reigning in both capacities till his death. He had married twice. The poet was the youngest child of his second wife, Anne Bowdon (d. 1809), a woman of great good sense, and anxiously ambitious for the success of her sons. On the death of his father, a presentation to Christ's Hospital was procured for Coleridge by the judge, Sir Francis Buller, an old pupil of his father's. He had already begun to give evidence of a powerful imagination, and he has described in a letter to his valued friend, Tom Poole, the pernicious effect which the admiration of an uncle and his circle of friends had upon him at this period. For eight years he continued at Christ's Hospital. Of these school-days Charles Lamb has given delightful glimpses in the *Essays of Elia*. The headmaster, Bowyer (as he was called, though his name was Boyer), was a severe disciplinarian, but respected by his pupils. Middleton, afterwards known as a Greek scholar, and bishop of Calcutta, reported Coleridge to Bowyer as a boy who read Virgil for amusement, and from that time Bowyer began to notice him and encouraged his reading. Some compositions in English poetry, written at sixteen, and not without a touch of genius, give evidence of the influence which Bowles, whose poems were then in vogue, had over his mind at this time. Before he left school his constitutional delicacy of frame, increased by swimming the New River in his clothes, began to give him serious discomfort.

In February 1791 he was entered at Jesus College, Cambridge. A school-fellow who followed him to the university has described in glowing terms evenings in his rooms, "when Aeschylus, and Plato, and Thucydides were pushed aside, with a pile of lexicons and the like, to discuss the pamphlets of the day. Ever and anon a pamphlet issued from the pen of Burke. There was no need of having the book before us;—Coleridge had read it in the morning, and in the evening he would repeat whole pages verbatim." William Frend, a fellow of Jesus, accused of sedition and Unitarianism, was at this time tried and expelled from Cambridge. Coleridge had imbibed his sentiments, and joined the ranks of his partisans. He grew discontented with university life, and in 1793, pressed by debt, went to London. Perhaps he was also influenced by his passion for Mary Evans, the sister of one of his school-fellows. A poem in the *Morning Chronicle* brought him a guinea, and when that was spent he enlisted in the 15th Dragoons under the name of Silas Tomkyn Comberbache. One of the officers of the dragoon regiment, finding a Latin sentence inscribed on a wall, discovered the condition of the very awkward recruit. Shortly afterwards an old school-fellow (G. L. Tuckett) heard of his whereabouts, and by the intervention of his brother, Captain James Coleridge, his

discharge was procured. He returned for a short time to Cambridge, but quitted the university without a degree in 1794. In the same year he visited Oxford, and after a short tour in Wales went to Bristol, where he met Southey. The French Revolution had stirred the mind of Southey to its depths. Coleridge received with rapture his new friend's scheme of Pantisocracy. On the banks of the Susquehanna was to be founded a brotherly community, where selfishness was to be extinguished, and the virtues were to reign supreme. No funds were forthcoming, and in 1795, to the chagrin of Coleridge, the scheme was dropped. In 1794 *The Fall of Robespierre*, of which Coleridge wrote the first act and Southey the other two, appeared. At Bristol Coleridge formed the acquaintance of Joseph Cottle, the bookseller, who offered him thirty guineas for a volume of poems. In October of 1795 Coleridge married Sarah Fricker, and took up his residence at Clevedon on the Bristol Channel. A few weeks afterwards Southey married a sister of Mrs Coleridge, and on the same day quitted England for Portugal.

Coleridge began to lecture in Bristol on politics and religion. He embodied the first two lectures in his first prose publication, *Conciones ad Populum* (1795). The book contained much invective against Pitt, and in after life Coleridge declared that, with this exception, and a few pages involving philosophical tenets which he afterwards rejected, there was little or nothing he desired to retract. The first volume of *Poems* was published by Cottle early in 1796. Coleridge projected a periodical called *The Watchman*, and in 1796 undertook a journey, well described in the *Biographic Literaria*, to enlist subscribers. *The Watchman* had a brief life of two months, but at this time Coleridge began to think of becoming a Unitarian preacher, and abandoning literature for ever. Hazlitt has recorded his very favourable impression of a remarkable sermon delivered at Shrewsbury; but there are other accounts of Coleridge's preaching not so enthusiastic. In the summer of 1795 he met for the first time the brother poet with whose name his own will be for ever associated. Wordsworth and his sister had established themselves at Racedown in the Dorsetshire hills, and here Coleridge visited them in 1797. There are few things in literary history more remarkable than this friendship. The gifted Dorothy Wordsworth described Coleridge as "thin and pale, the lower part of the face not good, wide mouth, thick lips, not very good teeth, longish, loose, half-curling, rough, black hair,"—but all was forgotten in the magic charm of his utterance. Wordsworth, who declared, "The only wonderful man I ever knew was Coleridge," seems at once to have desired to see more of his new friend. He and his sister removed in July 1797 to Alfoxden, near Nether Stowey, to be in Coleridge's neighbourhood, and in the most delightful and unrestrained intercourse the friends spent many happy days. It was the delight of each one to communicate to the other the productions of his mind, and the creative faculty of both poets was now at its best. One evening, at Watchett on the British Channel, *The Ancient Mariner* first took shape. Coleridge was anxious to embody a dream of a friend, and the suggestion of the shooting of the albatross came from Wordsworth, who gained the idea from Shelvocke's *Voyage* (1726). A joint volume was planned. Wordsworth was to show the real poetry that lies hidden in commonplace subjects, while Coleridge was to treat supernatural subjects to illustrate the common emotions of humanity. From this sprang the *Lyrical Ballads*, to which Coleridge contributed *The Ancient Mariner*, the *Nightingale* and two scenes from *Osorio*, and after much cogitation the book was published in 1798 at Bristol by Cottle, to whose reminiscences, often indulging too much in detail, we owe the account of this remarkable time. A second edition of the *Lyrical Ballads* in 1800 included another poem by Coleridge—*Love*, to which subsequently the sub-title was given of *An Introduction to the Tale of the Dark Ladie*. To the Stowey period belong also the tragedy of *Osorio* (afterwards known as *Remorse*), *Kubla Khan* and the first part of *Christabel*. In 1798 an annuity, granted him by the brothers Wedgwood, led Coleridge to abandon his reluctantly formed intention of becoming a Unitarian minister. For many years he had desired to see the continent, and in September 1798, in company with Wordsworth and his sister, he left England for Hamburg. *Satyrane's Letters* (republished in *Biog. Lit.* 1817) give an account of the tour.

A new period in Coleridge's life now began. He soon left the Wordsworths to spend four months at Ratzeburg, whence he removed to Göttingen to attend lectures. A great intellectual movement had begun in Germany. Coleridge was soon in the full whirl of excitement. He learnt much from Blumenbach and Eichhorn, and took interest in all that was going on around him. During his stay of nine months in Germany, he made himself master of the language to such purpose that the translation of *Wallenstein*—his first piece of literary work after his return to England—was actually accomplished in six weeks. It was published in 1800, and, although it failed to make any impression on the general public, it became at once prized by Scott and others as it deserved. It is matter for regret that a request to Coleridge that he should undertake to translate *Faust* never received serious

attention from him. During these years Coleridge wrote many newspaper articles and some poems, among them "Fire, Famine and Slaughter," for the *Morning Post* (January 8, 1798). He had vehemently opposed Pitt's policy, but a change came over his way of thought, and he found himself separated from Fox on the question of a struggle with Napoleon. He had lost his admiration for the Revolutionists, as his "Ode to France" shows (*Morning Post*, April 16, 1798). Like many other Whigs, he felt that all questions of domestic policy must at a time of European peril be postponed. From this time, however, his value for the ordered liberty of constitutional government increased; and though never exactly to be found among the ranks of old-fashioned Constitutionalists, during the remainder of his life he kept steadily in view the principles which received their full exposition in his well-known work on *Church and State*. In the year 1800 Coleridge left London for the Lakes. Here in that year he wrote the second part of *Christabel*. In 1803 Southey became a joint lodger with Coleridge at Greta Hall, Keswick, of which in 1812 Southey became sole tenant and occupier.

In 1801 begins the period of Coleridge's life during which, in spite of the evidence of work shown in his compositions, he sank more and more under the dominion of opium, in which he may have first indulged at Cambridge. Few things are so sad to read as the letters in which he details the consequences of his transgression. He was occasionally seen in London during the first years of the century, and wherever he appeared he was the delight of admiring circles. He toured in Scotland with the Wordsworths in 1803, visited Malta in 1804, when for ten months he acted as secretary to the governor, and stayed nearly eight months at Naples and Rome in 1805-1806. In Rome he received a hint that his articles in the *Morning Post* had been brought to Napoleon's notice, and he made the voyage from Leghorn in an American ship. On a visit to Somersetshire in 1807 he met De Quincey for the first time, and the younger man's admiration was shown by a gift of £300, "from an unknown friend." In 1809 he started a magazine called *The Friend*, which continued only for eight months. At the same time Coleridge began to contribute to the *Courier*. In 1808 he lectured at the Royal Institution, but with little success, and two years later he gave his lectures on Shakespeare and other poets. These lectures attracted great attention and were followed by two other series. In 1812 his income from the Wedgwoods was reduced, and he settled the remainder on his wife. His friends were generous in assisting him with money. Eventually Mackintosh obtained a grant of £100 a year for him in 1824 during the lifetime of George IV., as one of the royal associates of the Society of Literature, and at different times he received help principally from Stuart, the publisher, Poole, Sotheby, Sir George Beaumont, Byron and Wordsworth, while his children shared Southey's home at Keswick. But between 1812 and 1817 Coleridge made a good deal by his work, and was able to send money to his wife in addition to the annuity she received. The tragedy of *Remorse* was produced at Drury Lane in 1813, and met with considerable success. Three years after this, having failed to conquer the opium habit, he determined to enter the family of Mr James Gillman, who lived at Highgate. The letter in which he discloses his misery to this kind and thoughtful man gives a real insight into his character. Under judicious treatment the hour of mastery at last arrived. The shore was reached, but the vessel had been miserably shattered in its passage through the rocks. For the rest of his life he hardly ever left his home at Highgate. During his residence there, *Christabel*, written many years before, and known to a favoured few, was first published in a volume with *Kubla Khan* and the *Pains of Sleep* in 1816. He read widely and wisely, in poetry, philosophy and divinity. In 1816 and the following year, he gave his *Lay Sermons* to the world. *Sibylline Leaves* appeared in 1817; the *Biographia Literaria* and a revised edition of *The Friend* soon followed. Seven years afterwards his most popular prose work—*The Aids to Reflection*—first appeared. His last publication, in 1830, was the work on *Church and State*. It was not till 1840 that his *Confessions of an Inquiring Spirit*, by far his most seminal work, was posthumously published. In 1833 he appeared at the meeting of the British Association at Cambridge, but he died in the following year (25th of July 1834), and was buried in the churchyard close to the house of Mr Gillman, where he had enjoyed every consolation which friendship and love could render. Coleridge died in the communion of the Church of England, of whose polity and teaching he had been for many years a loving admirer. An interesting letter to his god-child, written twelve days before his death, sums up his spiritual experience in a most touching form.

Of the extraordinary influence which he exercised in conversation it is impossible to speak fully here. Many of the most remarkable among the younger men of that period resorted to Highgate as to the shrine of an oracle, and although one or two disparaging judgments, such as that of Carlyle, have been recorded, there can be no doubt that since Samuel Johnson there had been no such power in England. His nephew, Henry Nelson Coleridge, gathered together some specimens of the *Table Talk* of the few last years. But remarkable as these are for the breadth of sympathy and extent of reading disclosed, they will hardly convey the



impressions furnished in a dramatic form, as in Boswell's great work. Four volumes of *Literary Remains* were published after his death, and these, along with the chapters on the poetry of Wordsworth in the *Biographia Literaria*, may be said to exhibit the full range of Coleridge's power as a critic of poetry. In this region he stands supreme. With regard to the preface, which contains Wordsworth's theory, Coleridge has honestly expressed his dissent:—"With many parts of this preface, in the sense attributed to them, and which the words undoubtedly seem to authorize, I never concurred; but, on the contrary, objected to them as erroneous in principle, and contradictory (in appearance at least) both to other parts of the same preface, and to the author's own practice in the greater number of the poems themselves." This disclaimer of perfect agreement renders the remaining portion of what he says more valuable. Coleridge was in England the creator of that higher criticism which had already in Germany accomplished so much in the hands of Lessing and Goethe. It is enough to refer here to the fragmentary series of his Shakespearian criticisms, containing evidence of the truest insight, and a marvellous appreciation of the judicial "sanity" which raises the greatest name in literature far above even the highest of the poets who approached him.

As a poet Coleridge's own place is safe. His niche in the great gallery of English poets is secure. Of no one can it be more emphatically said that at his highest he was "of imagination all compact." He does not possess the fiery pulse and humaneness of Burns, but the exquisite perfection of his metre and the subtle alliance of his thought and expression must always secure for him the warmest admiration of true lovers of poetic art. In his early poems may be found traces of the fierce struggle of his youth. The most remarkable is the *Monody on the Death of Chatterton* and the *Religious Musings*. In what may be called his second period, the ode entitled *France*, considered by Shelley the finest in the language, is most memorable. The whole soul of the poet is reflected in the *Ode to Dejection*. The well-known lines—

"O Lady! we receive but what we give,  
And in our life alone does nature live;  
Ours is her wedding garment, ours her shroud,"

with the passage which follows, contain more vividly, perhaps, than anything which Coleridge has written, the expression of the shaping and colouring function which he assigns, in the *Biographia Literaria*, to imagination. *Christabel* and the *Ancient Mariner* have so completely taken possession of the highest place, that it is needless to do more than allude to them. The supernatural has never received such treatment as in these two wonderful productions of his genius, and though the first of them remains a torso, it is the loveliest torso in the gallery of English literature. Although Coleridge had, for many years before his death, almost entirely forsaken poetry, the few fragments of work which remain, written in later years, show little trace of weakness, although they are wanting in the unearthly melody which imparts such a charm to *Kubla Khan*, *Love* and *Youth and Age*.

(G. D. B.; H. Ch.)

In the latter part of his life, and for the generation which followed, Coleridge was ranked by many young English churchmen of liberal views as the greatest religious thinker of their time. As Carlyle has told in his *Life of Sterling*, the poet's distinction, in the eyes of the younger churchmen with philosophic interests, lay in his having recovered and preserved his Christian faith after having passed through periods of rationalism and Unitarianism, and faced the full results of German criticism and philosophy. His opinions, however, were at all periods somewhat mutable, and it would be difficult to state them in any form that would hold good for the whole even of his later writings. He was, indeed, too receptive of thought impressions of all kinds to be a consistent systematizer. As a schoolboy, by his own account, he was for a time a Voltairean, on the strength of a perusal of the *Philosophical Dictionary*. At college, as we have seen, he turned Unitarian. From that position he gradually moved towards pantheism, a way of thought to which he had shown remarkable leanings when, as a schoolboy, he discoursed of Neo-Platonism to Charles Lamb, or—if we may trust his recollection—translated the hymns of Synesius. Early in life, too, he met with the doctrines of Jacob Behmen, of whom, in the *Biographia Literaria*, he speaks with affection and gratitude as having given him vital philosophic guidance. Between pantheism and Unitarianism he seems to have balanced till his thirty-fifth year, always tending towards the former in virtue of the recoil from "anthropomorphism" which originally took him to Unitarianism. In 1796, when he named his first child David Hartley, but would not have him baptized, he held by the "Christian materialism" of the writer in question, whom in his *Religious Musings* he terms "wisest of mortal kind."

When, again, he met Wordsworth in 1797, the two poets freely and sympathetically

discussed Spinoza, for whom Coleridge always retained a deep admiration; and when in 1798 he gave up his Unitarian preaching, he named his second child Berkeley, signifying a new allegiance, but still without accepting Christian rites otherwise than passively. Shortly afterwards he went to Germany, where he began to study Kant, and was much captivated by Lessing. In the *Biographia* he avows that the writings of Kant "more than any other work, at once invigorated and disciplined my understanding"; yet the gist of his estimate there is that Kant left his system undeveloped, as regards his idea of the Noumenon, for fear of orthodox persecution—a judgment hardly compatible with any assumption of Kant's Christian orthodoxy, which was notoriously inadequate. But after his stay at Malta, Coleridge announced to his friends that he had given up his "Socinianism" (of which ever afterwards he spoke with asperity), professing a return to Christian faith, though still putting on it a mystical construction, as when he told Crabb Robinson that "Jesus Christ was a Platonic philosopher." At this stage he was much in sympathy with the historico-rationalistic criticism of the Old Testament, as carried on in Germany; giving his assent, for instance, to the naturalistic doctrine of Schiller's *Die Sendung Moses*. From about 1810 onwards, however, he openly professed Christian orthodoxy, while privately indicating views which cannot be so described. And even his published speculations were such as to draw from J. H. Newman a protest that they took "a liberty which no Christian can tolerate," and carried him to "conclusions which were often heathen rather than Christian." This would apply to some of his positions concerning the Logos and the Trinity. After giving up Unitarianism he claimed that from the first he had been a Trinitarian on Platonic lines; and some of his latest statements of the doctrine are certainly more pantheistic than Christian.

The explanation seems to be that while on Christian grounds he repeatedly denounced pantheism as being in all its forms equivalent to atheism, he was latterly much swayed by the thought of Schelling in the pantheistic direction which was natural to him. To these conflicting tendencies were probably due his self-contradictions on the problem of original sin and the conflicting claims of feeling and reason. It would seem that, in the extreme spiritual vicissitudes of his life, conscious alternately of personal weakness and of the largest speculative grasp, he at times threw himself entirely on the consolations of evangelical faith, and at others reconstructed the cosmos for himself in terms of Neo-Platonism and the philosophy of Schelling. So great were his variations even in his latter years, that he could speak to his friend Allsop in a highly latitudinarian sense, declaring that in Christianity "the miracles are supererogatory," and that "the law of God and the great principles of the Christian religion would have been the same had Christ never assumed humanity."

From Schelling, whom he praised as having developed Kant where Fichte failed to do so, he borrowed much and often, not only in the metaphysical sections of the *Biographia* but in his aesthetic lectures, and further in the cosmic speculations of the posthumous *Theory of Life*. On the first score he makes but an equivocal acknowledgment, claiming to have thought on Schelling's lines before reading him; but it has been shown by Hamilton and Ferrier that besides transcribing much from Schelling without avowal he silently appropriated the learning of Maass on philosophical history. In other directions he laid under tribute Herder and Lessing; yet all the while he cast severe imputations of plagiarism upon Hume and others. His own plagiarisms were doubtless facilitated by the physiological effects of opium.

Inasmuch as he finally followed in philosophy the mainly poetical or theosophic movement of Schelling, which satisfied neither the logical needs appealed to by Hegel nor the new demand for naturalistic induction, Coleridge, after arousing a great amount of philosophic interest in his own country in the second quarter of the century, has ceased to "make a school." Thus his significance in intellectual history remains that of a great stimulator. He undoubtedly did much to deepen and liberalize Christian thought in England, his influence being specially marked in the school of F. D. Maurice, and in the lives of men like John Sterling. And even his many borrowings from the German were assimilated with a rare power of development, which bore fruit not only in a widening of the field of English philosophy but in the larger scientific thought of a later generation.

(J. M. Ro.)

Of Coleridge's four children, two (Hartley and Sara) are separately noticed. His second child, Berkeley, died when a baby. The third, Derwent (1800-1883), a distinguished scholar and author, was master of Helston school, Cornwall (1825-1841), first principal of St Mark's College, Chelsea (1841-1864), and rector of Hanwell (1864-1880); and his daughter Christabel (b. 1843) and son Ernest Hartley (b. 1846) both became well known in the world of letters, the former as a novelist, the latter as a biographer and critic.

After Coleridge's death several of his works were edited by his nephew, Henry Nelson Coleridge, the husband of Sara, the poet's only daughter. In 1847 Sara Coleridge published the *Biographia Literaria*, enriched with annotations and biographical supplement from her own pen. Three volumes of political writings, entitled *Essays on his Own Times*, were also published by Sara Coleridge in 1850. The standard life of Coleridge is that by J. Dykes Campbell (1894); his letters were edited by E. H. Coleridge.

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**COLERIDGE, SARA** (1802-1852), English author, the fourth child and only daughter of Samuel Taylor Coleridge and his wife Sarah Fricker of Bristol, was born on the 23rd of December 1802, at Greta Hall, Keswick. Here, after 1803, the Coleridges, Southey and his wife (Mrs Coleridge's sister), and Mrs Lovell (another sister), widow of Robert Lovell, the Quaker poet, all lived together; but Coleridge was often away from home; and "Uncle Southey" was a *pater familias*. The Wordsworths at Grasmere were their neighbours. Wordsworth, in his poem, the *Triad*, has left us a description, or "poetical glorification," as Sara Coleridge calls it, of the three girls—his own daughter Dora, Edith Southey and Sara Coleridge, the "last of the three, though eldest born." Greta Hall was Sara Coleridge's home until her marriage; and the little Lake colony seems to have been her only school. Guided by Southey, and with his ample library at her command, she read by herself the chief Greek and Latin classics, and before she was five-and-twenty had learnt French, German, Italian and Spanish.

In 1822 Sara Coleridge published *Account of the Abipones*, a translation in three large volumes of Dobrizhoffer, undertaken in connexion with Southey's *Tale of Paraguay*, which had been suggested to him by Dobrizhoffer's volumes; and Southey alludes to his niece, the translator (canto iii. stanza 16), where he speaks of the pleasure the old missionary would have felt if

"... he could in Merlin's glass have seen  
By whom his tomes to speak our tongue were taught."

In less grandiloquent terms, Charles Lamb, writing about the *Tale of Paraguay* to Southey in 1825, says, "How she Dobrizhoffer'd it all out, puzzles my slender Latinity to conjecture." In 1825 her second work appeared, a translation from the medieval French of the "Loyal Serviteur," *The Right Joyous and Pleasant History of the Feats, Jestes, and Prowesses of the Chevalier Bayard, the Good Knight without Fear and without Reproach: By the Loyal Servant*.

In September 1829 at Crosthwaite church, Keswick, after an engagement of seven years' duration, Sara Coleridge was married to her cousin, Henry Nelson Coleridge (1798-1843), younger son of Captain James Coleridge (1760-1836). He was then a chancery barrister in London. The first eight years of her married life were spent in a little cottage in Hampstead. There four of her children were born, of whom two survived. In 1834 Mrs Coleridge published her *Pretty Lessons in Verse for Good Children; with some Lessons in Latin in Easy Rhyme*. These were originally written for the instruction of her own children, and became very popular. In 1837 the Coleridges removed to Chester Place, Regent's Park; and in the same year appeared *Phantasmion, a Fairy Tale*, Sara Coleridge's longest original work. The songs in *Phantasmion* were much admired at the time by Leigh Hunt and other critics. Some of them, such as "Sylvan Stay" and "One Face Alone," are extremely graceful and musical, and the whole fairy tale is noticeable for the beauty of the story and the richness of its language.

In 1843 Henry Coleridge died, leaving to his widow the unfinished task of editing her father's works. To these she added some compositions of her own, among which are the *Essay on Rationalism, with a special application to the Doctrine of Baptismal Regeneration*, appended to Coleridge's *Aids to Reflection*, a Preface to the *Essays on his Own Times*, by S. T. Coleridge, and the Introduction to the *Biographia Literaria*. During the last few years of her life Sara Coleridge was a confirmed invalid. Shortly before she died she amused herself by writing a little autobiography for her daughter. This, which reaches only to her ninth year, was completed by her daughter, and published in 1873, together with some of her letters, under the title *Memoirs and Letters of Sara Coleridge*. The letters show a cultured

and highly speculative mind. They contain many apt criticisms of known people and books, and are specially interesting for their allusions to Wordsworth and the Lake Poets. Sara Coleridge died in London on the 3rd of May 1852.

Her son, Herbert Coleridge (1830-1861), won a double first class in classics and mathematics at Oxford in 1852. He was secretary to a committee appointed by the Philological Society to consider the project of a standard English dictionary, a scheme of which the *New English Dictionary*, published by the Clarendon Press, was the ultimate outcome. His personal researches into the subject were contained in his *Glossarial Index to the Printed English Literature of the Thirteenth Century* (1859).

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**COLET, JOHN** (1467?-1510), English divine and educationist, the eldest son of Sir Henry Colet (lord mayor of London 1486 and 1495), was born in London about 1467. He was educated at St Anthony's school and at Magdalen College, Oxford, where he took the M.A. degree in 1490. He already held the non-resident rectory of Dennington, Suffolk, and the vicarage of St Dunstan's, Stepney, and was now collated rector of Thurning, Hunts. In 1493 he went to Paris and thence to Italy, studying canon and civil law, patristics and the rudiments of Greek. During his residence abroad he became acquainted with Budaeus (Guillaume Budé) and Erasmus, and with the teaching of Savonarola. On his return to England in 1496 he took orders and settled at Oxford, where he lectured on the epistles of St Paul, replacing the old scholastic method of interpretation by an exegesis more in harmony with the new learning. His methods did much to influence Erasmus, who visited Oxford in 1498, and in after years Erasmus received an annuity from him. Since 1494 he had been prebendary of York, and canon of St Martin le Grand, London. In 1502 he became prebendary of Salisbury, in 1505 prebendary of St Paul's, and immediately afterwards dean of the same cathedral, having previously taken the degree of doctor of divinity. Here he continued his practice of lecturing on the books of the Bible; and he soon afterwards established a perpetual divinity lecture, on three days in each week, in St Paul's church. About the year 1508, having inherited his father's large wealth, Colet formed his plan for the re-foundation of St Paul's school, which he completed in 1512, and endowed with estates of an annual value of £122 and upwards. The celebrated grammarian William Lilly was the first master, and the company of mercers were (in 1510) appointed trustees, the first example of non-clerical management in education. The dean's religious opinions were so much more liberal than those of the contemporary clergy (whose ignorance and corruption he denounced) that they deemed him little better than a heretic; but William Warham, the archbishop, refused to prosecute him. Similarly Henry VIII. held him in high esteem despite his sermons against the French wars. In 1514 he made the Canterbury pilgrimage, and in 1515 preached at Wolsey's installation as cardinal. Colet died of the sweating sickness on the 16th of September 1519. He was buried on the south side of the choir of St Paul's, where a stone was laid over his grave, with no other inscription than his name. Besides the preferments above mentioned, he was rector of the guild of Jesus at St Paul's and chaplain to Henry VIII.

Colet, though never dreaming of a formal breach with the Roman Church, was a keen reformer, who disapproved of auricular confession, and of the celibacy of the clergy. Though no great scholar or writer, he was a powerful force in the England of his day, and helped materially to disintegrate the medieval conditions still obtaining, and to introduce the humanist movement. Among his works, which were first collectively published in 1867-1876, are *Absolutissimus de octo orationis partium constructione libellus* (Antwerp, 1530), *Rudimenta Grammatices* (London, 1539), *Daily Devotions*, *Monition to a Godly Life*, *Epistolae ad Erasmus*, and commentaries on different parts of the Bible.

See F. Seebohm, *The Oxford Reformers*; J. H. Lupton, *Life of John Colet* (1887); art. in *The Times*, July 7, 1909.

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**COLET, LOUISE** (1810-1876), French poet and novelist, was born at Aix of a Provençal

family named Revoil, on the 15th of September 1810. In 1835 she came to Paris with her husband Hippolyte Colet (1808-1851), a composer of music and professor of harmony and counterpoint at the conservatoire. In 1836 appeared her *Fleurs du Midi*, a volume of verse, of liberal tendency, followed by *Penserosa* (1839), a second volume of verse; by *La Jeunesse de Goethe* (1839), a one-act comedy; by *Les Cœurs brisés* (1843), a novel; *Les Funerailles de Napoléon* (1840), a poem, and *La Jeunesse de Mirabeau* (1841), a novel. Her works were crowned five or six times by the Institute, a distinction which she owed, however, to the influence of Victor Cousin rather than to the quality of her work. The criticisms on her books and on the prizes conferred on her by the Academy exasperated her; and in 1841 Paris was diverted by her attempted reprisals on Alphonse Karr for certain notices in *Les Guêpes*. In 1849 she had to defend an action brought against her by the heirs of Madame Récamier, whose correspondence with Benjamin Constant she had published in the columns of the *Presse*. She produced a host of writings in prose and verse, but she is perhaps best known for her intimate connexion with some of her famous contemporaries, Abel Villemain, Gustave Flaubert and Victor Cousin. Only one of her books is now of interest—*Lui: roman contemporain* (1859), the novel in which she told the story of her life. She died on the 8th of March 1876.

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**COLEUS**, a genus of herbaceous or shrubby plants belonging to the natural order Labiatae, chiefly natives of the tropics. They are very ornamental plants, the colour of their leaves being exceedingly varied, and often very brilliant. They are of the easiest culture. The cuttings of young shoots should be propagated every year, about March, being planted in thumb pots, in sandy loam, and placed in a close temperature of 70°. After taking root shift into 6-in. pots, using ordinary light loamy compost, containing abundance of leaf-mould and sand, and keeping them near the light. They may be passed on into larger pots as often as required, but 8-in. pots will be large enough for general purposes, as they can be fed with liquid manure. The young spring-struck plants like a warm growing atmosphere, but by midsummer they will bear more air and stand in a greenhouse or conservatory. They should be wintered in a temperature of 60° to 65°. The stopping of the young shoots must be regulated by the consideration whether bushy or pyramidal plants are desired. Some of the varieties are half-hardy and are used for summer bedding.

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**COLFAX, SCHUYLER** (1823-1885), American political leader, vice-president of the United States from 1869 to 1873, was born in New York city on the 23rd of March 1823. His father died before the son's birth, and his mother subsequently married a Mr Matthews. The son attended the public schools of New York until he was ten, and then became a clerk in his step-father's store, removing in 1836 with his mother and step-father to New Carlisle, Indiana. In 1841 he removed to South Bend, where for eight years he was deputy auditor (his step-father being auditor) of St Joseph county; in 1842-1844 he was assistant enrolling clerk of the state senate and senate reporter for the *Indiana State Journal*. In 1845 he established the *St Joseph Valley Register*, which he published for eighteen years and made an influential Whig and later Republican journal. In 1850 he was a member of the state constitutional convention, and in 1854 took an active part in organizing the "Anti-Nebraska men" (later called Republicans) of his state, and was by them sent to Congress. Here he served with distinction from 1855 until 1869, the last six years as speaker of the House. At the close of the Civil War he was a leading member of the radical wing of the Republican party, advocating the disfranchisement of all who had been prominent in the service of the Confederacy, and declaring that "loyalty must govern what loyalty has preserved." In 1868 he had presidential aspirations, and was not without supporters. He accepted, however, the Republican nomination as vice-president on a ticket headed by General Grant, and was elected; but he failed in 1872 to secure renomination. During the political campaign of 1872 he was accused, with other prominent politicians, of being implicated in corrupt transactions with the *Crédit Mobilier*, and a congressional investigation brought out the fact that he had agreed to take twenty shares from this concern, and had received dividends amounting to

\$1200. It also leaked out during the investigation that he had received in 1868, as a campaign contribution, a gift of \$4000 from a contractor who had supplied the government with envelopes while Colfax was chairman of the post office committee of the House. At the close of his term Colfax returned to private life under a cloud, and during the remainder of his lifetime earned a livelihood by delivering popular lectures. He died at Mankato, Minnesota, on the 13th of January 1885.

See J. C. Hollister's *Life of Schuyler Colfax* (New York, 1886).

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**COLIC** (from the Gr. κόλον or κῶλον, the large intestine), a term in medicine of very indefinite meaning, used by physicians outside England for any paroxysmal abdominal pain, but generally limited in England to a sudden sharp pain having its origin in the pelvis of the kidney, the ureter, gall-bladder, bile-ducts or intestine. Thus it is customary to speak of renal, biliary or intestinal colic. There is a growing tendency, however, among professional men of to-day, to restrict the use of the word to a pain produced by the contraction of the muscular walls of any of the hollow viscera of which the aperture has become more or less occluded, temporarily or otherwise. For renal and biliary colic, see the articles [KIDNEY DISEASES](#) and [LIVER](#), only intestinal colic being treated in this place.

In infants, usually those who are "bottle-fed," colic is exceedingly common, and is shown by the drawing up of their legs, their restlessness and their continuous cries.

Among adults one of the most serious causes is that due to lead-poisoning and known as lead colic (*Syn.* painters' colic, *colica Pictonum*, Devonshire colic), from its having been clearly ascertained to be due to the absorption of lead into the system (see [LEAD-POISONING](#)). This disease had been observed and described long before its cause was discovered. Its occurrence in an epidemic form among the inhabitants of Poitou was recorded by François Citois (1572-1652) in 1617, under the title of *Novus et popularis apud Pictones dolor colicus biliosus*. The disease was thereafter termed *colica Pictonum*. It was supposed to be due to the acidity of the native wines, but it was afterwards found to depend on lead contained in them. A similar epidemic broke out in certain parts of Germany in the end of the 17th century, and was at the time believed by various physicians to be caused by the admixture of acid wines with litharge to sweeten them.

About the middle of the 18th century this disease, which had long been known to prevail in Devonshire, was carefully investigated by Sir George Baker (1722-1809), who succeeded in tracing it unmistakably to the contamination of the native beverage, cider, with lead, either accidentally from the leadwork of the vats and other apparatus for preparing the liquor, or from its being sweetened with litharge.

In Germany a similar colic resulting from the absorption of copper occurs, but it is almost unknown in England.

The simplest form of colic is that arising from habitual constipation, the muscular wall of the intestines contracting painfully to overcome the resistance of hardened scybalous masses of faeces, which cause more or less obstruction to the onward passage of the intestinal contents. Another equally common cause is that due to irritating or indigestible food such as apples, pears or nuts, heavy pastry, meat pies and puddings, &c. It may then be associated with either constipation or diarrhoea, though the latter is the more common. It may result from any form of enteritis as simple, mucous and ulcerative colitis, or an intestinal malignant growth. The presence of *ascaris lumbricoides* may, by reflex action, set up a very painful nervous spasm; and certain forms of influenza (*q.v.*) are ushered in by colic of a very pronounced type. Many physicians describe a rheumatic colic due to cold and damp, and among women disease of the pelvic organs may give rise to an exactly similar pain. There are also those forms of colic which must be classed as functional or neuralgic, though this view of the case must never be accepted until every other possible cause is found to be untenable. From this short account of a few of the commoner causes of the trouble, it will be clear that colic is merely a symptom of disease, not a disease in itself, and that no diagnosis has been made until the cause of the pain has been determined.

Intestinal colic is paroxysmal, usually both beginning and ending suddenly. The pain is generally referred to the neighbourhood of the umbilicus, and may radiate all over the

abdomen. It varies in intensity from a slight momentary discomfort to a pain so severe as to cause the patient to shriek or even to break out into a cold clammy sweat. It is usually relieved by pressure, and this point is one which aids in the differential diagnosis between a simple colic and peritonitis, the pain of the latter being increased by pressure. But should the colic be due to a malignant growth, or should the intestines be distended with gas, pressure will probably increase the pain. The temperature is usually subnormal, but may be slightly raised, and the pulse is in proportion.

In the treatment of simple colic the patient must be confined to bed, hot fomentations applied to the abdomen and a purge administered, a few drops of laudanum being added when the pain is exceptionally severe. But the whole difficulty lies in making the differential diagnosis. Acute intestinal obstruction (ileus) begins just as an attack of simple colic, but the rapid increase of illness, frequent vomiting, anxious countenance, and still more the condition of the pulse, warn a trained observer of the far more serious state. Appendicitis and peritonitis, as also the gastric crises of locomotor ataxy, must all be excluded.

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**COLIGNY, GASPARD DE** (1519-1572), admiral of France and Protestant leader, came of a noble family of Burgundy, who traced their descent from the 11th century, and in the reign of Louis XI. were in the service of the king of France. His father, Gaspard de Coligny, known as the *maréchal de Châtillon* (d. 1522), served in the Italian wars from 1495 to 1515, and was created marshal of France in 1516. By his wife, Louise de Montmorency, sister of the future constable, he had three sons: Odet, cardinal de Châtillon; Gaspard, the admiral; and Francis, seigneur d'Andelot; all of whom played an important part in the first period of the wars of religion. At twenty-two young Gaspard came to court, and there contracted a friendship with Francis of Guise. In the campaign of 1543 Coligny distinguished himself greatly, and was wounded at the sieges of Montmédy and Bains. In 1544 he served in the Italian campaign under the duke of Enghien, and was knighted on the field of Ceresole. Returning to France, he took part in different military operations; and having been made colonel-general of the infantry (April 1547), exhibited great capacity and intelligence as a military reformer. He was made admiral on the death of d'Annebaut (1552). In 1557 he was entrusted with the defence of Saint Quentin. In the siege he displayed great courage, resolution, and strength of character; but the place was taken, and he was imprisoned in the stronghold of L'Ecluse. On payment of a ransom of 50,000 crowns he recovered his liberty. But he had by this time become a Huguenot, through the influence of his brother, d'Andelot—the first letter which Calvin addressed to him is dated the 4th of September 1558—and he busied himself secretly with protecting his co-religionists, a colony of whom he sent to Brazil, whence they were afterwards expelled by the Portuguese.

On the death of Henry II. he placed himself, with Louis, prince of Condé, in the front of his sect, and demanded religious toleration and certain other reforms. In 1560, at the Assembly of Notables at Fontainebleau, the hostility between Coligny and Francis of Guise broke forth violently. When the civil wars began in 1562, Coligny decided to take arms only after long hesitation, and he was always ready to negotiate. In none of these wars did he show superior genius, but he acted throughout with great prudence and extraordinary tenacity; he was "le héros de la mauvaise fortune." In 1569 the defeat and death of the prince of Condé at Jarnac left him sole leader of the Protestant armies. Victorious at Arnay-le-Duc, he obtained in 1570 the pacification of St Germain. Returning to the court in 1571, he grew rapidly in favour with Charles IX. As a means of emancipating the king from the tutelage of his mother and the faction of the Guises, the admiral proposed to him a descent on Spanish Flanders, with an army drawn from both sects and commanded by Charles in person. The king's regard for the admiral, and the bold front of the Huguenots, alarmed the queen-mother; and the massacre of St Bartholomew was the consequence. On the 22nd of August 1572 Coligny was shot in the street by Maurevel, a bravo in the pay of the queen-mother and Guise; the bullets, however, only tore a finger from his right hand and shattered his left elbow. The king visited him, but the queen-mother prevented all private intercourse between them. On the 24th of August, the night of the massacre, he was attacked in his house, and a servant of the duke of Guise, generally known as Besme, slew him and cast him from a window into the courtyard at his master's feet. His papers were seized and burned by the queen-mother; among them, according to Brantôme, was a history of the civil war, "très-beau et tres-bien fait, et digne d'estre imprimé."

By his wife, Charlotte de Laval, Coligny had several children, among them being Louise, who married first Charles de Téliigny and afterwards William the Silent, prince of Orange, and Francis, admiral of Guienne, who was one of the devoted servants of Henry IV. Gaspard de Coligny (1584-1646), son of Francis, was marshal of France during the reign of Louis XIII.

See Jean du Bouchet, *Preuves de l'histoire généalogique de l'illustre maison de Coligny* (Paris, 1661); biography by François Hotman, 1575 (French translation, 1665); L. J. Delaborde, *Gaspard de Coligny* (1879-1882); Erich Marcks, *Gaspard von Coligny, sein Leben und das Frankreich seiner Zeit* (Stuttgart, 1892); H. Patry, "Coligny et la Papauté," in the *Bulletin du protestantisme français* (1902); A. W. Whitehead, *Gaspard de Coligny, Admiral of France* (1904); and C. Merki, *L'Amiral de Coligny* (1909).

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**COLIMA**, a small Pacific coast state of Mexico, lying between Jalisco on the N.W. and N., and Michoacan on the E. Including the Revilla Gigédo islands its area is only 2272 sq. m., which thus makes it the second smallest of the Mexican states. Pop. (1895) 55,264; (1900) 65,115. The larger part of its territory is within the narrow, flat coastal plain, beyond which it rises toward the north-east into the foothills of the Sierra Madre, the higher masses of the range, including the Colima volcano, lying outside the state. It is drained by the America and Coahuayana rivers and their affluents, which are largely used for irrigation. There are tidewater lagoons and morasses on the coast which accentuate its malarious character. One of the largest of these, Cuitlán, immediately south of Manzanillo, is the centre of a large salt-producing industry. The soil is generally fertile and productive, but lack of transportation facilities has been a serious obstacle to any production greatly exceeding local demands. The dry and rainy seasons are sharply defined, the rainfall being abundant in the latter. The climate is hot, humid and malarious, becoming drier and healthier on the higher mountain slopes of the interior. Stock-raising is an important industry in the higher parts of the state, but the horses, mules and cattle raised have been limited to local demands. Agriculture, however, is the principal occupation of the state, the more important products being sugar, rice, Indian corn, palm oil, coffee, indigo, cotton and cacao. The production of cacao is small, and that of indigo and cotton is declining, the latter being limited to the requirements of small local mills. There are two crops of Indian corn a year, but sugar and rice are the principal crops. The "Caracolillo" coffee, produced on the slopes of the mountains culminating in the volcano of Colima, is reputed the best in Mexico, and the entire crop (about 506,000  $\text{lb.}$  in 1906) is consumed in the country at a price much above other grades. There are important mineral deposits in the state, including iron, copper and lead, but mining enterprise has made no progress through lack of transportation facilities. Salt is made on the coast and shipped inland, and palm-leaf hats are manufactured and exported. Hides and deerskins are also exported in large quantities. A narrow-gauge railway has been in operation between the capital and Manzanillo for many years, and in 1907 a branch of the Mexican Central was completed between Guadalajara and the capital, and the narrow-gauge line to the coast was widened to the standard gauge. The chief cities of the state are the capital Colima, Manzanillo, Comala (the second largest town in the state), 5 m. from the capital, with which it is connected by an electric railway, Ixtlahuacan Coquimatlan and Almolyan.

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**COLIMA**, a city of Mexico and capital of a state of the same name, 570 m. (direct) W. by S. of Mexico City and about 36 m. inland from the Pacific coast. Pop. (1895) 18,977; (1900) 20,698. Colima is picturesquely situated on the Colima river, in a large fertile valley about 1650 ft. above the sea, and lies in the midst of fine mountain-scenery. About 30 m. to the north-east the volcano of Colima, in the state of Jalisco, rises to an elevation of 12,685 ft.; it is the most westerly of the active volcanoes of Mexico. Colima enjoys a moderately cool and healthy climate, especially in the dry season (November to June). The city is regularly laid out and is in great part well built, with good public buildings, several churches, a theatre, two hospitals, and a handsome market completed in 1905. Tramways connect the central



plaza with the railway station, cemetery, and the suburb of Villa de Alvarez, 2½ m. distant, and an extension of 5 m. was projected in 1906 to Comala. The local industries include two old-fashioned cotton mills, an ice plant, corn-grinding mill, and five cigarette factories. Colima is the commercial centre for a large district, but trade has been greatly restricted by lack of transportation facilities. A railway connects with the port of Manzanillo, and the Mexican Central railway serves Colima itself. Colima was founded in 1522 by Gonzalo de Sandoval. It has not played a very prominent part in Mexican history because of its inaccessibility, and for the same reason has suffered less from revolutionary violence.

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**COLIN, ALEXANDRE** (1526-1612), Flemish sculptor, was born at Malines. In 1563 he went, at the invitation of the emperor Ferdinand I., to Innsbruck, to work on the magnificent monument which was being erected to Maximilian I. in the nave of the Franciscan church. Of the twenty-four marble *alti-rilievi*, representing the emperor's principal acts and victories, which adorn the sides of this tomb, twenty were executed by Colin, apparently in three years. The work displays a remarkable combination of liveliness and spirit with extreme care and finish, its delicacy rivalling that of a fine cameo. Thorwaldsen is said to have pronounced it the finest work of its kind. Colin, who was sculptor in ordinary both to the emperor and to his son, the archduke Ferdinand of Tirol, did a great deal of work for his patrons at Innsbruck and in its neighbourhood; particular mention may be made of the sepulchres of the archduke and his first wife, Philippine Welser, both in the same church as the Maximilian monument, and of Bishop Jean Nas. His tomb in the cemetery at Innsbruck bears a fine bas-relief executed by one of his sons.

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**COLL**, an island of the Inner Hebrides, Argyllshire, Scotland. Pop. (1901) 432. It is situated about 7 m. west of Caliach Point in Mull, and measures 12 m. from N.E. to S.W., with a breadth varying from ¾ m. to 4 m. It is composed of gneiss, is generally rather flat, save in the west where Ben Hogh reaches a height of 339 ft., and has several lakes. The pasturage is good and the soil fairly fertile. Much dairy produce is exported, besides sheep and cattle. The antiquities include stone circles, duns, the ruins of Breachacha Castle, once a fortress of the Lords of the Isles. A steamer from Oban calls regularly at Arinagour.

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**COLLAERT, HANS**, Flemish engraver, son of Adrian Collaert, a draughtsman and engraver of repute, was born at Antwerp about 1545. After working some years in his father's studio, he went to Rome to perfect himself in his art. His engravings after Rubens are very highly esteemed. He left many works; among the best may be mentioned a "Life of Saint Francis," 16 prints; a "Last Judgment," folio; "Monilium, Bullarum, Inauriumque Artificiosissimae Icones," 10 prints, 1581; "The Dead Christ in his Mother's Lap"; "Marcus Curtius"; "Moses Striking the Rock," and "The Resurrection of Lazarus," after Lambert Lombard; "The Fathers of the Desert"; and "Biblia Sacra and the History of the Church," after Rubens.

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**COLLAR**, something worn or fastened round the neck (Lat. *collare*, from *collum*, neck), particularly a band of linen, lace or other material, which, under various shapes at different periods, has been worn by men and women to serve as a completion or finish to the

neckband of a garment (see [COSTUME](#)); also a chain, worn as a personal ornament, a badge of livery, a symbol of office, or as part of the insignia of an order of knighthood, an application of the term with which the present article deals. The word is also applied to that part of the draught-harness of a horse which fits over the animal's neck, to which the traces are attached, and against which the strain of the drawing of the vehicle is exercised, and to a circular piece of metal passed round the joints of a rod or pipe, to prevent movement or to make the joint steam- or water-tight.

Necklaces with beads and jewels threaded thereon or the plain laces with a hanging ornament are among the common braveries of all times and countries. From these come the collar and the neck-chain. Torques or twisted collars of metal are found in burying-places of the barbarous people of northern Europe. British chiefs wore them, and gold torques were around the necks of the leaders of the first of the Saxon invaders of Britain, among whose descendants, however, the fashion seems to have languished. Edward the Confessor was buried with a neck-chain of gold 2 ft. long, fastened with a jewelled locket and carrying an enamelled crucifix.

The extravagant age of Richard II. saw a great revival of the neck-chain, heavy links twisted of gold or silver. From this time onward neck chains, with or without pendant devices, were commonly worn by men and women of the richer sort. The men abandoned them in the time of Charles I.

Closely allied to the chain are the livery collars which appeared in the 14th century, worn by those who thus displayed their alliances or their fealty. Thus Charles V. of France in 1378 granted to his chamberlain Geoffrey de Belleville the right of bearing in all feasts and in all companies the collar of the *Cosse de Geneste* or Broomcod, a collar which was accepted and worn even by the English kings, Charles VI. sending such collars to Richard II. and to his three uncles. This French collar, a chain of couples of broom-cods linked by jewels, is seen in the contemporary portrait of Richard II. at Wilton. The like collar was worn by Henry IV. on the way to his crowning. During the sitting of the English parliament in 1394 the complaints of the earl of Arundel against Richard II. are recorded, one of his grievances being that the king was wont to wear the livery of the collar of the duke of Lancaster, his uncle, and that people of the king's following wore the same livery. To which the king answered that soon after the return from Spain (in 1389) of his uncle, the said duke, he himself took the collar from his uncle's neck, putting it on his own, which collar the king would wear and use for a sign of the good and whole-hearted love between them, even as he wore the liveries of his other uncles. Livery collars of the king of France, of Queen Anne and of the dukes of York and Lancaster are numbered with the royal plate and jewels which in the first year of Henry IV. had come to the king's hands. The inventory shows that Queen Anne's collar was made up of sprigs of rosemary garnished with pearls. The York collar had falcons and fetterlocks, and the Lancaster collar was doubtless that collar of Esses (or S S) used by the duke's son, Henry of Bolingbroke, as an earl, duke and king. This famous livery collar, which has never passed out of use, takes many forms, its Esses being sometimes linked together chainwise, and sometimes, in early examples, bestowed as the ornamental bosses of a garter-shaped strap-collar. The oldest effigy bearing it is that in Spratton church of Sir John Swinford, who died in 1371. Swinford was a follower of John of Gaunt, and the date of his death easily disposes of the fancy that the Esses were devised by Henry IV. to stand for his motto or "word" of *Soverayne*. Many explanations are given of the origin of these letters, but none has as yet been established with sufficient proof. During the reigns of Henry IV., his son and grandson, the collar of Esses was a royal badge of the Lancastrian house and party, the white swan being its pendant. In one of Henry VI.'s own collars the S was joined to the Broomcod of the French device, thus symbolizing the king's claim to the two kingdoms.

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The kings of the house of York and their chief followers wore the Yorkist collar of suns and roses, with the white lion of March, the Clare bull, or Richard's white boar for a pendant device. Henry VII. brought back the collar of Esses, a portcullis or a rose hanging from it, although in a portrait of this king, now possessed by the Society of Antiquaries, his neck bears the *rose en soleil* alternating with knots, and his son, when young, had a collar of roses red and white. Besides these royal collars, the 14th and 15th centuries show many of private devices. A brass at Mildenhall shows a knight whose badge of a dog or wolf circled by a crown hangs from a collar with edges suggesting a pruned bough or the ragged staff. Thomas of Markenfield (d. c. 1415) on his brass at Ripon has a strange collar of park palings with a badge of a hart in a park, and the Lord Berkeley (d. 1392) wears one set with mermaids.

Collars of various devices are now worn by the grand crosses of the European orders of knighthood. The custom was begun by Philip of Burgundy, who gave his knights of the

Golden Fleece, an order founded on the 10th of February 1429-1430, badges of a golden fleece hung from that collar of flints, steels and sparks which is seen in so many old Flemish portraits. To this day it remains the most beautiful of all the collars, keeping in the main the lines of its Flemish designer, although a vulgar fancy sometimes destroys the symbolism of the golden fleece by changing it for an unmeaning fleece of diamonds. Following this new fashion, Louis XI. of France, when instituting his order of St Michael in 1469, gave the knights collars of scallop shells linked on a chain. The chain was doubled by Charles VIII., and the pattern suffered other changes before the order lapsed in 1830. Until the reign of Henry VIII., the Garter, most ancient of the great knightly orders, had no collar. But the Tudor king must needs match in all things with continental sovereigns, and the present collar of the Garter knights, with its golden knots and its buckled garters enclosing white roses set on red roses, has its origin in the Tudor age. An illustration in colours of the Garter collar is given on Plate I. in the article [KNIGHTHOOD AND CHIVALRY](#), while descriptions of the collars of the other principal orders are also given. The collar of the Thistle with the thistles and rue-sprigs is as old as the reign of James II. The Bath collar, in its first form of white knots linking closed crowns to roses and thistles issuing from sceptres, dates from 1725, up to which time the knights of the Bath had hung their medallion from a ribbon.

Founding the order of the Saint Esprit in 1578, Henry III. of France devised a collar of enflamed fleur-de-lis and cyphers of H and L, a fashion which was soon afterwards varied by Henry his successor. Elephants have been always borne on the collar of the Elephant founded in Denmark in 1478, the other links of which have taken many shapes. Another Danish order, the Dannebrog, said to be "re-instituted" by Christian V. in 1671, has a collar of crosses formy alternating with the crowned letters C and W, the latter standing for Waldemar the Victorious, whom a legend of no value described as founding the order in 1219. Of other European orders, that of St Andrew, founded by Peter of Russia in 1698, has eagles and Andrew crosses and cyphers, while the Black Eagle of Prussia has the Prussian eagle with thunderbolts in its claws beside roundels charged with cyphers of the letters F.R.

Plain collars of Esses are now worn in the United Kingdom by kings-of-arms, heralds and serjeants-at-arms. Certain legal dignitaries have worn them since the 16th century, the collar of the lord chief-justice having knots and roses between the letters. Henry IV.'s parliament in his second year restricted the free use of the king's livery collar to his sons and to all dukes, earls, barons and bannerets, while simple knights and squires might use it when in the royal presence or in going to and from the hostel of the king. The giving of a livery collar by the king made a squire of a man even as the stroke of the royal sword made him a knight. Collars of Esses are sometimes seen on the necks of ladies. The queen of Henry IV. wears one. So do the wife of a 16th century Knightley on her tomb at Upton, and Penelope, Lady Spencer (d. 1667), on her Brington monument.

Since 1545 the lord mayor of London has worn a royal livery collar of Esses. This collar, however, has its origin in no royal favour, Sir John Alen, thrice a lord mayor, having bequeathed it to the then lord mayor and his successors "to use and occupie yerely at and uppon principall and festivall dayes." It was enlarged in 1567, and in its present shape has 28 Esses alternating with knots and roses and joined with a portcullis. Lord mayors of York use a plain gold chain of a triple row of links given in 1670; this chain, since the day when certain links were found wanting, is weighed on its return by the outgoing mayor. In Ireland the lord mayor of Dublin wears a collar given by Charles II., while Cork's mayor has another which the Cork council bought of a silversmith in 1755, stipulating that it should be like the Dublin one. The lady mayoress of York wears a plain chain given with that of the lord mayor in 1670, and, like his, weighed on its return to official keeping. For some two hundred and thirty years the mayoress of Kingston-on-Hull enjoyed a like ornament until a thrifty council in 1835 sold her chain as a useless thing.

Of late years municipal patriotism and the persuasions of enterprising tradesmen have notably increased the number of English provincial mayors wearing collars or chains of office. Unlike civic maces, swords and caps of maintenance, these gauds are without significance. The mayor of Derby is decorated with the collar once borne by a lord chief-justice of the king's bench, and his brother of Kingston-on-Thames uses without authority an old collar of Esses which once hung over a herald's tabard. By a modern custom the friends of the London sheriffs now give them collars of gold and enamel, which they retain as mementoes of their year of office.

(O. Ba.)

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**COLLATERAL** (from Med. Lat. *collateralis*,—*cum*, with, and *latus, lateris*, side,—side by side, hence parallel or additional), a term used in law in several senses. *Collateral relationship* means the relationship between persons who are descended from the same stock or ancestor, but in a different line; as opposed to *lineal*, which is the relationship between ascendants and descendants in a direct line, as between father and son, grandfather and grandson. A *collateral agreement* is an agreement made contemporaneously with a written contract as part of the transaction, but without being incorporated with it. *Collateral facts*, in evidence, are those facts which do not bear directly on the matters in dispute. *Collateral security* is an additional security for the better safety of the mortgagee, *i.e.* property or right of action deposited to secure the fulfilment of an obligation.

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**COLLATIA**, an ancient town of Latium, 10 m. E. by N. of Rome by the Via Collatina. It appears in the legendary history of Rome as captured by Tarquinius Priscus. Livy tells us it was taken from the Sabines, while Virgil speaks of it as a Latin colony. In the time of Cicero it had lost all importance; Strabo names it as a mere village, in private hands, while for Pliny it was one of the lost cities of Latium. The site is undoubtedly to be sought on the hill now occupied by the large medieval fortified farmhouse of Lunghezza, immediately to the south of the Anio, which occupies the site of the citadel joined by a narrow neck to the tableland to the south-east on which the city stood: this is protected by wide valleys on each side, and is isolated at the south-east end by a deep narrow valley enlarged by cutting. No remains are to be seen, but the site is admirably adapted for an ancient settlement. The road may be traced leading to the south end of this tableland, being identical with the modern road to Lunghezza for the middle part of its course only. The current identification with Castellaccio, 2 m. to the south-east, is untenable.

See T. Ashby in *Papers of the British School at Rome*, i. 138 seq., iii. 201.

(T. As.)

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**COLLATION** (Lat. *collatio*, from *conferre*, to bring together or compare), the bringing together of things for the special purpose of comparison, and thus, particularly, the critical examination of the texts of documents or MSS. and the result of such comparison. The word is also a term in printing and bookbinding for the register of the "signatures," the number of quires and leaves in each quire of a book or MS. In Roman and Scots law "collation" answers to the English law term "hotch-pot" (*q.v.*). From another meaning of the Latin word, a consultation or conference, and so a treatise or homily, comes the title of a work of Johannes Cassianus (*q.v.*), the *Conferences of the Fathers (Collationes Patrum)*. Readings from this and similar works were customary in monasteries; by the *regula* of St Benedict it is ordered that on rising from supper there should be read *collationes*, passages from the lives of the Fathers and other edifying works; the word is then applied to the discussions arising from such readings. On fast days it was usual in monasteries to have a very light meal after the *Collatio*, and hence the meal itself came to be called "collation," a meaning which survives in the modern use of the word for any light or quickly prepared repast.

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**COLLÉ, CHARLES** (1709-1783), French dramatist and song-writer, the son of a notary, was born at Paris in 1709. He was early interested in the rhymes of Jean Héganier, then the most famous maker of couplets in Paris. From a notary's office Collé was transferred to that of M. de Neulan, the receiver-general of finance, and remained there for nearly twenty years. When about seventeen, however, he made the acquaintance of Alexis Piron, and afterwards, through Gallet (d. 1757), of Panard. The example of these three masters of the

vaudeville, while determining his vocation, made him diffident; and for some time he composed nothing but *amphigouris*—verses whose merit was measured by their unintelligibility. The friendship of the younger Crébillon, however, diverted him from this by-way of art, and the establishment in 1729 of the famous “Caveau” gave him a field for the display of his fine talent for popular song. In 1739 the Society of the Caveau, which numbered among its members Helvétius, Charles Duclos, Pierre Joseph Bernard, called Gentil-Bernard, Jean Philippe Rameau, Alexis Piron, and the two Crébillons, was dissolved, and was not reconstituted till twenty years afterwards. His first and his best comedy, *La Vérité dans le vin*, appeared in 1747. Meanwhile, the Regent Orleans, who was an excellent comic actor, particularly in representations of low life, and had been looking out for an author to write suitable parts for him, made Collé his reader. It was for the duke and his associates that Collé composed the greater part of his *Théâtre de société*. In 1763 Collé produced at the Théâtre Français *Dupuis et Desronais*, a successful sentimental comedy, which was followed in 1771 by *La Veuve*, which was a complete failure. In 1774 appeared *La Partie de chasse de Henri Quatre* (partly taken from Dodsley’s *King and the Miller of Mansfield*), Collé’s last and best play. From 1748 to 1772, besides these and a multitude of songs, Collé was writing his *Journal*, a curious collection of literary and personal strictures on his boon companions as well as on their enemies, on Piron as on Voltaire, on La Harpe as on Corneille. Collé died on the 3rd of November 1783. His lyrics are frank and jovial, though often licentious. The subjects are love and wine; occasionally, however, as in the famous lyric (1756) on the capture of Port Mahon, for which the author received a pension of 600 livres, the note of patriotism is struck with no unskilful hand, while in many others Collé shows himself possessed of considerable epigrammatic force.

See also H. Bonhomme’s edition (1868) of his *Journal et Mémoires* (1748-1772); Grimm’s *Correspondance*; and C. A. Sainte-Beuve, *Nouveaux lundis*, vol. vii.

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**COLLECTIVISM**, a term used to denote the economic principle of the ownership by a community of all the means of production in order to secure to the people collectively an equitable distribution of the produce of their associated labour. Though often used in a narrow sense to express the economic basis of Socialism, the latter term is so generally employed in the same sense that collectivism is best discussed in connexion with it (see [SOCIALISM](#)).

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**COLLECTOR**, a term technically used for various officials, and particularly in India for the chief administrative official of a district. The word was in this case originally a translation of *tahsildar*, and indicates that the special duty of the office is the collection of revenue; but the collector has also magisterial powers and is a species of autocrat within the bounds of his district. The title is confined to the regulation provinces, especially Madras; in the non-regulation provinces the same duties are discharged by the deputy-commissioner (see [COMMISSIONER](#)).

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**COLLE DI VAL D’ ELSA**, a town and episcopal see of Italy, in the province of Siena, 5 m. by rail S. of Poggibonsi, which is 16 m. N.W. of Siena. Pop. (1901) town 1987; commune 9879. The old (upper) town (732 ft. above sea-level), contains the cathedral, dating from the 13th century, with a pulpit partly of this period; the façade has been modernized. There are also some old palaces of good architecture, and the old house where Arnolfo di Cambio, the first architect of the cathedral at Florence (1232-1301) was born. The lower town (460 ft.) contains glass-works; the paper and iron industries (the former as old as 1377) are less important.

**COLLEGE** (*Collegium*), in Roman law, a number of persons associated together by the possession of common functions,—a body of colleagues. Its later meaning applied to any union of persons, and *collegium* was the equivalent of ἑταιρεία. In many respects, *e.g.* in the distinction between the responsibilities and rights of the society and those of individual members thereof, the collegium was what we should now call a corporation (*q.v.*). Collegia might exist for purposes of trade like the English guilds, or for religious purposes (*e.g.* the college of augurs, of pontifices, &c.), or for political purposes, *e.g.* *tribunorum plebis collegia*. By the Roman law a collegium must have at least three members. The name is now usually applied to educational corporations, such as the colleges of Oxford and Cambridge, with which, in the numerous English statutes relating to colleges, the colleges of Winchester and Eton are usually associated. These colleges are in the eye of the law eleemosynary corporations. In some of the earlier statutes of Queen Elizabeth they are spoken of as having an ecclesiastical character, but the doctrine of the common law since the Reformation has been that they are purely lay corporations, notwithstanding that most or all of their members may be persons in priest's orders. This is said to have been settled by Dr Patrick's case (*Raymond's Reports*, p. 101).

Colleges appear to have grown out of the voluntary association of students and teachers at the university. According to some accounts these must at one time have been numerous and flourishing beyond anything we are now acquainted with. We are told, for example, of 300 halls or societies at Oxford, and 30,000 students. In early times there seems to have been a strong desire to confine the scholars to certain licensed houses beyond the influence of the townspeople. Men of wealth and culture, and notably the political bishops and chancellors of England, obtained charters from the crown for the incorporation of societies of scholars, and these in time became exclusively the places of abode for students attending the university. At the same time the corporations thus founded were not necessarily attached to the locality of the university. The early statutes of Merton College, for example, allow the residence of the college to be shifted as occasion required; and the foundations of Wolsey at Oxford and Ipswich seem to have been the same in intention. In later times (until the introduction of non-collegiate students) the university and the colleges became coextensive; every member of the university had to attach himself to some college or hall, and every person admitted to a college or hall was obliged to matriculate himself in the university.

