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THE ENCYCLOPÆDIA BRITANNICA

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ELEVENTH EDITION

VOLUME X SLICE IV

Finland to Fleury, André

Articles in This Slice

FINLAND (Finnish, *Suomi* or *Suomenmaa*), a grand-duchy governed subject to its own constitution by the emperor of Russia as grand-duke of Finland. It is situated between the gulfs of Bothnia and Finland, and includes, moreover, a large territory in Lapland. It touches at its south-eastern extremity the government of St Petersburg, includes the northern half of Lake Ladoga, and is separated from the Russian governments of Arkhangelsk and Olonets by a sinuous line which follows, roughly speaking, the water-parting between the rivers flowing into the Baltic Sea and the White Sea. In the north of the Gulf of Bothnia it is separated from Sweden and Norway by a broken line which takes the course of the valley of the Torneå river up to its sources, thus falling only 21 m. short of reaching the head of Norwegian Lyngen-fjord; then it runs south-east and north-east down the Tana and Pasis-joki, but does not reach the Arctic Ocean, and 13 m. from the Varanger-fjord it turns southwards. Finland includes in the south-west the Åland archipelago—its frontier approaching within 8 m. from the Swedish coast—as well as the islands of the Gulf of Finland, Hogland, Tytärs, &c. Its utmost limits are: 59° 48′—70° 6′ N., and 19° 2′—32° 50′ E. The area of Finland, in square miles, is as follows (*Altas de Finlande, 1899*):—

Government.	Continent.	Islands in Lakes.	Islands in Seas.	Lakes.	Total.
Nyland	4,062	24	210	286	4,582
Åbo-Björneborg	7,594	8	1331	400	9,333
Tavastehus	6,837	97	..	1,400	8,334
Viborg	11,630	362	130	4,502	16,624
St Michel	5,652	1018	..	2,149	8,819
Kuopio	13,160	643	..	2,696	16,499
Vasa	14,527	62	203	1,313	16,105
Uleåborg	60,348	171	94	3,344	63,957
Total	123,810	2385	1968	16,090	144,253

Orography.—A line drawn from the head of the Gulf of Bothnia to the eastern coast of Lake Ladoga divides Finland into two distinct parts, the lake region and the nearly uninhabited hilly tracts belonging to the Kjölen mountains, to the plateau of the Kola peninsula, and to the slopes of the plateau which separates Finland proper from the White Sea. At the head-waters of the Torneå, Finland penetrates as a narrow strip into the heart of the highlands of Kjölen (the Keel), where the Haldefjäll (Lappish, Halditjokko) reaches 4115 ft. above the sea, and is surrounded by other *fjälls*, or flat-topped summits, of from 3300 to 3750 ft. of altitude. Extensive plateaus (1500-1750 ft.), into which Lake Enare, or Inari, and the valleys of its tributaries are deeply sunk, and which take the character of a mountain region in the Saariselkä (highest summit, 2360 ft.), occupy the remainder of Lapland. Along the eastern border the dreary plateaus of Olonets reach on Finnish territory altitudes of from 700 to 1000 ft. Quite different is the character of the pentagonal space comprised between the Gulfs of Bothnia and Finland, Lake Ladoga, and the above-mentioned line traced through the lakes Uleå and Piellis. The meridional ridges which formerly used to be traced here along the main water-partings do not exist in reality, and the country appears on the hypsometrical map in the *Atlas de Finlande* as a plateau of 350 ft. of average altitude, covered with countless lakes, lying at altitudes of from 250 to 300 ft. The three main lake-basins of Näsi-järvi, Päjäne and Saima are separated by low and flat hills only; but one sees distinctly appearing on the map a line of flat elevations running south-west to north-east along the north-west border of the lake regions from Lauhanvuori to Kajana, and reaching from 650 to 825 ft. of altitude. A regular gentle slope leads from these hills to the Gulf of Bothnia (Osterbotten), forming vast prairie tracts in its lower parts.

A notable feature of Finland are the *åsar* or narrow ridges of morainic deposits, more or less reassorted on their surfaces. Some of them are relics of the longitudinal moraines of the ice-sheet, and they run north-west to south-east, parallel to the striation of the rocks and to the countless parallel troughs excavated by the ice in the hard rocks in the same direction; while the Lojo ås, which runs from Hangöudd to Vesi-järvi, and is continued farther east under the name of Salpauselliä, parallel to the shore of the Gulf of Finland, are remainders of the frontal moraines, formed at a period when the ice-sheet remained for some time stationary during its retreat. As a rule these forest-clothed *åsar* rise from 30 to 60 and occasionally 120 ft. above the level of the surrounding country, largely adding to the already great picturesqueness of the lake region; railways are traced in preference along them.

Lakes and Rivers.—A labyrinth of lakes, covering 11% of the aggregate territory, and connected by short and rapid streams (*fjärden*), covers the surface of South Finland, offering great facilities for internal navigation, while the connecting streams supply an enormous amount of motive-power. The chief lakes are: Lake Ladoga, of which the northern half belongs to Finland; Saima (three and a half times larger than Lake Leman), whose outlet, the Vuoksen, flows into Lake Ladoga, forming the mighty Imatra rapids, while the lake itself is connected by means of a sluiced canal with the Gulf of Finland; the basins of Pyhä-selkä, Ori-vesi and Piellis-järvi; Päjäne, surrounded by hundreds of smaller lakes, and the waters of which are discharged into the lower gulf through the Kymmene river; Näsi-järvi and Pyhä-järvi, whose outflow is the Kumo-elf, flowing into the Gulf of Bothnia; Uleå-träsk, discharged by the Uleå into the same gulf; and Enare, belonging to the basin of the Arctic Ocean. Two large rivers, Kemi and Torneå, enter the head of the Gulf of Bothnia, while the Uleå is now navigable throughout, owing to improvements in its channel.

Geology.—Cambrian, Silurian, Devonian and Carboniferous deposits are found on the coasts of the Gulf of Finland and Lake Ladoga, and also along the coasts of the Arctic Ocean (probably Devonian), and in the Kjölen. Eruptive rocks of Palaeozoic age are met with in the Kola peninsula (nepheline-syenites) and at Kuusamo (syenite). The remainder of Finland is built up of the oldest known crystalline rocks belonging to the Archaeozoic or Algonkian period. The most ancient of these seem to be the granites of East Finland. The denudation and destruction of the granites gave rise to the *Ladoga schists* and various deposits of the same period, which were subsequently strongly folded. Then the country came once more under the sea, and the debris of the previous formations, mixed with fragments from the volcanoes then situated in West Finland, formed the so-called *Bothnian series*. New masses of granites protruded next from underneath, and the Bothnian deposits underwent foldings in their turn, while denudation was again at work on a grand scale. A new series of *Jatulian deposits* was formed and a new system of foldings followed; but these were the last in this part of the globe. The *Jotnian series*, which were formed next, remain still undisturbed. It is to this series that the well-known Rapakivi granite of Åland, Nystad and Viborg belongs. No marine deposits younger than those just mentioned—all belonging to a pre-Cambrian epoch—are found in the central portion of Finland; and the greater part of the country has probably been dry land since Palaeozoic times. The whole of Finland is covered with Glacial and post-Glacial deposits. The former of these, representing the bottom-moraine of the ice-sheet, are covered with Glacial and post-Glacial clays (partly of lacustrine and partly of marine origin) only in the peripheral coast-region—or in separate areas in the interior depressions. Some Finnish geologists —Sederholm for one—consider it probable that during the Glacial period an Arctic sea (*Yoldia* sea) covered all southern Finland and also Scania (Skåne) in Sweden, thus connecting the Atlantic Ocean with the Baltic and the White Sea by a broad channel; but no fossils from that sea have been found anywhere in Finland. Conclusive proofs, however, of a later submergence under a post-Glacial Littorina sea (containing shells now living in the Baltic) are found up to 150 ft. along the Gulf of Finland, and up to 260, or perhaps 330 ft., in Osterbotten. Traces of a large inner post-Glacial lake, similar to Lake Agassiz of North America, have been discovered. The country is still continuing to rise, but at an unequal rate; of nearly 3.3 ft. in a century in the Gulf of Bothnia (Kvarken), from 1.4 to 2 ft. in the south, and nearly zero in the Baltic provinces.

Climate.—Owing to the prevalence of moist west and south-west winds the climate of Finland is less severe than it is farther east in corresponding latitudes. The country lies thus between the annual isotherms of 41° and 28° Fahr., which run in a W.N.W.-E.S.E. direction. In January the average monthly temperature varies from 9° Fahr. about Lake Enare to 30° along the south coast; while in July the difference between the monthly averages is only eight degrees, being 53° in the north and 61° in the south-east. Everywhere, and especially in the interior, the winter lasts very long, and early frosts (June 12-14 in 1892) often destroy the crops. The amount of rain and snow is from 25½ in. along the south coast to 13.8 in. in the interior of southern Finland.

Flora, *Forests*, *Fauna*.—The flora of Finland has been most minutely explored, especially in the south, and the Finnish botanists were enabled to divide the country into twenty-eight different provinces, giving the numbers of phanerogam species for each province. These numbers vary from 318 to 400 species in Lapland, from 508 to 651 in Karelia, and attain 752 species for Finland proper; while the total for all Finland attains 1132 species. Alpine plants are not met with in Finland proper, but are represented by from 32 to 64 species in the Kola peninsula. The chief forest trees of Finland are the Scotch fir (*Pinus sylvestris*, L.), the fir (*Picea excelsa*, Link.); two species of birch (*B. verrucosa*, Ehrh., and *B. odorata*, Bechst.), as well as the birch-bush (*B. nana*); two species of *Alnus* (*glutinosa* and *incana*); the oak (*Q. pedunculata*, Ehrh.), which grows only on the south coast; the poplar (*Populus tremula*); and the Siberian larch, introduced in culture in the 18th century. Over 6,000,000 trees are cut every year to be floated to thirty large saw-mills, and about 1,000,000 to be transformed into paper pulp. The total export of timber was valued in 1897 at 82,160,000 marks. It is estimated, however, that the domestic use of wood (especially for fuel) represents nearly five times as many cubic feet as the wood used for export in different shapes. The total area under forests is estimated at 63,050,000 acres, of which 34,662,000 acres belong to the state. The fauna has been explored in great detail both as regards the vertebrates and the invertebrates, and specialists will find the necessary bibliographical indications in *Travaux géographiques en Finlande*, published for the London Geographical Congress of 1895.

Population.—The population of Finland, which was 429,912 in 1751, 832,659 in 1800, 1,636,915 in 1850, and 2,520,437 in 1895, was 2,712,562 in 1904, of whom 1,370,480 were women and 1,342,082 men. Of these only 341,602 lived in towns, the remainder in the country districts. The distribution of population in various provinces was as follows:—

1904.	Population.	Density per sq. kilometre.
Åbo-Björneborg.	447,098	20.3
Kuopio	313,951	8.9
Nyland	297,813	29.3
St Michel	189,360	11.1
Tavastehus	301,272	17.7
Uleåborg	280,899	1.9
Viborg	421,610	14.6
Vasa	460,460	12.5
Total	2,712,562	8.6

The number of births in 1904 was 90,253 and the deaths 50,227, showing an excess of births over deaths of 40,026. Emigration was estimated at about three thousand every year before 1898, but it largely increased then owing to Russian encroachments on Finnish autonomy. In 1899 the emigrants numbered 12,357; 10,642 in 1900; 12,659 in 1901; and 10,952 in 1904.

The bulk of the population are Finns (2,352,990 in 1904) and Swedes (349,733). Of Russians there were only 5939, chiefly in the provinces of Viborg and Nyland. Both Finns and Swedes belong to the Lutheran faith, there being only 46,466 members of the Greek Orthodox Church and 755 Roman Catholics.

The leading cities of Finland are: Helsingfors, capital of the grand-duchy and of the province (*län*) of Nyland, principal seaport (111,654 inhabitants); Åbo, capital of the Åbo-Björneborg province and ancient

capital of Finland (42,639); Tammerfors, the leading manufacturing town of the grand-duchy (40,261); Viborg, chief town of province of same name, important seaport (34,672); Uleåborg, capital of province (17,737); Vasa, or Nikolaistad, capital of Vasa län (18,028); Björneborg (16,053); Kuopio, capital of province (13,519); and Tavastehus, capital of province of the same name (5545).

Industries.—Agriculture gives occupation to the large majority of the population, but of late the increase of manufactures has been marked. Dairy-farming is also on the increase, and the foreign exports of butter rose from 1930 cwt. in 1900 to 3130 cwt. in 1905. Measures have been taken since 1892 for the improvement of agriculture, and the state keeps twenty-six agronomists and instructors for that purpose. There are two high schools, one experimental station, twenty-two middle schools and forty-eight lower schools of agriculture, besides ten horticultural schools. Agricultural societies exist in each province.

Fishing is an important item of income. The value of exports of fish, &c., was £140,000 in 1904, but fish was also imported to the value of £61,300. The manufacturing industries (wood-products, metallurgy, machinery, textiles, paper and leather) are of modern development, but the aggregate production approaches one and a half millions sterling in value.

Some gold is obtained in Lapland on the Ivalajoki, but the output, which amounted in 1871 to 56,692 grammes, had fallen in 1904 to 1951 grammes. There is also a small output of silver, copper and iron. The last is obtained partly from mines, but chiefly from the lakes. In 1904 22,050 tons of cast iron were obtained. The textile industries are making rapid progress, and their produce, notwithstanding the high duties, is exported to Russia. The fabrication of paper out of wood is also rapidly growing. As to the timber trade, there are upwards of 500 saw-mills, employing 21,000 men, and with an output valued at over £3,000,000 annually.

Communications.—The roads, attaining an aggregate length of 27,500 m., are kept as a rule in very good order. The first railway was opened in 1862, and the next, from Helsingfors to St Petersburg, in 1870 (cost only £4520 per mile). Railways of a lighter type began to be built since 1877, and now Finland has about 2100 m. of railway, mostly belonging to the state. The gross income from the state railways is 26,607,622, and the net income 4,684,856 marks. Finland has an extensive and well-kept system of canals, of which the sluiced canal connecting Lake Saima with the Gulf of Finland is the chief one. It permits ships navigating the Baltic to penetrate 270 m. inland, and is passed every year by from 4980 to 5200 vessels. Considerable works have also been made to connect the different lakes and lake-basins for inland navigation, a sum of £1,000,000 having been spent for that purpose.

The telegraphs chiefly belong to Russia. Telephones have an enormous extension both in the towns and between the different towns of southern Finland; the cost of the yearly subscription varies from 40 to 60 marks,[1] and is only 10 marks in the smaller towns.

Commerce.—The foreign trade of Finland increases steadily, and reached in 1904 the following values:—

	From or to Russia.	From or to other Countries.	Totals.
Imports	£4,036,000	£6,488,000	£10,524,000
Exports	2,332,000	6,292,000	8,624,000

The chief trade of Finland is with Russia, and next with Great Britain, Germany, Denmark, France and Sweden. The main imports are: cereals and flour (to an annual value exceeding £3,000,000), metals, machinery, textile materials and textile products. The chief articles of export are: timber and wood articles (£5,250,000), paper and paper pulp, some tissues, metallic goods, leather, &c. The chief ports are Helsingfors, Åbo, Viborg, Hangö and Vasa.

Education.—Great strides have been made since 1866, when a new education law was passed. Rudimentary teaching in reading, occasionally writing, and the first principles of Lutheran faith are given in the maternal house, or in "maternal schools," or by ambulatory schools under the control of the clergy, who make the necessary examination in the houses of every parish. All education above that level is in the hands of the educational department and school boards elected in each parish, each rural parish being bound (since 1898) to be divided into a proper number of school districts and to have a school in each of them, the state contributing to these expenses 800 marks a year for each male and 600 marks for each female teacher, or 25% of the total cost in urban communes. Secondary education, formerly instituted on two separate lines, classical and scientific, has been reformed so as to give more prominence to scientific education, even in the classical (linguistic) lyceums or gymnasia. For higher education there is the university of Helsingfors (formerly the Åbo Academy), which in 1906 had 1921 students (328 women) and 141 professors and docents. Besides the Helsingfors polytechnic there are a number of higher and lower technical, commercial and navigation schools. Finland has several scientific societies enjoying a world-wide reputation, as the Finnish Scientific Society, the Society for the Flora and Fauna of Finland, several medical societies, two societies of literature, the Finno-Ugrian Society, the Historical and Archaeological Societies, one juridical, one technical and two geographical societies. All of these, as also the Finnish Geological Survey, the Forestry Administration, &c., issue publications well known to the scientific world. The numerous local branches of the Friends of the Folk-School and the Society for Popular Education display great activity, the former by aiding the smaller communes in establishing schools, and the latter in publishing popular works, starting their own schools as well as free libraries (in nearly every commune), and organizing lectures for the people. The university students take a lively part in this work.

Government and Administration.—From the time of its union with Russia at the Diet of Borgå in 1809 till the events of 1899 (see *History*) Finland was practically a separate state, the emperor of Russia as grand-duke governing by means of a nominated senate and a diet elected on a very narrow franchise, and meeting at distant and irregular intervals. This diet was on the old Swedish model, consisting of representatives of the four estates—nobility, clergy, burghers and peasants—sitting and voting in separate "Houses." The government of the country was practically carried on by the senate, which communicated with St Petersburg through a Finnish secretary attached to the Russian government. War and foreign affairs were entirely in the hands of Russia, and a Russian governor had his residence in Helsingfors. The senate also controlled the

administration of the law. The constitutional conflict of 1899-1905 brought about something like a revolution in Finland. For some years the country was subject to a practically arbitrary form of government, but the disasters of the Russo-Japanese War and the growing anarchy in Russia resulted in 1905 in a complete and peaceful victory for the defenders of the Finnish constitution. As a Finnish writer puts it: “just as the calamities which had befallen Finland came from Russia, so was her deliverance to come from Russia.” The *status quo ante* was restored, the diet met in extraordinary session, and proceeded to the entire recasting of the Finnish government. Freedom of the press was voted, and the diet next proceeded to reform its own constitution. Far-reaching changes were voted. The new diet, instead of being composed of four estates sitting separately, consists of a single chamber of 200 members elected directly by universal suffrage, women being eligible. By the new constitution the grand-duchy was to be divided into not less than twelve and not more than eighteen constituencies, electing members in proportion to population. A scheme of “proportional representation,” the votes being counted in accordance with the system invented by G.M. d’Hondt, a Belgian, was also adopted. The executive was to consist of a minister-secretary of state and of the members of the senate, who were entitled to attend and address the diet and who might be the subject of interpellations. The members of the senate were made responsible to the diet as well as to the emperor-grand-duke for their acts. The diet has power to consider and decide upon measures proposed by the government. After a measure has been approved by the diet it is the duty of the senate to report upon it to the sovereign. But the senate is not obliged to accept the decision of the majority of the diet, nor, apparently, is the sovereign bound to accept the advice of the senate. The first elections, April 1907, resulted in the election to the diet of about 40% representatives of the Social Democratic party, and nineteen women members. The budget of Finland in 1905 was £4,273,970 of “ordinary” revenue. The “ordinary” expenditure was £3,595,300. The public debt amounted at the end of 1905 to £5,611,170.

History.—It was probably at the end of the 7th or the beginning of the 8th century that the Finns took possession of what is now Finland, though it was only when Christianity was introduced, about 1157, that they were brought into contact with civilized Europe. They probably found the Lapps in possession of the country. The early Finlanders do not seem to have had any governmental organization, but to have lived in separate communities and villages independent of each other. Their mythology consisted in the deification of the forces of nature, as “Ukko,” the god of the air, “Tapio,” god of the forests, “Ahti,” the god of water, &c. These early Finlanders seem to have been both brave and troublesome to their neighbours, and their repeated attacks on the coast of Sweden drew the attention of the kings of that country. King Eric IX. (St Eric), accompanied by the bishop of Upsala, Henry (an Englishman, it is said), and at the head of a considerable army, invaded the country in 1157, when the people were conquered and baptized. King Eric left Bishop Henry with his priests and some soldiers behind to confirm the conquest and complete the conversion. After a time he was killed, canonized, and as St Henry became the patron saint of Finland. As Sweden had to attend to her own affairs, Finland was gradually reverting to independence and paganism, when in 1209 another bishop and missionary, Thomas (also an Englishman), arrived and recommenced the work of St Henry. Bishop Thomas nearly succeeded in detaching Finland from Sweden, and forming it into a province subject only to the pope. The famous Birger Jarl undertook a crusade in Finland in 1249, compelling the Tavastians, one of the subdivisions of the Finlanders proper, to accept Christianity, and building a castle at Tavestehus. It was Torkel Knutson who conquered and connected the Karelian Finlanders in 1293, and built the strong castle of Viborg. Almost continuous wars between Russia and Sweden were the result of the conquest of Finland by the latter. In 1323 it was settled that the river Rajajoki should be the boundary between Russia and the Swedish province. After the final conquest of the country by the Swedes, they spread among the Finlanders their civilization, gave them laws, accorded them the same civil rights as belonged to themselves, and introduced agriculture and other beneficial arts. The Reformed religion was introduced into Finland by Gustavus Vasa about 1528, and King John III. raised the country to the dignity of a grand-duchy. It continued to suffer, sometimes deplorably, in most of the wars waged by Sweden, especially with Russia and Denmark. His predecessor having created an order of nobility,—counts, barons and nobles, Gustavus Adolphus in the beginning of the 17th century established the diet of Finland, composed of the four orders of the nobility, clergy, burghers and peasants. Gustavus and his successor did much for Finland by founding schools and gymnasia, building churches, encouraging learning and introducing printing. During the reign of Charles XI. (1692-1696) the country suffered terribly from famine and pestilence; in the diocese of Åbo alone 60,000 persons died in less than nine months. Finland has been visited at different periods since by these scourges; so late as 1848 whole villages were starved during a dreadful famine. Peter the Great cast an envious eye on Finland and tried to wrest it from Sweden; in 1710 he managed to obtain possession of the towns of Kexholm and Villmanstrand; and by 1716 all the country was in his power. Meantime the sufferings of the people had been great; thousands perished in the wars of Charles XII. By the peace of Nystad in 1721 the province of Viborg, the eastern division of Finland, was finally ceded to Russia. But the country had been laid very low by war, pestilence and famine, though it recovered itself with wonderful rapidity. In 1741 the Swedes made an effort to recover the ceded province, but through wretched management suffered disaster, and were compelled to capitulate in August 1742, ceding by the peace of Åbo, next year, the towns of Villmanstrand and Fredrikshamn. Nothing remarkable seems to have occurred till 1788, under Gustavus III., who began to reign in 1771, and who confirmed to Finland those “fundamental laws” which they have succeeded in maintaining against kings and tsars for over two centuries. The country was divided into six governments, a second superior court of justice was founded at Vasa, many new towns were built, commerce flourished, and science and art were encouraged. Latin disappeared as the academic language, and Swedish was adopted. In 1788 war again broke out between Sweden and Russia, and was carried on for two years without much glory or gain to either party, the main aim of Gustavus being to recover the lost Finnish province. In 1808, under Gustavus IV., peace was again broken between the two countries, and the war ended by the cession in 1809 of the whole of Finland and the Åland Islands to Russia. Finland, however, did not enter Russia as a conquered province, but, thanks to the bravery of her people after they had been abandoned by an incompetent monarch and treacherous generals, and not less to the wisdom and generosity of the emperor Alexander I. of Russia, she maintained her free constitution and fundamental laws, and became a semi-independent grand-duchy with the emperor as grand-duke. The estates were summoned to a free diet at Borgå and accepted Alexander as grand-duke of Finland,

he on his part solemnly recognizing the Finnish constitution and undertaking to preserve the religion, laws and liberties of the country. A senate was created and a governor-general named. The province of Viborg was reunited to Finland in 1811, and Åbo remained the capital of the country till 1821, when the civil and military authorities were removed to Helsingfors, and the university in 1827. The diet, which had not met for 56 years, was convoked by Alexander II. at Helsingfors in 1863. Under Alexander II. Finland was on the whole prosperous and progressive, and his statue in the great square in front of the cathedral and the senate house in Helsingfors testifies to the regard in which his memory is cherished by his Finnish subjects. Unfortunately his successor soon fell under the influence of the reactionary party which had begun to assert itself in Russia even before the assassination of Alexander II. One of Alexander III.'s first acts was to confirm "the constitution which was granted to the grand-duchy of Finland by His Majesty the emperor Alexander Pavlovich of most glorious memory, and developed with the consent of the estates of Finland by our dearly beloved father of blessed memory the emperor Alexander Nicolaievich." But the Slavophil movement, with its motto, "one law, one church, one tongue," acquired great influence in official circles, and its aim was, in defiance of the pledges of successive tsars, to subject Finland to Orthodoxy and autocracy. It is unnecessary to follow in detail the seven years' struggle between the Russian bureaucracy and the defenders of the Finnish constitution. Politics in Finland were complicated by the rivalry between the Swedish party, which had hitherto been dominant in Finland, and the Finnish "nationalist" party which, during the latter half of the 19th century, had been determinedly asserting itself linguistically and politically. With some exceptions, however, the whole country united in defence of its constitution; "Fennoman" and "Svecoman," recognizing that their common liberties were at stake, suspended their feud for a season. With the accession of Nicholas II. (see Russia) the constitutional conflict became acute, and the "February manifesto" (February 15th, 1899) virtually abrogated the legislative power of the Finnish diet. A new military law, practically amalgamating the Finnish with the Russian forces, followed in July 1901; Russian officials and the Russian language were forced on Finland wherever possible, and in April 1903 the Russian governor, General Bobrikov, was invested with practically dictatorial powers. The country was flooded with spies, and a special Russian police force was created, the expenses being charged to the Finnish treasury. The Russian system was now in full swing; domiciliary visits, illegal arrests and banishments, and the suppression of newspapers, were the order of the day. To all this the people of Finland opposed a dogged and determined resistance, which culminated in November 1905 in a "national strike." The strike was universal, all classes joining in the movement, and it spread to all the industrial centres and even to the rural districts. The railway, steamship, telephone and postal services were practically suspended. Helsingfors was without tramcars, cabs, gas and electricity; no shops except provision shops were open; public departments, schools and restaurants were closed. After six days the unconstitutional government—already much shaken by events in Russia and Manchuria—capitulated. In an imperial manifesto dated the 7th of November 1905 the demands of Finland were granted, and the *status quo ante* 1899 was restored.

But the reform did not rest here. The old Finnish constitution, although precious to those whose only protection it was, was an antiquated and not very efficient instrument of government. Popular feeling had been excited by the political conflict, advanced tendencies had declared themselves, and when the new diet met it proceeded as explained above to remodel the constitution, on the basis of universal suffrage, with freedom of the press, speech, meeting and association.

In 1908-10 friction with Russia was again renewed. The Imperial government insisted that the decision in all Finnish questions affecting the Empire must rest with them; and a renewed attempt was made to curtail the powers of the Finnish Diet.

Ethnology.—The term Finn has a wider application than Finland, being, with its adjective Finnic or Finno-Ugric (*q.v.*) or Ugro-Finnic, the collective name of the westernmost branch of the Ural-Altaic family, dispersed throughout Finland, Lapland, the Baltic provinces (Esthonia, Livonia, Curland), parts of Russia proper (south of Lake Onega), both banks of middle Volga, Perm, Vologda, West Siberia (between the Ural Mountains and the Yenissei) and Hungary.

Originally nomads (hunters and fishers), all the Finnic people except the Lapps and Ostyaks have long yielded to the influence of civilization, and now everywhere lead settled lives as herdsmen, agriculturists, traders, &c. Physically the Finns (here to be distinguished from the Swedish-speaking population, who retain their Scandinavian qualities) are a strong, hardy race, of low stature, with almost round head, low forehead, flat features, prominent cheek bones, eyes mostly grey and oblique (inclining inwards), short and flat nose, protruding mouth, thick lips, neck very full and strong, so that the occiput seems flat and almost in a straight line with the nape; beard weak and sparse, hair no doubt originally black, but, owing to mixture with other races, now brown, red and even fair; complexion also somewhat brown. The Finns are morally upright, hospitable, faithful and submissive, with a keen sense of personal freedom and independence, but also somewhat stolid, revengeful and indolent. Many of these physical and moral characteristics they have in common with the so-called "Mongolian" race, to which they are no doubt ethnically, if not also linguistically, related.

Considerable researches have been accomplished since about 1850 in the ethnology and archaeology of Finland, on a scale which has no parallel in any other country. The study of the prehistoric population of Finland—Neolithic (no Palaeolithic finds have yet been made)—of the Age of Bronze and the Iron Age has been carried on with great zeal. At the same time the folklore, Finnish and partly Swedish, has been worked out with wonderful completeness (see *L'Œuvre demi-séculaire de la Société de Littérature finnoise et le mouvement national finnois*, by Dr E.G. Palmén, Helsingfors, 1882, and K. Krohn's report to the London Folklore Congress of 1891). The work that was begun by Porthan, Z. Topelius, and especially E. Lönnrot (1802-1884), for collecting the popular poetry of the Finns, was continued by Castrén (1813-1852), Europaeus (1820-1884), and V. Porkka (1854-1889), who extended their researches to the Finns settled in other parts of the Russian empire, and collected a considerable number of variants of the Kalewala and other popular poetry and songs. In order to study the different eastern kinsfolk of the Finns, Sjögren (1792-1855) extended his journeys to North Russia, and Castrén to West and East Siberia (*Nordische Reisen und Forschungen*), and collected the materials which permitted himself and Schiefner to publish grammatical

works relative to the Finnish, Lappish, Zyrian, Tcheremiss, Ostiak, Samoyede, Tungus, Buryat, Karagas, Yenisei-Ostiak and Kott languages. Ahlqvist (1826-1889), and a phalanx of linguists, continued their work among the Vogules, the Mordves and the Obi-Ugrians. And finally, the researches of Aspelin (*Foundations of Finno-Ugrian Archaeology*, in Finnish, and *Atlas of Antiquities*) led the Finnish ethnologists to direct more and more their attention to the basin of the Yenisei and the Upper Selenga. A series of expeditions (of Aspelin, Snellman and Heikel) were consequently directed to those regions, especially since the discovery by Yadrintseff of the remarkable Orkhon inscriptions (see Turks, p. 473), which finally enabled the Danish linguist, V. Thomsen, to decipher these inscriptions, and to discover that they belonged to the Turkish Iron Age. (See *Inscriptions de l'Iénissei recueillies et publiées par la Société Finl. d'Archéologie*, 1889, and *Inscriptions de l'Orkhon*, 1892.)

Authorities.—The general history of Finland is fully treated by Yrjö Koskinen (1869-1873) and M.G. Schybergson (1887-1889). Both works have been translated into German. The constitutional conflict gave rise to a host of books and pamphlets in various languages. Mechelin, Danielson and Hermanson were the leading writers on the Finnish side, and M. Ordin on the Russian. Most of the political documents have been published and translated. A finely illustrated book, *Finland in the Nineteenth Century*, by various Finnish writers, gives an excellent account of the country; also Reuter's *Finlandia*, a very complete work with an exhaustive bibliography. The constitutional question was fully discussed in English in *Finland and the Tsars*, by J.R. Fisher (2nd ed., 1900). *The Atlas de Finlande*, published in 1899 by the Geographical Society of Finland, is a remarkably well executed and complete work. *The Statistical Annual for Finland—Statistisk Arsbok för Finland*—published annually by the Central Statistical Bureau in Helsingfors, gives the necessary figures.

(P. A. K.; J. S. K.; J. R. F.*)

Finnish Literature.

The earliest writer in the Finnish vernacular was Michael Agricola (1506-1557), who published an *A B C Book* in 1544, and, as bishop of Åbo, a number of religious and educational works. A version of the New Testament in Finnish was printed by Agricola in 1548, and some books of the Old Testament in 1552. A complete Finnish Bible was published at Stockholm in 1642. The dominion of the Swedes was very unfavourable to the development of anything like a Finnish literature, the poets of Finland preferring to write in Swedish and so secure a wider audience. It was not until, in 1835, the national epos of Finland, the *Kalewala* (*q.v.*), was introduced to readers by the exertions of Elias Lönnrot (*q.v.*), that the Finnish language was used for literary composition. Lönnrot also collected and edited the works of the peasant-poets P. Korhonen (1775-1840) and Pentti Lyytinen, with an anthology containing the improvisations of eighteen other rustic bards. During the last quarter of the 19th century there was an ever-increasing literary activity in Finland, and it took the form less and less of the publication of Swedish works, but more and more that of examples of the aboriginal vernacular. At the present time, in spite of the political troubles, books in almost every branch of research are found in the language, mainly translations or adaptations. We meet with, during the present century, a considerable number of names of poets and dramatists, no doubt very minor, as also painters, sculptors and musical composers. At the Paris International Exhibition of 1878 several native Finnish painters and sculptors exhibited works which would do credit to any country; and both in the fine and applied arts Finland occupied a position thoroughly creditable. An important contribution to a history of Finnish literature is Krohn's *Suomenkielinen runollisuus ruotsinvallan aikana* (1862). Finland is wonderfully rich in periodicals of all kinds, the publications of the Finnish Societies of Literature and of Sciences and other learned bodies being specially valuable. A great work in the revival of an interest in the Finnish language was done by the *Suomalaisen Kirjallisuuden Seura* (the Finnish Literary Society), which from the year 1841 has published a valuable annual, *Suomi*. The Finnish Literary Society has also published a new edition of the works of the father of Finnish history, Henry Gabriel Porthan (died 1804). A valuable handbook of Finnish history was published at Helsingfors in 1869-1873, by Yrjö Koskinen, and has been translated into both Swedish and German. The author was a Swede, Georg Forsman, the above form being a Finnish translation. Other works on Finnish history and some important works in Finnish geography have also appeared. In language we have Lönnrot's great Finnish-Swedish dictionary, published by the Finnish Literary Society. Dr Otto Donner's *Comparative Dictionary of the Finno-Ugric Languages* (Helsingfors and Leipzig) is in German. In imaginative literature Finland has produced several important writers of the vernacular. Alexis Stenwall ("Kiwi") (1834-1872), the son of a village tailor, was the best poet of his time; he wrote popular dramas and an historical romance, *The Seven Brothers* (1870). Among recent playwrights Mrs Minna Canth (1844-1897) has been the most successful. Other dramatists are E.F. Johnsson (1844-1895), P. Cajander (b. 1846), who translated Shakespeare into Finnish, and Karl Bergbom (b. 1843). Among lyric poets are J.H. Erkko (b. 1849), Arwi Jännes (b. 1848) and Yrjö Weijola (b. 1875). The earliest novelist of Finland, Pietari Päivärinta (b. 1827), was the son of a labourer; he is the author of a grimly realistic story, *His Life*. Many of the popular Finnish authors of our day are peasants. Kauppis Heikki was a wagoner; Alkio Filander a farmer; Heikki Maviläinen a smith; Juhana Kokko (Kyösti) a gamekeeper. The most gifted of the writers of Finland, however, is certainly Juhani Aho (b. 1861), the son of a country clergyman. His earliest writings were studies of modern life, very realistically treated. Aho then went to reside in France, where he made a close study of the methods of the leading French novelists of the newer school. About the year 1893 he began to publish short stories, some of which, such as *Enris*, *The Fortress of Matthias*, *The Old Man of Korpela* and *Finland's Flag*, are delicate works of art, while they reveal to a very interesting degree the temper and ambitions of the contemporary Finnish population. It has been well said that in the writings of Juhani Aho can be traced all the idiosyncrasies which have formed the curious and pathetic history of Finland in recent years. A village priest, Juho Reijonen (b. 1857), in tales of somewhat artless form, has depicted the hardships which poverty too often entails upon the Finn in his country life. Tolstoy has found an imitator in Arwid Järnefelt (b. 1861). Santeri Ingman (b. 1866) somewhat naïvely, but not without skill, has followed in the steps of Aho. It would be an error to exaggerate either the force or the originality of these early developments of a national Finnish literature, which, moreover, are mostly brief and unambitious in character. But they are eminently sincere, and they have the great merit of illustrating the local aspects of

landscape and temperament and manners.

AUTHORITIES.—E.G. Palmén, *L'Œuvre demi-séculaire de la Suomalaisen Kirjallisuuden Seura*, 1831-81 (Helsingfors, 1882); J. Krohn, *Suomalaisen Kirjallisuuden waiheet* (Helsingfors, 1897); F.W. Pipping, *Förteckning öfver böcker på finska språket* (Helsingfors, 1856-1857); E. Brausewetter, *Finland im Bilde seiner Dichtung und seiner Dichter* (Berlin, 1899); C.J. Billson, *Popular Poetry of the Finns* (London, 1900); V. Vasenius, *Öfversigt af Finlands Litteraturhistoria för skolor* (Helsingfors, 1893). For writers using the Swedish language, see SWEDEN: *Literature*.

(E. G.)

1 The Finnish mark, *markka*, of 100 *penni*, equals about 9½ d.

FINLAY, GEORGE (1799-1875), British historian, was born of Scottish parents at Faversham, Kent, on the 21st of December 1799. He studied for the law in Glasgow, and about 1821 went to Göttingen. He had already begun to feel a deep interest in the Greek struggle for independence, and in 1823 he resolved to visit the country. In November he arrived in Cephalonia, where he was kindly received by Lord Byron. Shortly afterwards he landed at Pyrgos, and during the next fourteen months he improved his knowledge of the language, history and antiquities of the country. Though he formed an unfavourable opinion of the Greek leaders, both civil and military, he by no means lost his enthusiasm for their cause. A severe attack of fever, however, combined with other circumstances, induced him to spend the winter of 1824-1825 and the spring of 1825 in Rome, Naples and Sicily. He then returned to Scotland, and, after spending a summer at Castle Toward, Argyllshire, went to Edinburgh, where he passed his examination in civil law at the university, with a view to being called to the Scottish bar. His enthusiasm, however, carried him back to Greece, where he resided almost uninterruptedly till his death. He took part in the unsuccessful operations of Lord Cochrane and Sir Richard Church for the relief of Athens in 1827. When independence had been secured in 1829 he bought a landed estate in Attica, but all his efforts for the introduction of a better system of agriculture ended in failure, and he devoted himself to the literary work which occupied the rest of his life. His first publications were *The Hellenic Kingdom and the Greek Nation* (1836); *Essai sur les principes de banque appliqués à l'état actuel de la Grèce* (Athens, 1836); and *Remarks on the Topography of Oropia and Diacria, with a map* (Athens, 1838). The first instalment of his great historical work appeared in 1844 (2nd ed., 1857) under the title *Greece under the Romans; a Historical View of the Condition of the Greek Nation from the time of its Conquest by the Romans until the Extinction of the Roman Empire in the East*. Meanwhile he had been qualifying himself still further by travel as well as by reading; he undertook several tours to various quarters of the Levant; and as the result of one of them he published a volume *On the Site of the Holy Sepulchre; with a plan of Jerusalem* (1847). *The History of the Byzantine and Greek Empires from 716-1453* was completed in 1854. It was speedily followed by the *History of Greece under the Ottoman and Venetian Domination* (1856), and by the *History of the Greek Revolution* (1861). In weak health, and conscious of failing energy, he spent his last years in revising his history. From 1864 to 1870 he was also correspondent of *The Times* newspaper, his letters to which attracted considerable attention, and, appearing in the Greek newspapers, exercised a distinct influence on Greek politics. He was a member of several learned societies; and in 1854 he received from the university of Edinburgh the honorary degree of LL.D. He died at Athens on the 26th of January 1875. A new edition of his *History*, edited by the Rev. H.F. Tozer, was issued by the Oxford Clarendon press in 1877. It includes a brief but extremely interesting fragment of an autobiography of the author, almost the only authority for his life.