In Ayliffe's *Ancient and Present State of the University of Oxford* it is stated that a college must be "made up of three persons (at least) joined in community. And the reason of this almost seems to speak its own necessity, without the help of any express law to countenance it: because among two persons only there cannot be, in fact, a major part; and then if any disagreement should happen to arise between them it cannot be, in fact, brought to a conclusion by such a number alone in case both the parties should firmly adhere to their dissenting opinions; and thus it is declared by the civil law. But by the canon law it is known to be otherwise; for by that law two persons in number may make and constitute a college, forasmuch as according to this law two persons make and constitute an assembly or congregation. The common law of England, or rather the constant usage of our princes in erecting aggregate bodies, which has established this rule among us as a law, has been herein agreeable to the method and doctrine of the civil law, for that in all their grants and charters of incorporation of colleges they have not framed any aggregate body consisting of less than three in number." Another principle, apparently derived from the civil law, is that a man cannot be a fellow in two colleges at the same time. The law of England steadily resisted any attempt to introduce the principle of inequality into colleges. An act of 1542, reciting that divers founders of colleges have given in their statutes a power of veto to individual members, enacts that every statute made by any such founder, whereby the grant or election of the governor or ruler with the assent of the most part of such corporation should be in any wise hindered by any one or more being the lesser number (contrary to the common law), shall be void.

The corporation consists of a head or master, fellows and scholars. Students, not being on the foundation, residing in the college, are not considered to be members of the corporation. The governing body in all cases is the head and fellows.

It is considered essential to corporations of an ecclesiastical or educational character that they should have a Visitor whose duty it is to see that the statutes of the founder are obeyed. The duties of this officer have been ascertained by the courts of law in a great variety of

decided cases. Subject to such restrictions as may be imposed on him by the statutes of the college, his duties are generally to interpret the statutes of the college in disputed cases, and to enforce them where they have been violated. For this purpose he is empowered to "visit" the society—usually at certain stated intervals. In questions within his jurisdiction his judgment is conclusive, but his jurisdiction does not extend to any cases under the common laws of the country, or to trusts attached to the college. Generally the visitorship resides in the founder and his heirs unless he has otherwise appointed, and in default of him in the crown.

The fellowships, scholarships, &c., of colleges were until a comparatively recent date subject to various restrictions. Birth in a particular county, education at a particular school, relationship to the founder and holy orders, are amongst the most usual of the conditions giving a preferential or conclusive claim to the emoluments. Most of these restrictions have been or are being swept away. (See [UNIVERSITIES](#); [OXFORD](#); [CAMBRIDGE](#); &c.)

The term "college" (like "academy") is also applied to various institutions, *e.g.* to colleges of physicians and surgeons, and to the electoral college in the United States presidential elections, &c. For the Sacred College see [CARDINAL](#).

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**COLLEONI, BARTOLOMMEO** (1400-1475), Italian soldier of fortune, was born at Bergamo. While he was still a child his father was attacked and murdered in his castle of Trezzo by Filippo Maria Visconti, duke of Milan. After wandering about Italy he entered the service of various *condottieri*, such as Braccio da Montone and Carmagnola. At the age of thirty-two he was serving the Venetian republic, and although Francesco Maria Gonzaga was commander-in-chief, Colleoni was the life and soul of the army. He recaptured many towns and districts for Venice from the Milanese, and when Gonzaga went over to the enemy he continued to serve the Venetians under Erasmo da Narni (known as Gattamelata) and Francesco A. Sforza, winning battles at Brescia, Verona and on the lake of Garda. When peace was made between Milan and Venice in 1441 Colleoni went over to the Milanese, together with Sforza in 1443. But although well treated at first, he soon fell under the suspicion of the treacherous Visconti and was imprisoned at Monza, where he remained until the duke's death in 1447. Milan then fell under the lordship of Sforza, whom Colleoni served for a time, but in 1448 he took leave of Sforza and returned to the Venetians. Disgusted at not having been elected captain-general, he went over to Sforza once more, but Venice could not do without him and by offering him increased emoluments induced him to return, and in 1455 he was appointed captain-general of the republic for life. Although he occasionally fought on his own account, when Venice was at peace, he remained at the disposal of the republic in time of war until his death.

Colleoni was perhaps the most respectable of all the Italian *condottieri*, and although he often changed sides, no act of treachery is imputed to him, nor did he subject the territories he passed through to the rapine and exactions practised by other soldiers of fortune. When not fighting he devoted his time to introducing agricultural improvements on the vast estates with which the Venetians had endowed him, and to charitable works. At his death in 1475 he left a large sum to the republic for the Turkish war, with a request that an equestrian statue of himself should be erected in the Piazza San Marco. The statue was made by Verrocchio, but as no monument was permitted in the famous Piazza it was placed opposite the hospital of St Mark by way of compromise.

See G. M. Bonomi, *Il Castello di Cavernago e i conti Martinengo Colleoni* (Bergamo, 1884); for an account of his wars see S. Romanin, *Storia documentata di Venezia*, vol. iv. (Venice, 1855), and other histories of Venice. (L. V.\*)

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**COLLETER** (Gr. κόλλος, glue), a botanical term for the gum-secreting hairs on the buds of certain plants.

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**COLLETTA, PIETRO** (1775-1831), Neapolitan general and historian, entered the Neapolitan artillery in 1796 and took part in the campaign against the French in 1798. On the entry of the French into Naples and the establishment of the Parthenopean republic (1799) he adhered to the new government, and when the Bourbon king Ferdinand IV. (*q.v.*) reconquered the city Colletta was thrown into prison and only escaped the death penalty by means of judiciously administered bribes. Turned out of the army he became a civil engineer, but when the Bourbons were expelled a second time in 1806 and Joseph Bonaparte seized the throne of Naples, he was reinstated in his rank and served in the expedition against the brigands and rebels of Calabria. In 1812 he was promoted general, and made director of roads and bridges. He served under Joachim Murat and fought the Austrians on the Panaro in 1815. On the restoration of Ferdinand Colletta was permitted to retain his rank in the army, and given command of the Salerno division. At the outbreak of the revolution of 1820 the king called him to his councils, and when the constitution had been granted Colletta was sent to put down the separatist rising in Sicily, which he did with great severity. He fought in the constitutionalist army against the Austrians at Rieti (7th of March 1821), and on the re-establishment of autocracy he was arrested and imprisoned for three months by order of the prince of Canosa, the chief of police, his particular enemy. He would have been executed had not the Austrians intervened in his favour, and he was exiled instead to Brünn in Moravia; in 1823 he was permitted to settle in Florence, where he spent the rest of his days engaged on his *Storia del reame di Napoli*. He died in 1831. His history (1st ed., Capolago, 1834), which deals with the reigns of Charles III. and Ferdinand IV. (1734-1825), is still the standard work for that period; but its value is somewhat diminished by the author's bitterness against his opponents and the fact that he does not give chapter and verse for his statements, many of which are based on his recollection of documents seen, but not available at the time of writing. Still, having been an actor in many of the events recorded, he is on the whole accurate and trustworthy.

See Gino Capponi's memoir of him published in the *Storia del reame di Napoli* (2nd ed., Florence, 1848).

(L. V.\*)

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**COLLEY, SIR GEORGE POMEROY** (1835-1881), British general, third son of George Pomeroy Colley, of Rathangan, Co. Kildare, Ireland, and grandson of the fourth Viscount Harberton, was born on the 1st of November 1835, and entered the 2nd Queen's Regiment from Sandhurst as ensign in 1852. From 1854 to 1860 he served in South Africa, and was employed in surveying and as a magistrate in charge of the Bashi river district in Kaffraria. Early in 1860 he went with his regiment to China to join the Anglo-French expedition, and took part in the capture of the Taku forts and the entry into Peking, returning to South Africa to complete his work in Kaffraria (brevet-majority). In 1862 he entered the Staff College and passed out in one year with honours. After serving as brigade-major at Devonport for five years, he went to the War Office in 1870 to assist in the preparation of (Lord) Cardwell's measures of army reform. He was appointed professor of military administration at the Staff College in 1871. Early in 1873 he joined Sir Garnet Wolseley at the Gold Coast, where he took charge of the transport, and the success of the Ashanti expedition was in no small degree due to his exertions. He was promoted brevet-colonel and awarded the C.B. In 1875 he accompanied Wolseley to Natal (C.M.G.). On his return home he was appointed military secretary to Lord Lytton, governor-general of India, and in 1877 private secretary (K.C.S.I.). In 1879 he joined Wolseley as chief of the staff and brigadier-general in S.E. Africa, but, on the murder of Cavagnari at Kabul, returned to India. In 1880 he succeeded Wolseley in S.E. Africa as high commissioner and general commanding, and conducted the operations against the rebel Boers. He was defeated at Laing's Nek and at the Ingogo river, and killed at Majuba Hill on the 27th of February 1881. He had a very high reputation not only for a theoretical knowledge of military affairs, but also as a practical soldier.

See *Life of Sir George Pomeroy Colley* by Lieut.-Gen. Sir W. F. Butler (London, 1899).



**COLLIER, ARTHUR** (1680-1732), English philosopher, was born at the rectory of Steeple Langford, Wiltshire, on the 12th of October 1680. He entered at Pembroke College, Oxford, in July 1697, but in October 1698 he and his brother William became members of Balliol. His father having died in 1697, it was arranged that the family living of Langford Magna should be given to Arthur as soon as he was old enough. He was presented to the benefice in 1704, and held it till his death. His sermons show no traces of his bold theological speculations, and he seems to have been faithful in the discharge of his duty. He was often in pecuniary difficulties, from which at last he was obliged to free himself by selling the reversion of Langford rectory to Corpus Christi College, Oxford. His philosophical opinions grew out of a diligent study of Descartes and Malebranche. John Norris of Bemerton also strongly influenced him by his *Essay on the Ideal World* (1701-1704). It is remarkable that Collier makes no reference to Locke, and shows no sign of having any knowledge of his works. As early as 1703 he seems to have become convinced of the non-existence of an external world. In 1712 he wrote two essays, which are still in manuscript, one on substance and accident, and the other called *Clavis Philosophica*. His chief work appeared in 1713, under the title *Clavis Universalis, or a New Inquiry after Truth, being a Demonstration of the Non-Existence or Impossibility of an External World* (printed privately, Edinburgh, 1836, and reprinted in *Metaphysical Tracts*, 1837, edited by Sam. Parr). It was favourably mentioned by Reid, Stewart and others, was frequently referred to by the Leibnitzians, and was translated into German by von Eschenbach in 1756. Berkeley's *Principles of Knowledge* and *Theory of Vision* preceded it by three and four years respectively, but there is no evidence that they were known to Collier before the publication of his book.

His views are grounded on two presuppositions:—first, the utter aversion of common sense to any theory of representative perception; second, the opinion which Collier held in common with Berkeley, and Hume afterwards, that the difference between imagination and sense perception is only one of degree. The former is the basis of the negative part of his argument; the latter supplies him with all the positive account he has to give, and that is meagre enough. The *Clavis* consists of two parts. After explaining that he will use the term “external world” in the sense of absolute, self-existent, independent matter, he attempts in the first part to prove that the visible world is not external, by showing—first, that the seeming externality of a visible object is no proof of real externality, and second, that a visible object, as such, is not external. The image of a centaur seems as much external to the mind as any object of sense; and since the difference between imagination and perception is only one of degree, God could so act upon the mind of a person imagining a centaur, that he would perceive it as vividly as any object can be seen. Similar illustrations are used to prove the second proposition, that a visible object, as such, is not external. The first part ends with a reply to objections based on the universal consent of men, on the assurance given by touch of the extra existence of the visible world, and on the truth and goodness of God (Descartes), which would be impugned if our senses deceived us. Collier argues naively that if universal consent means the consent of those who have considered the subject, it may be claimed for his view. He thinks with Berkeley that objects of sight are quite distinct from those of touch, and that the one therefore cannot give any assurance of the other; and he asks the Cartesians to consider how far God's truth and goodness are called in question by their denial of the externality of the secondary qualities. The second part of the book is taken up with a number of metaphysical arguments to prove the impossibility of an external world. The pivot of this part is the logical principle of contradiction. From the hypothesis of an external world a series of contradictions are deduced, such as that the world is both finite and infinite, is movable and immovable, &c.; and finally, Aristotle and various other philosophers are quoted, to show that the external matter they dealt with, as mere potentiality, is just nothing at all. Among other uses and consequences of his treatise, Collier thinks it furnishes an easy refutation of the Romish doctrine of transubstantiation. If there is no external world, the distinction between substance and accidents vanishes, and these become the sole essence of material objects, so that there is no room for any change whilst they remain as before. Sir William Hamilton thinks that the logically necessary advance from the old theory of representative perception to idealism was stayed by anxiety to save this miracle of the church; and he gives Collier credit for being the first to make the discovery.

His *Clavis Universalis* is interesting on account of the resemblance between its views and those of Berkeley. Both were moved by their dissatisfaction with the theory of representative perception. Both have the feeling that it is inconsistent with the common sense of mankind, which will insist that the very object perceived is the sole reality. They equally affirm that

the so-called representative image is the sole reality, and discard as unthinkable the unperceiving material cause of the philosophers. Of objects of sense, they say, their *esse* is *percipi*. But Collier never got beyond a bald assertion of the fact, while Berkeley addressed himself to an explanation of it. The thought of a distinction between direct and indirect perception never dawned upon Collier. To the question how all matter exists in dependence on percipient mind his only reply is, "Just how my reader pleases, provided it be somehow." As cause of our sensations and ground of our belief in externality, he substituted for an unintelligible material substance an equally unintelligible operation of divine power. His book exhibits no traces of a scientific development. The most that can be said about him is that he was an intelligent student of Descartes and Malebranche, and had the ability to apply the results of his reading to the facts of his experience. In philosophy he is a curiosity, and nothing more. His biographer attributes the comparative failure of the *Clavis* to its inferiority in point of style, but the crudeness of his thought had quite as much to do with his failure to gain a hearing. Hamilton (*Discussions*, p. 197) allows greater sagacity to Collier than to Berkeley, on the ground that he did not vainly attempt to enlist men's natural belief against the hypothetical realism of the philosophers. But Collier did so as far as his light enabled him. He appealed to the popular conviction that the proper object of sense is the sole reality, although he despaired of getting men to give up their belief in its externality, and asserted that nothing but prejudice prevented them from doing so; and there is little doubt that, if it had ever occurred to him, as it did to Berkeley, to explain the genesis of the notion of externality, he would have been more hopeful of commending his theory to the popular mind.

In theology Collier was an adherent of the High Church party, though his views were by no means orthodox. In the Jacobite *Mist's Journal* he attacked Bishop Hoadly's defence of sincere errors. His views on the problems of Arianism, and his attempt to reconcile it with orthodox theology, are contained in *A Specimen of True Philosophy* (1730, reprinted in *Metaphysical Tracts*, 1837) and *Logology, or a Treatise on the Logos in Seven Sermons on John i. 1, 2, 3, 14* (1732, analysed in *Metaph. Tracts*). These may be compared with Berkeley's *Siris*.

See Robt. Benson, *Memoirs of the Life and Writings of Arthur Collier* (1837); Tennemann, *History of Philosophy*; Hamilton, *Discussions*; A. C. Fraser, edition of *Berkeley's Works*; G. Lyon, "Un Idéaliste anglais au XVIII. siècle," in *Rev. philos.* (1880), x. 375.

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**COLLIER, JEREMY** (1650-1726), English nonjuring divine, was born at Stow-with-Quy, Cambridgeshire, on the 23rd of September 1650. He was educated at Ipswich free school, over which his father presided, and at Caius College, Cambridge, graduating B.A. in 1673 and M.A. in 1676. He acted for a short time as a private chaplain, but was appointed in 1679 to the small rectory of Ampton, near Bury St Edmunds, and in 1685 he was made lecturer of Gray's Inn.

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At the Revolution he was committed to Newgate for writing in favour of James II. a tract entitled *The Desertion discuss'd in a Letter to a Country Gentleman* (1688), in answer to Bishop Burnet's defence of King William's position. He was released after some months of imprisonment, without trial, by the intervention of his friends. In the two following years he continued to harass the government by his publications: and in 1692 he was again in prison under suspicion of treasonable correspondence with James. His scruples forbade him to acknowledge the jurisdiction of the court by accepting bail, but he was soon released. But in 1696 for his boldness in granting absolution on the scaffold to Sir John Friend and Sir William Parkyns, who had attempted the assassination of William, he was obliged to flee, and for the rest of his life continued under sentence of outlawry.

When the storm had blown over he returned to London, and employed his leisure in works which were less political in their tone. In 1697 appeared the first volume of his *Essays on Several Moral Subjects*, to which a second was added in 1705, and a third in 1709. The first series contained six essays, the most notable being that "On the office of a Chaplain," which throws much light on the position of a large section of the clergy at that time. Collier deprecated the extent of the authority assumed by the patron and the servility of the poorer clergy.

In 1698 Collier produced his famous *Short View of the Immorality and Profaneness of the English Stage...* He dealt with the immodesty of the contemporary stage, supporting his

contentions by a long series of references attesting the comparative decency of Latin and Greek drama; with the profane language indulged in by the players; the abuse of the clergy common in the drama; the encouragement of vice by representing the vicious characters as admirable and successful; and finally he supported his general position by the analysis of particular plays, Dryden's *Amphitryon*, Vanbrugh's *Relapse* and D'Urfey's *Don Quixote*. The Book abounds in hypercriticism, particularly in the imputation of profanity; and in a useless display of learning, neither intrinsically valuable nor conducive to the argument. He had no artistic appreciation of the subject he discussed, and he mistook cause for effect in asserting that the decline in public morality was due to the flagrant indecency of the stage. Yet, in the words of Macaulay, who gives an admirable account of the discussion in his essay on the comic dramatists of the Restoration, "when all deductions have been made, great merit must be allowed to the work." Dryden acknowledged, in the preface to his *Fables*, the justice of Collier's strictures, though he protested against the manner of the onslaught;<sup>1</sup> but Congreve made an angry reply; Vanbrugh and others followed. Collier was prepared to meet any number of antagonists, and defended himself in numerous tracts. *The Short View* was followed by a *Defence* (1699), a *Second Defence* (1700), and *Mr Collier's Dissuasive from the Playhouse, in a Letter to a Person of Quality* (1703), and a *Further Vindication* (1708). The fight lasted in all some ten years; but Collier had right on his side, and triumphed; his position was, moreover, strengthened by the fact that he was known as a Troy and high churchman, and that his attack could not, therefore, be assigned to Puritan rancour against the stage.

From 1701 to 1721 Collier was employed on his *Great Historical, Geographical, Genealogical and Poetical Dictionary*, founded on, and partly translated from, Louis Moréri's *Dictionnaire historique*, and in the compilation and issue of the two volumes folio of his own *Ecclesiastical History of Great Britain from the first planting of Christianity to the end of the reign of Charles II.* (1708-1714). The latter work was attacked by Burnet and others, but the author showed himself as keen a controversialist as ever. Many attempts were made to shake his fidelity to the lost cause of the Stuarts, but he continued indomitable to the end. In 1712 George Hickes was the only survivor of the nonjuring bishops, and in the next year Collier was consecrated. He had a share in an attempt made towards union with the Greek Church. He had a long correspondence with the Eastern authorities, his last letters on the subject being written in 1725. Collier preferred the version of the *Book of Common Prayer* issued in 1549, and regretted that certain practices and petitions there enjoined were omitted in later editions. His first tract on the subject, *Reasons for Restoring some Prayers* (1717), was followed by others. In 1718 was published a new *Communion Office taken partly from Primitive Liturgies and partly from the first English Reformed Common Prayer Book...* which embodied the changes desired by Collier. The controversy that ensued made a split in the nonjuring communion. His last work was a volume of *Practical Discourses*, published in 1725. He died on the 26th of April 1726.

BIBLIOGRAPHY.—There is an excellent account of Collier in A. Kippis's *Biographia Britannica*, vol. iv. (1789), where some sensible observations by the editor are added to the original biography. A full list of Collier's writings is given by the Rev. Wm. Hunt in the article in the *Dictionary of National Biography*. For particulars of Collier's history as a nonjuring bishop, see Thomas Lathbury, *A History of the Nonjurors ...* (1845). There is an excellent account of the *Short View* and the controversy arising from it in A. Beljame's *Le Public et les hommes de lettres en Angleterre au XVIIIe siècle* (2nd ed., 1897), pp. 244-263.

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1 "He is too much given to horse-play in his raillery, and comes to battle like a dictator from the plough. I will not say, 'the zeal of God's house has eaten him up'; but I am sure it has devoured some part of his good manners and civility." (Dryden, *Works*, ed. Scott, xi. 239).

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**COLLIER, JOHN PAYNE** (1789-1883), English Shakespearian critic, was born in London, on the 11th of January 1789. His father, John Dyer Collier (1762-1825), was a successful journalist, and his connexion with the press obtained for his son a position on the *Morning Chronicle* as leader writer, dramatic critic and reporter, which continued till 1847; he was also for some time a reporter for *The Times*. He was summoned before the House of Commons in 1819 for giving an incorrect report of a speech by Joseph Hume. He entered the Middle Temple in 1811, but was not called to the bar until 1829. The delay was partly due to

his indiscretion in publishing the *Criticisms on the Bar* (1819) by "Amicus Curiae." His leisure was given to the study of Shakespeare and the early English drama. After some minor publications he produced in 1825-1827 a new edition of Dodsley's *Old Plays*, and in 1833 a supplementary volume entitled *Five Old Plays*. In 1831 appeared his *History of English Dramatic Poetry and Annals of the Stage to the Restoration*, a badly arranged, but valuable work. It obtained for him the post of librarian to the duke of Devonshire, and, subsequently, access to the chief collections of early English literature throughout the kingdom, especially to the treasures of Bridgwater House. These opportunities were unhappily misused to effect a series of literary fabrications, which may be charitably, and perhaps not unjustly, attributed to literary monomania, but of which it is difficult to speak with patience, so completely did they for a long time bewilder the chronology of Shakespeare's writings, and such suspicion have they thrown upon MS. evidence in general. After *New Facts*, *New Particulars* and *Further Particulars* respecting Shakespeare had appeared and passed muster, Collier produced (1852) the famous *Perkins Folio*, a copy of the second folio (1632), so called from a name written on the title-page. On this book were numerous MS. emendations of Shakespeare said by Collier to be from the hand of "an old corrector." He published these corrections as *Notes and Emendations to the Text of Shakespeare* (1852), and boldly incorporated them in his edition (1853) of Shakespeare. Their authenticity was disputed by S. W. Singer in *The Text of Shakespeare Vindicated* (1853) and by E. A. Brae in *Literary Cookery* (1855) on internal evidence; and when in 1859 the folio was submitted by its owner, the duke of Devonshire, to experts at the British Museum, the emendations were incontestably proved to be forgeries of modern date. Collier was exposed by Mr Nicholas Hamilton in his *Inquiry* (1860). The point whether he was deceiver or deceived was left undecided, but the falsifications of which he was unquestionably guilty among the MSS. at Dulwich College have left little doubt respecting it. He had produced the *Memoirs of Edward Alleyn* for the Shakespeare Society in 1841. He followed up this volume with the *Alleyn Papers* (1843) and the *Diary of P. Henslowe* (1845). He forged the name of Shakespeare in a genuine letter at Dulwich, and the spurious entries in Alleyn's *Diary* were proved to be by Collier's hand when the sale of his library in 1884 gave access to a transcript he had made of the *Diary* with interlineations corresponding with the Dulwich forgeries. No statement of his can be accepted without verification, and no manuscript he has handled without careful examination, but he did much useful work. He compiled a valuable *Bibliographical and Critical Account of the Rarest Books in the English Language* (1865); he reprinted a great number of early English tracts of extreme rarity, and rendered good service to the numerous antiquarian societies with which he was connected, especially in the editions he produced for the Camden Society and the Percy Society. His *Old Man's Diary* (1871-1872) is an interesting record, though even here the taint of fabrication is not absent. Unfortunately what he did amiss is more striking to the imagination than what he did aright, and he will be chiefly remembered by it. He died at Maidenhead, where he had long resided, on the 17th of September 1883.

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For an account of the discussion raised by Collier's emendations see C.M. Ingleby, *Complete View of the Shakespeare Controversy* (1861).

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**COLLIN, HEINRICH JOSEPH VON** (1771-1811), Austrian dramatist, was born in Vienna, on the 26th of December 1771. He received a legal education and entered the Austrian ministry of finance where he found speedy promotion. In 1805 and in 1809, when Austria was under the heel of Napoleon, Collin was entrusted with important political missions. In 1803 he was, together with other members of his family, ennobled, and in 1809 made *Hofrat*. He died on the 28th of July 1811. His tragedy *Regulus* (1801), written in strict classical form, was received with enthusiasm in Vienna, where literary taste, less advanced than that of North Germany, was still under the ban of French classicism. But in his later dramas, *Coriolan* (1804), *Polyxena* (1804), *Balboa* (1806), *Bianca della Porta* (1808), he made some attempt to reconcile the pseudo-classic type of tragedy with that of Shakespeare and the German romanticists. As a lyric poet (*Gedichte*, collected 1812), Collin has left a collection of stirring *Wehrmannslieder* for the fighters in the cause of Austrian freedom, as well as some excellent ballads (*Kaiser Max auf der Martinswand*, *Herzog Leupold vor Solothurn*). His younger brother Matthäus von Collin (1779-1824), was, as editor of the *Wiener Jahrbücher für Literatur*, an even more potent force in the literary life of Vienna. He was, moreover, in sympathy with the Romantic movement, and intimate with its leaders. His

dramas on themes from Austrian national history (*Belas Krieg mit dem Vater*, 1808, *Der Tod Friedrichs des Streitbaren*, 1813) may be regarded as the immediate precursors of Grillparzer's historical tragedies.

His *Gesammelte Werke* appeared in 6 vols. (1812-1814); he is the subject of an excellent monograph by F. Laban (1879). See also A. Hauffen, *Das Drama der klassischen Periode*, ii. 2 (1891), where a reprint of *Regulus* will be found. M. von Collin's *Dramatische Dichtungen* were published in 4 vols. (1815-1817); his *Nachgelassene Schriften*, edited by J. von Hammer, in 2 vols. (1827). A study of his life and work by J. Wihan will be found in *Euphorion*, Ergänzungsheft, v. (1901).

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**COLLIN D'HARLEVILLE, JEAN FRANÇOIS** (1755-1806), French dramatist, was born at Mévoisins, near Maintenon (Eure-et-Loire), on the 30th of May 1755. His first dramatic success was *L'Inconstant*, a comedy accepted by the Comédie Française in 1780, but not produced there until six years later, though it was played elsewhere in 1784. This was followed by *L'Optimiste, ou l'homme toujours content* (1788), and *Châteaux en Espagne* (1789). His best play, *Le Vieux Célibataire*, appeared in 1793. Among his other plays are—the one-act comedy *Monsieur de Crac dans son petit castel* (1791), *Les Artistes* (1796), *Les Mœurs du jour* (1800) and *Malice pour malice* (1803). Collin was one of the original members of the Institute of France, and died in Paris on the 24th of February 1806.

The 1822 edition of his *Théâtre et poésies fugitives* contains a notice by his friend the dramatist Andrieux. His *Théâtre* was also edited by L. Moland in 1876; and by Édouard Thierry in 1882.

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**COLLING, ROBERT** (1749-1820), and **CHARLES** (1751-1836), English stock breeders, famous for their improvement of the Shorthorn breed of cattle, were the sons of Charles Colling, a farmer of Ketton near Darlington. Their lives are closely connected with the history of the Shorthorn breed. Of the two brothers, Charles is probably the better known, and it was his visit to the farm of Robert Bakewell at Dishley that first led the brothers to realize the possibilities of scientific cattle breeding. Charles succeeded to his father's farm at Ketton. Robert, after being first apprenticed to a grocer in Shields, took a farm at Barmpton. An animal which he bought at Charles's advice for £8 and afterwards sold to his brother, became known as the celebrated "Hubback," a bull which formed the basis of both the Ketton and Barmpton herds. The two brothers pursued the same system of "in and in" breeding which they had learned from Bakewell, and both the Ketton and the Barmpton herds were sold by auction in the autumn of 1810. The former with 47 lots brought £7116, and the latter with 61 lots £7852. Robert Colling died unmarried at Barmpton on the 7th of March 1820, leaving his property to his brother. Charles Colling, who is remembered as the owner of the famous bulls "Hubback," "Favourite" and "Comet," was more of a specialist and a business man than his brother. He died on the 16th of January 1836.

See the Journal of the Royal Agricultural Society, 1899, for a biographical sketch of the brothers Colling, by C. J. Bates.

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**COLLINGWOOD, CUTHBERT COLLINGWOOD, BARON** (1750-1810), British naval commander, was born at Newcastle-upon-Tyne, on the 26th of September 1750. He was early sent to school; and when only eleven years of age he was put on board the "Shannon," then under the command of Captain (afterwards Admiral) Brathwaite, a relative of his own, to whose care and attention he was in a great measure indebted for that nautical knowledge which shone forth so conspicuously in his subsequent career. After serving under Captain

Brathwaite for some years, and also under Admiral Roddam, he went in 1774 to Boston with Admiral Graves, and served in the naval brigade at the battle of Bunker Hill (17th of June 1775), where he gained his lieutenancy. In 1779 he was made commander of the "Badger," and shortly afterwards post-captain of the "Hinchinbroke," a small frigate. In the spring of 1780 that vessel, under the command of Nelson, was employed upon an expedition to the Spanish Main, where it was proposed to pass into the Pacific by navigating boats along the river San Juan and the lakes Nicaragua and Leon. The attempt failed, and most of those engaged in it became victims to the deadly influence of the climate. Nelson was promoted to a larger vessel, and Collingwood succeeded him in the command. It is a fact worthy of record that the latter succeeded the former very frequently from the time when they first became acquainted, until the star of Nelson set at Trafalgar—giving place to that of Collingwood, less brilliant certainly, but not less steady in its lustre.

After commanding in another small frigate, Collingwood was promoted to the "Sampson" (64); and in 1783 he was appointed to the "Mediator," destined for the West Indies, where, with Nelson, who had a command on that station, he remained till the end of 1786. With Nelson he warmly co-operated in carrying into execution the provisions of the navigation laws, which had been infringed by the United States, whose ships, notwithstanding the separation of the countries, continued to trade to the West Indies, although that privilege was by law exclusively confined to British vessels. In 1786 Collingwood returned to England, where, with the exception of a voyage to the West Indies, he remained until 1793, in which year he was appointed captain of the "Prince," the flag-ship of Rear-Admiral Bowyer. About two years previous to this event he had married Miss Sarah Roddam—a fortunate alliance, which continued to be a solace to him amidst the privations to which the life of a seaman must ever be subject.

As captain of the "Barfleur," Collingwood was present at the naval engagement which was fought on the 1st of June 1794; and on that occasion he displayed equal judgment and courage. On board the "Excellent" he shared in the victory of the 14th of February 1797, when Sir John Jervis (Lord St Vincent) humbled the Spanish fleet off Cape St Vincent. His conduct in this engagement was the theme of universal admiration throughout the fleet, and greatly advanced his fame as a naval officer. After blockading Cadiz for some time, he returned for a few weeks to Portsmouth to repair. In the beginning of 1799 Collingwood was raised to the rank of vice-admiral, and hoisting his flag in the "Triumph," he joined the Channel Fleet, with which he proceeded to the Mediterranean, where the principal naval forces of France and Spain were assembled. Collingwood continued actively employed in watching the enemy, until the peace of Amiens restored him once more to the bosom of his family.

The domestic repose, however, which he so highly relished, was cut short by the recommencement of hostilities with France, and in the spring of 1803 he quitted the home to which he was never again to return. The duty upon which he was employed was that of watching the French fleet off Brest, and in the discharge of it he displayed the most unwearied vigilance. Nearly two years were spent in this employment; but Napoleon had at length matured his plans and equipped his armament, and the grand struggle which was to decide the fate of Europe and the dominion of the sea was close at hand. The enemy's fleet having sailed from Toulon, Admiral Collingwood was appointed to the command of a squadron, with orders to pursue them. The combined fleets of France and Spain, after spreading terror throughout the West Indies, returned to Cadiz. On their way thither they bore down upon Admiral Collingwood, who had only three vessels with him; but he succeeded in eluding the pursuit, although chased by sixteen ships of the line. Ere one-half of the enemy had entered the harbour he drew up before it and resumed the blockade, at the same time employing an ingenious artifice to conceal the inferiority of his force. But the combined fleet was at last compelled to quit Cadiz; and the battle of Trafalgar immediately followed. The brilliant conduct of Admiral Collingwood upon this occasion has been much and justly applauded. The French admiral drew up his fleet in the form of a crescent, and in a double line, every alternate ship being about a cable's length to windward of her second, both ahead and astern. The British fleet bore down upon this formidable and skilfully arranged armament in two separate lines, the one led by Nelson in the "Victory," and the other by Collingwood in the "Royal Sovereign." The latter vessel was the swifter sailer, and having shot considerably ahead of the rest of the fleet, was the first engaged. "See," said Nelson, pointing to the "Royal Sovereign" as she penetrated the centre of the enemy's line, "see how that noble fellow Collingwood carries his ship into action!" Probably it was at the same instant that Collingwood, as if in response to the observation of his great commander, remarked to his captain, "What would Nelson give to be here?" The consummate valour and skill evinced by Collingwood had a powerful moral influence upon both fleets. It was with

the Spanish admiral's ship that the "Royal Sovereign" closed; and with such rapidity and precision did she pour in her broadsides upon the "Santa Anna," that the latter was on the eve of striking in the midst of thirty-three sail of the line, and almost before another British ship had fired a gun. Several other vessels, however, seeing the imminent peril of the Spanish flag-ship, came to her assistance, and hemmed in the "Royal Sovereign" on all sides; but the latter, after suffering severely, was relieved by the arrival of the rest of the British squadron; and not long afterwards the "Santa Anna" struck her colours. The result of the battle of Trafalgar, and the expense at which it was purchased, are well known. On the death of Nelson, Collingwood assumed the supreme command; and by his skill and judgment greatly contributed to the preservation of the British ships, as well as of those which were captured from the enemy. He was raised to the peerage as Baron Collingwood of Coldburne and Heathpool, and received the thanks of both Houses of Parliament, with a pension of £2000 per annum.

From this period until the death of Lord Collingwood no great naval action was fought; but he was much occupied in important political transactions, in which he displayed remarkable tact and judgment. Being appointed to the command of the Mediterranean fleet, he continued to cruise about, keeping a watchful eye upon the movements of the enemy. His health, however, which had begun to decline previously to the action of Trafalgar in 1805, seemed entirely to give way, and he repeatedly requested government to be relieved of his command, that he might return home; but he was urgently requested to remain, on the ground that his country could not dispense with his services. This conduct has been regarded as harsh; but the good sense and political sagacity which he displayed afford some palliation of the conduct of the government; and the high estimation in which he was held is proved by the circumstance that among the many able admirals, equal in rank and duration of service, none stood so prominently forward as to command the confidence of ministers and of the country to the same extent as he did. After many fruitless attempts to induce the enemy to put to sea, as well as to fall in with them when they had done so (which circumstance materially contributed to hasten his death), he expired on board the "Ville de Paris," then lying off Port Mahon, on the 7th of March 1810.

Lord Collingwood's merits as a naval officer were in every respect of the first order. In original genius and romantic daring he was inferior to Nelson, who indeed had no equal in an age fertile in great commanders. In seamanship, in general talent, and in reasoning upon the probability of events from a number of conflicting and ambiguous statements, Collingwood was equal to the hero of the Nile; indeed, many who were familiar with both give him the palm of superiority. His political penetration was remarkable; and so high was the opinion generally entertained of his judgment, that he was consulted in all quarters, and on all occasions, upon questions of general policy, of regulation, and even of trade. He was distinguished for benevolence and generosity; his acts of charity were frequent and bountiful, and the petition of real distress was never rejected by him. He was an enemy to impressment and to flogging; and so kind was he to his crew, that he obtained amongst them the honourable name of father. Between Nelson and Collingwood a close intimacy subsisted, from their first acquaintance in early life till the fall of the former at Trafalgar; and they lie side by side in the cathedral of St Paul's.

The selections from the public and private correspondence of Lord Collingwood, published in 2 vols., 8vo, in 1828, contain some of the best specimens of letter-writing in the language. See also *A Fine Old English Gentleman exemplified in the Life and Character of Lord Collingwood, a Biographical Study*, by William Davies (London, 1875).

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**COLLINGWOOD**, a city of Bourke county, Victoria, Australia, suburban to Melbourne on the N.E., on the Yarra Yarra river. Pop. (1901) 32,766. It was the first town in Victoria incorporated after Melbourne and Geelong. It is esteemed one of the healthiest of the metropolitan suburbs.

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**COLLINGWOOD**, a town of Simcoe county, Ontario, Canada, 90 m. N.N.W. of Toronto, on Georgian Bay, and on the Grand Trunk railway. Pop. (1901) 5755. It is the eastern terminus of two lines of steamers for the ports of Lakes Huron and Superior. It contains a large stone dry-dock and shipyard, pork factory, and saw and planing mills, and has a large lumber, grain and produce export trade, besides a shipbuilding plant and steel works.

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**COLLINS, ANTHONY** (1676-1729), English deist, was born at Heston, near Hounslow in Middlesex, on the 21st of June 1676. He was educated at Eton and King's College, Cambridge, and was for some time a student at the Middle Temple. The most interesting episode of his life was his intimacy with Locke, who in his letters speaks of him with affection and admiration. In 1715 he settled in Essex, where he held the offices of justice of the peace and deputy-lieutenant, which he had before held in Middlesex. He died at his house in Harley Street, London, on the 13th of December 1729.

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His writings are important as gathering together the results of previous English Freethinkers. The imperturbable courtesy of his style is in striking contrast to the violence of his opponents; and it must be remembered that, in spite of his unorthodoxy, he was not an atheist or even an agnostic. In his own words, "Ignorance is the foundation of atheism, and freethinking the cure of it" (*Discourse of Freethinking*, 105).

His first work of note was his *Essay concerning the Use of Reason in Propositions the Evidence whereof depends on Human Testimony* (1707), in which he rejected the distinction between *above* reason and *contrary to* reason, and demanded that revelation should conform to man's natural ideas of God. Like all his works, it was published anonymously, although the identity of the author was never long concealed. Six years later appeared his chief work, *A Discourse of Freethinking, occasioned by the Rise and Growth of a Sect called Freethinkers* (1713). Notwithstanding the ambiguity of its title, and the fact that it attacks the priests of all churches without moderation, it contends for the most part, at least explicitly, for no more than must be admitted by every Protestant. Freethinking is a right which cannot and must not be limited, for it is the only means of attaining to a knowledge of truth, it essentially contributes to the well-being of society, and it is not only permitted but enjoined by the Bible. In fact the first introduction of Christianity and the success of all missionary enterprise involve freethinking (in its etymological sense) on the part of those converted. In England this essay, which was regarded and treated as a plea for deism, made a great sensation, calling forth several replies, among others from William Whiston, Bishop Hare, Bishop Hoadly, and Richard Bentley, who, under the signature of *Phileleutherus Lipsiensis*, roughly handles certain arguments carelessly expressed by Collins, but triumphs chiefly by an attack on trivial points of scholarship, his own pamphlet being by no means faultless in this very respect. Swift also, being satirically referred to in the book, made it the subject of a caricature.

In 1724 Collins published his *Discourse of the Grounds and Reasons of the Christian Religion, with An Apology for Free Debate and Liberty of Writing* prefixed. Ostensibly it is written in opposition to Whiston's attempt to show that the books of the Old Testament did originally contain prophecies of events in the New Testament story, but that these had been eliminated or corrupted by the Jews, and to prove that the fulfilment of prophecy by the events of Christ's life is all "secondary, secret, allegorical, and mystical," since the original and literal reference is always to some other fact. Since, further, according to him the fulfilment of prophecy is the only valid proof of Christianity, he thus secretly aims a blow at Christianity as a revelation. The canonicity of the New Testament he ventures openly to deny, on the ground that the canon could be fixed only by men who were inspired. No less than thirty-five answers were directed against this book, the most noteworthy of which were those of Bishop Edward Chandler, Arthur Sykes and Samuel Clarke. To these, but with special reference to the work of Chandler, which maintained that a number of prophecies were literally fulfilled in Christ, Collins replied by his *Scheme of Literal Prophecy Considered* (1727). An appendix contends against Whiston that the book of *Daniel* was forged in the time of Antiochus Epiphanes (see [DEISM](#)).

In philosophy, Collins takes a foremost place as a defender of Necessitarianism. His brief *Inquiry Concerning Human Liberty* (1715) has not been excelled, at all events in its main outlines, as a statement of the determinist standpoint. One of his arguments, however, calls



for special criticism,—his assertion that it is self-evident that nothing that has a beginning can be without a cause is an unwarranted assumption of the very point at issue. He was attacked in an elaborate treatise by Samuel Clarke, in whose system the freedom of the will is made essential to religion and morality. During Clarke's lifetime, fearing perhaps to be branded as an enemy of religion and morality, Collins made no reply, but in 1729 he published an answer, entitled *Liberty and Necessity*.

Besides these works he wrote *A Letter to Mr Dodwell*, arguing that it is conceivable that the soul may be material, and, secondly, that if the soul be immaterial it does not follow, as Clarke had contended, that it is immortal; *Vindication of the Divine Attributes* (1710); *Priestcraft in Perfection* (1709), in which he asserts that the clause "the Church ... Faith" in the twentieth of the Thirty-nine Articles was inserted by fraud.

See Kippis, *Biographia Britannica*; G. Lechler, *Geschichte des englischen Deismus* (1841); J. Hunt, *Religious Thought in England*, ii. (1871); Leslie Stephen, *English Thought in the 18th Century*, i. (1881); A. W. Benn, *Hist. of English Rationalism in the 19th Century* (London, 1906), vol. i. ch. iii.; J. M. Robertson, *Short History of Freethought* (London, 1906); and Deism.

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**COLLINS, JOHN CHURTON** (1848-1908), English literary critic, was born on the 26th of March 1848 at Bourton on the Water, Gloucestershire. From King Edward's school, Birmingham, he went to Balliol College, Oxford, where he graduated in 1872, and at once devoted himself to a literary career, as journalist, essayist and lecturer. His first book was a study of Sir Joshua Reynolds (1874), and later he edited various classical English writers, and published volumes on *Bolingbroke and Voltaire in England* (1886), a *Study of English Literature* (1891), a study of *Dean Swift* (1893), *Essays and Studies* (1895), *Ephemera Critica* (1901), *Essays in Poetry and Criticism* (1905), and *Rousseau and Voltaire* (1908), his original essays being sharply controversial in tone, but full of knowledge. In 1904 he became professor of English literature at Birmingham University. For many years he was a prominent University Extension lecturer, and a constant contributor to the principal reviews. On the 15th of September 1908 he was found dead in a ditch near Lowestoft, at which place he had been staying with a doctor for the benefit of his health. The circumstances necessitated the holding of an inquest, the verdict being that of "accidental death."

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**COLLINS, MORTIMER** (1827-1876), English writer, was born at Plymouth, where his father, Francis Collins, was a solicitor, on the 29th of June 1827. He was educated at a private school, and after some years spent as mathematical master at Queen Elizabeth's College, Guernsey, he went to London, where he devoted himself to journalism in the Conservative interest. In 1855 he published his *Idyls and Rhymes*; and in 1865 appeared his first story, *Who is the Heir?* A second volume of lyrics, *The Inn of Strange Meetings*, was issued in 1871; and in 1872 he produced his longest and best sustained poem, *The British Birds, a communication from the Ghost of Aristophanes*. He also wrote several capital novels, the best of which is perhaps *Sweet Anne Page* (1868). Some of his lyrics, in their light grace, their sparkling wit, their airy philosophy, are equal to anything of their kind in modern English. On his second marriage in 1868 he settled at Knowl Hill, Berkshire. Collins was an athlete, an excellent pedestrian, and an enthusiastic lover of country life; and from this time he rarely left his home for a day. Conservative in his political and literary tastes, an ardent upholder of Church and State, he was yet a hater of convention; and his many and very varied gifts endeared him to a large circle of friends. He died on the 28th of July 1876.

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**COLLINS, WILLIAM** (1721-1759), English poet, was born on the 25th of December 1721. He divides with Gray the glory of being the greatest English lyricist of the 18th century. After some childish studies in Chichester, of which his father, a rich hatter, was the mayor, he was sent, in January 1733, to Winchester College, where Whitehead and Joseph Warton were his school-fellows. When he had been nine months at the school, Pope paid Winchester a visit and proposed a subject for a prize poem; it is legitimate to suppose that the lofty forehead, the brisk dark eyes and gracious oval of the childish face, as we know it in the only portrait existing of Collins, did not escape the great man's notice, then not a little occupied with the composition of the *Essay on Man*.

In 1734 the young poet published his first verses, in a sixpenny pamphlet on *The Royal Nuptials*, of which, however, no copy has come down to us; another poem, probably satiric, called *The Battle of the Schoolbooks*, was written about this time, and has also been lost. Fired by his poetic fellows to further feats in verse, Collins produced, in his seventeenth year, those *Persian Eclogues* which were the only writings of his that were valued by the world during his own lifetime. They were not printed for some years, and meanwhile Collins sent, in January and October 1739, some verses to the *Gentleman's Magazine*, which attracted the notice and admiration of Johnson, then still young and uninfluential. In March 1740 he was admitted a commoner of Queen's College, Oxford, but did not go up to Oxford until July 1741, when he obtained a demyship at Magdalen College. At Oxford he continued his affectionate intimacy with the Wartons, and gained the friendship of Gilbert White. Early in 1742 the *Persian Eclogues* appeared in London. They were four in number, and formed a modest pamphlet of not more than 300 lines in all. In a later edition, of 1759, the title was changed to *Oriental Eclogues*. Those pieces may be compared with Victor Hugo's *Les Orientales*, to which, of course, they are greatly inferior. Considered with regard to the time at which they were produced, they are more than meritorious, even brilliant, and one at least—the second—can be read with enjoyment at the present day. The rest, perhaps, will be found somewhat artificial and effete.

In November 1743 Collins was made bachelor of arts, and a few days after taking his degree published his second work, *Verses humbly addressed to Sir Thomas Hanmer*. This poem, written in heroic couplets, shows a great advance in individuality, and resembles, in its habit of personifying qualities of the mind, the riper lyrics of its author. For the rest, it is an enthusiastic review of poetry, culminating in a laudation of Shakespeare. It is supposed that he left Oxford abruptly in the summer of 1744 to attend his mother's death-bed, and did not return. He is said to have now visited an uncle in Flanders. His indolence, which had been no less marked at the university than his genius, combined with a fatal irresolution to make it extremely difficult to choose for him a path in life. The army and the church were successively suggested and rejected; and he finally arrived in London, bent on enjoying a small property as an independent man about town. He made the acquaintance of Johnson and others, and was urged by those friends to undertake various important writings—a *History of the Revival of Learning*, several tragedies, and a version of Aristotle's *Poetics*, among others—all of which he began but lacked force of will to continue. He soon squandered his means, plunged, with most disastrous effects, into profligate excesses, and sowed the seed of his untimely misfortune.

It was at this time, however, that he composed his matchless *Odes*—twelve in number—which appeared on the 12th of December 1746, dated 1747. The original project was to have combined them with the odes of Joseph Warton, but the latter proved at that time to be the more marketable article. Collins's little volume fell dead from the press, but it won him the admiration and friendship of the poet Thomson, with whom, until the death of the latter in 1748, he lived on terms of affectionate intimacy. In 1749 Collins was raised beyond the fear of poverty by the death of his uncle, Colonel Martyn, who left him about £2000, and he left London to settle in his native city. He had hardly begun to taste the sweets of a life devoted to literature and quiet, before the weakness of his will began to develop in the direction of insanity, and he hurried abroad to attempt to dispel the gathering gloom by travel. In the interval he had published two short pieces of consummate grace and beauty—the *Elegy on Thomson*, in 1749, and the *Dirge in Cymbeline*, later in the same year. In the beginning of 1750 he composed the *Ode on the Popular Superstitions of the Highlands*, which was dedicated to the author of *Douglas*, and not printed till long after the death of Collins, and an *Ode on the Music of the Grecian Theatre*, which no longer exists, and in which English literature probably has sustained a severe loss. With this poem his literary career closes, although he lingered in great misery for nearly nine years. From Gilbert White, who jotted down some pages of invaluable recollections of Collins in 1781, and from other friends, we learn that his madness was occasionally violent, and that he was confined for a time in an asylum at Oxford. But for the most part he resided at Chichester, suffering from extreme

debility of body when the mind was clear, and incapable of any regular occupation. Music affected him in a singular manner, and it is recorded that he was wont to slip out into the cathedral cloisters during the services, and moan and howl in horrible accordance with the choir. In this miserable condition he passed out of sight of all his friends, and in 1756 it was supposed, even by Johnson, that he was dead; in point of fact, however, his sufferings did not cease until the 12th of June 1759. No journal or magazine recorded the death of the forgotten poet, though Goldsmith, only two months before, had begun the laudation which was soon to become universal.

No English poet so great as Collins has left behind him so small a bulk of writings. Not more than 1500 lines of his have been handed down to us, but among these not one is slovenly, and few are poor. His odes are the most sculpturesque and faultless in the language. They lack fire, but in charm and precision of diction, exquisite propriety of form, and lofty poetic suggestion they stand unrivalled. The ode named *The Passions* is the most popular; that *To Evening* is the classical example of perfect unrhymed verse. In this, and the *Ode to Simplicity*, one seems to be handling an antique vase of matchless delicacy and elegance. In his descriptions of nature it is unquestionable that he owed something to the influence of Thomson. Distinction may be said to be the crowning grace of the style of Collins; its leading peculiarity is the incessant personification of some quality of the character. In the *Ode on Popular Superstitions* he produced a still nobler work; this poem, the most considerable in size which has been preserved, contains passages which are beyond question unrivalled for rich melancholy fulness in the literature between Milton and Keats.

The life of Collins was written by Dr Johnson; he found an enthusiastic editor in Dr Langhorne in 1765, and in 1858 a kindly biographer in Mr Moy Thomas.

(E. G.)

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**COLLINS, WILLIAM** (1787-1847), English painter, son of an Irish picture dealer and man of letters, the author of a *Life of George Morland*, was born in London. He studied under Etty in 1807, and in 1809 exhibited his first pictures of repute—"Boys at Breakfast," and "Boys with a Bird's Nest." In 1815 he was made associate of the Royal Academy, and was elected R. A. in 1820. For the next sixteen years he was a constant exhibitor; his fishermen, shrimp-catchers, boats and nets, stretches of coast and sand, and, above all, his rustic children were universally popular. Then, however, he went abroad on the advice of Wilkie, and for two years (1837-1838) studied the life, manners and scenery of Italy. In 1839 he exhibited the first fruits of this journey; and in 1840, in which year he was appointed librarian to the Academy, he made his first appearance as a painter of history. In 1842 he returned to his early manner and choice of subject, and during the last years of life enjoyed greater popularity than ever. Collins was a good colourist and an excellent draughtsman. His earlier pictures are deficient in breadth and force, but his later work, though also carefully executed, is rich in effects of tone and in broadly painted masses. His biography by his son, W. Wilkie Collins, the novelist, appeared in 1848.

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**COLLINS, WILLIAM WILKIE** (1824-1889), English novelist, elder son of William Collins, R.A., the landscape painter, was born in London on the 8th of January 1824. He was educated at a private school in Highbury, and when only a small boy of twelve was taken by his parents to Italy, where the family lived for three years. On their return to England Wilkie Collins was articled to a firm in the tea trade, but four years later he abandoned that business for the law, and was entered at Lincoln's Inn in 1846, being called to the bar three years later. He found little pleasure in his new career, however; though what he learned in it was exceedingly valuable to him later. On his father's death in 1847 young Collins made his first essay in literature, publishing the *Life of William Collins*, in two volumes, in the following year. In 1850 he put forth his first work of fiction, *Antonina, or the Fall of Rome*, which was clearly inspired by his life in Italy. *Basil* appeared in 1852, and *Hide and Seek* in

1854. About this time he made the acquaintance of Charles Dickens, and began to contribute to *Household Words*, where *After Dark* (1856) and *The Dead Secret* (1857) ran serially. His great success was achieved in 1860 with the publication of *The Woman in White*, which was first printed in *All the Year Round*. From that time he enjoyed as much popularity as any novelist of his day, *No Name* (1862), *Armadale* (1866), and *The Moonstone*, a capital detective story (1868), being among his most successful books. After *The New Magdalen* (1873) his ingenuity became gradually exhausted, and his later stories were little more than faint echoes of earlier successes. He died in Wimpole Street, London, on the 23rd of September 1889. Collins's gift was of the melodramatic order, and while many of his stories made excellent plays, several of them were actually reconstructed from pieces designed originally for stage production. But if his colours were occasionally crude and his methods violent, he was at least a master of situation and effect. His trick of telling a story through the mouths of different characters is sometimes irritatingly disconnected; but it had the merit of giving an air of actual evidence and reality to the elucidation of a mystery. He possessed in the highest degree the gift of absorbing interest; the turns and complexities of his plots are surprisingly ingenious, and many of his characters are not only real, but uncommon. Count Fosco in *The Woman in White* is perhaps his masterpiece; the character has been imitated again and again, but no imitation has ever attained to the subtlety and humour of the original.

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**COLLODION** (from the Gr. κόλλα, glue), a colourless, viscid fluid, made by dissolving gun-cotton and the other varieties of pyroxylin in a mixture of alcohol and ether. It was discovered in 1846 by Louis Nicolas Ménard in Paris, and independently in 1848 by Dr J. Parkers Maynard in Boston. The quality of collodion differs according to the proportions of alcohol and ether and the nature of the pyroxylin it contains. Collodion in which there is a great excess of ether gives by its evaporation a very tough film; the film left by collodion containing a large quantity of alcohol is soft and easily torn; but in hot climates the presence of an excess of alcohol is an advantage, as it prevents the rapid evaporation of the ether. Under the microscope, the film produced by collodion of good quality appears translucent and colourless. To preserve collodion it should be kept cool and out of the action of the light; iodized collodion that has been discoloured by the development of free iodine may be purified by the immersion in it of a strip of silver foil. For the iodizing of collodion, ammonium bromide and iodide, and the iodides of calcium and cadmium are the agents employed (see [PHOTOGRAPHY](#)). Collodion is used in surgery since, when painted on the skin, it rapidly dries and covers the skin with a thin film which contracts as it dries and therefore affords both pressure and protection. Flexible collodion, containing Canada balsam and castor oil, does not crack, but, on the other hand, does not contract. It is therefore of less value. Collodion is applied to small aseptic wounds, to small-pox pustules, and occasionally to the end of the urethra in boys in order to prevent nocturnal incontinence. Collodion and crystals of carbolic acid, taken in equal parts, are useful in relieving toothache due to the presence of a carious cavity. *Vesicating* or *Blistering Collodion* contains cantharidin as one of its constituents. The styptic colloid of Richardson is a strong solution of tannin in gun-cotton collodion. Similarly collodion may be impregnated with salicylic acid, carbolic acid, iodine and other substances. Small balloons are manufactured from collodion by coating the interior of glass globes with the liquid; the film when dry is removed from the glass by applying suction to the mouth of the vessel. M. E. Gripon found (*Compt. rend.*, 1875) that collodion membranes, like glass, reflect light and polarize it both by refraction and reflection; they also transmit a very much larger proportion of radiant heat, for the study of which they are preferable to mica.

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**COLLOT D'HERBOIS, JEAN MARIE** (1750-1796), French revolutionist, was a Parisian by birth and an actor by profession. After figuring for some years at the principal provincial theatres of France and Holland, he became director of the playhouse at Geneva. He had from the first a share in the revolutionary tumult; but it was not until 1791 that he became a

figure of importance. Then, however, by the publication of *L'Almanach du Père Gérard*,<sup>1</sup> a little book setting forth, in homely style, the advantages of a constitutional monarchy, he suddenly acquired great popularity. His renown was soon increased by his active interference on behalf of the Swiss of the Château-Vieux Regiment, condemned to the galleys for mutiny at Nancy. His efforts resulted in their liberation; he went himself to Brest in search of them; and a civic feast was decreed on his behalf and theirs, which gave occasion for one of the few poems published during his life by André Chénier. But his opinions became more and more radical. He was a member of the Commune of Paris on the 10th of August 1792, and was elected deputy for Paris to the Convention, where he was the first to demand the abolition of royalty (on the 21st of September 1792), and he voted the death of Louis XVI. "*sans sursis*." In the struggle between the Mountain and the Girondists he displayed great energy; and after the *coup d'état* of the 31st of May 1793 he made himself conspicuous by his pitiless pursuit of the defeated party. In June he was made president of the Convention; and in September he was admitted to the Committee of Public Safety, on which he was very active. After having entrusted him with several missions, the Convention sent him, on the 30th of October 1793, to Lyons to punish the revolt of that city. There he introduced the Terror in its most terrible form.

In May 1794 an attempt was made to assassinate Collot; but it only increased his popularity, and this won him the hatred of Robespierre, against whom he took sides on the 9th Thermidor, when he presided over the Convention during a part of the session. During the Thermidorian reaction he was one of the first to be accused of complicity with the fallen leader, but was acquitted. Denounced a second time, he defended himself by pleading that he had acted for the cause of the Revolution, but was condemned with Barère and Billaud-Varenne to transportation to Cayenne (March 1795), where he died early in 1796.

Collot d'Herbois wrote and adapted from the English and Spanish many plays, one of which, *Le Paysan magistrat*, kept the stage for several years. *L'Almanach du Père Gérard* was reprinted under the title of *Étrennes aux amis de la Constitution française, ou entretiens du Père Gérard avec ses concitoyens* (Paris, 1792).

See F. A. Aulard, *Les Orateurs de la Législative et de la Convention* (Paris, 1885-1886), t. ii. pp. 501-512. The principal documents relative to the trial of Collot d'Herbois, Barère and Billaud-Varenne are indicated in Aulard, *Recueil des actes du comité de salut public*, t. i. pp. 5 and 6.

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<sup>1</sup> Michel Gérard was a popular Breton peasant deputy (see [JACOBINS](#)).

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**COLLUSION** (from Lat. *colludere*, strictly, to play with), a secret agreement or compact for some improper purpose. In judicial proceedings, and particularly in matrimonial causes (see [DIVORCE](#)), collusion is a deceitful agreement between two or more persons, or between one of them and a third party, to bring an action against the other in order to obtain a judicial decision, or some remedy which would not have been obtained unless the parties had combined for the purpose or suppressed material facts or otherwise.

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**COLLYER, ROBERT** (1823- ), American Unitarian clergyman, was born in Keighley, Yorkshire, England, on the 8th of December 1823. At the age of eight he was compelled to leave school and support himself by work in a linen factory. He was naturally studious, however, and supplemented his scant schooling by night study. At fourteen he was apprenticed to a blacksmith, and for several years worked at this trade at Ilkley. In 1849 he became a local Methodist minister, and in the following year emigrated to the United States, where he obtained employment as a hammer maker at Shoemakersville, Pennsylvania. Here he soon began to preach on Sundays while still employed in the factory on week-days. His earnest, rugged, simple style of oratory made him extremely popular, and at once secured for him a wide reputation. His advocacy of anti-slavery principles, then frowned upon by the

Methodist authorities, aroused opposition, and eventually resulted in his trial for heresy and the revocation of his licence. He continued, however, as an independent preacher and lecturer, and in 1859, having joined the Unitarian Church, became a missionary of that church in Chicago, Illinois. In 1860 he organized and became pastor of the Unity Church, the second Unitarian church in Chicago. Under his guidance the church grew to be one of the strongest of that denomination in the West, and Mr Collyer himself came to be looked upon as one of the foremost pulpit orators in the country. During the Civil War he was active in the work of the Sanitary Commission. In 1879 he left Chicago and became pastor of the church of the Messiah in New York city, and in 1903 he became pastor emeritus. He published: *Nature and Life* (1867); *A Man in Earnest: Life of A. H. Conant* (1868); *The Life That Now is* (1871); *The Simple Truth* (1877); *Talks to Young Men: With Asides to Young Women* (1888); *Things New and Old* (1893); *Father Taylor* (1906); and *A History of the Town and Parish of Ilkley* (with Horsefall Turner, 1886).

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**COLMAN, SAINT** (d. 676), bishop of Lindisfarne, was probably an Irish monk at Iona. Journeying southwards he became bishop of Lindisfarne in 661, and a favoured friend of Oswio, king of Northumbria. He was at the synod of Whitby in 664, when the great dispute between the Roman and the Celtic parties in the church was considered; as spokesman of the latter party he upheld the Celtic usages, but King Oswio decided against him and his cause was lost. After this event Colman and some monks went to Iona and then to Ireland. He settled on the island of Inishbofin, where he built a monastery and where he died on the 8th of August 676.

Colman must be distinguished from St Colman of Cloyne (c. 522-600), an Irish saint, who became a Christian about 570; and also from another Irishman, St Colman Ela (553-610), a kinsman of St Columba. The word Colman is derived from the Latin *columbus*, a dove, and the *Book of Leinster* mentions 209 saints of this name.

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**COLMAN, GEORGE** (1732-1794), English dramatist and essayist, usually called "the Elder," and sometimes "George the First," to distinguish him from his son, was born in 1732 at Florence, where his father was stationed as resident at the court of the grand duke of Tuscany. Colman's father died within a year of his son's birth, and the boy's education was undertaken by William Pulteney, afterwards Lord Bath, whose wife was Mrs Colman's sister. After attending a private school in Marylebone, he was sent to Westminster School, which he left in due course for Christ Church, Oxford. Here he made the acquaintance of Bonnell Thornton, the parodist, and together they founded *The Connoisseur* (1754-1756), a periodical which, although it reached its 140th number, "wanted weight," as Johnson said. He left Oxford after taking his degree in 1755, and, having been entered at Lincoln's Inn before his return to London, he was called to the bar in 1757. A friendship formed with David Garrick did not help his career as a barrister, but he continued to practise until the death of Lord Bath, out of respect for his wishes.

In 1760 he produced his first play, *Polly Honeycomb*, which met with great success. In 1761 *The Jealous Wife*, a comedy partly founded on *Tom Jones*, made Colman famous. The death of Lord Bath in 1764 placed him in possession of independent means. In 1765 appeared his metrical translation of the plays of Terence; and in 1766 he produced *The Clandestine Marriage*, jointly with Garrick, whose refusal to take the part of Lord Ogleby led to a quarrel between the two authors. In the next year he purchased a fourth share in the Covent Garden Theatre, a step which is said to have induced General Pulteney to revoke a will by which he had left Colman large estates. The general, who died in that year, did, however, leave him a considerable annuity. Colman was acting manager of Covent Garden for seven years, and during that period he produced several "adapted" plays of Shakespeare. In 1768 he was elected to the Literary Club, then nominally consisting of twelve members. In 1774 he sold his share in the great playhouse, which had involved him in much litigation with his partners, to Leake; and three years later he purchased of Samuel Foote, then

broken in health and spirits, the little theatre in the Haymarket. He was attacked with paralysis in 1785; in 1789 his brain became affected, and he died on the 14th of August 1794. Besides the works already cited, Colman was author of adaptations of Beaumont and Fletcher's *Bonduca*, Ben Jonson's *Epicoene*, Milton's *Comus*, and of other plays. He also produced an edition of the works of Beaumont and Fletcher (1778), a version of the *Ars Poëtica* of Horace, an excellent translation from the *Mercator* of Plautus for Bonnell Thornton's edition (1769-1772), some thirty plays, many parodies and occasional pieces. An incomplete edition of his dramatic works was published in 1777 in four volumes.