As an historian, Finlay had the merit of entering upon a field of research that had been neglected by English writers, Gibbon alone being a partial exception. As a student, he was laborious; as a scholar he was accurate; as a thinker, he was both acute and profound; and in all that he wrote he was unswerving in his loyalty to the principles of constitutional government and to the cause of liberty and justice.

FINN MAC COOL (in Irish FIND MAC CUMAILL), the central figure of the later heroic cycle of Ireland, commonly called Ossianic or Fenian. In Scotland Find usually goes by the name of Fingal. This appears to be due to a misunderstanding of the title assumed by the Lord of the Isles, Rí Fionnghall, *i.e.* king of the Norse. Find's father, Cumall mac Trénmóir, was uncle to Conn Cétchathach, High King of Ireland, who died in A.D. 157. Cumall carried off Murna Munchaem, the daughter of a Druid named Tadg mac Nuadat, and this led to the battle of Cnucha, in which Cumall was slain by Goll mac Morna (A.D. 174). Find was born after his father's death and was at first called Demni. He is leader of the *fiann* or *féinne* (English "Fenians"), a kind of militia or standing army which was drawn from all quarters of Ireland. His father had held the same office before him, but after his death it passed to his enemy Goll mac Morna, who retained it until Find came to man's estate. Find usually resided at Almu (Allen) in Co. Kildare, where he was surrounded by some of the contingents of the fiann, the rest being scattered throughout Ireland to ward off enemies, particularly those coming from over the sea. In times of invasion Find collected his forces, overcame the foe, and pursued him to Scotland or Lochlann (Scandinavia) as the case might be. When not engaged in war the fiann gave themselves up to the chase or love-adventures. We are informed in great detail as to the conditions of admission to this privileged band, which were at once singular and exacting. The foremost heroes in Find's train were his son Ossian, his grandson Oscar, Cailte mac Ronain, and Diarmait O'Duibne, whose elopement with Find's destined bride Grainne, daughter of the High-King Cormac mac Airt (A.D. 227-266), forms the

subject of a celebrated story. These, like Find, were all of the Ua Baisgne branch, with which was allied the Ua Morna, with whom they were generally at variance. The latter hailed from Connaught, chief among them being Goll and Conan. By the annalists Find is represented as having met with death by treachery either in 252 or 283. Under Coirpre Lifeochair, successor to Cormac mac Airt, the power of the fiann became intolerable. The monarch accordingly took up arms against them and utterly crushed them at the battle of Gabra (A.D. 283). Very few survived the defeat, but the story makes Ossian and Cailte live on until after the arrival of St Patrick in 432.

It is incredible that such a band as the fiann should have existed in the 2nd and 3rd centuries. A number of sagas older in date than the Ossianic stories have been preserved, which deal with events happening in the reigns of Art son of Conn (166-196), Lugaid mac Con (196-227), and Cormac mac Airt (227-266), but none of these in their oldest shape contain any allusion whatsoever to Find and his warriors. In the history of the Boroma, contained in the book of Leinster, Find is merely a Leinster chieftain who assists Bressal the king of Leinster against Coirpre Lifeochair. It can be shown that Find was originally a figure in Leinster-Munster tradition previous to the Viking age, but we have no documentary evidence concerning him at this time. He seems primarily to have been regarded as a poet and magician. Later he appears to have been transformed into a petty chief, and Zimmer even tried to show that his personality was developed in Leinster and Munster local tradition out of stories clustering round the figure of the Viking leader Ketill Hviti (Caittil Find), who was slain in 857. By the year 1000 Find was certainly connected in the minds of the people with the reign of Cormac mac Airt, but the process is obscure. Recently John MacNeill has pointed out that in the oldest genealogies Find is always connected with the Ui Tairrsigh of Failge (Offaley, a district comprising the present county of Kildare and parts of King's and Queen's counties). The Ui Tairrsigh were undoubtedly of Firbolg origin, and MacNeill would account in this manner for the slow acceptance of the stories by the conquering Milesians. Whilst the Ulster epic was fashionable at court, the subject races clung to the Fenian cycle. For the last 800 years Find has been the national hero of the Gaelic-speaking populations of Ireland, the Scottish Highlands and the Isle of Man. See also Celt (subsection *Irish Literature*).

Authorities.—A. Nutt, *Ossian and the Ossianic Literature* (London, 1899); H. Zimmer, "Keltische Beiträge iii.," *Zeitschrift für deutsches Altertum* (1891), vol. xxxv. pp. 1-172; L.C. Stern, "Die Ossianischen Heldenlieder," *Zeitschrift für vergleichende Litteraturgeschichte* (1895; trans, by J.L. Robertson in *Transactions of the Gaelic Society of Inverness*, 1897-1898, vol. xxii. pp. 257-325); J. MacNeill, *Duanaire Finn* (London, 1908).

(E. C. Q.)

FINNO-UGRIAN, or Finno-Ugric, the designation of a division of the Ural-Altaic family of languages and their speakers. The first part is the name given by their neighbours, though not used by themselves, to the inhabitants of the eastern shores of the Baltic. It is probably the same word as the Fenni of Tacitus and Φίννοι of Ptolemy, though it is not certain that those races were Finns in the modern sense. It possibly means people of the fens or marshes, and corresponds to the native word *Suomi*, which appears to be derived from *suo*, a marsh. Finn and Finnish are used not only of the inhabitants of Finland but also in a more extended sense of similar tribes found in Russia and sometimes called Baltic Finns and Volga Finns. In this sense the Esthonian tribes (Baltic), the Laps, the Cheremis and Mordvins (Volga), and the Permian tribes are all Finns. The name is not, however, extended to the Ostiaks, Voguls and Magyars, who, though allied, form a separate subdivision called Ugrian, a name derived from Yura or Ugra, the country on either side of the Ural Mountains, and first used by Castrén in a scientific sense.

The name Finno-Ugric is primarily linguistic and must not be pressed as indicating a community of physical features and customs. But making allowance for the change of language by some tribes, the Finno-Ugrians form, with the striking exception of the Hungarians, a moderately homogeneous whole. They are nomads, but, unlike the Turks, Mongols and Manchus, have hardly ever shown themselves warlike and have no power of political organization. Those of them who have not come under European influence live under the simplest form of patriarchal government, and states, kings or even great chiefs are almost unknown among them.

Their headquarters are in Russia. From the Baltic to south Siberia extends a vast plain broken only by the Urals. Large parts of it are still wooded, and the proportion of forest land and marsh was no doubt much greater formerly. The Finno-Ugric tribes seem to shun the open steppes but are widely spread in the wooded country, especially on the banks of lakes and rivers. Their want of political influence renders them obscure, but they form a considerable element in the population of the northern, middle and eastern provinces of Russia, but are not found much to the south of Moscow (except in the east) or in the west (except in the Baltic provinces). The difference of temperament between the Great Russians and the purer Slavs such as the Little Russians is partly due to an infusion of Finnish blood.

Physically the Finno-Ugric races are as a rule solidly built and, though there is considerable variation in height and the cephalic index, are mostly of small or medium stature, somewhat squat, and brachy- or mesocephalic. As a rule the skin is greyish or olive coloured, the eyes grey or blue, the hair light, the beard scanty. Most of them seem deficient in energy and liveliness, both mental and physical; they are slow, heavy, conservative, somewhat suspicious and vindictive, inclined to be taciturn and melancholy. On the other hand they are patient, persevering, industrious, faithful and honest. When their natural mistrust of strangers is overcome they are kindly and hospitable.

I. *Tribes and Nations.*—The Ugrian subdivision, which seems to be in many respects the more primitive, consists of three peoples standing on very different levels of civilization, the Ostiaks and Voguls and the Hungarians.

Ostiaks.

The *Ostiaks* (Ostyaks or Ostjaks) are a tribe of nomadic fishermen and hunters inhabiting at present the government of Tobolsk and the banks of the Obi. They formerly extended into the government of Perm on the European side of the Ural Mountains. The so-called Ostiaks of the Yenisei appear to be a different race and not to belong to the Finno-Ugrian group. The Ostiaks are still partially pagan and worship the River Obi. Allied to them are the *Voguls*, a similar nomadic tribe found on both sides of the Urals, and formerly extending at least as far as the government of Vologda.

Voguls.

The languages of the Ostiaks and Voguls are allied, though not mere dialects of one another, and form a small group separated from the languages of the Finns both Western and Eastern. For further details of these and other tribes see under the separate headings.

Magyars or Hungarians.

According to the legend, Nimrod had two sons, Hunyor and Magyor. They married daughters of the prince of the Alans and became the ancestors of the two kindred nations, Huns and Magyars or Hungarians. This story corresponds with what can be ascertained scientifically about the origin of these peoples. It is probable that the Huns and Magyars were allied tribes of mixed descent comprising both Turkish and Finno-Ugrian elements. The language is indisputably Finno-Ugrian, but the name Hungarian seems to lead back to the form Un-ugur, and to suggest Turkish connexions which are confirmed by the warlike habits of the Huns and Magyars. The same name possibly occurs in the form Hiung-nu as far east as the frontiers of China, but recent authorities are of opinion that the tribes from whom the present Hungarians are descended were formed originally in the Terek-Kuban country to the north of the Caucasus, where a mixture of Turkish and Ugrian blood took place, a Ugrian language but Turkish mode of life predominating. They were also influenced by Iranians and the various tribes of the Caucasus. Both Huns and Magyars moved westwards, but the Huns invaded Europe in the 5th century and made no permanent settlement in spite of the devastation they caused, whereas the Magyars remained for some centuries near the banks of the Don. According to tradition they were compelled to leave a country called Lebedia under the pressure of nomadic tribes, and moved westward under the leadership of seven dukes. They conquered Hungary in the years 884-895, and the first king of their new dominions was called Árpád. For the chequered and often tragic history of the country see Hungary. The Magyars were converted to Christianity in the 11th century and adhered to the Roman not the Eastern Church. They have in all probability entirely lost their ancient physique, but have retained their language, and traces of their older life may be seen in their fondness for horses and flocks.

Permians and Syryenians.

The following are the principal Finnish peoples. The *Permians* and *Syryenians* may be treated as one tribe. The latter name is very variously spelt as Syrjenian, Sirianian, Zyrjenian, Zirian, &c. They both call themselves Komi and speak a mutually intelligible language, allied to Votiak. The name Bjarmisch is sometimes applied to this sub-group. Both Permians and Syryenians are found chiefly in the governments of Perm, Vologda and Archangel, but there are a few Syryenians on the Siberian side of the Urals. The Syryenian headquarters are at the town of Ishma on the Pechora, whereas the name Permian is more correctly restricted to the inhabitants of the right bank of the upper Kama. Both probably extended much farther to the west in former times. The Syryenians are said to be more intelligent and active than most Finnish tribes and to make considerable journeys for trading purposes. They are possibly a mixed race.

Votiaks.

The *Votiaks* are a tribe of about a quarter of a million persons dwelling chiefly in the south-eastern part of the government of Viatka. Their language indicates that they have borrowed a good deal from the Tatars and Chuvashes, and they seem to have little individuality, being described as weak both mentally and physically. They call themselves Ud-murt or Urt-murt. About the 16th century some of them migrated, doubtless under the pressure of Russian advance, into the government of Ufa and, the country being more fertile, are said to have improved in physique.

Cheremissians.

The *Cheremissians*, or Tcheremissians or Cheremis, who call themselves Mari, inhabit the banks of the Volga, chiefly in the neighbourhood of Kazan. Those inhabiting the right bank of the Volga are physically stronger and are known as Hill Cheremiss. The evidence of place names makes it probable that their present position is the result of their being driven northwards by the Mordvins and then southwards by the Russians. There is some discrepancy between their language and their physical characteristics. The former shows affinities to both Mordvinian and the Permian group, but their crania are said to be mainly dolichocephalic, and it has been suggested that they are connected with the neolithic dolichocephalic population of Lake Ladoga. They are gentle and honest, but neither active nor intelligent.

Mordvinians.

The *Mordvinians*, also called Mordvá, Mordvins and Mordvs, are scattered over the provinces near the middle Volga, especially Nizhniy Novgorod, Kazan, Penza, Tambov, Simbirsk, Ufa and even Orenburg. Though not continuous, their settlements are considerable both in extent and population. They are the most important of the Eastern Finns, and their traditions speak of a capital and of a king who fought with the Tatars. They are mentioned as Mordens as early as the 6th century, but do not now use the name, calling themselves after one of their two divisions, Moksha or Erza. Their country is still covered with forest to a large extent. Their language is on the one side allied to Cheremissian. On the other it shows a nearer approach to Finnish (Suomi) than the other Eastern languages of the family, but it has also constructions peculiar to itself.

Lapps.

The *Lapps* are found in Norway, Sweden and Finland. They call themselves Sabme, but are called Finns by the Norwegians. They are the shortest and most brachycephalic race in Europe. The majority are nomads who live by pasturing reindeer, and are known as Mountain Lapps, but others have become more or less settled and live by hunting or fishing. From ancient times the Lapps have had a great reputation among the Finns and other neighbouring nations for skill in sorcery.

Esthonians.

The *Esthonians* are the peasantry of the Russian province Esthonia and the neighbouring districts. They were serfs until 1817 when they were liberated, but their condition remained unsatisfactory and led to a serious rebellion in 1859. They are practically a branch of the Finns, and are hardly separable from the other Finnish tribes inhabiting the Baltic provinces. The name Est or

Ehst, by which they are known to foreigners, appears to be the same as the Aestii of Tacitus, and to have properly belonged to quite a different tribe. They call themselves Mā mēs, or country people, and their land Rahwama or Wiroma (cf. Finnish, Virolaiset, Esthonians.) Though not superior to other tribes in general intelligence, they have become more civilized owing to their more intimate connexion with the Russian and German population around them.

Livonians.

Livs, *Livlanders* or *Livonians* is the name given to the old Finnish-speaking population of west Livland or Livonia and north Kurland. We hear of them as a warlike and predatory pagan tribe in the middle ages, and it is possible that they were a mixed Letto-Finnish race from the beginning. In modern times they have become almost completely absorbed by Letts, and their language is only spoken in a few places on the coast of Kurland. It has indeed been disputed if it still exists. It is known as Livish or Livonian and is allied to Esthonian.

Votes.

The *Votes* (not to be confounded with the Votiaks), also called southern Chudes and Vatjalaiset, apparently represent the original inhabitants of Ingria, the district round St Petersburg, but have decreased before the advance of the Russians and also of Karelians from the north. They are heard of in the 11th century, but now occupy only about thirty parishes in north-west Ingria.

Vepsas.

The *Vepsas* or *Vepses*, also called Northern Chudes, are another tribe allied to the Esthonians, but are more numerous than the Votes. They are found in the district of Tikhvinsk and other parts of the government of Old Novgorod, and apparently extended farther east into the government of Vologda in former times. Linguistically both the Votes and Vepsas are closely related to the Esthonians.

Finns.

The *Finns* proper or Suomi, as they call themselves, are the most important and civilized division of the group. They inhabit at present the grand duchy of Finland and the adjacent governments, especially Olonetz, Tver and St Petersburg. Formerly a tribe of them called Kainulaiset was also found in Sweden, whence the Swedes call the Finns Qven. At present there are two principal 390 subdivisions of Finns, the Tavastlanders or Hämäläiset, who occupy the southern and western parts of the grand duchy, and the Karelians or Karjalaiset found in the east and north, as far as Lake Onega and towards the White Sea.

The former, and generally speaking, all the inhabitants of the grand duchy have undergone a strong Swedish influence. There is a considerable admixture of Swedish blood; the language is full of Swedish words; Christianity is universal; and the upper classes and townspeople are mainly Swedish in their habits and speech, though of late a persistent attempt has been made to Russify the country. The Finns have much the same mental and moral characteristics as the other allied tribes, but have reached a far higher intellectual and literary stage. Several collections of their popular and mythological poetry have been made, the most celebrated of which is the *Kalewala*, compiled by Lönnrot about 1835, and there is a copious modern literature. The study of the national languages and antiquities is prosecuted in Helsingfors and other towns with much energy: several learned societies have been formed and considerable results published, partly in Finnish. It is clear that this scientific activity, though animated by a patriotic Finnish spirit, owes much to Swedish training in the past. Besides the literary language there are several dialects, the most important of which is that of Savolaks.

Karelians.

The *Karelians* are not usually regarded as separate from the Finns, though they are a distinct tribe as much as the Vepsas and Votes. Living farther east they have come less under Swedish and more under Russian influence than the inhabitants of West Finland; but, since many of the districts which they inhabit are out of the way and neglected, this influence has not been strong, so that they have adopted less of European civilization, and in places preserved their own customs more than the Westerners. They are of a slighter and better proportioned build than the Finns, more enterprising, lively and friendly, but less persevering and tenacious. They number about 260,000, of whom about 63,000 live in Olonetz and 195,000 in Tver and Novgorod, but in the southern districts are less distinguished from the Russian population. They belong to the Russian Church, whereas the Finns of the grand duchy are Protestants. There also appear to be authentic traces of a Karelian population in Kaluga, Yaroslavl, Vladimir, Vologda and Tambov. It was among them that the *Kalewala* was collected, chiefly in East Finland and Olonetz.

Samoyedes.

There is some difference of opinion as to whether the *Samoyedes* should be included among the Finno-Ugrian tribes or be given the rank of a separate division equivalent to Finno-Ugrian and Turkish. The linguistic question is discussed below. The Samoyedes are a nomad tribe who wander with their reindeer over the treeless plains which border on the White and Kara seas on either side of the Urals. In culture and habits they resemble the Finno-Ugrian tribes, and there seems to be no adequate reason for separating them.

Other inclusions.

Various other peoples have been referred to the Finno-Ugrian group, but some doubt must remain as to the propriety of the classification, either because they are now extinct, or because they are suspected of having changed their language.

The original Bulgarians, who had their home on the Volga before they invaded the country which now bears their name, were probably a tribe similar to the Magyars, though all record of their language is lost. It has been disputed whether the Khazars, who in the middle ages occupied parts of south Russia and the shores of the Caspian, were Finno-Ugrians or Turks, and there is the same doubt about the Avars and Pechenegs, which without linguistic evidence remains insoluble. Nor is the difference ethnographically important. The formation of hordes of warlike bodies, half tribes, half armies, composed of different races, was a characteristic of Central Asia, and it was probably often a matter of chance what language was adopted as the common speech.

At the present day the Bashkirs, Meshchers and Tepters, who speak Tatar languages, are thought to be Finnish in origin, as are also the Chuvashes, whose language is Tatar strongly modified by Finnish influence.

The little known Soyots of the head-waters of the Yenisei are also said to be Finno-Ugrians.

The name Chude appears to be properly applied to the Vepsas and Votes but is extended by popular usage in Russia to all Finno-Ugrian tribes, and to all extinct tribes of whatever race who have left tombs, monuments or relics of mining operations in European Russia or Siberia. Some Russian archaeologists use it specifically of the Permian group. But its extension is so vague that it is better to discard it as a scientific term.

II. *Languages.*—The Finno-Ugric languages are generally considered as a division of the Ural-Altaic group, which consists of four families: Turkish, Mongol, Manchu and Finno-Ugric, including Samoyede unless it is reckoned separately as a fifth. The chief character of the group is that agglutination, or the addition of suffixes, is the only method of word-formation, prefixes and significant change of vowels being unknown, as is also gender. This suggests an affinity with many other languages, such as the ancient Accadian or Sumerian, and Japanese. A connexion between the Finno-Ugric and Dravidian languages has also been suggested. On the other hand, the more highly developed agglutinative languages, such as Finnish, approach the inflected Aryan type, so that the Aryan languages may have been developed from an ancestor not unlike the Ural-Altaic group.

The Finno-Ugrian languages are distinguished from the other divisions of the Ural-Altaic group both in grammar and vocabulary. Compared with Mongol and Manchu they have a much greater wealth of forms, both in declension and conjugation; the suffixes form one word with the root and are not wholly or partially detachable postpositions; the pronominal element is freely represented in the suffixes added to both verbs and nouns. These features are also found in the Turkish languages, but Finno-Ugrian has a much greater variety of cases denoting position or motion, and the union of the case termination with the noun is more complete; in some languages the object can be incorporated in the verb, which does not occur in Turkish, but the negative is rarely (Cheremissian) thus incorporated after the Turkish fashion (*e.g. yazmak*, “to write”; *yazmamak*, “not to write”), and in some languages takes pronominal suffixes (Finnish *en tule*, *et tule*, *eivät tule*, “I, you, they do not come”). Vowel-harmony is completely observed in Finnish and Magyar, but in the other languages is imperfectly developed, or has been lost under Russian influence. Relative pronouns and particles exist and are fully developed in some languages. The tendency to form compounds, which is not characteristic of Turkish, is very marked in Finnish and Hungarian, and is said also to be found in Samoyede, Cheremissian and Syryenian. The original order in the sentence seems to be that the governing word follows the word governed, but there are many exceptions to this, particularly in Hungarian where the arrangement is very free.

In vocabulary the pronouns agree fairly well with those of Turkish, Mongol and Manchu, but there is little resemblance between the numbers. Many of the languages contain numerous Tatar and Turkish loan-words, but with this exception the resemblance of vocabulary is not striking and indicates an ancient separation. But the similarity in the process of word-building and of the elements used, even if they have not the same sense, as well as analogies in the general construction of sentences and in some details (*e.g.* the use of the infinitive or verbal substantive), seem to justify the hypothesis of an original relationship with the Turkish languages, which in their turn have connexions with the other groups.

Samoyede is classed by some as a separate group and by some among the Finno-Ugrian languages, but it at any rate displays a far closer resemblance to them in both grammar and vocabulary than do any of the Turkish languages. The numerals are different, but the personal and interrogative pronouns and many common words (*e.g. joha*, “river,” Finn. *joki*; *sava*, “good,” Finn, *hywä*; *kole*, “fish,” Finn, *kala*) show a considerable resemblance. The inflection of nouns is very like that found in Finno-Ugrian but that of the verb differs, verb and noun being imperfectly differentiated. In detail, however, the verbal suffixes show analogies to those of Finno-Ugrian. Vowel-harmony and weakening of consonants occur as in Finnish.

Excluding Samoyede, the Finno-Ugrian languages may be divided into two sections: (1) Ugrian, comprising Ostiak, Vogul and Magyar; and (2) Finnish. The Permian languages (Syryenian, Permian and Votiak) form a distinct group within this latter section, and the remainder may be divided into the Volga group (Cheremissian and Mordvinian) and the West Finnish (Lappish, Esthonian and Finnish proper).

The Ugrian languages appear to have separated from the Finnish branch before the systems of declension or conjugation were developed. Their case suffixes seem to be later formations, though we find, *t*, *tl* or *k* for the plural and traces of *l* as a local suffix. Ostiak and Vogul, like Samoyede, have a dual. Moods and tenses are less numerous but the number of verbal forms is increased by those in which the pronominal object is incorporated. Hungarian has naturally advanced enormously beyond the stage reached by Ostiak and Vogul, and shows marks of strong European influence, but also retains primitive features. Vowel-harmony is observed (*várok*, “I await,” but *verek*, “I strike”). The verb has two sets of terminations, according as it is transitive or intransitive, and the pronominal object is sometimes incorporated. Alone among Finno-Ugrian languages it has developed an article, and the adjective is inflected when used as a predicate though not as an attribute (*Jó emberek*, “good men,” but *Az emberek jók*, “the men are good”). There is great freedom in the order of words and, as in Finnish, a tendency to form long compounds.

The Finnish languages are not divided from the Ugrian by any striking differences, but show greater resemblances to one another in details. None of them have a dual and only Mordvinian an objective conjugation. The case system is elaborate and generally comprises twelve or fifteen forms. The negative conjugation is peculiar; there are negative adjectives ending in *tem* or *tom* and abessive cases (*e.g.* Finnish *syyttä*, without a cause, *tiedotta*, without knowledge).

Permian, Syryenian and Votiak exhibit this common development less fully than the more western languages. They are less completely inflected than the Finnish languages and more thoroughly agglutinative in the strict sense. In vocabulary, *e.g.* the numerals, they show resemblances to the Ugrian division. Syryenian has older literary remains than any Finno-Ugrian language except Hungarian. In the latter part of the 14th century Russian missionaries composed in it various manuals and translations, using a special alphabet for the purpose.

Unlike the Finnish and Esthonian branch, the languages of the Volga Finns (Mordvinian and Cheremissian) have been influenced by Russian and Tatar rather than by Scandinavian, and hence show apparent differences. But Mordvinian has points of detailed resemblance to Finnish which seem to point to a comparatively late separation, *e.g.* the use of *kemen* for ten, *-nza* as the possessive suffix of the third personal pronoun, the regular formation of the imperfect with *i*, the infinitive with *ma*, and the participle with *f* (Finnish *va*). On the other hand it has many peculiarities. It retains an objective conjugation like the Ugrian languages, and has developed two forms of declension, the definite and indefinite.

Cheremissian has affinities to both the Permian languages and Mordvinian. It resembles Syryenian in its case terminations and also in marking the plural by interposing a distinct syllable (Syry. *yas*, Cher. *vlya*) between the singular and the case suffixes. Most of the numerals are like Syryenian but *kändekhsye*, *indekhsye*, for eight and nine, recall Finnish forms (*kahdeksan*, *yhdeksän*), as do also the pronouns.

The connexion between the various West Finnish languages is more obvious than between those already discussed. Lappish (or Lapponic) forms a link between them and Mordvinian. Its pronouns are remarkably like the Mordvinian equivalents, but the general system of declension and conjugation, both positive and negative, is much as in Finnish. Superficially, however, the resemblance is somewhat obscured by the difference in phonetics, for Lappish has an extraordinary fondness for diphthongs and also an unusually ample provision of consonants.

The affinity of Esthonian (together with Votish, Vepsish and Livish) to Finnish is obvious not only to the philologist but to the casual learner. In a few cases it shows older forms than Finnish, but on the whole is less primitive and has assumed under foreign influence the features of a European language even more thoroughly. The vowel-harmony is found only in the Dorpat dialect and there imperfectly, the pronominal affixes are not used, and the negative has become an unvarying particle, though in Vepsish and Votish it takes suffixes as in Finnish. On the other hand, the laws for the change of consonants, the general system of phonetics, the declension, the pronouns and the positive conjugation of the verb all closely resemble Finnish. Esthonian has two chief dialects, those of Reval and Dorpat, and a certain amount of literary culture, the best-known work being the national epic or *Kalewi-poeg*.

Finnish proper is divided into two chief dialects, the Karelian or Eastern, and the Tavastland or Western. The spoken language of the Karelians is corrupt and mixed with Russian, but the *Kalewala* and their other old songs are written in a pure Finnish dialect, which has come to be accepted as the ordinary language of poetry throughout modern Finland, just as the Homeric dialect was used by the Greeks for epic poetry. It is more archaic than the Tavastland dialect and preserves many old forms which have been lost elsewhere, but its utterance is softer and it sometimes rejects consonants which are retained in ordinary speech, *e.g. saa'a, kosen* for *saada, kosken*.

The affinity of Finnish to the more eastern languages of the group is clear, but it has been profoundly influenced by Scandinavian and in its present form consists of non-Aryan material recast in an Aryan and European mould. Not only are some of the simplest words borrowed from Scandinavian, but the grammar has been radically modified. Un-Aryan peculiarities have been rejected, though perhaps less than in Esthonian. The various forms of nouns and verbs are not merely roots with a string of obvious suffixes attached, but the termination forms a whole with the root as in Greek and Latin inflections; the adjective is declined and compared and agrees with its substantive; compound tenses are formed with the aid of the auxiliary verb, and there is a full supply of relative pronouns and particles.

Finnish and Hungarian together with Turkish are interesting examples of non-Aryan languages trying to participate, by both translation and imitation, in the literary life of Europe, but it may be doubted if the experiment is successful. The sense of effort is felt less in Hungarian than in the other languages; though they are admirable instruments for terse conversation or popular poetry, there appears to be some deep-seated difference in the force of the verb and the structure of phrases which renders them clumsy and complicated when they attempt to express sentences of the type common in European literature.

III. *Civilization and Religion*.—The Finno-Ugric tribes have not been equally progressive; some, such as the Finns and Magyars, have adopted, at least in towns, the ordinary civilization of Europe; others are agriculturists; others still nomadic. The wilder tribes, such as the Ostiaks, Voguls and Lapps, mostly consist of one section which is nomadic and another which is settling down. The following notes apply to traces of ancient conditions which survive sporadically but are nowhere universal. Few except the Hungarians have shown themselves warlike, though we read of conflicts with the Russians in the middle ages as they advanced among this older population. But most Finno-Ugrians are astute and persevering hunters, and the Ostiaks still shoot game with a bow. The tribes are divided into numerous small clans which are exogamous. Marriage by capture is said to survive among the Cheremiss, who are still polygamous in some districts, but purchase of the bride is the more general form. Women are treated as servants and often excluded from pagan religious ceremonies. The most primitive form of house consists of poles inclined towards one another and covered with skins or sods, so as to form a circular screen round a fire; winter houses are partly underground. Long snow-shoes are used in winter and boats are largely employed in summer. The Finns in particular are very good seamen. The Ostiaks and Samoyedes still cast tin ornaments in wooden moulds. The variation of the higher numerals in the different languages, which are sometimes obvious loan words, shows that the original system did not extend beyond seven, and the aptitude for calculating and trading is not great. Several thousands of the Ostiaks, Voguls and Cheremiss are still unbaptized, and much paganism lingers among the nominal Christians, and in poetry such as the *Kalewala*. The deities are chiefly nature spirits and the importance of the several gods varies as the tribes are hunters, fishermen, &c. Sun or sky worship is found among the Samoyedes and *Jumala*, the Finnish word for god, seems originally to mean sky. The Ostiaks worship a water-spirit of the river Obi and also a thunder-god. We hear of a forest-god among the Finns, Lapps and Cheremiss. There are also clan gods worshipped by each clan with special ceremonies. Traces of ancestor-worship are also found. The Samoyedes and Ostiaks are said to sacrifice to ghosts, and the Ostiaks to make images of the more important dead, which are tended and honoured, as if alive, for some years. Images are found in the tombs and barrows of most tribes, and the Samoyedes, Ostiaks and

Voguls still use idols, generally of wood. Animal sacrifices are offered, and the lips of the idol sometimes smeared with blood. Quaint combinations of Christianity and paganism occur; thus the Cheremiss are said to sacrifice to the Virgin Mary. The idea that disease is due to possession by an evil spirit, and can be both caused and cured by spells, seems to prevail among all tribes, and in general extraordinary power is supposed to reside in incantations and magical formulae. This belief is conspicuous in the *Kalewala*, and almost every tribe has its own collection of prayers, healing charms and spells to be used on the most varied occasions. A knowledge of these formulae is possessed by wizards (Finnish noita) corresponding to the Shamans of the Altaic peoples. They are exorcists and also mediums who can ascertain the will of the gods; a magic drum plays a great part in their invocations, and their office is generally hereditary. The non-Buddhist elements of Chinese and Japanese religion present the same features as are found among the Finno-Ugrians —nature-worship, ancestor-worship and exorcism—but in a much more elaborate and developed form.

IV. *History.*—Most of the Finno-Ugrian tribes have no history or written records, and little in the way of traditions of their past. In their later period the Hungarians and Finns enter to some extent the course of ordinary European history. For the earlier period we have no positive information, but the labours of investigators, especially in Finland, have collected a great number of archaeological and philological data from which an account of the ancient wanderings of these tribes may be constructed. Barrows containing skulls and ornaments may mark the advance of a special form of culture, and language may be of assistance; if we find, for instance, a language with loan words of an archaic type, we may conclude that it was in contact with the other language from which it borrowed at the time when such forms were current. But clearly all such deductions contain a large element of theory, and the following sketch is given with all reserve.

The Finno-Ugrian tribes originally lived together east of the Urals and spoke a common language. It is not certain if they were all of the same physical type, for the association of different races speaking one language is common in central Asia. They were hunters and fishermen, not agriculturists. At an unknown period the Finns, still undivided, moved into Europe and perhaps settled on the Volga and Oka. They had perhaps arrived there before 1500 B.C., learned some rudiments of agriculture, and developed their system of numbers up to ten. They were still in the neolithic stage. About 600 B.C. they came in contact with an Iranian people, from whom they learned the use of metals, and borrowed numerals for a hundred (Finnish *sata*, Ostiak *sät*, Magyar *szaz*; cf. Zend *sata*) and a thousand (Magyar *ezer*; cf. *hazaṅra* and *hazar*). Magyar and some other languages also borrowed a word for ten (*tíz*, cf. *das*). This Iranian race may perhaps have been the Scythians, who are believed by many authorities to have been Iranians and to be represented by the Osetians of the Caucasus. There was probably a trade route up the Volga in the 4th century B.C. About that time the Western Finns must have broken away from the Mordvinians and wandered north-westwards. At a period not much later than the Christian era, they must have come in contact with Letto-Lithuanian peoples in the Baltic provinces, and also with Scandinavians. Whether they came in contact with the latter first in the Baltic provinces or in Finland itself is disputed, as there may have been Scandinavians in the Baltic provinces. But the distribution of tombs and barrows seems to indicate that they entered Finland not from the east through Karelia but from the Baltic provinces by sea to Satakunta and the south-east coast, whence they extended eastwards. From both Lithuanians and Scandinavians they borrowed an enormous quantity of culture-words and probably the ideas and materials they indicate. Thus the Finnish words for gold, king and everything concerned with government are of Scandinavian origin. Their migration to Finland was probably complete about A.D. 800. Meanwhile the Slav tribes known later as Russians were coming up from the south and pressed the Finns northwards, overwhelming but not annihilating them in the country between St Petersburg and Moscow. The same movement tended to drive the Eastern Finns and Ugrians backwards towards the east. The Finns know the Russians by the name of *Venäjä*, or Wends, and as this name is not used by Slavs themselves but by Scandinavians and Teutons, it seems clear that they arrived among the Finns as greater strangers than the Scandinavians and known by a foreign name. Christianity was perhaps first preached to the Finns as early as A.D. 1000, but there was a long political and religious struggle with the Swedes. At the end of the 13th century Finland was definitely converted and annexed to Sweden, remaining a dependency of that country until 1809, when it was ceded to Russia.

The Ugrians and Eastern Finns took no part in the westward movement and did not fall under western influences but came into contact with Tatar tribes and were more or less Tatarized. In some cases this took the form of the adoption of a Tatar language, in others (Mordvin, Cheremis and Votiak) a large number of Tatar words were borrowed. We also know that there were considerable settlements of these tribes, perhaps amounting to states, on the Volga and in south-eastern Russia. Such was Great Bulgaria, which continued until destroyed by the Mongols in 1238. The pressure of tribes farther east acting on these settlements dislodged sections of them from time to time and created the series of invasions which devastated the East Roman empire from the 5th century onwards. But we do not know what were the languages spoken by the Huns, Bulgarians, Pechenegs and Avars, so that we cannot say whether they were Turks, Finns or Ugrians, nor does it follow that a horde speaking a Ugrian language were necessarily Ugrians by race. An inspection of the performances of the various tribes, as far as we can distinguish them, suggests that the Turks or Tatars were the warlike element. The names Hun and Hungarian may possibly be the same as Hiung-nu, but we cannot assume that this tribe passed across Asia unchanged in language and physique. The Hungarians entered on their present phase at the end of the 9th century of this era, when they crossed the Carpathians and conquered the old Pannonia and Dacia. For half a century or so before this invasion they are said to have inhabited Atelkuzu, probably a district between the Dnieper and the Danube. The isolated groups of Hungarians now found in Transylvania and called Szeklers are considered the purest descendants of the invading Magyars. Those who settled in the plains of Hungary probably mingled there with remnants of Huns, Avars and earlier invaders, and also with subsequent invaders, such as Pechenegs and Kumans.

BIBLIOGRAPHY.—Among the older writers may be mentioned Strahlenberg (*Das nord- und östliche Theil von Europa und Asia*, 1730), Johann Gottlieb Georgi (*Description de toutes les nations de l'empire de la Russie*, French tr., St Petersburg, 1777); but especially the various works of Matthias A. Castrén (1852-1853) and W. Schott (1858). Modern scientific knowledge of the Finno-Ugrians and their languages was founded by these two authors. Among newer works some of the most important separate publications are: J.R. Aspelin,

Antiquités du nord finno-ougrien (1877-1884); J. Abercromby, *Pre- and Proto-historic Finns* (1898); and A. Hackmann, *Die ältere Eisenzeit in Finnland* (1905).

The recent literature on the origin, customs, antiquities and languages of these races is voluminous, but is contained chiefly not in separate books but in special learned periodicals. Of these there are several: *Journal de la Société Finno-ougrienne* (Helsingfors) (*Suomalais-Ugrilaisen Seuran Aikakauskirja*); *Finnisch-Ugrische Forschungen* (Helsingfors and Leipzig); *Mitteilungen der archäologischen, historischen und ethnographischen Gesellschaft der Kais. Universität zu Kasan; Keleti Szemle or Revue orientale pour les études ouralo-altaïques* (Budapest). In all of these will be found numerous valuable articles by such authors as Ahlqvist, Halévy, Heikel, Krohn, Muncácsi, Paasonen, Setälä, Smurnow, Thomsen and Vambéry.

The titles of grammars and dictionaries will be found under the headings of the different languages. For general linguistic questions may be consulted the works of Castrén, Schott and Otto Donner, also such parts of the following as treat of Finno-Ugric languages: Byrne, *Principles of the Structure of Language*, vol. i. (1892); Friedrich Müller, *Grundriss der Sprachwissenschaft II.*, Band ii., Abth. 1882; Steinthal and Misleli, *Abriss der Sprachwissenschaft* (1893).

(C. EL.)

FINSBURY, a central metropolitan borough of London, England, bounded N. by Islington, E. by Shoreditch, S. by the city of London and W. by Holborn and St Pancras. Pop. (1901) 101,463. The principal thoroughfares are Pentonville Road, from King's Cross east to the Angel, Islington, continuing E. and S. in City Road and S. again to the City in Moorgate Street; Clerkenwell Road and Old Street, crossing the centre from W. to E., King's Cross Road running S.E. into Farringdon Road, and so to the City; St John Street and Road and Goswell Road (the residence of Dickens' Pickwick) running S. from the Angel towards the City; and Rosebery Avenue running S.W. from St John Street into Holborn. The commercial character of the City extends into the southern part of the borough; the residential houses are mostly those of artisans. Local industries include working in precious metals, watch-making, printing and paper-making.

An early form of the name is Vynesbury, but the derivation is not known. The place was supposed by some to take name from an extensive fen, a part of which, commonly known as Moorfields (cf. Moorgate Street), was drained in the 16th century and subsequently laid out as public grounds. It was a frequent resort of Pepys, who mentions its houses of entertainment and the wrestling and other pastimes carried on, also that it furnished a refuge for many of those whose houses were destroyed in the fire of London in 1666. Bookstalls and other booths were numerous at a somewhat later date. The borough includes the parish of Clerkenwell (*q.v.*), a locality of considerable historic interest, including the former priory of St John, Clerkenwell, of which the gateway and other traces remain. Among several other sites and buildings of historical interest the Charterhouse (*q.v.*) west of Aldersgate Street, stands first, originally a Carthusian monastery, subsequently a hospital and a school out of which grew the famous public school at Godalming. Bunhill Fields, City Road, was used by the Dissenters as a burial-place from the middle of the 17th century until 1832. Among eminent persons interred here are John Bunyan, Daniel Defoe, Susanna, mother of John and Charles Wesley, and George Fox, founder of the Society of Friends. A neighbouring chapel is intimately associated with the Wesleys, and the house of John Wesley is opened as a museum bearing his name. Many victims of the plague were buried in a pit neighbouring to these fields, near the junction of Goswell Road and Old Street. To the south of the fields lies the Artillery Ground, the training ground of the Honourable Artillery Company, so occupied since 1641, with barracks and armoury. Sadler's Wells theatre, Rosebery Avenue, dating as a place of entertainment from 1683, preserves the name of a fashionable medicinal spring, music room and theatre, the last most notable in its connexion with the names of Joseph Grimaldi the clown and Samuel Phelps. Other institutions are the technical college, Leonard Street, and St Mark's, St Luke's and the Royal chest hospitals. At Mount Pleasant is the parcels department of the general post office, and at Clerkenwell Green the sessions house for the county of London (north side of the Thames). Adjacent to Rosebery Avenue are reservoirs of the New River Head. The municipal borough coincides with the east and central divisions of the parliamentary borough of Finsbury, each returning one member. The borough council consists of a mayor, 9 aldermen and 54 councillors. Area, 589.1 acres.

FINSTERWALDE, a town of Germany, in the kingdom of Prussia, on the Schackebach, a tributary of the Little Elster, 28 m. W.S.W. of Cottbus by rail. Pop. (1905) 10,726. The town has a Gothic church (1581), a château, schools, cloth and cigar factories, iron-foundries, flour and saw mills and factories for machine building. The town, which is first mentioned in 1288, came into the possession of electoral Saxony in 1635 and of Prussia in 1815.

FIORENZO DI LORENZO (*c.* 1440-1522), Italian painter, of the Umbrian school, lived and worked at Perugia, where most of his authentic works are still preserved in the Pinacoteca. There is probably no other Italian master of importance of whose life and work so little is known. In fact the whole edifice that modern

scientific criticism has built around his name is based on a single signed and dated picture (1487) in the Pinacoteca of Perugia—a niche with lunette, two wings and predella—and on the documentary evidence that he was decemvir of that city in 1472, in which year he entered into a contract to paint an altarpiece for Santa Maria Nuova—the pentatych of the “Madonna and Saints” now in the Pinacoteca. Of his birth and death and pupilage nothing is known, and Vasari does not even mention Fiorenzo’s name, though he probably refers to him when he says that Cristofano, Perugino’s father, sent his son to be the shop drudge of a painter in Perugia, “who was not particularly distinguished in his calling, but held the art in great veneration and highly honoured the men who excelled therein.” Certain it is that the early works both of Perugino and of Pinturicchio show certain mannerisms which point towards Fiorenzo’s influence, if not to his direct teaching. The list of some fifty pictures which modern critics have ascribed to Fiorenzo includes works of such widely varied character that one can hardly be surprised to find great divergence of opinion as regards the masters under whom Fiorenzo is supposed to have studied. Pisanello, Verrocchio, Benozzo Gozzoli, Antonio Pollaiuolo, Benedetto Bonfigli, Mantegna, Squarcione, Filippo Lippi, Signorelli and Ghirlandajo have all been credited with this distinguished pupil, who was the most typical Umbrian painter that stands between the primitives and Perugino; but the probability is that he studied under Bonfigli and was indirectly influenced by Gozzoli. Fiorenzo’s authentic works are remarkable for their sense of space and for the expression of that peculiar clear, soft atmosphere which is so marked a feature in the work of Perugino. But Fiorenzo has an intensity of feeling and a power of expressing character which are far removed from the somewhat affected grace of Perugino. Of the forty-five pictures bearing Fiorenzo’s name in the Pinacoteca of Perugia, the eight charming St Bernardino panels are so different from his well-authenticated works, so Florentine in conception and movement, that the Perugian’s authorship is very questionable. On the other hand the beautiful “Nativity,” the “Adoration of the Magi,” and the “Adoration of the Shepherds” in the same gallery, may be accepted as the work of his hand, as also the fresco of SS. Romano and Rocco at the church of S. Francesco at Deruta. The London National Gallery, the Berlin and the Frankfort museums contain each a “Madonna and Child” ascribed to the master, but the attribution is in each case open to doubt.

See Jean Carlyle Graham, *The Problem of Fiorenzo di Lorenzo* (Perugia, 1903); Edward Hutton, *The Cities of Umbria* (London).

(P. G. K.)

FIORENZUOLA D’ARDA, a town of Emilia, Italy, in the province of Piacenza, from which it is 14 m. S.E. by rail, 270 ft. above sea-level. Pop. (1901) 7792. It is traversed by the Via Aemilia, and has a picturesque piazza with an old tower in the centre. The Palazzo Grossi also is a fine building. Alseno lies 4 m. to the S.E., and near it is the Cistercian abbey of Chiaravalle della Colomba, with a fine Gothic church and a large and beautiful cloister (in brick and Verona marble), of the 12th-14th century.

FIORILLO, JOHANN DOMINICUS (1748-1821), German painter and historian of art, was born at Hamburg on the 13th of October 1748. He received his first instructions in art at an academy of painting at Bayreuth; and in 1761, to continue his studies, he went first to Rome, and next to Bologna, where he distinguished himself sufficiently to attain in 1769 admission to the academy. Returning soon after to Germany, he obtained the appointment of historical painter to the court of Brunswick. In 1781 he removed to Göttingen, occupied himself as a drawing-master, and was named in 1784 keeper of the collection of prints at the university library. He was appointed professor extraordinary in the philosophical faculty in 1799, and ordinary professor in 1813. During this period he had made himself known as a writer by the publication of his *Geschichte der zeichnenden Künste*, in 5 vols. (1798-1808). This was followed in 1815 to 1820 by the *Geschichte der zeichnenden Künste in Deutschland und den vereinigten Niederlanden*, in 4 vols. These works, though not attaining to any high mark of literary excellence, are esteemed for the information collected in them, especially on the subject of art in the later middle ages. Fiorillo practised his art almost till his death, but has left no memorable masterpiece. The most noticeable of his painting is perhaps the “Surrender of Briseis.” He died at Göttingen on the 10th of September 1821.

FIR, the Scandinavian name originally given to the Scotch pine (*Pinus sylvestris*), but at present not infrequently employed as a general term for the whole of the true conifers (*Abielineae*); in a more exact sense, it has been transferred to the “spruce” and “silver firs,” the genera *Picea* and *Abies* of most modern botanists.

The firs are distinguished from the pines and larches by having their needle-like leaves placed singly on the shoots, instead of growing in clusters from a sheath on a dwarf branch. Their cones are composed of thin, rounded, closely imbricated scales, each with a more or less conspicuous bract springing from the base. The trees have usually a straight trunk, and a tendency to a conical or pyramidal growth, throwing out each year a more or less regular whorl of branches from the foot of the leading shoot, while the buds of the lateral

boughs extend horizontally.

In the spruce firs (*Picea*), the cones are pendent when mature and their scales persistent; the leaves are arranged all round the shoots, though the lower ones are sometimes directed laterally. In the genus *Abies*, the silver firs, the cones are erect, and their scales drop off when the seed ripens; the leaves spread in distinct rows on each side of the shoot.

The most important of the firs, in an economic sense, is the Norway spruce (*Picea excelsa*), so well known in British plantations, though rarely attaining there the gigantic height and grandeur of form it often displays in its native woods. Under favourable conditions of growth it is a lofty tree, with a nearly straight, tapering trunk, throwing out in somewhat irregular whorls its widespreading branches, densely clothed with dark, clear green foliage. The boughs and their side-branches, as they increase in length, have a tendency to droop, the lower tier, even in large trees, often sweeping the ground—a habit that, with the jagged sprays, and broad, shadowy, wave-like foliage-masses, gives a peculiarly graceful and picturesque aspect to the Norway spruce. The slender, sharp, slightly curved leaves are scattered thickly around the shoots; the upper one pressed towards the stem, and the lower directed sideways, so as to give a somewhat flattened appearance to the individual sprays. The elongated cylindrical cones grow chiefly at the ends of the upper branches; they are purplish at first, but become afterwards green, and eventually light brown; their scales are slightly toothed at the extremity; they ripen in the autumn, but seldom discharge their seeds until the following spring.

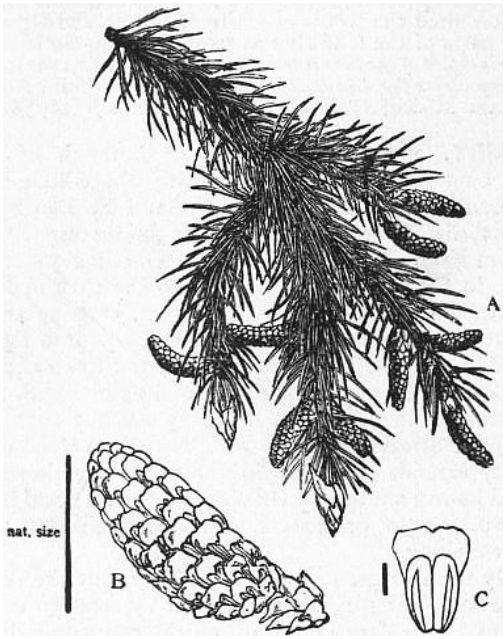
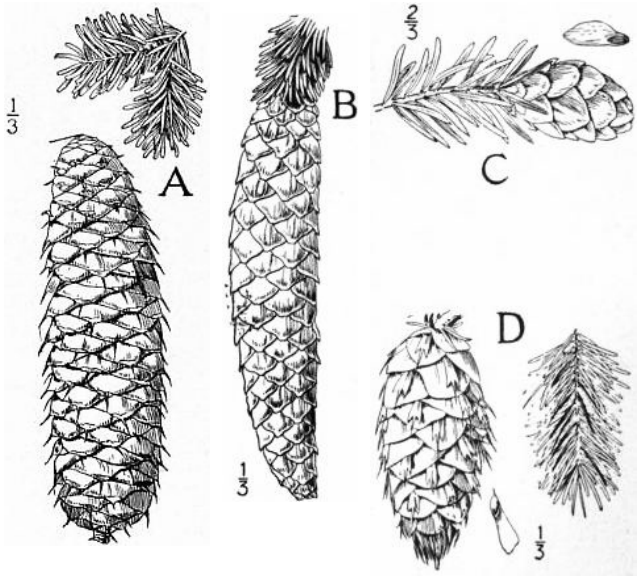


Fig. 1.—Norway Spruce (*Picea excelsa*). Male Flowers. A, branch bearing male cones, reduced; B, single male cone, enlarged; C, single stamen, enlarged.

The tree is very widely distributed, growing abundantly on most of the mountain ranges of northern and central Europe; while in Asia it occurs at least as far east as the Lena, and in latitude extends from the Altaic ranges to beyond the Arctic circle. On the Swiss Alps it is one of the most prevalent and striking of the forest trees, its dark evergreen foliage often standing out in strong contrast to the snowy ridges and glaciers beyond. In the lower districts of Sweden it is the predominant tree in most of the great forests that spread over so large a portion of that country. In Norway it constitutes a considerable part of the dense woods of the southern dales, flourishing, according to Franz Christian Schübeler, on the mountain slopes up to an altitude of from 2800 to 3100 ft., and clothing the shores of some of the fjords to the water’s edge; in the higher regions it is generally mingled with the pine. Less abundant on the western side of the fjelds, it again forms woods in Nordland, extending in the neighbourhood of the coast nearly to the 67th parallel; but it is, in that arctic climate, rarely met with at a greater elevation than 800 ft. above the sea, though in Swedish Lapland it is found on the slope of the Sulitelma as high as 1200 ft., its upper limit being everywhere lower than that of the pine. In all the Scandinavian countries it is known as the *Gran* or *Grann*. Great tracts of low country along the southern shores of the Baltic and in northern Russia are covered with forests of spruce. It everywhere shows a preference for a moist but well-drained soil, and never attains its full stature or luxuriance of growth upon arid ground, whether on plain or mountain—a peculiarity that should be remembered by the planter. In a favourable soil and open situation it becomes the tallest and one of the stateliest of European trees, rising sometimes to a height of from 150 to 170 ft., the trunk attaining a diameter of from 5 to 6 ft. at the base. But when it grows in dense woods, where the lower branches decay and drop off early, only a small head of foliage remaining at the tapering summit, its stem, though frequently of great height, is rarely more than 1½ or 2 ft. in thickness. Its growth is rapid, the straight leading shoot, in the vigorous period of the tree, often extending 2½ or even 3 ft. in a single season. In its native habitats it is said to endure for several centuries; but in those countries from which the commercial supply of its timber is chiefly drawn, it attains perfection in from 70 to 90 years, according to soil and situation.



SILVER FIR (*Abies pectinata*).
A, Cone and foliage.

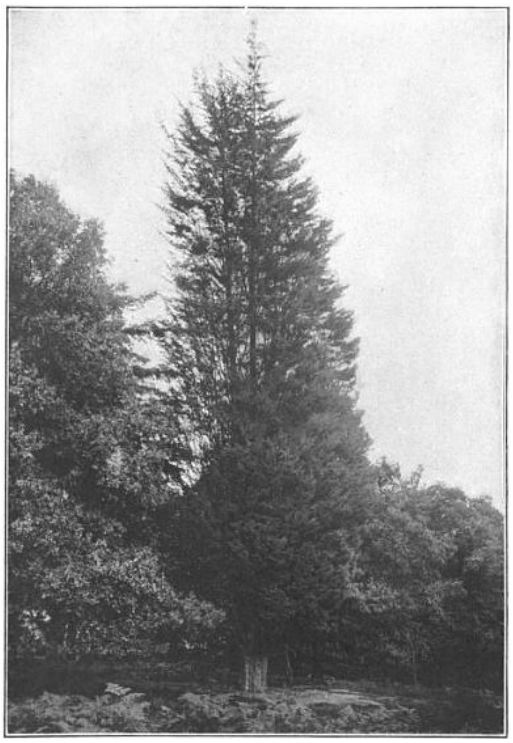
SPRUCE FIR (*Picea excelsa*).
B, Cone and foliage.

HEMLOCK SPRUCE (*Tsuga canadensis*)
C, Cone, seed and foliage.

DOUGLAS FIR (*Pseudo-tsuga Douglasii*).
D, Cone, seed and foliage.

Photos by Henry Irving.

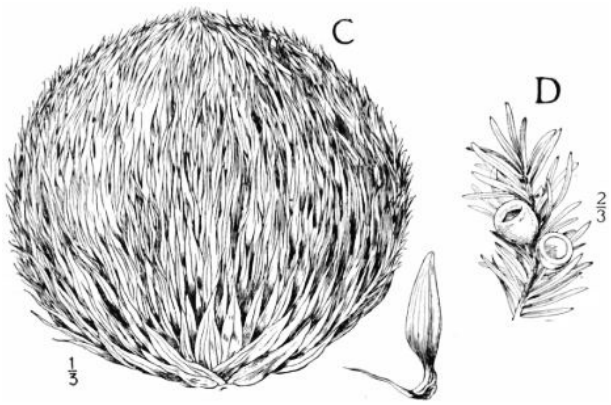
PLATE II.

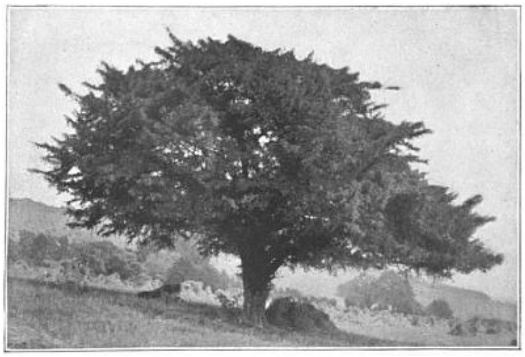


CYPRESS (*Cupressus sempervirens*). *A*, Cone and branchlets.

JUNIPER (*Juniperus communis*). *B*, Fruit and foliage.

ARAUCARIA (*A. imbricata*, Chile pine or monkey-puzzle). *C*, Seed-bearing cone and a single scale with seed.





YEW (*Taxus baccata*). *D*, Seed and foliage.

Photos by Henry Irving.

In the most prevalent variety of the Norway spruce the wood is white, apt to be very knotty when the tree has grown in an open place, but, as produced in the close northern forests, often of fine and even grain. Immense quantities are imported into Britain from Norway, Sweden and Prussia, under the names of “white Norway,” “Christiania” and “Danzig deal.” The

larger trees are sawn up into planks and battens, much used for the purposes of the builder, especially for flooring, joists and rafters. Where not exposed to the weather the wood is probably as lasting as that of the pine, but, not being so resinous, appears less adapted for out-door uses. Great quantities are sent from Sweden in a manufactured state, in the form of door and window-frames and ready-prepared flooring, and much of the cheap “white deal” furniture is made of this wood. The younger and smaller trees are remarkably durable, especially when the bark is allowed to remain on them; and most of the poles imported into Britain for scaffolding, ladders, mining-timber and similar uses are furnished by this fir. Small masts and spars are often made of it, and are said to be lighter than those of pine. The best poles are obtained in Norway from small, slender, drawn-up trees, growing under the shade of the larger ones in the thick woods, these being freer from knots, and tougher from their slower growth. A variety of the spruce, abounding in some parts of Norway, produces a red heartwood, not easy to distinguish from that of the Norway pine (Scotch fir), and imported with it into England as “red deal” or “pine.” This kind is sometimes seen in plantations, where it may be recognized by its shorter, darker leaves and longer cones. The smaller branches and the waste portion of the trunks, left in cutting up the timber, are exported as fire-wood, or used for splitting into matches. The wood of the spruce is also employed in the manufacture of wood-pulp for paper.

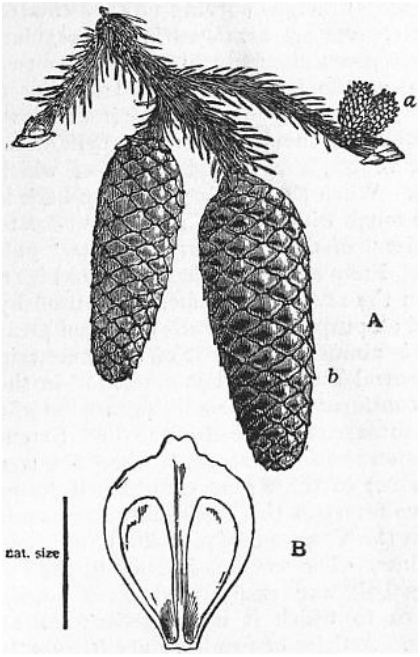


FIG. 2.—Norway Spruce (*Picea excelsa*). Cones; scale with seeds. A, Branch bearing (*a*) young female cones, (*b*) ripe cones, reduced. B, Ripe cone scale with seeds, enlarged.

The resinous products of the Norway spruce, though yielded by the tree in less abundance than those furnished by the pine, are of considerable economic value. In Scandinavia a thick turpentine oozes from cracks or fissures in the bark, forming by its congelation a fine yellow resin, known commercially as “spruce rosin,” or “frankincense”; it is also procured artificially by cutting off the ends of the lower branches, when it slowly exudes from the extremities. In Switzerland and parts of Germany, where it is collected in some quantity for commerce, a long strip of bark is cut out of the tree near the root; the resin that slowly accumulates during the summer is scraped out in the latter part of the season, and the slit enlarged slightly the following spring to ensure a continuance of the supply. The process is repeated every alternate year, until the tree no longer yields the resin in abundance, which under favourable circumstances it will do for twenty years or more. The quantity obtained from each fir is very variable, depending on the vigour of the tree, and greatly lessens after it has been subjected to the operation for some years. Eventually the tree is destroyed, and the wood rendered worthless for timber, and of little value even for fuel. From the product so obtained most of the better sort of “Burgundy pitch” of the druggists is prepared. By the peasantry of its native countries the Norway spruce is applied to innumerable purposes of daily life. The bark and young cones afford a tanning material, inferior indeed to oak-bark, and hardly equal to that of the larch, but of value in countries where substances more rich in tannin are not abundant. In Norway the sprays, like those of the juniper, are scattered over the floors of churches and the sitting-rooms of dwelling-houses, as a fragrant and healthful substitute for carpet or matting. The young shoots are also given to oxen in the long winters of those northern latitudes, when other green fodder is hard to obtain. In times of scarcity the Norse peasant-farmer uses the sweetish inner bark, beaten in a mortar and ground in his primitive mill with oats or barley, to eke out a scanty supply of meal, the mixture yielding a tolerably palatable though somewhat resinous substitute for his ordinary *flad-brod*. A decoction of the buds in milk or whey is a common household remedy for scurvy; and the young shoots or green cones form an essential ingredient in the spruce-beer drank with a similar object, or as an occasional beverage. The well-known “Danzig-spruce” is prepared by adding a decoction of the buds or cones to the wort or saccharine liquor before fermentation. Similar preparations are in use wherever the spruce fir abounds. The wood is burned for fuel, its heat-giving power being reckoned in Germany about one-fourth less than that of beech. From the widespreading roots string and ropes are manufactured in Lapland and Bothnia: the longer ones which run near the surface are selected, split through, and then boiled for some hours in a ley of wood-ashes and salt, which, dissolving out the resin, loosens the fibres and renders them easily separable, and ready for twisting into cordage. Light portable boats are sometimes made of very thin boards of fir, sewn together with cord thus manufactured from the roots of the tree.

The Norway spruce seems to have been the “Picea” of Pliny, but is evidently often confused by the Latin writers with their “Abies,” the *Abies pectinata* of modern botanists. From an equally loose application of the word “fir” by our older herbalists, it is difficult to decide upon the date of introduction of this tree into Britain; but it was commonly planted for ornamental purposes in the beginning of the 17th century. In places suited to its growth it seems to flourish nearly as well as in the woods of Norway or Switzerland; but as it needs for its successful cultivation as a timber tree soils that might be turned to agricultural account, it is not so well adapted for economic planting in Britain as the Scotch fir or larch, which come to perfection in more bleak and elevated regions, and on comparatively barren ground, though it may perhaps be grown to advantage on some moist hill-sides and mountain hollows. Its great value to the English forester is as a “nurse” for other trees, for which its dense leafage and tapering form render it admirably fitted, as it protects, without overshading, the young saplings, and yields saleable stakes and small poles when cut out. For hop-poles it is not so well adapted as the larch. As a picturesque tree, for park and ornamental plantation, it is among the best of the conifers, its colour and form contrasting yet harmonizing with the olive green and rounded outline of oaks and beeches, or with the red trunk and glaucous foliage of the pine. When young its spreading boughs form good cover for game. The fresh branches, with their thick mat of foliage, are useful to the gardener for sheltering wall-fruit in the spring. In a good soil and position the tree

sometimes attains an enormous size: one in Studley Park, Yorkshire, attained nearly 140 ft. in height, and the trunk more than 6 ft. in thickness near the ground. The spruce bears the smoke of great cities better than most of the *Abietineae*; but in suburban localities after a certain age it soon loses its healthy appearance, and is apt to be affected with blight (*Eriosoma*), though not so much as the Scotch fir and most of the pines.

The black spruce (*Picea nigra*) is a tree of more formal growth than the preceding. The branches grow at a more acute angle and in more regular whorls than those of the Norway spruce; and, though the lower ones become bent to a horizontal position, they do not droop, so that the tree has a much less elegant appearance. The leaves, which grow very thickly all round the stem, are short, nearly quadrangular, and of a dark greyish-green. The cones, produced in great abundance, are short and oval in shape, the scales with rugged indented edges; they are deep purple when young, but become brown as they ripen. The tree also occurs in the New England states and extends over nearly the whole of British North America, its northern limit occurring at about 67° N. lat., often forming a large part of the dense forests, mostly in the swampy districts. A variety with lighter foliage and reddish bark is common in Newfoundland and some districts on the mainland adjacent. The trees usually grow very close together, the slender trunks rising to a great height bare of branches; but they do not attain the size of the Norway spruce, being seldom taller than 60 or 70 ft., with a diameter of 1½ or 2 ft. at the base. This species prefers a peaty soil, and often grows luxuriantly in very moist situations. The wood is strong, light and very elastic, forming an excellent material for small masts and spars, for which purpose the trunks are used in America, and exported largely to England. The sawn timber is inferior to that of *P. excelsa*, besides being of a smaller size. In the countries in which it abounds, the log-houses of the settlers are often built of the long straight trunks. The spruce-beer of America is generally made from the young shoots of this tree. The small twigs, tied in bundles, are boiled for some time in water with broken biscuit or roasted grain; the resulting decoction is then poured into a cask with molasses or maple sugar and a little yeast, and left to ferment. It is often made by the settlers and fishermen of the St Lawrence region, being esteemed as a preventive of scurvy. The American “essence of spruce,” occasionally used in England for making spruce-beer, is obtained by boiling the shoots and buds and concentrating the decoction. The resinous products of the tree are of no great value. It was introduced into Britain at the end of the 17th century.

The white spruce (*Picea alba*), sometimes met with in English plantations, is a tree of lighter growth than the black spruce, the branches being more widely apart; the foliage is of a light glaucous green; the small light-brown cones are more slender and tapering than in *P. nigra*, and the scales have even edges. It is of comparatively small size, but is of some importance in the wilds of the Canadian dominion, where it is found to the northern limit of tree-vegetation growing up to at least 69°; the slender trunks yield the only useful timber of some of the more desolate northern regions. In the woods of Canada it occurs frequently mingled with the black spruce and other trees. The fibrous tough roots, softened by soaking in water, and split, are used by the Indians and voyageurs to sew together the birch-bark covering of their canoes; and a resin that exudes from the bark is employed to varnish over the seams. It was introduced to Great Britain at the end of the 17th century and was formerly more extensively planted than at present.

The hemlock spruce (*Tsuga canadensis*) is a large tree, abounding in most of the north-eastern parts of America up to Labrador; in lower Canada, New Brunswick and Nova Scotia it is often the prevailing tree. The short leaves are flat, those above pressed close to the stem, and the others forming two rows; they are of a rather light green tint above, whitish beneath. The cones are very small, ovate and pointed. The large branches droop, like those of the Norway spruce, but the sprays are much lighter and more slender, rendering the tree one of the most elegant of the conifers, especially when young. When old, the branches, broken and bent down by the winter snows, give it a ragged but very picturesque aspect. The trunk is frequently 3 ft. thick near the base. The hemlock prefers rather dry and elevated situations, often forming woods on the declivities of mountains. The timber is very much twisted in grain, and liable to warp and split, but is used for making plasterers’ laths and for fencing; “shingles” for roofing are sometimes made of it. The bark, split off in May or June, forms one of the most valuable tanning substances in Canada. The sprays are sometimes used for making spruce-beer and essence of spruce. It was introduced into Great Britain in about the year 1736.

The Douglas spruce (*Pseudo-tsuga Douglasii*), one of the finest conifers, often rises to a height of 200 ft. and sometimes considerably more, while the gigantic trunk frequently measures 8 or 10 ft. across. The yew-like leaves spread laterally, and are of a deep green tint; the cones are furnished with tridentate bracts that project far beyond the scales. It forms extensive forests in Vancouver Island, British Columbia and Oregon, whence the timber is exported, being highly prized for its strength, durability and even grain, though very heavy; it is of a deep yellow colour, abounding in resin, which oozes from the thick bark. It was introduced into Britain soon after its rediscovery by David Douglas in 1827, and has been widely planted, but does not flourish well where exposed to high winds or in too shallow soil.

Of the *Abies* group, the silver fir (*A. pectinata*), may be taken as the type,—a lofty tree, rivalling the Norway spruce in size, with large spreading horizontal boughs curving upward toward the extremities. The flat leaves are arranged in two regular, distinct rows; they are deep green above, but beneath have two broad white lines, which, as the foliage in large trees has a tendency to curl upwards, give it a silvery appearance from below. The large cones stand erect on the branches, are cylindrical in shape, and have long bracts, the curved points of which project beyond the scales. When the tree is young the bark is of a silvery grey, but gets rough with age. This tree appears to have been the true “Abies” of the Latin writers—the “pulcherrima abies” of Virgil. From early historic times it has been held in high estimation in the south of Europe, being used by the Romans for masts and all purposes for which timber of great length was required. It is abundant in most of the mountain ranges of southern and central Europe, but is not found in the northern parts of that continent. In Asia it occurs on the Caucasus and Ural, and in some parts of the Altaic chain. Extensive woods of this fir exist on the southern Alps, where the tree grows up to nearly 4000 ft.; in the Rhine countries it forms great part of the extensive forest of the Hochwald, and occurs in the Black Forest and in the Vosges; it is plentiful likewise on the Pyrenees and Apennines. The wood is inferior to that

of *Picea excelsa*, but, being soft and easily worked, is largely employed in the countries to which it is indigenous for all the purposes of carpentry. Articles of furniture are frequently made of it, and it is in great esteem for carving and for the construction of stringed instruments. Deficient in resin, the wood is more perishable than that of the spruce fir when exposed to the air, though it is said to stand well under water. The bark contains a large amount of a fine, highly-resinous turpentine, which collects in tumours on the trunk during the heat of summer. In the Alps and Vosges this resinous semi-fluid is collected by climbing the trees and pressing out the contents of the natural receptacles of the bark into horn or tin vessels held beneath them. After purification by straining, it is sold as "Strasburg turpentine," much used in the preparation of some of the finer varnishes. Burgundy pitch is also prepared from it by a similar process as that from *Picea excelsa*. A fine oil of turpentine is distilled from the crude material; the residue forms a coarse resin. Introduced into Britain at the beginning of the 17th century, the silver fir has become common there as a planted tree, though, like the Norway spruce, it rarely comes up from seed scattered naturally. There are many fine trees in Scotland; one near Roseneath, figured by Strutt in his *Sylva Britannica*, then measured more than 22 ft. round the trunk. In the more southern parts of the island it often reaches a height of 90 ft., and specimens exist considerably above that size; but the young shoots are apt to be injured in severe winters, and the tree on light soils is also hurt by long droughts, so that it usually presents a ragged appearance; though, in the distance, the lofty top and horizontal boughs sometimes stand out in most picturesque relief above the rounded summits of the neighbouring trees. The silver fir flourishes in a deep loamy soil, and will grow even upon stiff clay, when well drained—a situation in which few conifers will succeed. On such lands, where otherwise desirable, it may sometimes be planted with profit. The cones do not ripen till the second year.

The silver fir of Canada (*A. balsamea*), a small tree resembling the last species in foliage, furnishes the "Canada balsam"; it abounds in Quebec and the adjacent provinces.

Numerous other firs are common in gardens and shrubberies, and some furnish valuable products in their native countries; but they are not yet of sufficient economic or general interest to demand mention here.

For further information see Veitch's *Manual of Coniferae* (2nd ed., 1900).

FIRDOUSĪ, Firdausī or Firdusī, Persian poet. Abu 'l Kāsim Mansur (or Hasan), who took the *nom de plume* of Firdousī, author of the epic poem the *Shāhnāma*, or "Book of Kings," a complete history of Persia in nearly 60,000 verses, was born at Shadab, a suburb of Tūs, about the year 329 of the Hegira (941 A.D.), or earlier. His father belonged to the class of *Dihkans* (the old native country families and landed proprietors of Persia, who had preserved their influence and status under the Arab rule), and possessed an estate in the neighbourhood of Tūs (in Khorasan). Firdousī's own education eminently qualified him for the gigantic task which he subsequently undertook, for he was profoundly versed in the Arabic language and literature and had also studied deeply the Pahlavi or Old Persian, and was conversant with the ancient historical records which existed in that tongue.

The *Shāhnāma* of Firdousī (see also Persia: *Literature*) is perhaps the only example of a poem produced by a single author which at once took its place as the national epic of the people. The nature of the work, the materials from which it was composed, and the circumstances under which it was written are, however, in themselves exceptional, and necessarily tended to this result. The grandeur and antiquity of the empire and the vicissitudes through which it passed, their long series of wars and the magnificent monuments erected by their ancient sovereigns, could not fail to leave numerous traces in the memory of so imaginative a people as the Persians. As early as the 5th century of the Christian era we find mention made of these historical traditions in the work of an Armenian author, Moses of Chorene (according to others, he lived in the 7th or 8th century). During the reign of Chosroes I. (Anushirvan) the contemporary of Mahomet, and by order of that monarch, an attempt had been made to collect, from various parts of the kingdom, all the popular tales and legends relating to the ancient kings, and the results were deposited in the royal library. During the last years of the Sassanid dynasty the work was resumed, the former collection being revised and greatly added to by the Dihkan Danishwer, assisted by several learned mobeds. His work was entitled the *Khoda'ināma*, which in the old dialect also meant the "Book of Kings." On the Arab invasion this work was in great danger of perishing at the hands of the iconoclastic caliph Omar and his generals, but it was fortunately preserved; and we find it in the 2nd century of the Hegira being paraphrased in Arabic by Abdallah ibn el Mokaffa, a learned Persian who had embraced Islam. Other Guebres occupied themselves privately with the collection of these traditions; and, when a prince of Persian origin, Yakūb ibn Laith, founder of the Saffarid dynasty, succeeded in throwing off his allegiance to the caliphate, he at once set about continuing the work of his illustrious predecessors. His "Book of Kings" was completed in the year 260 of the Hegira, and was freely circulated in Khorasan and Irak. Yakūb's family did not continue long in power; but the Samanid princes who succeeded applied themselves zealously to the same work, and Prince Nūh II., who came to the throne in 365 A.H. (A.D. 976), entrusted it to the court poet Dakiki, a Guebre by religion. Dakiki's labours were brought to a sudden stop by his own assassination, and the fall of the Samanian house happened not long after, and their kingdom passed into the hands of the Ghaznevids. Mahmūd ibn Sabuktagin, the second of the dynasty (998-1030), continued to make himself still more independent of the caliphate than his predecessors, and, though a warrior and a fanatical Moslem, extended a generous patronage to Persian literature and learning, and even developed it at the expense of the Arabic institutions. The task of continuing and completing the collection of the ancient historical traditions of the empire especially attracted him. With the assistance of neighbouring princes and of many of the influential Dihkans, Mahmud collected a vast amount of materials for the work, and after having searched in vain for a man of sufficient learning and ability to edit them faithfully, and having entrusted various episodes for versification to the numerous poets whom he had

gathered round him, he at length made choice of Firdousī. Firdousī had been always strongly attracted by the ancient Pahlavi records, and had begun at an early age to turn them into Persian epic verse. On hearing of the death of the poet Dakiki, he conceived the ambitious design of himself carrying out the work which the latter had only just commenced; and, although he had not then any introduction to the court, he contrived, thanks to one of his friends, Mahommed Lashkari, to procure a copy of the Dihkan Danishwer's collection, and at the age of thirty-six commenced his great undertaking. Abu Mansur, the governor of Tūs, patronized him and encouraged him by substantial pecuniary support. When Mahmud succeeded to the throne, and evinced such active interest in the work, Firdousī was naturally attracted to the court of Ghazni. At first court jealousies and intrigues prevented Firdousī from being noticed by the sultan; but at length one of his friends, Mahek, undertook to present to Mahmud his poetic version of one of the well-known episodes of the legendary history. Hearing that the poet was born at Tūs, the sultan made him explain the origin of his native town, and was much struck with the intimate knowledge of ancient history which he displayed. Being presented to the seven poets who were then engaged on the projected epic, Abu 'l Kāsim was admitted to their meetings, and on one occasion improvised a verse, at Mahmud's request, in praise of his favourite Ayāz, with such success that the sultan bestowed upon him the name of Firdousī, saying that he had converted his assemblies into paradise (*Firdous*). During the early days of his sojourn at court an incident happened which contributed in no small measure to the realization of his ambition. Three of the seven poets were drinking in a garden when Firdousī approached, and wishing to get rid of him without rudeness, they informed him who they were, and told him that it was their custom to admit none to their society but such as could give proof of poetical talent. To test his acquirements they proposed that each should furnish an extemporary line of verse, his own to be the last, and all four ending in the same rhyme. Firdousī accepted the challenge, and the three poets having previously agreed upon three rhyming words to which a fourth could not be found in the Persian language, 'Ansari began—

"Thy beauty eclipses the light of the sun";

Farrakhi added—

"The rose with thy cheek would comparison shun";

'Asjadi continued—

"Thy glances pierce through the mailed warrior's johsun";[1]

and Firdousī, without a moment's hesitation, completed the quatrain—

"Like the lance of fierce Giv in his fight with Poshun."

The poets asked for an explanation of this allusion, and Firdousī recited to them the battle as described in the *Shāhnāma*, and delighted and astonished them with his learning and eloquence.

Mahmud now definitely selected him for the work of compiling and versifying the ancient legends, and bestowed upon him such marks of his favour and munificence as to elicit from the poet an enthusiastic panegyric, which is inserted in the preface of the *Shāhnāma*, and forms a curious contrast to the bitter satire which he subsequently prefixed to the book. The sultan ordered his treasurer, Khojah Hasan Maimandi, to pay to Firdousī a thousand gold pieces for every thousand verses; but the poet preferred allowing the sum to accumulate till the whole was finished, with the object of amassing sufficient capital to construct a dike for his native town of Tūs, which suffered greatly from defective irrigation, a project which had been the chief dream of his childhood. Owing to this resolution, and to the jealousy of Hasan Maimandi, who often refused to advance him sufficient for the necessaries of life, Firdousī passed the later portion of his life in great privation, though enjoying the royal favour and widely extended fame. Amongst other princes whose liberal presents enabled him to combat his pecuniary difficulties, was one Rustam, son of Fakhr Addaula, the Dailamite, who sent him a thousand gold pieces in acknowledgment of a copy of the episode of Rustam and Isfendiar which Firdousī had sent him, and promised him a gracious reception if he should ever come to his court. As this prince belonged, like Firdousī, to the Shiah sect, while Mahmud and Maimandi were Sunnites, and as he was also politically opposed to the sultan, Hasan Maimandi did not fail to make the most of this incident, and accused the poet of disloyalty to his sovereign and patron, as well as of heresy. Other enemies and rivals also joined in the attack, and for some time Firdousī's position was very precarious, though his pre-eminent talents and obvious fitness for the work prevented him from losing his post. To add to his troubles he had the misfortune to lose his only son at the age of 37.

At length, after thirty-five years' work, the book was completed (1011), and Firdousī entrusted it to Ayāz, the sultan's favourite, for presentation to him. Mahmud ordered Hasan Maimandi to take the poet as much gold as an elephant could carry, but the jealous treasurer persuaded the monarch that it was too generous a reward, and that an elephant's load of silver would be sufficient. 60,000 silver dirhems were accordingly placed in sacks, and taken to Firdousī by Ayāz at the sultan's command, instead of the 60,000 gold pieces, one for each verse, which had been promised. The poet was at that moment in the bath, and seeing the sacks, and believing that they contained the expected gold, received them with great satisfaction, but finding only silver he complained to Ayāz that he had not executed the sultan's order. Ayāz related what had taken place between Mahmud and Hasan Maimandi, and Firdousī in a rage gave 20 thousand pieces to Ayāz himself, the same amount to the bath-keeper, and paid the rest to a beer seller for a glass of beer (*fouka*), sending word back to the sultan that it was not to gain money that he had taken so much trouble. On hearing this message, Mahmud at first reproached Hasan with having caused him to break his word, but the wily treasurer succeeded in turning his master's anger upon Firdousī to such an extent that he threatened that on the morrow he would "cast that Carmathian (heretic) under the feet of his elephants." Being apprised by one of the nobles of the court of what had taken place, Firdousī passed the night in great anxiety; but passing in the morning by the gate that led from his own apartments into the palace, he met the sultan in his private garden, and succeeded by humble apologies in appeasing his wrath. He was, however, far from being appeased himself, and determined at once upon quitting Ghazni. Returning home he tore up the draughts of some thousands of verses which he had composed and threw them in the fire, and repairing to the grand

mosque of Ghazni he wrote upon the walls, at the place where the sultan was in the habit of praying, the following lines:—

> "The auspicious court of Mahmud, king of Zabulistan, is like a sea. What a sea! One cannot see its shore. If I have dived therein without finding any pearls it is the fault of my star and not of the sea."