His son, GEORGE COLMAN (1762-1836), known as "the Younger," English dramatist and miscellaneous writer, was born on the 21st of October 1762. He passed from Westminster school to Christ Church, Oxford, and King's College, Aberdeen, and was finally entered as a student of law at Lincoln's Inn, London. While in Aberdeen he published a poem satirizing Charles James Fox, called *The Man of the People*; and in 1782 he produced, at his father's playhouse in the Haymarket, his first play, *The Female Dramatist*, for which Smollett's *Roderick Random* supplied the materials. It was unanimously condemned, but *Two to One* (1784) was entirely successful. It was followed by *Turk and no Turk* (1785), a musical comedy; *Inkle and Yarico* (1787), an opera; *Ways and Means* (1788); *The Iron Chest* (1796), taken from William Godwin's *Adventures of Caleb Williams*; *The Poor Gentleman* (1802); *John Bull, or an Englishman's Fireside* (1803), his most successful piece; *The Heir at Law* (1808), which enriched the stage with one immortal character, "Dr Pangloss," and numerous other pieces, many of them adapted from the French.

The failing health of the elder Colman obliged him to relinquish the management of the Haymarket theatre in 1789, when the younger George succeeded him, at a yearly salary of £600. On the death of the father the patent was continued to the son; but difficulties arose in his way, he was involved in litigation with Thomas Harris, and was unable to pay the expenses of the performances at the Haymarket. He was forced to take sanctuary within the Rules of the King's Bench. Here he resided for many years continuing to direct the affairs of his theatre. Released at last through the kindness of George IV., who had appointed him exon of the Yeomen of the Guard, a dignity disposed of by Colman to the highest bidder, he was made examiner of plays by the duke of Montrose, then lord chamberlain. This office, to the disgust of all contemporary dramatists, to whose MSS. he was as illiberal as he was severe, he held till his death. Although his own productions were open to charges of indecency and profanity, he was so severe a censor of others that he would not pass even such words as "heaven," "providence" or "angel." His comedies are a curious mixture of genuine comic force and sentimentality. A collection of them was published (1827) in Paris, with a life of the author, by J. W. Lake.

Colman, whose witty conversation made him a favourite, was also the author of a great deal of so-called humorous poetry (mostly coarse, though much of it was popular)—*My Night Gown and Slippers* (1797), reprinted under the name of *Broad Grins*, in 1802; and *Poetical Vagaries* (1812). Some of his writings were published under the assumed name of Arthur Griffinhood of Turnham Green. He died in Brompton, London, on the 17th of October 1836. He had, as early as 1784, contracted a runaway marriage with an actress, Clara Morris, to whose brother David Morris, he eventually disposed of his share in the Haymarket theatre. Many of the leading parts in his plays were written especially for Mrs Gibbs (*née* Logan), whom he was said to have secretly married after the death of his first wife.

See the second George Colman's memoirs of his early life, entitled *Random Records* (1830), and R. B. Peake, *Memoirs of the Colman Family* (1842).

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**COLMAN, SAMUEL** (1832- ), American landscape painter, was born at Portland, Maine, on the 4th of March 1832. He was a pupil of Ashur B. Durand in New York, and in 1860-1862 studied in Spain, Italy, France and England. In 1871-1876 he was again in Europe. In 1860, with James D. Smilie, he founded the American Water Color Society, and became its first president (1866-1867), his own water-colour paintings being particularly fine. He was elected a member of the National Academy of Design in 1862. Among his works are "The Ships of the Western Plains," in the Union League Club, New York; and "The Spanish Peaks, Colorado," in the Metropolitan Museum, New York.

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**COLMAR**, or **KOLMAR**, a town of Germany, in the imperial province of Alsace-Lorraine, formerly the capital of the department of Haut-Rhin in France, on the Logelbach and Lauch, tributaries of the Ill, 40 m. S.S.W. from Strassburg on the main line of railway to Basel. Pop. (1905) 41,582. It is the seat of the government for Upper Alsace, and of the supreme court of appeal for Alsace-Lorraine. The town is surrounded by pleasant promenades, on the site of the old fortifications, and has numerous narrow and picturesque streets. Of its edifices the most remarkable are the Roman Catholic parish church of St Martin, known also as the *Münster*, dating from the 13th and 14th centuries, the Lutheran parish church (15th century), the former Dominican monastery (1232-1289), known as "Unterlinden" and now used as a museum, the Kaufhaus (trade-hall) of the 15th century, and the handsome government offices (formerly the Prefecture). Colmar is the centre of considerable textile industries, comprising wool, cotton and silk-weaving, and has important manufactures of sewing thread, starch, sugar and machinery. Bleaching and brewing are also carried on, and the neighbourhood is rich in vineyards and fruit-gardens. The considerable trade of the place is assisted by a chamber of commerce and a branch of the Imperial Bank (Reichsbank).

Colmar (probably the *columbarium* of the Romans) is first mentioned, as a royal *villa*, in a charter of Louis the Pious in 823, and it was here that Charles the Fat held a diet in 884. It was raised to the status of a town and surrounded with walls by Wölfelin, advocate (*Landvogt*) of the emperor Frederick II. in Alsace, a masterful and ambitious man, whose accumulated wealth was confiscated by the emperor in 1235, and who is said to have been murdered by his wife lest her portion should also be seized. In 1226 Colmar became an imperial city, and the civic rights (*Stadtrecht*) conferred on it in 1274 by Rudolph of Habsburg became the model for those of many other cities. Its civic history is much the same as that of other medieval towns: a struggle between the democratic guilds and the aristocratic "families," which ended in 1347 in the inclusion of the former in the governing body, and in the 17th century in the complete exclusion of the latter. In 1255 Colmar joined the league of Rhenish cities, and in 1476 and 1477 took a vigorous share in the struggle against Charles the Bold. In 1632, during the Thirty Years' War, it was taken by the Swedes, and in 1635 by the French, who held it till after the Peace of Westphalia (1649). In 1673 the French again occupied it and dismantled the fortifications. In 1681 it was formally annexed to France by a decree of Louis XIV.'s *Chambre de Réunion*, and remained French till 1871, when it passed with Alsace-Lorraine to the new German empire.

See "Annalen und Chronik von Kolmar," German translation, G. H. Pabst, in *Geschichtsschreiber der deutschen Vorzeit* (2nd ed., G. Wattenbach, Leipzig, 1897); Sigmund Billing, *Kleine Chronik der Stadt Kolmar* (Colmar, 1891); Hund, *Kolmar vor und während seiner Entwicklung zur Reichsstadt* (Strassburg, 1899); J. Liblin, *Chronique de Colmar*, 58-1400 (Mülhausen, 1867-1868); T. F. X. Hunkler, *Gesch. der Stadt Kolmar* (Colmar, 1838). For further references see Ulysse Chevalier, *Répertoire des sources. Topobibliographie* (Montbéliard, 1894-1899); and Waltz, *Bibliographie de la ville de Colmar* (Mülhausen, 1902).

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**COLNE**, a market town and municipal borough in the Clitheroe parliamentary division of Lancashire, England, 34½ m. N. by E. from Manchester by the Lancashire & Yorkshire railway; it is served also by a branch of the Midland railway from Skipton. Pop. (1901) 23,000. It stands on a hilly site above a small affluent of the river Calder. The church of St Bartholomew retains some Norman work, but is chiefly of various later periods. There is a cloth hall or piece hall, originally used as an exchange when woollens were the staple of the town. The grammar school is of interest as the place where John Tillotson (1630-1694), archbishop of Canterbury, received early education. Colne is a place of great antiquity, and many Roman coins have been found on the site. As early as the 14th century it was the seat of a woollen manufacture; but its principal manufactures now are cottons, printed calicoes and muslin. In the neighbourhood are several limestone and slate quarries. The town was incorporated in 1895, and the corporation consists of a mayor, 6 aldermen and 18 councillors. Area, 5063 acres.



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**COLOCYNTH**, COLOQUINTIDA OR BITTER APPLE, *Citrullus Colocynthis*, a plant of the natural order Cucurbitaceae. The flowers are unisexual; the male blossoms have five stamens with sinuous anthers, the female have reniform stigmas, and an ovary with three large fleshy placentas. The fruit is round, and about the size of an orange; it has a thick yellowish rind, and a light, spongy and very bitter pulp, which yields the colocynth of druggists. The seeds, which number from 200 to 300, and are disposed in vertical rows on the three parietal placentas of the fruit, are flat and ovoid and dark-brown; they are used as food by some of the tribes of the Sahara, and a coarse oil is expressed from them. The pulp contains only about 3.5% of fixed oil, whilst the seeds contains about 15%. The foliage resembles that of the cucumber, and the root is perennial. The plant has a wide range, being found in Ceylon, India, Persia, Arabia, Syria, North Africa, the Grecian Archipelago, the Cape Verd Islands, and the south-east of Spain. The term *pakkuoth*, translated "wild gourds" in 2 Kings iv. 39, is thought to refer to the fruit of the colocynth; but, according to Dr Olaf Celsius (1670-1756), a Swedish theologian and naturalist, it signifies a plant known as the squirting cucumber, *Ecbalium Elaterium*.

The commercial colocynth consists of the peeled and dried fruits. In the preparation of the drug, the seeds are always removed from the pulp. Its active principle is an intensely bitter amorphous or crystalline glucoside, colocynthin,  $C_{56}H_{84}O_{23}$ , soluble in water, ether and alcohol, and decomposable by acids into glucose and a resin, colocynthein,  $C_{40}H_{54}O_{13}$ . Colocynthein also occurs as such in the drug, together with at least two other resins, citrullin and colocynthiden. Colocynthin has been used as a hypodermic purgative—a class of drugs practically nonexistent, and highly to be desired in numberless cases of apoplexy. The dose recommended for hypodermic injection is fifteen minims of a 1% solution in glycerin.

The British Pharmacopeia contains a compound extract of colocynth, which no one ever uses; a compound pill—dose 4 to 8 grains—in which oil of cloves is included in order to relieve the griping caused by the drug; and the *Pilula Colocynthidis et Hyoscyami*, which contains 2 parts of the compound pill to 1 of extract of hyoscyamus. This is by far the best preparation, the hyoscyamus being added to prevent the pain and griping which is attendant on the use of colocynth alone. The official dose of this pill is 4 to 8 grains, but the most effective and least disagreeable manner in which to obtain its action is to give four two-grain pills at intervals of an hour or so.

In minute doses colocynth acts simply as a bitter, but is never given for this purpose. In ordinary doses it greatly increases the secretion of the small intestine and stimulates its muscular coat. The gall-bladder is also stimulated, and the biliary function of the liver, so that colocynth is both an excretory and a secretory cholagogue. The action which follows hypodermic injection is due to the excretion of the drug from the blood into the alimentary canal. Though colocynth is a drastic hydragogue cathartic, it is desirable, as a rule, to supplement its action by some drug, such as aloes, which acts on the large intestine, and a sedative must always be added. Owing to its irritant properties, the drug must not be used habitually, but it is very valuable in initiating the treatment of simple chronic constipation, and its pharmacological properties obviously render it especially useful in cases of hepatitis and congestion of the liver.

Colocynth was known to the ancient Greek, Roman and Arabic physicians; and in an Anglo-Saxon herbal of the 11th century (Cockayne, *Leechdoms, &c.*, vol. i. p. 325, London, 1864), the following directions are given as to its use:—"For stirring of the inwards, take the inward neshness of the fruit, without the kernels, by weight of two pennies; give it, pounded in lithe beer to be drunk, it stirreth the inwards."

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**COLOGNE** (Ger. *Köln*, or officially, since 1900, *Cöln*), a city and archiepiscopal see of Germany, in the Prussian Rhine province, a fortress of the first rank, and one of the most important commercial towns of the empire. Pop. (1885) 239,437; (1900) 370,685; (1905)

428,503, of which about 80% are Roman Catholics. It lies in the form of a vast semicircle on the left bank of the Rhine, 44 m. by rail north-east from Aix-la-Chapelle, 24 south-east from Düsseldorf and 57 north-north-west from Coblenz. Its situation on the broad and navigable Rhine, and at the centre of an extensive network of railways, giving it direct communication with all the important cities of Europe, has greatly fostered its trade, while its close proximity to the beautiful scenery of the Rhine, has rendered it a favourite tourist resort. When viewed from a distance, especially from the river, the city, with its medieval towers and buildings, the whole surmounted by the majestic cathedral, is picturesque and imposing. The ancient walls and ditches, which formerly environed the city, were dismantled between 1881 and 1885, and the site of the old fortifications, bought from the government by the municipality, were converted into a fine boulevard, the Ring, nearly 4 m. long. Beyond the Ring, about  $\frac{1}{2}$  m. farther out, a new continuous line of wall fortifications, with outlying clusters of earthworks and forts, has since been erected; 1000 acres, now occupied by handsome streets, squares and two public parks, were thus added to the inner town, almost doubling its area.

Cologne is connected by bridges with the suburb of Deutz. Within the outer municipal boundary are included (besides Deutz) the suburbs of Bayenthal, Lindenthal, Ehrenfeld, Nippes, Sülz, Bickendorf, Niehl and Poll, protected by another widely extended circle of detached forts on both banks of the Rhine. Of the former city gates four have been retained, restored and converted into museums: the Severin gate, on the south, contains the geological section of the natural history museum; the Hahnen gate, on the west, is fitted as the historical and antiquarian museum of the city; and the Eigelstein gate, on the north, accommodates the zoological section of the natural history museum.

Cologne, with the tortuous, narrow and dark streets and lanes of the old inner town, is still regarded as one of the least attractive capital cities of Germany; but in modern times it has been greatly improved, and the evil smells which formerly characterized it have yielded to proper sanitary arrangements. The most important squares are the Domhof, the Heumarkt, Neumarkt, Alte Markt and Waidmarkt in the old inner, and the Hansa-platz in the new inner town. The long Hohe-strasse of the old town is the chief business street.

The cathedral or Dom, the principal edifice and chief object of interest in Cologne, is one of the finest and purest monuments of Gothic architecture in Europe (for plan, &c. see [ARCHITECTURE: Romanesque and Gothic in Germany](#)). It stands on the site of a cathedral begun about the beginning of the 9th century by Hildebold, metropolitan of Cologne, and finished under Willibert in 873. This structure was ruined by the Normans, was rebuilt, but in 1248 was almost wholly destroyed by fire. The foundation of the present cathedral was then laid by Conrad of Hochstaden (archbishop from 1238 to 1261). The original plan of the building has been attributed to Gerhard von Rile (d. c. 1295). In 1322 the new choir was consecrated, and the bones of the Three Kings were removed to it from the place they had occupied in the former cathedral. After Conrad's death the work of building advanced but slowly, and at the time of the Reformation it ceased entirely. In the early part of the 19th century the repairing of the cathedral was taken in hand, in 1842 the building of fresh portions necessary for the completion of the whole structure was begun, and on the 15th of October 1880 the edifice, finally finished, was opened in the presence of the emperor William I. and all the reigning German princes. The cathedral, which is in the form of a cross, has a length of 480, and a breadth of 282 ft.; the height of the central aisle is 154 ft.; that of each of the towers 511 ft. The heaviest of the seven bells (*Kaiserglocke*), cast in 1874 from the metal of French guns, weighs 543 cwt., and is the largest and heaviest bell that is rung. In the choir the heart of Marie de' Medici is buried; and in the adjoining side-chapels are monuments of the founder and other archbishops of Cologne, and the shrine of the Three Kings, which is adorned with gold and precious stones. The three kings of Cologne (Kaspar, Melchior and Balthazar) were supposed to be the three wise men who came from the East to pay adoration to the infant Christ; according to the legend, the emperor Frederick I. Barbarossa brought their bones from Milan in 1162, and had them buried in Cologne cathedral, and miraculous powers of healing were attributed to these relics. The very numerous and richly-coloured windows, presented at various times to the cathedral, add greatly to the imposing effect of the interior. The view of the cathedral has been much improved by a clearance of the old houses on the Domhof, including the archiepiscopal palace, but the new Hof, though flanked by many fine buildings, is displeasing owing to the intrusion of numerous modern palatial hotels and shops.

Among the other churches of Cologne, which was fondly styled in the middle ages the "holy city" (*heilige Stadt*) and "German Rome," and, according to legend, possessed as many sacred fanes as there are days in the year, are several of interest both for their age and for

the monuments and works of art they contain. In St Peter's are the famous altar-piece by Rubens, representing the Crucifixion of St Peter, several works by Lucas van Leyden, and some old German glass-paintings. St Martin's, built between the 10th and 12th centuries, has a fine baptistery; St Gereon's, built in the 11th century on the site of a Roman rotunda, is noted for its mosaics, and glass and oil-paintings; the Minorite church, begun in the same year as the cathedral, contains the tomb of Duns Scotus. Besides these may be mentioned the church of St Pantaleon, a 13th-century structure, with a monument to Theophano, wife of the emperor Otto II.; St Cunibert, in the Byzantine-Moorish style, completed in 1248; St Maria im Capitol, the oldest church in Cologne, dedicated in 1049 by Pope Leo IX., noted for its crypt, organ and paintings; St Cecilia, St Ursula, containing the bones of that saint and, according to legend, of the 11,000 English virgins massacred near Cologne while on a pilgrimage to Rome; St Severin, the church of the Apostles, and that of St Andrew (1220 and 1414), which contains the remains of Albertus Magnus in a gilded shrine. Most of these, and also many other old churches, have been completely restored. Among newer ecclesiastical buildings must be mentioned the handsome Roman Catholic church in Deutz, completed in 1896, and a large synagogue, in the new town west of the Ring, finished in 1899.

Among the more prominent secular buildings are the Gürzenich, a former meeting-place of the diets of the Holy Roman Empire, built between 1441 and 1447, of which the ground floor was in 1875 converted into a stock exchange, and the upper hall, capable of accommodating 3000 persons, is largely utilized for public festivities, particularly during the time of the Carnival: the Rathaus, dating from the 13th century, with beautiful Gobelin tapestries; the Tempelhaus, the ancestral seat of the patrician family of the Overstolzens, a beautiful building dating from the 13th century, and now the chamber of commerce; the Wallraf-Richartz Museum, in which is a collection of paintings by old Italian and Dutch masters, together with some works by modern artists; the Zeughaus, or arsenal, built on Roman foundations; the Supreme Court for the Rhine provinces; the post-office (1893); the Imperial Bank (Reichsbank); and the municipal library and archives. The Wolkenburg, a fine Gothic house of the 15th century, originally a patrician residence, was restored in 1874, and is now the headquarters of the famous men's choral society of Cologne (Kölner Männergesangverein).

A handsome central railway station (high level), on the site of the old station, and close to the cathedral, was built in 1889-1894. The railway to Bonn and the Upper Rhine now follows the line of the *ceinture* of the new inner fortifications, and on this section there are three city stations in addition to the central. Like all important German towns, Cologne contains many fine monuments. The most conspicuous is the colossal equestrian statue (22½ ft. high) of Frederick William III. of Prussia in the Heumarkt. There are also monuments to Moltke (1881), to Count Johann von Werth (1885), the cavalry leader of the Thirty Years' War, and to Bismarck (1879). Near the cathedral is an archiepiscopal museum of church antiquities. Cologne is richly endowed with literary and scientific institutions. It has an academy of practical medicine, a commercial high school, a theological seminary, four Gymnasia (classical schools), numerous lower-grade schools, a conservatory of music and several high-grade ladies' colleges. Of its three theatres, the municipal theatre (Stadttheater) is famed for its operatic productions.

Commercially, Cologne is one of the chief centres on the Rhine, and has a very important trade in corn, wine, mineral ores, coals, drugs, dyes, manufactured wares, groceries, leather and hides, timber, porcelain and many other commodities. A large new harbour, with spacious quays, has been constructed towards the south of the city. In 1903, the traffic of the port amounted to over one million tons. Industrially, also, Cologne is a place of high importance. Of the numerous manufactures, among which may be especially mentioned sugar, chocolate, tobacco and cigars, the most famous is the perfume known as *eau de Cologne (q.v.) (Kölnisches Wasser, i.e. Cologne-water)*.

Of the newspapers published at Cologne the most important is the *Kölnische Zeitung* (often referred to as the "Cologne Gazette"), which has the largest circulation of any paper in Germany, and great weight and influence. It must be distinguished from the *Kölnische Volkszeitung*, which is the organ of the Clerical party in the Prussian Rhine provinces.

*History.*—Cologne occupies the site of *Oppidum Ubiorum*, the chief town of the Ubii, and here in A.D. 50 a Roman colony, *Colonia*, was planted by the emperor Claudius, at the request of his wife Agrippina, who was born in the place. After her it was named Colonia Agrippina or Agrippinensis. Cologne rose to be the chief town of Germania Secunda, and had the privilege of the Jus Italicum. Both Vitellius and Trajan were at Cologne when they became emperors. About 330 the city was taken by the Franks but was not permanently occupied by them till the 5th century, becoming in 475 the residence of the Frankish king Childeric. It

was the seat of a *pagus* or *gau*, and counts of Cologne are mentioned in the 9th century.

The succession of bishops in Cologne is traceable, except for a gap covering the troubled 5th century, from A.D. 313, when the see was founded. It was made the metropolitan see for the bishoprics of the Lower Rhine and part of Westphalia by Charlemagne, the first archbishop being Hildebold, who occupied the see from 785 to his death in 819. Of his successors one of the most illustrious was Bruno (*q.v.*), brother of the emperor Otto I., archbishop from 953 to 965, who was the first of the archbishops to exercise temporal jurisdiction, and was also "archduke" of Lorraine. The territorial power of the archbishops was already great when, in 1180, on the partition of the Saxon duchy, the duchy of Westphalia was assigned to them. In the 11th century they became *ex-officio* arch-chancellors of Italy (see [ARCHCHANCELLOR](#)), and by the Golden Bull of 1356 they were finally placed among the electors (*Kurfürsten*) of the Empire. With Cologne itself, a free imperial city, the archbishop-electors were at perpetual feud; in 1262 the archiepiscopal see was transferred to Brühl, and in 1273 to Bonn; it was not till 1671 that the quarrel was finally adjusted. The archbishopric was secularized in 1801, all its territories on the left bank of the Rhine being annexed to France; in 1803 those on the right bank were divided up among various German states; and in 1815 by the congress of Vienna, the whole was assigned to Prussia. The last archbishop-electors, Maximilian of Austria, died in 1801.

In Archbishop Hildebold's day Cologne was still contained by the square of its Roman walls, within which stood the cathedral and the newly-founded church of St Maria (known later as "im Capitol"); the city was, however, surrounded by a ring of churches, among which those of St Gereon, St Ursula, St Severin and St Cunibert were conspicuous. In 881 Norman pirates, sailing up the Rhine, took and sacked the city; but it rapidly recovered, and in the 11th century had become the chief trading centre of Germany. Early in the 12th century the city was enlarged by the inclusion of suburbs of Oversburg; Niederich and St Aposteln; in 1180 these were enclosed in a permanent rampart which, in the 13th century, was strengthened with the walls and gates that survived till the 19th century.

The municipal history of Cologne is of considerable interest. In general it follows the same lines as that of other cities of Lower Germany and the Netherlands. At first the bishop ruled through his burgrave, advocate, and nominated jurats (*scabini*, *Schöffen*). Then, as the trading classes grew in wealth, his jurisdiction began to be disputed; the *conjuratio pro libertate* of 1112 seems to have been an attempt to establish a commune (see [COMMUNE, MEDIEVAL](#)). Peculiar to Cologne, however, was the *Richerzeche* (*rigirzegheide*), a corporation of all the wealthy patricians, which gradually absorbed in its hands the direction of the city's government (the first record of its active interference is in 1225). In the 13th century the archbishops made repeated efforts to reassert their authority, and in 1259 Archbishop Conrad of Hochstaden, by appealing to the democratic element of the population, the "brotherhoods" (*fraternitates*) of the craftsmen, succeeded in overthrowing the Richerzeche and driving its members into exile. His successor, Engelbert II., however, attempted to overthrow the democratic constitution set up by him, with the result that in 1262 the brotherhoods combined with the patricians against the archbishop, and the Richerzeche returned to share its authority with the elected "great council" (*Weiter Rat*). As yet, however, none of the trade or craft guilds, as such, had a share in the government, which continued in the hands of the patrician families, membership of which was necessary even for election to the council and to the parochial offices. This continued long after the battle of Worringen (1288) had finally secured for the city full self-government, and the archbishops had ceased to reside within its walls. In the 14th century a narrow patrician council selected from the Richerzeche, with two burgomasters, was supreme. In 1370 an insurrection of the weavers was suppressed; but in 1396, the rule of the patricians, having been weakened by internal dissensions, a bloodless revolution led to the establishment of a comparatively democratic constitution, based on the organization of the trade and craft guilds, which lasted with but slight modification till the French Revolution.

The greatness of Cologne, in the middle ages as now, was due to her trade. Wine and herrings were the chief articles of her commerce; but her weavers had been in repute from time immemorial, and exports of cloth were large, while her goldsmiths and armourers were famous. So early as the 11th century her merchants were settled in London, their colony forming the nucleus of the Steelyard. When, in 1201, the city joined the Hanseatic League (*q.v.*) its power and repute were so great that it was made the chief place of a third of the confederation.

In spite of their feuds with the archbishops, the burghers of Cologne were staunch Catholics, and the number of the magnificent medieval churches left is evidence at once of their piety and their wealth. The university, founded in 1389 by the sole efforts of the

citizens, soon gained a great reputation; in the 15th century its students numbered much more than a thousand, and its influence extended to Scotland and the Scandinavian kingdoms. Its decline began, however, from the moment when the Catholic sentiment of the city closed it to the influence of the Reformers; the number of its students sank to vanishing point, and though, under the influence of the Jesuits, it subsequently revived, it never recovered its old importance. A final blow was dealt it when, in 1777, the enlightened archbishop Maximilian Frederick (d. 1784) founded the university of Bonn, and in 1798, amid the confusion of the revolutionary epoch, it ceased to exist.

The same intolerance that ruined the university all but ruined the city too. It is difficult, indeed, to blame the burghers for resisting the dubious reforming efforts of Hermann of Wied, archbishop from 1515 to 1546, inspired mainly by secular ambitions; but the expulsion of the Jews in 1414, and still more the exclusion, under Jesuit influence, of Protestants from the right to acquire citizenship, and from the magistracy, dealt severe blows at the prosperity of the place. A variety of other causes contributed to its decay: the opening up of new trade routes, the gradual ossification of the guilds into close and corrupt corporations, above all the wars in the Netherlands, the Thirty Years' War, and the Wars of the Spanish and Austrian Succession. When in 1794 Cologne was occupied by the French, it was a poor and decayed city of some 40,000 inhabitants, of whom only 6000 possessed civic rights. When, in 1801, by the treaty of Lunéville, it was incorporated in France, it was not important enough to be more than the chief town of an *arrondissement*. On the death of the last elector in 1801 the archiepiscopal see was left vacant. With the assignment of the city to Prussia by the congress of Vienna in 1815 a new era of prosperity began. The university, indeed, was definitively established at Bonn, but the archbishopric was restored (1821) as part of the new ecclesiastical organization of Prussia, and the city became the seat of the president of a governmental district. Its prosperity now rapidly increased; when railways were introduced it became the meeting-place of several lines, and in 1881 its growth necessitated the pushing outward of the circle of fortifications.

See L. Ennen, *Gesch. der Stadt Köln* (5 vols., Cologne, 1863-1880) to 1648, and *Frankreich und der Niederrhein* (2 vols., ib., 1855, 1856), a history of the city and electorate of Cologne since the Thirty Years' War; R. Schultze and C. Steuernagel, *Colonia Agrippinensis* (Bonn, 1895); K. Heldmann, *Der Kölngau und die Civitas Köln* (Halle, 1900); L. Korth, *Köln im Mittelalter* (Cologne, 1890); F. Lau, *Entwicklung der kommunalen Verfassung der Stadt Köln bis zum Jahre 1396* (Bonn, 1898); K. Hegel, *Städte und Gilden der germanischen Völker im Mittelalter* (2 vols., Leipzig, 1891), ii. p. 323; H. Keussen, *Historische Topographie der Stadt Köln im Mittelalter* (Bonn, 1906); W. Behnke, *Aus Kölns Franzosenzeit* (Cologne, 1901); Helmken, *Köln und seine Sehenswürdigkeiten* (20th ed., Cologne, 1903). For sources see L. Ennen and G. Eckertz, *Quellen zur Geschichte der Stadt Köln* (6 vols., Cologne, 1860-1879); later sources will be found in U. Chevalier, *Répertoire des sources hist. Topobibliographie* (Montbéliard, 1894-1899), s.v. Cologne, which gives also a full list of works on everything connected with the city; also in Dahlmann-Waitz, *Quellenkunde* (ed. Leipzig, 1906), p. 17, Nos. 252, 253. For the archdiocese and electorate of Cologne see Binterim and Mooren, *Die Erzdiözese Köln bis zur französischen Staatsumwälzung*, new ed. by A. Mooren in 2 vols. (Düsseldorf, 1892, 1893).

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**COLOMAN** (1070-1116), king of Hungary, was the son of King Geza of Hungary by a Greek concubine. King Ladislaus would have made the book-loving youth a monk, and even designated him for the see of Eger; but Coloman had no inclination for an ecclesiastical career, and, with the assistance of his friends, succeeded in escaping to Poland. On the death of Ladislaus (1095), he returned to Hungary and seized the crown, passing over his legitimately born younger brother Almos, the son of the Greek princess Sinadene. Almos did not submit to this usurpation, and was more or less of an active rebel till 1108, when the emperor Henry V. espoused his cause and invaded Hungary. The Germans were unsuccessful; but Coloman thought fit to be reconciled with his kinsman and restored to him his estates. Five years later, however, fearing lest his brother might stand in the way of his heir, the infant prince Stephen, Coloman imprisoned Almos and his son Béla in a monastery and had them blinded. Despite his adoption of these barbarous Byzantine methods, Coloman was a good king and a wise ruler. In foreign affairs he preserved the policy of St Ladislaus by endeavouring to provide Hungary with her greatest need, a suitable seaboard. In 1097 he overthrew Peter, king of Croatia, and acquired the greater part of Dalmatia, though here he

encountered formidable rivals in the Greek and German emperors, Venice, the pope and the Norman-Italian dukes, all equally interested in the fate of that province, so that Coloman had to proceed cautiously in his expansive policy. By 1102, however, Zara, Traú, Spalato and all the islands as far as the Cetina were in his hands. But it was as a legislator and administrator that Coloman was greatest (see [HUNGARY: History](#)). He was not only one of the most learned, but also one of the most statesmanlike sovereigns of the earlier middle ages. Coloman was twice married, (1) in 1097 to Buzella, daughter of Roger, duke of Calabria, the chief supporter of the pope, and (2) in 1112 to the Russian princess, Euphemia, who played him false and was sent back in disgrace to her kinsfolk the following year. Coloman died on the 3rd of February 1116.

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**COLOMB, PHILIP HOWARD** (1831-1899), British vice-admiral, historian, critic and inventor, the son of General G. T. Colomb, was born in Scotland, on the 29th of May 1831. He entered the navy in 1846, and served first at sea off Portugal in 1847; afterwards, in 1848, in the Mediterranean, and from 1848 to 1851 as midshipman of the "Reynard" in operations against piracy in Chinese waters; as midshipman and mate of the "Serpent" during the Burmese War of 1852-53; as mate of the "Phoenix" in the Arctic Expedition of 1854; as lieutenant of the "Hastings" in the Baltic during the Russian War, taking part in the attack on Sveaborg. He became what was known at that time as a "gunner's lieutenant" in 1857, and from 1859 to 1863 he served as flag-lieutenant to rear-admiral Sir Thomas Pasley at Devonport. Between 1858 and 1868 he was employed in home waters on a variety of special services, chiefly connected with gunnery, signalling and the tactical characteristics and capacities of steam warships. From 1868 to 1870 he commanded the "Dryad," and was engaged in the suppression of the slave trade. In 1874, while captain of the "Audacious," he served for three years as flag-captain to vice-admiral Ryder in China; and finally he was appointed, in 1880, to command the "Thunderer" in the Mediterranean. Next year he was appointed captain of the steam reserve at Portsmouth; and after serving three years in that capacity, he remained at Portsmouth as flag-captain to the commander-in-chief until 1886, when he was retired by superannuation before he had attained flag rank. Subsequently he became rear-admiral, and finally vice-admiral on the retired list.

Few men of his day had seen more active and more varied service than Colomb. But the real work on which his title to remembrance rests is the influence he exercised on the thought and practice of the navy. He was one of the first to perceive the vast changes which must ensue from the introduction of steam into the navy, which would necessitate a new system of signals and a new method of tactics. He set himself to devise the former as far back as 1858, but his system of signals was not adopted by the navy until 1867.

What he had done for signals Colomb next did for tactics. Having first determined by experiment—for which he was given special facilities by the admiralty—what are the manœuvring powers of ships propelled by steam under varying conditions of speed and helm, he proceeded to devise a system of tactics based on these data. In the sequel he prepared a new evolutionary signal-book, which was adopted by the royal navy, and still remains in substance the foundation of the existing system of tactical evolutions at sea. The same series of experimental studies led him to conclusions concerning the chief causes of collisions at sea; and these conclusions, though stoutly combated in many quarters at the outset, have since been generally accepted, and were ultimately embodied in the international code of regulations adopted by the leading maritime nations on the recommendation of a conference at Washington in 1889.

After his retirement Colomb devoted himself rather to the history of naval warfare, and to the large principles disclosed by its intelligent study, than to experimental inquiries having an immediate practical aim. As in his active career he had wrought organic changes in the ordering, direction and control of fleets, so by his historic studies, pursued after his retirement, he helped greatly to effect, if he did not exclusively initiate, an equally momentous change in the popular, and even the professional, way of regarding sea-power and its conditions. He did not invent the term "sea-power,"—it is, as is shown elsewhere (see [SEA-POWER](#)), of very ancient origin,—nor did he employ it until Captain Mahan had made it a household word with all. But he thoroughly grasped its conditions, and in his great work on naval warfare (first published in 1891) he enunciated its principles with great cogency and with keen historic insight. The central idea of his teaching was that naval supremacy is the

condition precedent of all vigorous military offensive across the seas, and, conversely, that no vigorous military offensive can be undertaken across the seas until the naval force of the enemy has been accounted for—either destroyed or defeated and compelled to withdraw to the shelter of its own ports, or at least driven from the seas by the menace of a force it dare not encounter in the open. This broad and indefeasible principle he enunciated and defended in essay after essay, in lecture after lecture, until what at first was rejected as a paradox came in the end to be accepted as a commonplace. He worked quite independently of Captain Mahan, and his chief conclusions were published before Captain Mahan's works appeared.

He died quite suddenly and in the full swing of his literary activity on the 13th of October 1899, at Steeple Court, Botley, Hants. His latest published work was a biography of his friend Sir Astley Cooper Key, and his last article was a critical examination of the tactics adopted at Trafalgar, which showed his acumen and insight at their best.

His younger brother, SIR JOHN COLOMB (1838-1909), was closely associated in the pioneer work done for British naval strategy and Imperial defence, and his name stands no less high among those who during this period promoted accurate thinking on the subject of sea-power. Entering the Royal Marines in 1854, he rose to be captain in 1867, retiring in 1869; and thenceforth he devoted himself to the study of naval and military problems, on which he had already published some excellent essays. His books on *Colonial Defence and Colonial Opinions* (1873), *The Defence of Great and Greater Britain* (1879), *Naval Intelligence and the Protection of Commerce* (1881), *The Use and the Application of Marine Forces* (1883), *Imperial Federation: Naval and Military* (1887), followed later by other similar works, made him well known among the rising school of Imperialists, and he was returned to parliament (1886-1892) as Conservative member for Bow, and afterwards (1895-1906) for Great Yarmouth. In 1887 he was created C.M.G., and in 1888 K.C.M.G. He died in London on the 27th of May 1909. In Kerry, Ireland, he was a large landowner, and became a member of the Irish privy council (1903), and in 1906 he sat on the Royal Commission dealing with congested districts.

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**COLOMBES**, a town of France in the department of Seine, arrondissement of St Denis, 7 m. N.N.W. of Paris. Pop. (1906) 28,920. It has a 16th-century church with 12th-century tower, a race-course, and numerous villa residences and boarding-schools. Manufactures include oil, vinegar and measuring-instruments. A castle formerly stood here, in which died Henrietta Maria, queen of Charles I. of England.

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**COLOMBEY**, a village of Lorraine, 4 m. E. of Metz, famous as the scene of a battle between the Germans and the French fought on the 14th of August 1870. It is often called the battle of Borny, from another village 2½ m. E. of Metz. (See [METZ](#) and [FRANCO-GERMAN WAR](#).)

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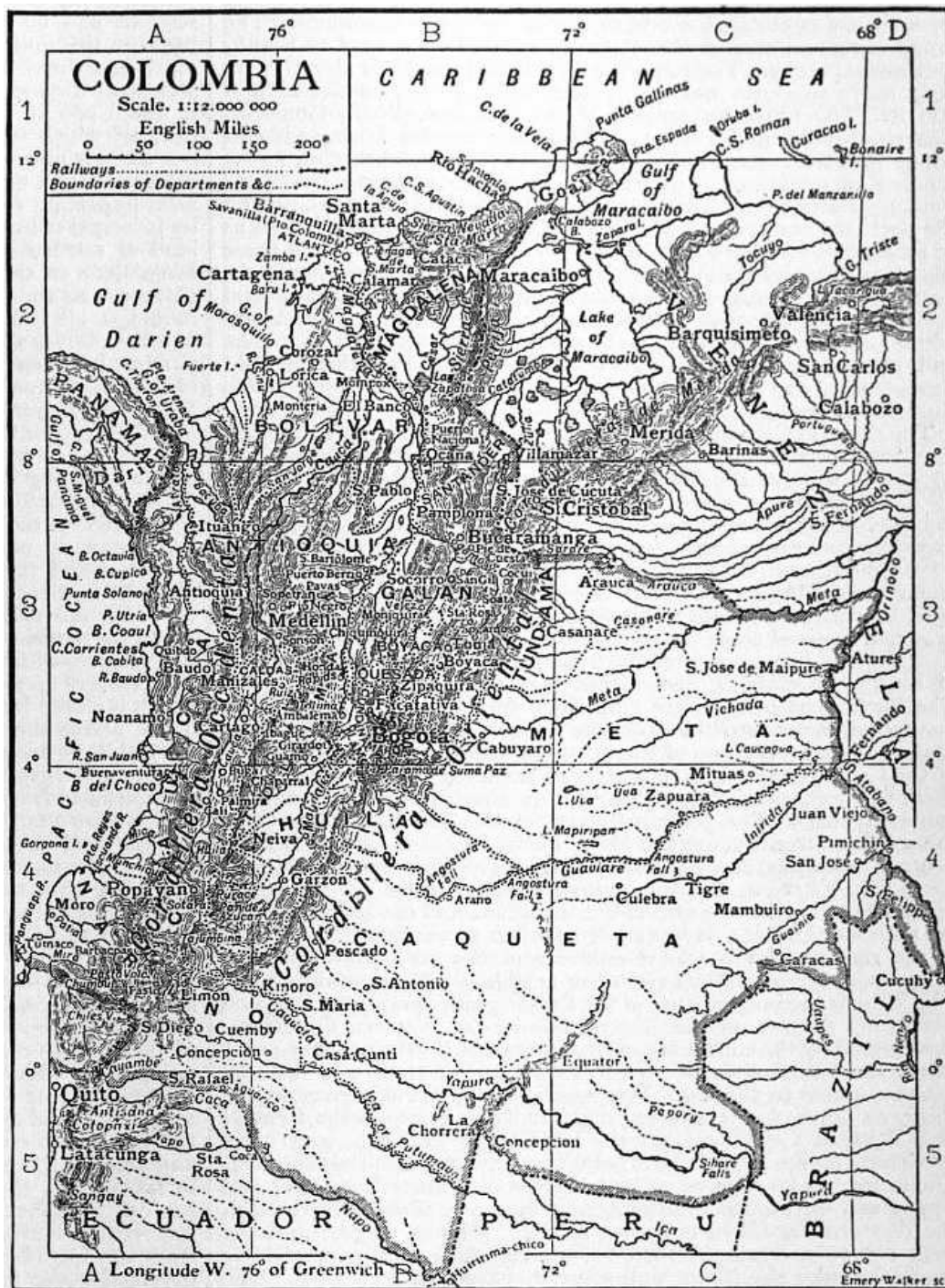
**COLOMBIA**, a republic of South America occupying the N.W. angle of that continent and bounded N. by the Caribbean Sea and Venezuela, E. by Venezuela and Brazil, S. by Brazil, Peru and Ecuador, and W. by Ecuador, the Pacific Ocean, Panama and the Caribbean Sea. The republic is very irregular in outline and has an extreme length from north to south of 1050 m., exclusive of territory occupied by Peru on the north bank of the upper Amazon, and an extreme width of 860 m. The approximate area of this territory, according to official calculations, is 481,979 sq. m., which is reduced to 465,733 sq. m. by Gotha planimetric measurements. This makes Colombia fourth in area among the South American states.

The loss of the department of Panama left the republic with unsettled frontiers on every side, and some of the boundary disputes still unsolved in 1909 concern immense areas of territory. The boundary with Costa Rica was settled in 1900 by an award of the President of France, but the secession of Panama in 1903 gave Colombia another unsettled line on the north-west. If the line which formerly separated the Colombian departments of Cauca and Panama is taken as forming the international boundary, this line follows the water-parting between the streams which flow eastward to the Atrato, and those which flow westward to the Gulf of San Miguel, the terminal points being near Cape Tiburon on the Caribbean coast, and at about 7° 10' N. lat. on the Pacific coast. The boundary dispute with Venezuela was referred in 1883 to the king of Spain, and the award was made in 1891. Venezuela, however, refused to accept the decision. The line decided upon, and accepted by Colombia, starts from the north shore of Calabozo Bay on the west side of the Gulf of Maracaibo, and runs west and south-west to and along the water-parting (Sierra de Perija) between the drainage basins of the Magdalena and Lake Maracaibo as far as the source in lat. 8° 50' N. of a small branch of the Catatumbo river, thence in a south-easterly direction across the Catatumbo and Zulia rivers to a point in 72° 30' W. long., 8° 12' N. lat., thence in an irregular southerly direction across the Cordillera de Mérida to the source of the Sarare, whence it runs eastward along that river, the Arauca, and the Meta to the Orinoco. Thence the line runs south and south-east along the Orinoco, Atabapo and Guainia to the Pedra de Cucuhy, which serves as a boundary mark for three republics. Of the eastern part of the territory lying between the Meta and the Brazilian frontier, Venezuela claims as far west as the meridian of 69° 10'. Negotiations for the settlement of the boundary with Brazil (*q.v.*) were resumed in 1906, and were advanced in the following year to an agreement providing for the settlement of conflicting claims by a mixed commission. With Ecuador and Peru the boundary disputes are extremely complicated, certain parts of the disputed territory being claimed by all three republics. Colombia holds possession as far south as the Napo in lat. 2° 47' S., and claims territory occupied by Peru as far south as the Amazon. On the other hand Peru claims as far north as La Chorrera in 0° 49' S. lat., including territory occupied by Colombia, and the eastern half of the Ecuadorean department of Oriente, and Ecuador would extend her southern boundary line to the Putumayo, in long. 71° 1' S., and make that river her northern boundary as far north as the Peruvian claim extends. The provisional line starts from the Japura river (known as the Caqueta in Colombia) in lat. 1° 30' S., long. 69° 24' W., and runs south-west to the 70th meridian, thence slightly north of west to the Igaraparana river, thence up that stream to the Peruvian military post of La Chorrera, in 0° 49' S. lat., thence west of south to Huiririmachico, on the Napo. Thence the line runs north-west along the Napo, Coca and San Francisco rivers to the Andean watershed, which becomes the dividing line northward for a distance of nearly 80 m., where the line turns westward and reaches the Pacific at the head of Panguapi Bay, into which the southern outlet of the Mira river discharges (about 1° 34' N. lat.).

*Physical Geography.*—Colombia is usually described as an extremely mountainous country, which is true of much less than half its total area. Nearly one half its area lies south-east of the Andes and consists of extensive *llanos* and forested plains, traversed by several of the western tributaries of the Amazon and Orinoco. These plains slope gently toward the east, those of the Amazon basin apparently lying in great terraces whose escarpments have the character of low, detached ranges of hills forming successive rims to the great basin which they partly enclose. The elevation and slope of this immense region, which has an approximate length of 640 m. and average width of 320 m., may be inferred from the elevations of the Caqueta, or Japura river, which was explored by Crevaux in 1878-1879. At Santa Maria, near the Cordillera (about 75° 30' W. long.), the elevation is 613 ft. above sea-level, on the 73rd meridian it is 538 ft., and near the 70th meridian 426 ft.—a fall of 187 ft. in a distance of about 400 m. The northern part of this great region has a somewhat lower elevation and gentler slope, and consists of open grassy plains, which are within the zone of alternating wet and dry seasons. In the south and toward the great lower basin of the Amazon, where the rainfall is continuous throughout the year, the plains are heavily forested. The larger part of this territory is unexplored except along the principal rivers, and is inhabited by scattered tribes of Indians. Near the Cordilleras and along some of the larger rivers there are a few small settlements of whites and mestizos, but their aggregate number is small and their economic value to the republic is inconsiderable. There are some cattle ranges on the open plains, however, but they are too isolated to have much importance. A small part of the northern Colombia, on the lower courses of the Atrato and Magdalena, extending across the country from the Eastern to the Western Cordilleras with a varying width of 100 to 150 m., not including the lower river basins which penetrate much farther inland, also consists of low, alluvial plains, partly covered with swamps and intricate watercourses, densely overgrown with vegetation, but in places admirably adapted to different kinds of tropical agriculture. These plains are broken in places by low ranges of



hills which are usually occupied by the principal industrial settlements of this part of the republic, the lower levels being for the most part swampy and unsuited for white occupation.



[\(Click to enlarge.\)](#)

The other part of the republic, which may be roughly estimated at two-fifths of its total area, consists of an extremely rugged mountainous country, traversed from south to north by the parallel river valleys of the Magdalena, Cauca and Atrato. The mountain chains which cover this part of Colombia are the northern terminal ranges of the great Andean system. In northern Ecuador the Andes narrows into a single massive range which has the character of a confused mass of peaks and ridges on the southern frontier of Colombia. There are several lofty plateaus in this region which form a huge central watershed for rivers flowing east to the Amazon, west to the Pacific, and north to the Caribbean Sea. The higher plateaus are called *paramos*, cold, windswept, mist-drenched deserts, lying between the elevations of 10,000 and 15,000 ft., which are often the only passes over the Cordilleras, and yet are almost impassable because of their morasses, heavy mists, and cold, piercing winds. The *paramos* of Cruz Verde (11,695 ft.) and Pasto, and the volcanoes of Chiles (15,900 ft.), Chumbul (15,715 ft.), and Pasto (13,990 ft.) are prominent landmarks of this desolate region. North of this great plateau the Andes divides into three great ranges, the Western, Central and Eastern Cordilleras. The Central is the axis of the system, is distinguished by a line of lofty volcanoes and *paramos*, some of which show their white mantles 2000 to 3000 ft. above the line of perpetual snow (approx. 15,000 ft. in this latitude), and is sometimes distinguished with the name borne by the republic for the time being. This range runs in a

north-north-east direction and separates the valleys of the Magdalena and Cauca, terminating in some low hills south-west of El Banco, a small town on the lower Magdalena. The principal summits of this range are Tajumbina (13,534 ft.), Pan de Azucar (15,978 ft.), Purace (15,420 ft.), Sotara (15,420 ft.), Huila (over 18,000 ft.), Tolima (18,432 ft.), Santa Isabel (16,700 ft.), Ruiz (18,373 ft.), and Mesa de Herveo (18,300 ft.). The last named affords a magnificent spectacle from Bogotá, its level top which is 5 or 6 m. across, and is formed by the rim of an immense crater, having the appearance of a table, down the sides of which for more than 3000 ft. hangs a spotless white drapery of perpetual snow. The Western Cordillera branches from the main range first and follows the coast very closely as far north as the 4th parallel, where the San Juan and Atrato rivers, though flowing in opposite directions and separated near the 5th parallel by a low transverse ridge, combine to interpose valleys between it and the Cordillera de Baudo, which thereafter becomes the true coast range. It then forms the divide between the Cauca and Atrato valleys, and terminates near the Caribbean coast. The general elevation of this range is lower than that of the others, its culminating points being the volcano Munchique (11,850 ft.) and Cerro Leon (10,847 ft.). The range is covered with vegetation and its Pacific slopes are precipitous and humid. The Cordillera de Baudo, which becomes the coast range above lat. 4° N., is the southern extension of the low mountainous chain forming the backbone of the Isthmus of Panama, and may be considered the southern termination of the great North American system. Its elevations are low and heavily wooded. It divides on the Panama frontier, the easterly branch forming the watershed between the Atrato and the rivers of eastern Panama, and serving as the frontier between the two republics. The passes across these ranges are comparatively low, but they are difficult because of the precipitous character of their Pacific slopes and the density of the vegetation on them. The Eastern Cordillera is in some respects the most important of the three branches of the Colombian Andes. Its general elevation is below that of the Central Cordillera, and it has few summits rising above the line of perpetual snow, the highest being the Sierra Nevada de Cocui, in lat. 6° 30' N. Between Cocui and the southern frontier of Colombia there are no noteworthy elevations except the so-called Paramo de Suma Paz near Bogotá, the highest point of which is 14,146 ft. above sea-level, and the Chita *paramo*, or range, north-east of Bogotá (16,700 ft.). Between the 5th and 6th parallels the range divides into two branches, the eastern passing into Venezuela, where it is called the Cordillera de Merida, and the northern continuing north and north-east as the Sierra de Perija and the Sierra de Oca, to terminate at the north-eastern extremity of the Goajira peninsula. The culminating point in the first-mentioned range is the Cerro Pintado (11,800 ft.). West of this range, and lying between the 10th parallel and the Caribbean coast, is a remarkable group of lofty peaks and knotted ranges known as the Sierra Nevada de Santa Marta, the highest snow-crowned summit of which rises 17,389 ft. above the sea according to some, and 16,728 according to other authorities. This group of mountains, covering an approximate area of 6500 sq. m., lies immediately on the coast, and its highest summits were long considered inaccessible. It stands detached from the lower ranges of the Eastern Cordillera, and gives the impression that it is essentially independent. The eastern Cordillera region is noteworthy for its large areas of plateau and elevated valley within the limits of the vertical temperate zone. In this region is to be found the greater part of the white population, the best products of Colombian civilization, and the greatest industrial development. The "sabana" of Bogotá is a good illustration of the higher of these plateaus (8563 ft., according to Stieler's *Hand-Atlas*), with its mild temperature, inexhaustible fertility and numerous productions of the temperate zone. It has an area of about 2000 sq. m. The lower valleys, plateaus and mountain slopes of this range are celebrated for their coffee, which, with better means of transportation, would be a greater source of prosperity for the republic than the gold-mines of Antioquia. The mountainous region of Colombia is subject to volcanic disturbances and earthquake shocks are frequent, especially in the south. These shocks, however, are less severe than in Venezuela or in Ecuador.

There are few islands on the coast of Colombia, and the great majority of these are too small to appear on the maps in general use. Gorgona is one of the larger islands on the Pacific coast, and is situated about 25 m. from the mainland in lat. 3° N. It is 5¾ m. long by 1¾ m. wide, and rises to an extreme elevation of 1296 ft. above sea-level. It is a beautiful island, and is celebrated as one of Pizarro's stopping places. It has been used by the Colombian government for political offenders. Malpelo island, 282 m. west by south of Charambira point, in lat. 3° 40' N., long. 81° 24' W., nominally belongs to Colombia. It is a small, rocky, uninhabited island, rising to an elevation of 846 ft. above the sea, and has no ascertained value. The famous Pearl islands of the Gulf of Panama are claimed by Colombia, and their pearl oyster fisheries are considered a rentable asset by the government. The group covers an area of about 450 sq. m., and consists of 16 islands and several rocks. The largest is Rey Island, which is about 17 m. long, north to south, and 8 m. broad, with an extreme elevation of 600 ft. The other larger islands are San José, Pedro Gonzales, Casaya, Saboga and Pacheca. There are several fishing

villages whose inhabitants are largely engaged in the pearl fisheries, and a number of coconut plantations. The islands belong chiefly to Panama merchants. There are several groups of small islands on the northern coast, and a few small islands so near the mainland as to form sheltered harbours, as at Cartagena. The largest of these islands is Baru, lying immediately south of the entrance to Cartagena harbour. North-west of Colombia in the Caribbean Sea are several small islands belonging to the republic, two of which (Great and Little Corn Is.) lie very near the coast of Nicaragua. The largest and most important of these islands is Vieja Providencia (Old Providence), 120 m. off the Mosquito Coast, 4½ m. long, which supports a small population.

The rivers of Colombia may be divided, for convenience of description, into three general classes according to the destination of their waters, the Pacific, Caribbean and Atlantic—the last reaching their destination through the Amazon and Orinoco. Of these,

**Rivers.**

the Caribbean rivers are of the greatest economic importance to the country, though those of the eastern plains may at some time become nearly as important as transportation routes in a region possessing forest products of great importance and rich in agricultural and pastoral possibilities. It is worthy of note that the principal rivers of these three classes—the Patia, Cauca, Magdalena, Caquetá and Putumayo—all have their sources on the high plateaus of southern Colombia and within a comparatively limited area. The Pacific coast rivers are numerous, and discharge a very large volume of water into the ocean in proportion to the area of their drainage basins, because of the heavy rainfall on the western slopes of the Coast range. The proximity of this range to the coast limits them to short, precipitous courses, with comparatively short navigable channels. The principal rivers of this group, starting from the southern frontier, are the Mira, Patia, Iscuande, Micai, Buenaventura or Dagua, San Juan and Baudo. The Mira has its principal sources in Ecuador, and for a short distance forms the boundary line between the two republics, but its outlets and navigable channel are within Colombia. It has a large delta in proportion to the length of the river, which is visible evidence of the very large quantity of material brought down from the neighbouring mountain slopes. The Patia is the longest river of the Pacific group, and is the only one having its sources on the eastern side of the Western Cordillera. It is formed by the confluence of the Sotara and Guaitara at the point where the united streams turn westward to cut their way through the mountains to the sea. The Sotara or upper Patia rises on the southern slope of a transverse ridge or dyke, between the Central and Western Cordilleras, in the vicinity of Popayan, and flows southward about 120 m. to the point of confluence with the Guaitara. The latter has its sources on the elevated plateau of Tuquerres and flows north-west to meet the Sotara. The canyon of the Patia through the Western Cordillera is known as the "Minima gorge," and has been cut to a depth of 1676 ft., above which the perpendicular mountain sides rise like a wall some thousands of feet more. The upper course of the Guaitara is known as the Carchi, which for a short distance forms the boundary line between Colombia and Ecuador. At one point in its course it is crossed by the Rumichaca arch, a natural arch of stone, popularly known as the "Inca's bridge," which with the Minima gorge should be classed among the natural wonders of the world. There is a narrow belt of low, swampy country between the Cordillera and the coast, traversed at intervals by mountain spurs, and across this the river channels are usually navigable. The San Juan has built a large delta at its mouth, and is navigable for a distance of 140 m. inland, the river flowing parallel with the coast for a long distance instead of crossing the coastal plain. It rises in the angle between the Western Cordillera and a low transverse ridge connecting it with the Baudo coast range, and flows westward down to the valley between the two ranges, and then southward through this valley to about lat. 4° 15' N., where it turns sharply westward and crosses a narrow belt of lowland to the coast. It probably has the largest discharge of water of the Pacific group, and has about 300 m. of navigable channels, including its tributaries, although the river itself is only 190 m. long and the sand-bars at its mouth have only 7 or 8 ft. of water on them. The San Juan is distinguished for having been one of the proposed routes for a ship canal between the Caribbean and Pacific. At one point in its upper course it is so near the Atrato that, according to a survey by Captain C. S. Cochrane, R.N., in 1824, a canal 400 yds. long with a maximum cutting of 70 ft., together with some improvements in the two streams, would give free communication. His calculations were made, of course, for the smaller craft of that time.

The rivers belonging to the Caribbean system, all of which flow in a northerly direction, are the Atrato, Bacuba, Sinú, Magdalena and Zulia. The Bacuba, Suriquilla or Leon, is a small stream rising on the western slopes of the Cordillera and flowing into the upper end of the Gulf of Uraba. Like the Atrato it brings down much silt, which is rapidly filling that depression. There are many small streams and one important river, the Sinú, flowing into the sea between this gulf and the mouth of the Magdalena. The Sinú rises on the northern slopes of the Alto del Viento near the 7th parallel, and flows almost due north across the coastal plain for a distance of about 286 m. to the Gulf of Morosquillo. It has a very sinuous

channel which is navigable for small steamers for some distance, but there is no good port at its outlet, and a considerable part of the region through which it flows is malarial and sparsely settled. The most important rivers of Colombia, however, are the Magdalena and its principal tributary, the Cauca. They both rise on the high table-land of southern Colombia about 14,000 ft. above sea-level—the Magdalena in the Laguna del Buey (Ox Lake) on the Las Papas plateau, and the Cauca a short distance westward in the Laguna de Santiago on the Paramo de Guanacas—and flow northward in parallel courses with the great Central Cordillera, forming the water-parting between their drainage basins. The principal tributaries of the Magdalena are the Suaza, Neiva, Cabrera, Prado, Fusagasaga, Funza or Bogotá, Carare, Opon, Sogamoso, Lebrija and Cesar, and the western the La Plata, Paez, Saldaña, Cuello, Guali, Samana or Miel, Nare or Negro and Cauca. There are also many smaller streams flowing into the Magdalena from both sides of the valley. Of those named, the Funza drains the “sabana” of Bogotá and is celebrated for the great fall of Tequendama, about 480 ft. in height; the Sogamoso passes through some of the richest districts of the republic; and the Cesar rises on the elevated slopes of the Sierra Nevada de Santa Marta and flows southward across a low plain, in which are many lakes, to join the Magdalena where it bends westward to meet the Cauca. The course of the Magdalena traverses nine degrees of latitude and is nearly 1000 m. long. It is navigable for steamers up to La Dorada, near Honda, 561 m. above its mouth, which is closed by sand-bars to all but light-draught vessels, and for 93 m. above the rapids at Honda, to Girardot. The river is also navigable at high water for small steamers up to Neiva, 100 m. farther and 1535 ft. above sea-level, beyond which point it descends precipitously from the plateaus of southern Colombia. The Honda rapids have a fall of only 20 ft. in a distance of 2 m., but the current is swift and the channel tortuous for a distance of 20 m., which make it impossible for the light-draught, flat-bottomed steamers of the lower river to ascend them. The Cauca differs much from the Magdalena, although its principal features are the same. The latter descends 12,500 ft. before it becomes navigable, but at 10,000 ft. below its source the Cauca enters a long narrow valley with an average elevation of 3500 ft., where it is navigable for over 200 m., and then descends 2500 ft. through a series of impetuous rapids for a distance of about 250 m., between Cartago and Cáceres, with a break of 60 m. above Antioquia, where smooth water permits isolated navigation. While, therefore, the Magdalena is navigable throughout the greater part of its course, or from Girardot to the coast, with an abrupt break of only 20 ft. at Honda which could easily be overcome, the Cauca has only 200 m. of navigable water in the upper valley and another 200 m. on its lower course before it joins the Magdalena in lat. 9° 30', the two being separated by 250 m. of canyon and rapids. So difficult is the country through which the Cauca has cut its tortuous course that the fertile upper valley is completely isolated from the Caribbean, and has no other practicable outlet than the overland route from Cali to Buenaventura, on the Pacific. The upper sources of the Cauca flow through a highly volcanic region, and are so impregnated with sulphuric and other acids that fish cannot live in them. This is especially true of the Rio Vinagre, which rises on the Purace volcano. The principal tributaries are the Piendamó, Ovejas, Palo, Amaime and Nechi, from the central Cordillera, of which the last named is the most important, and the Jamundi and a large number of small streams from the Western. The largest branch of the Cauca on its western side, however, is the San Jorge, which, though rising in the Western Cordillera on the northern slopes of the Alto del Viento, in about lat. 7° N., and not far from the sources of the Sinú and Bacuba, is essentially a river of the plain, flowing north-east across a level country filled with small lakes and subject to inundations to a junction with the Cauca just before it joins the Magdalena. Both the San Jorge and Nechi are navigable for considerable distances. The valley of the Cauca is much narrower than that of the Magdalena, and between Cartago and Cáceres the mountain ranges on both sides press down upon the river and confine it to a narrow canyon. The Cauca unites with the Magdalena about 200 m. from the sea through several widely separated channels, which are continually changing through the wearing away of the alluvial banks. These changes in the channel are also at work in the Lower Magdalena. The remaining rivers of the Caribbean system, exclusive of the smaller ones rising in the Sierra Nevada de Santa Marta, are the Zulia and Catatumbo, which rise in the mountains of northern Santander and flow across the low plains of the Venezuelan state of Zulia into Lake Maracaibo.

Of the rivers of the great eastern plains, whose waters pass through the Orinoco and Amazon to the Atlantic, little can be said beyond the barest geographical description. The size and courses of many of their affluents are still unknown, as this great region has been only partially explored. The largest of these rivers flow across the plains in an easterly direction, those of the Orinoco system inclining northward, and those of the Amazon system southward. The first include the Guaviare or Guayabero, the Vichada, the Meta, and the upper course of the Arauca. The Guaviare was explored by Crevaux in 1881. It rises on the eastern slopes of the Eastern Cordillera between the 3rd and 4th parallels, about 75 m. south of Bogotá, and flows with a slight southward curve across the llanos to the Orinoco, into which it discharges at San Fernando de Atabapo in lat. 4° N. Its largest tributary is the

Inirida, which enters from the south. The Guaviare has about 600 m. of navigable channel. The Meta rises on the opposite side of the Cordillera from Bogotá, and flows with a sluggish current east-north-east across the llanos to the Orinoco, into which it discharges below the Atures rapids, in lat. 6° 22' N. It is navigable throughout almost its whole length, small steamers ascending it to a point within 100 m. of Bogotá. Its principal tributaries, so far as known, are the Tuca, Chire and Casanare. The principal rivers of the Amazon system are the Napo, the upper part of which forms the provisional boundary line with Ecuador, the Putumayo or Iça, and the Caqueta or Japurá (Yapurá), which flow from the Andes entirely across the eastern plains, and the Guainia, which rises on the northern slopes of the Serra Tunaji near the provisional Brazilian frontier, and flows with a great northward curve to the Venezuelan and Brazilian frontiers, and is thereafter known as the Rio Negro, one of the largest tributaries of the Amazon. There are many large tributaries of these rivers in the unexplored regions of south-eastern Colombia, but their names as well as their courses are still unsettled.

The coast of Colombia faces on the Pacific Ocean and the Caribbean Sea, and is divided by the Isthmus of Panama into two completely separated parts. The Pacific coast-line, omitting minor convolutions, has a length of about 500 m., while that of the

### **Coasts.**

Caribbean is about 700 m. The former has been of slight service in the development of the country because of the unsettled and unhealthy character of the coast region, and the high mountain barriers between its natural ports and the settled parts of the republic. There are only two commercial ports on the coast, Tumaco and Buenaventura, though there are several natural harbours which would be of great service were there any demand for them. The rivers Mira, Patia and San Juan permit the entrance of small steamers, as also some of the smaller rivers. The larger bays on this coast are Tumaco, Chocó, Magdalena, Cabita, Coqui, Puerto Utria, Solano, Cupica and Octavia—some of them affording exceptionally safe and well-sheltered harbours. The Caribbean coast of Colombia has only four ports engaged in international trade—Barranquilla, Cartagena, Santa Marta and Rio Hacha. There are some smaller ports on the coast, but they are open only to vessels of light draft and have no trade worth mention. Barranquilla, the principal port of the republic, is situated on the Magdalena, and its seaport, or landing-place, is Puerto Colombia at the inner end of Savanilla Bay, where a steel pier 4000 ft. long has been built out to deep water, alongside which ocean-going vessels can receive and discharge cargo. The bay is slowly filling up, however, and two other landing-places—Salgar and Savanilla—had to be abandoned before Puerto Colombia was selected. The pier-head had 24 ft. of water alongside in 1907, but the silt brought down by the Magdalena is turned westward by the current along this coast, and may at any time fill the bay with dangerous shoals. The oldest and best port on the coast is Cartagena, 65 m. south-west of Barranquilla, which has a well-sheltered harbour protected by islands, and is connected with the Magdalena at Calamar by railway. The next best port is that of Santa Marta, about 46 m. east-north-east of Barranquilla (in a straight line), with which it is connected by 23 m. of railway and 50 m. of inland navigation on the Ciénaga de Santa Marta and eastern outlets of the Magdalena. Santa Marta is situated on a small, almost landlocked bay, well protected from prevailing winds by high land on the north and north-east, affording excellent anchorage in waters free from shoaling through the deposit of silt. The depth of the bay ranges from 4½ to 19 fathoms. The town stands at the foot of the Sierra Nevada de Santa Marta, which restricts the area of cultivatable land in its immediate vicinity, and the enclosing high lands make the climate hot and somewhat dangerous for foreigners. Since the development of the fruit trade on the shores of the Caribbean sea and Gulf of Mexico by an important American company, which owns a large tract of land near Santa Marta devoted to banana cultivation, and has built a railway 50 m. inland principally for the transportation of fruit, the trade of the port has greatly increased. The population of this region, however, is sparse, and its growth is slow. The fourth port on this coast is Rio Hacha, an open roadstead, about 93 m. east of Santa Marta, at the mouth of the small river Rancheira descending from the eastern slopes of the Sierra Nevada de Santa Marta. It has little trade, and the undeveloped, unpopulated state of the country behind it affords no promise of immediate growth. There are other small towns on the coast which are ports for the small vessels engaged in the coasting and river trade, but they have no international importance because of their inaccessibility to ocean-going steamers, or the extremely small volume of their trade. The Gulf of Uraba is a large bight or southerly extension of the Gulf of Darien. It receives the waters of the Atrato, Bacuba, and a number of small rivers, and penetrates the land about 50 m., but has very little commercial importance because of the unhealthy and unsettled character of the neighbouring country, and because of the bar across its entrance formed by silt from the Atrato. The Gulf of Morosquillo, a broad shallow indentation of the coast south of Cartagena, receives the waters of the Rio Sinú, at the mouth of which is the small port of Cispata. Between the mouth of the Magdalena and Santa Marta is the Ciénaga de Santa Marta, a large marshy lagoon separated from the sea by a narrow sand spit, having its "boca" or outlet at its eastern side. There is some traffic in small steamers on its shallow

waters, which is increasing with the development of fruit cultivation on its eastern and southern sides. It extends inland about 31 m., and marks a deep indentation of the coast like the Gulf of Uraba.

*Geology.*—The geology of Colombia is very imperfectly known, and it is only by a comparison with the neighbouring regions that it is possible to form any clear idea of the geological structure and succession. The oldest rocks are gneisses and schists, together with granite and other eruptive rocks. These are overlaid by sandstones, slates and limestones, alternating with porphyries and porphyrites sometimes in the form of sheets, sometimes as breccias and conglomerates. Cretaceous fossils have been found abundantly in this series, but it is still possible that earlier systems may be represented. Coal-bearing beds, possibly of Tertiary age, occur in Antioquia and elsewhere. Structurally, the four main chains of Colombia differ considerably from one another in geological constitution. The low Cordilleras of the Chocos, on the west coast, are covered by soft Quaternary sandstones and marls containing shells of extant species, such as still inhabit the neighbouring ocean. The Western Cordillera is the direct continuation of the Western Cordillera of Ecuador, and, like the latter, to judge from the scattered observations which are all that are available, consists chiefly of sandstones and porphyritic rocks of the Cretaceous series. Between the Western and the Central Cordilleras is a longitudinal depression along which the river Cauca finds its way towards the sea. On the western side of this depression there are red sandstones with coal-seams, possibly Tertiary; the floor and the eastern side consist chiefly of ancient crystalline and schistose rocks. The Central Cordillera is the direct continuation of the Eastern Cordillera of Ecuador, and is formed chiefly of gneiss and other crystalline rocks, but sedimentary deposits of Cretaceous age also occur. Finally the Eastern branch, known as the Cordillera of Bogotá, is composed almost entirely of Cretaceous beds thrown into a series of regular anticlinals and synclinals similar to those of the Jura Mountains. The older rocks occasionally appear in the centre of the anticlinals. In all these branches of the Andes the folds run approximately in the direction of the chains, but the Sierra de Santa Marta appears to belong to a totally distinct system of folding, the direction of the folds being from west to east, bending gradually towards the south-east. Although volcanoes are by no means absent, they are much less important than in Ecuador, and their products take a far smaller share in the formation of the Andes. In Ecuador the depression between the Eastern and Western Cordilleras is almost entirely filled with modern lavas and agglomerates; in Colombia the corresponding Cauca depression is almost free from such deposits. In the Central Cordillera volcanoes extend to about 5° N.; in the Western Cordillera they barely enter within the limits of Colombia; in the Cordillera of Bogotá they are entirely absent.<sup>1</sup>

*Climate.*—Were it not for the high altitudes of western Colombia, high temperatures would prevail over the whole country, except where modified by the north-east trade winds and the cold ocean current which sweeps up the western coast. The elevated plateaus and summits of the Andes are responsible, however, for many important and profound modifications in climate, not only in respect to the lower temperatures of the higher elevations, but also in respect to the higher temperatures of the sheltered lowland valleys and the varying climatic conditions of the neighbouring plains. The republic lies almost wholly within the north torrid zone, a comparatively small part of the forested Amazonian plain extending beyond the equator into the south torrid zone. The great Andean barrier which crosses the republic from the south to north acts as a condenser to the prevailing easterly winds from the Atlantic, and causes a very heavy rainfall on their eastern slopes and over the forested Amazon plain. High temperatures as well as excessive humidity prevail throughout this region. Farther north, on the open llanos of the Orinoco tributaries, the year is divided into equal parts, an alternating wet and dry season, the sun temperatures being high followed by cool nights, and the temperatures of the rainy season being even higher. The rainfall is heavy in the wet season, causing many of the rivers to spread over extensive areas, but in the dry season the inundated plains become dry, the large rivers fed by the snows and rainfall of the Andes return within their banks, the shallow lagoons and smaller streams dry up, vegetation disappears, and the level plain becomes a desert. The northern plains of the republic are swept by the north-east trades, and here, too, the mountain barriers exercise a strongly modifying influence. The low ridges of the Sierra de Perijá do not wholly shut out these moisture-laden winds, but they cause a heavy rainfall on their eastern slopes, and create a dry area on their western flanks, of which the Vale of Upar is an example. The higher masses of the Sierra Nevada de Santa Marta cover a very limited area, leaving the trade winds a comparatively unbroken sweep across the northern plains until checked by the Western Cordillera, the Panama ranges and the Sierra de Baudo, where a heavy precipitation follows. Farther south the coast ranges cause a very heavy rainfall on their western slopes, which are quite as uninhabitable because of rain and heat as are the coasts of southern Chile through rain and cold. The rainfall on this coast is said to average 73 in., though it is much higher at certain points and in the Atrato Valley. As a result the coastal plain is covered with swamps and tangled forests, and is extremely unhealthy, except at a few favoured points on the

coast. High temperatures prevail throughout the greater part of the Magdalena and Cauca valleys, because the mountain ranges which enclose them shut out the prevailing winds. At Honda, on the Magdalena, 664 ft. above sea-level, the mean temperature for the year is 82° F., and the mercury frequently rises to 102° in the shade. These lowland plains and valleys comprise the climatic tropical zone of Colombia, which is characterized by high temperatures, and by excessive humidity and dense forests, an exception to the last-named characteristic being the open llanos where dry summers prevail. Above this tropical zone in the mountainous regions are to be found all the varying gradations of climate which we are accustomed to associate with changes in latitude. There are the subtropical districts of the valleys and slopes between 1500 and 7500 ft. elevation, which include some of the most fertile and productive areas in Colombia; the temperate districts between 7500 and 10,000 ft., the cold, bleak and inhospitable *paramos* between 10,000 and 15,000 ft., and above these the arctic wastes of ice and snow. The temperate and subtropical regions cover the greater part of the departments traversed by the Eastern Cordillera, the northern end of the Central Cordillera, the Santa Marta plateaus, and the Upper Cauca Valley. They include the larger part of the white population and the chief productive industries of the country. There is no satisfactory record of temperatures and rainfall in these widely different climatic zones from which correct averages can be drawn and compared. Observations have been made and recorded at Bogotá and at some other large towns, but for the greater part of the country we have only fragmentary reports. The mean annual temperature on the eastern plains, so far as known, ranges from 87° F. on the forested slopes to 90° and 91° on the llanos of the Meta and Arauca. On the Caribbean coastal plain it ranges from 80° to 84°, but at Tumaco, on the Pacific coast, within two degrees of the equator, it is only 79°. At Medellín, in the mountainous region of Antioquia, 4950 ft. above sea-level, the mean annual temperature is 70°, and the yearly rainfall 55 in., while at Bogotá, 8563 ft., the former is 57° and the latter 44 in. At Tuquerres, near the frontier of Ecuador, 10,200 ft. elevation, the mean annual temperature is said to be 55°. The changes of seasons are no less complicated and confusing. A considerable part of the republic is covered by the equatorial belt of calms, whose oscillations divide the year into a wet and dry season. This division is modified, however, by the location of mountain ranges and by elevation. In the Amazon region there is no great change during the year, and on the northern plains the so-called dry season is one of light rains except where mountain ranges break the sweep of the north-east trades. The alternating wet and dry seasons are likewise to be found on the Pacific coastal plain, though this region is not entirely dry and vegetation never dries up as on the *llanos*. Above the lowland plains the seasons vary in character according to geographical position and elevation. The two-season division rules in the departments of Santander and Antioquia, but without the extremes of humidity and aridity characteristic of the eastern plains. Farther south, at elevations between 800 and 9500 ft., the year is divided into four distinct seasons—two wet and two dry—the former called *inviernos* (winters) and the latter *veranos* (summers). These seasons are governed by the apparent movements of the sun, the winters occurring at the equinoxes and the summers at the solstices. The *sabana* of Bogotá and neighbouring districts are subject to these changes of season. At higher altitudes long, cold, wet winters are experienced, with so short and cold a summer between them that the bleak *paramos* are left uninhabited except by a few shepherds in the short dry season.

*Fauna*.—The geographical position of Colombia gives to it a fauna and flora largely characteristic of the great tropical region of the Amazon on the south-east, and of the mountainous regions of Central America on the north-west. At the same time it is rich in animal and plant types of its own, especially the latter, and is considered one of the best fields in South America for the student and collector. The fauna is essentially tropical, though a few species characteristic of colder regions are to be found in the higher Andes. Of the Quadrumana there are at least seventeen distinct species, and this number may be increased after a thorough exploration of the forested eastern plains. They are all arboreal in habit, and are to be found throughout the forested lowlands and lower mountain slopes. The carnivora are represented by seven or eight species of the Felidae, the largest of which are the puma (*Felis concolor*) and the jaguar (*F. onca*). These animals, together with the smaller ocelot, have a wide geographical range, and are very numerous in the valley of the Magdalena. Two species of bear and the “coati” (*Nasua*) represent the plantigrades and inhabit the mountain slopes, and, of Pachydermata, the peccary (*Dicotyles*) and “danta” or tapir (*Tapirus*) have a wide distribution throughout the lowland and lower plateau forests. The Colombian tapir is known as the *Tapirus Roulini*, and is slightly smaller than the Brazilian species (*T. americanus*). There are deer in the forests and on the open savannahs, the rabbit and squirrel are to be seen on the eastern slopes of the Andes, and partly amphibious rodents, the “capybara” (*Hydrochoerus*) and “guagua” (*Coelogenys subniger*), are very numerous along the wooded watercourses. The sloth, armadillo, opossum, skunk and a species of fox complete the list of the more common quadrupeds so far as known, though it is certain that a careful biological survey would discover many others. The large rivers of Colombia and the lakes of the lowlands are filled with alligators, turtles, and fish,

and several species of fish are highly esteemed by the natives as food. The saurians are represented on land by several species of lizard, some of them conspicuous for their brilliant colouring, and by the large "iguana," whose flesh is considered a great delicacy. Among the ophidians, which include many harmless species, are the boa-constrictor, rattlesnake, the dreaded *Lachesis* and the coral snake. The "manatee" (*Manatus americanus*) is found in the Atrato and other large Colombian rivers.

In bird and insect life Colombia is second only to Brazil. The condor, which inhabits the higher Cordilleras, is peculiar to the whole Andean region, and is the largest of the Raptores. Among other members of this order are the eagle, osprey, vulture, buzzard, kite and hawk, with about a dozen species in all. Parrots and paroquets are numerous everywhere in the tropical and subtropical regions, as also the gorgeously coloured macaw and awkward toucan. The largest class, perhaps, is that formed by the astonishing number of water-fowl which throng the shallow lagoons and river beaches at certain seasons of the year. They are mostly migratory in habit, and are to be found in many other countries. Among these are the large white crane and small crane, the blue heron, the snowy-white egret, the roseate spoonbill (*Platalea ajaja*), stork, bittern and many species of ducks. The largest and most conspicuous member of this interesting family is the *Mycteria americana*, the gigantic stork so frequently seen in the Amazon valley, and even more numerous about the lagoons of northern Colombia. One of the best game-birds of the forest is the "crested curassow" (*Crax alector*), sometimes weighing 12lb, which feeds on arboreal fruits and rarely comes to the ground. Colombia also possesses many species of the beautiful little humming-bird, among which are the tiny *Steganura Underwoodi* and the sword-bill, *Docimastes ensiferus*, which were found by Mr Albert Millican on a bleak *paramo* 12,000 ft. above sea-level. One of the most interesting birds found in the country is the "weaver-bird" (*Cassicus persicus*), which lives in colonies and suspends its long, pouch-like nest from the end of a horizontal branch of some high, isolated tree. In regard to insects, what has been said of Brazil will apply very closely to Colombia. Mosquitoes, butterflies, spiders, beetles and ants are infinitely numerous, and some of the species are indescribably troublesome.

*Flora.*—The Colombian flora is richer in species and individual characteristics than the fauna, owing in part to its greater dependence on climatic conditions. It ranges from the purely tropical types of the lowlands to the Alpine species of the more elevated *paramos*. It should be remembered, however, that large areas of the lowland plains have only a very limited arboreal growth. These plains include the extensive llanos of the Orinoco tributaries where coarse, hardy grasses and occasional clumps of palms are almost the only vegetation to be seen. There are other open plains in northern Colombia, sometimes covered with a shrubby growth, and the "mesas" (flat-topped mountains) and plateaus of the Cordilleras are frequently bare of trees. Farther up, on the cold, bleak *paramos*, only stunted and hardy trees are to be found. On the other hand, a luxuriant forest growth covers a very large part of the republic, including the southern plains of the Amazon tributaries, the foothills, slopes and valleys of the Cordilleras, a larger part of the northern plains, and the whole surface of the Western Cordillera and coast. The most conspicuous and perhaps the most universal type in all these regions, below an approximate elevation of 10,000 ft., is the palm, whose varieties and uses are incredibly numerous. On the eastern plains are to be found the "miriti" (*Mauritia flexuosa*) and the "pirijao" or peach palm (*Guilielma speciosa*), called the "pupunha" on the Amazon, whose fruit, fibre, leaf, sap, pith and wood meet so large a part of the primary needs of the aborigines. A noteworthy palm of the eastern Andean slopes is the "corneto" (*Deckeria*), whose tall, slender trunk starts from the apex of a number of aerial roots, rising like a cone 6 to 8 ft. above the ground. It is one of the most fruitful of palms, its clusters weighing from 120 to 200 lb each. Extensive groves of the coco-nut palm are to be found on the Caribbean coast, the fruit and fibre of which figure among the national exports. In north-eastern Colombia, where a part of the year is dry, the "curuas" form the prevailing species, but farther south, on the slopes of the Cordilleras up to an elevation of 10,000 ft., the wax-palm, or "palma de cera" (*Ceroxylon andicola*), is said to be the most numerous. It is a tall slender palm, and is the source of the vegetable wax so largely used in some parts of the country in the manufacture of matches, a single stem sometimes yielding 16-20 lb. Another widely distributed species in central Colombia is known as the "palmita del Azufral" in some localities, and as the "palma real" and "palma dulce" in others. Humboldt says it is not the "palma real" of Cuba (*Oreodoxa regia*), but in the Rio Sinú region is the *Cocos butyracea*, or the "palma dulce," from which palm wine is derived. Another palm of much economic importance in Colombia is the "tagua" (*Phytelephas macrocarpa*), which grows abundantly in the valleys of the Magdalena, Atrato and Patia, and produces a large melon-shaped fruit in which are found the extremely hard, fine-grained nuts or seeds known in the commercial world as vegetable ivory. The Colombian "Panama hat" is made from the fibres extracted from the ribs of the fan-shaped leaves of still another species of palm, *Carludovica palmata*, while in the Rio Sinú region the natives make a kind of butter ("manteca de Corozo") from the *Elaeis melanococca*, Mart., by peeling the nuts in water and then



purifying the oil extracted in this way by boiling. This oil was formerly used for illuminating purposes. The forests are never made up wholly of palms, but are composed of trees of widely different characters, including many common to the Amazon region, together with others found in Central American forests, such as mahogany and "vera" or lignum vitae (*Zygophyllum arboreum*). Brazilwood (*Caesalpinia echinata*), valuable for its timber and colouring extract, and "roco" (*Bixa orellana*), the "urucú" of Brazil which furnishes the anatto of commerce, are widely distributed in central and southern Colombia, and another species of the first-named genus, the *C. coariaria*, produces the "divi-divi" of the Colombian export trade—a peculiarly shaped seed-pod, rich in tannic and gallic acids, and used for tanning leather. The rubber-producing *Hevea guayanensis* is found in abundance on the Amazon tributaries, and the *Castilloa elastica* is common to all the Caribbean river valleys. Southern Colombia, especially the eastern slopes of the Andes, produces another valuable tree, the *Cinchona calisaya*, from the bark of which quinine is made. These are but a few of the valuable cabinet woods, dye-woods, &c., which are to be found in the forests, but have hardly been reached by commerce because of their inaccessibility and the unsettled state of the country. The adventurous orchid-hunter, however, has penetrated deeply into their recesses in search of choice varieties, and collectors of these valuable plants are largely indebted to Colombia for their specimens of *Cattleya Mendelli*, *Warszewiczii* and *Trianae*; *Dowiana aurea*; *Odontoglossum crispum*, *Pescatorei*, *vexillarium*, *odoratum*, *coronarum*, *Harryanum*, and *blandum*; *Miltonia vexillaria*; *Oncidium carthaginense* and *Kramerianum*; *Masdevalliae*, *Epidendra*, *Schomburgkiae* and many others. Colombia is also the home of the American "Alpine rose" (*Befaria*), which is to be found between 9000 and 11,000 ft. elevation, and grows to a height of 5-6 ft. Tree ferns have a remarkable growth in many localities, their stems being used in southern Cundinamarca to make corduroy roads. The South American bamboo (*Bambusa guadia*) has a very wide range, and is found nearly up to the limit of perpetual snow. The cactus is also widely distributed, and is represented by several well-known species. Among the more common fruit-trees, some of which are exotics, may be mentioned cacáo (*Theobroma*), orange, lemon, lime, pine-apple, banana, guava (*Psidium*), breadfruit (*Artocarpus*), cashew (*Anacardium*), alligator pear (*Persea*), with the apple, peach, pear, and other fruits of the temperate zone on the elevated plateaus. Other food and economic plants are coffee, rice, tobacco, sugar-cane, cotton, indigo, vanilla, cassava or "yucca," sweet and white potatoes, wheat, maize, rye, barley, and vegetables of both tropical and temperate climates. It is claimed in Colombia that a species of wild potato found on the *paramos* is the parent of the cultivated potato.

*Population.*—The number of the population of Colombia is very largely a matter of speculation. A census was taken in 1871, when the population was 2,951,323. What the vegetative increase has been since then (for there has been no immigration) is purely conjectural, as there are no available returns of births and deaths upon which an estimate can be based. Civil war has caused a large loss of life, and the withdrawal from their homes of a considerable part of the male population, some of them for military service and a greater number going into concealment to escape it, and it is certain that the rate of increase has been small. Some statistical authorities have adopted 1½% as the rate, but this is too high for such a period. All things considered, an annual increase of 1% for the thirty-five years between 1871 and 1906 would seem to be more nearly correct, which would give a population in the latter year—exclusive of the population of Panama—of a little over 3,800,000. The *Statesman's Year Book* for 1907 estimates it at 4,279,674 in 1905, including about 150,000 wild Indians, while Supan's *Die Bevölkerung der Erde* (1904) places it at 3,917,000 in 1899. Of the total only 10% is classed as white and 15% as Indian, 40% as *mestizos* (white and Indian mixture), and 35% negroes and their mixtures with the other two races. The large proportion of *mestizos*, if these percentages are correct, is significant because it implies a persistence of type that may largely determine the character of Colombia's future population, unless the more slowly increasing white element can be reinforced by immigration.

The white contingent in the population of Colombia is chiefly composed of the descendants of the Spanish colonists who settled there during the three centuries following its discovery and conquest. Mining enterprises and climate drew them into the highlands of the interior, and there they have remained down to the present day, their only settlements on the hot, unhealthy coast being the few ports necessary for commercial and political intercourse with the mother country. The isolation of these distant inland settlements has served to preserve the language, manners and physical characteristics of these early colonists with less variation than in any other Spanish-American state. They form an intelligent, high-spirited class of people, with all the defects and virtues of their ancestry. Their isolation has made them ignorant to some extent of the world's progress, while a supersensitive patriotism blinds them to the discredit and disorganization which political strife and misrule have brought upon them. A very small proportion of the white element consists of foreigners

engaged in commercial and industrial pursuits, but they very rarely become permanently identified with the fortunes of the country. The native whites form the governing class, and enjoy most of the powers and privileges of political office.

Of the original inhabitants there remain only a few scattered tribes in the forests, who refuse to submit to civilized requirements, and a much larger number who live in organized communities and have adopted the language, customs and habits of the dominant race. Their total number is estimated at 15% of the population, or nearly 600,000, including the 120,000 to 150,000 credited to the uncivilized tribes. Many of the civilized Indian communities have not become wholly Hispanicized and still retain their own dialects and customs, their attitude being that of a conquered race submitting to the customs and demands of a social organization of which they form no part. According to Uricoechea there are at least twenty-seven native languages spoken in the western part of Colombia, fourteen in Tolima, thirteen in the region of the Caquetá, twelve in Panama, Bolívar and Magdalena, ten in Bogotá and Cundinamarca, and thirty-four in the region of the Meta, while twelve had died out during the preceding century. The tribes of the Caribbean seaboard, from Chiriqui to Goajira, are generally attached to the great Carib stock; those of the eastern plains show affinities with the neighbouring Brazilian races; those of the elevated Tuquerres district are of the Peruvian type; and the tribes of Antioquia, Cauca, Popayan and Neiva preserve characteristics more akin to those of the Aztecs than to any other race. At the time of the Spanish Conquest the most important of these tribes was the Muyscas or Chibchas, who inhabited the tablelands of Bogotá and Tunja, and had attained a considerable degree of civilization. They lived in settled communities, cultivated the soil to some extent, and ascribed their progress toward civilization to a legendary cause remarkably similar to those of the Aztecs of Mexico and the Incas of Peru. They are represented by some tribes living on the head-waters of the Meta, and their blood flows in the veins of the *mestizos* of the Bogotá plateau. Their ancient language has been partly preserved through the labours of Gonzalo Bermudez, José Dadei, Bernardo de Lugo, and Ezequiel Uricoechea, the last having made it the subject of a special study. According to this author the Chibchas were composed of three loosely united nationalities governed by three independent chiefs—the *Zipa* of Muequetá (the present Funza), the *Zaque* of Hunsa (now Tunja), and the *Jeque* of Iraca, who was regarded as the successor of the god Nemterequisiteba, whom they worshipped as the author of their civilization. The latter had his residence at Suamoz, or Sogamoso.

The Tayronas, of the Santa Marta highlands, who have totally disappeared, were also remarkable for the progress which they had made toward civilization. Evidence of this is to be found in the excellent roads which they constructed, and in the skilfully made gold ornaments which have been found in the district which they occupied, as well as in the contemporary accounts of them by their conquerors. Among the tribes which are still living in a savage state are the Mesayas, Caquetas, Mocoas, Amarizanos, Guipanabis and Andaquies of the unsettled eastern territories; the Goajiros, Motilones, Guainetas, and Cocinas of the Rio Hacha, Upar and Santa Marta districts; and the Dariens, Cunacunas, and Chocos of the Atrato basin. These tribes have successfully resisted all efforts to bring them under political and ecclesiastical control, and their subjection is still a matter of no small concern to the Colombian government. As late as the year 1900 Mr Albert Millican, while collecting orchids on the Opon river, a tributary of the Magdalena between Bogotá and the Caribbean coast, was attacked by hostile Indians, and one of his companions was killed by a poisoned arrow. These hostile tribes are usually too small to make much trouble, but they are able to make exploration and settlement decidedly dangerous in some districts.

The *mestizos*, like the whites and Indians, chiefly inhabit the more elevated regions of the interior. They are of a sturdy, patient type, like their Indian ancestors, and are sufficiently industrious to carry on many of the small industries and occupations, and to meet the labour requirements of the inhabited plateau districts. Those of the urban middle classes are shopkeepers and artisans, and those of the lower class are domestics and day labourers. The whites of Spanish descent object to manual labour, and this places all such occupations in the hands of the coloured races. In the country the *mestizos* are small agriculturists, herders, labourers and fishermen; but there are many educated and successful merchants and professional men among them. There are no social barriers in their intercourse with the whites, nor race barriers against those who have political aspirations. The negroes of pure blood are to be found principally on the coastal plains and in the great lowland river valleys, where they live in great part on the bounties of nature. A small percentage of them are engaged in trade and other occupations; a few are small agriculturists.

Bogotá was reputed to be a centre of learning in colonial times, but there was no great breadth and depth to it, and it produced nothing of real value. By nature the Spanish-

American loves art and literature, and the poetic faculty is developed in him to a degree rarely found among the Teutonic races. Writing and reciting poetry are universal, and fill as important a place in social life as instrumental music. In Colombia, as elsewhere, much attention has been given to belles-lettres among the whites of Spanish descent, but as yet the republic has practically nothing of a permanent character to show for it. The natural sciences attracted attention very early through the labours of José Celestino Mútis, who was followed by a number of writers of local repute, such as Zea, Cabal, Córdas, Pombo, Cespedes, Camacho and Lozano. We are indebted to Humboldt for our earliest geographical descriptions of the northern part of the continent, but to the Italian, Augustin Codazzi, who became a Colombian after the War of Independence, Colombia is indebted for the first systematic exploration of her territory. Geographical description has had a peculiar fascination for Colombian writers, and there have been a number of books issued since the appearance of Codazzi's *Resumen* and *Atlas*. Historical writing has also received much attention, beginning with the early work of José Manuel Restrepo (1827), and a considerable number of histories, compendiums and memoirs have been published, but none of real importance. Some good work has been done in ethnography and archaeology by some writers of the colonial period, and by Ezequiel Uricochea and Ernesto Restrepo.

*Territorial Divisions and Towns.*—Previously to 1903 the republic was divided into nine departments, which were then reduced to eight by the secession of Panama. This division of the national territory was modified in 1905, by creating seven additional departments from detached portions of the old ones, and by cutting up the unsettled districts of Goajira and the great eastern plains into four *intendencias*. The fifteen departments thus constituted, with the official estimates of 1905 regarding their areas and populations, are as follows:—

Department.	Area sq. m.	Estimated Population.	Capital.	Estimated Population.
Antioquia	24,400	750,000	Medellin	60,000
Atlantico	1,080	104,674	Barranquilla	40,115
Bolívar	23,940	250,000	Cartagena	14,000
Boyacá	4,630	350,000	Tunja	10,000
Caldas	7,920	150,000	Manizales	20,000
Cauca	26,030	400,000	Popayán	10,000
Cundinamarca	5,060	225,000	Facatativá	12,000
Galán	6,950	300,000	San Gil	15,000
Huila	8,690	150,000	Neiva	10,000
Magdalena	20,460	100,000	Santa Marta	6,000
Nariño	10,040	200,000	Pasto	6,000
Quesada	2,900	300,000	Zipaquirá	12,000
Santander	11,970	300,000	Bucaramanga	20,000
Tolima	10,900	200,000	Ibagué	12,000
Tundama	2,390	300,000	Santa Rosa	6,000
Federal District	..	200,000	Bogotá	120,000
Intendencias (4)	277,620	..	..	..
Totals	444,980	4,279,674	..	..

Of these departments the original eight are Antioquia, Bolívar, Boyacá (or Bojacá), Cauca, Cundinamarca, Magdalena, Santander and Tolima. The four *intendencias* are called Goajira, Meta, Alto Caquetá and Putumayo, and their aggregate area is estimated to be considerably more than half of the republic. The first covers the Goajira peninsula, which formerly belonged to the department of Magdalena, and the other three roughly correspond to the drainage basins of the three great rivers of the eastern plains whose names they bear. These territories formerly belonged to the departments of Boyacá, Cundinamarca and Cauca. The seven new departments are: Atlantico, taken from the northern extremity of Bolívar; Caldas, the southern part of Antioquia; Galán, the southern districts of Santander, including Charalá, Socorro, Velez, and its capital San Gil; Huila, the southern part of Tolima, including the headwaters of the Magdalena and the districts about Neiva and La Plata; Nariño, the southern part of Cauca extending from the eastern Cordillera to the Pacific coast; Quesada, a cluster of small, well-populated districts north of Bogotá formerly belonging to Cundinamarca, including Zipaquirá, Guatavita, Ubaté and Pacho; and Tundama, the northern part of Boyacá lying on the frontier of Galán in the vicinity of its capital Santa Rosa. The Federal District consists of a small area surrounding the national capital taken from the department of Cundinamarca. These fifteen departments are subdivided into provinces, 92 in all, and these into municipalities, of which there are 740.

The larger cities and towns of the republic other than the department capitals, with their estimated populations in 1904, are:—

Aguadas (Antioquia)	13,000
Antioquia (Antioquia)	13,000
Barbacoas (Nariño)	16,000
Buga (Cauca)	12,500
Cali (Cauca)	16,000
Chiquinquirá (Boyacá)	18,000
La Mesa (Cundinamarca)	10,000
Pamplona (Santander)	11,000
Palmira (Cauca)	15,000
Pié de Cuesta (Santander)	12,000
Puerto Nacional	16,000
Rio Negro (Antioquia)	12,000
Santa Rosa de Osos (Antioquia)	11,000
Sonson	15,000
San José de Cúcuta (Santander)	13,000
Soatá (Boyacá)	16,000
Socorro (Galán)	20,000
Velez (Galán)	15,000

Among the smaller towns which deserve mention are Ambalema on the upper Magdalena, celebrated for its tobacco and cigars; Buenaventura (*q.v.*); Chaparral (9000), a market town of Tolima in the valley of the Saldaña, with coal, iron and petroleum in its vicinity; Honda (6000), an important commercial centre at the head of navigation on the lower Magdalena; Girardot, a railway centre on the upper Magdalena; and Quibdó, a small river town at the head of navigation on the Atrato.

*Communications.*—The railway problem in Colombia is one of peculiar difficulty. The larger part of the inhabited and productive districts of the republic is situated in the mountainous departments of the interior, and is separated from the coast by low, swampy, malarial plains, and by very difficult mountain chains. These centres of production are also separated from each other by high ridges and deep valleys, making it extremely difficult to connect them by a single transportation route. The one common outlet for these districts is the Magdalena river, whose navigable channel penetrates directly into the heart of the country. From Bogotá the Spaniards constructed two partially-paved highways, one leading down to the Magdalena in the vicinity of Honda, while the other passed down into the upper valley of the same river in a south-westerly direction, over which communication was maintained with Popayan and other settlements of southern Colombia and Ecuador. This highway was known as the *camino real*. Political independence and misrule led to the abandonment of these roads, and they are now little better than the bridle-paths which are usually the only means of communication between the scattered communities of the Cordilleras. In some of the more thickly settled and prosperous districts of the Eastern Cordillera these bridle paths have been so much improved that they may be considered reasonably good mountain roads, the traffic over them being that of pack animals and not of wheeled vehicles. Navigation on the lower Magdalena closely resembles that of the Mississippi, the same type of light-draft, flat-bottomed steamboat being used, and similar obstacles and dangers to navigation being encountered. There is also the same liability to change its channel, as shown in the case of Mompox, once an important and prosperous town of the lower plain situated on the main channel, now a decaying, unimportant place on a shallow branch 20 m. east of the main river. Small steamers also navigate the lower Cauca and Nechi rivers, and a limited service is maintained on the upper Cauca.

With three exceptions all the railway lines of the country lead to the Magdalena, and are dependent upon its steamship service for transportation to and from the coast. In 1906, according to an official statement, these lines were: (1) The Barranquilla and Savanilla (Puerto Colombia), 17½ m. in length; (2) the Cartagena and Calamar, 65 m.; (3) the La Dorada & Arancaplumas (around the Honda rapids), 20½ m.; (4) the Colombian National, from Girardot to Facatativá, 80 m., of which 48½ m. were completed in 1906; (5) the Girardot to Espinal, 13½ m., part of a projected line running south-west from Girardot; (6) the Sabana railway, from Bogotá to Facatativá, 25 m.; (7) the Northern, from Bogotá to Zipaquirá, 31 m.; (8) the Southern, from Bogotá to Sibaté, 18 m.; and (9) the Puerto Berrio & Medellin, about 78 m. long, of which 36 are completed. The three lines which do not connect with the Magdalena are: (1) the Cúcuta and Villamazar, 43½ m., the latter being a port on the Zulia river near the Venezuelan frontier; (2) the Santa Marta railway, running inland from that port through the banana-producing districts, with 41½ m. in operation in

1907; and (3) the Buenaventura and Cali, 23 m. in operation inland from the former. This gives a total extension of 383 m. in 1906, of which 226 were built to connect with steamship transportation on the Magdalena, 49 to unite Bogotá with neighbouring localities, and 108 to furnish other outlets for productive regions. There is no system outlined in the location of these detached lines, though in 1905-1908 President Reyes planned to connect them in such a way as to form an extensive system radiating from the national capital. Tramway lines were in operation in Bogotá, Barranquilla and Cartagena in 1907.

The telegraph and postal services are comparatively poor, owing to the difficulty of maintaining lines and carrying mails through a rugged and uninhabited tropical country. The total length of telegraph lines in 1903 was 6470 m., the only cable connexion being at Buenaventura, on the Pacific coast. All the principal Caribbean ports and department capitals are connected with Bogotá, but interruptions are frequent because of the difficulty of maintaining lines through so wild a country.

There are only five ports, Buenaventura, Barranquilla, Cartagena, Santa Marta and Rio Hacha, which are engaged in foreign commerce, though Tumaco and Villamazar are favourably situated for carrying on a small trade with Ecuador and Venezuela. Colombia has no part in the carrying trade, however, her merchants marine in 1905 consisting of only one steamer of 457 tons and five sailing vessels of 1385 tons. Aside from these, small steamers are employed on some of the small rivers with barges, called "bongoes," to bring down produce and carry back merchandise to the inland trading centres. The coasting trade is insignificant, and does not support a regular service of even the smallest boats. The foreign carrying trade is entirely in the hands of foreigners, in which the Germans take the lead, with the British a close second. The Caribbean ports are in frequent communication with those of Europe and the United States.

*Agriculture.*—The larger part of the Colombian population is engaged in agricultural and pastoral pursuits. Maize, wheat and other cereals are cultivated on the elevated plateaus, with the fruits and vegetables of the temperate zone, and the European in Bogotá is able to supply his table very much as he would do at home. The plains and valleys of lower elevation are used for the cultivation of coffee and other sub-tropical products, the former being produced in nearly all the departments at elevations ranging from 3500 to 6500 ft. This industry has been greatly prejudiced by civil wars, which not only destroyed the plantations and interrupted transportation, but deprived them of the labouring force essential to their maintenance and development. It is estimated that the revolutionary struggle of 1899-1903 destroyed 10% of the able-bodied agricultural population of the Santa Marta district, and this estimate, if true, will hold good for all the inhabited districts of the Eastern Cordillera. The best coffee is produced in the department of Cundinamarca in the almost inaccessible districts of Fusagasagá and La Palma. Tolima coffee is also considered to be exceptionally good. The department of Santander, however, is the largest producer, and much of its output in the past has been placed upon the market as "Maracaibo," the outlet for this region being through the Venezuelan port of that name. Coffee cultivation in the Santa Marta region is receiving much attention on account of its proximity to the coast.

The tropical productions of the lower plains include, among others, many of the leading products of the world, such as cacáo, cotton, sugar, rice, tobacco, and bananas, with others destined wholly for home consumption, as yams, cassava and arracacha. Potatoes are widely cultivated in the temperate and sub-tropical regions, and sweet potatoes in the sub-tropical and tropical. Although it is found growing wild, cacáo is cultivated to a limited extent, and the product is insufficient for home consumption. Cotton is cultivated only on a small scale, although there are large areas suitable for the plant. The staple product is short, but experiments have been initiated in the Santa Marta region to improve it. Sugar cane is another plant admirably adapted to the Colombian lowlands, but it is cultivated to so limited an extent that the sugar produced is barely sufficient for home consumption. Both cultivation and manufacture have been carried on in the old time way, by the rudest of methods, and the principal product is a coarse brown sugar, called *panela*, universally used by the poorer classes as an article of food and for making a popular beverage. Antiquated refining processes are also used in the manufacture of an inferior white sugar, but the quantity produced is small, and it is unable to compete with beet-sugar from Germany. A considerable part of the sugar-cane produced is likewise devoted to the manufacture of *chicha* (rum), the consumption of which is common among the Indians and half-breeds of the Andean regions.

Rice is grown to a very limited extent, though it is a common article of diet and the partially submerged lowlands are naturally adapted to its production. Tobacco was cultivated in New Granada and Venezuela in colonial times, when its sale was a royal monopoly and its cultivation was restricted to specified localities. The Colombian product is best known through the Ambalema, Girardot, and Palmira tobacco, especially the Ambalema

cigars, which are considered by some to be hardly inferior to those of Havana, but the plant is cultivated in other places and would probably be an important article of export were it possible to obtain labourers for its cultivation. Banana cultivation for commercial purposes is a comparatively modern industry, dating from 1892 when the first recorded export of fruit was made. Its development is due to the efforts of an American fruit-importing company, which purchased lands in the vicinity of Santa Marta for the production of bananas and taught the natives that the industry could be made profitable. A railway was built inland for the transportation of fruit to Santa Marta, and is being extended toward the Magdalena as fast as new plantations are opened. The growth of the industry is shown in the export returns, which were 171,891 bunches for 1892, and 1,397,388 bunches for 1906, the area under cultivation being about 7000 acres in the last-mentioned year. Yams, sweet potatoes, cassava and arracacha are chiefly cultivated for domestic needs, but in common with other fruits and vegetables they give occupation to the small agriculturalists near the larger towns.

The pastoral industry dates from colonial times and engages the services of a considerable number of people, but its comparative importance is not great. The open plains, "mesas," and plateaus of the north support large herds of cattle, and several cattle ranches have been established on the Meta and its tributaries. Live cattle, to a limited extent, are exported to Cuba and other West Indian markets, but the chief produce from this industry is hides. The department of Santander devotes considerable attention to horse-breeding. Goats are largely produced for their skins, and in some localities, as in Cauca, sheep are raised for their wool. Swine are common to the whole country, and some attention has been given to the breeding of mules.

*Minerals.*—The mineral resources of Colombia are commonly believed to be the principal source of her wealth, and this because of the precious metals extracted from her mines since the Spanish invasion. The estimate aggregate for three and a half centuries is certainly large, but the exact amount will probably never be known, because the returns in colonial times were as defective as those of disorderly independence have been. Humboldt and Chevalier estimated the total output down to 1845 at £1,200,000, which Professor Soetbeer subsequently increased to £169,422,750. A later Colombian authority, Vicente Restrepo, whose studies of gold and silver mining in Colombia have been generally accepted as conclusive and trustworthy, after a careful sifting of the evidence on which these two widely diverse conclusions were based and an examination of records not seen by Humboldt and Soetbeer, reaches the conclusion that the region comprised within the limits of the republic, including Panama, had produced down to 1886 an aggregate of £127,800,000 in gold and £6,600,000 in silver. This aggregate he distributes as follows:—

16th century	£10,600,000
17th "	34,600,000
18th "	41,000,000
19th "	41,600,000

According to his computations the eight Colombian departments, omitting Panama, had produced during this period in gold and silver:—

Antioquia	£50,000,000
Cauca	49,800,000
Tolima	10,800,000
Santander	3,000,000
Bolívar	1,400,000
Cundinamarca	360,000
Magdalena	200,000
Boyacá	40,000
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	£115,600,000

Three-fourths of the gold production, he estimates, was derived from alluvial deposits. Large as these aggregates are, it will be seen that the annual production was comparatively small, the highest average, that for the 19th century, being less than £500,000 a year. Toward the end of the 19th century, after a decline in production due to the abolition of slavery and to civil wars, increased interest was shown abroad in Colombian mining operations. Medellin, the capital of Antioquia, is provided with an electrolytic refining establishment, several assaying laboratories, and a mint. The department of Cauca is considered to be the richest of the republic in mineral deposits, but it is less conveniently situated for carrying on mining operations. Besides this, the extreme unhealthiness of its most productive regions, the Chocó and Barbacoas districts on the Pacific slope, has been a serious obstacle to foreign enterprise. Tolima is also considered to be rich in gold and (especially) silver deposits. East of the Magdalena the production of these two metals has been comparatively small. In

compensation the famous emerald mines of Muzo and Coscuez are situated in an extremely mountainous region north of Bogotá and near the town of Chiquinaquirá, in the department of Boyacá. The gems are found in a matrix of black slate in what appears to be the crater of a volcano, and are mined in a very crude manner. The mines are owned by the government. The revenue was estimated at £96,000 for 1904. Platinum is said to have been discovered in Colombia in 1720, and has been exported regularly since the last years of the 18th century. It is found in many parts of the country, but chiefly in the Chocó and Barbacoas districts, the annual export from the former being about 10,000 in value. Of the bulkier and less valuable minerals Colombia has copper, iron, manganese, lead, zinc and mercury. Coal is also found at several widely-separated places, but is not mined. There are also indications of petroleum in Tolima and Bolívar. These minerals, however, are of little value to the country because of their distance from the seaboard and the costs of transportation. Salt is mined at Zipaquirá, near Bogotá, and being a government monopoly, is a source of revenue to the national treasury.

*Manufactures.*—The Pradera iron works, near Bogotá, carry on some manufacturing (sugar boilers, agricultural implements, &c.) in connexion with their mining and reducing operations. Pottery and coarse earthenware are made at Espinal, in Tolima, where the natives are said to have had a similar industry before the Spanish conquest. There are woollen mills at Popayan and Pasto, and small cigar-making industries at Ambalema and Palmira. Hat-making from the “jipijapa” fibre taken from the *Carludovica* palm is a domestic industry in many localities, and furnishes an article of export. Friction matches are made from the vegetable wax extracted from the *Ceroxylon* palm, and are generally used throughout the interior. Rum and sugar are products of a crude manufacturing industry dating from colonial times. A modern sugar-mill and refinery at Sincerin, 28 m. from Cartagena, was the first of its kind erected in the republic. It is partially supported by the government, and the concession provides that the production of sugar shall not be less than 2,600,000 lb per annum.

*Commerce.*—In the Barranquilla customs returns for 1906 the imports were valued at \$6,787,055 (U.S. gold), on which the import duties were \$4,333,028, or an average rate of 64%. According to a statistical summary issued in 1906 by the U.S. Bureau of Statistics, entitled “Commercial America in 1905,” the latest official return to the foreign trade of Colombia was said to be that of 1898, which was: imports 11,083,000 *pesos*, exports 19,158,000 *pesos*. Uncertainty in regard to the value of the *peso* led the compiler to omit the equivalents in U.S. gold, but according to foreign trade returns these totals represent gold values, which at 4s. per *peso* are: imports £2,216,600, exports £3,831,600. In his annual message to congress on the 1st of April 1907, President Reyes stated that the imports for 1904 were \$14,453,000, and the exports \$12,658,000, presumably U.S. gold, as the figures are taken from the *Monthly Bulletin* of the Bureau of American Republics (July 1907). An approximate equivalent would be: imports £3,011,000, exports £2,637,000; which shows a small increase in the first and a very large decrease in the second. The imports include wheat flour, rice, barley, prepared foods, sugar, coal, kerosene, beer, wines and liquors, railway equipment, machinery and general hardware, fence wire, cotton and other textiles, drugs, lumber, cement, paper, &c., while the exports comprise coffee, bananas, hides and skins, tobacco, precious metals, rubber, cabinet woods, divi-divi, dye-woods, vegetable ivory, Panama hats, orchids, vanilla, &c.

*Government.*—The government of Colombia is that of a centralized republic composed of 15 departments, 1 federal district, and 4 intendencias (territories). It is divided into three co-ordinate branches, legislative, executive and judicial, and is carried on under the provisions of the constitution of 1886, profoundly modified by the amendments of 1905. Previous to 1886, the departments were practically independent, but under the constitution of that year the powers of the national government were enlarged and strengthened, while those of the departments were restricted to purely local affairs. The departments are provided with biennial departmental assemblies, but their governors are appointees of the national executive.

The legislative branch consists of a senate and chamber of deputies, which meets at Bogotá biennially (after 1908) on February 1st for an ordinary session of ninety days. The Senate is composed of 48 members—3 from each department chosen by the governor and his departmental council, and 3 from the federal district chosen by the president himself and two of his cabinet ministers. Under this arrangement the president practically controls the choice of senators. Their term of office is four years, and is renewed at the same time and for the same period as those of the lower house. The chamber is composed of 67 members, elected by popular suffrage in the departments, on the basis of one representative for each 50,000 of population. The intendencias are represented by one member each, who is chosen by the intendant, his secretary, and 3 citizens elected by the municipal council of the

territorial capital. As the constituent assembly which amended the constitution, according to the president's wishes in 1905, was to continue in office until 1908 and to provide laws for the regulation of elections and other public affairs, it appeared that the president would permit no expression of popular dissent to interfere with his purpose to establish a dictatorial régime in Colombia similar to the one in Mexico.

The executive power is vested in a president chosen by Congress for a period of four years. The first presidential period, dating from the 1st of January 1905, was for ten years, and no restriction was placed upon the choice of President Rafael Reyes to succeed himself. The constituent assembly gave the president exceptional powers to deal with all administrative matters. He is assisted by a cabinet of six ministers, interior, foreign affairs, finance, war, public instruction and public works, who are chosen and may be removed by himself. The office of vice-president is abolished, and the president is authorized to choose a temporary substitute from his cabinet, and in case of his death or resignation his successor is chosen by the cabinet or the governor of a department who happens to be nearest Bogotá at the time. The president is authorized to appoint the governors of departments, the intendants of territories, the judges of the supreme and superior courts, and the diplomatic representatives of the republic. His salary, as fixed by the 1905 budget, is £3600 a year, and his cabinet ministers receive £1200 each. The council of state is abolished and the senate is charged with the duty of confirming executive appointments.

The judicial branch of the government, like the others, has been in great measure reorganized. It consists of a supreme court of seven members at Bogotá, and a superior court in each judicial district. There are various inferior courts also, including magistrates or *jueces de paz*, but their organization and functions are loosely defined and not generally understood outside the republic. The supreme court has appellate jurisdiction in judicial matters, and original jurisdiction in impeachment trials and in matters involving constitutional interpretation. Under the constitution of 1886 the judges of the higher courts were appointed for life, but the reforms of 1905 changed their tenure to five years for the supreme court and four years for the superior courts, the judges being eligible for re-appointment.

The departments, which are administered by governors representing the national executive, are permitted to exercise restricted legislative functions relating to purely local affairs. Municipal councils are also to be found in the larger towns. The governor is assisted by a departmental council consisting of his secretaries and the president of the Corte de Cuentas, which places the political administration of the department under the direct control of the president at Bogotá.

The strength of the army is determined annually by congress, but every able-bodied citizen is nominally liable to military service. Its peace footing in 1898 was 1000 men. After the war of 1899-1903 its strength was successively reduced to 10,000 and 5000, a part of this force being employed in the useful occupation of making and repairing public roads. The navy in 1906 consisted of only three small cruisers on the Caribbean coast, and two cruisers, two gunboats, one troopship and two steam launches on the Pacific. There was also one small gunboat on the Magdalena.

*Education.*—Although Bogotá was reputed to be an educational centre in colonial times, so slight an influence did this exert upon the country that Colombia ended the 19th century with no effective public school system, very few schools and colleges, and fully 90% of illiteracy in her population. This is due in great measure to the long reign of political disorder, but there are other causes as well. As in Chile, the indifference of the ruling class to the welfare of the common people is a primary cause of their ignorance and poverty, to which must be added the apathy, if not opposition, of the Church. Under such conditions primary schools in the villages and rural districts were practically unknown, and the parish priest was the only educated person in the community. Nominally there was a school system under the supervision of the national and departmental governments, but its activities were limited to the larger towns, where there were public and private schools of all grades. There were universities in Bogotá and Medellín, the former having faculties of letters and philosophy, jurisprudence and political science, medicine and natural sciences, and mathematics and engineering, with an attendance of 1200 to 1500 students. The war of 1899-1903 so completely disorganized this institution that only one faculty, medicine and natural sciences, was open in 1907. There were also a number of private schools in the larger towns, usually maintained by religious organizations. The reform programme of President Reyes included a complete reorganization of public instruction, to which it is proposed to add normal schools for the training of teachers, and agricultural and technical schools for the better development of the country's material resources. The supreme direction of this branch of the public service is entrusted to the minister of public



instruction, and state aid is to be extended to the secondary, as well as to the normal, technical and professional schools. The secondary schools receiving public aid, however, have been placed in charge of religious corporations of the Roman Catholic Church. The expenditure on account of public instruction, which includes schools of all grades and descriptions, is unavoidably small, the appropriation for the biennium 1905-1906 being only £167,583. The school and college attendance for 1906, according to the president's review of that year, aggregated 218,941, of whom 50,691 were in Antioquia, where the whites are more numerous than in any other department; 4916 in Atlantico, which includes the city of Barranquilla, and in which the negro element preponderates; and only 12,793 in the federal district and city of Bogotá where the *mestizo* element is numerous. Although primary instruction is gratuitous it is not compulsory, and these figures clearly demonstrate that school privileges have not been extended much beyond the larger towns. The total attendance, however, compares well with that of 1897, which was 143,096, although it shows that only 5% of the population, approximately, is receiving instruction.

*Religion.*—The religious profession of the Colombian people is Roman Catholic, and is recognized as such by the constitution, but the exercise is permitted of any other form of worship which is not contrary to Christian morals or to the law. There is one Protestant church in Bogotá, but the number of non-Catholics is small and composed of foreign residents. There has been a long struggle between liberals and churchmen in Colombia, and at one time the latter completely lost their political influence over the government, but the common people remained loyal to the Church, and the upper classes found it impossible to sever the ties which bound them to it. The constitution of 1861 disestablished the Church, confiscated a large part of its property, and disfranchised the clergy, but in 1886 political rights were restored to the latter and the Roman Catholic religion was declared to be the faith of the nation. The rulers of the Church have learned by experience, however, that they can succeed best by avoiding partisan conflicts, and the archbishop of Bogotá gave effect to this in 1874 by issuing an edict instructing priests not to interfere in politics. The Church influence with all classes is practically supreme and unquestioned, and it still exercises complete control in matters of education. The Colombian hierarchy consists of an archbishop, residing at Bogotá, 10 bishops, 8 vicars-general, and 2170 priests. There were also in 1905 about 750 members of 10 monastic and religious orders. There were 270 churches and 312 chapels in the republic. Each diocese has its own seminary for the training of priests.

*Finance.*—In financial matters Colombia is known abroad chiefly through repeated defaults in meeting her bonded indebtedness, and through the extraordinary depreciation of her paper currency. The public revenues are derived from import duties on foreign merchandise, from export duties on national produce, from internal taxes and royalties on liquors, cigarettes and tobacco, matches, hides and salt, from rentals of state emerald mines and pearl fisheries, from stamped paper, from port dues and from postal and telegraph charges. The receipts and expenditure are estimated for biennial periods, but it has not been customary to publish detailed results. Civil wars have of course been a serious obstacle, but it was announced by President Reyes in 1907 that the revenues were increasing. For the two years 1905 and 1906 the revenues were estimated to produce (at \$5 to the £1 sterling) £4,203,823, the expenditures being fixed at the same amount. The expenditures, however, did not include a charge of £424,000, chiefly due on account of war claims and requisitions. During the first year of this period the actual receipts, according to the council of the corporation of foreign bondholders, were \$9,149,591 gold (£1,829,918) and the payments \$7,033,317 gold (£1,406,663). It was expected by the government that the 1906 revenues would largely exceed 1905, but the expectation was not fully realized, chiefly, it may be assumed, because of the inability of an impoverished people to meet an increase in taxation. An instance of this occurred in the promising export of live cattle to Cuba and Panama, which was completely suppressed in 1906 because of a new export tax of \$3 gold per head. Of the expenditures about one-fourth is on account of the war department.

The foreign debt, according to the 1896 arrangement with the bondholders which was renewed in 1905, is £2,700,000, together with unpaid interest since 1896 amounting to £351,000 more. Under the 1905 arrangement the government undertook to pay the first coupons at 2½% and succeeding ones at 3%, pledging 12 to 15% of the customs receipts as security. The first payments were made according to agreement, and it was believed in 1907 that the succeeding ones, together with one-half of the unpaid interest since 1896, would also be met. It is worthy of note that this debt, principal and accumulated interest, exceeded six and a half millions sterling in 1873, and that the bondholders surrendered about 60% of the claim in the hope of securing the payment of the balance. It is also worthy of note that Panama refused to assume any part of this debt without a formal recognition of her independence by Colombia, and even then only a sum proportionate to her population. The internal debt of Colombia in June 1906 was as follows:—

Consolidated	5,476,887 dollars silver,
Floating	2,345,658 dollars gold.

Whether or not this included the unpaid war claims was not stated.

*Money.*—The monetary system, which has been greatly complicated by the use of two depreciated currencies, silver and paper, has been undergoing a radical reform since 1905, the government proposing to redeem the depreciated paper and establish a new uniform currency on a gold basis. The paper circulation in 1905 exceeded 700,000,000 *pesos*. The issue began in 1881 through the Banco Nacional de Colombia, its value then being equal to that of the silver coinage. Political troubles in 1884-1885 led to a suspension of cash payments in 1885, and in 1886 Congress made the notes inconvertible and of forced circulation. In 1894 the Banco Nacional ceased to exist as a corporation, and thenceforward the currency was issued for account of the national treasury. On October 16, 1899—the outstanding circulation then amounting to 46,000,000 *pesos*,—the government decreed an unlimited issue to meet its expenditures in suppressing the revolution, and later on the departments of Antioquia, Bolívar, Cauca, and Santander were authorized to issue paper money for themselves. This suicidal policy continued until February 28, 1903, when, according to an official statement, the outstanding paper circulation was:—

	Pesos.
National government issues	600,398,581
Department of Antioquia	35,938,495.60
"    "    Bolívar	18,702,100
"    "    Cauca	44,719,688.70
"    "    Santander	750,000
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	700,598,865.30

So great was the depreciation of this currency that before the end of the war 100 American gold dollars were quoted at 22,500 *pesos*. The declaration of peace brought the exchange rate down to the neighbourhood of 10,000, where it remained, with the exception of a short period during the Panama Canal negotiations, when it fell to 6000. This depreciation (10,000) was equivalent to a loss of 99% of the nominal value of the currency, a paper *peso* of 100 *centavos* being worth only one centavo gold. International commercial transactions were based on the American gold dollar, which was usually worth 100 *pesos* of this depreciated currency. Even at this valuation, the recognized outstanding circulation (for there had been fraudulent issues as well) amounted to more than £1,400,000. In 1903 Congress adopted a gold dollar of 1.672 grammes weight .900 fine (equal to the U.S. gold dollar) as the monetary standard created a redemption bureau for the withdrawal of the paper circulation, prohibited the further issue of such currency, and authorized free contracts in any currency. Previous to that time the law required all contracts to specify payments in paper currency. Certain rents and taxes were set aside for the use of the redemption bureau, and a nominally large sum has been withdrawn from circulation through this channel. On the 1st of January 1906, another monetary act came into operation, with additional provisions for currency redemption and improvement of the monetary system. A supplementary act of 1906 also created a new national banking institution, called the Banco Central, which is made a depository of the public revenues and is charged with a considerable part of their administration, including payments on account of the foreign debt and the conversion of the paper currency into coin. The new law likewise reaffirmed the adoption of a gold dollar of 1.672 grammes .900 fine as the unit of the new coinage, which is:

<i>Gold:</i> —	
Double condor	= 20 dollars.
Condor	= 10 "
Half condor	= 5 "
Dollar (mon. unit)	= 100 cents.
<i>Silver:</i> —	
Half dollar	= 50 cents.
Peseta	= 20 "
Real	= 10 "
<i>Nickel:</i> —5 cents.	
<i>Bronze:</i> —2 cents and 1 cent.	

The silver coinage (.900 fine) is limited to 10%, and the nickel and bronze coins to 2% of the gold coinage. The new customs tariff, which came into force at the same time, was an increase of 70% on the rates of 1904, and provided that the duties should be paid in gold, or in paper at the current rate of exchange. This measure was designed to facilitate the general

resumption of specie payments.

*Weights and Measures.*—The metric system of weights and measures has been the legal standard in Colombia since 1857, but its use is confined almost exclusively to international trade. In the interior and in all domestic transactions the old Spanish weights and measures are still used—including the Spanish *libra* of 1.102 15 avoirdupois, the *arroba* of 25 *libras* (12½ kilogrammes), the quintal of 100 *libras* (50 kilog.), the *carga* of 250 *libras* (125 kilogs.), the *vara* of 80 centimetres, and the *fanega*. The litre is the standard liquid measure.

(A. J. L.)

#### HISTORY

The coast of Colombia was one of the first parts of the American continent visited by the Spanish navigators. Alonso de Ojeda touched at several points in 1499 and 1501; and Columbus himself visited Veragua, Portobello, and other places in his last voyage in 1502. In 1508 Ojeda obtained from the Spanish crown a grant of the district from Cape Vela westward to the Gulf of Darien, while the rest of the country from the Gulf of Darien to Cape Gracias-a-Dios was bestowed on his fellow-adventurer, Nicuessa. The two territories designated respectively Nueva Andalucia and Castella de Oro were united in 1514 into the province of Tierra-firma, and entrusted to Pedro Arias de Avila. In 1536-1537 an expedition under Gonzalo Jimenez de Quesada made their way from Santa Marta inland by the river Magdalena, and penetrated to Bogotá, the capital of the Muiscas or Chibchas. Quesada gave to the country the name of New Granada.

By the middle of the century the Spanish power was fairly established, and flourishing communities arose along the coasts, and in the table-lands of Cundinamarca formerly occupied by the Muiscas. For the better government of the colony the Spanish monarch erected a presidency of New Granada in 1564, which continued till 1718, when it was raised to the rank of a viceroyalty. In the following year, however, the second viceroy, D. Jorge Villalonga, Count de la Cueva, expressing his opinion that the maintenance of this dignity was too great a burden on the settlers, the viceroyalty gave place to a simple presidency. In 1740 it was restored, and it continued as long as the Spanish authority, including within its limits not only the present Colombia, but also Venezuela and Ecuador. An insurrection against the home government was formally commenced in 1811, and an incessant war against the Spanish forces was waged till 1824.

In 1819 the great national hero, Bolivar (*q.v.*), effected a union between the three divisions of the country, to which was given the title of the Republic of Colombia; but in 1829 Venezuela withdrew, and in 1830, the year of Bolivar's death, Quito or Ecuador followed her example. The Republic of New Granada was founded on the 21st of November 1831; and in 1832 a constitution was promulgated, and the territory divided into eighteen provinces, each of which was to have control of its local affairs. The president was to hold office for four years; and the first on whom the dignity was bestowed was General Francisco de Paula Santander. His position, however, was far from enviable; for the country was full of all the elements of unrest and contention. One of his measures, by which New Granada became responsible for the half of the debts of the defunct republic of Colombia, gave serious offence to a large party, and he was consequently succeeded not, as he desired, by José Maria Obando, but by a member of the opposition, José Ignacio de Marquez. This gave rise to a civil war, which lasted till 1841, and not only left the country weak and miserable, but afforded an evil precedent which has since been too frequently followed. The contest terminated in favour of Marquez, and he was succeeded in May 1841 by Pedro Alcantara Herran, who had assisted to obtain the victory. In 1840 the province of Cartagena had seceded, and the new president had hardly taken office before Panama and Veragua also declared themselves independent, under the title of the State of the Isthmus of Panama. Their restoration was, however, soon effected; the constitution was reformed in 1843; education was fostered, and a treaty concluded with the English creditors of the republic. Further progress was made under General Tomas de Mosquera from 1845 to 1848; a large part of the domestic debt was cleared off, immigration was encouraged, and free trade permitted in gold and tobacco. The petty war with Ecuador, concluded by the peace of Santa Rosa de Carchi, is hardly worthy of mention. From 1849 to 1852 the reins were in the hands of General José Hilario Lopez, a member of the democratic party, and under him various changes were effected of a liberal tendency. In January 1852 slavery was entirely abolished. The next president was José Maria Obando, but his term of office had to be completed by vice-presidents Obaldia and Mallarino.