He then gave a sealed paper to Ayāz, begging him to hand it to the sultan in a leisure moment after 20 days had elapsed, and set off on his travels with no better equipment than his staff and a dervish's cloak. At the expiration of the 20 days Ayāz gave the paper to the sultan, who on opening it found the celebrated satire which is now always prefixed to copies of the *Shāhnāma*, and which is perhaps one of the bitterest and severest pieces of reproach ever penned. Mahmud, in a violent rage, sent after the poet and promised a large reward for his capture, but he was already in comparative safety. Firdousī directed his steps to Mazandaran, and took refuge with Kabus, prince of Jorjan, who at first received him with great favour, and promised him his continued protection and patronage; learning, however, the circumstances under which he had left Ghazni, he feared the resentment of so powerful a sovereign as Mahmud, who he knew already coveted his kingdom, and dismissed the poet with a magnificent present. Firdousī next repaired to Bagdad, where he made the acquaintance of a merchant, who introduced him to the vizier of the caliph, al-Qadir, by presenting an Arabic poem which the poet had composed in his honour. The vizier gave Firdousī an apartment near himself, and related to the caliph the manner in which he had been treated at Ghazni. The caliph summoned him into his presence, and was so much pleased with a poem of a thousand couplets, which Firdousī composed in his honour, that he at once received him into favour. The fact of his having devoted his life and talents to chronicling the renown of fire-worshipping Persians was, however, somewhat of a crime in the orthodox caliph's eyes; in order therefore to recover his prestige, Firdousī composed another poem of 9000 couplets on the theme borrowed from the Koran of the loves of Joseph and Potiphar's wife—*Yūsuf and Zuleikha* (edited by H. Ethé, Oxford, 1902; complete metrical translation by Schlechta-Wssehrd, Vienna, 1889). This poem, though rare and little known, is still in existence—the Royal Asiatic Society possessing a copy. But Mahmud had by this time heard of his asylum at the court of the caliph, and wrote a letter menacing his liege lord, and demanding the surrender of the poet. Firdousī, to avoid further troubles, departed for Ahwaz, a province of the Persian Irak, and dedicated his *Yūsuf and Zuleikha* to the governor of that district. Thence he went to Kohistan, where the governor, Nasir Lek, was his intimate and devoted friend, and received him with great ceremony upon the frontier. Firdousī confided to him that he contemplated writing a bitter exposition of his shameful treatment at the hands of the sultan of Ghazni; but Nasir Lek, who was a personal friend of the latter, dissuaded him from his purpose, but himself wrote and remonstrated with Mahmud. Nasir Lek's message and the urgent representations of Firdousī's friends had the desired effect; and Mahmud not only expressed his intention of offering full reparation to the poet, but put his enemy Maimandi to death. The change, however, came too late; Firdousī, now a broken and decrepit old man, had in the meanwhile returned to Tūs, and, while wandering through the streets of his native town, heard a child lisping a verse from his own satire in which he taunts Mahmud with his slavish birth:—

> "Had Mahmud's father been what he is now
> A crown of gold had decked this aged brow;
> Had Mahmud's mother been of gentle blood,
> In heaps of silver knee-deep had I stood."

He was so affected by this proof of universal sympathy with his misfortunes that he went home, fell sick and died. He was buried in a garden, but Abu'l Kasim Jurjani, chief sheikh of Tūs, refused to read the usual prayers over his tomb, alleging that he was an infidel, and had devoted his life to the glorification of fire-worshippers and misbelievers. The next night, however, having dreamt that he beheld Firdousī in paradise dressed in the sacred colour, green, and wearing an emerald crown, he reconsidered his determination; and the poet was henceforth held to be perfectly orthodox. He died in the year 411 of the Hegira (1020 A.D.), aged about eighty, eleven years after the completion of his great work. The legend goes that Mahmud had in the meanwhile despatched the promised hundred thousand pieces of gold to Firdousī, with a robe of honour and ample apologies for the past. But as the camels bearing the treasure reached one of the gates of the city, Firdousī's funeral was leaving it by another. His daughter, to whom they brought the sultan's present, refused to receive it; but his aged sister remembering his anxiety for the construction of the stone embankment for the river of Tūs, this work was completed in honour of the poet's memory, and a large caravanserai built with the surplus.

Much of the traditional life, as given above, which is based upon that prefixed to the revised edition of the poem, undertaken by order of Baisingar Khan, grandson of Timur-i-Leng (Timur), is rejected by modern scholars (see T. Nöldeke, "Das iranische Nationalepos," in W. Geiger's *Grundriss der iranischen Philologie*, ii. pp. 150-158).

The *Shāhnāma* is based, as we have seen, upon the ancient legends current among the populace of Persia, and collected by the Dihkans, a class of men who had the greatest facilities for this purpose. There is every reason therefore to believe that Firdousī adhered faithfully to these records of antiquity, and that the poem is a perfect storehouse of the genuine traditions of the country.

The entire poem (which only existed in MS. up to the beginning of the 19th century) was published (1831-1868) with a French translation in a magnificent folio edition, at the expense of the French government, by the learned and indefatigable Julius von Mohl. The size and number of the volumes, however, and their great expense, made them difficult of access, and Frau von Mohl published the French translation (1876-1878) with her illustrious husband's critical notes and introduction in a more convenient and cheaper form. Other editions are by Turner Macan (Calcutta, 1829), J.A. Vullers and S. Landauer (unfinished; Leiden, 1877-1883). There is an English abridgment by J. Atkinson (London, 1832; reprinted 1886, 1892); there is a verse-translation, partly rhymed and partly unrhymed, by A.G. and E. Warner (1905 foll.), with an introduction containing an account of Firdousī and the Shāhnāma; the version by A. Rogers (1907) contains the greater part of the work. The episode of Sohrab and Rustam is well known to English readers from Matthew Arnold's

poem. The only complete translation is Il Libro dei Rei, by I. Pizzi (8 vols., Turin, 1886-1888), also the author of a history of Persian poetry.

See also E.G. Browne's *Literary History of Persia*, i., ii. (1902-1906); T. Nöldeke (as above) for a full account of the Shāhnāma, editions, &c.; and H. Ethé, "Neupersische Litteratur," in the same work.

(E. H. P.; X.)

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1 A sort of cuirass.

FIRE (in O. Eng. *fýr*; the word is common to West German languages, cf. Dutch *vuur*, Ger. *Feuer*; the pre-Teutonic form is seen in Sanskrit *pū*, *pāvaka*, and Gr. πῦρ; the ultimate origin is usually taken to be a root meaning to purify, cf. Lat. *purus*), the term commonly used for the visible effect of combustion (see Flame), operating as a heating or lighting agency.

So general is the knowledge of fire and its uses that it is a question whether we have any authentic instance on record of a tribe altogether ignorant of them. A few notices indeed are to be found in the voluminous literature of travel which would decide the question in the affirmative; but when they are carefully investigated, their evidence is found to be far from conclusive. The missionary Krapf was told by a slave of a tribe in the southern part of Shoa who lived like monkeys in the bamboo jungles, and were totally ignorant of fire; but no better authority has been found for the statement, and the story, which seems to be current in eastern Africa, may be nothing else than the propagation of fables about the Pygmies whom the ancients located around the sources of the Nile. Lieut. Charles Wilkes, commander of the United States exploring expedition of 1838-42, says that in Fakaafo or Bowditch Island "there was no sign of places for cooking nor any appearance of fire," and that the natives felt evident alarm at the sparks produced by flint and steel and the smoke emitted by those with cigars in their mouths. The presence of the word *afi*, fire, in the Fakaafo vocabulary supplied by Hale the ethnographer of the expedition, though it might perhaps be explained as equivalent only to solar light and heat, undoubtedly invalidates the supposition of Wilkes; and the Rev. George Turner, in an account of a missionary voyage in 1859, not only repeats the word *afi* in his list for Fakaafo, but relates the native legend about the origin of fire, and describes some peculiar customs connected with its use. Alvaro de Saavedra, an old Spanish traveller, informs us that the inhabitants of Los Jardines, an island of the Pacific, showed great fear when they saw fire—which they did not know before. But that island has not been identified with certainty by modern explorers. It belongs, perhaps, to the Ladrones or Marianas Archipelago, where fire was unknown, says Padre Gobien, "till Magellan, wroth at the pilferings of the inhabitants, burnt one of their villages. When they saw their wooden huts ablaze, their first thought was that fire was a beast which eats up wood. Some of them having approached the fire too near were burnt, and the others kept aloof, fearing to be torn or poisoned by the powerful breath of that terrible animal." To this Freycinet objects that these Ladrone islanders made pottery before the arrival of Europeans, that they had words expressing the ideas of flame, fire, oven, coals, roasting and cooking. Let us add that in their country numerous graves and ruins have been found, which seem to be remnants of a former culture. Thus the question remains in uncertainty: though there is nothing impossible in the supposition of the existence of a fireless tribe, it cannot be said that such a tribe has been discovered.

It is useless to inquire in what way man first discovered that fire was subject to his control, and could even be called into being by appropriate means. With the natural phenomenon and its various aspects he must soon have become familiar. The volcano lit up the darkness of night and sent its ashes or its lava down into the plains; the lightning or the meteor struck the tree, and the forest was ablaze; or some less obvious cause produced some less extensive ignition. For a time it is possible that the grand manifestations of nature aroused no feelings save awe and terror; but man is quite as much endowed with curiosity as with reverence or caution, and familiarity must ere long have bred confidence if not contempt. It is by no means necessary to suppose that the practical discovery of fire was made only at one given spot and in one given way; it is much more probable indeed that different tribes and races obtained the knowledge in a variety of ways.

It has been asserted of many tribes that they would be unable to rekindle their fires if they were allowed to die out. Travellers in Australia and Tasmania depict the typical native woman bearing always about with her a burning brand, which it is one of her principal duties to protect and foster; and it has been supposed that it was only ignorance which imposed on her the endless task. This is absurd. The Australian methods of producing fire by the friction of two pieces of wood are perfectly well known, and are illustrated in Howitt's *Native Tribes of South-East Australia*, pp. 771-773. To carry a brand saves a little trouble to the men.

The methods employed for producing fire vary considerably in detail, but are for the most part merely modified applications of concussion or friction. Lord Avebury has remarked that the working up of stone into implements must have been followed sooner or later by the discovery of fire; for in the process of chipping sparks were elicited, and in the process of polishing heat was generated. The first or concussion method is still familiar in the flint and steel, which has hardly passed out of use even in the most civilized countries. Its modifications are comparatively few and unimportant. The Alaskans and Aleutians take two pieces of quartz, rub them well with native sulphur, strike them together till the sulphur catches fire, and then transfer the flame to a heap of dry grass over which a few feathers have been scattered. Instead of two pieces of quartz the Eskimos use a piece of quartz and a piece of iron pyrites. Mr Frederick Boyle saw fire produced by striking broken china violently against a bamboo, and Bastian observed the same process in Burma, and Wallace in Ternate. In Cochin China two pieces of bamboo are considered sufficient, the silicious character of the outside layer rendering it as good as native flint. The friction methods are more various. One of the simplest is what E.B. Tylor calls the stick and groove—"a blunt pointed stick being run along a groove of its own making in a piece of wood lying on the ground." Much, of course, depends on the quality of the woods

and the expertness of the manipulator. In Tahiti Charles Darwin saw a native produce fire in a few seconds, but only succeeded himself after much labour. The same device was employed in New Zealand, the Sandwich Islands, Tonga, Samoa and the Radak Islands. Instead of rubbing the movable stick backwards and forwards other tribes make it rotate rapidly in a round hole in the stationary piece of wood—thus making what Tylor has happily designated a fire-drill. This device has been observed in Australia, Kamchatka, Sumatra and the Carolines, among the Veddahs of Ceylon, throughout a great part of southern Africa, among the Eskimo and Indian tribes of North America, in the West Indies, in Central America, and as far south as the Straits of Magellan. It was also employed by the ancient Mexicans, and Tylor gives a quaint picture of the operation from a Mexican MS.—a man half kneeling on the ground is causing the stick to rotate between the palms of his hands. This simple method of rotation seems to be very generally in use; but various devices have been resorted to for the purpose of diminishing the labour and hastening the result. The Gaucho of the Pampas takes “an elastic stick about 18 in. long, presses one end to his breast and the other in a hole in a piece of wood, and then rapidly turns the curved part like a carpenter’s centre-bit.” In other cases the rotation is effected by means of a cord or thong wound round the drill and pulled alternately by this end and that. In order to steady the drill the Eskimo and others put the upper end in a socket of ivory or bone which they hold firmly in their mouth. A further advance was made by the Eskimo and neighbouring tribes, who applied the principle of the bow-drill; and the still more ingenious pump-drill was used by the Onondaga Indians. For full descriptions of these instruments and a rich variety of details connected with fire-making we must refer the reader to Tylor’s valuable chapter in his *Researches*. These methods of producing fire are but rarely used in Europe, and only in connexion with superstitious observances. We read in Wuttke that some time ago the authorities of a Mecklenburg village ordered a “wild fire” to be lit against a murrain amongst the cattle. For two hours the men strove vainly to obtain a spark, but the fault was not to be ascribed to the quality of the wood, or to the dampness of the atmosphere, but to the stubbornness of an old lady, who, objecting to the superstition, would not put out her night lamp; such a fire, to be efficient, must burn alone. At last the strong-minded female was compelled to give in; fire was obtained—but of bad quality, for it did not stop the murrain.

It has long been known that the rays of the sun might be concentrated by a lens or concave mirror. Aristophanes mentions the burning-lens in *The Clouds*, and the story of Archimedes using a mirror to fire the ships at Syracuse is familiar to every schoolboy. If Garcilasso de la Vega can be trusted as an authority the Virgins of the Sun in Peru kindled the sacred fire with a concave cup set in a great bracelet. In China the burning-glass is in common use.

To the inquiry how mankind became possessed of fire, the cosmogonies, those records of pristine speculative thought, do not give any reply which would not be found in the relations of travellers and historians.

> They say in the Tonga Islands that the god of the earthquakes is likewise the god of fire. At Mangaïa it is told that the great Maui went down to hell, where he surprised the secret of making fire by rubbing two pieces of wood together. The Maoris tell the tale differently. Maui had the fire given to him by his old blind grandmother, Mahuika, who drew it from the nails of her hands. Wishing to have a stronger one, he pretended that it had gone out, and so he obtained fire from her great toe. It was so fierce that every thing melted before the glow; even Maui and the grandmother herself were already burning when a deluge, sent from heaven, saved the hero and the perishing world; but before the waters extinguished all the blaze, Mahuika shut a few sparks into some trees, and thence men draw it now. The Maoris have also the legend that thunder is the noise of Tawhaki’s footsteps, and that lightnings flash from his armpits. At Western Point, Victoria, the Australians say the good old man Pundyil opened the door of the sun, whose light poured then on earth, and that Karakorok, the good man’s good daughter, seeing the earth to be full of serpents, went everywhere destroying serpents; but before she had killed them all, her staff snapped in two, and while it broke, a flame burst out of it. Here the serpent-killer is a fire-bringer. In the Persian *Shahnama* also fire was discovered by a dragon-fighter. Hushenk, the powerful hero, hurled at the monster a prodigious stone, which, evaded by the snake, struck a rock and was splintered by it. “Light shone from the dark pebble, the heart of the rock flashed out in glory, and fire was seen for the first time in the world.” The snake escaped, but the mystery of fire had been revealed.
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> North American legends narrate how the great buffalo, careering through the plains, makes sparks flit in the night, and sets the prairie ablaze by his hoofs hitting the rocks. We meet the same idea in the Hindu mythology, which conceives thunder to have been, among many other things, the clatter of the solar horses on the Akmon or hard pavement of the sky. The Dakotas claim that their ancestor obtained fire from the sparks which a friendly panther struck with its claws, as it scampered upon a stony hill.
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> Tohil, who gave the Quiches fire by shaking his sandals, was, like the Mexican Quetzelcoatl, represented by a flint stone. Guamansuri, the father of the Peruvians, produced the thunder and the lightning by hurling stones with his sling. The thunderbolts are his children. Kudai, the great god of the Altaian Tartars, disclosed “the secret of the stone’s edge and the iron’s hardness.” The Slavonian god of thunder was depicted with a silex in his hand, or even protruding from his head. The Lapp Tiermes struck with his hammer upon his own head; the Scandinavian Thor held a mallet in one hand, a flint in the other. Taranis, the Gaul, had upon his head a huge mace surrounded by six little ones. Finnish poems describe how “fire, the child of the sun, came down from heaven, where it was rocked in a tub of yellow copper, in a large pail of gold.” Ukko, the Esthonian god, sends forth lightnings, as he strikes his stone with his steel. According to the Kalewala, the same mighty Ukko struck his sword against his nail, and from the nail issued the “fiery babe.” He gave it to the Wind’s daughter to rock it, but the unwary maiden let it fall in the sea, where it was swallowed by the great pike, and fire would have been lost for ever if the child of the sun had not come to the rescue. He dragged the great pike from the water, drew out his entrails, and found there the heavenly spark still alive. Prometheus brought to earth the torch he had lighted at the sun’s chariot.

Human culture may be said to have begun with fire, of which the uses increased in the same ratio as culture itself. To save the labour expended on the initial process of procuring light, or on carrying it about constantly, primitive men hit on the expedient of a fire which should burn night and day in a public building. The Egyptians had one in every temple, the Greeks, Latins and Persians in all towns and villages. The

Natchez, the Aztecs, the Mayas, the Peruvians had their “national fires” burning upon large pyramids. Of these fires the “eternal lamps” in the synagogues, in the Byzantine and Catholic churches, may be a survival. The “Regia,” Rome’s sacred centre, supposed to be the abode of Vesta, stood close to a fountain; it was convenient to draw from the same spot the two great requisites, fire and water. All civil and political interests grouped themselves around the prytaneum which was at once a temple, a tribunal, a town-hall, and a gossiping resort: all public business and most private affairs were transacted by the light and in the warmth of the common fire. No wonder that its flagstones should become sacred. Primitive communities consider as holy everything that ensures their existence and promotes their welfare, material things such as fire and water not less than others. Thus the prytaneum grew into a religious institution. And if we hear a little more of fire worship than of water worship, it is because fire, being on the whole more difficult to obtain, was esteemed more precious. The prytaneum and the state were convertible terms. If by chance the fire in the Roman temple of Vesta was extinguished, all tribunals, all authority, all public or private business had to stop immediately. The connexion between heaven and earth had been broken, and it had to be restored in some way or other—either by Jove sending down divine lightning on his altars, or by the priests making a new fire by the old sacred method of rubbing two pieces of wood together, or by catching the rays of the sun in a concave mirror. No Greek or Roman army crossed the frontier without carrying an altar where the fire taken from the prytaneum burned night and day. When the Greeks sent out colonies the emigrants took with them living coals from the altar of Hestia, and had in their new country a fire lit as a representative of that burning in the mother country.[1] Not before the three curiae united their fires into one could Rome become powerful; and Athens became a shining light to the world only, we are told, when the twelve tribes of Attica, led by Theseus, brought each its brand to the altar of Athene Polias. All Greece confederated, making Delphi its central hearth; and the islands congregated around Delos, whence the new fire was fetched every year.

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Periodic Fires.—Because the sun loses its force after noon, and after midsummer daily shortens the length of its circuit, the ancients inferred, and primitive populations still believe, that, as time goes on, the energies of fire must necessarily decline. Therefore men set about renewing the fires in the temples and on the hearth on the longest day of summer or at the beginning of the agricultural year. The ceremony was attended with much rejoicing, banqueting and many religious rites. Houses were thoroughly cleansed; people bathed, and underwent lustrations and purifications; new clothes were put on; quarrels were made up; debts were paid by the debtor or remitted by the creditor; criminals were released by the civil authorities in imitation of the heavenly judges, who were believed to grant on the same day a general remission of sins. All things were made new; each man turned over a new page in the book of his existence. Some nations, like the Etruscans in the Old World and the Peruvians and Mexicans in the New, carried these ideas to a high degree of development, and celebrated with magnificent ceremonies the renewal of the *saecula*, or astronomic periods, which might be shorter or longer than a century. Some details of the festival among the Aztecs have been preserved. On the last night of every period (52 years) every fire was extinguished, and men proceeded in solemn procession to some sacred spot, where, with awe and trembling, the priests strove to kindle a new fire by friction. It was as if they had a vague idea that the cosmos, with its sun, moon and stars, had been wound up like a clock for a definite period of time. And had they failed to raise the vital spark, they would have believed that it was because the great fire was being extinguished at the central hearth of the world. The Stoics and many other ancient philosophers thought that the world was doomed to final extinction by fire. The Scandinavian bards sung the end of the world, how at last the wolf Fenrir would get loose, how the cruel fire of Loki would destroy itself by destroying everything. The Essenes enlarged upon this doctrine, which is also found in the Sibylline books and appears in the Apocrypha (2 Esdras xvi. 15).

See Dupuis, *Origine de tous les cultes* (1794); Burnout, *Science des religions*; Grimm, *Deutsche Mythologie*, cap. xx. (1835); Adalbert Kuhn. *Die Herabkunft des Feuers und des Göttertranks* (1859); Steinthal, *Über die ursprüngliche Form der Sage von Prometheus* (1861); Albert Reville, “Le Mythe de Prométhée,” in *Revue des deux mondes* (August 1862); Michel Bréal, *Hercule et Cacus* (1863); Tylor, *Researches into the Early History of Mankind*, ch. ix. (1865); Bachofen, *Die Sage von Tanaquil* (1870); Lord Avebury, *Prehistoric Times* (6th ed., 1900); Haug, *Religion of the Parsis* (1878).

(E. Re.)

1 Curiously enough we see the same institution obtaining among the Damaras of South Africa, where the chiefs, who sway their people with a sort of priestly authority, commit to their daughters the care of a so-called eternal fire. From its hearth younger scions separating from the parent stock take away a burning brand to their new home. The use of a common prytaneum, of circular form, like the Roman temple of Vesta, testified to the common origin of the North American Assinais and Maichas. The Mobiles, the Chippewas, the Natchez, had each a corporation of Vestals. If the Natchez let their fire die out, they were bound to renew it from the Mobiles. The Moquis, Pueblos and Comanches had also their perpetual fires. The Redskins discussed important affairs of state at the “council fires,” around which each *sachem* marched three times, turning to it all the sides of his person. “It was a saying among our ancestors,” said an Iroquois chief in 1753, “that when the fire goes out at Onondaga”—the Delphi of the league —“we shall no longer be a people.”

FIRE AND FIRE EXTINCTION. Fire is considered in this article, primarily, from the point of view of the protection against fire that can be accorded by preventive measures and by the organization of fire extinguishing establishments.

History is full of accounts of devastation caused by fires in towns and cities of nearly every country in the civilized world. The following is a list of notable fires of early days:—

Great Britain and Ireland

798. *London*, nearly destroyed.

982. *London*, greater part of the city burned.

1086. *London*, all houses and churches from the east to the west gate burned.

1212. *London*, greater part of the city burned.

1666. *London*, "The Great Fire," September 2-6.

> It began in a wooden house in Pudding Lane, and burned for three days, consuming the buildings on 436 acres, 400 streets, lanes, &c., 13,200 houses, with St Paul's church, 86 parish churches, 6 chapels, the guild-hall, the royal exchange, the custom-house, many hospitals and libraries, 52 companies' halls, and a vast number of other stately edifices, together with three of the city gates, four stone bridges, and the prisons of Newgate, the Fleet, and the Poultry and Wood Street Compters. The fire swept from the Tower to Temple church, and from the N.E. gate to Holborn bridge. Six persons were killed. The total loss of property was estimated at the time to be £10,731,500.

1794. *London*, 630 houses destroyed at Wapping. Loss above £1,000,000.

1834. *London*, Houses of Parliament burned.

1861. *London*, Tooley Street wharves, &c., burned. Loss estimated at £2,000,000.

1873. *London*, Alexandra palace destroyed.

1137. *York*, totally destroyed.

1184. *Glastonbury*, town and abbey burned.

1292. *Carlisle*, destroyed.

1507. *Norwich*, nearly destroyed; 718 houses burned.

1544. *Leith*, burned.

1598. *Tiverton*, 400 houses and a large number of horses burned; 33 persons killed. Loss, £150,000.

1612. *Tiverton*, 600 houses burned. Loss over £200,000.

1731. *Tiverton*, 300 houses burned.

1700. *Edinburgh*, "the Great Fire."

1612. *Cork*, greater part burned, and again in 1622.

1613. *Dorchester*, nearly destroyed. Loss, £200,000.

1614. *Stratford-on-Avon*, burned.

1644. *Beaminster*, burned. Again in 1684 and 1781.

1675. *Northampton*, almost totally destroyed.

1683. *Newmarket*, large part of the town burned.

1694. *Warwick*, more than half burned; rebuilt by national contribution.

1707. *Lisburn*, burned.

1727. *Gravesend*, destroyed.

1738. *Wellingborough*, 800 houses burned.

1743. *Crediton*, 450 houses destroyed.

1760. *Portsmouth*, dockyard burned. Loss, £400,000.

1770. *Portsmouth*, dockyard burned. Loss, £100,000.

1802. *Liverpool*, destructive fire. Loss, £1,000,000.

1827. *Sheerness*, 50 houses and much property destroyed.

1854. *Gateshead*, 50 persons killed. Loss, £1,000,000.

1875. *Glasgow*. Great fire. Loss, £300,000.

France

59. *Lyons*, burned to ashes. Nero offers to rebuild it.

1118. *Nantes*, greater part of the city destroyed.

1137. *Dijon*, burned.

1524. *Troyes*, nearly destroyed.

1720. *Rennes*, on fire from December 22 to 29. 850 houses burned.

1784. *Brest*. Fire and explosion in dockyard. Loss, £1,000,000.

1862. *Marseilles*, destructive fire.

1871. *Paris*. Communist devastations. Property destroyed, £32,000,000.

Central and Southern Europe

64. *Rome* burned during 8 days. 10 of the 14 wards of the city were destroyed.

1106. *Venice*, greater part of the city was burned.

1577. " fire at the arsenal, greater part of the city ruined by an explosion.

1299. *Weimar*, destructive fire; also in 1424 and 1618.

1379. *Memel* was in large part destroyed, and again in 1457, 1540, 1678, 1854.

1405. *Bern* was destroyed.

1420. *Leipzig* lost 400 houses.

1457. *Dort*, cathedral and large part of the town burned.

1491. *Dresden* was destroyed.

1521. *Oviedo*, large part of the city destroyed.

1543. *Komorn* was burned.

1634. *Fürth* was burned by Austrian Croats.

1680. *Fürth* was again destroyed.

1686. *Landau* was almost destroyed.

1758. *Pirna* was burned by Prussians. 260 houses destroyed.

1762. *Munich* lost 200 houses.

1764. *Königsberg*, public buildings, &c., burned. Loss, £600,000.

1769. *Königsberg*, almost destroyed.

1784. *Rokitzan* (Bohemia) was totally destroyed. Loss, £300,000.

1801. *Brody*, 1500 houses destroyed.

1859. *Brody*, 1000 houses destroyed.

1803. *Posen*, large part of older portion of city burned.

1811. Forest fires in Tyrol destroyed 64 villages and hamlets.

1818. *Salzburg* was partly destroyed.

1842. *Hamburg*. A fire raged for 100 hours, May 5-7.

> During the fire the city was in a state of anarchy. 4219 buildings, including 2000 dwellings, were destroyed. One-fifth of the population was made homeless, and 100 persons lost their lives. The total loss amounted to £7,000,000. After the fire, contributions from all Germany came in to help to rebuild the city.

1861. *Glarus* (Switzerland), 500 houses burned.

Northern Europe

1530. *Aalborg*, almost entirely destroyed.

1541. *Aarhuus*, almost entirely destroyed, and again in 1556.

1624. *Opslo*, nearly destroyed. Christiania was built on the site.

1702. *Bergen*, greater part of the town destroyed.

1728. *Copenhagen*, nearly destroyed. 1650 houses burned, 77 streets.

1794. *Copenhagen*, royal palace with contents burned.

1795. *Copenhagen*, 50 streets, 1563 houses burned.

1751. *Stockholm*, 1000 houses destroyed.

1759. *Stockholm*, 250 houses burned. Loss, 2,000,000 crowns.

1775. *Åbo*, 200 houses and 15 mills burned.

1827. *Åbo*, 780 houses burned, with the university.

1790. *Carlscrona*, 1087 houses, churches, warehouses, &c., destroyed.

1802. *Gothenburg*, 178 houses burned.

1858. *Christiania*. Loss estimated at £250,000.

1865. *Carlstadt* (Sweden), everything burned except the bishop’s residence, hospital and jail. 10 lives lost.

Russia

1736. *St Petersburg*, 2000 houses burned.

1862. *St Petersburg*, great fire. Loss, £1,000,000.

1752. *Moscow*, 18,000 houses burned.

1812. *Moscow*, The Russians fired the city on September 14 to drive out the army of Napoleon. The fire continued five days. Nine-tenths of the city was destroyed. Number of houses burned, 30,800. Loss, £30,000,000.

1753. *Archangel*, 900 houses burned.

1793. *Archangel*, 3000 buildings and the cathedral burned.

1786. *Tobolsk*, nearly destroyed.

1788. *Milau*, nearly destroyed.

1812. *Riga*, partly destroyed.

1834. *Tula*, destructive fire.

1848. *Orel*, large part of the town destroyed.

1850. *Cracow*, large part of the town burned.

1864. *Novgorod*, large amount of property destroyed.

Turkey

The following fires have occurred at *Constantinople*:—

1729. A great fire destroyed 12,000 houses and 7000 people.

1745. A fire lasted five days.

1750. In January, 10,000 houses burned; in April, property destroyed estimated from £1,000,000 to £3,000,000. Later in the year 10,000 houses were destroyed.

1751. 4000 houses were burned.

1756. 15,000 houses and 100 people destroyed. During the years 1761, 1765 and 1767 great havoc was made by fire.

1769. July 17. A fire raged for twelve hours, extending nearly 1 m. in length. Many of the palaces, some small mosques and nearly 650 houses were destroyed.

1771. A fire lasting 15 hours consumed 2500 houses and shops.

1778. 2000 houses were burned.

1782. August 12. A fire burned three days: 10,000 houses, 50 mosques and 100 corn mills destroyed; 100 lives lost. In February, 600 houses burned; in June, 7000 more.

1784. August 5. A fire burned for 26 hours and destroyed 10,000 houses, most of which had been rebuilt since the fires of 1782. In the same year, March 13, a fire in the suburb of Pera destroyed two-thirds of that quarter. Loss estimated at 2,000,000 florins.

1791. Between March and July 32,000 houses are said to have been burned, and as many in 1795.

1799. In the suburb of Pera 13,000 houses were burned and many magnificent buildings.

1816. August 16. 12,000 houses and 3000 shops in the finest quarter were destroyed.

1818. August 13. A fire destroyed several thousand houses.

1826. A fire destroyed 6000 houses.

1848. 500 houses and 2000 shops destroyed. Loss estimated at £3,000,000.

1865. A great fire destroyed 2800 houses, public buildings, &c. Over 22,000 people were left homeless.

1870. June 5. The suburb of Pera, occupied by the foreign population and native Christians, was swept by a fire which destroyed over 7000 buildings, many of them among the best in the city, including the residence of the foreign legations. Loss estimated at nearly £5,000,000.

1797. *Scutari*, the town of 3000 houses totally destroyed.

1763. *Smyrna*, 2600 houses consumed. Loss, £200,000.

1772. *Smyrna*, 3000 dwellings burned. 3000 to 4000 shops, &c. consumed. Loss, £4,000,000.

1796. *Smyrna*, 4000 shops, mosques, magazines, &c., burned.

1841. *Smyrna*, 12,000 houses were burned.

India

1631. *Rajmahal*. Palace and great part of the town burned.

1799. *Manilla*, vast storehouses were burned.

1833. *Manilla*, 10,000 huts were burned, March 26. 30,000 people rendered homeless, and 50 lives lost.

1803. *Madras*, more than 1000 houses burned.

1803. *Bombay*. Loss by fire of £600,000.

China and Japan

1822. *Canton* was nearly destroyed by fire.

1866. *Yokohama*, two-thirds of the native town and one-sixth of the foreign settlement destroyed.

1872. *Yeddo*. A fire occurred in April during a gale of wind, destroying buildings covering a space of 6 sq. m. 20,000 persons were made homeless.

1873. *Yeddo*. A fire destroyed 10,000 houses.

United States

1679. *Boston*. All the warehouses, 80 dwellings, and the vessels in the dockyards were consumed. Loss, £200,000.

1760. *Boston*. A fire caused a loss estimated at £100,000.

1787. *Boston*. A fire consumed 100 buildings, February 20.

1794. *Boston*. 96 buildings were burned. Loss, £42,000.

1872. *Boston*. Great fire, November 9-10. By this fire the richest quarter of Boston was destroyed.

> The fire commenced at the corner of Summer and Kingston streets. The area burned over was 65 acres. 776 buildings, comprising the largest granite and brick warehouses of the city, filled with merchandise, were burned. The loss was about £15,000,000. Before the end of the year 1876 the burned district had been rebuilt more substantially than ever.

1778. *Charleston* (S.C.). A fire caused the loss of £100,000.

1796. *Charleston*, 300 houses were burned.

1838. *Charleston*. One-half the city was burned on April 27. 1158 buildings destroyed. Loss, £600,000.

1802. *Portsmouth* (N.H.), 102 buildings destroyed.

1813. *Portsmouth*, 397 buildings destroyed.

1820. *Savannah*, 463 buildings were burned. Loss, £800,000.

1835. *New York*. The great fire of New York began in Merchant Street, December 16, and burned 530 buildings in the business part of the city. 1000 mercantile firms lost their places of business. The area burned over was 52 acres. The loss was £3,000,000.

1845. *New York*. A fire in the business part of the city, July 20, destroyed 300 buildings. The loss was £1,500,000. 35 persons were killed.

1845. *Pittsburg*. A large part of the city burned, April 11. 20 squares, 1100 buildings destroyed. Loss, £2,000,000.

1846. *Nantucket* was almost destroyed.

1848. *Albany*. 600 houses burned, August 17. Area burned over 37 acres, one-third of the city. Loss, £600,000.

1849. *St Louis*. 23 steamboats at the wharves, and the whole or part of 15 blocks of the city burned, May 17. Loss, £600,000.

1851. *St Louis*. More than three-quarters of the city was burned, May 4. 2500 buildings. Loss, £2,200,000.

1851. *St Louis*, 500 buildings burned. Loss, £600,000.

1850. *Philadelphia*. 400 buildings burned, July 9. 30 lives lost. Loss, £200,000.

1865. *Philadelphia*. 50 buildings burned, February 8. 20 persons killed. Loss, £100,000.

1851. *Washington*. Part of the Capitol and the whole of the Congressional Library were burned.

1851. *San Francisco*. On May 4-5 a fire destroyed 2500 buildings. A number of lives lost. More than three-fourths of the city destroyed. Loss, upwards of £2,000,000. In June another fire burned 500 buildings. Loss estimated at £600,000.

1857. *Chicago*. A fire destroyed over £100,000. 14 lives lost.

1859. *Chicago*. Property destroyed worth £100,000, Sept. 15.

1866. *Chicago*. Two fires on August 10 and November 18. Loss, £100,000 each.

1871. *Chicago*. The greatest fire of modern times.

> It began in a barn on the night of the 8th of October and raged until the 10th. The area burned over was 2124 acres, or 3⅓ sq. m., of the very heart of the city. 250 lives were lost, 98,500 persons were made homeless, and 17,430 buildings were consumed. The buildings were one-third in number and one-half in value of the buildings of the city. Before the end of 1875 the whole burned district had been rebuilt. The loss was estimated at £39,000,000.

1862. *Troy* (N.Y.) was nearly destroyed by fire.

1866. *Portland* (Maine). Great fire on July 4. One-half of the city was burned; 200 acres were ravaged; 50 buildings were blown up to stop the progress of the fire. Loss, £2,000,000 to £2,250,000.

1871. October. Forest and prairie fires in Wisconsin and Michigan. 15,000 persons were made homeless; 1000 lives lost. Loss estimated at £600,000.

British North America

1815. *Quebec* was injured to the extent of £260,000.

1845. *Quebec*, 1650 houses were burned, May 28. One-third of the population made homeless. Loss from £400,000 to £750,000. Another fire, on June 28, consumed 1300 dwellings. 6000 persons were made homeless. 30 streets destroyed. Insurance losses, £60,770.

1866. *Quebec*, 2500 houses and 17 churches in French quarter burned.

1825. *New Brunswick*. A tract of 4,000,000 acres, more than 100 m. in length, was burned over; it included many towns. 160 persons killed, and 875 head of cattle. 590 buildings burned. Loss, about £60,000. Towns of Newcastle, Chatham and Douglastown destroyed.

1837. *St John* (New Brunswick). 115 houses burned, January 13, and nearly all the business part of the city. Loss, £1,000,000.

1877. *St. John.* Great fire on June 21. The area burned over was 200 acres. 37 streets and squares totally or in part destroyed; 10 m. of streets; 1650 dwellings. 18 lives lost. Total loss, £2,500,000. Two-fifths of the city burned.

1846. *St John's* (Newfoundland) was nearly destroyed, June 9. Two whole streets burned upwards of 1 m. long. Loss estimated at £1,000,000.

1850. *Montreal*. A fire destroyed the finest part of the city on June 7. 200 houses were burned.

1852. *Montreal*. A fire on July 9 rendered 10,000 people destitute. The space burned was 1 m. in length by ½ m. in width, including 1200 houses. Loss, £1,000,000.

South America

1536. *Cuzco* was nearly consumed.

1861. *Mendoza*. A great fire followed an earthquake which had destroyed 10,000 people.

1862. *Valparaiso* was devastated by fire.

1863. *Santiago*. Fire in the Jesuit church; 2000 persons, mostly women and children, perished.

West Indies

1752. *Pierre* (Martinique) had 700 houses burned.

1782. *Kingston* (Jamaica) had 80 houses burned. Loss, £500,000.

1795. *Montego Bay* (Jamaica). Loss by fire of £400,000.

1805. *St Thomas.* 900 warehouses consumed. Loss, £6,000,000.

1808. *Spanish Town* (Trinidad) was totally destroyed. Loss estimated at £1,500,000.

1828. *Havana* lost 350 houses; 2000 persons reduced to poverty.

1843. *Port Republicain* (Haiti). Nearly one-third of the town was burned.

Since this list was compiled, there have been further notable fires, more particularly in North America, the great conflagrations at Chicago, Baltimore and San Francisco being terrible examples. But speaking generally, these conflagrations, extensive as they were, only repeated the earlier lessons as to the necessity

of combating the general negligence of the public by attaching far greater importance to the development of fire-preventive measures even than to the better organization of the fire-fighting establishments.