In 1853 an important alteration of the constitution took place, by which the right was granted to every province to declare itself independent, and to enter into merely federal

connexion with the central republic, which was now known as the Granadine Confederation. In 1856 and 1857 Antioquia and Panama took advantage of the permission. The Conservative party carried their candidate in 1857, Mariano Ospino, a lawyer by profession; but an insurrection broke out in 1859, which was fostered by the ex-president Mosquera, and finally took the form of a regular civil war. Bogotá was captured by the democrats in July 1861, and Mosquera assumed the chief power. A congress at Bogotá established a republic, with the name of the United States of Colombia, adopted a new federal constitution, and made Mosquera dictator. Meanwhile the opposite party was victorious in the west; and their leader, Julio Arboleda, formed an alliance with Don Garcia Moreno, the president of Ecuador. He was assassinated, however, in 1862; and his successor, Leonardo Canal, came to terms with Mosquera at Cali. The dictatorship was resigned into the hands of a convention (February 1863) at Rio Negro, in Antioquia; a provisional government was appointed, a constitution was drawn up, and Mosquera elected president till 1864. An unsuccessful attempt was also made to restore the union between the three republics of the former federation. The presidency of Manuel Murillo Toro (1864-1866) was disturbed by various rebellions, and even Mosquera, who next came to the helm, found matters in such a disorganized condition that he offered to retire. On the refusal of his resignation, he entered into a struggle with the majority in the congress, and ultimately resorted to an adjournment and the unconstitutional arrest of 68 of the senators and representatives. To the decree of impeachment published by the congress he replied by a notice of dissolution and a declaration of war; but he soon found that the real power was with his opponents, who effected his arrest, and condemned him first to two years' imprisonment, but afterwards by commutation to two years' exile. The presidency of Santos Gutierrez (1868-1870) was disturbed by insurrections in different parts of the republic, the most important of which was that in Panama, where the most absolute disorganization prevailed. Under his successor, General E. Salgar, a Liberal candidate elected in opposition to General Herran, a treaty was finally concluded with the United States in connexion with an interoceanic canal, a bank was established at Bogotá, and educational reforms instituted. Manuel Murillo Toro (1872-1874) and Santiago Perez (1874-1876) saw the country apparently acquiring constitutional equilibrium, and turning its energies to the development of its matchless resources.

The election for the presidential term 1876-1878 resulted in favour of Aquiles Parra, who was succeeded in April 1878 by General Julian Trujillo. His administration was marked by a strong effort to place the financial position of the government on a more satisfactory footing, and the internal indebtedness was substantially reduced during his rule. In April 1880 Señor Rafael Nuñez acceded to the presidency. During his term of office revolutionary disturbances occurred in the provinces of Cauca and Antioquia, but were suppressed with no great difficulty. Provision was made in 1880 for a settlement of the boundary dispute with Costa Rica, and in July of that year the federal Congress authorized the formation of a naval squadron. A movement was now set afoot in favour of a confederation of the three republics of Colombia, Ecuador and Venezuela on the basis of the original conditions existing after the expulsion of Spanish authority, and a resolution was passed by the chamber of deputies to that effect. The opposition shown by Venezuela and Ecuador to this project prevented any definite result from being achieved. In April 1882 Señor Francisco J. Laldúa became president, but his death occurring a year later, General José Eusebio Otalora was nominated to exercise the executive power for the unexpired portion of the term. In 1883 the dispute in connexion with the boundary between Colombia and Venezuela was submitted by the two governments to the arbitration of Alphonso XII., king of Spain, and a commission of five members was appointed to investigate the merits of the respective claims. The decision in this dispute was finally given by the queen regent of Spain on the 16th of March 1891. In April 1884 Señor Rafael Nuñez was again proclaimed president of the republic in his absence abroad. Pending his return the administration was left in the hands of General Campo Serrano and General Eliseo Payan. The Liberal party had been instrumental in the re-election of Nuñez, and looked for a policy in conformity with their views and political convictions. President Nuñez had no sooner returned to Colombia than the Liberals discovered that his political opinions had changed and had become strongly Conservative. Discontent at this condition of affairs soon spread. Nuñez from motives of ill-health did not openly assume the presidential office, but from his house near Cartagena he practically directed the government of the republic. The Liberals now began to foment a series of revolutionary movements, and these led in 1885 to a civil war extending over the departments of Boyaca, Cundinamarca, Magdalena and Panama. General Reyes and General Velez were the two principal leaders of the revolt. In order to protect the passage of the traffic across the Isthmus of Panama during these disturbed times detachments of United States marines were landed at Panama and Colon, in accordance with the terms of the

concession under which the railway had been constructed. After a number of defeats the leaders of the revolt surrendered in August 1885, and on the 5th of September following peace was officially proclaimed. Nuñez, who had meanwhile assumed the presidential duties, now brought about a movement in favour of a fresh Act of Constitution for Colombia, and a new law to that effect was finally approved and promulgated on 4th August 1886. Under the terms of this act the federal system of government for Colombia was abolished, the states becoming departments, the governors of these political divisions being appointed by the president of the republic. Each department has a local legislative assembly elected by the people. The national congress is constituted of the Senate and the House of Representatives. The Senate is composed of twenty-seven members elected for six years, one-third retiring every two years, three of whom are nominated by each of the nine departments. The House of Representatives comprises members elected for four years by universal suffrage, each department forming a constituency and returning one member for every 50,000 inhabitants. Congress convenes every two years. The presidential term of office under the new act was fixed at six years in place of the two years formerly prevailing. The judiciary was irremovable, and trial by jury was allowed for criminal offences. Capital punishment was re-established, and the press was made responsible for matter published. The unlicensed trade in arms and ammunition thitherto existing was prohibited. Previous to 1886 the crime of murder was only punishable by 10 years' imprisonment, a sentence which in practice was reduced to two-thirds of that term; slander and libel were formerly offences which the law had no power to restrain, and no responsibility attached to seditious publications.

After the promulgation of this new Act of Constitution President Nuñez was proclaimed as president of the republic for the term ending in 1892. He was unable, however, in consequence of ill-health, to reside at Bogotá and discharge the presidential duties, and consequently in August 1888 Señor Cárlos Holguin was designated to act for him. In 1892 President Nuñez was again elected to the presidency for a term of six years, his continued ill-health, however, forcing him to place the active performance of his duties in the hands of the vice-president, Señor Miguel Caro. In 1895 the Liberals made another attempt to seize the government of the country, but the movement was suppressed without any very great difficulty. In this same year Nuñez died, and Vice-President Caro became the actual president, an office he had practically filled during the three previous years. In 1898 Señor M. A. Sanclemente, a strong Conservative, and supported by the Church party, was elected to the presidency for the period ending in 1904. In October 1899 the Liberals organized another revolutionary outbreak for the purpose of trying to wrest the power from Conservatives, but this attempt had no better success than the movements of 1885 and 1895. In January 1900, however, Vice-President José Marroquin seized upon the government, imprisoned President Sanclemente (who died in prison in March 1902), and another period of disturbance began. The rebels were defeated in May in a desperate battle at Cartagena; and continuous fighting went on about Panama, where British marines had to be landed to protect foreign interests. As the year 1900 advanced, the conflict went on with varying success, but the government troops were generally victorious, and in August Vice-President Marroquin was recognized as the acting head of the executive, with a cabinet under General Calderon. In 1901 the rebellion continued, and severe fighting took place about Colon. Further complications arose in August, when trouble occurred between Colombia and Venezuela. On the one hand, there were grounds for believing that the Clericals and Conservatives in both countries were acting together; and, on the other, it was expected that President Castro of Venezuela would not be sorry to unite his own countrymen, and to divert their attention from internal affairs, by a war against Colombia. The Colombian revolutionary leaders had made use of the Venezuelan frontier as a base of operations, and the result was an invasion of Venezuelan territory by Colombian government troops, an incident which at once caused a diplomatic quarrel. The United States government in September offered its good offices, but President Castro refused them, and the state of affairs became gradually more menacing. Meanwhile both Panama and Colon were seriously threatened by the rebel forces, who in November succeeded in capturing Colon by surprise. The situation was complicated by the fact that the railway traffic on the Isthmus was in danger of interruption, and on the capture of Colon it became necessary for the American, British and French naval authorities to land men for the protection of the railway and of foreign interests.

On the 18th of September the Venezuelans, who had entered Colombia, were totally routed near La Hacha, and after fierce fighting the insurgents at Colon were compelled to surrender on the 29th of November. But the Civil War was not yet ended. For another eight months it was to continue, causing immense damage to property and trade, and the loss of

tens of thousands of lives. In many towns and villages the male population was almost entirely destroyed. Not till June 1903 was internal peace finally restored. In the autumn of that same year Colombia, exhausted and half ruined, was to suffer a further severe loss in the secession of Panama.

The abrogation of the Clayton-Bulwer treaty in 1901, and the failure of the second French company to construct a canal between Colon and Panama (see [PANAMA CANAL](#)) had, after many hesitations, induced the United States government to abandon the Nicaragua route and decide on adopting that of Panama. Negotiations were set on foot with Colombia, and an arrangement—under what was known as the Hay-Herran treaty—was made to the following effect. Colombia agreed (1) to the transfer of the rights, under the concession, of the French company to the United States; (2) to cede, on a hundred years' lease, a right of way for the canal, and a strip of land 5m. broad on either side of the waterway, and the two ports of Colon and Panama. The United States agreed to pay Colombia (1) £2,000,000 down in cash, and, ten years later, an annual rental of £50,000, and further a share of the price paid to the French company, *i.e.* £8,000,000, in which Colombia held 50,000 shares. This treaty was signed by the plenipotentiaries and ratified by the United States Senate. The Colombian Congress, however, refused to ratify the treaty on the ground that when the negotiations had taken place the country was in a state of siege, really in the hope of securing a larger money payment. The adjournment took place on the 31st of October. On the 3rd of November a revolution broke out at Panama, and the state seceded from Colombia and declared itself to be an independent republic. This opportune revolution was no doubt fomented by persons interested in the carrying through of the United States scheme for piercing the isthmus, but their task was one that presented no difficulties, for the isthmian population had been in a state of perennial insurrection against the central government for many years. Whoever may have instigated the rising, this much is certain, that American warships prevented the Colombian troops from landing to suppress the revolt. On the 7th of November the United States government formally recognized the independence of the republic of Panama (*q.v.*). The other powers in succession likewise recognized the new state; the recognition of Great Britain was given on the 26th of December. Colombia thus sacrificed a great opportunity of obtaining, by the ratification of the Hay-Herran treaty, such a pecuniary recompense for the interest in the territory through which the canal was to be constructed as would have gone far to re-establish her ruined financial credit.

In 1904 the troubled term of President Marroquin came to an end, and by the narrowest of majorities General Rafael Reyes was elected in his place. He had been sent as a special envoy to Washington to protest against the recognition of Panama, and to attempt to revive the Hay-Herran treaty, and to secure favourable terms for Colombia in the matter of the canal. He failed to do so, but it was recognized that he had discharged his difficult task with great skill and ability. On his accession to office as president he found the country exhausted and disorganized, more especially in the department of finance, and the congress was on the whole hostile to him. Finding himself hampered in his efforts to reform abuses, the president dissolved the congress, and summoned a national constituent and legislative assembly to meet on the 15th of March 1905, and with its aid proceeded to modify the constitution.

Having personal acquaintance with the success of the rule of President Porfirio Diaz in Mexico, General Reyes determined to set about the regeneration of Colombia by similar methods. His tenure of the presidency was extended to a term of ten years from the 1st of January 1905, and the restriction as to re-election at the end of that term was withdrawn, other alterations being made in the constitution with the effect of placing General Reyes really in the position of a dictator. He soon proved that he had the ability and the integrity of purpose to use his great opportunity for the benefit of his country. His firm and masterful government and wise measures did much to allay the spirit of unrest which had so long been the bane of Colombia, and though an attempt at assassination was made in the spring of 1906, the era of revolution appeared to be over.

The chief foreign treaties entered into by Colombia in the last quarter of the 19th century were:—(1) A treaty with Great Britain, signed on the 27th of October 1888, for the extradition of criminals; (2) a treaty of friendship, commerce and navigation with Italy, signed on the 27th of October 1892; (3) two protocols with Italy, signed respectively on the 24th of May and on the 25th of August 1886, in connexion with the affair of the Italian subject Cerruti; (4) a consular convention with Holland, signed on the 20th of July 1881; (5) a treaty of peace and friendship with Spain, signed on the 30th of January 1881; (6) a convention with Spain for the reciprocal protection of intellectual property; (7) a concordat with the Vatican, signed on the 31st of December 1887; (8) an agreement with the Vatican, signed on the 20th of August 1892, in connexion with ecclesiastical jurisdiction; (9) an

agreement with the republic of San Salvador, signed on the 24th of December 1880, in regard to the despatch of a delegate to an international congress; (10) a treaty of peace, friendship and commerce with Germany, signed on the 23rd of July 1892; (11) a treaty with the republic of Costa Rica, signed in 1880, for the delimitation of the boundary; (12) the postal convention, signed at Washington, on the 4th of July 1891; (13) a convention with Great Britain, signed on the 31st of July 1896, in connexion with the claim of Messrs Punchard, M'Taggart, Lowther & Co.; (14) a treaty of friendship, commerce and navigation with Peru, signed on the 6th of August 1898; (15) an extradition treaty with Peru, signed on the 6th of August 1898; (16) a treaty of peace, friendship and defensive alliance with Venezuela, signed on the 21st of November 1896, and on the same date a treaty regulating the frontier commerce.

(G. E.)

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See also the diplomatic and consular reports of Great Britain and the United States; publications of the International Bureau of American Republics (Washington, D.C.); Bureau of Statistics, *Commercial America in 1905* (Washington, 1906).

- 1 See A. Hettner and G. Linck, "Beiträge zur Geologie und Petrographie der columbianischen Anden," *Zeits. deutsch. geol. Ges.* vol. xl. (1888), pp. 204-230; W. Sievers, "Die Sierra Nevada de Santa Marta und die Sierra de Perijá," *Zeits. Ges. Erdk. Berlin*, vol. xxiii. (1888), pp. 1-158 and p. 442, Pls. i. and iii.; A. Hettner, "Die Kordillere von Bogotá," *Peterm. Mitt.*, Ergänzungsheft 104 (1892), and "Die Anden des westlichen Columbiens," *Peterm. Mitt.* (1893), pp. 129-136; W. Reiss and A. Stübel, *Reisen in Süd America. Geologische Studien in der Republik Colombia* (Berlin, 1892-1899),—a good geological bibliography will be found in part ii. of this work.

**COLOMBIER, PIERRE BERTRAND DE** (1299-1361), French cardinal and diplomatist, was born at Colombier in Ardèche. He was nephew and namesake of Cardinal Pierre Bertrand of Annonay. After a careful juristic education he was successively advocate at the parlement of Paris, intendant of the council of the count of Nevers (1321), and counsellor-clerk to the parlement (1329). Having taken holy orders, he became dean of St Quentin in 1330, and was employed to negotiate the marriage of the duke of Normandy, the future king John the Good of France, with the daughter of the king of Bohemia. In 1335 he became bishop of Nevers, in 1339 of Arras, and contributed to bring the county of Flanders into the kingdom of France. Created cardinal priest of St Susanna in 1344, he was employed by the pope on important missions, notably to negotiate peace or an armistice between France and England. Having become bishop of Ostia in 1353, he was sent next year to Charles IV. of Germany, and induced him to come to Italy to be crowned emperor at Rome, 1355. In 1356

he went to France to try to arrange a peace with England, and died in 1361 at the priory of Montaud near Avignon.

See A. Mazon, *Essai historique sur l'état du Vivarais pendant la guerre de cent ans* (Paris, 1889), with references there.

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**COLOMBO**, the capital and principal seaport of Ceylon, situated on the west coast of the island. Pop. (1901) 154,691. Colombo stands to the south of the mouth of the river Kelani. The coast-land is here generally low-lying, but broken by slight eminences. The great artificial harbour, enclosed by breakwaters, is bounded on the south by a slight promontory. This is occupied by the quarter of the city known as the Fort, from the former existence of a fort founded by the Portuguese and reconstructed by the Dutch. In 1869 the governor, Sir Hercules Robinson (afterwards Lord Rosmead), obtained authority to demolish the fortifications, which were obsolete for purposes of defence, and required 6000 men to man them properly. The levelling of the walls and filling up of the moat made the Fort much more accessible and healthy, and since then it has become the business centre of the city. Here are situated Queen's House, the governor's residence; the secretariat or government offices, and other government buildings, such as the fine general post office and the customs house. Here also are most of the principal hotels, which have a peculiarly high reputation among European hotels in the East. A lofty tower serves as the principal lighthouse of the port and also as a clock-tower. On the south side of the Fort are extensive barracks. The old banqueting-hall of the Dutch governors is used as the garrison church of St Peter.

To the north-east of the Fort, skirting the harbour, are the Pettah, the principal native quarter, the districts of Kotahena and Mutwall, and suburbs beyond. In this direction the principal buildings are the Wolfendahl church, a massive Doric building of the Dutch (1749); the splendid Roman Catholic cathedral of St Lucia (completed in 1904); and St Thomas's College (1851), which follows the lines of an English public school. Close to this last is the Anglican cathedral of Christ Church. The Kotahena temple is the chief Buddhist temple in Colombo.

To the north-east of the Fort is the Lake, a ramifying sheet of fresh water, which adds greatly to the beauty of the site of Colombo, its banks being clothed with luxuriant foliage and flowers. The narrow isthmus between this lake and the sea, south of the Fort, is called Galle Face, and is occupied chiefly by promenades and recreation grounds. The peninsula enclosed by two arms of the Lake is known as Slave Island, having been the site of a slave's prison under the Dutch. South-east of this is the principal residential quarter of Colombo, with the circular Victoria Park as its centre. To the east of the park a series of parallel roads, named after former British governors, are lined with beautiful bungalows embowered in trees. This locality is generally known as the Cinnamon Gardens, as it was formerly a Dutch reserve for the cultivation of the cinnamon bush, many of which are still growing here. In the park is the fine Colombo Museum, founded by Sir William Gregory; and near the neighbouring Campbell Park are the handsome buildings of a number of institutions, such as Wesley College, and the General, Victoria Memorial Eye and other hospitals. South of Victoria Park is the Havelock racecourse. Among educational establishments not hitherto mentioned are the Royal College, the principal government institution, the government technical college and St Joseph's Roman Catholic college. Most of the town is lighted by gas, and certain quarters with electric light, and electric tramways have been laid over several miles of the city roads. The water-supply is drawn from a hill region 30 m. distant.

Under British rule Colombo has shared in the prosperity brought to the island by the successive industries of coffee and tea-planting. At the height of the coffee-growing enterprise 20,000 men, women and children, chiefly Sinhalese and Tamils, found employment in the large factories and stores of the merchants scattered over the town, where the coffee was cleaned, prepared, sorted and packed for shipment. Tea, on the contrary, is prepared and packed on the estates; but there is a considerable amount of work still done in the Colombo stores in sorting, blending and repacking such teas as are sold at the local public sales; also in dealing with cacao, cardamoms, cinchona bark and the remnant still left of the coffee industry. But it is to its position as one of the great ports of call of the East that Colombo owes its great and increasing importance. A magnificent breakwater, 4200 ft. long, the first stone of which was laid by the prince of Wales in 1875,



was completed in 1884. This breakwater changed an open roadstead into a harbour completely sheltered on the most exposed or south-west side; but there was still liability in certain months to storms from the north-west and south-east. Two additional arms were therefore constructed, consisting of a north-east and north-west breakwater, leaving two openings, one 800 ft. and the other 700 ft. wide, between the various sections. The area enclosed is 660 acres. A first-class graving-dock, of which the Admiralty bore half the cost, has also been added. These improvements caused Galle to be abandoned as a port of call for steamers in favour of Colombo, while Trincomalee has been abandoned as a naval station. The port has assumed first-class importance, mail steamers calling regularly as well as men-of-war and the mercantile marine of all nations; and it is now one of the finest artificial harbours in the world. The extension of railways also has concentrated the trade of the island upon the capital, and contributed to its rise in prosperity.

Colombo was originally known as the Kalantotta or Kalany ferry. By the Arabs the name was changed to Kolambu, and the town was mentioned by Ibn Batuta in 1346 as the largest and finest in Serendib. In 1517 the Portuguese effected a settlement, and in 1520 they fortified their port and bade defiance to the native besiegers. In 1586 the town was invested by Raja Singh, but without success. On its capture by the Dutch in 1656 it was a flourishing colony with convents of five religious orders, churches and public offices, inhabited by no fewer than 900 noble families and 1500 families dependent on mercantile or political occupations. In 1796 it was surrendered to the British.

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**COLON** (formerly known as **ASPINWALL**), a city of the Republic of Panama, on the Atlantic coast, in the Bay of Limon, and 47 m. by rail N.W. of the city of Panama. Pop. (1908) about 3000, consisting largely of Jamaica negroes and natives of mixed Spanish, Indian and African descent. It is served by the Panama railway, which crosses the Isthmus of Panama from ocean to ocean. Colon has a deep, though poorly sheltered harbour, and is either the terminus or a place of call for seven lines of steamships. It thus serves as an entrepôt for much of the commerce between Atlantic and Pacific ports, and between the interior towns of Central and South America and the cities of Europe and the United States. The city lies on the west side of the low island of Manzanillo, is bordered on the landward sides by swamp, and consists mainly of unimposing frame houses and small shops. The most attractive parts are the American quarter, where the employés of the Panama railway have their homes, and the old French quarter, where dwelt the French officers during their efforts to build the canal. In this last district, near the mouth of the old canal, stands a fine statue of Christopher Columbus, the gift of the empress Eugénie in 1870. Here also stands the mansion erected and occupied by Ferdinand de Lesseps during his residence on the isthmus. With the exception of railway shops, there are no important industrial establishments.

Colon dates its origin from the year 1850, when the island of Manzanillo was selected as the Atlantic terminus of the Panama railway. The settlement was at first called Aspinwall, in honour of William H. Aspinwall (1807-1875), one of the builders of the railway; but some years afterwards its name was changed by legislative enactment to Colon, in honour of Christopher Columbus, who entered Limon Bay in 1502. The original name, however, survived among the English-speaking inhabitants for many years after this change. With the completion of the railway in 1855, the town supplanted Chagres (*q.v.*) as the principal Atlantic port of the isthmus. Later it acquired increased importance through its selection by de Lesseps as the site for the Atlantic entrance to his canal. During the revolution of 1885 it was partly burned and was rebuilt on a somewhat larger plan. As the city has always been notoriously unhealthful, the United States, on undertaking the construction of the Panama Canal (*q.v.*), became interested in preventing its becoming a centre of infection for the Canal Zone, and by the treaty of November 1903 secured complete jurisdiction in the city and harbour over all matters relating to sanitation and quarantine, and engaged to construct a system of waterworks and sewers in the municipality, which had been practically completed in 1907. The United States government has also opened a port at Cristobal, within the Canal Zone.

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**COLON**, a town of Matanzas province, Cuba, on the railway between Matanzas and Santa Clara, and the centre of a rich sugar-planting country. Pop. (1907) 7124.

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**COLON**, (1) (Gr. κόλον, miswritten and mispronounced as κῶλον, the term being taken from κόλος, curtailed), in anatomy, that part of the greater intestine which extends from the caecum to the rectum (see [ALIMENTARY CANAL](#)). (2.) (Gr. κῶλον, a member or part), originally in Greek rhetoric a short clause longer than the "comma," hence a mark (:), in punctuation, used to show a break in construction greater than that marked by the semicolon (;), and less than that marked by the period or full stop. The sign is also used in psalters and the like to mark off periods for chanting. The word is applied in palaeography to a unit of measure in MSS., amounting in length to a hexameter line.

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**COLONEL** (derived either from Lat. *columna*, Fr. *colonne*, column, or Lat. *corona*, a crown), the superior officer of a regiment of infantry or cavalry; also an officer of corresponding rank in the general army list. The colonelcy of a regiment formerly implied a proprietary right in it. Whether the colonel commanded it directly in the field or not, he always superintended its finance and interior economy, and the emoluments of the office, in the 18th century, were often the only form of pay drawn by general officers. The general officers of the 17th and 18th centuries were invariably colonels of regiments, and in this case the active command was exercised by the lieutenant-colonels. At the present day, British general officers are often, though not always, given the colonelcy of a regiment, which has become almost purely an honorary office. The sovereign, foreign sovereigns, royal princes and others, hold honorary colonelcies, as colonels-in-chief or honorary colonels of many regiments. In other armies, the regiment being a fighting unit, the colonel is its active commander; in Great Britain the lieutenant-colonel commands in the field the battalion of infantry and the regiment of cavalry. Colonels are actively employed in the army at large in staff appointments, brigade commands, &c. extra-regimentally. Colonel-general, a rank formerly used in many armies, still survives in the German service, a colonel-general (*General-Oberst*) ranking between a general of infantry, cavalry or artillery, and a general field marshal (*General-Feldmarschall*). Colonels-general are usually given the honorary rank of general field marshal.

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**COLONIAL OFFICE**, the department of the administration of the United Kingdom which deals with questions affecting the various colonial possessions of the British crown. The department as it now exists is of comparatively modern creation, dating only from 1854. The affairs of the English colonies began to assume importance at the Restoration, and were at first entrusted to a committee of the privy council, but afterwards transferred to a commission created by letters patent. From 1672 to 1675 the council for trade was combined with this commission, but in the latter year the colonies were again placed under the control of the privy council. This arrangement continued until 1695, when a Board of Trade and Plantations was created; its duty, however, was confined to collecting information and giving advice when required. The actual executive work was performed by the secretary of state for the southern department, who was assisted, from 1768 to 1782, by a secretary of state for the colonies. Both the Board of Trade and Plantations and the additional secretary were abolished in 1782, and the executive business wholly given over to the home office. In 1794 a third secretary of state was reappointed, and in 1801 this secretary was designated as secretary of state for war and the colonies. In 1854 the two offices were separated, and a distinct office of secretary of state for the colonies created.

The secretary of state for the colonies is the official medium of communication with colonial governments; he has certain administrative duties respecting crown colonies, and has a right of advising the veto of an act of a colonial legislature—this veto, however, is never exercised in the case of purely local statutes. He is assisted by a permanent and a parliamentary under-secretary and a considerable clerical staff.

As reorganized in 1907 the colonial office consists of three chief departments: (1) the Dominions Department, dealing with the affairs of the self-governing over-sea dominions of the British crown, and of certain other possessions geographically connected with those dominions; (2) the Colonial Department, dealing with the affairs of crown colonies and protectorates; (3) the General Department, dealing with legal, financial and other general business. In addition to these three departments, standing committees exist to take a collective view of such matters as contracts, concessions, mineral and other leases, and patronage.

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**COLONNA**, a noble Roman family, second only to the Gaetani di Sermoneta in antiquity, and first of all the Roman houses in importance. The popes Marcellinus, Sixtus III., Stephen IV. and Adrian III. are said to have been members of it, but the authentic pedigree of the family begins with Pietro, lord of Columna, Palestrina and Paliano (about 1100), probably a brother of Pope Benedict IX. His great grandson Giovanni had two sons, respectively the founders of the Colonna di Paliano and Colonna di Sciarra lines. The third, or Colonna-Romano line, is descended from Federigo Colonna (1223). In the 12th century we find the Colonna as counts of Tusculum, and the family was then famous as one of the most powerful and turbulent of the great Roman clans; its feuds with the Orsini and the Gaetani are a characteristic feature of medieval Rome and the Campagna; like the other great nobles of the Campagna the Colonna plundered travellers and cities, and did not even spare the pope himself if they felt themselves injured by him. Boniface VIII. attempted to break their power, excommunicated them in 1297, and confiscated their estates. He proclaimed a crusade against them and captured Palestrina, but they afterwards revenged themselves by besieging him at Anagni, and Sciarra Colonna laid violent hands on His Holiness, being with difficulty restrained from actually murdering him (1303). In 1347 the Colonna, at that time almost an independent power, were defeated by Cola di Rienzi, but soon recovered. Pope Martin V. (1417-1431) was a Colonna, and conferred immense estates on his family, including Marino, Frascati, Rocca di Papa, Nettuno, Palinao, &c., in the Campagna, and other fiefs in Romagna and Umbria. Their goods were frequently confiscated and frequently given back, and the house was subject to many changes of fortune; during the reign of Pope Alexander VI. they were again humbled, but they always remained powerful and important, and members of the family rose to eminence as generals, prelates and statesmen in the service of the Church or other powers. In the war of 1522 between France and Spain there were Colonna on both sides, and at the battle of Lepanto (1571) Marc Antonio Colonna, who commanded the papal contingent, greatly distinguished himself. A detailed record of the Colonna family would be a history of Rome. To-day there are three lines of Colonna: (1) Colonna di Paliano, with two branches, the princes and dukes of Paliano, and the princes of Stigliano; (2) Colonna di Sciarra, with two branches, Colonna di Sciarra, princes of Carbagnano, and Barberini-Colonna, princes of Palestrina; and (3) Colonna-Romano. The Colonna palace, one of the finest in Rome, was begun by Martin V. and contains a valuable picture and sculpture gallery.

See A. von Reumont, *Geschichte der Stadt Rom* (Berlin, 1868), containing an elaborate account of the family; F. Gregorovius, *Geschichte der Stadt Rom* (Stuttgart, 1872); *Almanack de Gotha*. (L. V.\*)

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**COLONNA, GIOVANNI PAOLO** (*circa* 1637-1695), Italian musician, was born in Bologna about 1637 and died in the same city on the 28th of November 1695. He was a pupil of Filippuzzi in Bologna, and of Abbatini and Benevoli in Rome, where for a time he held the

post of organist at S. Apollinare. A dated poem in praise of his music shows that he began to distinguish himself as a composer in 1659. In that year he was chosen organist at S. Petronio in Bologna, where on the 1st of November 1674 he was made chapel-master. He also became president of the Philharmonic Academy of Bologna. Most of Colonna's works are for the church, including settings of the psalms for three, four, five and eight voices, and several masses and motets. He also composed an opera, under the title *Amilcare*, and an oratorio, *La Profezia d' Eliseo*. The emperor Leopold I. received a copy of every composition of Colonna, so that the imperial library in Vienna possesses upwards of 83 church compositions by him. Colonna's style is for the most part dignified, but is not free from the inequalities of style and taste almost unavoidable at a period when church music was in a state of transition, and had hardly learnt to combine the gravity of the old style with the brilliance of the new.

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**COLONNA, VITTORIA** (1490-1547), marchioness of Pescara, Italian poet, daughter of Fabrizio Colonna, grand constable of the kingdom of Naples, and of Anna da Montefeltro, was born at Marino, a fief of the Colonna family. Betrothed when four years old at the instance of Ferdinand, king of Naples, to Ferrante de Avalos, son of the marquis of Pescara, she received the highest education and gave early proof of a love of letters. Her hand was sought by many suitors, including the dukes of Savoy and Braganza, but at nineteen, by her own ardent desire, she was married to de Avalos on the island of Ischia. There the couple resided until 1511, when her husband offered his sword to the League against the French. He was taken prisoner at the battle of Ravenna (1512) and conveyed to France. During the months of detention and the long years of campaigning which followed, Vittoria and Ferrante corresponded in the most passionate terms both in prose and verse. They saw each other but seldom, for Ferrante was one of the most active and brilliant captains of Charles V.; but Vittoria's influence was sufficient to keep him from joining the projected league against the emperor after the battle of Pavia (1525), and to make him refuse the crown of Naples offered to him as the price of his treason. In the month of November of the same year he died of his wounds at Milan. Vittoria, who was hastening to tend him, received the news of his death at Viterbo; she halted and turned off to Rome, and after a brief stay departed for Ischia, where she remained for several years. She refused several suitors, and began to produce those *Rime spirituali* which form so distinct a feature in her works. In 1529 she returned to Rome, and spent the next few years between that city, Orvieto, Ischia and other places. In 1537 we find her at Ferrara, where she made many friends and helped to establish a Capuchin monastery at the instance of the reforming monk Bernardino Ochino, who afterwards became a Protestant. In 1539 she was back in Rome, where, besides winning the esteem of Cardinals Reginald Pole and Contarini, she became the object of a passionate friendship on the part of Michelangelo, then in his sixty-fourth year. The great artist addressed some of his finest sonnets to her, made drawings for her, and spent long hours in her society. Her removal to Orvieto and Viterbo in 1541, on the occasion of her brother Ascanio Colonna's revolt against Paul III., produced no change in their relations, and they continued to visit and correspond as before. She returned to Rome in 1544, staying as usual at the convent of San Silvestro, and died there on the 25th of February 1547.

Cardinal Bembo, Luigi Alamanni and Baldassare Castiglione were among her literary friends. She was also on intimate terms with many of the Italian Protestants, such as Pietro Carnesecchi, Juan de Valdes and Ochino, but she died before the church crisis in Italy became acute, and, although she was an advocate of religious reform, there is no reason to believe that she herself became a Protestant. Her life was a beautiful one, and goes far to counteract the impression of the universal corruption of the Italian Renaissance conveyed by such careers as those of the Borgia. Her amatory and elegiac poems, which are the fruits of a sympathetic and dainty imitative gift rather than of any strong original talent, were printed at Parma in 1538; a third edition, containing sixteen of her *Rime Spirituali*, in which religious themes are treated in Italian, was published at Florence soon afterwards; and a fourth, including a still larger proportion of the pious element, was issued at Venice in 1544.

A great deal has been written about Vittoria Colonna, but perhaps the best account of her life is A. Luzio's *Vittoria Colonna* (Modena, 1885); A. von Reumont's *Vita di Vittoria Colonna* (Italian corrected edit., Turin, 1883) is also excellent; F. le Fèvre's *Vittoria Colonna* (Paris, 1856) is somewhat inaccurate, but T. Roscoe's *Vittoria Colonna* (London, 1868) may be

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**COLONNADE**, in architecture, a range of columns (Ital. *colonna*) in a row. When extended so as to enclose a temple, it is called a peristyle, and the same term applies when round an open court, as in the houses at Pompeii. When projecting in front of a building, it is called a portico, as in the Pantheon at Rome and the National Gallery in London. When enclosed between wings, as in Perrault's façade to the Louvre, it is correctly described as a colonnade. Colonnades lined the streets of the towns in Syria and Asia Minor, and they were largely employed in Rome.

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**COLONSAY**, an island of the Inner Hebrides, Argyllshire, Scotland, 10 m. S. of the Ross of Mull. It is 7½ m. long by 3 m. broad. The highest point is Carnan Eoin (470 ft.). Towards the middle of the island lies Loch Fada, nearly 2 m. long but very narrow, and there are two other small lakes and a few streams. The coast-line, with frequent beautiful sandy reaches, is much indented, the chief bays being Kiloran, Kilchattan and Staosunaig. On the north-western coast the cliffs are particularly fine. To the south, separated by a strait that is fordable at low water, lies the isle of Oronsay, 2¼ m. long by 2¾ m. wide. Both islands contain a number of ecclesiastical remains, standing stones, and some beautiful sculptured crosses. They are named after Columba and Oran, who are said to have stopped here after they left Ireland. There is regular communication between Scalasaig and Glasgow and the Clyde ports. The golf-course at Kilchattan lends a touch of modernity to these remote islands. Near Scalasaig a granite obelisk has been erected to the memory of Sir Duncan M'Neill (1794-1874), a distinguished Scottish lawyer, who took the title of Lord Colonsay when he became a lord of appeal. The soil of both islands is fertile, potatoes and barley being raised and cattle pastured. Population: Colonsay (1901), 301; Oronsay (1901), 12.

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**COLONY** (Lat. *colonia*, from *colonus*, a cultivator), a term most commonly used to denote a settlement of the subjects of a sovereign state in lands beyond its boundaries, owning no allegiance to any foreign power, and retaining a greater or less degree of dependence on the mother country. The founding and the growth of such communities furnish matter for an interesting chapter in the history as well of ancient as of modern civilization; and the regulation of the relations between the parent state and its dependencies abroad gives rise to important problems alike in national policy and in international economics.

It was mainly the spirit of commercial enterprise that led the Phoenicians to plant their colonies upon the islands and along the southern coast of the Mediterranean; and even beyond the Pillars of Hercules this earliest great colonizing race left enduring traces of its maritime supremacy. Carthage, indeed, chief of the Phoenician settlements, sent forth colonies to defend her conquests and strengthen her military power; and these sub-colonies naturally remained in strict subjection to her power, whereas the other young Phoenician states assumed and asserted entire independence.

In this latter respect the Greek colonies resembled those of the Phoenicians. From a very early period the little civic communities of Greece had sent forth numerous colonizing streams. At points so far asunder as the Tauric Chersonese, Cyrene and Massilia were found prosperous centres of Greek commercial energy; but the regions most thickly peopled by settlers of Greek descent were the western seaboard of Asia Minor, Sicily and the southern parts of the Italian peninsula. Nor were the least prosperous communities those which were

sprung from earlier colonies. The causes that led to the foundation of the Greek colonies were very various. As in Phoenicia, pressure created by the narrow limits of the home country coincided with an adventurous desire to seek new sources of wealth beyond seas; but very many Greek emigrations were caused by the expulsion of the inhabitants of conquered cities, or by the intolerable domination of a hated but triumphant faction within the native state. The polity of the new community, often founded in defiance of the home authorities, might either be a copy of that just left behind or be its direct political antithesis. But wherever they went, and whether, as apparently in Asia Minor, Greek blood was kept free from barbaric mixture, or whether, as in Magna Graecia and Sicily, it was mingled with that of the aboriginal races, the Greek emigrants carried with them the Hellenic spirit and the Hellenic tongue; and the colonies fostered, not infrequently more rapidly and more brilliantly than at home, Greek literature, Greek art and Greek speculation. The relation to be preserved towards the mother states was seldom or never definitely arranged. But filial feeling and established custom secured a measure of kindly sympathy, shown by precedence yielded at public games, and by the almost invariable abstinence of the colony from a hostile share in wars in which the mother city was engaged.

The relation of Rome to her colonies was altogether different. No Roman colony started without the sanction and direction of the public authority; and while the *Colonia Romano* differed from the *Colonia Latina* in that the former permitted its members to retain their political rights intact, the colony, whether planted within the bounds of Italy or in provinces such as Gaul or Britain, remained an integral part of the Roman state. In the earlier colonies, the state allotted to proposing emigrants from amongst the needy or discontented class of citizens portions of such lands as, on the subjection of a hostile people, the state took into its possession as public property. At a later time, especially after the days of Sulla, the distribution of the territories of a vanquished Roman party was employed by the victorious generals as an easy means of satisfying the claims of the soldiery by whose help they had triumphed. The Roman colonies were thus not merely valuable as *propugnacula* of the state, as permanent supports to Roman garrisons and armies, but they proved a most effective means of extending over wide bounds the language and the laws of Rome, and of inoculating the inhabitants of the provinces with more than the rudiments of Roman civilization.

The occupation of the fairest provinces of the Roman empire by the northern barbarians had little in common with colonization. The Germanic invaders came from no settled state; they maintained loosely, and but for a short while, any form of brotherhood with the allied tribes. A nearer parallel to Greek colonization may be found in Iceland, whither the adherents of the old Norse polity fled from the usurpation of Harold Haarfager; and the early history of the English pale in Ireland shows, though not in orderliness and prosperity, several points of resemblance to the Roman colonial system.

Though both Genoese and Venetians in their day of power planted numerous trading posts on various portions of the Mediterranean shores, of which some almost deserve the name of colonies, the history of modern colonization on a great scale opens with the Spanish conquests in America. The first Spanish adventurers came, not to colonize, but to satisfy as rapidly as possible and by the labour of the enslaved aborigines, their thirst for silver and gold. Their conquests were rapid, but the extension of their permanent settlements was gradual and slow. The terrible cruelty at first exercised on the natives was restrained, not merely by the zeal of the missionaries, but by effective official measures; and ultimately home-born Spaniards and Creoles lived on terms of comparative fairness with the Indians and with the half-breed population. Till the general and successful revolt of her American colonies, Spain maintained and employed the latter directly and solely for what she conceived to be her own advantage. Her commercial policy was one of most irrational and intolerable restriction and repression; and till the end of Spanish rule on the American continent, the whole political power was retained by the court at Madrid, and administered in the colonies by an oligarchy of home-bred Spaniards.

The Portuguese colonization in America, in most respects resembling that of Spain, is remarkable for the development there given to an institution sadly prominent in the history of the European colonies. The nearness of Brazil to the coast of Africa made it easy for the Portuguese to supply the growing lack of native labour by the wholesale importation of purchased or kidnapped Africans.

Of the French it is admitted that in their colonial possessions they displayed an unusual faculty for conciliating the prejudices of native races, and even for assimilating themselves to the latter. But neither this nor the genius of successive governors and commanders succeeded in preserving for France her once extensive colonies in Canada or her great

influence in India. In Algeria and West Africa the French government has not merely found practical training schools for her own soldiers, but by opening a recruiting field amongst the native tribes it has added an available contingent to the French army.

The Dutch took early a leading share in the carrying trade of the various European colonies. They have still extensive colonies in the East Indian Archipelago, as well as possessions in the West Indies. The Danish dependencies in the Antilles are but trifling in extent or importance.

It is the English-speaking race, however, that has shown the most remarkable energy and capacity for colonization. The English settlements in Virginia, New England, New York, New Jersey, Maryland, Pennsylvania, Delaware, South Carolina, North Carolina, and Georgia had, between the first decade of the 17th and the seventh decade of the 18th century, developed into a new nation, the United States of America. It is unnecessary here to deal with the development of what have since been the two great independent branches of the English-speaking people—those of the United States (*q.v.*) and of the British Empire (*q.v.*), as their history is given elsewhere. But the colonizing genius which, with the British Isles as centre, has taken up the “white man’s burden” in all quarters of the globe, is universally recognized. In the problems of government raised by the organization of the British dominions beyond the seas the system of colonization has been developed to an extent unknown under any other national flag.

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**COLOPHON**, an ancient city of Ionia, situated inland about 15 m. N. of Ephesus. Its port was at Notium or New Colophon. The site, now called *Tracha* (only recognized towards the end of the 19th century), lies near Diermendere, 5 m. S. of Develikeui station on the Smyrna-Aidin railway, and about 2 m. from the farms and hamlet of Malkajik. It is almost entirely under cultivation, and there is little to be seen but remains of the walls and certain tumuli. Rich tombs, however, have been found beside the old roads leading to it, and the site is usually regarded as a particularly promising one for excavation, since Colophon was a very flourishing city in the great period of Ionia and had declined and been largely superseded by Notium before the Roman age. The common belief, however, that it had no existence after the time of Lysimachus is not borne out by the remains on the site. Founded by Andracmon of Pylos, it was at the acme of its prosperity in the 8th and 7th centuries B.C. up to the epoch of its sack by Gyges of Lydia in 665. It claimed to have produced Homer, but its greatest genuine literary name was Mimnermus. It seems to have been ruled by a rich aristocracy which provided a famous troop of horse; and, from the Greek saying, usually supposed to refer to the decisive effect of the final charge of this troop in battle, the word *colophon* has come to be used for the final note appended to old printed books, containing date, &c. In 287 Lysimachus transferred a part of the population to his new city at Ephesus. Though an Ionian colony Colophon did not share in the common festival of the *Apaturia* and seems to have been isolated for some reason among its neighbours, with one of whom, Ephesus, it was constantly at enmity. The forts by which Ephesus protected itself against Colophonian invasion are still to be seen on the hills north of the Caystrus.

Notium or New Colophon contained the important shrine of the Clarian Apollo, whose site has recently been identified with probability by Th. Makridy Bey during excavations conducted for the Ottoman museum.

See C. Schuchardt in *Athen. Mitteil.* (1886); W. M. Ramsay, *Hist. Geog. of Asia Minor* (addenda) (1890).

(D. G. H.)

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**COLOPHON**, a final paragraph in some manuscripts and many early printed books (see [Book](#)), giving particulars as to authorship, date and place of production, &c. Before the invention of printing, a scribe when he had finished copying a book occasionally added a final paragraph at the end of the text in which he recorded the fact, and (if he were so

minded) expressed his thankfulness to God, or asked for the prayers of readers. In the famous Bodleian MS. 264 of the *Roman d'Alexandre* there is an unusually full note of this kind recording the completion of the copy on the 18th of December 1338 and ending—

“Explicit iste liber, scriptor sit crimine liber,  
Christus scriptorem custodiat ac det honorem.”

Both in manuscripts and also in early printed books authors made use of such a final paragraph for expressing similar feelings. Thus the Guillelmus who made a famous collection of sermons on the gospels for Sundays and saints' days records its completion in 1437 and submits it to the correction of charitable readers, and Sir Thomas Malory notes that his *Morte d'Arthur* “was ended the ix yere of the reygne of Kyng Edward the fourth,” and bids his readers “praye for me whyle I am on lyue that God sende me good deluyerance, and whan I am deed I praye you all praye for my soule.” So again Jacobus Bergomensis records that his *Supplementum Chronicarum* was finished “anno salutis nostre 1483. 3<sup>o</sup> Kalendas Julii in ciuitate Bergomi: mihi vero a natiuitate quadragesimo nono,” and in the subsequent editions which he revised brings both the year and his own age up to date. Before printing was invented, however, such paragraphs were exceptional, and many of the early printers, notably Gutenberg himself, were content to allow their books to go out without any mention of their own names. Fust and Schoeffer, on the other hand, printed at the end of their famous psalter of 1457 the following paragraph in red ink:—*Presens spalorum (sic for psalorum) codex venustate capitalium decoratus Rubricationibusque sufficienter distinctus, Adinuentione artificiosa imprimendi ac caracterizandi absque calami vlla exaracione sic effigiatus, Et ad eusebiam dei industrie est consummatus, Per Iohannem fust ciuem maguntinum, Et Petrum Schoffer de Gernszheim Anno domini Millesimo. cccc. lvii In vigilia Assumpcionis.* Similar paragraphs in praise of printing and of Mainz as the city where the art was brought to perfection appear in most of the books issued by the partners and after Fust's death by Schoeffer alone, and were widely imitated by other printers. In their Latin Bible of 1462 Fust and Schoeffer added a device of two shields at the end of the paragraph, and this addition was also widely copied. Many of these final paragraphs give information of great value for the history of printing; many also, especially those to the early editions of the classics printed in Italy, are written in verse. As the practice grew up of devoting a separate leaf or page to the title of a book at its beginning, the importance of these final paragraphs slowly diminished, and the information they gave was gradually transferred to the title-page. Complete title-pages bearing the date and name of the publishers are found in most books printed after 1520, and the final paragraph, if retained at all, was gradually reduced to a bare statement of the name of the printer. From the use of the word in the sense of a “finishing stroke,” such a final paragraph as has been described is called by bibliographers a “colophon” (Gr. κολοφών), but at what period this name for it was first used has not been ascertained. It is quite possibly not earlier than the 18th century. (For origin see [COLOPHON](#) [city].)

(A. W. Po.)

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**COLORADO**, a state of the American union, situated between 41° and 37° N. lat. and 102° and 109° W. long., bounded N. by Wyoming and Nebraska, E. by Nebraska and Kansas, S. by Oklahoma and New Mexico, and W. by Utah. Its area is 103,948 sq. m. (of which 290 are water surface). It is the seventh largest state of the Union.

*Physiography.*—Colorado embraces in its area a great variety of plains, mountains and plateaus. It lies at the junction of the Great Plains—which in their upward slant to the westward attain an average elevation of about 4000 ft. along the east boundary of the state—with the Rocky Mountains, to the west of which is a portion of the Colorado Plateau. These are the three physiographic provinces of the state (see also [UNITED STATES](#), section *Geology*, ad fin., for details of structure). The last-named includes a number of lofty plateaus—the Roan or Book, Uncompahgre, &c., which form the eastern continuation of the high plateaus of Utah—and covers the western quarter of the state. Its eastern third consists of rich, unbroken plains. On their west edge lies an abrupt, massive, and strangely uniform chain of mountains, known in the neighbourhood of Colorado Springs as the Rampart Range, and in the extreme north as the Front Range, and often denominated as a whole by the latter name. The upturning of the rocks of the Great Plains at the foot of the Front Range develops an



interesting type of topography, the harder layers weathering into grotesquely curious forms, as seen in the famous Garden of the Gods at the foot of Pike's Peak. Behind this barrier the whole country is elevated 2000 ft. or so above the level of the plains region. In its lowest portions just behind the front ranges are the natural "parks"—great plateaus basined by superb enclosing ranges; and to the west of these, and between them, and covering the remainder of the state east of the plateau region, is an entanglement of mountains, tier above tier, running from north to south, buttressed laterally with splendid spurs, dominated by scores of magnificent peaks, cut by river valleys, and divided by mesas and plateaus. These various chains are known by a multitude of local names. Among the finest of the chains are the Rampart, Sangre de Cristo, San Juan, Sawatch (Saguache) and Elk ranges. The first, like the other ranges abutting from north to south upon the region of the prairie, rises abruptly from the plain and has a fine, bold outline. It contains a number of fine summits dominated by Pike's Peak (14,108 ft.). Much more beautiful as a whole is the Sangre de Cristo range. At its southern end are Blanca Peak (14,390) and Old Baldy (14,176, Hayden), both in Costilla county; to the northward are Rito Alto Peak (12,989, Wheeler), in Custer county, and many others of almost equal height and equal beauty. The mountains of the south-west are particularly abrupt and jagged. Sultan Mountain (13,366, Hayden), in San Juan county, and Mt. Eolus (14,079), in La Plata county, dominate the fine masses of the San Juan ranges; and Mt. Sneffels (14,158, Hayden), Ouray county, and Uncompahgre Peak (14,289), Hinsdale county, the San Miguel and Uncompahgre ranges, which are actually parts of the San Juan. Most magnificent of all the mountains of Colorado, however, are the Sawatch and adjoining ranges in the centre of the state. The former (the name is used a little loosely) consists of almost a solid mass of granite, has an average elevation of probably 13,000 ft., presents a broad and massive outline, and has a mean breadth of 15 to 20 m. Mt. Ouray (13,956 ft.), in Chaffee county, may be taken as the southern end, and in Eagle county, the splendid Mount of the Holy Cross (14,170)—so named from the figure of its snow-filled ravines—as the northern. Between them lie: in Chaffee county, Mt. Shavano (14,239, Hayden), Mt. Princeton (14,196, Hayden), Mt. Yale (14,187, Hayden), Mt. Harvard (14,375, Hayden), and La Plata Peak (14,342); in Pitkin county, Grizzly Peak (13,956, Hayden); in Lake county, Elbert Peak (14,421), and Massive mountain (14,424), the highest peak in the state; on the boundary between Summit and Park counties, Mt. Lincoln (14,297, Hayden); and, in Summit county, Mt. Fletcher (14,265). The Elk range is geologically interesting for the almost unexampled displacement of the strata of which it is composed, and the apparent confusion which has thence arisen. Among the most remarkable of its separate summits, which rise superbly in a crescent about Aspen, are North Italian Peak (13,225), displaying the red, white and green of Italy's national colours, White Rock Mountain (13,532), Mt. Owen (13,102), Teocalli Mountain (13,220), Snow Mass (13,970, Hayden) and Maroon (14,003, Hayden) mountains, Castle Peak (14,259), Capitol Mountain (13,997, Hayden), Pyramid Peak (13,885, Hayden), Taylor Peak (13,419), and about a dozen other summits above 12,000 ft. A few miles to the north and north-east of the Mount of the Holy Cross are Red Mountain (13,333, Wheeler), in Eagle county, Torrey Peak (14,336, Hayden) and Gray's Peak (14,341, Hayden), in Summit county, Mt. Evans (14,330, Hayden), in Clear Creek county, and Rosalie Peak (13,575), in Park county; a little farther north, in Gilpin, Grand and Clear Creek counties, James Peak (13,283, Hayden), and, in Boulder county, Long's Peak (14,271, Hayden). Many fine mountains are scattered in the lesser ranges of the state. Altogether there are at least 180 summits exceeding 12,000 ft. in altitude, more than 110 above 13,000 and about 40 above 14,000.

Cirques, valley troughs, numberless beautiful cascades, sharpened alpine peaks and ridges, glacial lakes, and valley moraines offer everywhere abundant evidence of glacial action, which has modified profoundly practically all the ranges. The Park Range east of Leadville, and the Sawatch Range, are particularly fine examples. Much of the grandest scenery is due to glaciation.

One of the most remarkable orographical features of the state are the great mountain "parks"—North, Estes, Middle, South and San Luis—extending from the northern to the southern border of the state, and lying (with the exception of Middle Park) just east of the continental divide. These "parks" are great plateaus, not all of them level, lying below the barriers of surrounding mountain chains. North Park, the highest of all, is a lovely country of meadow and forest. Middle Park is not level, but is traversed thickly by low ranges like the Alleghanies; in the bordering mountain rim are several of the grandest mountain peaks and some of the most magnificent scenery of the state. Estes Park is small, only 20 m. long and never more than 2 m. broad; it is in fact the valley of Thompson Creek. Its surface is one of charming slopes, and by many it is accounted among the loveliest of Colorado valleys. Seven ranges lie between it and the plains. South Park is similarly quiet and charming in

character. Much greater than any of these is San Luis Park. The surface is nearly as flat as a lake, and it was probably at one time the bed of an inland sea. In the centre there is a long narrow lake fed by many streams. It has no visible outlet, but is fresh. The San Luis Park, which runs into New Mexico, is traversed by the Rio Grande del Norte and more than a dozen of its mountain tributaries. These parks are frequented by great quantities of large game, and—especially the North and Middle—are famous hunting-grounds. They are fertile, too, and as their combined area is something like 13,000 sq. m. they are certain to be of great importance in Colorado's agricultural development.

The drainage system of the state is naturally very complicated. Eleven topographical and climatic divisions are recognized by the United States Weather Bureau within its borders, including the several parks, the continental divide, and various river valleys. Of the rivers, the North Platte has its sources in North Park, the Colorado (the Gunnison and Grand branches) in Middle Park, the Arkansas and South Platte in South Park—where their waters drain in opposite directions from Palmer's Lake—the Rio Grande in San Luis Park. Three of these flow east and south-east to the Missouri, Mississippi and the Gulf; but the waters of the Colorado system flow to the south-west into the Gulf of California. Among the other streams, almost countless in number among the mountains, the systems of the Dolores, White and Yampa, all in the west, are of primary importance. The scenery on the headwaters of the White and Bear, the upper tributaries of the Gunnison, and on many of the minor rivers of the south-west is wonderfully beautiful. The South Platte falls 4830 ft. in the 139 m. above Denver; the Grand 3600 ft. in the 224 m. between the mouth of the Gunnison and the Forks; the Gunnison 6477 ft. in 200 m. to its mouth (and save for 16 m. never with a gradient of less than 10 ft.); the Arkansas 7000 ft. in its 338 m. west of the Kansas line. Of the smaller streams the Uncompahgre falls 2700 ft. in 134 m., the Las Animas 7190 ft. in 113 m., the Los Pinos 4920 ft. in 75 m., the Roaring Fork 5923 ft. in 64 m., the Mancos 5000 ft. in 62 m., the La Plata 3103 ft. in 43 m., the Eagle 4293 ft. in 62 m., the San Juan 3785 in 303, the Lake Fork of the Gunnison 6047 in 59. The canyons formed in the mountains by these streams are among the glories of Colorado and of America. The grandest are the Toltec Gorge near the Southern boundary line, traversed by the railway 1500 ft. above the bottom; the Red Gorge and Rouge Canyon of the Upper Grand, and a splendid gorge 16 m. long below the mouth of the Eagle, with walls 2000-2500 ft. in height; the Grand Canyon of the Arkansas (8 m.) above Canyon City, with granite walls towering 2600 ft. above the boiling river at the Royal Gorge; and the superb Black Canyon (15 m.) of the Gunnison and the Cimarron. But there are scores of others which, though less grand, are hardly less beautiful. The exquisite colour contrasts of the Cheyenne canyons near Colorado Springs, Boulder Canyon near the city of the same name, Red Cliff and Eagle River Canyons near Red Cliff, Clear Creek Canyon near Denver—with walls at places 1000 ft. in height—the Granite Canyon (11 m.) of the South Platte west of Florissant, and the fine gorge of the Rio de las Animas (1500 ft.), would be considered wonderful in any state less rich in still more marvellous scenery. One peculiar feature of the mountain landscapes are the mines. In districts like that of Cripple Creek their enormous ore "dumps" dot the mountain flanks like scores of vast ant-hills; and in Eagle River canyon their mouths, like dormer windows into the granite mountain roof, may be seen 2000 ft. above the railway.

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Many parts of the railways among the mountains are remarkable for altitude, construction or scenery. More than a dozen mountain passes lie above 10,000 ft. Argentine Pass (13,000 ft.), near Gray's Peak, is one of the highest wagon roads of the world; just east of Silverton is Rio Grande Pass, about 12,400 ft. above sea-level, and in the Elk Mountains between Gunnison and Pitkin counties is Pearl Pass (12,715 ft.). Many passes are traversed by the railways, especially the splendid scenic route of the Denver and Rio Grande. Among the higher passes are Hoosier Pass (10,309 ft.) in the Park Range, and Hayden Divide (10,780) and Veta Pass (9390); both of these across the Sangre de Cristo range; the crossing of the San Miguel chain at Lizard Head Pass (10,250) near Rico; of the Uncompahgre at Dallas Divide (8977) near Ouray; of the Elk and Sawatch ranges at Fremont (11,320), Tennessee (10,229), and Breckenridge (11,470) passes, and the Busk Tunnel, all near Leadville; and Marshall Pass (10,846) above Salida. Perhaps finer than these for their wide-horized outlooks and grand surroundings are the Alpine Tunnel under the continental divide of the Lower Sawatch chain, the scenery of the tortuous line along the southern boundary in the Conejos and San Juan mountains, which are crossed at Cumbres (10,003 ft.), and the magnificent scenery about Ouray and on the Silverton railway over the shoulder of Red Mountain (attaining 11,235 ft.). Notable, too, is the road in Clear Creek Canyon—where the railway track coils six times upon itself above Georgetown at an altitude of 10,000 ft.

*Climate.*—The climate of Colorado is exceptional for regularity and salubrity. The mean annual temperature for the state is about 46°. The mean yearly isothermals crossing the

state are ordinarily 35° to 50° or 55° F. Their course, owing to the complex orography of the state, is necessarily extremely irregular, and few climatic generalizations can be made. It can be said, however, that the south-east is the warmest portion of the state, lying as it does without the mountains; that the north-central region is usually coldest; that the normal yearly rainfall for the entire state is about 15.5 in., with great local variations (rarely above 27 in.). Winds are constant and rather high (5 to 10 m.), and for many persons are the most trying feature of the climate. Very intense cold prevails of course in winter in the mountains, and intense heat (110° F. or more in the shade) is often experienced in summer, temperatures above 90° being very common. The locality of least annual thermometric range is Lake Moraine (10,268 ft. above the sea)—normally 91° F.; at other localities the range may be as great as 140°, and for the whole state of course even greater (155° or slightly more). The lowest monthly mean in 16 years (1887-1903) was 17.30. Nevertheless, the climate of Colorado is not to be judged severe, and that of the plains region is in many ways ideal. In the lowlands the snow is always slight and it disappears almost immediately, even in the very foothills of the mountains, as at Denver or Colorado Springs. However hot the summer day, its night is always cool and dewless. Between July and October there is little rain, day after day bringing a bright and cloudless sky. Humidity is moderate (annual averages for Grand Junction, Pueblo, Denver and Cheyenne, Wyo., for 6 A.M. about 50 to 66; for 6 P.M. 33 to 50); it is supposed to be increasing with the increasing settlement of the country. Sunshine is almost continuous, and splendidly intense. The maximum number of "rainy" days (with a rainfall of more than 0.01 in.) rarely approaches 100 at the most unfortunate locality; for the whole state the average of perfectly "clear" days is normally above 50%, of "partly cloudy" above 30, of "cloudy" under 20, of "rainy" still less. At Denver, through 11 years, the actual sunlight was 70% of the possible; many other points are even more favoured; very many enjoy on a third to a half of the days of the year above 90% of possible sunshine. All through the year the atmosphere is so dry and light that meat can be preserved by the simplest process of desiccation. "An air more delicious to breathe," wrote Bayard Taylor, "cannot anywhere be found; it is neither too sedative nor too exciting, but has that pure, sweet, flexible quality which seems to support all one's happiest and healthiest moods." For asthmatic and consumptive troubles its restorative influence is indisputable. Along with New Mexico and Arizona, Colorado has become more and more a sanitarium for the other portions of the Union. Among the secondary hygienic advantages are the numerous mineral wells.

*Flora and Fauna.*—The life zones of Colorado are simple in arrangement. The boreal embraces the highest mountain altitudes; the transition belts it on both sides of the continental divide; the upper Sonoran takes in about the eastern half of the plains region east of the mountains, and is represented further by two small valley penetrations from Utah. Timber is confined almost wholly to the high mountain sides, the mountain valleys and the parks being for the most part bare. Nowhere is the timber large or dense. The timberline on the mountains is at about 10,000 ft., and the snow line at about 11,000. It is supposed that the forests were much richer before the settlement of the state, which was followed by reckless consumption and waste, and the more terrible ravages of fire. In 1872-1876 the wooded area was estimated at 32% of the state's area. It is certainly much less now. The principal trees, after the yellow and lodgepole pines, are the red-fir, so-called hemlock and cedar, the Engelmann spruce, the cottonwood and the aspen (*Populus tremuloides*). In 1899 Federal forest reserves had been created, aggregating 4849 sq. m. in extent, and by 1910 this had been increased to 24,528 sq. m. The reserves cover altitudes of 7000 to 14,000 ft. The rainfall is ample for their needs, but no other reserves in the country showed in 1900 such waste by fire and pillage. The minor flora of the country is exceedingly rich. In the plains the abundance of flowers, from spring to autumn, is amazing.

Large game is still very abundant west of the continental divide. The great parks are a favourite range and shelter. Deer and elk frequent especially the mountains of the north-west, in Routt and Rio Blanco counties, adjoining the reservations of the Uncompahgre (White River Ute) and Uintah-Ute Indians—from whose depredations, owing to the negligence of Federal officials, the game of the state has suffered enormous losses. The bison have been exterminated. Considerable bands of antelope live in the parks and even descend to the eastern plains, and the mule-deer, the most common of large game, is abundant all through the mountains of the west. Grizzly or silver-tip, brown and black bears are also abundant in the same region. Rarest of all is the magnificent mountain sheep. Game is protected zealously, if not successfully, by the state, and it was officially estimated in 1898 that there were then probably 7000 elk, as many mountain sheep, 25,000 antelope and 100,000 deer within its borders (by far the greatest part in Routt and Rio Blanco counties). Fish are not naturally very abundant, but the mountain brooks are the finest home for trout,

and these as well as bass, cat-fish and some other varieties have been used to stock the streams.