It may be of interest to mention notable fires in the British empire, and London in particular, during the decade 1890 to 1899:—

Port of Spain (Trinidad)	March 4, 1895
New Westminster (British Columbia)	Sept. 10, 1898
Toronto (Ontario)	Jan. 6, 10, and March 3, 1895
Windsor (Nova Scotia)	Oct. 17, 1897
St John's (Newfoundland)	July 8, 1892
London—Charterhouse Square	Dec. 25, 1889
” St Mary Axe	July 18, 1893
” Old Bailey and Fleet Street	Nov. 15, 1893
” Tabernacle Street, Finsbury	June 21, 1894
” Bermondsey Leather Market	Sept. 13, 1894
” Bermondsey Leather Market	May 17, 1895
” Minories	Nov. 10, 1894
” South-West India Docks	Feb. 8, 1895
” Charlotte and Leonard Streets, Finsbury	June 10, 1896
” Cripplegate	Nov. 19, 1897
Nottingham	Nov. 17, 1894
Sheffield	Dec. 21, 1893
Bradford	Nov. 30, 1896
Sunderland	July 18, 1898
Dublin	May 4, 1894
Glasgow—Anderston Quay	Jan. 16, 1897
Glasgow—Dunlop Street	April 25, 1898

As to fires in any one specific class of building, the extraordinary number of fires that occurred in theatres and similar places of public entertainment up to the close of the 19th century calls for mention. Since that time, however, there has been a considerable abatement in this respect, owing to the adoption of successful measures of fire prevention. A list of some 1100 fires was published by Edwin O. Sachs in 1897 (*Fires at Public Entertainments*), and the results of these fires analysed. They involved a recorded loss of life to the extent of 9350 souls. About half of them (584) occurred in Europe, and the remainder in other parts of the world. Since the publication of that list extraordinary efforts have been made in all countries to reduce the risk of fires in public entertainments. The only notable disaster that has occurred since was that at the Iroquois Theatre at Chicago.

The annual drain in loss of life and in property through fires is far greater than is generally realized, and although the loss of life and property is being materially reduced from year to year, mainly by the fire-preventive measures that are now making themselves felt, the annual fire wastage of the world still averages quite £50,000,000 sterling. It is extremely difficult to obtain precise data as to the fire loss, insured and uninsured, but it may be assumed that in Great Britain the annual average loss by fire, towards the end of the 19th century (say 1897), was about £17,000,000 sterling, and that this had been materially reduced by 1909 to probably somewhere about £12,000,000 sterling. This extraordinary diminution in the fire waste of Great Britain,—in spite of the daily increasing number of houses, and the increasing amount of property in buildings—is in the main owing to the fire-preventive measures, which have led to a better class of new building and a great improvement in existing structures, and further, to a greater display of intelligence and interest in general fire precautionary measures by the public.

Notable improvements in the fire service have been effected, more particularly in London and in the country towns of the south of England since 1903. The International Fire Exhibition held in 1903 at Earl's Court, and the Fire Prevention Congress of the same year, may be said to have revolutionized thought on the subject of fire brigade organization and equipment in the British empire; but, for all that, the advance made by the fire service has not been so rapid as the development of the fire-preventive side of fire protection.

Fire Protection.—The term "Fire Protection" is often misunderstood. Fire-extinguishing—in other words, fire brigade work—is what the majority understand by it, and many towns consider themselves well protected if they can boast of an efficiently manned fire-engine establishment. The fire brigade as such, however, has but a minor rôle in a rational system of protection. Really well-protected towns owe their condition in the first place to properly applied preventive legislation, based on the practical experience and research of architects, engineers, fire experts and insurance and municipal officials. Fire protection is a combination of fire prevention, fire combating and fire research.

Under the heading of "Fire Prevention" should be classed all preventive measures, including the education of the public; and under the heading "Fire Combating" should be classed both self-help and outside help.

Preventive measures may be the result of private initiative, but as a rule they are defined by the local authority, and contained partly in Building Acts, and partly in separate codes of fire-survey regulations—supplemented, if necessary, by special rules as to the treatment of extraordinary risks, such as the storage of petroleum, the manufacture of explosives, and theatrical performances. The education of the public may be simply such as can be begun informally at school and continued by official or semi-official warnings, and a judicious arrangement with the newspapers as to the tendency of their fire reports.

> Such forms of training have already been successfully introduced. There are English towns where the authorities have, for instance, had some of the meaningless fables of the old elementary school *Standard Reader* replaced by more instructive ones, which warn children not to play with matches, and teach them to run for help in case of an emergency. Instructive copy-book headings have been arranged in place of the meaningless sentences so often used in elementary schools. There are a number of municipalities where regular warnings are issued every December as to the dangerous Christmas-tree. In such places every

inhabitant has at least an opportunity of learning how to throw a bucket of water properly, and how to trip up a burning woman and roll her up without fanning the flames. The householder is officially informed where the nearest fire-call point is, and how long he must expect to wait till the first engine can reach his house. If he is a newspaper reader, he will also have ample opportunity of knowing the resources of his town, and the local reporter's fire report will give him much useful information based on facts or hints supplied by the authorities.

Both self-help and outside help must be classed under the heading of "Fire Combating." Self-help mainly deals with the protection of large risks, such as factories, stores and public places of amusement, which lend themselves to regulation. The requirements of the fire survey code may allow for hydrants or sprinklers in certain risks, and also for their regular inspection, and the means for self-help may thus be given. These means will, however, probably not be properly employed unless some of the employés engaged on the risk are instructed as to their purpose, and have confidence in the apparatus at their disposal. The possibility of proper self-help in dangerous risks may be encouraged by enforcing regular drills for the employés, and regular inspections to test their efficiency. There are towns where great reliance is placed on the efforts of such amateur firemen. In some cities they even receive extra pay and are formed into units, properly uniformed and equipped, and retained by the fire brigade as a reserve force for emergencies.

Self-help for the shopkeeper, the lodger or the householder can scarcely be regulated. The opportunities already mentioned for the education of the public, if properly utilized, would assure intelligent behaviour on the part of a large percentage of the community. There are places where, without any regulation being attempted, and thanks entirely to the influence referred to, most residences can boast of a hand-pump, a bucket, and a crowbar, the proper use of which is known to most of the household. Self-help in small risks may, however, be distinctly encouraged by the authorities, without any irksome interference with personal liberty, simply by the provision of street pillar-boxes, with the necessaries of first aid, including perhaps a couple of scaling ladders, and, further, by opportunities being given to householders to learn how to handle them. If a street pillar-box of this kind be put in a fire-station, and certain afternoons in the year be reserved on which this elementary instruction will be given, and the students afterwards shown over the fire-station or treated to a "turn-out," a considerable number will be found to take advantage of the opportunity. No matter whether curiosity or real interest brings them, the object in view will be attained.

Under "outside" help should be understood what is organized, and not simply such as is tendered by the casual passer-by or by a neighbour. The link between self-help and outside help is the fire-call.

The Fire-Call.—The efficiency of the fire-call depends not only on the instrument employed and its position, but also on its conspicuous appearance, and the indications by which its situation may be discovered. These indications are quite as important as the instruments themselves. The conspicuousness of the instrument alone does not suffice. Of the official notifications given in the press, those in regard to the position of the call-points are among the most useful. An indication at every street corner as to the direction to take to reach the point—or perhaps better, the conspicuous advertisement Of the nearest call-point over every post pillar-box and inside every front door—may enable the veriest stranger to call assistance, and minimize the chances of time being lost in search of the instrument. It is immaterial for the moment whether the helpers are called by bell outside a fire-station, by a messenger from some special messenger service, by a call through a telephone, or by an electric or automatic appliance. Any instrument will do that ensures the call being transmitted with maximum speed and certainty and in full accord with the requirements of the locality.

Outside Help.—Organized outside help may not be limited simply to the attendance of the fire brigade. Special arrangements can be made for the attendance of the local police force, a public or private salvage corps, an ambulance, or, in some cases, a military guard. Then in some instances arrangements are made for the attendance of the water and gas companies' servants, and even officials from the public works office, insurance surveyors, and the Press. There are places where the salvage corps arrives on the scene almost simultaneously with the fire brigade, and others where the police are generally on the spot in good force five minutes after the arrival of the first engines. There are several cities where the ambulance wagon and the steamers arrive together, and another city where the military authorities always send a fire piquet which can be turned out in a few minutes.

If all these helpers come together, no matter how high the rank of the individual commanders, the senior officer of the fire brigade, even if he holds only non-commissioned officer's rank, should have control, and his authority be fully recognized. Unfortunately, there are not many countries where this is the case. The efficiency of outside help depends in the first instance on the clear definition of the duties and powers of all concerned—on the legal foundation, in fact; then on the organization, the theoretically as well as practically correct executive; and, last but by no means least, on the prestige, the social standing, the education of commanders and their ability to handle men. Among the rank and file of the brigade, clear-headedness, pluck, smartness and agility will be as invaluable as reckless dare-devilry; showy acrobatism, or an unhealthy ambition for public applause, will be dangerous.

Research.—Under the heading "Fire Research" should be included theoretical and experimental investigation as to materials and construction, combined with the chronicling of practical experience in fires, then the careful investigation and chronicling of the causes of fires, assisted where necessary by a power for holding fire inquests in interesting, suspicious or fatal cases. Experimental investigation as to natural and accidental causes as distinct from criminal causes can be included. Research in criminal cases may be assisted not only by a fire inquest, but also by immediate formal inquiries held on the spot, by the senior fire brigade and police officers present, or by immediate government investigations held on the same lines as inquiries into explosions and railway accidents.[1] As to general research work, there are several cities which contribute substantially towards the costs of fire tests at independent testing stations. Some towns also have special commissions of experts who visit all big fires occurring within easy travelling distance, take photographs and sketches, and issue reports as to how the materials were affected. Then there are the usual statistics as to outbreaks, their recurrence and causes, and in some places such tables are supplemented by

reports on experiments with oil lamps, their burners and wicks, electric wiring, and the like.

The British Fire Prevention Committee.—The British Fire Prevention Committee is an organization founded a few days after the great Cripplegate (London) fire in 1897, and incorporated in February 1899. It comprises some 500 members and subscribers. The members include civil engineers, public officials holding government appointments, fire chiefs, insurance surveyors and architects, whilst the subscribers in the main include the great public departments, such as the admiralty and war office, and municipalities, such as the important corporations of Glasgow, Liverpool and the like. Colonial government departments and municipalities are also on the roll, together with a certain number of colonial members. New Zealand has formed a special section having its own local honorary secretary. The ordinary work of the committee is carried out by a council and an executive, and the necessary funds are provided by the subscription of members and subscribers. The services of the members of council and executive are given gratuitously, no out-of-pocket expenses of any kind being refunded. Whilst the routine work deals mainly with questions of regulations, rules and publications of general technical interest, the tests are probably what have brought the committee into prominence and given it an international reputation. They are not only the recognized fire tests of Great Britain, but they rank as universal standard tests for the whole of the civilized world, and Americans, just as much as Danes, Germans or Austrians, pride themselves when some product of their country has passed the official procedure of a test by the committee. The reports of the tests, which state facts only without giving criticisms or recommendations, are much appreciated by all who have the control of public works or the specification of appliances. The committee does not limit itself solely to testing proprietary forms of construction or appliances, but has a number of tests—quite equal to the proprietary tests—of articles in general use. The ordinary concrete floor or the ordinary wooden joist floor protected by asbestos boards or slag wool receives as much attention as a patent floor; and similarly the ordinary everyday hydrant receives equal attention with the patent hydrant, or ordinary bucket of water with the special fire extinguisher. The door tests of the committee, which cover some thirty different types of doors, deal with no less than twenty ordinary wooden doors that can be made by any ordinary builder or cabinet-maker. These so-called non-proprietary tests are made at the expense of the general funds of the committee, whilst for the proprietary tests the owners have to pay about two-thirds of the expenses incurred in the form of a testing fee. The expenses incurred in a test, of course, not only comprise the actual testing operation of testing, but also the expense of producing the report, which is always a very highly finished publication with excellent blocks. The expense incurred also includes the establishment expenses of the testing station at Regent's Park.

The British Fire Prevention Committee organized the great Fire Exhibition and International Fire Congress of London in 1903, in both of which it enjoyed the support and assistance of the National Fire Brigades Union and the Association of Professional Fire Chiefs. It from time to time despatches special commissions to the continent of Europe, and these visits are followed by the issue of official reports, well illustrated, presenting the appliances, rules and methods of the countries visited, and serving as most useful reference publications.

Taken generally, the whole of the work of the committee, both in respect of scientific investigations and propagandism, has been most beneficial. Fire waste has been materially reduced, regardless of the fact of the greater fire hazards and the ever-growing amount of property. In Great Britain alone the sum saved in fire wastage annually is about £5,000,000. This great annual saving has been obtained at an expenditure in research work, as far as the British Fire Prevention Committee is concerned, of about £23,000, of which more than half was provided by the membership in voluntary contributions or subscriptions.

There is no similar institution anywhere in the world, although several government laboratories occasionally undertake fire tests, notably the Gross Lichterfelde laboratory near Berlin, and several insurance corporations have testing plants, notably the American Underwriters at Chicago. The efforts at research work outside Great Britain have, however, been spasmodic and in no way compare with the systematic series of inquiries conducted without any substantial state aid in London.

Distribution of Losses.—Property destroyed by fire is practically an absolute loss. This loss may actually only affect the owner, or it may be distributed among a number of people, who are taxed for it in the form of a contribution to their national or local fire fund, a share in some mutual insurance "ring," or the more usual insurance companies' premium. In the first two cases some expenses have also to be met in connexion with the management of the fund, "tariff" organization, or "ring." In the last case, not only the expenses of management have to be covered, but also the costs incurred in running the insurance enterprise as such, and then a further amount for division amongst those who share the risk of the venture—namely, the insurance company's shareholders.

It is well to distinguish between loss and mere expenditure. The sinking fund of the large property owner should cover a loss with a minimum extra expense; insurance in an extravagantly managed company paying large dividends will cover a loss, but with an unnecessarily large extra outlay. In every case the loss remains; and as property may always be considered part of the community, the province or nation, as the case may be, suffers. It is always in the interest of a nation to minimize its national losses, no matter whether they fall on one individual's shoulders or on many, and whether such losses are good for certain trades or not. With a suitable system of fire protection it is possible to bring these losses to a minimum, but this minimum would probably only be reached by an extra expense, which would fall heavier on the insurers' pockets in the form of municipal rates than the higher premium for the greater risk. A practical minimum is all that can be attempted, and that practical minimum varies according to circumstances.

Practical protection must mean smaller annual insurance dues, and the actual extra cost of this protection should be something less than the saving off these dues. Then not only has the nation a smaller dead loss, but the owner also has a smaller annual expenditure for his combined contributions toward the losses, the management of his insurance, and the protective measures. Where there is mutual insurance or municipal insurance in its best sense, the losses by fire and the costs of the protection are often booked in one account, and the better protection up to a certain point should mean a smaller individual annual share. Where there is company insurance the municipal rates are increased to cover the cost of extra protection, while a proportionate decrease is expected in the insurance premiums. Competition and public opinion generally impose this decrease of the insurance rates as soon as there is a greater immunity from fire. Where the

insurance companies are well managed and the shareholders are satisfied with reasonable dividends, practical protection can be said to find favour with all concerned, but if the protection is arranged for and the companies do not moderate their charges accordingly, the reverse is the case.

The position of insurance companies subscribing towards the maintenance of a fire brigade should here be referred to, as there is considerable misunderstanding on the subject. The argument which municipalities or fire brigade organizations often use is to the effect that the insurance companies derive all the profit from a good fire service, and should contribute towards its cost. Where properly managed companies have the business, a better fire service, however, means a smaller premium to the ratepayer. If the ratepayer has to pay for extra protection in the form of an increased municipal rate, or in the form of an increased premium raised to meet the contribution levied, this is simply juggling with figures.

Cost.—As to the cost of a practical system of fire protection, better and safer building from the fire point of view means better and more valuable structures of longer life from the economic aspect. Such better and safer constructional work pays for itself and cannot be considered in the light of an extra tax on the building owner. The compilation and administration of the fire protective clauses in a Building Act would be attended to by the same executive authorities as would in any case superintend general structural matters, and the additional work would at the most require some increased clerical aid. If the execution of the fire survey regulations were delegated to the same authority there would again simply be some extra clerical aid to pay for, and the salaries of perhaps a few extra surveyors. To make the inspections thoroughly efficient, it has been found advisable in several instances to form parties of three for the rounds. The second man would, in this case, be a fire brigade officer, and the third probably a master chimney-sweep, who would have to receive a special retaining fee.

The cost of the public training referred to would be small, as the elementary part would simply be included in the schoolmaster’s work, and the Press matters could be easily managed in the fire brigade office. Payments would have only to be made for advertisements, such as the official warnings, lists for fire-call points, &c., and perhaps for the publication of semi-official hints. Self-help, as far as inspection and drills for amateurs are concerned would be under the control of the fire brigade. There would, however, be an extra expense for the purchase and maintenance of the street first-aid appliances referred to.

The most expensive items in the system of fire protection undoubtedly come under the headings “Fire-Call” and “Fire Brigade.” As to the former, there are a number of cities where the cost is modified by having the whole of the electrical service for the police force, the ambulance and fire brigade, managed by a separate department. The same wires call up each of these services, and, as the same staff attend to their maintenance, the fire protection of a city need only be debited with perhaps a third of the outlay it would occasion if managed independently. The combined system has also the great advantage of facilitating the mutual working of the different services in case of an emergency. The indicators which have been referred to involve an outlay; but here again, if the three services work together, the expenses on the count of fire protection can be lessened. The money rewards given in some cities to the individuals who first call the fire-engines may become a heavy item. Their utility is doubtful, and they have formed an inducement for arson.

As to the outlay on fire brigade establishment, a strong active force should be provided, supported by efficient reserves. The latter should be as inexpensive as possible, but should at least constitute a part-paid and disciplined body which could be easily called in for emergencies. Fire brigade budgets cannot allow for an active force being ready for such coincidences as an unusual number of large fires starting simultaneously, but they must allow for an ample strength always being forthcoming for the ordinary emergencies, and this with all due consideration for men’s rest and possible sickness. An undermanned fire brigade is an anomaly which is generally fatal, not only to the property owner, but also to the whole efficiency and esprit of the force. The budget must also allow for an attractive rate of pay, as the profession is one which requires men who have a maximum of the sterling qualities which we look for in the pick of a nation. It must also not be forgotten that the fire service is one of the few where a system of pensions is the only fair way of recognizing the risks of limb and health, and at the same time securing that stability in which practical experience from long service is so essential a factor. The budget must allow for an ample reserve of appliances.

Whether or not a fire brigade should be so strong as to permit of its having a separate section for salvage corps purposes depends on circumstances. Economically a salvage corps is required, and should be part and parcel of the municipal brigade and organized on the same lines with a reserve, no matter whether the insurance of the locality be managed by the authorities or by companies. If a corps is necessary, it matters little whether it be paid for out of premiums or out of rates.

Of further expenses which have to be considered, there are items for fire research and fire inquest. If managed economically, due confidence being placed in the opinions of the fire officers and surveyors, there is no reason why the outlay should be great. The statistical work would only require some clerical aid. Where special coroners are retained for criminal cases some extra money will of course be required; but even here the costs need not be excessive, as there are many retired fire brigade officers and fire surveyors who are well suited for the work, and would be satisfied with a small emolument.

As to the cost of the water supply, there are but few places where special fire high-pressure mains are laid on in the interests of fire protection. As a rule the costs which are debited to the heading “Fire Protection” have simply to cover the maintenance of hydrants and tablets, or at the most the cost of the water actually used for fire-extinguishing purposes. Sometimes the cost of hydrants is shared with the scavenging department or the commission of sewers, which also have the use of them. Where the provision of water and hydrants falls to a private water company, the property owners will be paying their share for them, indirectly, in the form of water rates.

The protective measures referred to will serve both for life-saving and for the protection of property. It should be remembered that a good staircase and a ladder are often as useful for the manœuvring of the firemen as for life-saving purposes, and that they are practically as essential for the saving of property as for

saving life. No distinction need be made between the two risks when speaking of fire protection in general; but as the safety of the most valueless life is generally classed higher than that of the most valuable property, it may be well to give life-saving the first place when alluding to the two separately.

Criminal fire-raising only prevails where the fire-protective system is defective. With good construction and a fire survey, the quick arrival of the firemen, and careful inquests, the risks of detection are as a rule far too great to encourage its growth.

Saving of Life.—Under “Fire Prevention” special requirements in the Building Act can greatly influence the safety of life by requiring practical exits and sufficient staircase accommodation. The risks in theatres and assembly halls require separate legislation. In ordinary structures no inmate of a building should be more than sixty feet away from a staircase, and preferably there should be two staircases at his disposal in the event of one being blocked. Generally, attention is only given to the construction of staircases; but it must be pointed out that their ventilation is equally important. Smoke is even a greater danger than fire, and may hamper the helpers terribly. The possibility of opening a window has saved many a life.

Safety of Property.—As far as the protection of property is concerned, the prevention of outbreaks can be influenced by the careful construction of flues, hearths, stoves, and in certain classes of buildings by the construction of floors and ceilings, the arrangement of skylights, shutters and lightning conductors. Then comes the prevention of the fire spreading, first, by the division of risks, and secondly, by the materials used in construction.

The legislator’s first ambition must be to prevent a fire in one house from spreading to another, and a stranger’s property, so to say, from being endangered. This is quite possible, given good party walls carried well over the roof to a height regulated by the nature of the risk, the provision of the shutters to windows where necessary, and the use of fire-resisting glass. Again, a thoroughly good roof—or still better, a fire-resisting attic floor—can do much. If the locality has a fire brigade and the force is efficiently handled, “spreads” from one house to another should never occur. Narrow thoroughfares and courts are, however, a source of danger which may baffle all efforts to localize a fire. This should be remembered by those responsible for street improvements.

The division of a building or large “risk” into a number of minor ones is only possible to a certain extent. There is no need to spend enormous sums to make each of the minor “risks” impregnable. The desire should be simply to try to retard the spread for a certain limited time after the flames have really taken hold of the contents. In those minutes most fires will have been discovered, and, where there is an efficient fire-extinguishing establishment, a sufficient number of firemen can be on the spot to localize the outbreak and prevent the conflagration from becoming a big one. In the drawing-room of an ordinary well-built house, for example, if the joists are strong and the boards grooved, if some light pugging be used and the plastering properly done, if the doors are made well-fitting and fairly strong, a very considerable amount of furniture and fittings can remain well alight for half an hour before there is a spread. In a warehouse or factory “risk” the same holds good. With well-built wooden floors, thickly pugged, and the ceilings perhaps run on wire netting or on metal instead of on laths, with ordinary double ledged doors safely hung, at the most perhaps lined with sheet iron or asbestos cloth, a very stiff blaze can be imprisoned for a considerable time. Many of the recent forms of “patent” flooring are exceedingly useful for the division of “risks,” and with their aid a fire can be limited to an individual storey of a building, but it should not be forgotten that even the best of flooring is useless if carried by unprotected iron girders supported, say, by some light framing or weak partition. The general mistake made in using expensive iron and concrete construction is the tendency to allow some breach to be made (for lifts, shafting, &c.), through which the fire spreads, or to forget that the protection of the supports and girder-work requires most careful attention.

Of the various systems of “patent” flooring, as a rule the simpler forms are the more satisfactory. It should, however, always be remembered that any specific form of flooring alone does not prevent a fire breaking from one “risk” to another. They should go hand in hand with general good construction, and naked ironwork must be non-existent. Some of the modern fire-resisting floors are too expensive to permit their introduction for fire protection alone. In considering their introduction, the general advantages which they afford as to spans, thickness, general stability, &c., should be taken into account. A practical installation of floors, partitions, doors, &c., should, first, not increase the cost of a building more than 5%, and secondly should add to the general value of the structure by giving it a more substantial character.

The danger of lift wells, skylights and shaft openings should not be forgotten. The last should be as small as possible, well armed with shutters, the skylights should have fire-resisting glass, and the lifts not only vertical doors, but also horizontal flaps, cutting up the well into sections. The question of light partitions must also not be neglected.

Division of “risks,” common-sense construction, and proper staircase accommodation are really all that fire protection requires, and where the special Building Act clauses have been kept within the lines indicated, there has been little friction and discontent. It is only as a rule when the authorities are eccentric in their demands that the building owner considers himself harassed by protective measures.

Fire survey regulations should mainly aim at preventing the actual outbreak of fire. In certain classes of risks fire survey can also increase the personal safety of the inmates and lessen the possibility of a fire spreading. The provision of fire-escapes or ladders, and a regular inspection of their efficiency, will do much. The examination of a rusty door-catch may save a building. The actual preventive work of the surveyor will, however, mostly consist in warning property owners against temporary stoves standing on ordinary floor boards, sooty chimneys, badly hung lamps, dangerous burners and gas brackets fixed in risky positions. Self-help will be greatly facilitated by the judicious arrangement of fire-extinguishing gear, and a like inspection of its efficiency. Hydrants and cocks must not rust, nor must the hose get so stiff that the water cannot pass through it, or sprinklers choked. Hand pumps and pails must always stand ready filled. One of the greatest errors generally made in distributing such apparatus is disregard of the fact that the amateur likes to have an easy retreat if his efforts are unsuccessful, and if this is not the case, he may not, perhaps, use the gear at

all.

With regard to regulations governing “special risks,” so far as the safety of the public in theatres and public assembly halls is concerned, attention should be chiefly given to the exits. Spread of fire, and even its outbreak, are secondary considerations. A panic caused by the suspicion of a fire can be quite as fatal as that caused by the actual start of a conflagration. In the storage of petroleum in shops, direct communication should be prevented between the shop or cellar and the main staircase or the living rooms. The sale of dangerous lamps and burners should be prohibited.

Fire-resisting Materials.—One of the greatest misnomers in connexion with fire prevention was originally the description of certain materials and systems of construction as being “fire-proof.” This has seriously affected the development of the movement towards fire prevention, for, having regard to the fact that nothing described as “fire-proof” could be fire-proof in the true sense, confidence was lost in everything so described, and in fact everything described as “fire-proof” came to be looked on with suspicion. In order to decrease this suspicion and obtain a better understanding on the subject, the International Fire Prevention Congress of London in 1903, at which some 800 representatives of government departments and municipalities were present, discussed this matter at considerable length, and they arrived at conclusions which, in consideration of their importance in affecting the whole development of fire-resisting construction, are published below. It is the classification of fire resistance adopted by this congress in 1903 that has been utilized by all concerned throughout the British empire, and in numerous other countries, since that date.

The resolutions adopted by the congress embodied the recommendations contained in the following statement issued by the British Fire Prevention Committee:—

> The executive of the British Fire Prevention Committee having given their careful consideration to the common misuse of the term “fire-proof,” now indiscriminately and often most unsuitably applied to many building materials and systems of building construction in use in Great Britain, have come to the conclusion that the avoidance of this term in general business, technical, and legislative vocabulary is essential.
>
> The executive consider the term “fire-resisting” more applicable for general use, and that it more correctly describes the varying qualities of different materials and systems of construction intended to resist the effect of fire for shorter or longer periods, at high or low temperatures, as the case may be, and they advocate the general adoption of this term in place of “fire-proof.”
>
> Further, the executive, fully realizing the great variations in the fire-resisting qualities of materials and systems of construction, consider that the public, the professions concerned, and likewise the authorities controlling building operations, should clearly discriminate between the amount of protection obtainable or, in fact, requisite for different classes of property. For instance, the city warehouse filled with highly inflammable goods of great weight requires very different protection from the tenement house of the suburbs.
>
> The executive are desirous of discriminating between fire-resisting materials and systems of construction affording *temporary* protection, *partial* protection, and *full* protection against fire, and to classify all building materials and systems of construction under these three headings. The exact and definite limit of these three classes is based on the experience obtained from numerous investigations and tests, combined with the experience obtained from actual fires, and after due consideration of the limitations of building practice and the question of cost.
>
> The executive’s minimum requirements of fire-resistance for building materials or systems of construction will be seen from the standard tables appended for—
>
> I. Fire-resisting floors and ceilings,
> II. Fire-resisting partitions,
> III. Fire-resisting doors,
>
> but they could be popularly summarized as follows:—
>
> (*a*) That temporary protection implies resistance against fire for at least three-quarters of an hour.
>
> (*b*) That partial protection implies resistance against a fierce fire for at least one hour and a half.
>
> (*c*) That full protection implies resistance against a fierce fire for at least two hours and a half.
>
> The conditions under this resistance should be obtainable, the actual minimum temperatures, thickness, questions of load, and the application of water can be appreciated from the annexed tables by all technically interested, but for the popular discrimination—-which the executive are desirous of encouraging—the time standard alone should suffice.
>
> It is desirable that these standards become the universal standards in this country, on the continent and in the United States, so that the same standardization may in future be common to all countries, and the preliminary arrangements for this universal standardization are already in hand.

Fire Combating.—As to self-help, complication must always be avoided. The amateur fireman must be drilled on the simplest lines. One thing which must be instilled into him is not to waste water—a sure sign of lack of training. Of course the drills must be on the same lines as those of the local brigade, and on no account should other gear be used for self-help than is generally customary in that force. When volunteers and regulars work together, the former should always remember that the paid force are experts, though the regulars must never have that contempt for volunteer work so often noticeable. Volunteers are often men who are probably experts in some other vocation outside fire-fighting, and have not had the opportunities which a professional fire-fighter has had.

Standard Table for Fire-resisting Floors and Ceilings.

				Load per		Minimum

Classification.	Sub-Class.	Duration of Test. At Least	Minimum Temperature.	Superficial Foot Distributed (per Sq. Metre).	Minimum Superficial Area under Test.	Time for Application of Water under Press.
Temporary Protection	Class A	45 mins.	1500° F. (815.5° C.)	Optional	100 sq. ft. (9.290 sq. m.)	2 mins.
	Class B	60 mins.	1500° F. (815.5° C.)	Optional	200 sq. ft. (18.580 sq. m.)	2 mins.
Partial Protection	Class A	90 mins.	1800° F. (982.2° C.)	112 lb. (546.852 kg.)	100 sq. ft. (9.290 sq. m.)	2 mins.
	Class B	120 mins.	1800° F. (982.2° C.)	168 lb. (820.278 kg.)	200 sq. ft. (18.580 sq. m.)	2 mins.
Full Protection	Class A	150 mins.	1800° F. (982.2° C.)	224 lb. (1093.706 kg.)	100 sq. ft. (9.290 sq. m.)	2 mins.
	Class B	240 mins.	1800° F. (982.2° C.)	280 lb. (1367.130 kg.)	200 sq. ft. (18.258 sq. m.)	5 mins.

kg. = kilogramme.

Standard Table for Fire-resisting Partitions.

Classification.	Sub-Class.	Duration of Test. At Least	Minimum Temperature.	Thickness of material.	Minimum Superficial Area under Test.	Minimum Time for Application of Water under Press.
Temporary Protection	Class A	45 mins.	1500° F. (815.5° C.)	2 in. and under (.051 m.)	80 sq. ft. (7.432 sq. m.)	2 mins.
	Class B	60 mins.	1500° F. (815.5° C.)	Optional	80 sq. ft. (7.432 sq. m.)	2 mins.
Partial Protection	Class A	90 mins.	1800° F. (982.2° C.)	2½ in. and under (.063 m.)	80 sq. ft. (7.432 sq. m.)	2 mins.
	Class B	120 mins.	1800° F. (982.2° C.)	Optional	80 sq. ft. (7.432 sq. m.)	2 mins.
Full Protection	Class A	150 mins.	1800° F. (982.2° C.)	2½ in. and under (.063 m.)	80 sq. ft. (7.432 sq. m.)	2 mins.
	Class B	240 mins.	1800° F. (982.2° C.)	Optional	80 sq. ft. (7.432 sq. m.)	5 mins.

Standard Table for Fire-resisting Single Doors, with or without Frames.

Classification.	Sub-Class.	Duration of Test. At Least	Minimum Temperature.	Thickness of material.	Minimum Superficial Area under Test.	Minimum Time for Application of Water under Press.
Temporary Protection	Class A	45 mins.	1500° F. (815.5° C.)	2 in. and under (.051 m.)	20 sq. ft. (1.858 sq. m.)	2 mins.
	Class B	60 mins.	1500° F. (815.5° C.)	Optional	20 sq. ft. (1.858 sq. m.)	2 mins.
Partial Protection	Class A	90 mins.	1800° F. (982.2° C.)	2½ in. and under (.063 m.)	20 sq. ft. (1.858 sq. m.)	2 mins.
	Class B	120 mins.	1800° F. (982.2° C.)	Optional	20 sq. ft. (1.858 sq. m.)	2 mins.
Full Protection	Class A	150 mins.	1800° F. (982.2° C.)	½ in. and under (.018 m.)	25 sq. ft. (2.322 sq. m.)	2 mins.
	Class B	240 mins.	1800° F. (982.2° C.)	Optional	25 sq. ft. (2.322 sq. m.)	5 mins.

Transmission of Fire-Calls.—There are several methods of transmitting the message of a fire-call. The simplest is, of course, to run direct to the nearest fire-station; but this is only possible where the distance is short. In one or two cities, however, the number of fire-stations is so great that they are very close to one another, and hence “direct” calls are generally recorded.

Then comes the system of special messengers. The fire is reported at some public office, police-station or guard-room, where there are always runners ready to start off to the nearest fire-station. The special runner is here practically a makeshift for the more modern telegraph or telephone line, and it is believed that the only city in which this system is employed is one where the unsettled political atmosphere has compelled the authorities to prohibit the construction of any telegraph lines other than those for the use of the general postal service. Similar messenger services have, however, also been introduced in connexion with the telegraphic signalling system. Private enterprises known as “general messenger” or “call-boy” services, which are organized for business purposes, have the advantage of including the fire-call and the police-call. In the same way that a cab can be signalled, a call may come for a fire-engine, and the ever-ready runner makes off to the fire-station instead of to the cab rank. As a rule, these messenger offices are near the fire-station. The combination is rather a curious one, as it embraces the most advanced notions of giving every “risk” its own fire-call, and the somewhat ancient one of the special runner.

Another system for facilitating the fire-call relies entirely on the public telephone system, the terms of subscription to which may compel holders to forward fire messages if required to do so. This system allows for such development as the payment of retaining fees to porters in public and other buildings which have a night service, on condition that the fire-call shall be promptly despatched. The telephones are, perhaps, even

provided free, if they are not forthcoming; but it should be remembered that the service always goes through a general telephone exchange, which is, of course, open day and night.

In the special telephone line system special wires are laid from buildings which are practically open all the year round direct to their nearest fire-stations, and some payment is again made for prompt attention. Sometimes the telegraph takes the place of the telephone, but this requires the porter or attendant to be specially trained to the work. To simplify matters, the buildings are sometimes provided with automatic fire-calls instead of telephones; but the principle of the system remains the same. In districts where there are few public offices, the list of buildings at which messages can be handed in has been frequently augmented by a set of bakeries or apothecaries' shops, where night service is not unusual.

What may be termed semi-public street alarms come next. Automatic fire-calls are put up in the street, but their handles are under lock and key, and the keys are distributed only among policemen, watchmen or householders, and the messages can, therefore, only be given by persons known to the authorities.

The public automatic street-call is the simplest system next to the direct message. Private automatic fire-calls or telephones can be laid on from dangerous risks, and there has even been an instance where an attempt was made to give every householder a private fire-call. This system is, however, unfortunately too extreme for the municipal purse. If in connexion with some other paying enterprise, as in the case of the messenger services referred to, it would be a different matter, though it should also not be forgotten that too great a number of call points means a probable repetition of signals of the same fire, and a risk of too many sections of the fire brigade being on the road to it.

Besides these forms of "call," there is also the private alarm. Dangerous buildings are frequently provided with telephones, alarm-posts, or even automatic temperature indicators, by which a call can be given direct from the "risk" involved.

Call points should be not only conspicuous, but also in most frequented positions. Possibly, in some towns, a point in front of a church would be the best; in others, the front of a public-house. It should always be remembered that every facility should be given to enable as many people as possible to know the whereabouts of the call points without any distinct effort on their part. Red paint may make a call pillar conspicuous by day, and a coloured lamp by night.

As to the indication of call points, a plate on every letter-box stating the position of the nearest call-point is perhaps one of the best methods. The letter-box is one of the instruments most in use in a modern city, and hence the plate is read by many. In an oriental town the public fountain would, however, take the place of the letter-box. Plates put up inside every front door are somewhat extreme measures. In one city red darts are painted on the glass of every street lamp, indicating the direction to be taken to find a street alarm. This sign, however, has the disadvantage of requiring a previous knowledge of its meaning, and is generally useless to a stranger in the town.

Rewards paid to messengers vary from one shilling to half a sovereign. In some places every call is rewarded—even those to chimney fires—and this often results in an abuse of the privilege. Rogues light fires on the top of a chimney and then run to call the engines. If a reward be given, a limitation should be made. In one town no relation or employé of the owner receives a reward. In other cities no rewards are given for calls to a fire in a dust-bin or a chimney.

No true fireman would be annoyed at a false alarm given by mistake. The possibility of a fire, or the suspicion of one, is a bona fide reason for a call which should not be discouraged. Malicious alarms should, however, be treated with the utmost rigour, as the absence of firemen from their stations always means an extra risk to life and property. Combined "lynch law" and imprisonment has generally been adopted with good effect. The rascal should first be put when caught over the pole of the engine and thrashed with a broad fireman's belt, and after that handed to the police.

The fire-call should, if possible, also be so constructed as to facilitate intercommunication between the scene of a fire and the headquarters of the fire brigade. Where the runner is employed or the telephone is used no special arrangements are required, but where the telegraph or automatic call point has been introduced, the apparatus must be adapted for this contingency. At some automatic fire-call points a few signals can be given, at others, a telegraphic or telephonic transmitter can be applied. Much valuable time may be saved in this way when more assistance is required.

Fire Brigades.—The organization of fire brigades varies greatly. There are brigades where officers and men are practically constantly ready to attend a fire, and others where they are ready on alternate days, two days out of every three, or three days out of every four, and the off day is entirely their own, or at the most, only partially used by the authorities for some light work. The men off duty are only expected to attend a fire if there is a great emergency, the brigade being strong enough without them for ordinary eventualities. Both systems can be worked with or without part-paid or volunteer service, which would be only called out for great calamities. They could be organized as a practically independent reserve force, or the reserve men might be attached to sections of the regulars and mixed with them when the occasion arises. The reserves can consist either of retired firemen who have a few regular drills, or of amateurs who go through a special course of training, and have some series of drills at intervals, with preferably a short spell of service every year with the regulars. For the regulars, forty-eight hours on duty to every twenty-four off has given the most satisfactory results.

The division of the active force may be on a system of a number of small parties of twos and threes backed by one or more strong bodies. Another system allows for subdivision into sections of equal strength, ranging from parties of, say, five men with a non-commissioned officer to thirty non-commissioned officers and men with an officer. The force can, of course, also simply be divided up into parties or sections of different strengths not governed by a system of military units. The sections either can work independently, as units, simply governed by one central authority, or there can be a grouping of the units into minor or major bodies or districts, each duly officered, and as a whole individually responsible to headquarters.

The officers may be all taken from the ranks, or they may be “officers and gentlemen” in the military sense, or have only temporarily done work with the rank and file when in training. There could also be a combination of these two systems. Only the captain and deputy-captain might be officers in the military sense, the sections or divisions being officered by “non-coms.” Some cities have an officer to every thirty “non-coms” and men, whilst others put a division of as many as two hundred under a fireman who has risen from the ranks. Where protection is treated as a science, and where those in charge of a brigade have really to act as advisers to their employers, officers in the military sense have been found essential. They have also been found advantageous where their scope is limited to fire extinguishing. The prestige of the fire service has been raised everywhere where the officers, besides being fire experts, are educated men of social standing. There are cities where the officers of the fire brigade are in every way recognized as equal to army or navy men, their social position is the same, and their mess fulfils the same functions as a regimental mess. The fire brigade officer is recognized at court, and there is no ceremonial without him. On the other hand, there are also cities with brigades several hundred strong where the captain’s social standing is beneath that of a petty officer or colour-sergeant. As to the primary training of a fire brigade officer, the best men have generally had some experience in another profession, such as the army, the navy, or the architectural and engineering professions, previous to their entering the fire service. Some brigades recruit from army officers only, and preferably from the engineers or artillery regiments; others recruit from among architects and engineers, subject to their having at least had some military experience in the reserve forces or the volunteers. Some cities only take engineers or architects, and make a point of it that they should have no previous military experience. Some previous experience in the handling of men is essential.