*Soil.*—The soils of the lowlands are prevailing sandy loams, with a covering of rich mould. The acreage of improved lands in 1900 was returned by the federal census as 2,273,968, three times as much being unimproved; the land improved constituted 3.4% of the state's area. The lands available for agriculture are the lowlands and the mountain parks and valleys.

Speaking generally, irrigation is essential to successful cultivation, but wherever irrigation is practicable the soil proves richly productive. Irrigation ditches having been exempted from taxation in 1872, extensive systems of canals were soon developed, especially after 1880. The Constitution of Colorado declares the waters of its streams the property of the state, and a great body of irrigation law and practice has grown up about this provision. The riparian doctrine does not obtain in Colorado. In no part of the semi-arid region of the country are the irrigation problems so diverse and difficult. In 1903 there were, according to the governor, 10 canals more than 50 m. in length, 51 longer than 20 m., and hundreds of reservoirs. In 1899 there were 7374 m. of main ditches. The average annual cost of water per acre was then estimated at about 79 cents. The acres under ditch in 1902 were greater (1,754,761) than in any other state; and the construction cost of the system was then \$14,769,561 (an increase of 25.6% from 1899 to 1902). There are irrigated lands in every county. Their area increased 8.9% in 1899-1902, and 80.9% from 1890 to 1900; in the latter year they constituted 70.9% of the improved farm-land of the state, as against 48.8 in 1890. The land added to the irrigated area in the decade was in 1890 largely worthless public domain; its value in 1900 was about \$29,000,000. As a result of irrigation the Platte is often dry in eastern Colorado in the summer, and the Arkansas shrinks so below Pueblo that little water reaches Kansas. The water is almost wholly taken from the rivers, but underflow is also utilized, especially in San Luis Park. The South Platte is much the most important irrigating stream. Its valley included 660,495 acres of irrigated land in 1902, no other valley having half so great an area. The diversion of the waters of the Arkansas led to the bringing of a suit against Colorado by Kansas in the United States Supreme Court in 1902, on the ground that such diversion seriously and illegally lessened the waters of the Arkansas in Kansas. In 1907 the Supreme Court of the United States declared that Colorado had diverted waters of the Arkansas, but, since it had not been shown that Kansas had suffered, the case was dismissed, without prejudice to Kansas, should it be injured in future by diversion of water from the river. The exhaustion, or alleged exhaustion, by irrigation in Colorado of the waters of the Rio Grande has raised international questions of much interest between Mexico and the United States, which were settled in 1907 by a convention pledging the United States to deliver 60,000 acre-feet of water annually in the bed of the Rio Grande at the Acequia Madre, just above Juarez, in case of drought this supply being diminished proportionately to the diminution in the United States. As a part of the plans of the national government for reclamation of land in the arid states, imposing schemes have been formulated for such work in Colorado, including a great reservoir on the Gunnison. One of the greatest undertakings of the national reclamation service is the construction of 77 m. of canal and of a six-mile tunnel, beneath a mountain, between the canyon of the Gunnison and the valley of the Uncompahgre, designed to make productive some 140,000 acres in the latter valley.

Apart from mere watering, cultivation is in no way intensive. One of the finest farming regions is the lowland valley of the Arkansas. It is a broad, level plain, almost untimbered, given over to alfalfa, grains, vegetables and fruits. Sugar-beet culture has been found to be exceptionally remunerative in this valley as well as in those of the South Platte and Grand rivers. The growth of this interest has been since 1899 a marked feature in the agricultural development of the state; and in 1905, 1906 and 1907 the state's product of beets and of sugar was far greater than that of any other state; in 1907, 1,523,303 tons of beets were worked—more than two-fifths of the total for the United States. There are various large sugar factories (in 1903, 9, and in 1907, 16), mainly in the north; also at Grand Junction and in the Arkansas valley. The total value of all farm property increased between 1880 and 1900 from \$42,000,000 to \$161,045,101 and 45.9% from 1890 to 1900. In the latter year \$49,954,311 of this was in live-stock (increase 1890-1900, 121.1%), the remaining value in land with improvements and machinery. The total value of farm products in 1899 was \$33,048,576; of this sum 97% was almost equally divided between crop products and animal products, the forests contributing the remainder. Of the various elements in the value of all farm produce as shown by the federal census of 1900, live-stock, hay and grains, and dairying represented 87.2%. The value of cereals (\$4,700,271)—of which wheat and oats represent four-fifths—is much exceeded by that of hay and forage (\$8,159,279 in 1899).

Wheat culture increased greatly from 1890 to 1900. Flour made from Colorado wheat ranks very high in the market. As a cereal-producing state Colorado is, however, relatively unimportant; nor in value of product is its hay and forage crop notable, except that of alfalfa, which greatly surpasses that of any other state. In 1906 the state produced 3,157,136 bushels of Indian corn, valued at \$1,578,568; 8,266,538 bushels of wheat, valued at \$5,373,250; 5,962,394 bushels of oats, valued at \$2,683,077; 759,771 bushels of barley, valued at \$410,276; 43,580 bushels of rye, valued at \$24,405; and 1,596,542 tons of hay, valued at \$15,167,149. The value of vegetable products, of fruits, and of dairy products was, relatively, equally small (only \$7,346,415 in 1899). Natural fruits are rare and practically worthless. Apples, peaches, plums, apricots, pears, cherries and melons have been introduced. The best fruit sections are the Arkansas valley, and in the western and south-western parts of the state. Melons are to some extent exported, and peaches also; the muskmelons of the Arkansas valley (Rocky Ford Canteloupes) being in demand all over the United States. The fruit industry dates practically from 1890. The dairy industry is rapidly increasing. In the holdings of neat cattle (1,453,971) and sheep (2,045,577) it ranked in 1900 respectively seventeenth and tenth among the states of the Union; in 1907, according to the *Yearbook* of the Department of Agriculture, there were in the state 1,561,712 neat cattle and 1,677,561 sheep. Stock-raising has always been important. The parks and mountain valleys are largely given over to ranges. The native grasses are especially adapted for fodder. The grama, buffalo and bunch varieties cure on the stem, and furnish throughout the winter an excellent ranging food. These native grasses, even the thin bunch varieties of dry hills, are surprisingly nutritious, comparing very favourably with cultivated grasses. Large areas temporarily devoted to cultivation with poor success, and later allowed to revert to ranges, have become prosperous and even noted as stock country. This is true of the sandhill region of eastern Colorado. The grass flora of the lowlands is not so rich in variety nor so abundant in quality as that of high altitudes. Before the plains were fenced large herds drifted to the south in the winter, but now sufficient hay and alfalfa are cut to feed the cattle during the storms, which at longest are brief. An account of Colorado agriculture would not be complete without mentioning the depredations of the grasshopper, which are at times extraordinarily destructive, as also of the "Colorado Beetle" (*Doryphora decemlineata*), or common potato-bug, which has extended its fatal activities eastward throughout the prairie states.

*Minerals.*—Colorado is pre-eminently a mineral region, and to this fact it owes its colonization. It possesses unlimited supplies, as yet not greatly exploited, of fine building stones, some oil and asphalt, and related bituminous products, a few precious and semi-precious stones (especially tourmalines, beryls and aquamarines found near Canyon near the Royal Gorge of the Arkansas river), rare opalized and jasperized wood (in the eastern part of the El Paso county), considerable wealth of lead and copper, enormous fields of bituminous coal, and enormous wealth of the precious metals. In the exploitation of the last there have been three periods: that before the discovery of the lead-carbonate silver ores of Leadville in 1879, in which period gold-mining was predominant; the succeeding years until 1894, in which silver-mining was predominant; and the period since 1894, in which gold has attained an overwhelming primacy. The two metals are found in more than 50 counties, San Miguel, Gilpin, Boulder, Clear Creek, Lake, El Paso and Teller being the leading producers. The Cripple Creek field in the last-named county is one of the most wonderful mining districts, past or present, of America. Leadville, in Lake county, is another. The district about Silverton (product 1870-1900 about \$35,000,000, principally silver and lead, and mostly after 1881) has also had a remarkable development; and Creede, in the years of its brief prosperity, was a phenomenal silver-field. From 1858 up to and including 1904 the state produced, according to the State Bureau of Mines (whose statistics have since about 1890 been brought into practical agreement with those of the national government) a value of no less than \$889,203,323 in gold, silver, lead, copper and zinc at market prices. (If the value of silver be taken at coinage value this total becomes vastly greater.) The yield of gold was \$353,913,695-\$229,236,997 from 1895 to 1904; of silver, \$386,455,463-\$115,698,366 from 1889 to 1893; of lead, \$120,742,674—its importance beginning in 1879; of copper, \$17,879,446-\$8,441,783 from 1898 to 1904; and of zinc, \$10,212,045—all this from 1902 to 1904. Silver-mining ceased to be highly remunerative beginning with the closing of the India mints and repeal of the Sherman Law in 1893; since 1900 the yield has shown an extraordinary decrease—in 1905 it was \$6,945,581, and in 1907 \$7,411,652—and it is said that as a result of the great fall in the market value of the metal the mines can now be operated only under the most favourable conditions and by exercise of extreme economy. In Lake county, for example, very much of the argentiferous ore that is too low for remunerative extraction (limit 1903 about \$12.00 per ton) is used for fluxes.<sup>1</sup> The copper output was of slight importance until 1889—\$1,457,749 in 1905, and \$1,544,918 in 1907;

and that of zinc was nil until 1902, when discoveries made it possible to rework for this metal enormous dumps of waste material about the mines, and in 1906 the zinc output was valued at \$5,304,884. Lead products declined with silver, but a large output of low ores has continued at Leadville, and in 1905 the product was valued at \$5,111,570, and in 1906 at \$5,933,829. Up to 1895 the gold output was below ten million dollars yearly; from 1898 to 1904 it ran from 21.6 to 28.7 millions. In 1897 the product first exceeded that of California. In 1907 the value was \$20,826,194. Silver values ran, in the years 1880-1902, from 11.3 to 23.1 million dollars; and the quantities in the same years from 11.6 to 26.3 million ounces. In 1907 it was 11,229,776 oz., valued at \$7,411,652. Regarding again the total combined product of the above five metals, its growth is shown by these figures for its value in the successive periods indicated: 1858-1879, \$77,380,140; 1879-1888, \$220,815,709; 1889-1898, \$322,878,362; 1899-1904, \$268,229,112. From 1900 to 1903 Colorado produced almost exactly a third of the total gold and silver (market value) product of the entire country.

In addition, iron ores (almost all brown hematite) occur abundantly, and all material for making steel of excellent quality. But very little iron is mined, in 1907 only 11,714 long tons, valued at \$21,085. Of much more importance are the manganiferous and the silver manganiferous ores, which are much the richest of the country. Their product trebled from 1889 to 1903; and in 1907 the output of manganiferous ores amounted to 99,711 tons, valued at \$251,207. A small amount is used for spiegeleisen, and the rest as a flux.

The stratified rocks of the Great Plains, the Parks, and the Plateaus contain enormous quantities of coal. The coal-bearing rocks are confined to the Upper Cretaceous, and almost wholly to the Laramie formation. The main areas are on the two flanks of the Rockies, with two smaller fields in the Parks. The east group includes the fields of Canyon City (whose product is the ideal domestic coal of the western states), Raton and the South Platte; the Park group includes the Cones field and the Middle Park; the west group includes the Yampa, La Plata and Grand River fields—the last prospectively (not yet actually) the most valuable of all as to area and quality. About three-fifths of all the coal produced in the state comes from Las Animas and Huerfano counties. In 1901 about a third and in 1907 nearly two-fifths of the state's output came from Las Animas county. The Colorado fields are superior to those of all the other Rocky Mountain states in area, and in quality of product. In 1907 Colorado ranked seventh among the coal-producing states of the Union, yielding 10,790,236 short tons (2.2% of the total for the United States). The total includes every variety from typical lignite to typical anthracite. The aggregate area of beds is estimated by the United States Geological Survey at 18,100 sq. m. (seventh in rank of the states of the Union); and the accessible coal, on other authority, at 33,897,800,000 tons. The industry began in 1864, in which year 500 tons were produced. The product first exceeded one million tons in 1882, two in 1888, three in 1890, four in 1893, five in 1900. From 1897 to 1902 the yield almost doubled, averaging 5,267,783 tons (lignite, semi-bituminous, bituminous, and a steady average production of 60,038 tons of anthracite). About one-fifth of the total product is made into coke, the output of which increased from 245,746 tons in 1890 to 1,421,579 tons (including a slight amount from Utah) in 1907; in 1907 the coke manufactured in Colorado (and Utah) was valued at \$4,747,436. Colorado holds the same supremacy for coal and coke west of the Mississippi that Pennsylvania holds for the country as a whole. The true bituminous coal produced, which in 1897 was only equal to that of the lignitic and semi-bituminous varieties (1.75 million tons), had come by 1902 to constitute three-fourths (5.46 million tons) of the entire coal output. Much of the bituminous coal, especially that of the Canyon City field, is so hard and clean as to be little less desirable than anthracite; it is the favoured coal for domestic uses in all the surrounding states.

Petroleum occurs in Fremont and Boulder counties. There have been very few flowing wells. The product increased from 76,295 barrels in 1887 to above 800,000 in the early 'nineties; it fell thereafter, averaging about 493,269 barrels from 1899 to 1903; in 1905 the yield was 376,238 barrels; and in 1907, 331,851 barrels. In 1905 the state ranked eleventh, in 1907 twelfth, in production of petroleum. It is mostly refined at Florence, the centre of the older field. The Boulder district developed very rapidly after 1902; its product is a high-grade illuminant with paraffin base. Asphalt occurs in the high north rim of Middle Park (c. 10,000 ft.). Tungsten is found in wolframite in Boulder county. In 1903 about 37,000 men were employed in the mines of Colorado. Labour troubles have been notable in state history since 1890.

Mineral springs have already been mentioned. They are numerous and occur in various parts of the state. The most important are at Buena Vista, Ouray, Wagon Wheel Gap, Poncha or Poncho Springs (90°-185° F.), Canyon City, Manitou, Idaho Springs and Glenwood

Springs (120°-140° F., highly mineralized). The last three places, all beautifully situated—the first at the base of Pike's Peak, the second in the Clear Creek Canyon, and the third at the junction of the Roaring Fork with the Grand river—have an especially high repute. In 1904 it was competently estimated that the mineral yield and agricultural yield of the state were almost equal—somewhat above \$47,000,000 each.<sup>2</sup>

In 1900 only 4.6% of the population were engaged in manufactures. They are mainly dependent on the mining industry. There are many large smelters and reduction plants in the state, most of them at Denver, Leadville, Durango and Pueblo; at the latter place there are also blast-furnaces, a steel plant and rolling mills. Use is made of the most improved methods of treating the ore. The cyanide process, introduced about 1890, is now one of the most important factors in the utilization of low-grade and refractory gold and silver ores. The improved dioxide cyanide process was adopted about 1895. The iron and steel product—mainly at Pueblo—is of great importance, though relatively small as compared with that of some other states. Nevertheless, the very high rank in coal and iron interests of the state among the states west of the Mississippi, the presence of excellent manganiferous ores, a central position for distribution, and much the best railway system of any mountain state, indicate that Colorado will almost certainly eventually entirely or at least largely control the trans-Mississippi market in iron and steel. The Federal census of 1900 credited the manufacturing establishments of the state with a capital of \$62,825,472 and a product of \$102,830,137 (increase 1890-1900, 142.1%); of which output the gold, silver, lead and copper smelted amounted to \$44,625,305. Of the other products, iron and steel (\$6,108,295), flouring and grist-mill products (\$4,528,062), foundry and machine-shop products (\$3,986,985), steam railway repair and construction work (\$3,141,602), printing and publishing, wholesale slaughtering and meat packing, malt liquors, lumber and timber, and coke were the most important. The production of beet sugar is relatively important, as more of it was produced in Colorado in 1905 than in any other state; in 1906 334,386,000 lb (out of a grand total for the United States of 967,224,000 lb) were manufactured here; the value of the product in 1905 was \$7,198,982, being 29.2% of the value of all the beet sugar produced in the United States in that year.<sup>3</sup>

*Railways.*—On the 1st of January 1909 there were 5403.05 m. of railway in operation. The Denver Pacific, built from Cheyenne, Wyoming, reached Denver in June 1870, and the Kansas Pacific, from Kansas City, in August of the same year. Then followed the building of the Denver & Rio Grande (1871), to which the earlier development of the state is largely due. The great Santa Fé (1873), Burlington (1882), Missouri Pacific (1887) and Rock Island (1888) systems reached Pueblo, Denver and Colorado Springs successively from the east. In 1888 the Colorado Midland started from Colorado Springs westward, up the Ute Pass, through the South Park to Leadville, and thence over the continental divide to Aspen and Glenwood Springs. The Colorado & Southern, a consolidation of roads connecting Colorado with the south, has also become an important system.

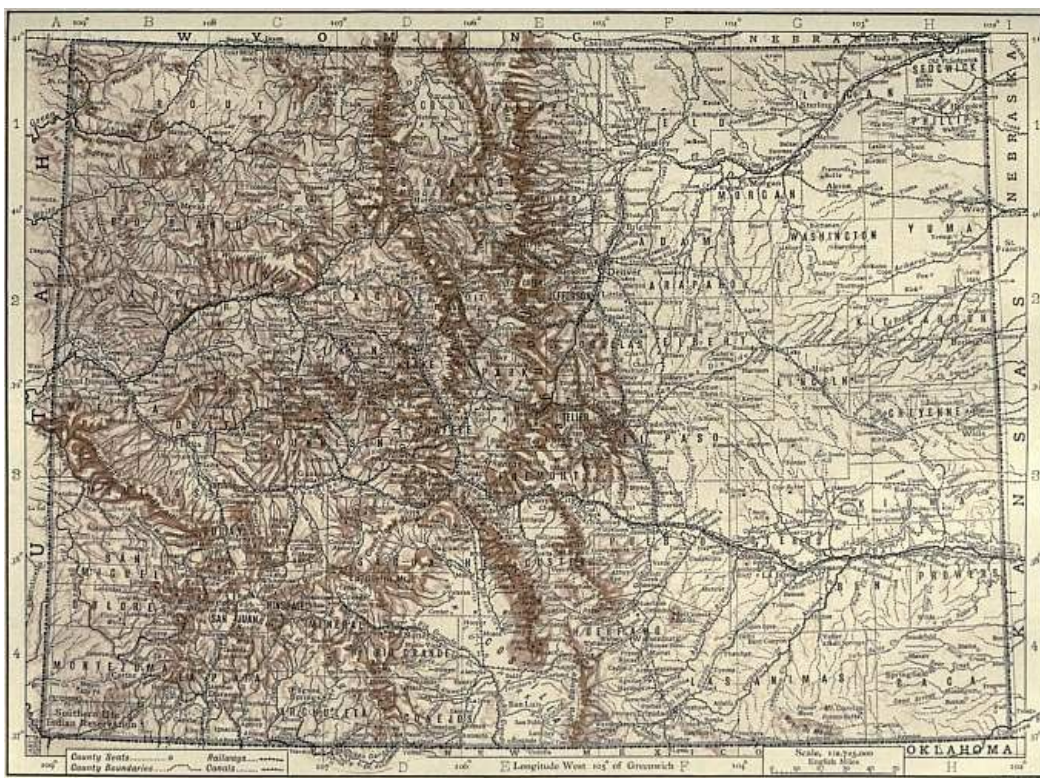
*Population.*—The population of the state in 1870 was 39,864; in 1880, 194,327<sup>4</sup>; in 1890, 413,249; in 1900, 539,700; and in 1910, 799,024. Of the 1900 total, males constituted 54.7%, native born 83.1%. The 10,654 persons of coloured race included 1437 Indians and 647 Chinese and Japanese, the rest being negroes. Of 185,708 males twenty-one or more years of age 7689 (4.1%) were illiterate (unable to write), including a fourth of the Asiatics, a sixth of the Indians, one-nineteenth of the negroes, one in twenty-four of the foreign born, and one in 147.4 of the native born. Of 165 incorporated cities, towns and villages, 27 had a population exceeding 2000, and 7 a population of above 5000. The latter were Denver (133,859), Pueblo (28,137), Colorado Springs (21,085), Leadville (12,455), Cripple Creek (10,147), Boulder (6150) and Trinidad (5345). Creede, county-seat of Mineral county, was a phenomenal silver camp from its discovery in 1891 until 1893; in 1892 it numbered already 7000 inhabitants, but the rapid depreciation of silver soon thereafter caused most of its mines to be closed, and in 1910 the population was only 741. Grand Junction (pop. in 1910, 7754) derives importance from its railway connexions, and from the distribution of the fruit and other products of the irrigated valley of the Grand river. Roman Catholics are in the majority among church adherents, and Methodists and Presbyterians most numerous of the Protestant denominations. The South Ute Indian Reservation in the south of the state is the home of the Moache, Capote and Wiminuche Utes, of Shoshonean stock.

*Administration.*—The first and only state constitution was adopted in 1876. It requires a separate popular vote on any amendment—though as many as six may be (since 1900) voted on at one election. Amendments have been rather freely adopted. The General Assemblies are biennial, sessions limited to 90 days (45 before 1884); state and county elections are held at the same time (since 1902). A declared intention to become a United States citizen

ceased in 1902 to be sufficient qualification for voters, full citizenship (with residence qualifications) being made requisite. An act of 1909 provides that election campaign expenses shall be borne "only by the state and by the candidates," and authorized appropriations for this purpose. Full woman suffrage was adopted in 1893 (by a majority of about 6000 votes). Women have served in the legislature and in many minor offices; they are not eligible as jurors. The governor may veto any separate item in an appropriation bill. The state treasurer and auditor may not hold office during two consecutive terms. Convicts are deprived of the privilege of citizenship only during imprisonment. County government is of the commissioner type. There is a State Voter's League similar to that of Illinois.

In 1907 the total bonded debt of the state was \$393,500; the General Assembly in 1906 authorized the issue of \$900,000 worth of bonds to fund outstanding military certificates of indebtedness incurred in suppressing insurrections at Cripple Creek and elsewhere in 1903-1904. The question of issuing bonds for all outstanding warrants was decided to be voted on by the people in November 1908. Taxation has been very erratic. From 1877 to 1893 the total assessment rose steadily from \$3,453,946 to \$238,722,417; it then fell at least partly owing to the depreciation in and uncertain values of mining property, and from 1894 to 1900 fluctuated between 192.2 and 216.8 million dollars; in 1901 it was raised to \$465,874,288, and fluctuated in the years following; the estimated total assessment for 1907 was \$365,000,000.

Of charitable and reformatory institutions a soldiers' and sailors' home (1889) is maintained at Monte Vista, a school for the deaf and blind (1874) at Colorado Springs, an insane asylum (1879) at Pueblo, a home for dependent and neglected children (1895) at Denver, an industrial school for girls (1887) near Morrison, and for boys (1881) at Golden, a reformatory (1889) at Buena Vista, and a penitentiary (1868) at Canyon City. Denver was one of the earliest cities in the country to institute special courts for juvenile offenders; a reform that is widening in influence and promise. The parole system is in force in the state reformatory; and in the industrial school at Golden (for youthful offenders) no locks, bars or cells are used, the theory being to treat the inmates as "students." The state has a parole law and an indeterminate-sentence law for convicts.



[\(Click to enlarge.\)](#)

The public school system of Colorado dates from 1861, when a school law was passed by the Territorial legislation; this law was superseded by that of 1876, which with subsequent amendments is still in force. In expenditure for the public schools per capita of total population from 1890 to 1903 Colorado was one of a small group of leading states. In 1906 there were 187,836 persons of school age (from 6 to 21) in the state, and of these 144,007 were enrolled in the schools; the annual cost of education was \$4.34 per pupil. In 1902-1903, 92.5% of persons from 5 to 18 years of age were enrolled in the schools. The institutions of the state are: the University of Colorado, at Boulder, opened 1877; the School



of Mines, at Golden (1873); the Agricultural College, at Fort Collins (1870); the Normal School (1891) at Greeley; and the above-mentioned industrial schools. All are supported by special taxes and appropriations—the Agricultural College receiving also the usual aid from the federal government. Experiment stations in connexion with the college are maintained at different points. Colorado College (1874) at Colorado Springs, Christian but not denominational, and the University of Denver, Methodist, are on independent foundations. The United States maintains an Indian School at Grand Junction.

*History.*—According as one regards the Louisiana purchase as including or not including Texas to the Rio Grande (in the territorial meaning of the state of Texas of 1845), one may say that all of Colorado east of the meridian of the head of the Rio Grande, or only that north of the Arkansas and east of the meridian of its head, passed to the United States in 1803. At all events the corner between the Rio Grande and the Arkansas was Spanish from 1819 to 1845, when it became American territory as a part of the state of Texas; and in 1850, by a boundary arrangement between that state and the federal government, was incorporated in the public domain. The territory west of the divide was included in the Mexican cession of 1848. Within Colorado there are pueblos and cave dwellings commemorative of the Indian period and culture of the south-west. Coronado may have entered Colorado in 1540; there are also meagre records of indisputable Spanish explorations in the south in the latter half of the 18th century (friars Escallante and Dominguez in 1776). In 1806 Zebulon M. Pike, mapping the Arkansas and Red rivers of the Louisiana Territory for the government of the United States, followed the Arkansas into Colorado, incidentally discovering the famous peak that bears his name. In 1819 Major S. H. Long explored the valleys of the South Platte and Arkansas, pronouncing them uninhabited and uncultivable (as he also did the valley of the Missouri, whence the idea of the "Great American Desert"). His work also is commemorated by a famous summit of the Rockies. There is nothing more of importance in Colorado annals until 1858. From 1804 to 1854 the whole or parts of Colorado were included, nominally, under some half-dozen territories carved successively out of the Trans-Mississippi country; but not one of these had any practical significance for an uninhabited land. In 1828 (to 1832) a fortified trading post was established near La Junta in the Arkansas valley on the Santa Fé trail; in 1834-1836 several private forts were erected on the Platte; in 1841 the first overland emigrants to the Pacific coast crossed the state, and in 1846-1847 the Mormons settled temporarily at the old Mexican town of Pueblo. John C. Frémont had explored the region in 1842-1843 (and unofficially in later years for railway routes), and gave juster reports of the country to the world than his predecessors. Commerce was tributary in these years to the (New) Mexican town of Taos.

Colorado was practically an unknown country when in 1858 gold was discovered in the plains, on the tributaries of the South Platte, near Denver. In 1859 various discoveries were made in the mountains. The history of Denver goes back to this time. Julesburg, in the extreme north-east corner, at the intersection of the Platte valley and the overland wagon route, became transiently important during the rush of settlers that followed. Emigration from the East was stimulated by the panic and hard times following 1857. During 1860, 1861 and 1862 there was a continuous stream of immigration. Denver (under its present name), Black Hawk, Golden, Central City, Mount Vernon and Nevada City were all founded in 1859; Breckenridge, Empire, Gold Hill, Georgetown and Mill City date from 1860 and 1861. The political development of the next few years was very complicated. "Arapahoe County," including all Colorado, was organized as a part of Kansas Territory in 1858; but a delegate was also sent to Congress to work for the admission of an independent territory (called "Jefferson"). At the same time, early in 1860, a movement for statehood was inaugurated, a constitution being framed and submitted to the people, who rejected it, adopting later in the year a constitution of territorial government. Accordingly the Territory of Jefferson arose, assuming to rule over six degrees of latitude (37°-43°) and eight of longitude (102°-110°). Then there was the Kansas territorial government also, and under this a full county organization was maintained. Finally, peoples' court, acting wholly without reference to Kansas, and with no more than suited them (some districts refusing taxes) to the local "provisional" legislature, secured justice in the mining country. The provisional legislature of the Territory of Jefferson maintained a wholly illegal but rather creditable existence somewhat precariously and ineffectively until 1861. Its acts, owing to the indifference of the settlers, had slight importance. Some, such as the first charter of Denver, were later re-enacted under the legal territorial government, organized by the United States in February 1861. Colorado City was the first capital, but was soon replaced by Golden, which was the capital from 1862 until 1868, when Denver was made the seat of government (in 1881 permanently, by vote of the people). In 1862 some Texas forces were defeated by Colorado forces in an attempt to occupy the territory for the Confederacy. From 1864 to

1870 there was trouble with the Cheyenne and Arapahoe Indians. A sanguinary attack on an Indian camp in Kiowa county in 1864 is known as the Sand Creek Massacre. In 1867 the Republican party had prepared for the admission of Colorado as a state, but the enabling act was vetoed by President Johnson, and statehood was not gained until 1876. Finally, under a congressional enabling act of the 3rd of March 1875, a constitution was framed by a convention at Denver (20th of December 1875 to 14th of March 1876) and adopted by the people on the 1st of July 1876. The admission of Colorado to the Union was thereupon proclaimed on the 1st of August 1876.

From this time on the history of the state was long largely that of her great mining camps. After 1890 industrial conditions were confused and temporarily set greatly backward by strikes and lockouts in the mines, particularly in 1894, 1896-1897 and 1903-1904, several times threatening civil war and necessitating the establishment of martial law. Questions of railways, of franchises, union scales and the recognition of the union in contracts, questions of sheep and cattle interests, politics, civic, legal and industrial questions, all entered into the economic troubles of these years. The Colorado "labour wars" were among the most important struggles between labour and capital, and afforded probably the most sensational episodes in the story of all labour troubles in the United States in these years. A state board of arbitration was created in 1896, but its usefulness was impaired by an opinion of the state attorney-general (in 1901) that it could not enforce subpoenas, compel testimony or enforce decisions. A law establishing an eight-hour day for underground miners and smelter employees (1899) was unanimously voided by the state supreme court, but in 1902 the people amended the constitution and ordered the general assembly to re-enact the law for labourers in mines, smelters and dangerous employments. Following the repeal of the Sherman Law and other acts and tendencies unfavourable to silver coinage in 1893 and thereafter, the silver question became the dominant issue in politics, resulting in the success of the Populist-Democratic fusion party in three successive elections, and permanently and greatly altering prior party organizations.

The governors of Colorado have been as follows:—

*Territorial.*

W. Gilpin	1861	E. M. McCook	1869
J. Evans	1862	S. H. Elbert	1873
A. Cummings	1865	E. M. McCook	1874
A. C. Hunt	1867	J. L. Routt	1875

*State.*

J. L. Routt	Republican	1876
F. W. Pitkin	"	1879
J. B. Grant	Democrat	1883
B. H. Eaton	Republican	1885
A. Adams	Democrat	1887
J. A. Cooper	Republican	1890
J. L. Routt	"	1891
D. H. Waite	Populist	1893
A. W. M'Intire	Republican	1895
A. Adams	Dem.-Populist	1897
C. S. Thomas	"	1899
J. B. Orman	"	1901
J. H. Peabody	Republican	1903
A. Adams	Democrat	1905 <sup>5</sup>
Jesse F. M'Donald	Republican	1905 <sup>5</sup>
Henry A. Buchtel	"	1907
John H. Shafroth	Democrat	1909

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On *history*: F. L. Paxson, "A Preliminary Bibliography of Colorado History," being vol. iii., No. 3, of *University of Colorado Studies* (June 1906); H. H. Bancroft, *History of ... Nevada, Colorado and Wyoming, 1540-1888* (San Francisco, 1890); on *labour conditions and troubles* consult: *Reports* of the State Bureau of Labour Statistics (since 1892); *Annual Reports* of the State Board of Arbitration (since 1898); publications of United States Bureau of Labour (bibliographies); also especially Senate Document 122, 58th Congress, 3rd Session, covering the years 1880-1904. See also [CRIPPLE CREEK](#) and [LEADVILLE](#).

- 1 The market value of silver varied in the years 1870-1885 from \$1.32 to \$1.065 an ounce; 1886-1893, \$0.995 to \$0.782; 1894-1904, \$0.630 to \$0.5722.
- 2 The mineral yield for 1907, according to *The Mineral Resources of the United States*, 1907, amounted to \$71,105,128.
- 3 The special census of manufactures of 1905 was concerned only with the manufacturing establishments of the state conducted under the so-called factory system. The capital invested in such establishments was \$107,663,500, and the product was valued at \$100,143,999. The corresponding figures for 1900 reduced to the same standard for purposes of comparison were \$58,172,865 and \$89,067,879. Thus during the five years the capital invested in factories increased 85.1%, and the factory product 12.4%. The increase in product would undoubtedly have been much greater but for the labour disturbances (described later in the article), which occurred during this interval. Of the total product in 1905 more than four-fifths were represented by the smelting of lead, copper and zinc ores, the manufacture of iron and steel, the production of coke, and the refining of petroleum. The value of the flour and grist-mill product was \$5,783,421.
- 4 Census figures before 1890 do not include Indians on reservations.
- 5 Adams was inaugurated on the 10th of January, having been elected on the return of the vote, which had been notoriously corrupted in Denver and elsewhere. The Republican legislature, after investigating the election and upon receiving from Peabody a written promise that he would resign in twenty-four hours, declared on the 16th of March that Peabody was elected. His resignation on the 17th of March made Lieutenant-Governor M'Donald governor of the state.

**COLORADO RIVER**, a stream in the south of the Argentine Republic. It has its sources on the eastern slopes of the Andes in the lat. of the Chilean volcano Tinguiririca (about 34° 48' S.), and pursues a general E.S.E. course to the Atlantic, where it discharges through several channels of a delta extending from lat. 39° 30' to 39° 30' S. Its total length is about 620 m., of which about 200 m. from the coast up to Pichemahuida is navigable for vessels of 7 ft. draft. It has been usually described as being formed by the confluence of the Grande and Barrancas, but as the latter is only a small stream compared with the Grande it is better described as a tributary, and the Grande as a part of the main river under another name. After leaving the vicinity of the Andes the Colorado flows through a barren, arid territory and receives no tributary of note except the Curaco, which has its sources in the Pampa territory and is considered to be part of the ancient outlet of the now closed lacustrine basin of southern Mendoza. The bottom lands of the Colorado in its course across Patagonia are fertile and wooded, but their area is too limited to support more than a small, scattered population.

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**COLORADO RIVER**, a stream in the south-west of the United States of America, draining a part of the high and arid plateau between the Rocky mountains and the Sierra Nevada in California. The light rainfall scarcely suffices over much of the river's course to make good the loss by evaporation from the waters drained from mountain snows at its source. Its headwaters are known as the Green river, which rises in north-west Wyoming and after a course of some 700 m. due south unites in south-east Utah with the Grand river, flowing down from Colorado, to form the main trunk of the Colorado proper. The Green cuts its way through the Uinta mountains of Wyoming; then flowing intermittently in the open, it crosses successive uplifts in a series of deep gorges, and flows finally at the foot of canyon walls 1500 ft. high near its junction with the Grand.

The Colorado in its course below the junction has formed a region that is one of the most wonderful of the world, not only for its unique and magnificent scenery, but also because it affords the most remarkable example known of the work of differential weathering and erosion by wind and water and the exposure of geologic strata on an enormous scale. Above the Paria the river flows through scenery comparatively tame until it reaches the plateau of the Marble Canyon, some 60 m. in length. The walls here are at first only a few score of feet in height, but increase rapidly to almost 5000 ft. At its southern end is the Little Colorado. Above this point eleven rivers with steep mountain gradients have joined either the Green or the Grand or their united system. The Little Colorado has cut a trench 1800 ft. deep into the plateau in the last 27 m. as it approaches the Colorado, and empties into it 2625 ft. above the sea. Here the Colorado turns abruptly west directly athwart the folds and fault line of the plateau, through the Grand Canyon (*q.v.*) of the Colorado, which is 217 m. long and from 4 to 20 m. wide between the upper cliffs. The walls, 4000 to 6000 ft. high, drop in successive escarpments of 500 to 1600 ft., banded in splendid colours, toward the gloomy narrow gorge of the present river. Below the confluence of the Virgin river of Nevada the Colorado abruptly turns again, this time southward, and flows as the boundary between Arizona and California and in part between Arizona and Nevada, and then through Mexican territory, some 450 m. farther to the Gulf of California. Below the Black Canyon the river lessens in gradient, and in its lower course flows in a broad sedimentary valley—a distinct estuarine plain extending northward beyond Yuma—and the channel through much of this region is bedded in a dyke-like embankment lying above the flood-plain over which the escaping water spills in time of flood. This dyke cuts off the flow of the river to the remarkable low area in southern California known as the Salton Sink, or Coahuila Valley, the descent to which from the river near Yuma is very much greater than the fall in the actual river-bed from Yuma to the gulf. In the autumn of 1904, the diversion flow from the river into a canal heading in Mexican territory a few miles below Yuma, and intended for irrigation of California south of the Sink, escaped control, and the river, taking the canal as a new channel, recreated in California a great inland sea—to the bed of which it had frequently been turned formerly, for example, in 1884 and 1891—and for a time practically abandoned its former course through Mexican territory to the Gulf of California. But it was effectively dammed in the early part of 1907 and returned to its normal course, from which, however, there was still much leakage to Salton Sea; in July 1907 the permanent dam was completed. From the Black Canyon to the sea the Colorado normally flows through a desert-like basin, to the west of which, in Mexico, is Laguna Maquata (or Salada), lying in the so-called Pattie

Basin, which was formerly a part of the Gulf of California, and which is frequently partially flooded (like Coahuila Valley) by the delta waters of the Colorado. Of the total length of the Colorado, about 2200 m., 500 m. or more from the mouth are navigable by light steamers, but channel obstacles make all navigation difficult at low water, and impossible about half the year above Mojave. The whole area drained by the river and its tributaries is about 225,000 sq. m.; and it has been estimated by Major J. W. Powell that in its drainage basin there are fully 200,000 sq. m. that have been degraded on an average 6000 ft. It is still a powerful eroding stream in the canyon portion, and its course below the canyons has a shifting bed much obstructed by bars built of sediment carried from the upper course. The desert country toward the mouth is largely a sandy or gravelly aggradation plain of the river. The regular floods are in May and June. Others, due to rains, are rare. The rise of the water at such times is extraordinarily rapid. Enormous drift is left in the canyons 30 or 40 ft. above the normal level. The valley near Yuma is many miles wide, frequently inundated, and remarkably fertile; it is often called the "Nile of America" from its resemblance in climate, fertility, overflows and crops. These alluvial plains are covered with a dense growth of mesquite, cottonwood, willow, arrowwood, quelite and wild hemp. Irrigation is essential to regular agriculture. There is a fine delta in the gulf. The Colorado is remarkable for exceedingly high tides at its mouth and for destructive bores.

In 1540, the second year that Spaniards entered Arizona, they discovered the Colorado. Hernando de Alarcon co-operating with F. V. de Coronado, explored with ships the Gulf of California and sailed up the lower river; Melchior Diaz, marching along the shores of the gulf, likewise reached the river; and Captain García López de Cárdenas, marching from Zuñi, reached the Grand Canyon, but could not descend its walls. In 1604 Juan de Oñate crossed Arizona from New Mexico and descended the Santa Maria, Bill Williams and Colorado to the gulf. The name Colorado was first applied to the present Colorado Chiquito, and probably about 1630 to the Colorado of to-day. But up to 1869 great portions of the river were still unknown. James White, a miner, in 1867, told a picturesque story (not generally accepted as true) of making the passage of the Grand Canyon on the river. In 1869, and in later expeditions, the feat was accomplished by Major J. W. Powell. There have been since then repeated explorations and scientific studies.

See C. E. Dutton, "Tertiary History of the Grand Canyon," *U.S. Geological Survey, Monograph II.* (1882); J. W. Powell, *Exploration of the Colorado River* (Washington, 1875), and *Canyons of the Colorado* (Meadville, Pa. 1895); F. S. Dellenbaugh, *Romance of the Colorado River* (New York, 1902), and *Canyon Voyage* (1908); G. W. James, *Wonders of the Colorado Desert* (2 vols., Boston, 1906).

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**COLORADO SPRINGS**, a city and the county-seat of El Paso county, Colorado, U.S.A., about 75 m. S. of Denver. Pop. (1890) 11,140; (1900) 21,085, of whom 2300 were foreign-born; (1910) 29,078. The city is served by the Atchison, Topeka & Santa Fe, the Denver & Rio Grande, the Chicago, Rock Island & Pacific (of which the city is a terminus), the Colorado & Southern, the Colorado Springs & Cripple Creek District (controlled by the Colorado & Southern), and the Colorado Midland railways, of which the first three are continental systems. Continuous on the west with Colorado Springs is Colorado City (pop. in 1900, 2914), one of the oldest settlements of Colorado, and the first capital (1861). Colorado Springs is superbly situated where the Rocky Mountains rise from the great plains of the prairie states, surrounded on all sides by foothills save in the south-east, where it is open to the prairie. To the south of the mesa (tableland) on which it lies is the valley of Fountain Creek. To the west is the grand background of the canyon-riven Rampart range, with Pike's Peak (*q.v.*) dominating a half-dozen other peaks (among them Cameron Cone, Mt. Rosa, Cheyenne Mt.) 9000 to 12,000 ft. in height. Monument Creek traverses the city. The streets are of generous width (100-140 ft.), and are well shaded by trees. There are several fine parks. The city is the seat of a state asylum for the deaf, dumb and blind, of a printers' home for union men, which was endowed in 1892 by Anthony J. Drexel and George W. Childs, and of Colorado College (1874), one of the leading educational institutions of the Rocky Mountain states, and the oldest institution for higher education in the state. The college is coeducational and non-sectarian. In 1908 it had a permanent endowment of about \$425,000, a faculty of 46 and 607 students; the library contained 40,000 bound volumes and as many pamphlets. The departments of the institution are a college of arts; schools of engineering

(1903), music, and (1906) forestry; and the Cutler Academy, a preparatory school under the control of the college. In 1905 Gen. W. J. Palmer (1836-1909) and W. A. Bell gave to the college Manitou Park, a tract of forest land covering about 13,000 acres and situated about 20 m. from Colorado Springs.

Bright sunshine and a pleasant climate (mean annual temperature about 48° F., rainfall 14 in., falling almost wholly from April to September, relative humidity 59), combined with beautiful scenery, have made the city a favourite health resort and place of residence. Land deeds for city property have always excluded saloons. The municipality owns and operates the water system, water being drawn from lakes near Pike's Peak. The scenery about the city is remarkable. Manitou (6100-6300 ft.) a popular summer resort, lies about 6 m. (by rail) north-west of Colorado Springs, in a glen at the opening of Ute Pass (so-named because it was formerly used by the Ute Indians), with the mountains rising from its edge. Its springs of soda and iron belong to the class of weak compound carbonated soda waters. In the neighbourhood are the Cave of the Winds, the Grand Caverns, charming glens, mountain lakes and picturesque canyons; and the Garden of the Gods (owned by the city)—approached between two tremendous masses of red rock 330 ft. high, and strewn (about 500 acres) with great rocks and ridges of brightly coloured sandstone, whose grotesque shapes and fantastic arrangement have suggested a playground of superhuman beings. At the southern end of the Rampart range is Cheyenne Mt. (9407 ft.), on whose slope was buried Helen Hunt Jackson ("H.H."), who has left many pictures of this country in her stories. The two Cheyenne Canyons, with walls as high as 1000 ft. and beautiful falls, and the road over the mountain side toward Cripple Creek, afford exquisite views. Monument Park (10 m. N.) is a tract of fantastically eroded sandstone rocks, similar to those in the Garden of the Gods.

In 1859 a winter mining party coming upon the sunny valley near the present Manitou, near the old Fontaine-qui-Bouille, settled "El Dorado." Colorado City is practically on the same site. In 1870, as part of the town development work of the Denver & Rio Grande railway, of which General W. J. Palmer was the president, a land company founded Colorado Springs. In 1872 Manitou (first La Fontaine) was founded. Colorado Springs was laid out in 1871, was incorporated in 1872, and was first chartered as a city in 1878. A new charter (May 1909) provided for the recall of elective officials. A road over the Ute Pass to South Park and Leadville was built, and at one time about 12,000 horses and mules were employed in freighting to the Leadville camps. The Chicago, Rock Island & Pacific railway reached the city in 1888. The greatest part of the Cripple Creek mining properties is owned in Colorado Springs, where the exchange is one of the greatest in the world.

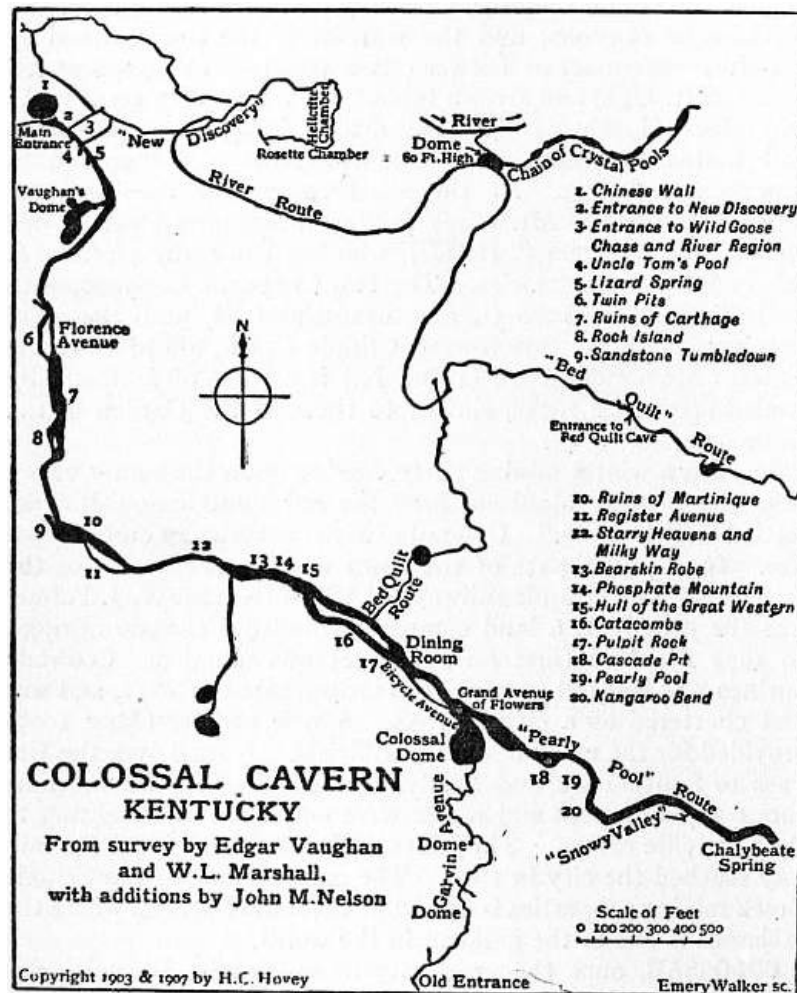
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**COLOSSAE**, once the great city of south-west Phrygia, was situated on rising ground (1150 ft.) on the left bank of the Lycus (*Churuk Su*), a tributary of the Maeander, at the upper end of a narrow gorge 2½ m. long, where the river runs between cliffs from 50 to 60 ft. high. It stood on the great trade route from Sardis to Celaenae and Iconium, and was a large, prosperous city (Herod, vii. 30; Xenophon, *Anab.* i. 2, § 6), until it was ruined by the foundation of Laodicea in a more advantageous position. The town was celebrated for its wool, which was dyed a purple colour called *colossinus*. Colossae was the seat of an early Christian church, the result of St Paul's activity at Ephesus, though perhaps actually founded by Epaphras. The church, to which St Paul wrote a letter, was mainly composed of mingled Greek and Phrygian elements deeply imbued with fantastic and fanatical mysticism. Colossae lasted until the 7th and 8th centuries, when it was gradually deserted under pressure of the Arab invasions. Its place was taken by Khonae (*Khonas*)—a strong fortress on a rugged spur of Mt. Kadmus, 3 m. to the south, which became a place of importance during the wars between the Byzantines and Turks, and was the birthplace of the historian, Nicetas Khoniates. The worship of angels alluded to by St Paul (Col. ii. 18), and condemned in the 4th century by a council at Laodicea, reappears in the later worship of St Michael, in whose honour a celebrated church, destroyed by the Seljuks in the 12th century, was built on the right bank of the Lycus.

See Sir W. M. Ramsay, *Cities and Bishoprics of Phrygia*, vol. i.

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**COLOSSAL CAVERN**, a cave in Kentucky, U.S.A., the main entrance of which is at the foot of a steep hill beyond Eden Valley, and 1½ m. from Mammoth Cave. It is connected with what has long been known as the Bed Quilt Cave. Several entrances found by local explorers were rough and difficult. They were closed when the property was bought in 1896 by the Louisville & Nashville railway and a new approach made as indicated on the accompanying map. From the surface to the floor is 240 ft.; under Chester Sandstone and in the St Louis Limestone. Fossil corals fix the geological age of the rock. The temperature is uniformly 54° Fahr., and the atmosphere is optically and chemically pure. Lovely incrustations alternate with queer and grotesque figures. There are exquisite gypsum rosettes and intricately involved helictites.



Tremendous forces have been at work, suggesting earthquakes and eruptions; but really all is due to the chemical and mechanical action of water. The so-called "Ruins of Carthage" fill a hall 400 ft. long by 100 ft. wide and 30 ft. high, whose flat roof is a vast homogeneous limestone block. Isolated detached blocks measure from 50 to 100 ft. in length. Edgar Vaughan and W. L. Marshall, civil engineers, surveyed every part of the cave. Vaughan's Dome is 40 ft. wide, 300 ft. long, and 79 ft. high. Numerous other domes exist, and many deep pits. The grandest place of all is the Colossal Dome, which used to be entered only from the apex by windlass and a rope reaching 135 ft. to the floor. This is now used only for illumination by raising and lowering a fire-basket. The present entrance is by a gateway buttressed by alabaster shafts, one of which, 75 ft. high, is named Henry Clay's Monument. The dome walls arise in a series of richly tinted rings, each 8 or 10 ft. thick, and each fringed by stalactites. The symmetry is remarkable, and the reverberations are strangely musical. The Pearly Pool, in a chamber near a pit 86 ft. deep, glistens with countless cave pearls. The route beyond is between rows of stately shafts, and ends in a copious chalybeate spring. Blind flies, spiders, beetles and crickets abound; and now and then a blind crawfish darts through the waters; but as compared with many caverns the fauna and flora are not abundant. It is conjectured, not without some reason, that there is a connexion, as yet undiscovered, between the Colossal and the Mammoth caves. It seems certain that Eden Valley, which now lies between them, is a vast "tumble-down" of an immense cavern that formerly united them into one.

**COLOSSIANS, EPISTLE TO THE**, the twelfth book of the New Testament, the authorship of which is ascribed to the Apostle Paul. Colossae, like the other Phrygian cities of Laodicea and Hierapolis, had not been visited by Paul, but owed its belief in Jesus Christ to Epaphras, a Colossian, who had been converted by Paul, perhaps in Ephesus, and had laboured not only in his native city but also in the adjacent portions of the Lycus valley,—a Christian in whom Paul reposed the greatest confidence as one competent to interpret the gospel of whose truth Paul was convinced (i. 7; iv. 12, 13). This Epaphras, like the majority of the Colossians, was a Gentile. It is probable, however, both from the letter itself and from the fact that Colossae was a trade centre, that Jews were there with their synagogues (cf. also Josephus, *Ant.* xii. 149). And it is further probable that some of the Gentiles, who afterwards became Christians, were either Jewish proselytes or adherents who paid reverence to the God of the Jews. At all events, the letter indicates a sensitiveness on the part of the Christians not only to oriental mysticism and theosophy (cf. Sir W. M. Ramsay, *Cities and Bishoprics of Phrygia*, and *Church in the Roman Empire*), but also to the Judaism of the Diaspora.

Our first definite knowledge of the Colossian Church dates from the presence of Epaphras in Rome in A.D. 62-64 (or A.D. 56-58), when Paul was a prisoner. He arrived with news, perhaps with a letter (J. R. Harris, *Expositor*, Dec. 1898, pp. 404 ff.), touching the state of religion in Colossae. Paul learns, to his joy, of their faith, hope and love; of the order and stability of their faith; and of their reception of Christ Jesus the Lord (i. 4, 8; ii. 5-7). He sees no sign of an attack upon him or his gospel. On the contrary, loyalty to him and sympathy with him in his sufferings are everywhere manifest (i. 9, 24; ii. 2; iv. 8); and the gospel of Christ is advancing here as elsewhere (i. 6). At the same time he detects a lack of cheerfulness and a lack of spiritual understanding in the Church. The joy of the gospel, expressing itself in songs and thanksgivings, is damped (iii. 15, 16), and, above all, the message of Christ does not dwell richly enough in them. Though the believers know the grace of God they are not filled with a knowledge of his will, so that their conduct is lacking in that strength and joy and perfection, that richness of the fulness of knowledge expected of those who had been made full in Christ (i. 6, 9-11, 28; ii. 2, 7, 10). The reason for this, Paul sees, is the influence of the claim made by certain teachers in Colossae that the Christians, in order to attain unto and be assured of *full* salvation, must supplement Paul's message with their own fuller and more perfect wisdom, and must observe certain rites and practices (ii. 16, 21, 23) connected with the worship of angels (ii. 18, 23) and elementary spirits (ii. 8, 20).

The origin and the exact nature of this religious movement are alike uncertain. (1) If it represents a type of syncretism as definite as that known to have existed in the developed gnostic systems of the 2nd century, it is inconceivable that Paul should have passed it by as easily as he did. (2) As there is no reference to celibacy, communism and the worship of the sun, it is improbable that the movement is identical with that of the Essenes. (3) The phenomena might be explained solely on the basis of Judaism (von Soden, Peake). Certainly the asceticism and ritualism might so be interpreted, for there was among the Jews of the Dispersion an increasing tendency to asceticism, by way of protest against the excesses of the Gentiles. The reference in ii. 23 to severity of the body may have to do with fasting preparatory to seeing visions (cf. *Apoc. Baruch*, xxi. 1, ix. 2, v. 7). Even the worship of angels, not only as mediators of revelation and visions, but also as cosmical beings, is a well-known fact in late Judaism (*Apoc. Bar.* lv. 3; *Ethiopic Enoch*, lx. 11, lxi. 10; Col. ii. 8, 20; Gal. iv. 3). As for the word "philosophy" (ii. 8), it is not necessary to take it in the technical Greek sense when the usage of Philo and Josephus permits a looser meaning. Finally the references to circumcision, *paradosis* (ii. 8) and *dogmata* (ii. 20), directly suggest a Jewish origin. If we resort solely to Judaism for explanation, it must be a Judaism of the Diaspora type. (4) The difficulty with the last-mentioned position is that it under-estimates the speculative tendencies of the errorists and ignores the direct influence of oriental theosophy. It is quite true that Paul does not directly attack the speculative position, but rather indicates the practical dangers inherent therein (the denial of the supremacy of Christ and of full salvation through Him); he does not say that the errorists hold Christ to be a mere angel or an aeon, or that words like *pleroma* (borrowed perhaps from their own vocabulary) involve a rigorous dualism. Yet his characterization of the movement as an arbitrary religion (ii. 23), a philosophy which is empty deceit (ii. 8), according to elemental spirits and not according to Christ, and a higher knowledge due to a mind controlled by the



flesh (ii. 18); his repeated emphasis on Christ, as supreme over all things, over men and angels, agent in creation as well as in redemption, in whom dwelt bodily the fulness of the Godhead; and his constant stress upon knowledge,—all these combine to reveal a speculation real and dangerous, even if naïve and regardless of consequences, and to suggest (with Jülicher and McGiffert) that in addition to Jewish influence there is also the direct influence of Oriental mysticism.

To meet the pressing need in Colossae, Paul writes a letter and entrusts it to Tychichus, who is on his way to Colossae with Onesimus, Philemon's slave (iv. 7, 9). (On the relation of this letter to Ephesians and to the letter to be sent from Laodicea to Colossae, see [EPHESIANS, EPISTLE TO THE](#).) His attitude is prophylactic, rather than polemic, for the "philosophy" has not as yet taken deep root. His purpose is to restore in the hearts of the readers the joy of the Spirit, by making them see that Christ fulfils every need, and that through faith in Him and love from faith, the advance is made unimpeded unto the perfect man. He will eliminate foreign accretions, that the gospel of Christ may stand forth in its native purity, and that Christ Himself may in all things have the pre-eminence.

The letter begins with a thanksgiving to God for the spiritual growth of the Colossians, and continues with a prayer for their fuller knowledge of the divine will, for a more perfect Christian life, and for a spirit of thanksgiving, seeing that it is God who guarantees their salvation in Christ (i. 1-14). It is Christ who is supreme, not angels, for He is the agent in creation; and it is solely on the basis of faith in Him, a faith expressing itself in love, that redemption is appropriated, and not on the basis of any further requirements such as ascetic practices and the worship of angels (i. 15-23). It is with a full message that Paul has been entrusted, the message of Christ, who alone can lead to all the riches of fulness of knowledge. And for this adequate knowledge the readers should be thankful (i. 23—ii. 7). Again he urges, that since redemption is in Christ alone, and that, too, full redemption and on the basis of faith alone, the demand for asceticism and meaningless ceremonies is folly, and moreover robs Christ, in whom dwells the divine fulness, of His rightful supremacy (ii. 8-23). And he exhorts them as members of the Body of Christ to manifest their faith in Christian love, particularly in their domestic relations and in their contact with non-Christians (iii. i-iv. 6). He closes by saying that Tychichus will give them the news. Greetings from all to all (iv. 7-18).

A letter like this, clear cut in its thought, teeming with ideas emanating from an unique religious experience, and admirably adjusted to known situations, bears on the face of it the marks of genuineness even without recourse to the unusually excellent external attestation. It is not strange that there is a growing consensus of opinion that Paul is the author. With the critical renaissance of the early part of the 19th century, doubts were raised as to the genuineness of the letter (*e.g.* by E. T. Mayerhoff, 1838). Quite apart from the difficulties created by the Tübingen theory, legitimate difficulties were found in the style of the letter, in the speculation of the errorists, and in the theology of the author. (1) As to style, it is replied that if there are peculiarities in *Colossians*, so also in the admittedly genuine letters, *Romans*, *Corinthians*, *Galatians*. Moreover, if *Philippians* is Pauline, so also the stylistically similar *Colossians* (cf. von Soden). (2) As to the speculation of the errorists, it is replied that it is explicable in the lifetime of Paul, that some of the elements of it may have their source in pre-Christian Jewish theories, and that recourse to the developed gnosticism of the 2nd century is unnecessary. (3) As to the Christology of the author, it is replied that it does not go beyond what we have already in Paul except in emphasis, which itself is occasioned by the circumstances. What is implicit in *Corinthians* is explicit in *Colossians*. H. J. Holtzmann (1872) subjected both *Colossians* and *Ephesians* to a rigorous examination, and found in *Colossians* at least a nucleus of Pauline material. H. von Soden (1885), with well-considered principles of criticism, made a similar examination and found a much larger nucleus, and later still, (1893), in his commentary, reduced the non-Pauline material to a negligible minimum. Harnack, Jülicher and McGiffert, however, agree with Lightfoot, Weiss, Zahn (and early tradition) in holding that the letter is wholly Pauline—a position which is proving more and more acceptable to contemporary scholarship.

AUTHORITIES.—In addition to the literature already mentioned, see the articles of Sanday on "Colossians" and Robertson on "Ephesians" in Smith's *Bible Dictionary* (2nd ed., 1893), and the article of A. Jülicher on "Colossians and Ephesians" in the *Encyclopaedia Biblica* (1899); the Introductions of H. J. Holtzmann (1892), B. Weiss (1897), Th. Zahn (1900) and Jülicher (1906); the histories of the apostolic age by C. von Weizsäcker (1892), A. C. McGiffert (1897) and O. Pfleiderer (*Urchristentum*, 1902); and the commentaries of J. B. Lightfoot (1875), H. von Soden (1893) T. K. Abbott (1897), E. Haupt (1902), Peake (1903) and P. Ewald (1905).

(J. E. F.)

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**COLOSSUS**, in antiquity a term applied generally to statues of great size (hence the adjective “colossal”), and in particular to the bronze statue of the sun-god Helios in Rhodes, one of the wonders of the world, made from the spoils left by Demetrius Poliorcetes when he raised the siege of the city. The sculptor was Chares, a native of Lindus, and of the school of Lysippus, under whose influence the art of sculpture was led to the production of colossal figures by preference. The work occupied him twelve years, it is said, and the finished statue stood 70 cubits high. It stood near the harbour (ἐπὶ λιμένι), but at what point is not certain. When, and from what grounds, the belief arose that it had stood across the entrance to the harbour, with a beacon light in its hand and ships passing between its legs, is not known, but the belief was current as early as the 16th century. The statue was thrown down by an earthquake about the year 224 B.C.; then, after lying broken for nearly 1000 years, the pieces were bought by a Jew from the Saracens, and probably reconverted into instruments of war.

Other Greek colossi were the Apollo of Calamis; the Zeus and Heracles of Lysippus; the Zeus at Olympia, the Athena in the Parthenon, and the Athena Promachos on the Acropolis—all the work of Pheidias.

The best-known Roman colossi are: a statue of Jupiter on the Capitol; a bronze statue of Apollo in the Palatine library; and the colossus of Nero in the vestibule of his Golden House, afterwards removed by Hadrian to the north of the Colosseum, where the basement upon which it stood is still visible (Pliny, *Nat. Hist.* xxxiv. 18).

**COLOUR** (Lat. *color*, connected with *celare*, to hide, the root meaning, therefore, being that of a covering). The visual apparatus of the eye enables us to distinguish not only differences of form, size and brilliancy in the objects looked upon, but also differences in the character of the light received from them. These latter differences, familiar to us as differences in *colour*, have their physical origin in the variations in wave-length (or frequency) which may exist in light which is capable of exciting the sensation of vision. From the physical point of view, light of a *pure colour*, or homogeneous light, means light whose undulations are mathematically of a simple character and which cannot be resolved by a prism into component parts. All the visible pure colours, as thus defined, are to be found in the spectrum, and there is an infinite number of them, corresponding to all the possible variations of wave-length within the limits of the visible spectrum (see [SPECTROSCOPY](#)). On this view, there is a strict analogy between variations of *colour* in light and variations of *pitch* in sound, but the visible spectrum contains a range of frequency extending over about one octave only, whereas the range of audibility embraces about eleven octaves.

Of all the known colours it might naturally be thought that white is the simplest and purest, and, till Sir Isaac Newton's time, this was the prevailing opinion. Newton, however, showed that white light could be decomposed by a prism into the spectral colours red, orange, yellow, green, blue, indigo and violet; the colours appearing in this order and passing gradually into each other without abrupt transitions. White is therefore not a simple colour, but is merely the colour of sunlight, and probably owes its apparently homogeneous character to the fact that it is the average colour of the light which fills the eye when at rest. The colours of the various objects which we see around us are not due (with the exception of self-luminous and fluorescent bodies) to any power possessed by these objects of creating the colours which they exhibit, but merely to the exercise of a selective action on the light of the sun, some of the constituent rays of the white light with which they are illuminated being absorbed, while the rest are reflected or scattered in all directions, or, in the case of transparent bodies, transmitted. White light is thus the basis of all other colours, which are derived from it by the suppression of some one or more of its parts. A red flower, for instance, absorbs the blue and green rays and most of the yellow, while the red rays and usually some yellow are scattered. If a red poppy is illuminated successively by red, yellow, green and blue light it will appear a brilliant red in the red light, yellow in the yellow light, but less brilliant if the red colour is pure; and black in the other colours, the blackness being due to the almost complete absorption of the corresponding colour.

Bodies may be classified as regards colour according to the nature of the action they exert on white light. In the case of ordinary opaque bodies a certain proportion of the incident light is irregularly reflected or scattered from their surfaces. A white object is one which reflects nearly all the light of all colours; a black object absorbs nearly all. A body which reflects only a portion of the light, but which exhibits no predominance in any particular hue, is called *grey*. A white surface looks grey beside a similar surface more brilliantly illuminated.

The next class is that of most transparent bodies, which owe their colour to the light which is transmitted, either directly through, or reflected back again at the farther surface. A body which transmits all the visible rays equally well is said to be colourless; pure water, for example, is nearly quite colourless, though in large masses it appears bluish-green. A translucent substance is one which partially transmits light. Translucency is due to the light being scattered by minute embedded particles or minute irregularities of structure. Some fibrous specimens of tremolite and gypsum are translucent in the direction of the fibres, and practically opaque in a transverse direction. Coloured transparent objects vary in shade and hue according to their size; thus, a conical glass filled with a red liquid commonly appears yellow at the bottom, varying through orange up to red at the upper part. A coloured powder is usually of a much lighter tint than the substance in bulk, as the light is reflected back after transmission through only a few thin layers. For the same reason the powders of transparent substances are opaque.

Polished bodies, whether opaque or transparent, when illuminated with white light and viewed at the proper angle, reflect the incident light regularly and appear white, without showing much of their distinctive colours.

Some bodies reflect light of one colour and transmit that of another; such bodies nearly always possess the properties of *selective* or *metallic reflection* and *anomalous dispersion*. Most of the coal-tar dyes belong to this category. Solid eosin, for example, reflects a yellowish-green and transmits a red light. Gold appears yellow under ordinary circumstances, but if the light is reflected many times from the surface it appears a ruby colour. On the other hand, a powerful beam of light transmitted through a thin gold-leaf appears green.

Some solutions exhibit the curious phenomenon of *dichromatism* (from δι-, double, and χρώμα, colour), that is, they appear of one colour when viewed in strata of moderate thickness, but of a different colour in greater thicknesses (see [ABSORPTION OF LIGHT](#)).

The blue colour of the sky (*q.v.*) has been explained by Lord Rayleigh as due to the scattering of light by small suspended particles and air molecules, which is most effective in the case of the shorter waves (blue). J. Tyndall produced similar effects in the laboratory. The green colour of sea-water near the shore is also due to a scattering of light.

The colours of bodies which are gradually heated to white incandescence occur in the order—red, orange, yellow, white. This is because the longer waves of red light are first emitted, then the yellow as well, so that orange results, then so much green that the total effect is yellow, and lastly all the colours, compounding to produce white. Fluorescent bodies have the power of converting light of one colour into that of another (see [FLUORESCENCE](#)).

Besides the foregoing kinds of colorization, a body may exhibit, under certain circumstances, a colouring due to some special physical conditions rather than to the specific properties of the material; such as the colour of a white object when illuminated by light of some particular colour; the colours seen in a film of oil on water or in mother-of-pearl, or soap-bubbles, due to interference (*q.v.*); the colours seen through the eyelashes or through a thin handkerchief held up to the light, due to diffraction (*q.v.*); and the colours caused by ordinary refraction, as in the rainbow, double refraction and polarization (*qq.v.*).

*Composition of Colours.*—It has been already pointed out that white light is a combination of all the colours in the spectrum. This was shown by Newton, who recombined the spectral colours and produced white. Newton also remarks that if a froth be made on the surface of water thickened a little with soap, and examined closely, it will be seen to be coloured with all the colours of the spectrum, but at a little distance it looks white owing to the combined effect on the eye of all the colours.

The question of the composition of colours is largely a physiological one, since it is possible, by mixing colours, say red and yellow, to produce a new colour, orange, which appears identical with the pure orange of the spectrum, but is physically quite different,

since it can be resolved by a prism into red and yellow again. There is no doubt that the sensation of colour-vision is threefold, in the sense that any colour can be produced by the combination, in proper proportions, of three standard colours. The question then arises, what are the three primary colours? Sir David Brewster considered that they were red, yellow and blue; and this view has been commonly held by painters and others, since all the known brilliant hues can be derived from the admixture of red, yellow and blue pigments. For instance, vermilion and chrome yellow will give an orange, chrome yellow and ultramarine a green, and vermilion and ultramarine a purple mixture. But if we superpose the pure spectral colours on a screen, the resulting colours are quite different. This is especially the case with yellow and blue, which on the screen combine to produce white, generally with a pink tint, but cannot be made to give green. The reason of this difference in the two results is that in the former case we do not get a true combination of the colours at all. When the mixed pigments are illuminated by white light, the yellow particles absorb the red and blue rays, but reflect the yellow along with a good deal of the neighbouring green and orange. The blue particles, on the other hand, absorb the red, orange and yellow, but reflect the blue and a good deal of green and violet. As much of the light is affected by several particles, most of the rays are absorbed except green, which is reflected by both pigments. Thus, the colour of the mixture is not a mixture of the colours yellow and blue, but the remainder of white light after the yellow and blue pigments have absorbed all they can. The effect can also be seen in coloured solutions. If two equal beams of white light are transmitted respectively through a yellow solution of potassium bichromate and a blue solution of copper sulphate in proper thicknesses, they can be compounded on a screen to an approximately white colour; but a single beam transmitted through both solutions appears green. Blue and yellow pigments would produce the effect of white only if very sparsely distributed. This fact is made use of in laundries, where cobalt blue is used to correct the yellow colour of linen after washing.

Thomas Young suggested red, green and violet as the primary colours, but the subsequent experiments of J. Clerk Maxwell appear to show that they should be red, green and blue. Sir William Abney, however, assigns somewhat different places in the spectrum to the primary colours, and, like Young, considers that they should be red, green and violet. All other hues can be obtained by combining the three primaries in proper proportions. Yellow is derived from red and green. This can be done by superposition on a screen or by making a solution which will transmit only red and green rays. For this purpose Lord Rayleigh recommends a mixture of solutions of blue litmus and yellow potassium chromate. The litmus stops the yellow and orange light, while the potassium chromate stops the blue and violet. Thus only red and green are transmitted, and the result is a full compound yellow which resembles the simple yellow of the spectrum in appearance, but is resolved into red and green by a prism. The brightest yellow pigments are those which give both the pure and compound yellow. Since red and green produce yellow, and yellow and blue produce white, it follows that red, green and blue can be compounded into white. H. von Helmholtz has shown that the only pair of simple spectral colours capable of compounding to white are a greenish-yellow and blue.

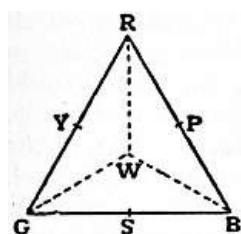


FIG. 1.

Just as musical sounds differ in pitch, loudness and quality, so may colours differ in three respects, which Maxwell calls *hue*, *shade* and *tint*. All hues can be produced by combining every pair of primaries in every proportion. The addition of white alters the tint without affecting the hue. If the colour be darkened by adding black or by diminishing the illumination, a variation in shade is produced. Thus the hue red includes every variation in tint from red to white, and every variation in shade from red to black, and similarly for other hues. We can represent every hue and tint on a diagram in a manner proposed by Young, following a very similar suggestion of

Newton's. Let RGB (fig. 1) be an equilateral triangle, and let the angular points be coloured red, green and blue of such intensities as to produce white if equally combined; and let the colour of every point of the triangle be determined by combining such proportions of the three primaries, that three weights in the same proportion would have their centre of gravity at the point. Then the centre of the triangle will be a neutral tint, white or grey; and the middle points of the sides Y, S, P will be yellow, greenish-blue and purple. The hue varies all round the perimeter. The tint varies along any straight line through W. To vary the shade, the whole triangle must be uniformly darkened.

The simplest way of compounding colours is by means of Maxwell's colour top, which is a broad spinning-top over the spindle of which coloured disks can be slipped (fig. 2). The disks are slit radially so that

they can be slipped partially over each other and the surfaces exposed in any desired ratio. Three disks are used together, and a match is obtained between these and a pair of smaller ones mounted on the same spindle. If any five colours are taken, two of which may be black and white, a match can be got between them by suitable adjustment. This shows that a relation exists between any four colours (the black being only needed to obtain the proper intensity) and that consequently the number of independent colours is three. A still better instrument for combining colours is Maxwell's colour box, in which the colours of the spectrum are combined by means of prisms. Sir W. Abney has also invented an apparatus for the same purpose, which is much the same in principle as Maxwell's colour box. Several methods of colour photography depend on the fact that all varieties of colour can be compounded from red, green and blue in proper proportions.

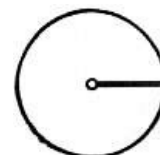
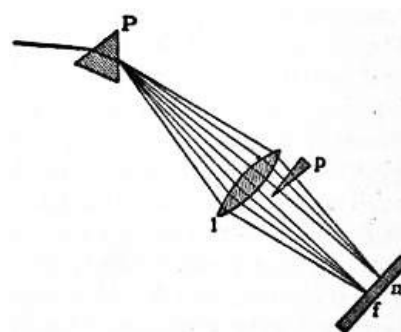


FIG. 2.

Any two colours which together give white are called *complementary* colours. Greenish-yellow and blue are a pair of complementaries, as already mentioned. Any number of pairs may be obtained by a simple device due to Helmholtz and represented in fig. 3. A beam of white light, decomposed by the prism P, is recomposed into white light by the lens l and focussed on a screen at f. If the thin prism p is inserted near the lens, any set of colours may be deflected to another point n, thus producing two coloured and complementary images of the source of light.



(After Müller-Pouillet's *Lehrbuch der Physik*, 1897.)

FIG. 3.

*Nature of White Light.*—The question as to whether white light actually consists of trains of waves of regular frequency has been discussed in recent years by A. Schuster, Lord Rayleigh and others, and it has been shown that even if it consisted of a succession of somewhat irregular impulses, it would still be resolved, by the dispersive property of a prism or grating, into trains of regular frequency. We may still, however, speak of white light as compounded of the rays of the spectrum, provided we mean only that the two systems are mathematically equivalent, and not that the homogeneous trains exist as such in the original light.

See also Newton's *Opticks*, bk. i. pt. ii.; Maxwell's *Scientific Papers*; Helmholtz's papers in *Poggendorf's Annalen*; Sir G. G. Stokes, *Burnett Lectures for 1884-5-6*; Abney's *Colour Vision* (1895).

(J. R. C.)

**COLOURS, MILITARY**, the flags carried by infantry regiments and battalions, sometimes also by troops of other arms. Cavalry regiments and other units have as a rule standards and guidons (see **FLAG**). Colours are generally embroidered with mottoes, symbols, and above all with the names of battles.

From the earliest time at which men fought in organized bodies of troops, the latter have possessed some sort of insignia visible over all the field of battle, and serving as a rallying-point for the men of the corps and an indication of position for the higher leaders and the men of other formed bodies. In the Roman army the eagle, the *vexillum*, &c. had all the moral and sentimental importance of the colours of to-day. During the dark and the middle ages, however, the basis of military force being the individual knight or lord, the banner, or other flag bearing his arms, replaced the regimental colour which had signified the corporate body and claimed the devotion of each individual soldier in the ranks, though the original meaning of the colour as a corps, not a personal distinction, was sometimes maintained by corporate bodies (such as trade-gilds) which took the field as such. An example is the famous *carroccio* or standard on wheels, which was frequently brought into the field of battle by the citizen militia of the Italian cities, and was fought for with the same ardour as the royal standard in other medieval battles.

The application of the word "colour" to such insignia, however, dates only from the 16th

century. It has been suggested that, as the professional captain gradually ousted the nobleman from the command of the drilled and organized companies of foot—the man of gentle birth, of course, maintained his ascendancy in the cavalry far longer—the leaders of such bodies, no longer possessing coat-armour and individual banners, had recourse to small flags of distinctive colour instead. "Colour" is in the 16th century a common name in England and middle Europe for the unit of infantry; in German the *Fähnlein* (colour) of landsknechts was a strong company of more than 300 foot. The ceremonial observances and honours paid nowadays to the colours of infantry were in fact founded for the most part by the landsknechts, for whom the flag (carried by their "ensign") was symbolical of their intense regimental life and feeling. The now universal customs of constituting the colour guard of picked men and of saluting the colours were in equal honour then; before that indeed, the appearance of the personal banner of a nobleman implied his actual presence with it, and the due honours were paid, but the colour of the 16th century was not the distinction of one man, but the symbol of the corporate life and unity of the regiment, and thus the new colour ceremonial implied the same allegiance to an impersonal regimental spirit, which it has (with the difference that the national spirit has been blended with the regimental) retained ever since. The old soldier rallied to the colours as a matter of habit in the confusion of battle, and the capture or the loss of a colour has always been considered a special event, glorious or the reverse, in the history of a regiment, the importance of this being chiefly sentimental, but having as a very real background the fact that, if its colour was lost, a regiment was to all intents and purposes dissolved and dispersed. Frederick the Great and Napoleon always attached the highest importance to the maintenance at all costs of the regimental colours. Even over young troops the influence of the colour has been extraordinary, and many generals have steadied their men in the heat of battle by taking a regimental colour themselves to lead the advance or to form up the troops. Thus in the first battle of Bull Run (1861) the raw Confederate troops were rallied under a heavy fire by General Joseph Johnston, their commander-in-chief, who stood with a colour in his hand until the men gathered quickly in rank and file. The archduke Charles at Aspern (1809) led his young troops to the last assault with a colour in his hand. Marshal Schwerin was killed at the battle of Prague while carrying a regimental colour.

In the British army colours are carried by guards and line (except rifle) battalions, each battalion having two colours, the king's and the regimental. The size of the colour is 3 ft. 9 in. by 3 ft., and the length of the stave 8 ft. 7 in. The colour has a gold fringe and gold and crimson tassels, and bears various devices and "battle honours." Both colours are carried by subaltern officers, and an escort of selected non-commissioned officers forms the rest of the colour party. The ceremony of presenting new colours is most impressive. The old colours are "trooped" (see below) before being cased and taken to the rear. The new colours are then placed against a pile of drums and then uncased by the senior majors and the senior subalterns. The consecration follows, after which the colours are presented to the senior subalterns. The battalion gives a general salute when the colours are unfurled, and the ceremony concludes with a march past. "Trooping the colour" is a more elaborate ceremonial peculiar to the British service, and is said to have been invented by the duke of Cumberland. In this, the colour is posted near the left of the line, the right company or guard moves up to it, and an officer receives it, after which the guard with the colour files between the ranks of the remainder from left to right until the right of the line is reached.

In the United States army the infantry regiment has two colours, the national and the regimental. They are carried in action.

In the French army one colour (*drapeau*) is carried by each infantry regiment. It is carried by an officer, usually a *sous-lieutenant*, and the guard is composed of a non-commissioned officer and a party of "first class" soldiers. Regiments which have taken an enemy's colour or standard in battle have their own colours "decorated," that is, the cross of the Legion of Honour is affixed to the stave near the point. Battle honours are embroidered on the white of the tricolour. The *eagle* was, in the First and Third Empires, the infantry colour, and was so called from the gilt eagle which surmounted the stave. The *chasseurs à pied*, like the rifles of the British army, carry no colours, but the battalion quartered for the time being at Vincennes carries a colour for the whole arm in memory of the first *chasseurs de Vincennes*. As in other countries, colours are saluted by all armed bodies and by individual officers and men. When the *drapeau* is not present with the regiment its place is taken by an ordinary flag.

The colours of the German infantry, foot artillery and engineers vary in design with the states to which the corps belong in the first instance; thus, black and white predominate in Prussian colours, red in those of Württemberg regiments, blue in Bavarian, and so on. The

point of the colour stave is decorated in some cases with the iron cross, in memory of the War of Liberation and of the war of 1870. Each battalion of an infantry regiment has its own colour, which is carried by a non-commissioned officer, and guarded as usual by a colour party. The colour is fastened to the stave by silver nails, and the ceremony of driving the first nail into the stake of a new colour is one of great solemnity. Rings of silver on the stave are engraved with battle honours, the names of those who have fallen in action when carrying the colour, and other commemorative names and dates. The oath taken by each recruit on joining is sworn on the colour (*Fahneneid*).

The practice in the British army of leaving the colours behind on taking the field dates from the battle of Isandhlwana (22nd January 1879), in which Lieutenants Melvill and Coghill lost their lives in endeavouring to save the colours of the 24th regiment. In savage warfare, in which the British regular army is more usually engaged, it is true that no particular reason can be adduced for imperilling the colours in the field. It is questionable, however, whether this holds good in civilized warfare. Colours were carried in action by both the Russians and the Japanese in the war of 1904-5, and they were supplemented on both sides by smaller flags or camp colours. The conception of the colour as the emblem of union, the rallying-point, of the regiment has been mentioned above. Many hold that such a rallying-point is more than ever required in the modern *guerre de masses*, when a national short-service army is collected in all possible strength on the decisive battle-field, and that scarcely any risks or loss of life would be disproportionate to the advantages gained by the presence of the colours. There is further a most important factor in the problem, which has only arisen in recent years through modern perfection in armament. In the first stages of an attack, the colours could remain, as in the past, with the closed reserves or line of battle, and they would not be uncased and sent into the thick of the fight at all hazards until the decisive assault was being delivered. Then, it is absolutely essential, as a matter of tactics, that the artillery (*q.v.*), which covers the assault with all the power given it by modern science and training, should be well informed as to the progress of the infantry. This covering fire was maintained by the Japanese until the infantry was actually in the smoke of their own shrapnel. With uniforms of neutral tint the need of some means whereby the artillery officers can, at 4000 yds. range, distinguish their own infantry from that of the enemy, is more pronounced than ever. The best troops are apt to be unsteadied by being fired into by their own guns (*e.g.* at Elandslaagte), and the more powerful the shell, and the more rapid and far-ranging the fire of the guns, the more necessary it becomes to prevent such accidents. A practicable solution of the difficulty would be to display the colours as of old, and this course would not only have to an enhanced degree the advantages it formerly possessed, but would also provide the simplest means for ensuring the vitally necessary co-operation of infantry and artillery in the decisive assault. The duty of carrying the colours was always one of special danger, and sometimes, in the old short-range battles, every officer who carried a flag was shot. That this fate would necessarily overtake the bearer under modern conditions is far from certain, and in any case the few men on the enemy's side who would be brave enough to shoot accurately under heavy shell fire would, however destructive to the colour party, scarcely inflict as much damage on the battalion as a whole, as a dozen or more accidental shells from the massed artillery of its own side.

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**COLOUR-SERGEANT**, a non-commissioned officer of infantry, ranking, in the British army, as the senior non-commissioned officer of each company. He is charged with many administrative duties, and usually acts as pay sergeant. A special duty of the colour-sergeants of a battalion is that of attending and guarding the colours and the officers carrying them. In some foreign armies the colours are actually carried by colour-sergeants. The rank was created in the British army in 1813.

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**COLOURS OF ANIMALS.** Much interest attaches in modern biology to the questions involved in the colours of animals. The subject may best be considered in two divisions: (1) as regards the uses of colour in the struggle for existence and in sexual relationships; (2) as

regards the chemical causation.

## 1. BIONOMICS

*Use of Colour for Concealment.*—*Cryptic colouring* is by far the commonest use of colour in the struggle for existence. It is employed for the purpose of attack (*aggressive resemblance* or *anticryptic colouring*) as well as of defence (*protective resemblance* or *procryptic colouring*). The fact that the same method, concealment, may be used both for attack and defence has been well explained by T. Belt (*The Naturalist in Nicaragua*, London, 1888), who suggests as an illustration the rapidity of movement which is also made use of by both pursuer and pursued, which is similarly raised to a maximum in both by the gradual dying out of the slowest through a series of generations. Cryptic colouring is commonly associated with other aids in the struggle for life. Thus well-concealed mammals and birds, when discovered, will generally endeavour to escape by speed, and will often attempt to defend themselves actively. On the other hand, small animals which have no means of active defence, such as large numbers of insects, frequently depend upon concealment alone. Protective resemblance is far commoner among animals than aggressive resemblance, in correspondence with the fact that predaceous forms are as a rule much larger and much less numerous than their prey. In the case of insectivorous Vertebrata and their prey such differences exist in an exaggerated form. Cryptic colouring, whether used for defence or attack, may be either *general* or *special*. In *general resemblance* the animal, in consequence of its colouring, produces the same effect as its environment, but the conditions do not require any special adaptation of shape and outline. General resemblance is especially common among the animals inhabiting some uniformly coloured expanse of the earth's surface, such as an ocean or a desert. In the former, animals of all shapes are frequently protected by their transparent blue colour; on the latter, equally diverse forms are defended by their sandy appearance. The effect of a uniform appearance may be produced by a combination of tints in startling contrast. Thus the black and white stripes of the zebra blend together at a little distance, and "their proportion is such as exactly to match the pale tint which arid ground possesses when seen by moonlight" (F. Galton, *South Africa*, London, 1889). *Special resemblance* is far commoner than general, and is the form which is usually met with on the diversified surface of the earth, on the shores, and in shallow water, as well as on the floating masses of Algae on the surface of the ocean, such as the Sargasso Sea. In these environments the cryptic colouring of animals is usually aided by special modifications of shape, and by the instinct which leads them to assume particular attitudes. Complete stillness and the assumption of a certain attitude play an essential part in general resemblance on land; but in special resemblance the attitude is often highly specialized, and perhaps more important than any other element in the complex method by which concealment is effected. In special resemblance the combination of colouring, shape and attitude is such as to produce a more or less exact resemblance to some one of the objects in the environment, such as a leaf or twig, a patch of lichen, or flake of bark. In all cases the resemblance is to some object which is of no interest to the enemy or prey respectively. The animal is not hidden from view by becoming indistinguishable from its background, as in the cases of general resemblance, but it is mistaken for some well-known object.

In seeking the interpretation of these most interesting and elaborate adaptations, attempts have been made along two lines. First, it is sought to explain the effect as a result of the direct influence of the environment upon the individual (G. L. L. Buffon), or by the inherited effects of effort and the use and disuse of parts (J. B. P. Lamarck). Second, natural selection is believed to have produced the result, and afterwards maintained it by the survival of the best concealed in each generation. The former suggestions break down when the complex nature of numerous special resemblances is appreciated. Thus the arrangement of colours of many kinds into an appropriate pattern requires the co-operation of a suitable shape and the rigidly exact adoption of a certain elaborate attitude. The latter is instinctive, and thus depends on the central nervous system. The cryptic effect is due to the exact co-operation of all these factors; and in the present state of science the only possible hope of an interpretation lies in the theory of natural selection, which can accumulate any and every variation which tends towards survival. A few of the chief types of methods by which concealment is effected may be briefly described. The colours of large numbers of Vertebrate animals are darkest on the back, and become gradually lighter on the sides, passing into white on the belly. Abbott H. Thayer (*The Auk*, vol. xiii., 1896) has suggested that this gradation obliterates the appearance of solidity, which is due to shadow. The colour-harmony, which is also essential to concealment, is produced because the back is of the same tint as the environment (*e.g.* earth) bathed in the cold blue-white of the sky, while the belly, being cold blue-white bathed in shadow and yellow earth reflections, produces the



same effect. Thayer has made models (in the natural history museums at London, Oxford and Cambridge) which support his interpretation in a very convincing manner. This method of neutralizing shadow for the purpose of concealment by increased lightness of tint was first suggested by E. B. Poulton in the case of a larva (*Trans. Ent. Soc. Lond.*, 1887, p. 294) and a pupa (*Trans. Ent. Soc. Lond.*, 1888, pp. 596, 597), but he did not appreciate the great importance of the principle. In an analogous method an animal in front of a background of dark shadow may have part of its body obliterated by the existence of a dark tint, the remainder resembling, *e.g.*, a part of a leaf (W. Müller, *Zool. Jahr. J. W. Spengel*, Jena, 1886). This method of rendering invisible any part which would interfere with the resemblance is well known in mimicry. A common aid to concealment is the adoption by different individuals of two or more different appearances, each of which resembles some special object to which an enemy is indifferent. Thus the leaf-like butterflies (*Kallima*) present various types of colour and pattern on the under side of the wings, each of which closely resembles some well-known appearance presented by a dead leaf; and the common British yellow under-wing moth (*Tryphaena pronuba*) is similarly polymorphic on the upper side of its upper wings, which are exposed as it suddenly drops among dead leaves. Caterpillars and pupae are also commonly *dimorphic*, green and brown. Such differences as these extend the area which an enemy is compelled to search in order to make a living. In many cases the cryptic colouring changes appropriately during the course of an individual life, either seasonally, as in the ptarmigan or Alpine hare, or according as the individual enters a new environment in the course of its growth (such as larva, pupa, imago, &c.). In insects with more than one brood in the year, *seasonal dimorphism* is often seen, and the differences are sometimes appropriate to the altered condition of the environment as the seasons change. The causes of change in these and Arctic animals are insufficiently worked out: in both sets there are observations or experiments which indicate changes from within the organism, merely following the seasons and not caused by them, and other observations or experiments which prove that certain species are susceptible to the changing external influences. In certain species concealment is effected by the use of adventitious objects, which are employed as a covering. Examples of this *allocryptic* defence are found in the tubes of the caddis worms (*Phryganea*), or the objects made use of by crabs of the genera *Hyas*, *Stenorhynchus*, &c. Such animals are concealed in any environment. If sedentary, like the former example, they are covered up with local materials; if wandering, like the latter, they have the instinct to re clothe. Allocryptic methods may also be used for aggressive purposes, as the ant-lion larva, almost buried in sand, or the large frog *Ceratophrys*, which covers its back with earth when waiting for its prey. Another form of allocryptic defence is found in the use of the colour of the food in the digestive organs showing through the transparent body, and in certain cases the adventitious colour may be dissolved in the blood or secreted in superficial cells of the body: thus certain insects make use of the chlorophyll of their food (Poulton, *Proc. Roy. Soc.* liv. 417). The most perfect cryptic powers are possessed by those animals in which the individuals can change their colours into any tint which would be appropriate to a normal environment. This power is widely prevalent in fish, and also occurs in Amphibia and Reptilia (the chameleon affording a well-known example). Analogous powers exist in certain Crustacea and Cephalopoda. All these rapid changes of colour are due to changes in shape or position of superficial pigment cells controlled by the nervous system. That the latter is itself stimulated by light through the medium of the eye and optic nerve has been proved in many cases. Animals with a short life-history passed in a single environment, which, however, may be very different in the case of different individuals, may have a different form of *variable cryptic colouring*, namely, the power of adapting their colour once for all (many pupae), or once or twice (many larvae). In these cases the effect appears to be produced through the nervous system, although the stimulus of light probably acts on the skin and not through the eyes. Particoloured surfaces do not produce particoloured pupae, probably because the antagonistic stimuli neutralize each other in the central nervous system, which then disposes the superficial colours so that a neutral or intermediate effect is produced over the whole surface (Poulton, *Trans. Ent. Soc. Lond.*, 1892, p. 293). Cryptic colouring may incidentally produce superficial resemblances between animals; thus desert forms concealed in the same way may gain a likeness to each other, and in the same way special resemblances, *e.g.* to lichen, bark, grasses, pine-needles, &c., may sometimes lead to a tolerably close similarity between the animals which are thus concealed. Such likeness may be called *syncryptic* or *common protective* (or *aggressive*) *resemblance*, and it is to be distinguished from mimicry and common warning colours, in which the likeness is not incidental, but an end in itself. Syncryptic resemblances have much in common with those incidentally caused by functional adaptation, such as the mole-like forms produced in the burrowing Insectivora, Rodentia and Marsupialia. Such likeness may be called *syntechnic resemblance*, incidentally produced by dynamic similarity, just as

synchronic resemblance is produced by static similarity.

*Use of Colour for Warning and Signalling, or Sematic Coloration.*—The use of colour for the purpose of warning is the exact opposite of the one which has been just described, its object being to render the animal conspicuous to its enemies, so that it can be easily seen, well remembered, and avoided in future. Warning colours are associated with some quality or weapon which renders the possessor unpleasant or dangerous, such as unpalatability, an evil odour, a sting, the poison-fang, &c. The object being to warn an enemy off, these colours are also called *aposematic*. Recognition markings, on the other hand, are *episematic*, assisting the individuals of the same species to keep together when their safety depends upon numbers, or easily to follow each other to a place of safety, the young and inexperienced benefiting by the example of the older. Episematic characters are far less common than aposematic, and these than cryptic; although, as regards the latter comparison, the opposite impression is generally produced from the very fact that concealment is so successfully attained. Warning or aposematic colours, together with the qualities they indicate, depend, as a rule, for their very existence upon the abundance of palatable food supplied by the animals with cryptic colouring. Unpalatability, or even the possession of a sting, is not sufficient defence unless there is enough food of another kind to be obtained at the same time and place (Poulton, *Proc. Zool. Soc.*, 1887, p. 191). Hence insects with warning colours are not seen in temperate countries except at the time when insect life as a whole is most abundant; and in warmer countries, with well-marked wet and dry seasons, it will probably be found that warning colours are proportionately less developed in the latter. In many species of African butterflies belonging to the genus *Junonia* (including *Precis*) the wet-season broods are distinguished by the more or less conspicuous under sides of the wings, those of the dry season being highly cryptic. Warning colours are, like cryptic, assisted by special adaptations of the body-form, and especially by movements which assist to render the colour as conspicuous as possible. On this account animals with warning colours generally move or fly slowly, and it is the rule in butterflies that the warning patterns are similar on both upper and under sides of the wings. Many animals, when attacked or disturbed, “sham death” (as it is commonly but wrongly described), falling motionless to the ground. In the case of well-concealed animals this instinct gives them a second chance of escape in the earth or among the leaves, &c., when they have been once detected; animals with warning colours are, on the other hand, enabled to assume a position in which their characters are displayed to the full (J. Portschinsky, *Lepidopterorum Rossiae Biologia*, St Petersburg, 1890, plate i. figs. 16, 17). In both cases a definite attitude is assumed, which is not that of death. Other warning characters exist in addition to colouring: thus sound is made use of by the disturbed rattlesnake and the Indian *Echis*, &c. Large birds, when attacked, often adopt a threatening attitude, accompanied by a terrifying sound. The cobra warns an intruder chiefly by attitude and the dilation of the flattened neck, the effect being heightened in some species by the “spectacles.” In such cases we often see the combination of cryptic and sematic methods, the animal being concealed until disturbed, when it instantly assumes an aposematic attitude. The advantage to the animal itself is clear: a poisonous snake gains nothing by killing an animal it cannot eat; while the poison does not cause immediate death, and the enemy would have time to injure or destroy the snake. In the case of small unpalatable animals with warning colours the enemies would only first become aware of the unpleasant quality by tasting and often destroying their prey; but the species would gain by the experience thus conveyed, even though the individual might suffer. An insect-eating animal does not come into the world with knowledge: it has to be educated by experience, and warning colours enable this education as to what to avoid to be gained by a small instead of a large waste of life. Furthermore, great tenacity of life is usually possessed by animals with warning colours. The tissues of aposematic insects generally possess great elasticity and power of resistance, so that large numbers of individuals can recover after very severe treatment.

The brilliant warning colours of many caterpillars attracted the attention of Darwin when he was thinking over his hypothesis of sexual selection, and he wrote to A. R. Wallace on the subject (C. Darwin, *Life and Letters*, London, 1887, iii. 93). Wallace, in reply, suggested their interpretation as warning colours, a suggestion since verified by experiment (*Proc. Ent. Soc. Lond.*, 1867, p. lxxx; *Trans. Ent. Soc. Lond.*, 1869, pp. 21 and 27). Although animals with warning colours are probably but little attacked by the ordinary enemies of their class, they have special enemies which keep the numbers down to the average. Thus the cuckoo appears to be an insectivorous bird which will freely devour conspicuously coloured unpalatable larvae. The effect of the warning colours of caterpillars is often intensified by gregarious habits. Another aposematic use of colours and structures is to divert attention from the vital parts, and thus give the animal attacked an extra chance of escape. The large,

conspicuous, easily torn wings of butterflies and moths act in this way, as is found by the abundance of individuals which may be captured with notches bitten symmetrically out of both wings when they were in contact. The eye-spots and "tails" so common on the hinder part of the hind wing, and the conspicuous apex so frequently seen on the fore wing, probably have this meaning. Their position corresponds to the parts which are most often found to be notched. In some cases (*e.g.* many *Lycaenidae*) the "tail" and eye-spot combine to suggest the appearance of a head with antennae at the posterior end of the butterfly, the deception being aided by movements of the hind wings. The flat-topped "tussocks" of hair on many caterpillars look like conspicuous fleshy projections of the body, and they are held prominently when the larva is attacked. If seized, the "tussock" comes out, and the enemy is greatly inconvenienced by the fine branched hairs. The tails of lizards, which easily break off, are to be similarly explained, the attention of the pursuer being probably still further diverted by the extremely active movements of the amputated member. Certain crabs similarly throw off their claws when attacked, and the claws continue to snap most actively. The tail of the dormouse, which easily comes off, and the extremely bushy tail of the squirrel, are probably of use in the same manner. Animals with warning colours often tend to resemble each other superficially. This fact was first pointed out by H. W. Bates in his paper on the theory of mimicry (*Trans. Linn. Soc.* vol. xxiii., 1862, p. 495). He showed that the conspicuous, presumably unpalatable, tropical American butterflies, belonging to very different groups, which are mimicked by others, also tend to resemble each other, the likeness being often remarkably exact. These resemblances were not explained by his theory of mimicry, and he could only suppose that they had been produced by the direct influence of a common environment. The problem was solved in 1879 by Fritz Müller (see *Proc. Ent. Soc. Lond.*, 1879, p. xx.), who suggested that life is saved by this resemblance between warning colours, inasmuch as the education of young inexperienced enemies is facilitated. Each species which falls into a group with common warning (*synaposematic*) colours contributes to save the lives of the other members. It is sufficiently obvious that the amount of learning and remembering, and consequently of injury and loss of life involved in the process, are reduced when many species in one place possess the same aposematic colouring, instead of each exhibiting a different "danger-signal." These resemblances are often described as "Müllerian mimicry," as distinguished from true or "Batesian mimicry" described in the next section. Similar synaposematic resemblances between the specially protected groups of butterflies were afterwards shown to exist in tropical Asia, the East Indian Islands and Polynesia by F. Moore (*Proc. Zool. Soc.*, 1883, p. 201), and in Africa by E. B. Poulton (*Report Brit. Assoc.*, 1897, p. 688). R. Meldola (*Ann. and Mag. Nat. Hist.* x., 1882, p. 417) first pointed out and explained in the same manner the remarkable general uniformity of colour and pattern which runs through so many species of each of the distasteful groups of butterflies; while, still later, Poulton (*Proc. Zool. Soc.*, 1887, p. 191) similarly extended the interpretation to the synaposematic resemblances between animals of all kinds in the same country. Thus, for example, longitudinal or circular bands of the same strongly contrasted colours are found in species of many groups with distant affinities.

Certain animals, especially the Crustacea, make use of the special defence and warning colours of other animals. Thus the English hermit-crab, *Pagurus Bernhardus*, commonly carries the sea-anemone, *Sagartia parasitica*, on its shell; while another English species, *Pagurus Prideauxii*, inhabits a shell which is invariably clothed by the flattened *Adamsia palliata*.

The white patch near the tail which is frequently seen in the gregarious Ungulates, and is often rendered conspicuous by adjacent black markings, probably assists the individuals in keeping together; and appearances with probably the same interpretation are found in many birds. The white upturned tail of the rabbit is probably of use in enabling the individuals to follow each other readily. The difference between a typical aposematic character appealing to enemies, and episematic intended for other individuals of the same species, is well seen when we compare such examples as (1) the huge banner-like white tail, conspicuously contrasted with the black or black and white body, by which the slow-moving skunk warns enemies of its power of emitting an intolerably offensive odour; (2) the small upturned white tail of the rabbit, only seen when it is likely to be of use and when the owner is moving, and, if pursued, very rapidly moving, towards safety.

*Mimicry* (see also **MIMICRY**) or *Pseudo-sematic Colours*.—The fact that animals with distant affinities may more or less closely resemble each other was observed long before the existing explanation was possible. Its recognition is implied in a number of insect names with the termination *-formis*, usually given to species of various orders which more or less closely resemble the stinging Hymenoptera. The usefulness of the resemblance was suggested in Kirby and Spence's *Introduction to Entomology*, London, 1817, ii. 223. H. W.

Bates (*Trans. Linn. Soc.* vol. xxiii., 1862, p. 495) first proposed an explanation of mimicry based on the theory of natural selection. He supposed that every step in the formation and gradual improvement of the likeness occurred in consequence of its usefulness in the struggle for life. The subject is of additional interest, inasmuch as it was one of the first attempts to apply the theory of natural selection to a large class of phenomena up to that time well known but unexplained. Numerous examples of mimicry among tropical American butterflies were discussed by Bates in his paper; and in 1866 A. R. Wallace extended the hypothesis to the butterflies of the tropical East (*Trans. Linn. Soc.* vol. xxv., 1866, p. 19); Roland Trimen (*Trans. Linn. Soc.* vol. xxvi., 1870, p. 497) to those of Africa in 1870. The term mimicry is used in various senses. It is often extended, as indeed it was by Bates, to include all the superficial resemblances between animals and any part of their environment. Wallace, however, separated the cryptic resemblances already described, and the majority of naturalists have followed this convenient arrangement. In cryptic resemblance an animal resembles some object of no interest to its enemy (or prey), and in so doing is concealed; in mimicry an animal resembles some other animal which is specially disliked by its enemy, or some object which is specially attractive to its prey, and in so doing becomes conspicuous. Some naturalists have considered mimicry to include all superficial likenesses between animals, but such a classification would group together resemblances which have widely different uses. (1) The resemblance of a mollusc to the coral on which it lives, or an external parasite to the hair or skin of its host, would be *procryptic*; (2) that between moths which resemble lichen, *syncryptic*; (3) between distasteful insects, *synaposematic*; (4) between the Insectivore mole and the Rodent mole-rat, *syntechnic*; (5) the essential element in mimicry is that it is a false warning (pseud-aposematic) or false recognition (pseud-episematic) character. Some have considered that mimicry indicates resemblance to a moving object; but apart from the non-mimetic likenesses between animals classified above, there are ordinary cryptic resemblances to drifting leaves, swaying bits of twig, &c., while truly mimetic resemblances are often specially adapted for the attitude of rest. Many use the term mimicry to include synaposematic as well as pseudo-sematic resemblances, calling the former "Müllerian," the latter "Batesian," mimicry. The objection to this grouping is that it takes little account of the deceptive element which is essential in mimicry. In synaposematic colouring the warning is genuine, in pseud-aposematic it is a sham. The term mimicry has led to much misunderstanding from the fact that in ordinary speech it implies deliberate imitation. The production of mimicry in an individual animal has no more to do with consciousness or "taking thought" than any of the other processes of growth. Protective mimicry is here defined as an advantageous and superficial resemblance of one animal to another, which latter is specially defended so as to be disliked or feared by the majority of enemies of the groups to which both belong—a resemblance which appeals to the sense of sight, sometimes to that of hearing, and rarely to smell, but does not extend to deep-seated characters except when the superficial likeness is affected by them. *Mutatis mutandis* this definition will apply to aggressive (pseud-episematic) resemblance. The conditions under which mimicry occurs have been stated by Wallace:—“(1) that the imitative species occur in the same area and occupy the same station as the imitated; (2) that the imitators are always the more defenceless; (3) that the imitators are always less numerous in individuals; (4) that the imitators differ from the bulk of their allies; (5) that the imitation, however minute, is *external* and *visible* only, never extending to internal characters or to such as do not affect the external appearance.” It is obvious that conditions 2 and 3 do not hold in the case of Müllerian mimicry. Mimicry has been explained, independently of natural selection, by the supposition that it is the common expression of the direct action of common causes, such as climate, food, &c.; also by the supposition of independent lines of evolution leading to the same result without any selective action in consequence of advantage in the struggle; also by the operation of sexual selection.

It is proposed, in conclusion, to give an account of the broad aspects of mimicry, and attempt a brief discussion of the theories of origin of each class of facts (see Poulton, *Linn. Soc. Journ. Zool.*, 1898, p. 558). It will be found that in many cases the argument here made use of applies equally to the origin of cryptic and sematic colours. The relationship between these classes has been explained: mimicry is, as Wallace has stated (*Darwinism*, London, 1889), merely “an exceptional form of protective resemblance. “Now, protective (cryptic) resemblance cannot be explained on any of the lines suggested above, except natural selection; even sexual selection fails, because cryptic resemblance is especially common in the immature stages of insect life. But it would be unreasonable to explain mimetic resemblance by one set of principles and cryptic by another and totally different set. Again, it may be plausible to explain the mimicry of one butterfly for another on one of the suggested lines, but the resemblance of a fly or moth to a wasp is by no means so easy, and here selection would be generally conceded; yet the appeal to antagonistic principles to

explain such closely related cases would only be justified by much direct evidence. Furthermore, the mimetic resemblances between butterflies are not haphazard, but the models almost invariably belong only to certain sub-families, the *Danainae* and *Acraeinae* in all the warmer parts of the world, and, in tropical America, the *Ithomiinae* and *Heliconinae* as well. These groups have the characteristics of aposematic species, and no theory but natural selection explains their invariable occurrence as models wherever they exist. It is impossible to suggest, except by natural selection, any explanation of the fact that mimetic resemblances are confined to changes which produce or strengthen a superficial likeness. Very deep-seated changes are generally involved, inasmuch as the appropriate instincts as to attitude, &c., are as important as colour and marking. The same conclusion is reached when we analyse the nature of mimetic resemblance and realize how complex it really is, being made up of *colours*, both pigmentary and structural, *pattern*, *form*, *attitude* and *movement*. A plausible interpretation of colour may be wildly improbable when applied to some other element, and there is *no* explanation except natural selection which can explain all these elements. The appeal to the direct action of local conditions in common often breaks down upon the slightest investigation, the difference in habits between mimic and model in the same locality causing the most complete divergence in their conditions of life. Thus many insects produced from burrowing larvae mimic those whose larvae live in the open. Mimetic resemblance is far commoner in the female than in the male, a fact readily explicable by selection, as suggested by Wallace, for the female is compelled to fly more slowly and to expose itself while laying eggs, and hence a resemblance to the slow-flying freely exposed models is especially advantageous. The facts that mimetic species occur in the same locality, fly at the same time of the year as their models, and are day-flying species even though they may belong to nocturnal groups, are also more or less difficult to explain except on the theory of natural selection, and so also is the fact that mimetic resemblance is produced in the most varied manner. A spider resembles its model, an ant, by a modification of its body-form into a superficial resemblance, and by holding one pair of legs to represent antennae; certain bugs (Hemiptera) and beetles have also gained a shape unusual in their respective groups, a shape which superficially resembles an ant; a Locustid (*Myrmecophana*) has the shape of an ant painted, as it were, on its body, all other parts resembling the background and invisible; a Membracid (Homoptera) is entirely unlike an ant, but is concealed by an ant-like shield. When we further realize that in this and other examples of mimicry "the likeness is almost always detailed and remarkable, however it is attained, while the methods differ absolutely," we recognize that natural selection is the only possible explanation hitherto suggested. In the cases of aggressive mimicry an animal resembles some object which is attractive to its prey. Examples are found in the flower-like species of *Mantis*, which attract the insects on which they feed. Such cases are generally described as possessing "alluring colours," and are regarded as examples of aggressive (anticryptic) resemblance, but their logical position is here.

*Colours displayed in Courtship, Secondary Sexual Characters, Epigamic Colours.*—Darwin suggested the explanation of these appearances in his theory of *sexual selection* (*The Descent of Man*, London, 1874). The rivalry of the males for the possession of the females he believed to be decided by the preference of the latter for those individuals with especially bright colours, highly developed plumes, beautiful song, &c. Wallace does not accept the theory, but believes that natural selection, either directly or indirectly, accounts for all the facts. Probably the majority of naturalists follow Darwin in this respect. The subject is most difficult, and the interpretation of a great proportion of the examples in a high degree uncertain, so that a very brief account is here expedient. That selection of some kind has been operative is indicated by the diversity of the elements into which the effects can be analysed. The most complete set of observations on epigamic display was made by George W. and Elizabeth G. Peckham upon spiders of the family *Attidae* (*Nat. Hist. Soc. of Wisconsin*, vol. i., 1889). These observations afforded the authors "conclusive evidence that the females pay close attention to the love-dances of the males, and also that they have not only the power, but the will, to exercise a choice among the suitors for their favour." Epigamic characters are often concealed except during courtship; they are found almost exclusively in species which are diurnal or semi-diurnal in their habits, and are excluded from those parts of the body which move too rapidly to be seen. They are very commonly directly associated with the nervous system; and in certain fish, and probably in other animals, an analogous heightening of effect accompanies nervous excitement other than sexual, such as that due to fighting or feeding. Although there is epigamic display in species with sexes alike, it is usually most marked in those with secondary sexual characters specially developed in the male. These are an exception to the rule in heredity, in that their appearance is normally restricted to a single sex, although in many of the higher animals they have been proved to be latent in the other, and may appear after the essential organs of

sex have been removed or become functionless. This is also the case in the Aculeate Hymenoptera when the reproductive organs have been destroyed by the parasite *Stylops*. J. T. Cunningham has argued (*Sexual Dimorphism in the Animal Kingdom*, London, 1900) that secondary sexual characters have been produced by direct stimulation due to contests, &c., in the breeding period, and have gradually become hereditary, a hypothesis involving the assumption that acquired characters are transmitted. Wallace suggests that they are in part to be explained as "recognition characters," in part as an indication of surplus vital activity in the male.

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(E. B. P.)

## 2. CHEMISTRY

The coloration of the *surface* of animals is caused either by *pigments*, or by a certain *structure* of the surface by means of which the light falling on it, or reflected through its superficial transparent layers, undergoes diffraction or other optical change. Or it may be the result of a combination of these two causes. It plays an important part in the relationship of the animal to its environment, in concealment, in mimicry, and so on; the presence of a pigment in the integument may also serve a more direct physiological purpose, such as a respiratory function. The coloration of birds' feathers, of the skin of many fishes, of many insects, is partially at least due to structure and the action of the peculiar pigmented cells known as "chromatophores" (which W. Garstang defines as pigmented cells specialized for the discharge of the chromatic function), and is much better marked when these have for their background a "reflecting layer" such as is provided by guanin, a substance closely related to uric acid. Such a mechanism is seen to greatest advantage in fishes. Among these, guanin may be present in a finely granular form, causing the light falling on it to be scattered, thus producing a white effect; or it may be present in a peculiar crystalline form, the crystals being known as "iridocytes"; or in a layer of closely apposed needles forming a silvery sheet or mirror. In the iris of some fishes the golden red colour is produced by the light reflected from such a layer of guanin needles having to pass through a thin layer of a reddish pigment, known as a "lipochrome." Again, in some lepidopterous insects a white or a yellow appearance is produced by the deposition of uric acid or a nearly allied substance on the surface of the wings. In many animals, but especially among invertebrates, colouring matters or pigments play an important rôle in surface coloration; in some cases such coloration may be of benefit to the animal, but in others the integument simply serves as an organ for the excretion of waste pigmentary substances. Pigments (1) may be of direct physiological importance; (2) they may be excretory; or (3) they may be introduced into the body of the animal with the food.

Of the many pigments which have been described up to the present time, very few have been subjected to elementary chemical analysis, owing to the great difficulties attending their isolation. An extremely small amount of pigment will give rise to a great amount of coloration, and the pigments are generally accompanied by impurities of various kinds which cling to them with great tenacity, so that when one has been thoroughly cleansed very little of it remains for ultimate analysis. Most of these substances have been detected by means of the spectroscope, their absorption bands serving for their recognition, but mere identity of spectrum does not necessarily mean chemical identity, and a few chemical tests have also to be applied before a conclusion can be drawn. The absorption bands are referred to certain definite parts of the spectrum, such as the Fraunhofer lines, or they may be given in wave-lengths. For this purpose the readings of the spectroscope are reduced to wave-lengths by means of interpolation curves; or if Zeiss's microspectroscope be used, the position of bands in wave-lengths (denoted by the Greek letter  $\lambda$ ) may be read directly.

Haemoglobin, the red colouring matter of vertebrate blood,  $C_{758}H_{1203}N_{195}S_3FeO_{218}$ , and its derivatives haematin,  $C_{32}H_{30}N_4FeO_3$ , and haematoporphyrin,  $C_{16}H_{18}N_2O_3$ , are colouring matters about which we possess definite chemical knowledge, as they have been isolated, purified and analysed. Most of the bile pigments of mammals have likewise been isolated and studied chemically, and all of these are fully described in the text-books of physiology and physiological chemistry. Haemoglobin, though physiologically of great importance in the respiratory process of vertebrate animals, is yet seldom used for surface pigmentation, except in the face of white races of man or in other parts in monkeys, &c. In some worms

the transparent skin allows the haemoglobin of the blood to be seen through the integument, and in certain fishes also the haemoglobin is visible through the integument. It is a curious and noteworthy fact that in some invertebrate animals in which no haemoglobin occurs, we meet with its derivatives. Thus haematin is found in the so-called bile of slugs, snails, the limpet and the crayfish. In sea-anemones there is a pigment which yields some of the decomposition-products of haemoglobin, and associated with this is a green pigment apparently identical with biliverdin ( $C_{16}H_{18}N_2O_4$ ), a green bile pigment. Again, haematoporphyrin is found in the integuments of star-fishes and slugs, and occurs in the "dorsal streak" of the earth-worm *Lumbricus terrestris*, and perhaps in other species. Haematoporphyrin and biliverdin also occur in the egg-shells of certain birds, but in this case they are derived from haemoglobin. Haemoglobin is said to be found as low down in the animal kingdom as the Echinoderms, e.g. in *Ophiactis virens* and *Thyonella gemmata*. It also occurs in the blood of *Planorbis corneus* and in the pharyngeal muscles of other mollusca.

A great number of other pigments have been described; for example, in the muscles and tissues of animals, both vertebrate and invertebrate, are the histohaematin, of which a special muscle pigment, myohaematin, is one. In vertebrates the latter is generally accompanied by haemoglobin, but in invertebrates—with the exception of the pharyngeal muscles of the mollusca—it occurs alone. Although closely related to haemoglobin or its derivative haemochromogen, the histohaematin is yet totally distinct, and they are found in animals where not a trace of haemoglobin can be detected. Another interesting pigment is turacin, which contains about 7% of nitrogen, found by Professor A. H. Church in the feathers of the Cape lory and other plantain-eaters, from which it can be extracted by water containing a trace of ammonia. It has been isolated, purified and analysed by Professor Church. From it may be obtained turacoporphyrin, which is identical with haematoporphyrin, and gives the band in the ultra-violet which J. L. Soret and subsequently A. Gamgee have found to be characteristic of haemoglobin and its compounds. Turacin itself gives a peculiar two-banded spectrum, and contains about 7% of copper in its molecule. Another copper-containing pigment is haemocyanin, which in the oxidized state gives a blue colour to the blood of various Mollusca and Arthropoda. Like haemoglobin, it acts as an oxygen-carrier in respiration, but it takes no part in surface coloration.

A class of pigments widely distributed among plants and animals are the lipochromes. As their name denotes, they are allied to fat and generally accompany it, being soluble in fat solvents. They play an important part in surface coloration, and may be greenish, yellow or red in colour. They contain no nitrogen. As an example of a lipochrome which has been isolated, crystallized and purified, we may mention carotin, which has recently been found in green leaves. Chlorophyll, which is so often associated with a lipochrome, has been found in some Infusoria, and in *Hydra* and *Spongilla*, &c. In some cases it is probably formed by the animal; in other cases it may be due to symbiotic algae, while in the gastric gland of many Mollusca, Crustacea and Echinodermata it is derived from food-chlorophyll. Here it is known as entero-chlorophyll. The black pigments which occur among both vertebrate and invertebrate animals often have only one attribute in common, viz. blackness, for among the discordant results of analysis one thing is certain, viz. that the melanins from vertebrate animals are not identical with those from invertebrate animals. The melanosis or blackening of insect blood, for instance, is due to the oxidation of a chromogen, the pigment produced being known as a uranidine. In some sponges a somewhat similar pigment has been noticed. Other pigments have been described, such as actinochrome, echinochrome, pentacrinin, antedonin, polyperyrin (which appears to be a haematoporphyrin), the floridines, spongioporphyrin, &c., which need no mention here; all these pigments can only be distinguished by means of the spectroscope.

Most of the pigments are preceded by colourless substances known as "chromogens," which by the action of the oxygen of the air and by other agencies become changed into the corresponding pigments. In some cases the pigments are built up in the tissues of an animal, in others they appear to be derived more or less directly from the food. Derivatives of chlorophyll and lipochromes especially, seem to be taken up from the intestine, probably by the agency of leucocytes, in which they may occur in combination with, or dissolved by, fatty matters and excreted by the integument. In worms especially, the skin seems to excrete many effete substances, pigments included. No direct connexion has been traced between the chlorophyll eaten with the food and the haemoglobin of blood and muscle. Attention may, however, be drawn to the work of Dr E. Schunck, who has shown that a substance closely resembling haematoporphyrin can be prepared from chlorophyll; this is known as phylloporphyrin. Not only does the *visible* spectrum of this substance resemble that of haematoporphyrin, but the *invisible* ultra-violet also, as shown by C. A. Schunck.

The reader may refer to E. A. Schäfer's *Text-Book of Physiology* (1898) for A. Gamgee's article "On Haemoglobin, and its Compounds"; to the writer's papers in the *Phil. Trans.* and *Proc. Roy. Soc.* from 1881 onwards, and also *Quart. Journ. Micros. Science* and *Journ. of Physiol.*; to C. F. W. Krukenberg's *Vergleichende physiologische Studien* from 1879 onwards, and to his *Vorträge*. Miss M. I. Newbiggin collected in *Colour in Nature* (1898) most of the recent literature of this subject. Dr E. Schunck's papers will be found under the heading "Contribution to the Chemistry of Chlorophyll" in *Proc. Roy. Soc.* from 1885 onwards; and Mr C. A. Schunck's paper in *Proc. Roy. Soc.* vol. lxiii.

(C. A. MacM.)

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**COLSTON, EDWARD** (1636-1721), English philanthropist, the son of William Colston, a Bristol merchant of good position, was born at Bristol on the 2nd of November 1636. He is generally understood to have spent some years of his youth and manhood as a factor in Spain, with which country his family was long connected commercially, and whence, by means of a trade in wines and oil, great part of his own vast fortune was to come. On his return he seems to have settled in London, and to have bent himself resolutely to the task of making money. In 1681, the date of his father's decease, he appears as a governor of Christ's hospital, to which noble foundation he afterwards gave frequently and largely. In the same year he probably began to take an active interest in the affairs of Bristol, where he is found about this time embarked in a sugar refinery; and during the remainder of his life he seems to have divided his attention pretty equally between the city of his birth and that of his adoption. In 1682 he appears in the records of the great western port as advancing a sum of £1800 to its needy corporation; in 1683 as "a free burgess and *meire* (St Kitts) merchant" he was made a member of the Merchant's Hall; and in 1684 he was appointed one of a committee for managing the affairs of Clifton. In 1685 he again appears as the city's creditor for about £2000, repayment of which he is found insisting on in 1686. In 1689 he was chosen auditor by the vestry at Mortlake, where he was residing in an old house once the abode of Ireton and Cromwell. In 1691, on St Michael's Hill, Bristol, at a cost of £8000, he founded an almshouse for the reception of 24 poor men and women, and endowed with accommodation for "Six Saylor's," at a cost of £600, the merchant's almshouses in King Street. In 1696, at a cost of £8000, he endowed a foundation for clothing and teaching 40 boys (the books employed were to have in them "no tincture of Whiggism"); and six years afterwards he expended a further sum of £1500 in rebuilding the school-house. In 1708; at a cost of £41,200, he built and endowed his great foundation on Saint Augustine's Back, for the instruction, clothing, maintaining and apprenticing of 100 boys; and in time of scarcity, during this and next year, he transmitted "by a private hand" some £20,000 to the London committee. In 1710, after a poll of four days, he was sent to parliament, to represent, on strictest Tory principles, his native city of Bristol; and in 1713, after three years of silent political life, he resigned this charge. He died at Mortlake in 1721, having nearly completed his eighty-fifth year; and was buried in All Saints' church, Bristol.

Colston, who was in the habit of bestowing large sums yearly for the release of poor debtors and the relief of indigent age and sickness, and who gave (1711) no less than £6000 to increase Queen Anne's Bounty Fund for the augmentation of small livings, was always keenly interested in the organization and management of his foundations; the rules and regulations were all drawn up by his hand, and the minutest details of their constitution and economy were dictated by him. A high churchman and Tory, with a genuine intolerance of dissent and dissenters, his name and example have served as excuses for the formation of two political benevolent societies—the "Anchor" (founded 1769) and the "Dolphin" (founded 1749),—and also the "Grateful" (founded 1758), whose rivalry has been perhaps as instrumental in keeping their patron's memory green as have the splendid charities with which he enriched his native city (see [BRISTOL](#)).

See Garrard, *Edward Colston, the Philanthropist* (4to, Bristol, 1852); Pryce, *A Popular History of Bristol* (1861); Manchee, *Bristol Charities*.

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**COLT, SAMUEL** (1814-1862), American inventor, was born on the 19th of July 1814 at Hartford, Connecticut, where his father had a manufactory of silks and woollens. At the age of ten he left school for the factory, and at fourteen, then being in a boarding school at Amherst, Massachusetts, he made a runaway voyage to India, during which (in 1829) he constructed a wooden model, still existing, of what was afterwards to be the revolver (see [PISTOL](#)). On his return he learned chemistry from his father's bleaching and dyeing manager, and under the assumed name "Dr Coult" travelled over the United States and Canada lecturing on that science. The profits of two years of this work enabled him to continue his researches and experiments. In 1835, having perfected a six-barrelled rotating breech, he visited Europe, and patented his inventions in London and Paris, securing the American right on his return; and the same year he founded at Paterson, New Jersey, the Patent Arms Company, for the manufacture of his revolvers only. As early as 1837 revolvers were successfully used by United States troops, under Lieut.-Colonel William S. Harney, in fighting against the Seminole Indians in Florida. Colt's scheme, however, did not succeed; the arms were not generally appreciated; and in 1842 the company became insolvent. No revolvers were made for five years, and none were to be had when General Zachary Taylor wrote for a supply from the seat of war in Mexico. In 1847 the United States government ordered 1000 from the inventor; but before these could be produced he had to construct a new model, for a pistol of the company's make could nowhere be found. This commission was the beginning of an immense business. The little armoury at Whitneyville (New Haven, Connecticut), where the order for Mexico was executed, was soon exchanged for larger workshops at Hartford. These in their turn gave place (1852) to the enormous factory of the Colt's Patent Fire-Arms Manufacturing Company, doubled in 1861, on the banks of the Connecticut river, within the city limits of Hartford, where so many millions of revolvers with all their appendages have been manufactured. Thence was sent, for the Russian and English governments, to Tula and Enfield, the whole of the elaborate machinery devised by Colt for the manufacture of his pistols. Colt introduced and patented a number of improvements in his revolver, and also invented a submarine battery for harbour defence. He died at Hartford on the 10th of January 1862.

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**COLT'S-FOOT**, the popular name of a small herb, *Tussilago Farfara*, a member of the natural order Compositae, which is common in Britain in damp, heavy soils. It has a stout branching underground stem, which sends up in March and April scapes about 6 in. high, each bearing a head of bright yellow flowers, the male in the centre surrounded by a much larger number of female. The flowers are succeeded by the fruits, which bear a soft snow-white woolly pappus. The leaves, which appear later, are broadly cordate with an angular or lobed outline, and are covered on the under-face with a dense white felt. The botanical name, *Tussilago*, recalls its use as a medicine for cough (*tussis*). The leaves are smoked in cases of asthma.

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**COLUGO**, or COBEGO, either of two species of the zoological genus *Galeopithecus*. These animals live in the forests of the Malay Peninsula, Sumatra, Borneo and the Philippine Islands, where they feed chiefly on leaves, and probably also on insects. In size they may be compared with cats; the long slender limbs are connected by a broad fold of skin extending outwards from the sides of the neck and body, the fingers and toes are webbed, and the hind-limbs joined by an outer membrane as in bats. Their habits are nocturnal, and during the daytime they cling to the trunks or limbs of trees head downwards in a state of repose. With the approach of night their season of activity commences, when they may be occasionally seen gliding from tree to tree supported on their cutaneous parachute, and they have been noticed as capable of traversing in this way a space of 70 yds. with a descent of only about one in five. Europeans in the East know these animals as "flying lemurs." (See GALEOPITHECUS.)

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**COLUMBA, SAINT** (Irish, *Colum*), Irish saint, was born on the 7th of December 521, in all probability at Gartan in Co. Donegal. His father Feidlimid was a member of the reigning family in Ireland and was closely allied to that of Dalriada (Argyll). His mother Eithne was of Leinster extraction and was descended from an illustrious provincial king. To these powerful connexions as much as to his piety and ability, he owed the immense influence he possessed. Later lives state that the saint was also called Crimthann (fox), and Reeves suggests that he may have had two names, the one baptismal, the other secular. He was afterwards known as Columkille, or Columba of the Church, to distinguish him from others of the same name. During his early years the Irish Church was reformed by Gildas and Finian of Clonard, and numerous monasteries were founded which made Ireland renowned as a centre of learning. Columba himself studied under two of the most distinguished Irishmen of his day, Finian of Moville (at the head of Strangford Lough) and Finian of Clonard. Almost as a matter of course, under such circumstances, he embraced the monastic life. He was ordained deacon while at Moville, and afterwards, when about thirty years of age, was raised to the priesthood. During his residence in Ireland he founded, in addition to a number of churches, two famous monasteries, one named Daire Calgaich (Derry) on the banks of Lough Foyle, the other Dair-magh (Durrow) in King's county.