As to the men, there are cities where only trained soldiers are taken as firemen; others where the engines are manned by sailors. In some towns the building trades supply the recruits; in others, all trades are either discriminately or indiscriminately represented. A combination from the army or navy on the one side and the building trades on the other is most satisfactory. The knowledge of building construction in the ranks stands the force in good stead, and has often saved both lives and property. Where a brigade can boast of a few men of each important trade, much money has been saved the ratepayers by the men doing their own repairs and refitting, but the number of men from sedentary trades should not be excessive. Where there are only men of one trade or calling, there is often too great a tendency to one-sidedness, and a great amount of prejudice.

Physical strength and perfect constitution are requisite for both officers and men. As to the height of the men, small, wiry men are very useful. First-class eyes, ears and nose are necessary, also a good memory. Fat men are entirely out of place in a brigade, and should be transferred to some other service if the fatness be developed during their engagement with a brigade. Many brigades take only single men, “non-coms” and officers only being allowed to marry. There are many brigades where twenty-two and forty are the limits of age for the privates, fifty for the “non-coms,” and sixty for the officers.

As to the equipment, there are brigades which have all their sections or units provided with practically the same gear; others where each unit has a double or treble set, one of which is used according to circumstances. The section may have a manual engine, a steamer and a ladder truck at its disposal, and may turn out with either. There are towns where the units are differently equipped, and steamer or manual sections called out, as the case may be. In a few extreme cases, where the sections are very strong, they may be equipped with a set of engines and trucks, and the unit, in every case, turns out complete with (say) a chemical engine, a steamer and a horsed escape. The contrast to this will be found in the small parties of twos or threes, whose turn-out would only consist of a small hose trolley or an escape. Of course, there are all kinds of combinations, the most important of which allows a section to have one or more independent subsections. Though practically belonging to the “unit,” the subsections work independently in charge of a certain gear. This may be a hose-reel, a long ladder, or a smoke helmet, according to circumstances. The subsections may act as outposts or simply as specialist parties, which are only called out for particular work.

As for the housing of the units or sections, simple street stations are provided for the small parties referred to. In a few cases two small parties are housed under the same roof. The large bodies that back them are generally quartered together in extensive barracks, from which any number of engines and men can be turned out according to the nature of the call. Then there are cities where every section has its own well-built station; others where one or two sections are housed together, according to circumstances, and perhaps as many as half a dozen located at headquarters. If groups are formed, the headquarters of the group or district has, perhaps, two sections, while each of the other stations has only one. The general headquarters may be the central station of a district at the same time. The actual working of the district headquarters would, however, then be kept separate from the working of the headquarters staff. The latter would, perhaps, have some sections ready to send anywhere besides the trucks, &c., necessary for the officers, the general extra gear, &c., that might be required. It is usual to combine workshops, stores, hose-drying towers, &c., with the headquarters station, and, in some cases, also with the district centres.

In the distribution of the stations, the formation of districts, &c., various systems have been adopted. The most satisfactory results have been obtained where a fully-equipped section (not simply a hose-car or escape-party) can reach any building in the city within six minutes from the time of the call reaching the station, the six minutes including both turn-out and run. Where there are exceptionally large or dangerous risks, this time has had to be shortened to four minutes, and the possibility of an attendance from a second station assured within six minutes. In dividing up districts, the most satisfactory results have been obtained where every house can be reached from the district centre within fifteen minutes from the call. Headquarters would naturally have a central position in the city. In one or two instances the headquarters offices are located in a separate building, which in no way serves as a fire-station, but simply as a centre through which all orders and business pass.

The different stations must be in connexion with each other. The special runner or rider is practically disappearing. The telegraph and telephone have taken his place. Some cities favour Morse telegraphy, which certainly had great advantages over the telephone at one time, as messages could be easily transmitted to

several stations with the same effort, but telephone distributors have now been successfully introduced. Errors are less frequent by telegraph than by telephone, and there is always a record of every message. The most modern forms of telephone communication are, however, more suitable for the fire service than the telegraph. Headquarters should be in direct communication with every station, but every station should be able to communicate with its neighbour directly, as well as through the headquarters office, and there should be a direct wire to its district station if it has one. There should be three routes of communication, so that two should be always ready for use in case of one breaking down. Either headquarters or the district centres would be in touch with the various auxiliaries referred to, as well as the general telegraph office and the telephone exchange.

As to the attendance at fires, some cities turn out but one unit to answer the first call if they have no particulars, others always turn out two or three sections, and there are several cities where the district centre would at least send an officer and a few men as well. In one brigade, headquarters is always represented by either the chief or the second officer in the case of a call of this kind. The idea is that it is always better to have too strong a force quickly in attendance than too small a number of men, and that it is most important that the first arrival should be well handled. Further, if two sections answer a call and one breaks down on the road, there is no chance of there being too great a delay in the arrival of organized help. It should, however, not be forgotten that further calls in the same district to other fires are not unusual, and that the absence of too many engines, on account of a first call, is dangerous. In some cities, when a call reaches the firemen one or two of the nearest stations turn out, and if more help is required other sections will be called up individually. In others the reinforcements are not called up separately, but the fires are divided into three classes—small, medium and large; and on the message arriving of a more extensive conflagration at a certain point, the section already know beforehand whether they must attend or not. First calls to certain classes of risks, *e.g.* to theatres or public offices, may always be considered to be for medium or large fires; and the same message will then simultaneously turn out the stronger body without any further detailed instructions being necessary. In some towns the fire-call automata are so arranged that the messenger can at once call for the different classes of fire. This, however, is not to be recommended, as a messenger will probably consider the smallest fire to be a gigantic blaze, and will bring out too many engines.

Equipment.—The following are characteristic features in the equipment of brigades. First, where there is a high-pressure water supply, some brigades simply attend with hose-cars, life-saving gear and ladders; or, instead of the hose-cars, take their manuals, which they practically never use and which serve only as vehicles to carry men and hose. Others take, and make a point of using, the manuals, and have a barrel with them ready to supply the first gallons of water necessary. No time is thus lost in connecting with the nearest hydrant or plug; and in case of a hydrant being out of order, there is always sufficient water at hand until the second hydrant has been found. Many cities have introduced chemical engines to take the place of this combination of water barrel and manual engine. A supply of water is carried on the chemical engine. Some cities always have an attendance of steamers, which are, however, only used in urgent cases. In other instances the steamer is at once used in the same way as the manual, and this quite independently of the pressure there is in the water service. Where there is no good water service, manuals or steamers have, of course, to be sent out, and are supplied either from the low-pressure service or from the natural waterways or wells. There are still a large number of cities where the suburbs have no proper water service, and the water barrel is then very handy for water porterage. Attempts have also been made at the chemical treatment of water which is to be thrown on to a fire, with the view of increasing its effect, or at the use of chemicals instead of water. In certain localities fire appliances are still run out to fires by hand, especially where there is a high pressure water system and hose carts only are required. Generally the appliances are horsed. Motor traction is, however, now rapidly superseding horse traction for reasons of economy and the wider and more rapid range of efficiency.

As to life saving and manœuvring gear, some brigades rely almost entirely on hook ladders, others almost entirely depend on scaling ladders or telescopic escapes. In some great confidence is placed in the jumping-sheet; in another, chutes are much used; and there are a few where wonderful work is done with life-lines. To indicate the diversity with which any one appliance can be treated, made or handled, in the fire service, it may be mentioned that there are quite ten different ways in which a jumping-sheet can be held. Then there is the material of the jumping-sheet to be considered; the size and the shape—whether round, oblong, square or rectangular; then the means of holding it, the way to fold it, how and where to stow it, and at what distance from the endangered building the sheet is to be held. Last, but not least, come the words of command.

Working of Brigades.—In some forces all possible attention is given to the rapidity of the actual turn out, while in others the speed at which engines run to the fire is considered to be of primary importance. Other brigades, again, give equal attention to both. There are brigades which work entirely on military lines, each man having certain duties marked out for him beforehand for every possible occasion, and there are others where happy-go-lucky working is preferred. Of course there are combinations in the same way as regards command. Some chief officers arrive at a fire with a staff of adjutants and orderlies, and control the working of the brigade from a position of vantage at a distance. Other chiefs delight to be in the thick of a fire, perhaps at the branch itself, or on some gallant life-saving exploit where they no doubt do good work as a fireman, but in no way fulfil the office of commanders. Officers must remember that they are officers, and not rank and file; and this is generally very difficult to those who have advanced from the ranks. Superintendents, however smart, must leave acts of bravery to their men, and chief officers, without going to extremes, must always be in a good position where they can superintend everything pertaining to the outbreak in question. Some brigades seem to make a point of working quietly, and shouting is absolutely forbidden, all commands being given by shrill whistles. In some brigades all commands are given by word of mouth, and there is much bawling. In others commands, besides being bawled, are even repeated on horns, and the noise becomes trying. As a rule, quiet working is a sign of efficiency.

Some brigades work as close as possible to the fire, others are satisfied with putting water on or about the

fire from a distance. Some attack the fire direct, others only try to protect what surrounds the seat of the flames. Several brigades are ordered always to try to attack by the natural routes of the front door and the staircases. In others, the men always have to attempt some more unnatural entrance, with the aid of ladders —through windows, for instance. Some brigades carefully extinguish a fire, some simply swamp it. Some brigades boast of never having damaged property unnecessarily. They have, for instance, had the patience to suffocate a cellar fire, instead of putting the whole cellar under water. In certain classes of property the bucket, the mop, and the hand-pump have been far more effective in minimizing actual destruction than the branch and hose. It is one of the easiest signs by which to judge the training and handling of a fire brigade—to see what damage they do. Even an inconsiderate smashing of doors and windows, when there is absolutely no need for it, can be avoided, where every man in the force feels that his first duty is to prevent damage and loss and his second to extinguish the fire.

Where the brigade includes a salvage division, it is generally stationed at headquarters; where this division is split up into sections, there would also be a distribution among the district centres; the salvage men are simply part of the force, told off on special duty. Where there are private salvage corps, their stations are generally near the headquarters or district centres of the brigade, from which they receive notice of the fire. In some cities the salvage corps work quite independently; in others, they work under the chief of the brigade directly they arrive at the fire.

As to the working of allied civilian forces in conjunction with the fire service, the advantages of firemen having plenty of room to work in is now fully recognized, and the police are at once called out and often brought on to the scene in an incredibly short time. The value of these measures should not be under-rated, especially in cities where rowdyism exists. In many cities the ambulance service is also turned out to fires. Where no independent ambulance corps exists, some of the firemen should be trained to work as ambulance men. Turncocks and gasmen are also frequently brought to all fires. Lastly, in many garrison towns the military turn out to assist the fire brigade.

National Fire Brigades' Union.—The National Fire Brigades' Union, which is the representative Fire Service Society for Great Britain, originated in a national demonstration of volunteer fire brigades held at Oxford in celebration of Queen Victoria's jubilee on the 30th of May 1887, when 82 fire brigades with 916 firemen were present. Next day a meeting of the officers was held at the Guildhall, Oxford, and it was then resolved to form the National Fire Brigades Union. Alderman Green, the chief officer of the Oxford fire brigade, was appointed the first chairman. Sir Eyre Massey Shaw was appointed first president in 1888, and on his retirement in 1896 through ill-health he was succeeded by the duke of Marlborough. When the union offered to provide ambulance firemen and stretcher bearers for his regiment the duke accepted the offer, and two fully equipped corps were sent out to the Imperial Yeomanry hospital at Deelfontein, South Africa, under Colonel Sloggett, who specially mentioned the services rendered by the firemen in his despatches.

The union is divided into seventeen districts, each having its own council, and sending one delegate for every ten brigades to the central council. The districts are:—Eastern, Midlands, South Coast, South-Eastern, West Midland, North-Eastern, North-Western, South Western, Surrey, South Midlands, Southern, South Wales, North Wales, Cornish, Yorkshire, Central and South Africa (formed in 1902). There are also seventy-five foreign members and correspondents in America, Australia, Austria, Belgium, Canada, Denmark, France, Germany, Holland, Italy, New Zealand, Russia, South Africa, India and the Federated Malay Straits. The total strength of the union is 667 fire brigades and members with nearly 12,000 firemen. Every member of the union gives his time and services for the benefit of the country; all appointments are honorary, with the exception that a small allowance is made for clerical assistance. A drill book is issued by the union, and the fourth edition was published in 1902. Over 60,000 of these books have been issued to brigades all over the world.

The ambulance department is under the charge of medical officers. All members have to come up for re-examination every three years, else they are not entitled to wear the red cross, and the examination is more stringent than that held by the St John Ambulance Association. This department has proved to be a great benefit to provincial fire brigades, who are often called upon to undertake ambulance work. A very useful and instructive manual has been issued by the union entitled *First Aid in the Fire Service*, by Chief Officer William Ettles, M.D.

The union organized and took part in the International Fire Exhibitions, at the Royal Agricultural Hall, London, in 1893 and 1896, and it was represented at the International Fire Congresses at Antwerp, Brussels, Ghent, Paris, Lyons, Havre and Berlin. It has also held a review before the German emperor at the Crystal Palace, and before Queen Victoria in Windsor Park.

Fire Brigade Organization.

Below are given examples of the organization of different fire brigades. The brigades so described have been selected not so much on account of their intrinsic importance, as because they represent classes or types of brigades and fire brigade organization which it may be useful to refer to. In respect of the London fire brigade, however, historical data are also presented, as it is only with the aid of these that the extraordinary development of that force can be properly realized.

With regard to modern views as to the functions of the fire brigade, the resolutions of the Fire Prevention Congress of 1903 are reprinted below. As they indicate, the general feeling amongst all interested in fire protection from an economic point of view is that fire brigades should not be merely fire extinguishing organizations but should utilize their influence in a much wider sense.

The Congress considered:—

1. That public authorities should encourage fire brigade officers to take an active interest in the preventive aspect of fire projection, inasmuch as the result of the fire brigade officers' experience in actual fire practice, if suitably applied in conjunction with the work of architects, engineers and public officials, would be most useful for the organization and development of precautionary measures.

2. That fire brigade societies, associations and unions should encourage amongst the brigades affiliated to these bodies the study of questions of fire prevention.

3. That fire brigades should be placed on a sound legal basis, and that it is advisable that their efficiency be supervised by a government department.

4. That an official investigation should be made of all fires. That on the occurrence of every fire an investigation should be immediately made by an official, duly qualified and empowered to ascertain the cause and circumstances connected therewith, reporting the result of such investigation to a public department for tabulation and publication.

5. That the whole or part of the cost of such inquiry should be charged to the occupier of the premises where the fire occurred, as may appear desirable in the circumstances of each case.

6. That the press should from time to time publish technical reports on fires so that the public may benefit from the knowledge and experience gained.

London.—In the early part of the 19th century the methods in vogue for the suppression of outbreaks of fire in the metropolis were of the most crude and disjointed character, in striking contrast with the highly elaborated system now put into practice by the London County Council through its fire brigade; and it was not until the second half of the 19th century was well advanced that anything approaching an adequate and satisfactory organization was brought into existence. Until the passing of the Metropolitan Fire Brigade Act 1865, the only acts relating to the suppression of outbreaks of fire in London were the Lighting and Watching Act (3 & 4 William IV., c. 90), and "an act (14 Geo. III., c. 78) for the further and better Regulation of Buildings and Party Walls, and for the more effectually preventing Mischiefs by Fire within the Cities of London and Westminster, and the Liberties thereof, and other the Parishes, Precincts and Places within the Weekly Bills of Mortality, the Parishes of Marylebone, Paddington, St Pancras, and St Luke's at Chelsea, in the County of Middlesex." The clauses in the latter act relating to protection against fire remained in force till the passing of the act of 1865. They provided that every parish should keep "one large engine and one small, called a hand engine, a leathern pipe, and a certain number of ladders." The Lighting and Watching Act contained a clause which extended to England and Wales and so covered the area "without the bills of mortality," enabling the inspectors appointed under that act to provide and keep up two fire-engines; and certain of the parishes in the metropolitan district, without the bills of mortality, availed themselves of this provision.

The select committee of fires in the metropolis, which sat in 1862, reported that it was difficult to ascertain how far the act of George III. was attended to, or when it ceased to be considered practically of importance, but that, at the time of the report, the arrangements generally made by the parishes under the act were not only entirely useless, but in many cases produced injurious results, as the system under the act frequently conferred a reward for the first useless parochial engine, whereas the efficient engine which might be on the spot a few minutes later derived no pecuniary advantages. There were, however, exceptions to the general rule. At Hackney, for example, a "very efficient" fire brigade was maintained at an expense of about £500 a year, or about one halfpenny in the pound on the rating of the parish. The select committee were unable to ascertain with any accuracy the total amount paid by the metropolitan parishes for the maintenance, "however inefficient," of their fire-engines, but it was estimated to be about £10,000.

For many years previous to 1832, the principal fire insurance offices in London kept fire brigades at their individual expense; to these brigades were attached a considerable number of men usually occupied as Thames watermen, retained in the service of the different Fire Offices, who received payment only on the occurrence of fires, and who wore the livery and badge of the respective companies. These fire brigades were, to quote the report of the select committee of 1862, considered as giving notoriety to the different insurance companies, and a considerable rivalry was maintained, which was productive naturally of good as well as of some considerable evil on occasions of fires.

The large expenses thus incurred by the companies induced an attempt to be made, which was effectually carried out in the year 1832, by R. Bell Forde, a leading director of the Sun Fire Office, to form one brigade for the purpose of promoting economy as well as greater efficiency. Thus the first organized fire brigade for London began its operations under the united sanction of, and from funds contributed by, most of the leading insurance offices in London. The force thus formed was known as the London Fire Engine Establishment. The annual expense was at first £8000, the number of stations 19, the number of men employed 80. By 1862 the annual cost had grown to £25,000, the number of stations had become 20, and the number of men 127.

It is interesting to note that the chief station of the Fire Engine Establishment was the Watling-Street station, in substitution for which the new Cannon-Street station has been built. The following is a list of the other stations of the establishment:—

School House-lane, Shadwell	Crown Street, Soho
Wellclose Square	Wells Street
Jeffrey's Square	Baker Street
Whitecross Street	King Street, Golden Square
Farringdon Street	Horseferry Road
Holborn	Waterloo Road
Chandos Street	Southwark Bridge Road
Tooley Street	Southwark Bridge (floating)
Lucas Street, Rotherhithe	Rotherhithe (floating)

The work of this force was carried out in an efficient manner as far as its limited equipment and strength would permit, but it was universally admitted that the staff, engines and stations were totally inadequate for the general protection of London from fire. The directors of the insurance offices themselves admitted this, but they considered their brigade sufficient for the protection of that part of London in which the largest

amount of insured property was located, and contended that it was not their business to provide fire stations in the more outlying districts where, if a fire occurred, it was not likely to involve their offices in serious loss.

From 1836 the work of the brigade maintained by the fire offices was supplemented by the "Society for the Protection of Life from Fire." This society was managed by a committee of which the lord mayor was president. It was supported entirely by voluntary contributions, and, at a cost of about £7000 a year, maintained fire-escapes at from 80 to 90 stations in different parts of the most central districts in London. Its most outlying station was only 4 m. from the Royal Exchange, and it maintained no stations in such localities as Greenwich, Peckham, Deptford and New Cross. It did much useful work, though its equipment was quite inadequate to cope with the needs of the metropolis.

In 1834, two years after the institution of the London Fire Engine Establishment, the Houses of Parliament were destroyed by fire, and the attention of the government was consequently directed to the inadequacy of the existing conditions for fire extinction. It was suggested, at the time, that the parochial engines should be placed under the inspection of the commissioners of police, but this proposal was not adopted, and the existing state of matters was allowed to continue for another thirty years. The select committee of 1862 recommended that a fire brigade should be created under the superintendence of the commissioners of police, and should form part of the general establishment of the metropolitan police. In 1865, however, the Metropolitan Fire Brigade Act was passed, under which the responsibility for the provision and maintenance of an efficient fire brigade was laid upon the Metropolitan Board of Works. Under the provisions of the act, the board took over the staff, stations and equipment of the Fire Engine Establishment; the engines maintained by the various parochial authorities, and the men in charge of them were also absorbed by the new organization, as were the fire-escapes and staff of the Society for the Protection of Life from Fire.

The funds provided by the Fire Brigade Act for the maintenance of the brigade were: (1) the produce of a halfpenny rate on all the rateable property in London; (2) contributions by the fire insurance companies at the rate of £35 per million of the gross amount insured by them in respect of property in London; and (3) a contribution of £10,000 a year by the government. Although the revenue allotted increased year by year, its increase was far from keeping pace with the constant calls from all parts of London for protection from fire. Some temporary financial relief was afforded by the Metropolitan Board of Works (Loans) Act 1869, which (1) authorized the interest on borrowed money to be paid, and the principal to be redeemed out of the proceeds of the Metropolitan Consolidated rate, apart from the halfpenny allocated for fire brigade purposes; and (2) provided that the amount to be raised for the annual working expenditure on the brigade should be equal to what would be produced by a halfpenny in the pound on the gross annual value of property, instead of, as before, on the rateable value. One result of the passing of the Local Government Act 1888 (by which the London County Council was constituted), under which a county rate for all purposes is levied, was virtually to repeal the limitation of the amount which might be raised from the ratepayers for fire brigade purposes. Since that time the expenditure on the brigade has therefore, like that of other departments of the council's service, been determined solely by what the council has judged to be the requirements of the case.

When the council came into existence early in 1889 the fire brigade was admittedly not large enough properly to protect the whole of London, the provision in various suburban districts being notoriously inadequate to the requirements. A plan for enlarging and improving old stations, and for carrying out a scheme of additional protection laid down after careful consideration of the needs of London as a whole, was approved on the 8th of February 1898 (and somewhat enlarged in 1901); it provided for the placing of horsed escapes at existing fire stations, for the establishment of some 22 additional stations provided with horsed escapes, and for the discontinuance of nearly all the fire-escape and hose-cart stations in the public thoroughfares.

> Since it came into existence the London County Council has established additional fire stations at Dulwich, New Cross, Kingsland, Whitefriars, Lewisham, Shepherd's Bush, West Hampstead, East Greenwich, Perivale, Homerton, Highbury, Vauxhall, Pageant's Wharf (Rotherhithe), Streatham, Kilburn, Bayswater, Eltham, Burdett Road (Mile End), Wapping, Northcote Road (Battersea), Herne Hill, Lee Green and North End (Fulham). Of these, Vauxhall, Kilburn, Bayswater, Eltham, Burdett Road, Herne Hill and North End stations are sub-stations. New stations have been erected, in substitution for small and inconvenient buildings, at Wandsworth, Shoreditch, Fulham, Brompton, Islington, Paddington, Redcross Street (City), Euston Road, Clapham, Mile End, Deptford, Old Kent Road, Millwall, Kensington, Westminster, Brixton and Cannon Street (City), and the existing stations at Kennington, Rotherhithe, Clerkenwell, Hampstead, Battersea, Whitechapel, Greenwich and Stoke Newington have been considerably enlarged. Two small stations without horses have been established in Battersea Park Road and North Woolwich respectively. A building has been erected at Rotherhithe for the accommodation of the staff of the Cherry-garden river station; and another building has been erected at Battersea for the accommodation of the staff of a river station which has been established there.
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> In 1909 new stations in substitution for existing stations were in course of erection at Knightsbridge and Tooting, and additional sub-stations were being erected at Plumstead and Hornsey Rise. The Bethnal Green station was being considerably altered and enlarged. The council had also determined to erect new stations in substitution for existing inconvenient buildings at Holloway, Waterloo Road, Shooter's Hill and North End, Fulham; and to build additional sub-stations at Charlton, Caledonian Road, Brixton Hill, Camberwell New Road, Roehampton, Balham, Brockley and Earlsfield.

Budapest.—There is a combination of a professional force and a volunteer force at Budapest, and in addition an auxiliary service of factory fire brigades. The professional fire brigade possesses a central station and eight sub-stations, two minor stations, and permanent theatre-watchrooms at the royal theatres. The staff (in 1901) of the professional brigade consisted of a chief officer, an inspector, a senior adjutant and two junior adjutants, a clerk, and further 23 warrant officers, 3 engineers, 15 foremen, 154 firemen and 30 coachmen with 62 horses. There have been some slight increases since. The apparatus at their disposal consists of 6 steam fire-engines, 22 manual engines, 27 small manual engines, 11 water carts, 13 traps, 4 tenders, 26 hose reels and hose carts, 5 long ladders, 9 ordinary extension ladders, 34 hook ladders, 12

smoke helmets and 22,000 metres of hose. The various stations are connected with the central station by private telephone lines. There are 149 telephonic fire alarms distributed throughout the city. They are on radial lines connected up with their respective nearest stations, and on a single radial line there are from three to seventeen call-points.

The volunteer brigade has an independent constitution and comprises some eighty members. Its equipment is housed with that of the professional brigade, and is bought and maintained by the municipality. This volunteer brigade is a comparatively wealthy institution, having a capital of 100,000 crowns, whilst receiving a special subsidy annually from the municipality. Though legally an entirely independent institution, the brigade voluntarily puts itself under the command of the chief officer of the professional brigade. It further puts daily at the disposal of the professional fire chief ten men who do duty every night and "turn out" when called upon to render service. This volunteer brigade stands as a kind of model to the other volunteer brigades, and it is in connexion with this volunteer brigade that the educational classes referred to above are held and facilities accorded to the officers undergoing instruction to gain experience at the Budapest fires.

> The Budapest professional fire brigade, even if assisted by the volunteer force, would scarcely be of adequate strength to deal with the great factory risks of that city were it not that the Budapest factories and mills have a splendidly organized service of factory fire brigades. These brigades—forty-four in number—are essentially private institutions, intended to render self-help in the factories to which they belong, but they are well organized, and have a mutual understanding whereby the neighbouring brigades of any one factory immediately turn out and assist in case of need. These factory brigades have a total staff of 1600 men. They are equipped with 1 steam fire-engine, 57 large manuals, 136 small manuals, and have a very considerable amount of small gear, including 15 smoke helmets.

Cologne.—The Cologne professional fire brigade is 153 strong (1906), with a chief officer, a second officer, and two divisional officers, a warrant officer, a telegraph superintendent and 16 foremen. The brigade has 26 horses, of which 2, however, are used for ambulance purposes. The brigade has three large stations and a minor station, and has a permanent fire-watch at the two municipal theatres. Men are told off for duty as coachmen among the firemen. The staff do forty-eight hours of duty to twenty-four hours of rest.

A peculiarity of the Cologne organization is its auxiliary retained fire brigade in two sections, comprising a superintendent, 2 deputy superintendents, 5 foremen, and 51 men, with 2 horses, who are retained men housed in municipal buildings (tenements), and available as an immediate reserve force. The first section of the reserve force are housed centrally.

There is a further system of suburban volunteer fire brigades manned by volunteers but equipped by the municipality, and horsed from the municipal stables or municipal tramways. Three of these volunteer brigades, which have large suburban districts, comprise each a superintendent, 2 senior foremen and 3 junior foremen, with 50 firemen and 3 coachmen. The minor outlying suburbs have several such brigades, each having one senior foreman, 3 junior foremen, 20 firemen and 2 coachmen. The combined force of the suburban volunteer brigades is 295, all ranks.

> The Cologne fire service thus comprises a combination of professional brigade with a retained auxiliary brigade and a system of suburban volunteer brigades. Of the three stations, the central one is still an old building, and the other two are in modern buildings; the extra sub-station (near the river stores) is also a modern building. The brigade has about 150 fires to attend per annum. Its printed matter, in the form of an annual detailed report, is exceptionally well prepared. The brigade does permanent "fire-watch" duty at the municipal theatres which are strengthened of an evening. It provides additional watches during performances at all other theatres and public entertainments. Such duties are provided in part by an auxiliary brigade and partly by the professional brigade. A number of the professional brigade are always utilized for doing general work in the workshops of the brigade. The first or central section of the auxiliary brigade drills eleven times per annum, and is additionally turned out eleven times per annum (without drill). Men newly attached to the auxiliary force have to go through a four weeks' recruit drill.

Nuremberg.—The Nuremberg fire service stands as the most economically organized efficient fire service in Central Europe, and its form of organization is peculiar and exceptional. In 1902 the entire fire-service cost the city 126,000 marks (£6300). The total of inhabitants in 1900 was 261,000. For this small amount of money the city gets a highly-trained retained fire brigade of 156 men (1907), and two volunteer fire brigades of 130 and 224 men respectively. Further, it has an auxiliary of eighteen suburban volunteer fire brigades (1080 men) and two private factory fire brigades (71 men). The whole service stands under a professional chief officer and professional second officer. There are 8 telegraph clerks, 6 watchmen and 17 coachmen attached to the retained brigade. The service has been in existence for fifty years. It has gradually developed and has worked remarkably well, and may, in fact, be taken as a model institution for municipal economy, with due regard to up-to-dateness and efficiency. The retained fire brigade comprises entirely municipal employés, regularly engaged in the municipal workshops, scavenging and works department. The municipal workshops are located alongside the fire-brigade stations. There is a headquarters station for the retained brigade and volunteer brigade in the centre of the town, a modern district station in the western district, and a third district station is in course of erection for the eastern district, which is at present only served by a small branch station.

> At headquarters station there are on immediate duty by day 14 firemen (chiefly smiths and carpenters) of the retained brigade. Nine men of the retained brigade are on duty at headquarters at night, together with 8 men of the volunteer fire brigade. At the west district station, 14 men of the retained brigade are on duty by day, and the same number at night.
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> The headquarters can turn out in succession four complete units of the following strength, namely:—
>
> First unit, a large chemical engine, and a mechanical long ladder.
>
> Second unit, a trap with hose reel, a special gear-cart and a long ladder.

Third unit, a trap with hose-cart and manual, and a long ladder.

Fourth unit, a steam fire-engine, and hose- and coal-tender trap.

From the west district station three units can be turned out in rotation, namely:—-

First unit, large chemical engine, large trap and a long ladder.

Second unit, a trap with hose-reel and manual engine.

Third unit, a steam fire-engine and a hose-tender and coal-tender trap.

The equipment of the eastern sub-station at present comprises a turn-out of a trap and a long ladder.

The brigade can thus turn out immediately, in rapid succession, these horsed appliances, well organized and fully manned. It further has a reserve of 4 manual engines and 2 long ladders.

The suburban volunteer brigades have besides at their disposal 25 manual engines, 9 fire-escapes and 18 hose-reels. The whole of the hose for all brigades is of uniform pattern and make, with bayonet pattern standard couplings. The brigade posts an evening "fire watch" at the theatres. The men of the retained brigade get modest extra pay for fire brigade duty, but this pay is intended rather to cover disbursements or expenses than to be considered as wages. The brigade uses the municipal horses, all of which are stabled in proximity to the fire stations, and a number of which are kept on duty for fire brigade purposes in the actual stations. For all practical purposes the retained brigade is the professional brigade in which the men do municipal work in the municipal workshops, and elsewhere, *i.e.* in training, drill and general efficiency they are quite up to the best professional standard. The volunteer brigade is well drilled and includes the best of the younger townsmen, who do duty at night by rotation. The brigade's responsibilities are clearly defined, and the position of the professional chief and second officer clearly laid down by by-laws. There are 129 fire-call points. During the fifty years' existence of the service, 85 firemen received the twenty-five years' long-service medal, of whom 32 belonged to the suburban volunteer brigades.

Venice.—The Venice fire brigade is a section of the force of "Vigili" or municipal watchmen, which body does general duty in preserving order and rendering assistance to the community. In other words, this force performs the duties of the civil police (rather than governmental or criminal police), fire, patrol watch service, and public control in a general sense. The force, which in all its sections made a most excellent impression, has a commandant, under whom the two primary sections work, namely (*a*) the civil police section and the (*b*) fire brigade section; each section in turn having its own principal officers. The police section comprises some 108 of all ranks, and the fire brigade section some 73 of all ranks (1908). The commandant of the whole force is a retired military officer, and the chief of the fire service section is a civil engineer, and these two officers, together with the chief of the civil police section, are the three superior officers of the force. The police section serve as auxiliaries to the fire brigade section in case of any great fire, and, of course, generally work very much hand in hand on all occasions. The fire brigade section has 3 superintendents, 6 foremen, 6 sub-foremen, 6 corporals and 40 file. The section is well equipped with appliances, both hand and steam, having a large modern petrol-propelled float, constructed in London, a large old type steam-float, two 35-ft. old steam-floats, and several small petrol motor-floats or first turnout appliances. The manual-engines, ladders, &c., which are in considerable number, are carried in a large fleet of swift gondolas. Fire-escape work is done with Roman ladders, which are usually planted on two gondolas flung together barge-form, or, if the depth of the canal permits, the lower length is buried in the canal bottom. Hook ladders are also used.

Men are distributed in six companies of varying strength, the headquarters company being stationed at the town hall, with a strength of 22, and most of the steam and petrol floats lie opposite the station. The fire brigade does theatre watch duty. As a fire station of considerable interest, should be mentioned the one at the Doge's palace; the large vaults occupying a portion of the ground floor facing St Mark's Square have been adapted for fire station purposes in a very simple yet artistic manner, and the old gear of the brigade has been used to form emblems, &c.

Vienna.—In 1892 the Vienna fire service was reconstituted on modern lines owing to the area of the Vienna municipality having been greatly extended. The professional brigade was somewhat strengthened and entirely re-equipped, and the various existing volunteer brigades of the outlying districts were transformed into suburban volunteer fire brigades, equipped and controlled by the municipality and standing under the general command of the fire brigade headquarters. The principle involved was the utilization of the splendid volunteer force around Vienna for the purpose of strengthening the municipal brigade, a principle of great economic advantage, as the professional brigade would otherwise have had to be materially strengthened, probably trebled. These suburban volunteer fire brigades number no fewer than 34, and have 1200 firemen of all ranks. They are practically independent institutions as far as the election of officers and administration is concerned, but their equipment and uniforms and their fire stations are provided by the municipality, and in certain districts a staff of professional firemen detached from headquarters are attached to their stations as telegraph clerks and drill-instructors.

The suburban volunteer brigades turn out to fires in their own districts, and further, assist in other districts when so ordered by headquarters. They form a strong reserve for great fires in the city proper. Headquarters, of course, renders assistance at large suburban fires. These suburban volunteer fire brigades are very perfectly equipped with appliances, generally of the same type as those used in the central professional brigade. Some of these brigades are equipped with combined chemical engines with 15-metres long ladders attached. They have smoke helmets, and everything that may be termed modern. The men are volunteers in the truest sense of the word, *i.e.* do not take pay of any description or make any charges for attendance at fires or refreshments at fires.

The Vienna "professional brigade," as it is generally called, has a personnel (1906) consisting of 8 officers, 5 officials and 475 men. Of stations there is the headquarters, a district station, 4 branch stations with steam fire engines, 9 small branch stations, and 2 "watches" in public buildings. The officers of the brigade consist of the commandant, chief inspector and six inspectors. The officers, of whom four are on duty daily, are all

quartered at headquarters. There are three telegraph superintendents. The rank and file is composed of 8 drill-sergeants, 40 telegraph clerks (three classes), 53 foremen (two classes), 22 engineers and stokers, 248 men (three classes). Twenty-four telegraph clerks and engineers are detailed for duty with the suburban volunteer brigades. There are 78 coachmen.

The following are the fire-extinguishing and life-saving apparatus and service vehicles of all kinds standing ready to "turn out":—2 open and 2 officers' service carriages (at headquarters), 6 "traps" for the first "turn-out" (5 at headquarters and 1 at the district fire station), each manned by one officer in charge and nine men, and equipped with 3 hook-ladders, a portable extension ladder and jumping sheet, a life-saving chute, an ambulance chest, 3 tool-boxes, a jack, tools, torches, 2 smoke-helmets, with hand-pump and a hose-reel attached; five special gear-carts (4 at headquarters and 1 at the district station), each manned by seven firemen and equipped like the "traps" with the exception that, instead of the life-saving chute, the carts carry with them a sliding-sheet, two petroleum torches each, an extension ladder (15 metres long) and some spare coal for the steam fire-engines; 4 pneumatic extension ladders each 25 metres long, and 3 extension turn-table ladders each 25 metres long (at headquarters and at two of the sub-stations); each of the pneumatic ladders has three men, and each turn-table ladder five men; 18 chemical engines (3 at headquarters and 1 each in the other stations), each having five men with 3 hook-ladders, a jointed ladder (in four sections), a hose-reel, a hand-engine, a smoke helmet, a jumping sheet, an ambulance chest, a tool box, torches, &c.; 8 steam fire-engines (3 at headquarters and one each in the district fire station and the 4 steam-engine stations), each with an engineer and stoker.

The reserve of appliances includes 12 manual engines, 15 large chemical engines, 17 steel water-carts (with 1000 litre reservoirs). The total number of oxygen smoke helmets in the brigade is 68, and there are 15 ordinary smoke helmets with hand-pumps. The total number of horses is 132. One electrically-driven trap and two electrically-driven chemical engines are being tried. The fire telegraphic and telephonic installation, including the lines in the volunteer brigades' districts kept up by the professional brigade, comprises 47 telegraph stations, 249 telephone stations, with altogether 161 Morse instruments and 536 semi-public fire-call points.

Zürich.—Zürich covers about 12,000 English acres, 1500 of which are built over with some 15,000 houses, the whole of the buildings being subject to the local building regulations and the State Insurance Association's rules, in which they are compulsorily insured. The brigade is a compulsory militia brigade, placed under the control of the head of the department of police under a law of 1898. The same municipal officer is head of a special municipal committee of nine, entrusted with the safety of the town from fire. The executive officer of the committee is known as the inspector, and acts as captain of the fire brigade. His office is at the fire-brigade headquarters, where he has a small permanent staff both for brigade work and correspondence. Every male inhabitant of Zürich is compelled to do some service for the prevention of, or protection against, fire, from the age of twenty to fifty years. The duty may be fulfilled (1) by active service, or (2) in the case of an able-bodied citizen, who for some reason is not found suited to be a member of the brigade, or has been dismissed from the brigade, by the payment of a tax, which tax is fixed on the basis of his income. Certain citizens, however, are *ipso facto* exempt from active service, namely members of parliament, members of council of the Polytechnic school, of the Cantonal government, of the High Court of Justice, and of the Town Council; also clergymen and schoolmasters, the officials of railways, tramway and steamboat companies, of the post-office and telephone department, students of the Polytechnic school and other educational institutions and municipal officials, with whose duties fire brigade service is incompatible. Exemption from active service can also be accorded on a testimonial of a medical board. Exemption from active service, however, in no case exempts from the tax, the total of which amounts to between £4000 and £5000. In making the selection of men for active service only, men particularly fitted for the work are taken, namely, men who are personally keen, who have a good physique, and who are preferably of the building or allied trades. The officers of the brigade are appointed by the municipal committee. The men's drills are by the chief officer, and the men are liable to fines and to imprisonment (up to four days) for not attending their drills. The whole of the brigade is insured against accidents and illness with the Swiss Fire Brigade Union at the expense of the city, and the city in addition provides a fund for families in cases of death of firemen on duty. There is also a sick fund provided for the brigade by the municipality, which also accords a scale of compensation.

The fire brigade comprises the very large complement of fifteen companies with 120 men each. Each company has three sections, namely, a fire service section, a life-saving section, and a police section, the last being utilized for keeping the ground and attending to salvage. Each company is supposed to be able, as a rule, to deal with the fire in its own district without calling upon the company of an adjoining district, and it is only in the case of a very serious fire that additional companies are turned out. There is thus a system of decentralization and independence of companies in this brigade not often met with elsewhere. Firemen are paid one franc for each drill of two hours. For fires, two francs for two hours, and fifty centimes per hour afterwards. Refreshments are provided. Any telephone can be used free by law for an alarm. The brigade has at its disposal an extension telephone service, but the men are not all connected up with the telephone of their respective districts, and thus the alarm is given mainly with horns sounded by men who are on the telephone. No section of the brigade has less than ten men on the telephone.