In 563 he left his native land, accompanied by twelve disciples, and went on a mission to northern Britain, perhaps on the invitation of his kinsman Conall, king of Dalriada. Irish accounts represent Columba as undertaking this mission in consequence of the censure expressed against him by the clergy after the battle of Cooldrevny; but this is probably a fabrication. The saint's labours in Scotland must be regarded as a manifestation of the same spirit of missionary enterprise with which so many of his countrymen were imbued. Columba established himself on the island of Hy or Iona, where he erected a church and a monastery. About the year 565 he applied himself to the task of converting the heathen kingdom of the northern Picts. Crossing over to the mainland he proceeded to the residence, on the banks of the Ness, of Brude, king of the Picts. By his preaching, his holy life, and, as his earliest biographers assert, by the performance of miracles, he converted the king and many of his subjects. The precise details, except in a few cases, are unknown, or obscured by exaggeration and fiction; but it is certain that the whole of northern Scotland was converted by the labours of Columba, and his disciples and the religious instruction of the people provided for by the erection of numerous monasteries. The monastery of Iona was revered as the mother house of all these foundations, and its abbots were obeyed as the chief ecclesiastical rulers of the whole nation of the northern Picts. There were then neither dioceses nor parishes in Ireland and Celtic Scotland; and by the Columbite rule the bishops themselves, although they ordained the clergy, were subject to the jurisdiction of the abbots of Iona, who, like the founder of the order, were only presbyters. In matters of ritual they agreed with the Western Church on the continent, save in a few particulars such as the precise time of keeping Easter and manner of tonsure.

Columba was honoured by his countrymen, the Scots of Britain and Ireland, as much as by his Pictish converts, and in his character of chief ecclesiastical ruler he gave formal benediction and inauguration to Aidan, the successor of Conall, as king of the Scots. He accompanied that prince to Ireland in 575, and took a leading part in a council held at Drumceat in Ulster, which determined once and for all the position of the ruler of Dalriada with regard to the king of Ireland. The last years of Columba's life appear to have been mainly spent at Iona. There he was already revered as a saint, and whatever credit may be given to some portions of the narratives of his biographers, there can be no doubt as to the wonderful influence which he exercised, as to the holiness of his life, and as to the love which he uniformly manifested to God and to his neighbour.

In the summer of 597 he knew that his end was approaching. On Saturday the 8th of June he was able, with the help of one of his monks, to ascend a little hill above the monastery and to give it his farewell blessing. Returning to his cell he continued a labour in which he had been engaged, the transcription of the Psalter. Having finished the verse of the 34th Psalm where it is written, "They who seek the Lord shall want no manner of thing that is good," he said, "Here I must stop:—what follows let Baithen write"; indicating, as was believed, his wish that his cousin Baithen should succeed him as abbot. He was present at evening in the church, and when the midnight bell sounded for the nocturnal office early on Sunday morning he again went thither unsupported, but sank down before the altar and passed away as in a gentle sleep.

Several Irish poems are ascribed to Columba, but they are manifestly compositions of a later age. Three Latin hymns may, however, be attributed to the saint with some degree of certainty.

The original materials for a life of St Columba are unusually full. The earliest biography was written by one of his successors, Cuminius, who became abbot of Iona in 657. Much more important is the enlargement of that work by Adamnan, who became abbot of Iona in 679. These narratives are supplemented by the brief but most valuable notices given by the Venerable Bede. See W. Reeves, *Life of St Columba, written by Adamnan* (Dublin, 1857); W. F. Skene, *Celtic Scotland*, vol. ii. "Church and Culture" (Edinburgh, 1877).

(E. C. Q.)

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**COLUMBAN** (543-615), Irish saint and writer, was born in Leinster in 543, and was educated in the monastery of Bangor, Co. Down. About the year 585 he left Ireland together with twelve other monks, and established himself in the Vosges, among the ruins of an ancient fortification called Anagrates, the present Anegray in the department of Haute-Saône. His enemies accused him before a synod of French bishops (602) for keeping Easter according to the old British and now unorthodox way, and a more powerful conspiracy was organized against him at the court of Burgundy for boldly rebuking the crimes of King Theuderich II. and the queen-mother Brunhilda. He was banished and forcibly removed from his monastery, and with St Gall and others of the monks he withdrew into Switzerland, where he preached with no great success to the Suebi and Alamanni. Being again compelled to flee, he retired to Italy, and founded the monastery of Bobbio in the Apennines, where he remained till his death, which took place on the 21st of November 615. His writings, which include some Latin poems, prove him a man of learning, and he appears to have been acquainted not only with the Latin classics, but also with Greek, and even Hebrew.

The collected edition of St Columban's writings was published by Patrick Fleming in his *Collectanea sacra Hiberni* (Louvain, 1667), and reproduced by Migne, p. 4, vol. lxxxvi. (Paris, 1844). See further, Wright's *Biographia Literaria*. Columban's *Regula Coenobitalis cum Poenitentiali* is to be found in the *Codex Regularum* (Paris, 1638). A complete bibliography is given in U. Chevallier, *Répertoire des sources hist.* (Bio. Bibliogr.), vol. i. 990 (Paris, 1905).

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**COLUMBANI, PLACIDO**, Italian architectural designer, who worked chiefly in England in the latter part of the 18th century. He belonged to the school of the Adams and Pergolesi, and like them frequently designed the enrichments of furniture. He was a prolific producer of chimney-pieces, which are often mistaken for Adam work, of moulded friezes, and painted plaques for cabinets and the like. There can be no question that the English furniture designers of the end of the 18th century, and especially the Adams, Hepplewhite and Sheraton, owed much to his graceful, flowing and classical conceptions, although they are often inferior to those of Pergolesi. His books are still a valuable store-house of sketches for internal architectural decoration. His principal works are:—*Vases and Tripods* (1770); *A New Book of Ornaments, containing a variety of elegant designs for Modern Panels, commonly executed in Stucco, Wood or Painting, and used in decorating Principal Rooms* (1775); *A variety of Capitals, Friezes and Corniches, and how to increase and decrease them, still retaining their proportions* (1776). He also assisted John Crunden in the production of *The Chimney-piece Makers' Daily Assistant* (1776).

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**COLUMBARIUM** (Lat. *columba*, a dove), a pigeon-house. The term is applied in architecture to those sepulchral chambers in and near Rome, the walls of which were sunk with small niches (*columbaria*) to receive the cinerary urns. Vitruvius (iv. 2) employs the term to signify the holes made in a wall to receive the ends of the timbers of a floor or roof.

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**COLUMBIA**, a city and the county-seat of Boone county, Missouri, U.S.A., situated in the central part of the state, about 145 m. (by rail) W.N.W. of St Louis. Pop. (1890) 4000; (1900) 5651 (1916 negroes); (1910) 9662. Columbia is served by the Wabash and the Missouri, Kansas & Texas railways. It is primarily an educational centre, is a market for grain and farm products, and has grain elevators, a packing house, a shoe factory and brick works. Columbia is the seat of the University of Missouri, a coeducational state institution, established in 1839 and opened in 1841; it received no direct financial support from the state until 1867, and its founding was due to the self-sacrifice of the people of the county. It is now liberally supported by the state; in 1908 its annual income was about \$650,000. In 1908 the university had (at Columbia) 200 instructors and 2419 students, including 680 women; included in its library is the collection of the State Historical Society. The School of Mines of the university is at Rolla, Mo.; all other departments are at Columbia. A normal department was established in 1867 and opened in 1868; and women were admitted to it in 1869. The College of Agriculture and Mechanic Arts became a department of the university in 1870. The law department was opened in 1872, the medical in 1873, and the engineering in 1877. The graduate department was established in 1896, and in 1908 a department of journalism was organized. On the university campus in the quadrangle is the monument of grey granite erected over the grave of Thomas Jefferson, designed after his own plans, and bearing the famous inscription written by him. It was given to the university by descendants of Jefferson when Congress appropriated money for the monument now standing over his grave. Near the city is the farm of the agricultural college and the experiment station. At Columbia, also, are the Parker Memorial hospital, the Teachers College high school, the University Military Academy, the Columbia Business College, Christian College (Disciples) for women, established in 1851, its charter being the first granted by Missouri for the collegiate education of Protestant women; the Bible College of the Disciples of Christ in Missouri; and Stephens College (under Baptist control) for women, established in 1856. The municipality owns the water-works and the electric lighting plant. Columbia was first settled about 1821.

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**COLUMBIA**, a borough of Lancaster county, Pennsylvania, U.S.A., on the W. bank of the Susquehanna river (here crossed by a long steel bridge), opposite Wrightsville and about 81 m. W. by N. of Philadelphia. Pop. (1890) 10,599; (1900) 12,316, of whom 772 were foreign-born; (1910) 11,454. It is served by the Pennsylvania, the Philadelphia, Baltimore & Washington, the Philadelphia & Reading, and the Northern Central railways, and by interurban electric railways. The river here is about a mile wide, and a considerable portion of the borough is built on the slope of a hill which rises gently from the river-bank and overlooks beautiful scenery. The Pennsylvania railway has repair shops here, and among Columbia's manufactures are silk goods, embroidery and laces, iron and steel pipe, engines, laundry machinery, brushes, stoves, iron toys, umbrellas, flour, lumber and wagons; the city is also a busy shipping and trading centre. Columbia was first settled, by Quakers, in 1726; it was laid out as a town in 1787; and in 1814 it was incorporated. In 1790 it was one of several places considered in Congress for a permanent site of the national capital.

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**COLUMBIA**, the capital city of South Carolina, U.S.A., and the county-seat of Richland county, on the E. bank of the Congaree river, a short distance below the confluence of the Saluda and the Broad rivers, about 130 m. N.W. of Charleston. Pop. (1890) 15,353; (1900) 21,108, of whom 9858 were negroes; and (1910) 26,319. It is served by the Atlantic Coast Line, the Southern, the Seaboard Air Line, and the Columbia, Newberry & Laurens railways. Columbia is picturesquely situated on the level top of a bluff overlooking the Congaree, which falls about 36 ft. in passing by, but is navigable for the remainder of its course. The surrounding country is devoted chiefly to cotton culture. The state house, United States government building and city hall are fine structures. Some of the new business houses are ten or more storeys in height. The state penitentiary and the state insane asylum are located here, and Columbia is an important educational centre, being the seat of the university of

South Carolina, the Columbia College for women (Methodist Episcopal South, 1854), the College for women (Presbyterian, 1890), and the Presbyterian Theological Seminary (1828); and the Allen University (African Methodist Episcopal; coeducational, 1880), and the Benedict College (Baptist) for negroes. The University of South Carolina, organized in 1801 and opened in 1805, was known as South Carolina College in 1805-1863, 1878-1887 and 1891-1906, and as the university of South Carolina in 1866-1877, 1888-1891 and after 1906; in 1907-1908 it had departments of arts, science, pedagogy and law, an enrolment of 285 students, and a faculty of 25 instructors. By means of a canal abundant water power is furnished by the Congaree, and the city has some of the largest cotton mills in the world; it has, besides, foundries and machine shops and manufactories of fertilizers and hosiery. The manufactures under the factory system were valued at \$3,133,903 in 1900 and at \$4,676,944 in 1905—a gain, greater than that of any other city in the state, of 49.2% in five years. In the neighbourhood are several valuable granite quarries. The municipality owns and operates its water-works.

While much of the site was still a forest the legislature, in 1786, chose it for the new capital. It was laid out in the same year, and in 1790 the legislature first met here. Until 1805, when it was incorporated as a village, Columbia was under the direct government of the legislature; in 1854 it was chartered as a city. On the morning of the 17th of February 1865 General W. T. Sherman, on his march through the Carolinas, entered Columbia, and on the ensuing night a fire broke out which was not extinguished until most of the city was destroyed. The responsibility for this fire was charged by the Confederates upon the Federals and by the Federals upon the Confederates.

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**COLUMBIA**, a city and the county-seat of Maury county, Tennessee, U.S.A., situated on the Duck river, in the central part of the state, 46 m. S. of Nashville. Pop. (1890) 5370; (1900) 6052 (2716 negroes); (1910) 5754. Columbia is served by the Louisville & Nashville, and the Nashville, Chattanooga & St Louis railways. It is the seat of the Columbia Institute for girls (under Protestant Episcopal control), founded in 1836, and of the Columbia Military Academy. Columbia is in a fine farming region; is engaged extensively in the mining and shipping of phosphates; has an important trade in live-stock, especially mules; manufactures cotton, lumber, flour, bricks, pumps and woollen goods; and has marble and stone works. Columbia was settled about 1807 and was incorporated in 1822. During the Civil War it was the base from which General N. B. Forrest operated in 1862-1863, and was alternately occupied by Confederate and Federal forces during General Hood's Nashville campaign (November-December 1864).

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**COLUMBIA RIVER**, a stream of the north-west United States and south-west Canada, about 939 m. in length, draining a basin of about 250,000 sq. m., of which 38,395 are in British Columbia; some 105,000 sq. m. belong to the valley of the Snake and 11,700 to that of the Willamette. The source of the river is partly in the Yellowstone country, partly near the Teton peaks, and partly in the pine-clad mountains of British Columbia. Some American geographers regard the head as that of the Clark Fork, but it is most generally taken to be in British Columbia about 80 m. north of the United States line. From this point it runs some 150 m. to the north-west to the "Big Bend," and then in a great curve southward, enclosing the superb ranges of the Selkirks, crossing the international line near the boundary of Washington and Idaho, where it is joined by the Pend Oreille river, or Clark Fork, already referred to. This latter river rises in the Rocky Mountains west of Helena, Montana, falls with a heavy slope (1323 ft. in 167 m.) to its confluence with the Flathead, flows through Lake Pend Oreille (27 m.) in northern Idaho, and runs in deep canyons (falling 900 ft. in 200 m.) to its junction with the Columbia, which from this point continues almost due south for more than 106 m. Here the Columbia is joined by the Spokane, a large river with heavy fall, and enters the "Great Plain of the Columbia," an area of some 22,000 sq. m., resembling the "parks" of Colorado, shut in on all sides by mountains: the Moses range to the north, the Bitter Root and Cœur d'Alène on the east, the Blue on the south, and the Cascades on the

west. The soil is rich, yielding great harvests of grain, and the mountains rich in minerals as yet only slightly prospected. After breaking into this basin the river turns sharply to the west and skirts the northern mountain barrier for about 105 m. Where it strikes the confines of the Cascades, it is joined by the Okanogan, turns due south in the second Big Bend, and flows about 200 m. to its junction with the Snake near Wallula.

After the confluence of the Snake with the Columbia the greater river turns west toward the Pacific. Throughout its course to this point it may be said that the Columbia has no flood plain; everywhere it is cutting its bed; almost everywhere it is characterized by canyons, although above the Spokane the valley is much broken down and there is considerable timbered and fertile bench land. Below the Spokane the canyon becomes more steep and rugged. From the mouth of the Okanogan to Priests Rapids extends a superb canyon, with precipitous walls of black columnar basalt 1000 to 3000 ft. in height. The finest portion is below the Rock Island Rapids. In this part of its course, along the Cascade range in the Great Plain and at its passage of the range westward, rapids and cascades particularly obstruct the imperfectly opened bed. In the lower Columbia, navigation is first interrupted 160 m. from the mouth at the Cascades, a narrow gorge across the Cascade range 4.5 m. long, where the river falls 24 ft. in 2500; the rapids are evaded by a canal constructed (1878-1896) by the Federal government, and by a portage railway (1890-1891). Fifty-three miles above this are the Dalles, a series of falls, rapids and rock obstructions extending some 12 m. and ending at Celilo, 115m. below Wallula, with a fall of 20 ft. There are also impediments just below the mouth of the Snake; others in the lower course of this river below Riparia; and almost continuous obstructions in the Columbia above Priests Rapids. The commerce of the Columbia is very important, especially that from Portland, Vancouver, Astoria, and other outlets of the Willamette valley and the lower Columbia. The grain region of the Great Plain, the bottom-land orchards and grain field on the plateaus of the Snake, have not since 1880 been dependent upon the water navigation for freighting, but in their interest costly attempts have been made to open the river below the Snake uninterruptedly to commerce.

The Columbia is one of the greatest salmon streams of the world (see [OREGON](#)). The tonnage of deep-sea vessels in and out over the bar at the river's mouth from 1890-1899 was 9,423,637 tons. From 1872-1899 the United States government expended for improvement of the Snake and Columbia \$6,925,649. The mouth of the latter is the only deep-water harbour between San Francisco and Cape Flattery (700 m.), and the only fresh water harbour of the Pacific coast. To facilitate its entrance, which, owing to bars, tides, winds, and the great discharge of the river, has always been difficult, a great jetty has been constructed (1885-1895, later enlarged) to scour the bars. It was about 4.5 miles long, and in 1903 work was begun to make it 2.5 miles longer. The tides are perceptible 150 m. above the mouth (mean tide at Astoria *c.* 6.2 ft.), the average tidal flow at the mouth being about 1,000,000 cub. ft. per second; while the fresh water outflow is from 90,000 to 300,000 cub. ft. according to the stage of water, and as high as 1,000,000 cub. ft. in time of flood. Improvements were undertaken by the Federal government and a state commission in 1902 in order to secure a 25-ft. channel from Portland to the sea.

In 1792, and possibly also in 1788, the river mouth was entered by Captain Robert Gray (1755-1806) of Boston, Mass., who named the river after his own vessel, "Columbia," which name has wholly supplanted the earlier name, "Oregon." In 1804-1805 the river was explored by Meriwether Lewis and William Clark. Upon these discoveries the United States primarily based its claim to the territory now embraced in the states of Oregon and Washington.

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**COLUMBIA UNIVERSITY**, one of the oldest and most important of the higher institutions of learning in the United States, located for the most part on Morningside Heights, New York city. It embraces Columbia College, founded as King's College in 1754; a school of medicine (the College of Physicians and Surgeons) founded in 1767, in West 59th Street; a school of law, founded in 1858; schools of applied science, including a school of mines and schools of chemistry and engineering, separately organized in 1896; a school of architecture, organized in 1881; graduate schools of political science, organized in 1880, philosophy, organized in 1890, and pure science, organized in 1892; and a school of journalism; closely affiliated with it are the College of Pharmacy, founded in 1829, in West

68th Street; Teachers' College, founded in 1886, as the New York College for the Training of Teachers, and essentially a part of the university since 1899; and Barnard College (for women) founded in 1889, and essentially a part of the university since 1900. Reciprocal relations also exist between the university and both the General Theological Seminary of the Protestant Episcopal Church and the Union Theological Seminary, thus practically adding to the university a theological department. Columbia also nominates the American professors who lecture at German universities by the reciprocal arrangement made in 1905, the German professors lecturing in America being nominated by the Prussian ministry of education. Women are now admitted to all the university courses except those in law, medicine, technology and architecture. Since 1900 a summer session has been held for six weeks and attended largely by teachers. Teachers and others, under the direction of the Teachers' College, are afforded an opportunity to pursue courses *in absentia* and so meet some of the requirements for an academic degree or a teacher's diploma. All students of good ability are enabled to complete the requirements for the bachelor's degree together with any one of the professional degrees by six years of study at the university. Several courses of lectures designed especially for the public—notably the Hewitt Lectures, in cooperation with Cooper Union—are delivered at different places in the city and at the university.

In 1908 there were in Columbia University in all departments 609 instructors and 4096 students; of these 420 were in Barnard College, 850 were in the Teachers' College, and 229 were in the College of Pharmacy. The numerous University publications include works embodying the results of original research published by the University Press; "Studies" published in the form of a series by each of several departments, various periodicals edited by some members of the faculty, such as the *Columbia University Quarterly*, the *Political Science Quarterly*, and the *School of Mines Quarterly*; and several papers or periodicals published by the students, among which are the *Columbia Spectator*, a daily paper, the *Columbia Law Review*, the *Columbia Monthly* and the *Columbia Jester*.

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With two or three unimportant exceptions the buildings of the university on Morningside Heights have been erected since 1896. They include, besides the several department buildings, a library building, a university hall (with gymnasium), Earl Hall (for social purposes), St Paul's chapel (dedicated in 1907), two residence halls for men, and one for women. The library contains about 450,000 volumes exclusive of duplicates and unbound pamphlets. The highest authority in the government of the institution is vested in a board of twenty-four trustees, vacancies in which are filled by co-optation; but the immediate educational interests are directed largely by the members of the university council, which is composed of the president of the university, the dean and one other representative from the faculty of each school. The institution is maintained by the proceeds from an endowment fund exceeding \$15,000,000, by tuition fees ranging, according to the school, from \$150 to \$250 for each student, and by occasional gifts for particular objects.

The charter (1754) providing for the establishment of King's College was so free from narrow sectarianism as to name ministers of five different denominations for ex-officio governors, and the purpose of the institution as set forth by its first president, Dr Samuel Johnson (1696-1772) was about as broad as that now realised. In 1756 the erection of the first building was begun at the lower end of Manhattan Island, near the Hudson, and the institution prospered from the beginning. From 1776 to 1784, during the War of Independence, the exercises of the college were suspended and the library and apparatus were stored in the New York city hall. In 1784 the name was changed to Columbia College, and an act of the legislature was passed for creating a state university, of which Columbia was to be the basis. But the plan was not a success, and three years later, in 1787, the act was repealed and the administration of Columbia was entrusted to a board of trustees of which the present board is a successor. In 1857 there was an extensive re-organization by which the scope of the institution was much enlarged, and at the same time it was removed to a new site on Madison Avenue between 49th and 50th Streets. From 1890 to 1895 much centralization in its administration was effected, in 1896 the name of Columbia University was adopted, and in the autumn of 1897 the old site and buildings were again abandoned for new, this time on Morningside Heights.

See *A History of Columbia University*, by members of the faculty (New York, 1904); and J. B. Pine, "King's College, now Columbia University," in *Historic New York* (New York, 1897).

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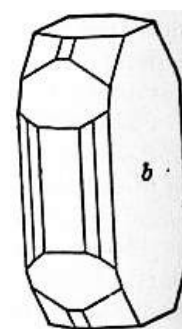
**COLUMBINE** (Ital. *columbina*, from *columba*, a dove), in pantomime (*q.v.*) the fairy-like dancer who is courted by Harlequin. In the medieval Italian popular comedy she was Harlequin's daughter.

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**COLUMBINE**, an erect perennial herbaceous plant known botanically as *Aquilegia vulgaris* (natural order Ranunculaceae). In Med. Latin it was known as *Columbina sc. herba*, the dove's plant. The slender stem bears delicate, long-stalked, deeply divided leaves with blunt segments, and a loose panicle of handsome drooping blue or white flowers, which are characterized by having all the five petals spurred. The plant occurs wild in woods and thickets in England and Ireland, and flowers in early summer. It is well known in cultivation as a favourite spring flower, in many varieties, some of which have red flowers.

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**COLUMBITE**, a rare mineral consisting of iron niobate,  $\text{FeNb}_2\text{O}_6$ , in which the iron and niobium are replaced by varying amounts of manganese and tantalum respectively, the general formula being  $(\text{Fe}, \text{Mn})(\text{Nb}, \text{Ta})_2\text{O}_6$ . It was in this mineral that Charles Hatchett discovered, in 1801, the element niobium, which he himself called columbium after the country (Columbia or America) whence came the specimen in the British Museum collection which he examined. The species has also been called niobite. It crystallizes in the orthorhombic system, and the black, opaque crystals are often very brilliant with a sub-metallic lustre. Twinned crystals are not uncommon, and there is a distinct cleavage parallel to the face marked *b* in the figure. Hardness 6; specific gravity 5.3. With increasing amount of tantalum the specific gravity increases up to 7.3, and members at this end of the series are known as tantalite ( $\text{FeTa}_2\text{O}_6$ ). Specimens in which the iron is largely replaced by manganese are known as manganocolumbite or manganotantalite, according as they contain more niobium or more tantalum. Columbite occurs as crystals and compact masses in granite and pegmatite at Rabenstein in Lower Bavaria, the Ilmen Mountains in the Urals, Haddam in Connecticut, and several other localities in the United States; also in the cryolite of Greenland. Tantalite is from Finland, and it has recently been found in some abundance in the deposits of cassiterite in the tin-field of Greenbushes in the Blackwood district, Western Australia.



Crystal of Columbite.

Dimorphous with columbite and tantalite are the tetragonal minerals tapiolite (= skogbölite) and mossaite, so that the four form an isodimorphous group with the general formula  $(\text{Fe}, \text{Mn})(\text{Nb}, \text{Ta})_2\text{O}_6$ . Mossaite is from a pegmatite vein near Moss in Norway, and tapiolite is from Finland. All these minerals contain tin in small amount.

(L. J. S.)

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**COLUMBIUM**, or NIOBIUM (symbol Cb or Nb, atomic weight 94), one of the metallic elements of the nitrogen group, first detected in 1801 by C. Hatchett in a specimen of columbite (niobite) from Massachusetts (*Phil. Trans.* 1802, 49). It is usually found associated with tantalum, the chief minerals containing these two elements being tantalite, columbite, fergusonite and yttrantalite; it is also a constituent of pyrochlor, euxenite and samarskite. Columbium compounds are usually prepared by fusing columbite with an excess of acid potassium sulphate, boiling out the fused mass with much water, and removing tin and tungsten from the residue by digestion with ammonium sulphide, any iron present being simultaneously converted into ferrous sulphide. The residue is washed, extracted by dilute hydrochloric acid, and again well washed with boiling water. It is then dissolved in



hydrofluoric acid and heated in order to expel silicon fluoride; finally the columbium, tantalum and titanium fluorides are separated by the different solubilities of their double fluorides (C. Marignac, *Ann. chim. et phys.* 1866 [4], 8, p. 63; 1868, 13, p. 28; see also W. Gibbs, *Jahresb.* 1864, p. 685; R. D. Hall and E. F. Smith, *Proc. Amer. Philos. Soc.* 1905, 44, p. 177).

The metal was first obtained by C. W. Blomstrand (*Journ. prak. Chem.* 1866, 97, p. 37) by reducing the chloride with hydrogen; it has more recently been prepared by H. Moissan by reducing the oxide with carbon in the electric furnace (the product obtained always contains from 2-3% of combined carbon), and by H. Goldschmidt and C. Vautin (*Journ. Soc. Chem. Industry*, 1898, 19, p. 543) by reducing the oxide with aluminium powder. As obtained by the reduction of the chloride, it is a steel grey powder of specific gravity 7.06. It burns on heating in air; and is scarcely attacked by hydrochloric or nitric acids, or by *aqua regia*; it is soluble in warm concentrated sulphuric acid.

*Columbium hydride*, CbH, is obtained as a greyish metallic powder, when the double fluoride, CbF<sub>5</sub>, 2KF, is reduced with sodium. It burns when heated in air, and is soluble in warm concentrated sulphuric acid. Three oxides of columbium are certainly known, namely the *dioxide*, Cb<sub>2</sub>O<sub>2</sub>, the *tetroxide*, Cb<sub>2</sub>O<sub>4</sub>, and the *pentoxide*, Cb<sub>2</sub>O<sub>5</sub>, whilst a fourth oxide, *columbium trioxide*, Cb<sub>2</sub>O<sub>3</sub>, has been described by E. F. Smith and P. Maas (*Zeit. f. anorg. Chem.* 1894, 7, p. 97). *Columbium dioxide*, Cb<sub>2</sub>O<sub>2</sub>, is formed when dry potassium columbium oxyfluoride is reduced by sodium (H. Rose, *Pogg. Ann.* 1858, 104, p. 312). It burns readily in air, and is converted into the pentoxide when fused with acid potassium sulphate. *Columbium tetroxide*, Cb<sub>2</sub>O<sub>4</sub> is obtained as a black powder when the pentoxide is heated to a high temperature in a current of hydrogen. It is unattacked by acids. *Columbium pentoxide* (columbic acid), Cb<sub>2</sub>O<sub>5</sub>, is obtained from columbite, after the removal of tantalum (see above). The mother liquors are concentrated, and the double salt of composition 2KF·CbOF<sub>3</sub>·H<sub>2</sub>O, which separates, is decomposed by sulphuric acid, or by continued boiling with water (C. Marignac; see also G. Krüss and L. F. Nilson, *Ber.* 1887, 20, p. 1676). It is a white amorphous infusible powder, which when strongly heated in sulphuretted hydrogen, yields an oxysulphide. Several hydrated forms are known, yielding salts known as *columbates*. A *percolumbic acid*, HCbO<sub>4</sub>·nH<sub>2</sub>O, has been prepared by P. Melikoff and L. Pissarjewsky (*Zeit. f. anorg. Chem.* 1899, 20, p. 341), as a yellow amorphous powder by the action of dilute sulphuric acid on the potassium salt, which is formed when columbic acid is fused in a silver crucible with eight times its weight of caustic potash (*loc. cit.*). Salts of the acid H<sub>3</sub>CbO<sub>8</sub> have been described by C. W. Balke and E. F. Smith (*Jour. Amer. Chem. Soc.* 1908, 30, p. 1637).

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*Columbium trichloride*, CbCl<sub>3</sub>, is obtained in needles or crystalline crusts, when the vapour of the pentachloride is slowly passed through a red-hot tube. When heated in a current of carbon dioxide it forms the oxychloride CbOCl<sub>3</sub>, and carbon monoxide. *Columbium pentachloride*, CbCl<sub>5</sub>, is obtained in yellow needles when a mixture of the pentoxide and sugar charcoal is heated in a current of air-free chlorine. It melts at 194° C. (H. Deville) and boils at 240.5° C. It is decomposed by water, and dissolves in hydrochloric acid. *Columbium oxychloride*, CbOCl<sub>3</sub>, is formed when carbon tetrachloride, and columbic acid are heated together at 440° C.: 3CCl<sub>4</sub> + Cb<sub>2</sub>O<sub>5</sub> = 2CbOCl<sub>3</sub> + 3COCl<sub>2</sub>, and also by distilling the pentachloride, in a current of carbon dioxide, over ignited columbic acid. It forms a white silky mass which volatilizes at about 400° C. It deliquesces in moist air, and is decomposed violently by water. *Columbium pentafluoride*, CbF<sub>5</sub>, is obtained when the pentoxide is dissolved in hydrofluoric acid. It is only known in solution; evaporation of the solution yields the pentoxide. The *oxyfluoride*, CbOF<sub>3</sub>, results when a mixture of the pentoxide and fluorspar is heated in a current of hydrochloric acid. It forms many double salts with other metallic fluorides.

*Columbium oxysulphide*, CbOS<sub>3</sub>, is obtained as a dark bronze coloured powder when the pentoxide is heated to a white heat in a current of carbon bisulphide vapour; or by gently heating the oxychloride in a current of sulphuretted hydrogen. It burns when heated in air, forming the pentoxide and sulphur dioxide.

*Columbium nitride*, Cb<sub>3</sub>N<sub>5</sub> (?), is formed when dry ammonia gas is passed into an ethereal solution of the chloride. A heavy white precipitate, consisting of ammonium chloride and columbium nitride, is thrown down, and the ammonium chloride is removed by washing it out with hot water, when the columbium nitride remains as an amorphous residue (Hall and Smith, *loc. cit.*).

*Potassium fluoxy percolumbate*, K<sub>2</sub>CbO<sub>2</sub>F<sub>5</sub>·H<sub>2</sub>O, is prepared by dissolving potassium columbium oxyfluoride in a 3% solution of hydrogen peroxide. The solution turns yellow in colour, and, when saturated, deposits a pasty mass of crystals. The salt separates from solutions containing hydrofluoric acid in large plates, which are greenish yellow in colour.

The atomic weight was determined by C. Marignac (*Ann. chim. et phys.* 1866 (4), 8, p. 16) to be 94 from the analysis of potassium columbium oxyfluoride, and the same value has been obtained by T. W. Richards (*Journ. Amer. Chem. Soc.* 1898, 20, p. 543).

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**COLUMBUS, CHRISTOPHER** [in Spanish CRISTOBAL COLÓN] (c. 1446, or perhaps rather 1451,-1506) was the eldest son of Domenico Colombo and Suzanna Fontanarossa, and was born at Genoa either about 1446 or in 1451, the exact date being uncertain. His father was a wool-comber, of some small means, who lived till 1498. According to the life of Columbus by his son Ferdinand (a statement supported by Las Casas), young Christopher was sent to the university of Pavia, where he devoted himself to astronomy, geometry and cosmography. Yet, according to the admiral's own statement, he became a sailor at fourteen. Evidently this statement, however, cannot mean the abandonment of all other employment, for in 1470, 1472, and 1473 we find him engaged in trade at Genoa, following the family business of weaving, and (in 1473) residing at the neighbouring Savona. In 1474-1475 he appears to have visited Chios, where he may have resided some time, returning to Genoa perhaps early in 1476. Thence he seems to have again set out on a voyage in the summer of 1476, perhaps bound for England; on the 13th of August 1476, the four Genoese vessels he accompanied were attacked off Cape St Vincent by a privateer, one Guillaume de Casenove, surnamed Coullon or Colombo ("Columbus"); two of the four ships escaped, with Christopher, to Lisbon. In December 1476, the latter resumed their voyage to England, probably carrying with them Columbus, who, after a short stay in England, claims to have made a voyage in the northern seas, and even to have visited Iceland about February 1477. This last pretension is gravely disputed, but it is perhaps not to be rejected, and we may also trace the Genoese about this time at Bristol, at Galway, and probably among the islands west and north of Scotland. Soon after this he returned to Portugal, where (probably in 1478) he married a lady of some rank, Felipa Moñiz de Perestrello, daughter of Bartholomew Perestrello, a captain in the service of Prince Henry the Navigator, and one of the early colonists and first governor of Porto Santo. Felipa was also a cousin of the archbishop of Lisbon at this time (1478).

About 1479 Columbus visited Porto Santo, here as in Portugal probably employing his time in making maps and charts for a livelihood, while he pored over the logs and papers of his deceased father-in-law, and talked with old seamen of their voyages, and of the mystery of the western seas. About this time, too, if not earlier, he seems to have arrived at the conclusion that much of the world remained undiscovered, and step by step conceived that

**Idea of western passage to Asia.**

design of reaching Asia by sailing west which was to result in the discovery of America. In 1474 he is said to have corresponded with Paolo Toscanelli, the Florentine physician and cosmographer, and to have received from him valuable suggestions, both by map and letter, for such a Western enterprise. (The whole of this incident has been disputed by some recent critics.) He had perhaps already begun his studies in a number of works, especially the *Book* of Marco Polo and the *Imago Mundi* of Pierre d'Ailly, by which his cosmographical and geographical conceptions were largely moulded. His views, as finally developed and presented to the courts of Portugal and Spain, were supported by three principal lines of argument, derived from natural reasons, from the theories of geographers, and from the reports and traditions of mariners. He believed the world to be a sphere; he underestimated its size; he overestimated the size of the Asiatic continent. And the farther that continent extended towards the east, the nearer it came towards Spain. Nor were these theories the only supports of his idea. Martin Vicente, a Portuguese pilot, was said to have found, 400 leagues to the westward of Cape St Vincent, and after a westerly gale of many days' duration, a piece of strange wood, wrought, but not with iron; Pedro Correa, Columbus's own brother-in-law, was said to have seen another such waif at Porto Santo, with great canes capable of holding four quarts of wine between joint and joint, and to have heard of two men being washed up at Flores "very broad-faced, and differing in aspect from Christians." West of Europe, now and then, men fancied there hove in sight the mysterious islands of St Brandan, of Brazil, of Antillia or of the Seven Cities. In his northern journey, too, some vague and formless traditions may have reached the explorer's ear of the voyages of Leif Ericson and Thorfinn Karlsefne, and of the coasts of Markland and Vinland. All were hints and rumours to bid the bold mariner sail towards the setting sun, and this he at length determined to do.

The concurrence of some state or sovereign, however, was necessary for the success of this design. Columbus, on the accession of John II. of Portugal, seems to have entered the service of this country, to have accompanied Diego d'Azambuja to the Gold Coast, and to have taken part in the construction of the famous fort of St George at El Mina (1481-1482). On his return from this expedition, he submitted to King John the scheme he had now matured for reaching Asia by a western route across the ocean. The king was deeply interested in the rival scheme (of an eastern or south-eastern route round Africa to India) which had so long held the field, which had been initiated by the Genoese in 1291, and which had been revived, for Portugal, by Prince Henry the Navigator; but he listened to the Genoese, and referred him to a committee of council for geographical affairs. The council's report was adverse; but the king, who was yet inclined to favour the theory of Columbus, assented to the suggestion of the bishop of Ceuta that the plan should be carried out in secret and without its author's knowledge. A caravel was despatched; but it returned after a brief absence, the sailors having lost heart, and refused to venture farther. Upon discovering this treachery, Columbus left Lisbon for Spain (1484), taking with him his son Diego, the only issue of his marriage with Felipa Moñiz, who was by this time dead. He departed secretly;—according to some writers, to give the slip to King John; according to others, to escape his creditors.

**Quest of a patron.**

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Columbus next betook himself to the south of Spain, and while meditating an appeal to the king of France, opened his plans to the count (from 1491, duke) of Medina Celi. The latter gave him great encouragement, entertained him for two years, and even determined to furnish him with three or four caravels, to carry out his great design. Finally, however, being deterred by the consideration that the enterprise was too vast for a subject, he turned his guest from the determination he had come to of making application at the court of France, by writing on his behalf to Queen Isabella; and Columbus repaired to the court at Cordova at her bidding (1486).

It was an ill moment for the navigator's fortune. Castile and Leon were in the thick of that struggle which resulted in the final conquest of the Granada Moors; and neither Ferdinand nor Isabella had time as yet to give due consideration to Columbus' proposals. The adventurer was indeed kindly received; he was handed over to the care of Alonso de Quintanilla, whom he speedily converted into an enthusiastic supporter of his theory. He made many other friends, and among them Beatriz Enriquez, the mother of his second son Fernando. But the committee, presided over by the queen's confessor, Fray Hernando de Talavera, which had been appointed to consider the new project, reported that it was vain and impracticable.

From Cordova Columbus followed the court to Salamanca, having already been introduced by Quintanilla to the notice of the grand cardinal, Pedro Gonzalez de Mendoza, "the third king of Spain"; the latter had befriended and supported the Genoese, and apparently arranged the first interview between him and Queen Isabella. At Salamanca prolonged discussions took place upon the questions now raised; the Dominicans of San Esteban entertained Columbus during the conferences (1486-1487). In 1487 Columbus, who had been following the court from place to place (billeted in towns as an officer of the sovereigns, and gratified from time to time with sums of money towards his expenses), was present at the siege of Malaga. In 1488 he was invited by the king of Portugal, his "especial friend," to return to that country, and was assured of protection against arrest or proceedings of any kind (March 20): he had probably made fresh overtures to King John shortly before; and in the autumn of 1488 we find him in Lisbon, conferring with his brother Bartholomew and laying plans for the future. We have no record of the final negotiations of Columbus with the Portuguese government, but they clearly did not issue in anything definite, for Christopher now returned to Spain (though not till he had witnessed the return of Bartholomew Diaz from the discovery of the Cape of Good Hope and his reception by King John), while Bartholomew proceeded to England with a mission to interest King Henry VII. in the Columbian schemes. If the London enterprise was unsuccessful (as indeed it proved), it was settled that Bartholomew should carry the same invitation to the French court. He did so; and here he remained till summoned to Spain in 1493. Meantime Christopher, unable throughout 1490 to get a hearing at the Spanish court, was in 1491 again referred to a *junta*, presided over by Cardinal Mendoza; but this *junta*, to Columbus' dismay, once more rejected his proposals; the Spanish sovereigns merely promised him that when the Granada war was over, they would reconsider what he had laid before them.

Columbus was now in despair. He at once betook himself to Huelva, a little maritime town in Andalusia, north-west of Cadiz, with the intention of taking ship for France. He halted, however, at the monastery of La Rabida, near Huelva, and still nearer Palos, where he

seems to have made lasting friendships on his first arrival in Spain in January 1485, where he especially enlisted the support of Juan Perez, the guardian, who invited him to take up his quarters in the monastery, and introduced him to Garcia Fernandez, a physician and student of geography. Juan Perez had been the queen's confessor; he now wrote to her in urgent terms, and was summoned to her presence; and money was sent to Columbus to bring him once more to court. He reached Granada in time to witness the surrender of the city (January 2, 1492), and negotiations were resumed. Columbus believed in his mission, and stood out for high terms; he asked for the rank of admiral at once ("Admiral of the Ocean" in all those islands, seas, and continents that he might discover), the vice-royalty of all he should discover, and a tenth of the precious metals discovered within his admiralty. These conditions were rejected, and the negotiations were again interrupted. An interview with Mendoza appears to have followed; but nothing came of it, and before the close of January 1492, Columbus actually set out for France. At length, however, on the entreaty of the Queen's confidante, the Marquesa de Moya, of Luis de Santangel, receiver of the ecclesiastical revenues of the crown of Aragon, and of other courtiers, Isabella was induced to determine on the expedition. A messenger was sent after Columbus, and overtook him near a bridge called "Pinos," 6 m. from Granada. He returned to the camp at Santa Fé; and on the 17th of April 1492, the agreement between him and their Catholic majesties was signed and sealed.

As his aims included not only the discovery of Cipangu or Japan, but also the opening up of intercourse with the grand khan of Cathay, he received a royal letter of introduction to the latter. The town of Palos was ordered to find him two ships, and these were soon placed at his disposal. But no crews could be got together, in spite of the indemnity offered to criminals and "broken men" who would serve on the expedition; and had not Juan Perez succeeded in interesting in the cause the Palos "magnates" Martin Alonso Pinzon and Vicente Yañez Pinzon, Columbus' departure had been long delayed. At last, however, men, ships and stores were ready. The expedition consisted of the "Santa Maria," a decked ship of 100 tons with a crew of 52 men, commanded by the admiral in person; and of two caravels; the "Pinta" of 50 tons, with 18 men, under Martin Pinzon; and the "Nina," of 40 tons, with 18 men, under his brother Vicente Yañez, afterwards (1499) the first to cross the line in the American Atlantic.

The adventurers numbered 88-souls; and on Friday, the 3rd of August 1492, at eight in the morning, the little fleet weighed anchor, and stood for the Canary Islands. An abstract of the admiral's diary made by Las Casas is yet extant; and from it many particulars may be gleaned concerning this first voyage. Three days after the ships had set sail the "Pinta" lost her rudder; the admiral was in some alarm, but comforted himself with the reflection that Martin Pinzon was energetic and ready-witted; they had, however, to put in at Teneriffe, to refit the caravel. On the 6th of September they weighed anchor once more with all haste, Columbus having been informed that three Portuguese caravels were on the look-out to intercept him. On the 13th of September the westerly variations of the magnetic needle were for the first time observed; on the 15th a meteor fell into the sea at four or five leagues distance; soon after they arrived at those vast plains of seaweed called the Sargasso Sea; while all the time, writes the admiral, they had most temperate breezes, the sweetness of the mornings being especially delightful, the weather like an Andalusian April, and only the song of the nightingale wanting. On the 17th the men began to murmur; they were frightened by the strange phenomena of the variation of the compass, but the explanation Columbus gave restored their tranquillity. On the 18th they saw many birds, and a great ridge of low-lying cloud; and they expected to see land. On the 20th they saw boobies and other birds, and were sure the land must be near. In this, however, they were disappointed; and thenceforth Columbus, who was keeping all the while a double reckoning, one for the crew and one for himself, had great difficulty in restraining the evil-disposed from the excesses they meditated. On the 25th Martin Alonso Pinzon raised the cry of land, but it proved false, as did the rumour to the same effect on the 7th of October, from the "Niña." But on the 11th the "Pinta" fished up a cane, a pole, a stick which appeared to have been wrought with iron, and a board, while the "Niña" sighted a branch covered with berries; "and with these signs all of them breathed and were glad." At ten o'clock on that night Columbus himself perceived and pointed out a light ahead, and at two in the morning of Friday, the 12th of October 1492, Rodrigo de Triana, a sailor aboard the "Niña," announced the appearance of what proved to be the New World. The land sighted was an island, called by the Indians Guanahani, and named by Columbus San Salvador. It is generally identified with Watling Island.

The same morning Columbus landed, richly clad, and bearing the royal banner of Spain.

He was accompanied by the brothers Pinzon, bearing banners of the Green Cross (a device of the admiral's), and by great part of the crew. When they all had "given thanks to God, kneeling upon the shore, and kissed the ground with tears of joy, for the great mercy received," the admiral named the island, and took solemn possession of it for their Catholic majesties of Castile and Leon. At the same time such of the crews as had shown themselves doubtful and mutinous sought his pardon weeping, and prostrated themselves at his feet.

Into the remaining detail of this voyage, of highest interest as it is, it is impossible to go further. It will be enough to say that it resulted in the discovery of the islands of Santa Maria de la Concepcion (Rum Cay), Fernandina (Long Island), Isabella (Crooked Island), Cuba or *Juana* (named by Columbus in honour of the young prince of Spain), and Hispaniola, Haiti, or San Domingo. Off the last of these the "Santa Maria" went aground, owing to the carelessness of the steersman. No lives were lost, but the ship had to be unloaded and abandoned; and Columbus, who was anxious to return to Europe with the news of his achievement, resolved to plant a colony on the island, to build a fort out of the material of the stranded hulk, and to leave the crew. The fort was called La Navidad; 44 Europeans were placed in charge. On the 4th of January 1493 Columbus, who had lost sight of Martin Pinzon, set sail alone in the "Niña" for the east; and two days afterwards the "Pinta" joined her sister-ship. A storm, however, separated the vessels, and it was not until the 18th of February that Columbus reached the island of Santa Maria in the Azores. Here he was threatened with capture by the Portuguese governor, who could not for some time be brought to recognize his commission. On the 24th of February, however, he was allowed to proceed, and on the 4th of March the "Niña" dropped anchor off Lisbon. The king of Portugal received the admiral with the highest honours. On the 13th of March the "Niña" put out from the Tagus, and two days afterwards, Friday, the 15th of March, she reached Palos.

The court was at Barcelona; and thither, after despatching a letter announcing his arrival, Columbus proceeded in person. He entered the city in a sort of triumphal procession, was received by their majesties in full court, and, seated in their presence, related the story of his wanderings, exhibiting the "rich and strange" spoils of the new-found lands,—the gold, the cotton, the parrots, the curious arms, the mysterious plants, the unknown birds and beasts, and the Indians he had brought with him for baptism. All his honours and privileges were confirmed to him; the title of Don was conferred on himself and his brothers; he rode at the king's bridle; he was served and saluted as a grandee of Spain. A new and magnificent scutcheon was also blazoned for him (4th May 1493), whereon the royal castle and lion of Castile and Leon were combined with the five anchors of his own coat of arms. Nor were their Catholic highnesses less busy on their own account than on that of their servant. On the 3rd and 4th of May Alexander VI. granted bulls confirming to the crowns of Castile and Leon all the lands discovered, or to be discovered, west of a line of demarcation drawn 100 leagues west of the Azores, on the same terms as those on which the Portuguese held their colonies along the African coast. A new expedition was got in readiness with all possible despatch, to secure and extend the discoveries already made.

After several delays the fleet weighed anchor on the 24th of September 1493 and steered westwards. It consisted of three great carracks (galleons) and fourteen caravels (light frigates), having on board over 1500 men, besides the animals and materials necessary for colonization. Twelve missionaries accompanied the expedition, under the orders of Bernardo Buil or Boil, a Benedictine; Columbus had been already directed (29th May 1493) to endeavour by all means in his power to Christianize the inhabitants of the islands, to make them presents, and to "honour them much", while all under him were commanded to treat them "well and lovingly," under pain of severe punishment. On the 13th of October the ships, which had put in at the Canaries, left Ferro; and on Sunday, the 3rd of November, after a single storm, "by the goodness of God and the wise management of the admiral" an island was sighted to the west, which was named Dominica. Northwards from this the isles of Marigalante and Guadalupe were next discovered and named; while on the north-western course to La Navidad those of Montserrat, Antigua, San Martin, Santa Cruz and the Virgin Islands were sighted, and the island now called Porto Rico was touched at, hurriedly explored, and named San Juan Bautista. On the 22nd of November Columbus came in sight of Hispaniola, and sailing westward to La Navidad, found the fort burned and the colony dispersed. He decided on building a second fort, and coasting on 30 m. east of Monte Cristi, he pitched on a spot where he founded the city of Isabella.

The climate proved unhealthy; the colonists were greedy of gold, impatient of control, proud, ignorant and mutinous; and Columbus, whose inclination drew him westward, was

doubtless glad to escape the worry and anxiety of his post, and to avail himself of the instructions of his sovereigns as to further discoveries. On the 2nd of February 1494 he sent home, by Antonio de Torres, that despatch to their Catholic highnesses by which he may be said to have founded the West Indian slave trade. He established the mining camp of San Tomaso in the gold country of Central Hispaniola; and on the 24th of April 1494, having nominated a council of regency under his brother Diego, and appointed Pedro Margarit his captain-general, he again put to sea. After following the southern shore of Cuba for some days, he steered southwards, and discovered (May 14th) the island of Jamaica, which he named Santiago. He then resumed his exploration of the Cuban coast, threaded his way through a labyrinth of islets which he named the Garden of the Queen (Jardin de la Reyna), and, after coasting westwards for many days, became convinced that he had discovered continental land. He therefore caused Perez de Luna, the notary, to draw up a document to this effect (12th of June 1494), which was afterwards taken round and signed (the admiral's steward witnessing) by the officers, men and boys of his three caravels, the "Niña," the "Cordera," and the "San Juan." He then stood to the south-east, and sighted the island of Evangelista (now Isla de los Pinos), revisited Jamaica, coasted the south of Hispaniola, and on the 24th of September touched at and named the island of La Mona, in the channel between Hispaniola and Porto Rico. Thence he had intended to sail eastwards and complete the survey of the Caribbean Archipelago; but he was exhausted by the terrible tear and wear of mind and body he had undergone (he says himself that on this expedition he was three-and-thirty days almost without sleep), and on the day following his departure from La Mona he fell into a lethargy, that deprived him of sense and memory, and had well-nigh proved fatal to life. At last, on the 29th of September, the little fleet dropped anchor off Isabella, and in his new city the admiral lay sick for five months.

The colony was in a sad plight. Every one was discontented, and many were sick, for the climate was unhealthy and there was nothing to eat. Margarit and Boil had deserted the settlement and fled to Spain, but ere his departure the former, in his capacity of captain-general, had done much to outrage and alienate the Indians. The strongest measures were necessary to undo this mischief, and, backed by his brother Bartholomew, Columbus proceeded to reduce the natives under Spanish sway. Alonso de Ojeda succeeded by a brilliant *coup de main* in capturing the cacique Caonabo, and the rest submitted. Five shiploads of Indians were sent off to Seville (24th June 1495) to be sold as slaves; and a tribute was imposed upon their fellows, which must be looked upon as the origin of that system of *repartimientos* or *encomiendas* which was afterwards to work such mischief among the conquered. In October 1495 Juan Aguado arrived at Isabella, with a royal commission to report on the state of the colony; here he took up the position of a judge of Columbus's government; and much recrimination followed. Columbus decided to return home; he appointed his brother Bartholomew *adelantado* of the island; and on the 10th of March 1496 he quitted Hispaniola in the "Niña." The vessel, after a protracted and perilous voyage, reached Cadiz on the 11th of June 1496, where the admiral landed, wearing the habit of a Franciscan. He was cordially received by his sovereigns, and a new fleet of eight vessels was put at his disposal. By royal patent, moreover, a tract of land in Hispaniola, of 50 leagues by 20, was offered to him, with the title of duke or marquis (which he declined); for three years he was to receive an eighth of the gross and a tenth of the net profits on each voyage; the right of creating a *mayorazgo* or perpetual entail of titles and estates was granted him; and his two sons were received into Isabella's service as pages.

Meanwhile, however, the preparing of the fleet proceeded slowly, and it was not till the 30th of May 1498 that he set sail with his main fleet of six ships—two caravels had already been sent on ahead. From San Lucar he steered for Porto Santo, Madeira, and Gomera, despatching three vessels direct from the Canaries to Hispaniola. He next proceeded to the Cape Verde Islands, which he quitted on the 5th of July. On the 31st of the same month, being greatly in need of water, and fearing that no land lay westwards as he had hoped, Columbus had turned his ship's head north, when Alonzo Perez of Huelva saw land about 15 leagues to the south-west. It was crowned with three hill-tops, from which circumstance, and in fulfilment of a vow made at starting (to name the first land discovered on this voyage in honour of the Trinity), the admiral named it Trinidad, which name it yet bears. On Wednesday, the 1st of August, he beheld for the first time the mainland of South America, the continent he had sought so long. It seemed to him but an insignificant island, and he called it Isla Santa. Sailing westwards, next day he saw the Gulf of Paria (named by him the Golfo de la Ballena), into which he was borne at immense risk on the ridge of waters formed by the meeting of the sea and the Orinoco estuaries. For several days he coasted the continent, esteeming as islands the various projections he saw, and naming them accordingly, nor was it until he had

realized the volume poured out by the Orinoco that he began to perceive the truly continental character of his last discovery. He was now anxious to revisit the colony in Hispaniola; and after sighting Tobago, Grenada, and Margarita, made for San Domingo, the new capital of the settlement, where he arrived on the 31st of August. He found that affairs had not prospered well in his absence. By the vigour and activity of the *adelantado*, the whole island had been reduced under Spanish sway; but under the leadership of Francisco Roldan the discontented settlers had risen in revolt, and Columbus had to compromise matters in order to restore peace. Roldan retained his office of chief justice; and such of his followers as chose to remain in the island were gratified with *repartimientos* of land and labour.

At home, however, court favour had turned against Columbus. For one thing, the ex-colonists were often bitterly hostile to the admiral and his brothers. They were wont to parade their grievances in the very court-yards of the Alhambra, to surround the king when he came forth with complaints and reclamations, to insult the discoverer's young sons with shouts and jeers. Again, the queen began to criticize severely the shipment of Indians from the new-found lands to Spain. And once more, there was no doubt that the colony itself, whatever the cause, had not prospered so well as might have been desired. Ferdinand's support of Columbus had never been very hearty, and his inclination to supersede the Genoese now prevailed over the queen's friendliness. Accordingly, on the 21st of May 1499, Francisco Bobadilla was appointed governor and judge of Hispaniola during royal pleasure, with authority to examine into all complaints. Columbus was ordered to deliver up his charge to Bobadilla, and to accept whatever the latter should deliver him from the sovereigns. Bobadilla left Spain in June 1500, and landed in Hispaniola on the 23rd of August.

Columbus, meanwhile, had restored such tranquillity as was possible in his government. With Roldan's help he had beaten off an attempt on the island of the adventurer Ojeda, his old lieutenant; the Indians were being collected into villages and Christianized. Gold-mining was profitably pursued; in three years, he calculated, the royal revenues might be raised to an average of 60,000,000 reals. The arrival of Bobadilla, however, speedily changed this state of affairs. On landing, he took possession of the admiral's house and summoned him and his brothers before him. Accusations of severity, of injustice, of venality even, were poured down on their heads, and Columbus anticipated nothing less than a shameful death. Bobadilla put all three in irons, and shipped them off to Spain.

Alonso Vallejo, captain of the caravel in which the illustrious prisoners sailed, still retained a proper sense of the honour and respect due to Columbus, and would have removed the fetters; but to this Columbus would not consent. He would wear them, he said, until their highnesses, by whose order they had been affixed, should order their removal; and he would keep them afterwards "as relics and as memorials of the reward of his service." He did so. His son Fernando "saw them always hanging in his cabinet, and he requested that when he died they might be buried with him." Whether this last wish was complied with is not known.

A heart-broken and indignant letter from Columbus to Doña Juana de Torres, formerly nurse of the infante Don Juan, arrived at court before the despatch of Bobadilla. It was read to the queen, and its tidings were confirmed by communications from Alonso Vallejo and the alcaide of Cadiz. There was a great movement of indignation; the tide of popular and royal feeling turned once more in the admiral's favour. He received a large sum to defray his expenses; and when he appeared at court, on the 17th of December 1500, he was no longer in irons and disgrace, but richly apparelled and surrounded with friends. He was received with all honour and distinction. The queen is said to have been moved to tears by the narration of his story. Their majesties not only repudiated Bobadilla's proceedings, but declined to inquire into the charges that he at the same time brought against his prisoners, and promised Columbus compensation for his losses and satisfaction for his wrongs. A new governor, Nicolas de Ovando, was appointed, and left San Lucar on the 13th of February 1502, with a fleet of thirty ships, to supersede Bobadilla. The latter was to be impeached and sent home; the admiral's property was to be restored; and a fresh start was to be made in the conduct of colonial affairs. Thus ended Columbus's history as viceroy and governor of the new Indies which he had presented to the country of his adoption.

His hour of rest, however, was not yet come. Ever anxious to serve their Catholic highnesses, "and particularly the queen," he had determined to find a strait through which he might penetrate westwards into Portuguese Asia. After the usual inevitable delays his prayers were granted, and on the 9th of May 1502, with four caravels and 150 men, he weighed anchor from Cadiz, and sailed on his fourth and last great voyage. He first betook himself to the relief of

#### **Fourth voyage.**

the Portuguese fort of Arzilla, which had been besieged by the Moors, but the siege had been raised before he arrived. He put to sea westwards once more, and on the 15th of June discovered the island of Martinino (probably St Lucia). He had received positive instructions from his sovereigns on no account to touch at Hispaniola; but his largest caravel was greatly in need of repairs, and he had no choice but to abandon her or disobey orders. He preferred the latter alternative, and sent a boat ashore to Ovando, asking for a new ship and for permission to enter the harbour to weather a hurricane which he saw was coming on. But his requests were refused, and he coasted the island, casting anchor under lee of the land. Here he weathered the storm, which drove the other caravels out to sea, and annihilated the homeward-bound fleet, the richest that had till then been sent from Hispaniola. Roldan and Bobadilla perished with others of the admiral's enemies; and Fernando Columbus, who accompanied his father on this voyage, wrote long afterwards, "I am satisfied it was the hand of God, for had they arrived in Spain they had never been punished as their crimes deserved, but rather been favoured and preferred."

After recruiting his flotilla at Azua, Columbus put in at Jaquimo and refitted his four vessels; and on the 14th of July 1502 he steered for Jamaica. For several days the ships wandered painfully among the keys and shoals he had named the Garden of the Queen, and only an opportune easterly wind prevented the crews from open mutiny. The first land sighted (July 30th) was the islet of Guanaja, about 40 m. east of the coast of Honduras. Here he got news from an old Indian of a rich and vast country lying to the eastward, which he at once concluded must be the long-sought-for empire of the grand khan. Steering along the coast of Honduras, great hardships were endured, but nothing approaching his ideal was discovered. On the 12th of September Cape Gracias-a-Dios was rounded. The men had become clamorous and insubordinate; not until the 5th of December, however, would he tack about and retrace his course. It now became his intention to plant a colony on the river Veragua, which was afterwards to give his descendants a title of nobility; but he had hardly put about when he was caught in a storm, which lasted eight days, wrenched and strained his crazy, worm-eaten ships severely, and finally, on Epiphany Sunday 1503, blew him into an embouchure which he named Belem or Bethlehem. Gold was very plentiful in this place, and here he determined to found his settlement. By the end of March 1503 a number of huts had been run up, and in these the *adelantado* (Bartholomew Columbus), with 80 men, was to remain, while Christopher returned to Spain for men and supplies. Quarrels, however, arose with the natives; the cacique was made prisoner, but escaped again; and before Columbus could leave the coast he had to abandon a caravel, to take the settlers on board, and to relinquish the enterprise of colonization. Steering eastwards, he left a second caravel at Puerto Bello; he thence bore northwards for Cuba, where he obtained supplies from the natives. From Cuba he bore up for Jamaica, and there, in the harbour of San Gloria, now St Ann's Bay, he ran his ships aground in a small inlet still called Don Christopher's Cove (June 23rd, 1503).

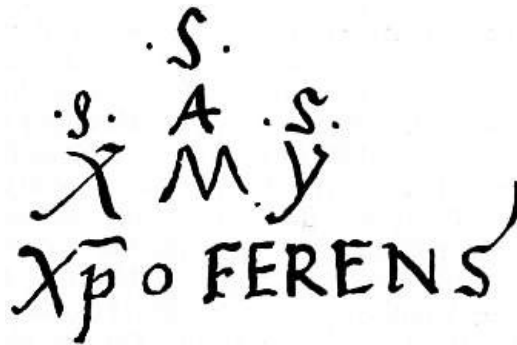
The expedition was received with great kindness by the natives, and here Columbus remained upwards of a year, awaiting the return of his lieutenant Diego Mendez, whom he had despatched to Ovando for assistance. During his critical sojourn here, the admiral suffered much from disease and from the lawlessness of his followers, whose misconduct had alienated the natives, and provoked them to withhold their accustomed supplies, until he dexterously worked upon their superstitions by prognosticating an eclipse. Two vessels having at last arrived for his relief, Columbus left Jamaica on the 28th of June 1504, and, after calling at Hispaniola, set sail for Spain on the 12th of September. After a tempestuous voyage he landed once more at San Lucar on the 7th of November 1504.

As he was too ill to go to court, his son Diego was sent thither in his place, to look after his interests and transact his business. Letter after letter followed the young man from Seville—one by the hands of Amerigo Vespucci. A licence to ride on muleback was granted him on the 23rd of February 1505; and in the following May he was removed to the court at Segovia, and thence again to Valladolid. On the landing of Philip and Juana at Coruña (25th of April 1506), although "much oppressed with the gout and troubled to see himself put by his rights," he is known to have sent off the *adelantado* to pay them his duty and to assure them that he was yet able to do them extraordinary service. The last documentary note of him is contained in a final codicil to the will of 1498, made at Valladolid on the 19th of May 1506. By this the old will is confirmed; the *mayorazgo* is bequeathed to his son Diego and his heirs male, failing these to Fernando, his second son, and failing these to the heirs male of Bartholomew; only in case of the extinction of the male line, direct or collateral, is it to descend to the females of the family; and those into whose hands it may fall are never to diminish it, but always to increase and ennoble it by all means possible. The head of the house is to sign himself "The Admiral." A tenth of the annual income is to be set aside yearly



for distribution among the poor relations of the house. A chapel is founded and endowed for the saying of masses. Beatriz Enriquez is left to the care of the young admiral. Among other legacies is one of "half a mark of silver to a Jew who used to live at the gate of the Jewry, in Lisbon." The codicil was written and signed with the admiral's own hand. Next day (20th of May 1506) he died.

After the funeral ceremonies at Valladolid, Columbus's remains were transferred to the Carthusian monastery of Santa Maria de las Cuevas, Seville, where the bones of his son Diego, the second admiral, were also laid. Exhumed in 1542, the bodies of both father and son were taken over sea to Hispaniola and interred in the cathedral of San Domingo. In 1795-1796, on the cession of that island to the French, the relics were re-exhumed and transferred to the cathedral of Havana, whence, after the Spanish-American War of 1898 and the loss of Cuba, they were finally removed to Seville cathedral, where they remain. The present heir and representative of Columbus belongs to the Larreategui family, descendants of the discoverer through the female line, and retains the titles of admiral and duke of Veragua.



Columbus Cipher.

The interpretation of the seven-lettered cipher, accepting the smaller letters of the second line as the final ones of the words, seems to be *Salve Christus, Maria, Yosephus*. The name *Christopher* (*Christoferens*) appears in the last line.

In person Columbus was tall and shapely. The only authentic portrait of him is that which once belonged to Paulus Jovius, and is still in the possession of the de Orchi family (related to Jovius by female descent) at Como. It shows us a venerable man with clean-shaven face, thin grey hair, high forehead, sad thoughtful eyes. It bears the inscription *Columbus Lygur. novi orbis repertor.*

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