The water-supply is of a most excellent character. The appliances in the main comprise hydrants and hose-reels with ladder trucks, and each section has not less than 3000 ft. of hose. They are mainly housed in small temporary corrugated iron sheds with roller shutter doors, to which all the firemen have keys. There are some sixty of these hydrant houses distributed round the city, the larger appliances being at headquarters and at some depots.

Apart from the fact of there being the inspector or chief officer for the whole district, with a certain permanent staff, each company might be considered as a separate brigade, having its own chief officer and staff, and independent organization, the organization of the companies, however, being identical. A company comprises 1 chief officer, 1 second officer, 1 doctor, 2 ambulance men and 6 orderlies, a staff in charge, and the three sections have respectively 1 lieutenant, 1 deputy-lieutenant and 40 men for the fire service section; 1 lieutenant, 1 deputy-lieutenant and 40 men for the life-saving section, and 1 lieutenant, 1 deputy-lieutenant

and 20 men for the police section. Only in the case of sections 1 and 2 is there some slight variation in the organization, namely, 1 and 2 sections have been combined as a joint section, with an additional senior officer. At Zürich, as in all Swiss fire brigades, there is an extraordinary uniformity of drills, rules, regulations and instructions in all its sections. In 1908 the brigade comprised 2268 in all ranks. There were about 70 fires in that year.

(E. O. S.)

United States.

Fire service in the United States has developed on so large a scale that in 1902 it was estimated by P.G. Hubert ("Fire Fighting To-Day and To-Morrow," *Scribner's Magazine*, 1902, 32, pp 448 sqq.) that in proportion to population the fire force of America was nearly four times that of Germany or France and about three times that of England. The many fires consequent on wooden construction even in the large cities; the bad effect of sudden climatic changes—drying, parching heat being followed by weather so cold as to require artificial heating; the less safe character of heating appliances; and, especially in tenements, the more inflammable character of furniture, are some of the reasons assigned for greater fire frequency in America. Fire-fighting service in the United States is in no way connected with the military as it is on the continent of Europe; the association of volunteer with paid firemen is uncommon except in the suburban parts of the large cities, and in the smaller cities and towns, where volunteers serving for a certain term are, during that term and thereafter, exempt from jury duty.

New York.—The fire department of New York City is the result of gradual development. The first record of municipal action in regard to fire prevention dates from 1659, when 250 leather buckets and a supply of fire- 416
ladders and hooks were purchased, and a tax of one guilder for fire apparatus was imposed on every chimney; in 1676 fire-wells were ordered to be dug; in 1686 every dwelling-house with two chimneys was required to provide one bucket (if with more than two hearths, two), and bakers and brewers had to provide three and six buckets respectively; in 1689 "brent-masters" or fire-marshals were appointed; in 1695 every dwelling-house had to provide one fire-bucket at least; in 1730 two Richard Newsham hand-engines were ordered from England, and soon afterwards a superintendent of fire-engines was appointed on a small salary; in 1736 an engine-house was built near the watch-house in Broad Street, and an act of the provincial legislature authorized the appointment of twenty-four firemen exempt from constable or militia duty. Early in the 19th century volunteer fire companies increased rapidly in numbers and in importance, especially political; and success in a fire company was a sure path to success in politics, the best-known case being that of Richard Croker, a member of "Americus 6," commonly called "Big Six," of which William M. Tweed was organizer and foreman. Parades of fire companies, chowder parties and picnics (predecessors of the present "ward leader's outing") under the auspices of the volunteer organizations, annual balls after 1829, water-throwing contests, often over liberty poles, and bitter fights between different companies (sometimes settled by fist duels between selected champions), improved the organization of these companies as political factors if not as fire-fighters. So devoted were the volunteers to their leaders that in 1836, when James Gulick, chief engineer since 1831, was removed from office for political reasons, the news of his removal coming when the volunteers were fighting a fire caused them all to stop their work, and they began again only when Gulick assured them that the news was false; almost all the firemen resigned until Gulick was reinstated. The type of the noisy, rowdy New York volunteer fire hero was made famous in 1848-1849 by Frank S. Chanfrau's playing of the part Mose in Benjamin Baker's play, *A Glance at New York*. The Ellsworth Zouaves of New York were raised entirely from volunteer firemen of the city.

In 1865, when the volunteer service was abolished, it consisted of 163 companies (52 engines, 54 hose; 57 hook and ladder) manned by 3521 men (engines averaging 40 to 60 men, hose-carts about 25, and hook and ladder companies about 40); the chief engineer, elected with assistants for terms of five or three years by ballots of the firemen, received a salary of $3000 a year; and three bell-ringers in each of eight district watch-towers, who watched for smoke and gave alarms, received $600 a year. The legislature in March 1865 created a Metropolitan Fire District and established therein a Fire Department, headed by four commissioners, who with the mayor and comptroller constituted a board of estimate.

This organization was practically unchanged until 1898, when the Greater New York was chartered and the present system was introduced. At its head is a commissioner who receives $7500 a year. The more immediate head of the firemen is a chief (annual salary $10,000), the only member of the force not appointed on the basis of a civil service examination; the chief has a deputy in Manhattan (for Manhattan, Bronx and Richmond boroughs) and another for Brooklyn and Queens, each receiving an annual salary of $5000.

In December 1908 there were: 14 deputy chiefs (eight in Manhattan, Bronx and Richmond, and six in Brooklyn and Queens); 59 chiefs of battalion (31 in Manhattan, Bronx and Richmond, and 28 in Brooklyn and Queens); 248 foremen or captains (137 in Manhattan, Bronx and Richmond, and 111 in Brooklyn and Queens), 365 assistant foremen (221 in Manhattan, Bronx and Richmond; and 144 in Brooklyn and Queens); 431 engineers of steamers (247 in Manhattan, Bronx and Richmond, and 184 in Brooklyn and Queens) and 2933 firemen (1772 in Manhattan, Bronx and Richmond, and 1161 in Brooklyn and Queens); and the total uniformed force was 4107. At the close of 1908 there were 88 engine companies—at East 99th St., Battery Park, Grand St. (East River), West 35th St., Gansevoort St. and West 132nd St.; and in Manhattan and the Bronx there were 38 hook and ladder companies; in Brooklyn and Queens there were 70 engine companies, including two fire-boat companies—at 42nd St. and at North 8th St. The appropriations for the year 1906 were $4,777,687 for Manhattan, Bronx and Richmond, and $3,147,033 for Brooklyn and Queens; and the department expenses were $3,980,535 for Manhattan, Bronx and Richmond, and $2,565,849 for Brooklyn and Queens.

The first high-pressure main system in the city was installed at Coney Island in 1905, gas-engines working the pumps. Electrically driven centrifugal pumps are used in Brooklyn (protected area, 1360 acres) and in Manhattan, where the system was introduced in 1908, and where the protected district (1454 acres) reaches from the City Hall to 25th St. and from the Hudson east to Second Avenue and East Broadway, being the "Dry Goods District"; water is pumped either from city mains or from the river, and the change may be made

instantaneously. The fire watch-tower system was abolished in 1869; the present system is that of red box electric telegraph alarms, which register at headquarters (East 67th St.), where an operator sends out the alarm to that engine-house nearest to the fire which is ready to respond, and a chart informing him of the absence from the engine-house of apparatus. There are volunteer forces (about 2700 men) in Queens and Richmond boroughs and in other outlying districts.

Boston.—The Boston fire department (reorganized after the great fire of 1872) is officered by a commissioner (annual salary, $5000), a chief (annual salary, $4000), a senior deputy ($2400), and a junior deputy ($2200), twelve district chiefs ($2000 each), a superintendent and an assistant superintendent of fire-alarms, and a superintendent and an assistant superintendent of the repair shop. In 1909 the force numbered 877 regulars and 8 call men. There were 53 steam fire-engines, 14 chemical engines, 3 water-towers, 3 combination chemical engines and hose-wagons (one being motor-driven), 3 fire-boats (built in 1889, 1895 and 1909 respectively), 29 ladder-trucks and 49 hose-wagons. The auxiliary salt-water main service was established in 1893. The earliest suggestion of the application of the electric telegraph to a fire-alarm system was made in Boston in 1845 by Dr Wm. F. Channing; in 1847-1848 Moses G. Farmer, then a telegraph operator at Framingham, made a practicable electric telegraph alarm; and in 1851-1855 Farmer became superintendent of the Boston fire-alarm system, a plant being installed in 1852.[2]

Chicago.—The Chicago organization practically dates from the fire of 1871, though there was a paid department as early as 1858. Its principal officers are a fire-marshal and chief of brigade (salary $8000), four assistant fire-marshals, a department inspector, eighteen battalion chiefs, a superintendent of machinery, a veterinary and assistant, and about one hundred each of captains, lieutenants, engineers and assistant engineers; the total regular force in 1908 was 1799 men with an auxiliary volunteer force of 71 in Riverdale, Norwood Park, Hansen Park and Ashburn Park. In the business part of the city there is a patrol of seven companies employed by the Board of Fire Underwriters. Since 1895 all men in the uniformed force (except the chief of brigade) are under civil service rules. In 1908 the equipment included 117 engine companies, 34 hook and ladder companies, including one water-tower, 15 chemical engines and one hose company; and there were 5 fire-boats (4 active and 1 reserve). The first fire-boat was built in 1883. The initial installation of high-pressure mains was completed in 1902, and was greatly enlarged in 1908.

Fire Appliances.

Fire-Alarms.—Most large cities possess a system of electrical fire-alarms, consisting of call boxes placed at frequent intervals along the streets. Any one wishing to give notice of a fire either opens the door of one of these boxes or breaks the glass window with which it is fitted, and then pulls the handle inside, thus causing the particular number allocated to the box, which of course indicates its position, to be electrically telegraphed to the nearest fire station, or elsewhere as thought advisable. Sometimes a telephone is fixed in each call-box. Automatic fire-alarms consist of arrangements whereby an electric circuit is closed when the surrounding air reaches a certain temperature. The electric circuit may be used to start an alarm bell or to give warning to a watchman or central office, and the devices for closing it are of the most varied kinds—the expansion of mercury in a thermometer tube, the sagging of a long wire suspended between horizontal supports, the unequal expansion of the brass in a curved strip of brass and steel welded together, &c.

Fire-Engines.—The earliest method of applying water to the extinction of fires was by means of buckets, and these long remained the chief instruments employed for the purpose, though Hero of Alexandria about 150 B.C. described a fire-engine with two cylinders and pistons worked by a reciprocating lever, and Pliny refers to the use of fire-engines in Rome. In the 16th century (as at Augsburg in 1518) we hear of fire squirts or syringes worked by hand, and towards the end of the same century Cyprien Lucar described a very large one operated by a screw handle. The fire squirts used in London about the time of the Great Fire were 3 or 4 ft. long by 2½ or 3 in. in diameter, and three men were required to manipulate them. The next stage of development was to mount a cistern or reservoir on wheels so that it was portable, and to provide it with pumps which forced out the water contained in it through a fixed delivery pipe in the middle of the machine. An important advance was made in 1672 when two Dutchmen, Jan van der Heyde, senior and junior, made flexible hose by sewing together the edges of a strip of leather, and applied it for both suction and delivery, so that the engines could be continuously supplied with water and the stream could be more readily directed on the seat of the fire. For many years manual engines were the only ones employed, and they came to be made of great size, requiring as many as 40 or 50 men to work them; but now they are superseded by power-driven engines, at least for all important services. The first practical steam fire-engine was made by John Braithwaite about 1829, but though it proved useful in various fires in London for several years after that date, it was objected to by the men of the fire brigade and its use was abandoned. A generation later, however, steam fire-engines began to come into vogue. At first they were usually drawn by horses to the scene of the fire, though exceptionally their engines could be geared to the wheels so that they became self-propelled; and it was not till the beginning of the 20th century that motor fire-engines were employed to any extent. Steam, petrol and electricity have all been used. Such engines have the advantage that they can reach a fire much more rapidly than a horse-drawn vehicle, especially in hilly districts, and they can if necessary be made of greater power, since their size need not be limited by considerations of the weight that can be drawn by horses. Petrol-propelled engines can be started off from a station within a few seconds of the receipt of an alarm, and their pumps are ready to work immediately the fire is reached; steam-propelled engines possess the same advantage, if they are kept always standing under steam, though this involves expense that is avoided with petrol engines, which cost nothing for maintenance except while they are actually working. Motor engines are made with a capacity to deliver 1000 gallons of water a minute or even more, but the sizes than can deal with 400 or 500 gallons a minute are probably those most commonly used.

In towns standing on a navigable water-way fire-boats are often provided for extinguishing fires in buildings, in docks and along the waterside. The capacity of these may rise to 6000 gallons a minute. Steam is the power most commonly used in them, both for propulsion and for pumping, but in one built for Spezia by Messrs Merryweather & Sons of London in 1909, an 80 H. P. petrol engine was fitted for propulsion, while a steam engine was employed for pumping. The boiler was fired with oil-fuel, and steam could be

raised in a few minutes while the boat was on its way to a fire. The pumps could throw a 1½-in. jet to a height of nearly 200 ft. In some places, as at Boston, Mass., the fire-boats are utilized for service at some distance from the water. Fire-mains laid through the streets terminate in deep water at points accessible to the boats, the pumps of which can be connected to them and made to fill them with water at high pressure. In cities where a high-pressure hydraulic supply system is available, a relatively small quantity of the pressure water can be used, by means of Greathead hydrants or similar devices, to draw a much larger quantity from the ordinary mains and force it in jets to considerable heights and distances, without the intervention of any engine.

The water is conducted from the engines or hydrants in hose-pipes, which are made either of leather fastened with brass or copper rivets, or of canvas (woven from flax) which has the merit of lightness but is liable to rot, or of rubber jacketed with canvas (or in America with cotton). For directing the water on the fire, nozzles of various forms are employed, some throwing a plain solid jet, others producing spray, and others again combining jet and spray, the spray being useful to drive away smoke and protect the firemen. Various devices are employed to enable the upper storeys of buildings to be effectively reached. A line of hose may be attached to a telescopic ladder, the extensions of which are pulled out by a wire rope until the top rests on the wall of the building at the required height. Water-towers enable the jet to be delivered at a considerable height independently of any support from the building. A light, stiff, lattice steel frame is mounted on a truck, on which it lies horizontally while being drawn to a fire, but when it has to be used it is turned to an upright position, often by the aid of compressed gas, and then an extensible tube is drawn out to a still greater height. The direction of the stream delivered at the top may be controlled from below by means of gearing which enables the nozzle to be moved both horizontally and vertically. The pipe up the tower may be of large diameter, so that it can carry a huge volume of water, and at the bottom it may terminate in a reservoir into which several fire-engines may pump simultaneously.

Another class of fire-engines, known in the smaller portable sizes as fire-extinguishers or “extincteurs,” and in the larger ones as “chemical engines,” throw a jet of water charged with gas, commonly carbon dioxide, which does not support combustion. Essentially they consist of a closed metal tank, filled with a solution of some carbonate and also containing a small vessel of sulphuric acid. Under normal conditions the acid is kept separate from the solution, but when the machine has to be used they are mixed together; in some cases there is a plunger projecting externally, which when struck a sharp blow breaks the bottle of acid, while in others the act of inverting the apparatus breaks the bottle or causes it to fall against a sharp pricker which pierces the metallic capsule that closes it. As soon as the acid comes into contact with the carbonate solution carbon dioxide is formed, and a stream of gas and liquid mixed issues under considerable pressure from the attached nozzle or hosepipe. Hand appliances of this kind, holding a few gallons, are often placed in the corridors of hotels, public buildings, &c., and if they are well-constructed, so that they do not fail to act when they are wanted, they are useful in the early stages of a fire, because they enable a powerful jet to be quickly brought to bear; but it is doubtful whether the stream of mixed gas and liquid they emit is much more efficacious than plain water, and too much importance can easily be attached to spectacular displays of their power to extinguish artificial blazes of wood soused with petrol, which have been burning only a few seconds. Chemical engines, up to 60 or 70 gallons capacity, are used by fire brigades as first-aid appliances, being mounted on a horsed or motor vehicle and often combined with a fire-escape, a reel of hose, and other appliances needed by the firemen, and even with pumps for throwing powerful jets of ordinary water. Large buildings, such as hotels and warehouses, where a competent watchman is assumed to be always on duty, may be protected by a large chemical engine placed in the basement and connected by pipes to hydrants placed at convenient points on the various floors. At each hose-station a handle is provided which when pulled actuates a device that effects the mixing of the acid and carbonate solution in the machine, so that in a minute or so a stream is available at the hydrants.

Automatic Sprinklers.—Factories, warehouses and other buildings in which the fire risks are great, are sometimes fitted with automatic sprinklers which discharge water from the ceiling of a room as soon as the temperature rises to a certain point. Lines of pipes containing water under pressure are carried through the building near the ceilings at distances of 8 or 10 ft. apart, and to these pipes are attached sprinkler heads at intervals such that the water from them is distributed all over the room. The valves of the sprinklers are normally kept closed by a device the essential feature of which is a piece of fusible metal; this as soon as it is softened (at a temperature of about 160° F.) by the heat from an incipient fire, gives way and releases the water, which striking against a deflecting plate is spread in a shower. In situations where the water is liable to freeze, the ceiling pipes are filled only with air at a pressure of say 10 lb per sq. in. When the sprinkler head opens under the influence of the heat from a fire, the compressed air escapes, and the consequent loss of pressure in the pipes is arranged to operate a system of levers that opens the water-valve of the main-feed pipe. The idea of automatic sprinklers is an old one, and a system was patented by Sir William Congreve in 1812; but in their present development they are specially associated with the name of Frederick Grinnell, of Providence, Rhode Island.

Fire-Escapes.—The best kind of fire-escape, because it is always in place, and always ready for use, is an external iron staircase, reaching from the top of a building to the ground, and connected with balconies accessible from the windows on each floor. In many towns the building by-laws require such staircases to be provided on buildings exceeding a certain height and containing more than a certain number of persons. Of non-fixed escapes, designed to enable the inmates of an upper room to reach the ground through the window, numberless forms have been invented, from simple knotted ropes and folding ladders to slings and baskets suspended by a rope over sheaves fixed permanently outside the windows, and provided with brakes by which the occupant can regulate the speed of his descent, and to “chutes” or canvas tubes down which he slides. Fire brigades are provided with telescopic ladders, mounted on a wheeled carriage, up which the firemen climb; sometimes the persons rescued are sent down a chute attached to the apparatus, but many fire brigades think it preferable to rely on carrying down those who are unable to descend the ladder unaided. Jumping sheets or nets, held by a number of men, are provided to catch those whose only chance of escape is by jumping from an upper window.

(X.)

1 In the United States a special officer called a “fire-marshal” has for some time been allocated to this work in many cities, and in 1894 state fire-marshals were authorized in Massachusetts and in Maryland, this example being followed by Ohio (1900), Connecticut (1901), and Washington (1902); and in other states laws have been passed making official inquiry compulsory. In England the question has been mooted whether coroners, even where no death has occurred, should hold similar inquiries, but though this has been done in recent years in the City of London no regular system exists.

2 See Thomas C. Martin, *Municipal Electric Fire Alarm and Police Patrol Systems* (Washington, 1904), Bulletin II of the Bureau of the Census, Department of Commerce and Labour. The next plant was installed in Philadelphia in 1855; one in St Louis was completed in 1858; and work was begun in New Orleans and Baltimore in 1860.

FIREBACK, the name given to the ornamented slab of cast iron protecting the back of a fireplace. The date at which firebacks became common probably synchronizes with the removal of the fire from the centre to the side or end of a room. They never became universal, since the proximity of deposits of iron ore was essential to their use. In England they were confined chiefly to the iron districts of Sussex and Surrey, and appear to have ceased being made when the ore in those counties was exhausted. They are, however, occasionally found in other parts of the country, and it is reasonable to suppose that there was a certain commerce in an appliance which gradually assumed an interesting and even artistic form. The earlier examples were commonly rectangular, but a shaped or gabled top eventually became common. English firebacks may roughly be separated into four chronological divisions—those moulded from more than one movable stamp; armorial backs; allegorical, mythological and biblical slabs with an occasional portrait; and copies of 17th and 18th century continental designs, chiefly Netherlandish. The fleur-de-lys, the rosette, and other motives of detached ornament were much used before attempts were made to elaborate a homogeneous design, but by the middle of the 17th century firebacks of a very elaborate type were being produced. Thus we have representations of the Crucifixion, the death of Jacob, Hercules slaying the hydra, and the plague of serpents. Coats of arms were very frequent, the royal achievement being used extensively —many existing firebacks bear the arms of the Stuarts. About the time of Elizabeth the coats of private families began to be used, the earliest instances remaining bearing those of the Sackvilles, who were lords of a large portion of the forest of Anderida, which furnished the charcoal for the smelting operations in our ancient iron-fields. To the armorial shields the date was often added, together with the initials of the owner. The method of casting firebacks was to cut the design upon a thick slab of oak which was impressed face downwards upon a bed of sand, the molten metal being ladled into the impression. Firebacks were also common in the Netherlands and in parts of France, notably in Alsace. At Strassburg and Metz there are several private collections, and there are also many examples in public museums. The museum of the Porte de Hal at Brussels contains one of the finest examples in existence with an equestrian portrait of the emperor Charles V., accompanied by his arms and motto. When monarchy was first destroyed in France the possession of a *plaque de cheminée* bearing heraldic insignia was regarded as a mark of disaffection to the republic, and on the 13th of October 1793 the National Convention issued a decree giving the owners and tenants of houses a month in which to turn such firebacks with their face to the wall, pending the manufacture by the iron foundries of a sufficient number of backs less offensive to the instinct of equality. Very few of the old plaques were however removed, and to this day the old chateaux of France contain many with their backs outward. Reproductions of ancient chimney backs are now not infrequently made, and the old examples are much prized and collected.

FIRE BRAT, a small insect (*Thermobia* or *Thermophila furnorum*) related to the silverfish, and found in bakehouses, where it feeds upon bread and flour.

FIREBRICK.—Under this term are included all bricks, blocks and slabs used for lining furnaces, fire-mouths, flues, &c., where the brickwork has to withstand high temperature (see Brick).

The conditions to which firebricks are subjected in use vary very greatly as regards changes of temperature, crushing strain, corrosive action of gases, scouring action of fuel or furnace charge, chemical action of furnace charge and products of combustion, &c., and in order to meet these different conditions many varieties of firebricks are manufactured.

Ordinary firebricks are made from fireclays, *i.e.* from clays which withstand a high temperature without fusion, excessive shrinkage or warping. Many clays fulfil these conditions although the term “fireclay” is generally restricted in use to certain shales from the Coal Measures, which contain only a small percentage of soda, potash and lime, and are consequently highly refractory. There is no fixed standard of refractoriness for these clays, but no clay should be classed as a fireclay which has a fusion point below 1600° C.

Fireclays vary considerably in chemical composition, but generally the percentage of alumina and silica (taken together) is high, and the percentage of oxide of iron, magnesia, lime, soda and potash (taken

together) is low. Other materials, such as lime, bauxite, &c., are also used for the manufacture of firebricks where special chemical or other properties are necessary.

The suitability of a fireclay for the manufacture of the various fireclay goods depends upon its physical character as well as upon its refractoriness, and it is often necessary to mix with the clay a certain proportion of ground firebrick, ganister, sand or some similar refractory material in order to obtain a suitable brick. Speaking generally, fireclay goods used for lining furnaces where the firing is continuous, or where the lining is in contact with molten metal or other flux, are best made from fine-grained plastic clays; whereas firebricks used in fire-mouths and other places which are subjected to rapid changes of temperature must be made from coarser-grained and consequently less plastic clays. In all cases care should be taken to obtain a texture and also, as far as possible, by selection and mixing, to obtain a chemical composition suitable for the purpose to which the goods are to be applied. The Coal Measure clays often contain nodules of siderite in addition to the carbonate of iron disseminated in fine particles throughout the mass, and these nodules are carefully picked out as far as practicable before the clay is used.

A firebrick suitable for ordinary purposes should be even and rather open in texture, fairly coarse in grain, free from cracks or warping, strong enough to withstand the pressure to which it may be subjected when in use, and sufficiently fired to ensure practically the full contraction of the material. Very few fireclays meet all these requirements, and it is usual to mix a certain proportion of ground firebrick, ganister, sand or clay with the fireclay before making up. The fireclay or shale or other materials are ground either between rollers or on perforated pans, and then passed through sieves to ensure a certain size and evenness of grain, after which the clay and other materials are mixed in suitable proportion in the dry state, water being generally added in the mixing mill, and the bricks made up from plastic or semi-plastic clay in the ordinary way.

The proportion of ground firebrick, &c., used depends on the nature of the clay and the purpose for which the material is required, but generally speaking the more plastic clays require a higher percentage of a plastic material than the less plastic clays, the object being to produce a clay mixture which shall dry and fire without cracking, warping or excessive shrinkage, and which shall retain after firing a sufficiently open and even texture to withstand alternate heatings and coolings without cracking or flaking. For special purposes special mixtures are required and many expedients are used to obtain fireclay goods having certain specific qualities. In preparing clay for the manufacture of ordinary fire-grate backs, &c., where the temperature is very variable but never very high, a certain percentage of sawdust is often mixed with the fireclay, which burns out on firing and ensures a very open or porous texture. Such material is much less liable to splitting or flaking in use than one having a closer texture, but it is useless for furnace lining and similar work, where strength and resistance to wear and tear are essential. For the construction of furnaces, fire-mouths, &c., the firebrick used must be sufficiently strong and rigid to withstand the crushing strain of the superimposed brickwork, &c., at the highest temperature to which they are subjected.

The wearing out of a firebrick used in the construction of furnaces, &c., takes place in various ways according to the character of the brick and the particular conditions to which it is subjected. The firebrick may waste by crumbling—due to excessive porosity or openness of texture; it may waste by shattering, due to the presence of large pebbles, pieces of limestone, &c.; it may gradually wear away by the friction of the descending charge in the furnace, of the solid particles carried by the flue gases and of the flue gases themselves; it may waste by the gradual vitrification of the surface through contact with fluxing materials: in cases where it is subjected to very high temperature it will gradually vitrify and contract and so split and fall away from the setting. It is a well-recognized fact that successive firings to a temperature approaching the fusion point, or long continued heating near that temperature, will gradually produce vitrification, which brings about a very dense mass and close texture, and entirely alters the properties of the brick.

Where firebricks are in contact with the furnace charge it is necessary that the texture shall be fairly close, and that the chemical composition of the brick shall be such as to retard the formation of fusible double silicates as much as possible. Where the furnace charge is basic the firebrick should, generally speaking, be basic or aluminous and not siliceous, *i.e.* it should be made from a fireclay containing little free silica, or from such a fireclay to which a high percentage of alumina, lime, magnesia, or iron oxide has been added. For such purposes firebricks are often made from materials containing little or no clay, as for example mixtures of calcined and uncalcined magnesite; mixtures of lime and magnesia and their carbonates; mixtures of bauxite and clay; mixtures of bauxite, clay and plumbago; bauxite and oxide of iron, &c.

In certain cases it is necessary to use an acid brick, and for the manufacture of these a highly siliceous mineral, such as chert or ganister, is used, mixed if necessary with sufficient clay to bind the material together. Dinas fireclay, so-called, and the ganisters of the south Yorkshire coal-fields are largely used for making these siliceous firebricks, which may be also used where the brickwork does not come in contact with basic material, as in the arches, &c., of many furnaces. It is evident that no particular kind of firebrick can be suitable for all purposes, and the manufacturer should endeavour to make his bricks of a definite composition, texture, &., to meet certain definite requirements, recognizing that the materials at his disposal may be ill-adapted or entirely unsuitable for making firebricks for other purposes. In setting firebricks in position, a thin paste of fireclay and water or of material similar to that of which the brick is composed, must be used in place of ordinary mortar, and the joints should be as close as possible, only just sufficient of the paste being used to enable the bricks to bed on one another.

It has long been the practice on certain works to wash the face of firebrick work with a thin paste of some very refractory material—such as kaolin—in order to protect the firebricks from the direct action of the flue gases, &c., and quite recently a thin paste of carborundum and clay, or carborundum and silicate of soda has been more extensively used for the same purpose. So-called carborundum bricks have been put on the market, which have a coating of carborundum and clay fired on to the firebrick, and which are said to have a greatly extended life for certain purposes. It is probable that the carborundum gradually decomposes in the firing, leaving a thin coating of practically pure silica which forms a smooth, impervious and highly-refractory facing.

(J. B.*; W. B.*)

FIREFLY, a term popularly used for certain tropical American click-beetles (*Pyrophorus*), on account of their power of emitting light. The insects belong to the family *Elateridae*, whose characters are described under Coleoptera (*q.v.*). The genus *Pyrophorus* contains about ninety species, and is entirely confined to America and the West Indies, ranging from the southern United States to Argentina and Chile. Its species are locally known as *cucujos*. Except for a few species in the New Hebrides, New Caledonia and Fiji, the luminous *Elateridae* are unknown in the eastern hemisphere. The light proceeds from a pair of conspicuous smooth ovoid spots on the pronotum and from an area beneath the base of the abdomen. Beneath the cuticle of these regions are situated the luminous organs, consisting of layers of cells which may be regarded as a specialized portion of the fat-body. Both the male and female fireflies emit light, as well as their larvae and eggs, the egg being luminous even while still in the ovary. The inhabitants of tropical America sometimes keep fireflies in small cages for purposes of illumination, or make use of the insects for personal adornment.

The name “firefly” is often applied also to luminous beetles of the family *Lampyridae*, to which the well-known glow-worm belongs.

FIRE-IRONS, the implements for tending a fire. Usually they consist of poker, tongs and shovel, and they are most frequently of iron, steel, or brass, or partly of one and partly of another. The more elegant brass examples of the early part of the 19th century are much sought after for use with the brass fenders of that date. They were sometimes hung from an ornamental brass stand. The fire-irons of our own times are smaller in size and lighter in make than those of the best period.

FIRENZUOLA, AGNOLO (1493-*c.* 1545), Italian poet and littérateur, was born at Florence on the 28th of September 1493. The family name was taken from the town of Firenzuola, situated at the foot of the Apennines, its original home. The grandfather of Agnolo had obtained the citizenship of Florence and transmitted it to his family. Agnolo was destined for the profession of the law, and pursued his studies first at Siena and afterwards at Perugia. There he became the associate of the notorious Pietro Aretino, whose foul life he was not ashamed to make the model of his own. They met again at Rome, where Firenzuola practised for a time the profession of an advocate, but with little success. It is asserted by all his biographers that while still a young man he assumed the monastic dress at Vallombrosa, and that he afterwards held successively two abbacies. Tiraboschi alone ventures to doubt this account, partly on the ground of Firenzuola’s licentiousness, and partly on the ground of absence of evidence; but his arguments are not held to be conclusive. Firenzuola left Rome after the death of Pope Clement VII., and after spending some time at Florence, settled at Prato as abbot of San Salvatore. His writings, of which a collected edition was published in 1548, are partly in prose and partly in verse, and belong to the lighter classes of literature. Among the prose works are—*Discorsi degli animali*, imitations of Oriental and Aesopian fables, of which there are two French translations; *Dialogo delle bellezze delle donne*, also translated into French; *Ragionamenti amorosi*, a series of short tales in the manner of Boccaccio, rivalling him in elegance and in licentiousness; *Discacciamento delle nuove lettere*, a controversial piece against Trissino’s proposal to introduce new letters into the Italian alphabet; a free version or adaptation of *The Golden Ass* of Apuleius, which became a favourite book and passed through many editions; and two comedies, *I Lucidi*, an imitation of the *Menaechmi* of Plautus, and *La Trinuzia*, which in some points resembles the *Calandria* of Cardinal Bibbiena. His poems are chiefly satirical and burlesque. All his works are esteemed as models of literary excellence, and are cited as authorities in the vocabulary of the Accademia della Crusca. The date of Firenzuola’s death is only approximately ascertained. He had been dead several years when the first edition of his writings appeared (1548).

His works have been very frequently republished, separately and in collected editions. A convenient reprint of the whole was issued at Florence in 2 vols. in 1848.

FIRESHIP, a vessel laden with combustibles, floated down on an enemy to set him on fire. Fireships were used in antiquity, and in the middle ages. The highly successful employment of one by the defenders of Antwerp when besieged by the prince of Parma in 1585 brought them into prominent notice, and they were used to drive the Armada from its anchorage at Gravelines in 1588. They continued to be used, sometimes with great effect, as late as the first quarter of the 19th century. Thus in 1809 fireships designed by Lord Cochrane (earl of Dundonald) were employed against the French ships at anchor in the Basque Roads; and in the War of Greek Independence the successes of the Greek fireships against the Ottoman navy, and the consequent demoralization of the ill-disciplined Turkish crews, largely contributed to secure for the insurgents the command of the sea. In general, however, it was found that fireships hampered the movements of a fleet, were easily sunk by an enemy’s fire, or towed aside by his boats, while a premature explosion was frequently fatal to the men who had to place them in position. They were made by building “a fire chamber” between the decks from the forecastle to a bulkhead constructed abaft the mainmast. This

space was filled with resin, pitch, tallow and tar, together with gunpowder in iron vessels. The gunpowder and combustibles were connected by trains of powder, and by bundles of brushwood called “bavins.” When a fireship was to be used, a body of picked men steered her down on the enemy, and when close enough set her alight, and escaped in a boat which was towed astern. As the service was peculiarly dangerous a reward of £100, or in lieu of it a gold chain with a medal to be worn as a mark of honour, was granted in the British navy to the successful captain of a fireship. A rank of *capitaine de brûlot* existed in the French navy of Louis XIV., and was next to the full captain—or *capitaine de vaisseau*.

FIRE-WALKING, a religious ceremony common to many races. The origin and meaning of the custom is very obscure, but it is shown to have been widespread in all ages. It still survives in Bulgaria, Trinidad, Fiji Islands, Tahiti, India, the Straits Settlements, Mauritius, and it is said Japan. The details of its ritual and its objects vary in different lands, but the essential feature of the rite, the passing of priests, fakirs, and devotees barefoot over heated stones or smouldering ashes is always the same. Fire-walking was usually associated with the spring festivals and was believed to ensure a bountiful harvest. Such was the Chinese vernal festival of fire. In the time of Kublai Khan the Taoist Buddhists held great festivals to the “High Emperor of the Sombre Heavens” and walked through a great fire barefoot, preceded by their priests bearing images of their gods in their arms. Though they were severely burned, these devotees held that they would pass unscathed if they had faith. J.G. Frazer (*Golden Bough*, vol. iii. p. 307) describes the ceremony in the Chinese province of Fo-kien. The chief performers are labourers who must fast for three days and observe chastity for a week. During this time they are taught in the temple how they are to perform their task. On the eve of the festival a huge brazier of charcoal, often twenty feet wide, is prepared in front of the temple of the great god. At sunrise the next morning the brazier is lighted. A Taoist priest throws a mixture of salt and rice into the flames. The two exorcists, barefooted and followed by two peasants, traverse the fire again and again till it is somewhat beaten down. The trained performers then pass through with the image of the god. Frazer suggests that, as the essential feature of the rite is the carrying of the deity through the flames, the whole thing is sympathetic magic designed to give to the coming spring sunshine (the supposed divine emanation), that degree of heat which the image experiences. Frazer quotes Indian fire-walks, notably that of the Dosadhs, a low Indian caste in Behar and Chota Nagpur. On the fifth, tenth, and full moon days of three months in the year, the priest walks over a narrow trench filled with smouldering wood ashes. The Bhuiyas, a Dravidian tribe of Mirzapur, worship their tribal hero Bir by a like performance, and they declare that the walker who is really “possessed” by the hero feels no pain. For fire-walking as observed in the Madras presidency see *Indian Antiquary*, vii. (1878) p. 126; iii. (1874) pp. 6-8; ii. (1873) p. 190 seq. In Fiji the ceremony is called *vilavilarevo*, and according to an eyewitness a number of natives walk unharmed across and among white-hot stones which form the pavement of a huge native oven. In Tahiti priests perform the rite. In April 1899 an Englishman saw a fire-walk in Tokio (see *The Field*, May 20th, 1899). The fire was six yards long by six wide. The rite was in honour of a mountain god. The fire-walkers in Bulgaria are called *Nistinares* and the faculty is regarded as hereditary. They dance in the fire on the 21st of May, the feast of SS. Helena and Constantine. Huge fires of faggots are made, and when these burn down the *Nistinares* (who turn blue in the face) dance on the red-hot embers and utter prophecies, afterwards placing their feet in the muddy ground where libations of water have been poured.

The interesting part of fire-walking is the alleged immunity of the performers from burns. On this point authorities and eyewitnesses differ greatly. In a case in Fiji a handkerchief was thrown on to the stones when the first man leapt into the oven, and what remained of it snatched up as the last left the stones. Every fold that touched the stone was charred! In some countries a thick ointment is rubbed on the feet, but this is not usual, and the bulk of the reports certainly leave an impression that there is something still to be explained in the escape of the performers from shocking injuries. S.P. Langley, who witnessed a fire-walk in Tahiti, declares, however, that the whole rite as there practised is a mere symbolic farce (*Nature* for August 22nd, 1901).

> For a full discussion of the subject with many eyewitnesses’ reports *in extenso*, see A. Lang, *Magic and Religion* (1901). See also Dr Gustav Oppert, *Original Inhabitants of India*, p. 480; W. Crooke, *Introd. to Popular Religion and Folklore of Northern India*, p. 10 (1896); *Folklore Journal* for September 1895 and for 1903, vol. xiv. P. 87.

FIREWORKS. In modern times this term is principally associated with the art of “pyrotechny” (Gr. πῦρ, fire, and τέχνη, art), and confined to the production of pleasing scenic effects by means of fire and inflammable and explosive substances. But the history of the evolution of such displays is bound up with that of the use of such substances not only for scenic display but for exciting fear and for military purposes; and it is consequently complicated by our lack of exact knowledge as to the materials at the disposal of the ancients prior to the invention of gunpowder (see also the article Greek Fire). For the following historical account the term “fireworks” is therefore used in a rather general sense.

History.—It is usually stated that from very ancient times fireworks were known in China; it is, however, difficult to assign dates or quote trustworthy authorities. Pyrotechnic displays were certainly given in the Roman circus. While a passage in Manilius,[1] who lived in the days of Augustus, seems to bear this interpretation, there is the definite evidence of Vopiscus[2] that fireworks were performed for the emperor

Carinus and later for the emperor Diocletian; and Claudian,[3] writing in the 4th century, gives a poetical description of a set piece, where whirling wheels and dropping fountains of fire were displayed upon the *pegma*, a species of movable framework employed in the various spectacles presented in the circus. After the fall of the Western empire no mention of fireworks can be traced until the Crusaders carried back with them to Europe a knowledge of the incendiary compounds of the East, and gunpowder had made its appearance. Biringuccio,[4] writing in 1540, says that at an anterior period it had been customary at Florence and Siena to represent a fable or story at the Feast of St John or at the Assumption, and that on these occasions stage properties, including effigies with wooden bodies and plaster limbs, were grouped upon lofty pedestals, and that these figures gave forth flames, whilst round about tubes or pipes were erected for projecting fire-balls into the air: but he adds that these shows were never heard of in his time except at Rome when a pope was elected or crowned. But if relinquished in Italy, fire festivals on the eve of St John were observed both in England and France; the custom was a very old one in the days of Queen Elizabeth,[5] while De Frezier,[6] writing in 1707, says it was commonly adhered to in his time, and that on one occasion the king of France himself set a light to the great Paris bonfire. Survivals of these curious rites have been noted quite recently in Scotland and Ireland.[7] Early use also of fireworks was made in plays and pageants. Hell or hell's mouth was represented by a gigantic head out of which flames were made to issue:[8] in the river procession on the occasion of the marriage of Henry VII. and Elizabeth (1487) the "Bachelors' Barge" carried a dragon spouting flames, and Hall relates that at the marriage of Anne Boleyn (1538) "there went before the lord mayor's barge a foyst or wafter full of ordnance, which foyst also carried a great red dragon that spouted out wild fyre and round about were terrible monstrous and wild men casting fire and making a hideous noise."[9] These individuals were known as "green men." Their clothing was green, they wore fantastic masks, and carried "fire clubs." They were sometimes employed to clear the way at processions.[10]

Soon after the introduction of gunpowder the gunner and fireworker came into existence; at first they were not soldiers, but civilians who sometimes exercised military functions, and part of their duties was intimately connected with the preparation of fireworks both for peace and war. The emperor Charles V. brought his fireworks under definite regulations in 1535,[11] and eventually other countries did the same. The *ignes triumphales* were an early form of public fireworks. Scaffold poles were erected with trophies at their summits, while fixed around them were tiers of casks filled with combustibles, so that they presented the appearance of huge flaming trees; at their bases crouched dragons or other mythical beasts. With such a display Antwerp welcomed the archduke of Austria in 1550.[12] Then the "fire combat" came into fashion. Helmets from which flames would issue were provided for the performers; there were also swords and clubs that would give out sparks at every stroke, lances with fiery points, and bucklers that when struck gave forth a detonation and a flame. A picture of a combat with weapons such as these will be found in Hanzelet's *Recueil de machines militaires* (1620). In addition, the fireworker grew to be somewhat of a scenic artist who could devise a romantic background and fill it with shapes bizarre, beautiful or terrific; he had to make his castle, his cave or his rocky ravine, and people his stage with distressed damsel, errant knight or devouring dragon. Furthermore he had to give motion to the inanimate persons of the drama; thus his dragon would run down an incline on hidden wheels, be actuated by a rope, or be propelled by a rocket.[13] In 1613 at the marriage of the prince palatine to the daughter of James, the pyrotechnic display was confided to four of the king's gunners, who provided a fiery drama which included a giant, a dragon, a lady, St George, a conjurer, and an enchanted castle, jumbled up together after the approved fashion of the Spenserian legends.[14] As time went on a more refined taste rejected the bizarre features of the old displays, artistic merit began to creep into the designs, and an effort was made to introduce something appropriate to the occasion. Thus Clarmer of Nuremberg, a well-known fire-worker, celebrated the capture of Rochelle (1613) by an adaptation of the Andromeda legend, where Rochelle was the rock, Andromeda the Catholic religion, the monster Heresy, and Perseus on his Pegasus the all-conquering Louis XIII.[15] In the first half of the 17th century many books[16] on fireworks appeared, which avoided the old grotesque ideas and advocated skill and finesse. "It is a rare thing," says Nye (1648), "to represent a tree or fountain in the air." The most celebrated work of them all was the *Great Art of Artillery* by Siemienowitz, which was considered important enough to be translated into English by order of the Board of Ordnance, nearly eighty years after it had appeared.[17] The classic façade now came into fashion; on it and about it were placed emblematic figures, and disposed around were groups of rockets, Roman candles, &c., musket barrels for projecting stars, and mortars from which were fired shells called balloons, which were full of combustibles. The figures were carved out of wood which was soaped or waxed over and covered with papier mâché so that a skin was formed: this was cut vertically into two parts, removed from the wood, formed into a hollow figure, and filled with fireworks.

National fireworks now assumed a stately and dignified appearance, and for two centuries played a conspicuous part all over Europe in the public expression of thanksgiving or of triumph. Representations and sometimes accounts will be found in the British Museum[18] of the more important English displays, from the coronation of James II. down to the peace rejoicings of 1856, during which period national fireworks were provided by the officials of the Ordnance. But since the days of Ranelagh and Vauxhall fireworks have become a subject of private enterprise, and the triumphs of such firms as Messrs Brock or Messrs Pain at the Crystal Palace and elsewhere have been without an official rival.

(J. R. J. J.)

Modern Fireworks.—In modern times the art of pyrotechny has been gradually improved by the work of specialists, who have had the advantage of being guided by the progress of scientific chemistry and mechanics. As in all such cases, however, science is useless without the aid of practical experience and acquired manual dexterity.

Many substances have a strong tendency to combine with oxygen, and will do so, in certain circumstances, so energetically as to render the products of the combination (which may be solid matter or gas) intensely hot and luminous. This is the general cause of the phenomenon known as fire. Its special character depends chiefly on the nature of the substances burned and on the manner in which the oxygen is supplied to them. As is well known, our atmosphere contains oxygen gas diluted with about four times its volume of nitrogen;

and it is this oxygen which supports the combustion of our coal and candles. But it is not often that the pyrotechnist depends wholly upon atmospheric oxygen for his purposes; for the phenomena of combustion in it are too familiar, and too little capable of variation, to strike with wonder. Two cases, however, where he does so may be instanced, viz. the burning of magnesium powder and of lycopodium, both of which are used for the imitation of lightning in theatres. Nor does the pyrotechnist resort much to the use of pure oxygen, although very brilliant effects may be produced by burning various substances in glass jars filled with the gas. Indeed, the art could never have existed in anything like its present form had not certain solid substances become known which, containing oxygen in combination with other elements, are capable of being made to evolve large volumes of it at the moment it is required. The best examples of these solid *oxidizing agents* are potassium nitrate (nitre or saltpetre) and chlorate; and these are of the first importance in the manufacture of fireworks. If a portion of one of these salts be thoroughly powdered and mixed with the correct quantity of some suitable combustible body, also reduced to powder, the resulting mixture is capable of burning with more or less energy without any aid from atmospheric oxygen, since each small piece of fuel is in close juxtaposition to an available and sufficient store of the gas. All that is required is that the liberation of the oxygen from the solid particles which contain it shall be started by the application of heat from without, and the action then goes on unaided. This, then, is the fundamental fact of pyrotechny— that, with proper attention to the chemical nature of the substances employed, solid mixtures (*compositions* or *fuses*) may be prepared which contain within themselves all that is essential for the production of fire.

If nitre and potassium chlorate, with other salts of nitric and chloric acids and a few similar compounds, be grouped together as oxidizing agents, most of the other materials used in making firework compositions may be classed as *oxidizable substances*. Every composition must contain at least one sample of each class: usually there are present more than one oxidizable substance, and very often more than one oxidizing agent. In all cases the proportions by weight which the ingredients of a mixture bear to one another is a matter of much importance, for it greatly affects the manner and rate of combustion. The most important oxidizable substances employed are charcoal and sulphur. These two, it is well known, when properly mixed in certain proportions with the oxidizing agent nitre, constitute gunpowder; and gunpowder plays an important part in the construction of most fireworks. It is sometimes employed alone, when a strong explosion is required; but more commonly it is mixed with one or more of its own ingredients and with other matters. In addition to charcoal and sulphur, the following oxidizable substances are more or less employed:—many compounds of carbon, such as sugar, starch, resins, &c.; certain metallic compounds of sulphur, such as the sulphides of arsenic and antimony; a few of the metals themselves, such as iron, zinc, magnesium, antimony, copper. Of these metals iron (cast-iron and steel) is more used than any of the others. They are all employed in the form of powder or small filings. They do not contribute much to the burning power of the composition; but when it is ignited they become intensely heated and are discharged into the air, where they oxidize more or less completely and cause brilliant sparks and scintillations.

Sand, potassium sulphate, calomel and some other substances, which neither combine with oxygen nor supply it, are sometimes employed as ingredients of the compositions in order to influence the character of the fire. This may be modified in many ways. Thus the rate of combustion may be altered so as to give anything from an instantaneous explosion to a slow fire lasting many minutes. The flame may be clear, smoky, or charged with glowing sparks. But the most important characteristic of a fire—one to which great attention is paid by pyrotechnists—is its *colour*, which may be varied through the different shades and combinations of yellow, red, green and blue. These colours are imparted to the flame by the presence in it of the heated vapours of certain metals, of which the following are the most important:—sodium, which gives a yellow colour; calcium, red; strontium, crimson; barium, green; copper, green or blue, according to circumstances. Suitable salts of these metals are much used as ingredients of fire mixtures; and they are decomposed and volatilized during the process of combustion. Very often the chlorates and nitrates are employed, as they serve the double purpose of supplying oxygen and of imparting colour to the flame.

The number of fire mixtures actually employed is very great, for the requirements of each variety of firework, and of almost each size of each variety, are different. Moreover, every pyrotechnist has his own taste in the matter of compositions. They are capable, however, of being classified according to the nature of the work to which they are suited. Thus there are rocket-fuses, gerbe-fuses, squib-fuses, star-compositions, &c.; and, in addition, there are a few which are essential in the construction of most fireworks, whatever the main composition may be. Such are the *starting-powder*, which first catches the fire, the *bursting-powder*, which causes the final explosion, and the *quick-match* (cotton-wick, dried after being saturated with a paste of gunpowder and starch), employed for connecting parts of the more complicated works and carrying the fire from one to another. Of the general nature of fuses an idea may be had from the following two examples, which are selected at hazard from among the numerous recipes for making, respectively, tourbillion fire and green stars:—

Tourbillion.			*Green Stars.*		
Meal gunpowder	24	parts.	Potassium chlorate	16	parts.
Nitre	10	”	Barium nitrate	48	”
Sulphur	7	”	Sulphur	12	”
Charcoal	4	”	Charcoal	1	”
Steel filings	8	”	Shellac	5	”
			Calomel	8	”
			Copper sulphide	2	”

Although the making of compositions is of the first importance, it is not the only operation with which the pyrotechnist has to do; for the construction of the *cases* in which they are to be packed, and the actual processes of packing and finishing, require much care and dexterity. These cases are made of paper or pasteboard, and are generally of a cylindrical shape. In size they vary greatly, according to the effect which it is desired to produce. The relations of length to thickness, of internal to external diameter, and of these to the size of the openings for discharge, are matters of extreme importance, and must always be attended to

with almost mathematical exactness and considered in connexion with the nature of the composition which is to be used.

There is one very important property of fireworks that is due more to the mechanical structure of the cases and the manner in which they are filled than to the precise chemical character of the composition, *i.e.* their power of *motion*. Some are so constructed that the piece is kept at rest and the only motion possible is that of the flame and sparks which escape during combustion from the mouth of the case. Others, also fixed, contain, alternately with layers of some more ordinary compositions, balls or blocks of a special mixture cemented by some kind of varnish; and these *stars*, as they are called, shot into the air, one by one, like bullets from a gun, blaze and burst there with striking effect. But in many instances motion is imparted to the firework as a whole—to the case as well as to its contents. This motion, various as it is in detail, is almost entirely one of two kinds—*rotatory* motion round a fixed point, which may be in the centre of gravity of a single piece or that of a whole system of pieces, and *free ascending* motion through the air. In all cases the cause of motion is the same, viz. that large quantities of gaseous matter are formed by the combustion, that these can escape only at certain apertures, and that a backward pressure is necessarily exerted at the point opposite to them. When a large gun is discharged, it recoils a few feet. Movable fireworks may be regarded as very light guns loaded with heavy charges; and in them the recoil is therefore so much greater as to be the most noticeable feature of the discharge; and it only requires proper contrivances to make the piece fly through the air like a sky-rocket or revolve round a central axis like a Catherine wheel. Beauty of motion is hardly less important in pyrotechny than brilliancy of fire and variety of colour.

The following is a brief description of some of the forms of firework most employed:—

Fixed Fires.—Theatre fires consist of a slow composition which may be heaped in a conical pile on a tile or a flagstone and lit at the apex. They require no cases. Usually the fire is coloured—green, red or blue; and beautiful effects are obtained by illuminating buildings with it. It is also used on the stage; but, in that case, the composition must be such as to give no suffocating or poisonous fumes. *Bengal lights* are very similar, but are piled in saucers, covered with gummed paper, and lit by means of pieces of match. *Marroons* are small boxes wrapped round several times with lind cord and filled with a strong composition which explodes with a loud report. They are generally used in *batteries*, or in combination with some other form of firework. *Squibs* are straight cylindrical cases about 6 in. long, firmly closed at one end, tightly packed with a strong composition, and capped with touch-paper. Usually a little bursting-powder is put in before the ordinary composition, so that the fire is finished by an explosion. The character of the fire is, of course, susceptible of great variation in colour, &c. *Crackers* are characterized by the cases being doubled backwards and forwards several times, the folds being pressed close and secured by twine. One end is primed; and when this is lit the cracker burns with a hissing noise, and a loud report occurs every time the fire reaches a bend. If the cracker is placed on the ground, it will give a jump at each report; so that it cannot quite fairly be classed among the fixed fireworks. *Roman candles* are straight cylindrical cases filled with layers of composition and *stars* alternately. These stars are simply balls of some special composition, usually containing metallic filings, made up with gum and spirits of wine, cut to the required size and shape, dusted with gunpowder and dried. They are discharged like blazing bullets several feet into the air, and produce a beautiful effect, which may be enhanced by packing stars of differently coloured fire in one case. *Gerbes* are choked cases, not unlike Roman candles, but often of much larger size. Their fire spreads like a sheaf of wheat. They may be packed with variously coloured stars, which will rise 30 ft. or more. *Lances* are small straight cases charged with compositions like those used for making stars. They are mostly used in complex devices, for which purpose they are fixed with wires on suitable wooden frames. They are connected by *leaders*, *i.e.* by quick-match enclosed in paper tubes, so that they can be regulated to take fire all at the same time, singly, or in detachments, as may be desired. The devices and “set pieces” constructed in this way are often of an extremely elaborate character; and they include all the varieties of *lettered designs*, of *fixed suns*, *fountains*, *palm-trees*, *waterfalls*, *mosaic work*, *Highland tartan*, *portraits*, *ships*, &c.

Rotating Fireworks.—Pin or *Catherine wheels* are long paper cases filled with a composition by means of a funnel and packing-wire and afterwards wound round a disk of wood. This is fixed by a pin, sometimes vertically and sometimes horizontally; and the outer primed end of the spiral is lit. As the fire escapes the recoil causes the wheel to revolve in an opposite direction and often with considerable velocity. *Pastiles* are very similar in principle and construction. Instead of the case being wound in a spiral and made to revolve round its own centre point, it may be used as the engine to drive a wheel or other form of framework round in a circle. Many varied effects are thus produced, of which the *fire-wheel* is the simplest. Straight cases, filled with some fire-composition, are attached to the end of the spokes of a wheel or other mechanism capable of being rotated. They are all pointed in the same direction at an angle to the spokes, and they are connected together by leaders, so that each, as it burns out, fires the one next it. The pieces may be so chosen that brilliant effects of changing colour are produced; or various fire-wheels of different colours may be combined, revolving in different planes and different directions—some fast and some slowly. *Bisecting wheels*, *plural wheels*, *caprice wheels*, *spiral wheels*, are all more or less complicated forms; and it is possible to produce, by mechanism of this nature, a model in fire of the solar system.

Ascending Fireworks.—Tourbillions are fireworks so constructed as to ascend in the air and rotate at the same time, forming beautiful spiral curves of fire. The straight cylindrical case is closed at the centre and at the two ends with plugs of plaster of Paris, the composition occupying the intermediate parts. The fire finds vent by six holes pierced in the case. Two of these are placed close to the end, but at opposite sides, so that one end discharges to the right and the other to the left; and it is this which imparts the rotatory motion. The other holes are placed along the middle line of what is the under-surface of the case when it is laid horizontally on the ground; and these, discharging downwards, impart an upward motion to the whole. A cross piece of wood balances the tourbillion; and the quick-match and touch-paper are so arranged that combustion begins at the two ends simultaneously and does not reach the holes of ascension till after the rotation is fairly begun. The *sky-rocket* is generally considered the most beautiful of all fireworks; and it certainly is the one that requires most skill and science in its construction. It consists essentially of two parts,—the body and the head. The body is a straight cylinder of strong pasted paper and is choked at the lower end, so as to present only a narrow opening for the escape of the fire. The composition does not fill up the case entirely, for a central hollow conical bore extends from the choked mouth up the body for three-quarters of its length. This is an essential feature of the rocket. It allows of nearly the whole composition

being fired at once; the result of which is that an enormous quantity of heated gases collects in the hollow bore, and the gases, forcing their way downwards through the narrow opening, urge the rocket up through the air. The top of the case is closed by a plaster-of-Paris plug. A hole passes through this and is filled with a fuse, which serves to communicate the fire to the head after the body is burned out. This head, which is made separately and fastened on after the body is packed, consists of a short cylindrical paper chamber with a conical top. It serves the double purpose of cutting a way through the air and of holding the *garniture* of stars, sparks, crackers, serpents, gold and silver rain, &c., which are scattered by bursting fire as soon as the rocket reaches the highest point of its path. A great variety of beautiful effects may be obtained by the exercise of ingenuity in the choice and construction of this garniture. Many of the best results have been obtained by unpublished methods which must be regarded as the secrets of the trade. The *stick* of the sky-rocket serves the purpose of guiding and balancing it in its flight; and its size must be accurately adapted to the dimensions of the case. In *winged* rockets the stick is replaced by cardboard wings, which act like the feathers of an arrow. A *girandole* is the simultaneous discharge of a large number of rockets (often from one hundred to two hundred), which either spread like a peacock's tail or pierce the sky in all directions with rushing lines of fire. This is usually the final feat of a great pyrotechnic display.

See Chertier, *Sur les feux d'artifice* (Paris, 1841; 2nd ed., 1854); Mortimer, *Manual of Pyrotechny* (London, 1856); Tessier, *Chimie pyrotechnique, ou traité pratique des feux colorés* (Paris, 1858); Richardson and Watts, *Chemical Technology, s.v.* "Pyrotechny" (London, 1863-1867); Thomas Kentish, *The Pyrotechnist's Treasury* (London, 1878); Websky, *Luftfeuerwerkkunst* (Leipzig, 1878).

(O. M.)

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1 Manilius, *Astronomica*, lib. v., 438-443.

2 Vopiscus, *Carus, Numerianus et Carinus*, ch. xix.

3 Claudianus, *De consulatu Manlii Theodori*, 325-330.

4 Vanuzzio Biringuccio, *Pyrotechnia*.

5 Strutts, *Sports and Pastimes of the English People*.

6 De Frezier, *Traité des feux d'artifice* (1707 and 1747).

7 *Notes and Queries*, series 5, vol. ix. p. 140, and series 8, vol. ii. pp. 145 and 254.

8 J.B. Nichols & Sons, *London Pageants*.

9 Hall's *Chronicles*.

10 J. Bate, *Mysteries of Nature and Art* (1635). This contains a picture of a green man.

11 *Geschichte des Feuerwerkswesen* (Berlin, 1887). The Jubilee pamphlet of the Brandenburg Artillery.

12 See "Fairholts' Collection" bequeathed to the Royal Society of Antiquaries.

13 *Journal* of the Royal Artillery, vol. xxxii. No. 11.

14 Somers' *Tracts*, vol. iii.

15 De Frezier.

16 Diego Ufano, *Artillery*, in Spanish (1614); Master Gunner Norton, *The Gunner* and *The Gunner's Dialogue* (1628); F. de Malthe (Malthus), *Artificial Fireworks*, in French and English (1628); "Hanzelet," *Recueil de plusieurs machines militaires et feux artificiels pour la guerre et récréation* (1620 and 1630); Furttenback, master gunner of Bavaria, *Halinitro Pyrobolio*, in German (1627); (John Babington Matross, *Pyrotechnia*, 1635); Nye, master gunner of Worcester, *Art of Gunnery* (Worcester, 1648); Casimir Siemienowitz, lieut.-general of the Ordnance to the king of Poland, *The Great Art of Artillery*, in French (1650).

17 Translated by George Shelvocke, 1727, by order of the surveyor-general of the Ordnance.

18 "Crace Collection" in the print-room; the King's Prints and Drawings in the library. See also "The Connection of the Ordnance Department with National and Royal Fireworks," *R. A. Journal*, vol. xxii. No. 11.

FIRM, an adjective originally indicating a dense or close consistency, hence steady, unshaken, unchanging or fixed. This word, in M. Eng. *ferme*, is derived through the French, from Lat. *firmus*. The medieval Latin substantive *firma* meant a fixed payment, either in the way of rent, composition for periodic payments, &c.; and this word, often represented by "firm" in translations of medieval documents, has produced the English "farm" (*q.v.*). From a late Latin use of *firmare*, to confirm by signature, *firma* occurs in many Romanic languages for a signature, and the English "firm" was thus used till the 18th century. From a transferred use came the meaning of a business house. In the Partnership Act 1890, persons who have entered into partnership with one another are called collectively a firm, and the name under which their business is carried on is called the firm-name.

FIRMAMENT, the sky, the heavens. In the Vulgate the word *firmamentum*, which means in classical Latin a strengthening or support (*firmare*, to make firm or strong) was used as the equivalent of στερέωμα (στερεόειν, to make firm or solid) in the LXX., which translates the Heb. rāqīya'. The Hebrew probably signifies literally "expanse," and is thus used of the expanse or vault of the sky, the verb from which it is

derived meaning “to beat out.” In Syriac the verb means “to make firm,” and is the direct source of the Gr. στερέωμα and the Lat. *firmamentum*. In ancient astronomy the firmament was the eighth sphere containing the fixed stars surrounding the seven spheres of the planets.

FIRMAN (an adaptation of the Per. *fermān*, a mandate or patent, cognate with the Sanskrit *pramāna*, a measure, authority), an edict of an oriental sovereign, used specially to designate decrees, grants, passports, &c., issued by the sultan of Turkey and signed by one of his ministers. A decree bearing the sultan’s sign-manual and drawn up with special formalities is termed a *hatti-sherif*, Arabic words meaning a line, writing or command, and lofty, noble. A written decree of an Ottoman sultan is also termed an *irade*, the word being taken from the Arab. *irādā*, will, volition, order.

FIRMICUS, MATERNUS JULIUS, a Latin writer, who lived in the reign of Constantine and his successors. About the year 346 he composed a work entitled *De erroribus profanarum religionum*, which he inscribed to Constantius and Constans, the sons of Constantine, and which is still extant. In the first part (chs. 1-17) he attacks the false objects of worship among the Oriental cults; in the second (chs. 18-29) he discusses a number of formulae and rites connected with the mysteries. The whole tone of the work is fanatical and declamatory rather than argumentative, and is thus in such sharp contrast with the eight books on astronomy (Libri VIII. *Matheseos*) bearing the same author’s name, that the two works have usually been attributed to different writers. Mommsen (*Hermes* vol. 29, pp. 468-472) has, however, shown that the astronomy—a work interfused with an urbane Neoplatonic spirit—was composed about 336 and not in 354 as was formerly held. When we add to this the similarity of style, and the fact that each betrays a connexion with Sicily, there is the strongest reason for claiming the same author for the two books, though it shows that in the 4th century acceptance of Christianity did not always mean an advance in ethical standpoint.

The Christian work is preserved in a Palatine MS. in the Vatican library. It was first printed at Strassburg in 1562, and has been reprinted several times, both separately and along with the writings of Minucius Felix, Cyprian or Arnobius. The most correct editions are those by Conr. Bursian (Leipzig, 1856), and by C. Halm, in his *Minucius Felix* (*Corp. Scr. Eccl. Lat.* ii.), (Vienna, 1867). The Neoplatonist work was first printed by Aldus Manutius in 1501, and has often been reprinted. For full discussions see G. Ebert, *Gesch. der chr. lat. Litt.*, ed. 1889, p. 129 ff.; O. Bardenhewer, *Patrologie*, ed. 1901, p. 354.

FIRMINY, a town of central France in the department of Loire, 8 m. S.W. of St Etienne by rail. Pop. (1906) 15,778. It has important coal mines known since the 14th century and extensive manufactures of iron and steel goods, including railway material, machinery and cannon. Fancy woollen hosiery is also manufactured.

FIRST-FOOT, in British folklore, especially that of the north and Scotland, the first person who crosses the threshold on Christmas or New Year’s Eve. Good or ill luck is believed to be brought the house by First-Foot, and a female First-Foot is regarded with dread. In Lancashire a light-haired man is as unlucky as a woman, and it became a custom for dark-haired males to hire themselves out to “take the New Year in.” In Worcestershire luck is ensured by stopping the first carol-singer who appears and leading him through the house. In Yorkshire it must always be a male who enters the house first, but his fairness is no objection. In Scotland first-footing was always more elaborate than in England, involving a subsequent entertainment.

FIRST OF JUNE, Battle of the. By this name we call the great naval victory won by Lord Howe over the French fleet of Admiral Villaret-Joyeuse, on the 1st of June 1794. No place name can be given to it, because the battle was fought 429 m. to the west of Ushant.

The French people were suffering much distress from the bad harvest of the previous year, and a great convoy of merchant ships laden with corn was expected from America. Admiral Vanstabel of the French navy had been sent to escort it with two ships of the line in December of 1793. He sailed with his charge from the Chesapeake on the 11th of April 1794. On the previous day six French ships of the line left Brest to meet

Vanstabel in mid ocean. The British force designed to intercept the convoy was under Lord Howe, then in command of the channel fleet. He sailed from Spithead on the 2nd of May with 34 sail of the line and 15 smaller vessels, having under his charge nearly a hundred merchant ships which were to be seen clear of the Channel. On the 4th, when off the Lizard, the convoy was sent on its way protected by 8 line of battle ships and 6 or 7 frigates. Two of the line of battle ships were to accompany them throughout the voyage. The other six under Rear-admiral Montagu were to go as far as Cape Finisterre, and were then to cruise on the look-out for the French convoy between Cape Ortegal and Belle Isle. These detachments reduced the force under Lord Howe's immediate command to 26 of the line and 7 frigates. On the 5th of May he was off Ushant, and sent frigates to reconnoitre the harbour of Brest. They reported to him that the main French fleet, which was under the command of Villaret-Joyeuse, and was of 25 sail of the line, was lying at anchor in the roads. Howe then sailed to the latitude on which the convoy was likely to be met with, knowing that if the French admiral came out it would be to meet the ships with the food and cover them from attack. To seek the convoy was therefore the most sure way of forcing Villaret-Joyeuse to action. Till the 18th the British fleet continued cruising in the Bay of Biscay. On the 19th Lord Howe returned to Ushant and again reconnoitred Brest. It was then seen that Villaret-Joyeuse had gone to sea. He had sailed with his whole force on the 16th and had passed close to the British fleet on the 17th, unseen in a fog. On the 19th the French admiral was informed by the "Patriote" (74) that Nielly had fallen in with, and had captured, the British frigate "Castor" (32), under Captain Thomas Troubridge, together with a convoy from Newfoundland. On the same day Villaret-Joyeuse captured part of a Dutch convoy of 53 sail from Lisbon. On the 19th a frigate detached by Admiral Montagu joined Howe. It brought information that Montagu had recaptured part of the Newfoundland convoy, and had learnt that Nielly was to join Vanstabel at sea, and that their combined force would be 9 sail of the line. Montagu himself had steered to cruise on the route of the convoy between the 45th and 47th degrees of north latitude. Howe now steered to meet his subordinate who, he considered, would be in danger from the main French fleet. On the 21st he recaptured some of the Dutch ships taken by Villaret-Joyeuse. From them he learnt that on the 19th the French fleet had been in latitude 47° 46′ N. and in longitude 11° 22′ N. and was steering westward. Judging that Montagu was too far to the south to be in peril from Villaret-Joyeuse, and considering him strong enough to perform the duty of intercepting the convoy, Lord Howe decided to pursue the main French fleet. The wind was changeable and the weather hazy. It was not till the 28th of May at 6.30 A.M. that the British fleet caught sight of the enemy in 47° 34′ N. and 13° 39′ W.

The wind was from the south-east, and the French were to windward. Villaret-Joyeuse bore down to a distance of 10 m. from the British, and then hauled to the wind on the port tack. It was difficult for the British fleet to force an action from leeward if the French were unwilling to engage. Lord Howe detached a light squadron of four ships, the "Bellerophon" (74), "Russel" (74), "Marlborough" (74), and "Thunderer" (74) under Rear-admiral Thomas Pasley, to attack the rear of the French line. Villaret-Joyeuse stood on and endeavoured to work to windward. In the course of the afternoon Rear-admiral Pasley's ships began to come up with the last of the French line, the "Révolutionnaire" (110). A partial action took place which went on till after dark; other British vessels joined. The "Révolutionnaire" was so damaged that she was compelled to leave her fleet, and the British "Audacious" (74) was also crippled and compelled to return to port. The "Révolutionnaire" was accompanied by another liner. During the night the two fleets continued on the same course, and next day Howe renewed his attempts to force an action from leeward. He tacked his fleet in succession—his first ship tacking first and the rest in order—in the hope that he would be able to cut through the French rear and gain the weather-gage. Villaret-Joyeuse then turned all his ships together and again headed in the same direction as the British. This movement brought him nearer the British fleet, and another partial action took place between the van of each force. Seeing that the French admiral was not disposed to charge home, Howe at noon once more ordered his fleet to tack in succession. His signal was poorly obeyed by the van, and his object, which was to cut through the French line, was not at once achieved. But the admiral himself finally set an example by tacking his flagship, the "Queen Charlotte" (100), and passing through the French, two ships from the end of their line. He was followed by his fleet, and Villaret-Joyeuse, seeing the peril of the ships in his rear, wore all his ships together to help them. Both forces had been thrown into considerable confusion by these movements, but the British had gained the weather-gage. Villaret-Joyeuse was able to save the two ships cut off, but he had fallen to leeward and the power to force on a battle had passed to Lord Howe. During the 30th the fleets lost sight of one another for a time. The French, who had four ships crippled, had been joined by four others, and were again 26 in number, including the "Patriote."

The 31st of May passed without a hostile meeting and in thick weather, but by the evening the British were close to windward of the French. As Howe, who had not full confidence in all his captains, did not wish for a night battle, he waited till the following morning, keeping the French under observation by frigates. On the 1st of June they were in the same relative positions, and at about a quarter past eight Howe bore down on the French, throwing his whole line on them at once from end to end, with orders to pass through from windward to leeward, and so to place the British ships on the enemy's line of retreat. It was a very bold departure from the then established methods of fighting, and most honourable in a man of sixty-eight, who had been trained in the old school. Its essential merit was that it produced a close *mêlée*, in which the better average gunnery and seamanship of the British fleet would tell. Lord Howe's orders were not fully obeyed by all his captains, but a signal victory was won,—six of the French line of battle ships were taken, and one, the "Vengeur," sunk. The convoy escaped capture, having passed over the spot on which the action of the 20th May was fought, on the following day, and it anchored at Brest on the 3rd of June. Its safe arrival went far to console the French for their defeat. The failure to stop it was forgotten in England in the pleasure given by the victory.

See James's *Naval History*, vol. i. (1837); and Tronde, *Batailles navales de la France* (1867).

(D. H.)

FIRTH, CHARLES HARDING (1857-), British historian, was born at Sheffield on the 16th of March 1857, and was educated at Clifton College and at Balliol College, Oxford. At his university he took the Stanhope prize for an essay on the marquess Wellesley in 1877, became lecturer at Pembroke College in 1887, and fellow of All Souls College in 1901. He was Ford's lecturer in English history in 1900, and became regius professor of modern history at Oxford in succession to F. York Powell in 1904. Firth's historical work was almost entirely confined to English history during the time of the Great Civil War and the Commonwealth; and although he is somewhat overshadowed by S.R. Gardiner, a worker in the same field, his books are of great value to students of this period. The chief of them are: *Life of the Duke of Newcastle* (1886); *Scotland and the Commonwealth* (1895); *Scotland and the Protectorate* (1899); *Narrative of General Venables* (1900); *Oliver Cromwell* (1900); *Cromwell's Army* (1902); and the standard edition of *Ludlow's Memoirs* (1894). He also edited the *Clarke Papers* (1891-1901), and Mrs Hutchinson's *Memoirs of Colonel Hutchinson* (1885), and wrote an introduction to the *Stuart Tracts* (1903), besides contributions to the *Dictionary of National Biography*. In 1909 he published *The Last Years of the Protectorate*.

FIRTH, MARK (1819-1880), English steel manufacturer and philanthropist, was born at Sheffield on the 25th of April 1819, the son of a steel smelter. At the age of fourteen Mark, with his brother, left school to join their father in the foundry where he was employed, and ten years later the three together started a six-hole furnace of their own. The venture proved successful, and besides an extensive home business, they soon established a large American connexion. Their huge Norfolk works were erected at Sheffield in 1849, and still greater were afterwards acquired at Whittington in Derbyshire and others at Clay Wheels near Wadsley. The manufacture of steel blocks for ordnance was the principal feature of their business, and they produced also shot and heavy forgings. They also installed a plant for the production of steel cores for heavy guns, and for some time they supplied nearly all the metal used for gun making by the British government and a large proportion of that used by the French. On the death of his father in 1848 Mark Firth became the head of the firm. In 1869 he built and endowed "Mark Firth's Almshouses" at Ranmoor near Sheffield, and in 1875, when mayor, he presented to his native place a freehold park of thirty-six acres. He founded and endowed Firth College, for lectures and classes in connexion with the extension of university education, which was opened in 1879. He died on the 28th of November 1880, and was accorded a public funeral.

FIRŪZABAD, a town of Persia, in the province of Fars, 72 m. S. of Shiraz, in 28° 51′ N. Pop. about 3000. It is situated in a fertile plain, 15 m. long and 7 m. broad, well watered by the river Khoja which flows through it from north to south. The town is surrounded by a mud wall and ditch. Three or four miles north-west of the town are the ruins of the ancient city and of a large building popularly known as the fire-temple of Ardashir, and beyond them on the face of the rock in the gorge through which the river enters the plain are two Sassanian bas-reliefs.

The river leaves the plain by a narrow gorge at the southern end, and according to Persian history it was there that Alexander the Great, when unable to capture the ancient city, built a dike across the gorge, thus damming up the water of the river and turning the plain into a lake and submerging the city and villages. The lake remained until the beginning of the 3rd century, when Ardashir, the first Sassanian monarch, drained it by destroying the dike. He built a new city, called it Gūr, and made it the capital of one of the five great provinces or divisions of Fars. Firuz (or Peroz, *q.v.*), one of Ardashir's successors, called the district after his name Firūzabad ("the abode of Firuz"), but the name of the city remained Gūr until Azud ed Dowleh (Adod addaula) (949-982) changed it to its present name. He did this because he frequently resided at Gūr, and the name meaning also "a grave" gave rise to unpleasant allusions, for instance, "People who go to Gūr (grave) never return alive; our king goes to Gūr (the town) several times a year and is not dead yet."

The district has twenty villages and produces much wheat and rice. It is said that the rice of Firūzabad bears sixty-fold.

(A. H.-S.)

FIRŪZKŪH, a small province of Persia, with a population of about 5000, paying a yearly revenue of about £500. Its chief place is a village of the same name picturesquely situated in a valley of the Elburz, about 90 m. east of Teheran, at an elevation of 6700 ft. and in 35° 46′ N. and 52° 48′ E. It has post and telegraph offices and a population of 2500. A precipitous cliff on the eastern side of the valley is surmounted by the ruins of an ancient fort popularly ascribed to Alexander the Great.

FISCHART, JOHANN (*c.* 1545-1591), German satirist and publicist, was born, probably at Strassburg (but according to some accounts at Mainz), in or about the year 1545, and was educated at Worms in the house of Kaspar Scheid, whom in the preface to his *Eulenspiegel* he mentions as his "cousin and preceptor." He appears to have travelled in Italy, the Netherlands, France and England, and on his return to have taken the degree of *doctor juris* at Basel. From 1575 to 1581, within which period most of his works were written, he lived with, and was probably associated in the business of, his sister's husband, Bernhard Jobin, a printer at Strassburg, who published many of his books. In 1581 Fischart was attached, as advocate to the Reichskammergericht (imperial court of appeal) at Spires, and in 1583, when he married, was appointed *Amtmann* (magistrate) at Forbach near Saarbrücken. Here he died in the winter of 1590-1591. Fischart wrote under various feigned names, such as Mentzer, Menzer, Reznem, Huldrich Elloposkleros, Jesuwalt Pickhart, Winhold Alkofribas Wüstblutus, Ulrich Mansehr von Treubach, and Im Fischen Gilt's Mischen; and it is partly owing to this fact that there is doubt whether some of the works attributed to him are really his. More than 50 satirical works, however, both in prose and verse, remain authentic, among which are —*Nachtrab oder Nebelkräh* (1570), a satire against one Jakob Rabe, who had become a convert to the Roman Catholic Church; *Von St Dominici des Predigermönchs und St Francisci Barfüssers artlichem Leben* (1571), a poem with the expressive motto "Sie haben Nasen und riechen's nit" (Ye have noses and smell it not), written to defend the Protestants against certain wicked accusations, one of which was that Luther held communion with the devil; *Eulenspiegel Reimensweis* (written 1571, published 1572); *Aller Praktik Grossmutter* (1572), after Rabelais's *Prognostication Pantagrueline*; *Flöh Haz, Weiber Traz* (1573), in which he describes a battle between fleas and women; *Affentheuerliche und ungeheuerliche Geschichtschrift vom Leben, Rhaten und Thaten der ... Helden und Herren Grandgusier Gargantoa und Pantagruel*, also after Rabelais (1575, and again under the modified title, *Naupengeheurliche Geschichtklitterung*, 1577); *Neue künstliche Figuren biblischer Historien* (1576); *Anmahnung zur christlichen Kinderzucht* (1576); *Das glückhafft Schiff von Zürich* (1576, republished 1828, with an introduction by the poet Ludwig Uhland), a poem commemorating the adventure of a company of Zürich arquebusiers, who sailed from their native town to Strassburg in one day, and brought, as a proof of this feat, a kettleful of *Hirsebrei* (millet), which had been cooked in Zürich, still warm into Strassburg, and intended to illustrate the proverb "perseverance overcomes all difficulties"; *Podagrammisch Trostbüchlein* (1577); *Philosophisch Ehzuchtbüchlein* (1578); the celebrated *Bienenkorb des heiligen römischen Immenschwarms*, &c., a modification of the Dutch *De roomsche Byen-Korf*, by Philipp Marnix of St Aldegonde, published in 1579 and reprinted in 1847; *Der heilig Brotkorb* (1580), after Calvin's *Traité des reliques*; *Das vierhörnige Jesuiterhütlein*, a rhymed satire against the Jesuits (1580); and a number of smaller poems. To Fischart also have been attributed some "Psalmen und geistliche Lieder" which appeared in a Strassburg hymn-book of 1576.

Fischart had studied not only the ancient literatures, but also those of Italy, France, the Netherlands and England. He was a lawyer, a theologian, a satirist and the most powerful Protestant publicist of the counter-reformation period; in politics he was a republican. Above all, he is a master of language, and was indefatigable with his pen. His satire was levelled mercilessly at all perversities in the public and private life of his time—at astrological superstition, scholastic pedantry, ancestral pride, but especially at the papal dignity and the lives of the priesthood and the Jesuits. He indulged in the wildest witticisms, the most abandoned caricature; but all this he did with a serious purpose. As a poet, he is characterized by the eloquence and picturesqueness of his style and the symbolical language he employed. Thirty years after Fischart's death his writings, once so popular, were almost entirely forgotten. Recalled to the public attention by Johann Jakob Bodmer and Gotthold Ephraim Lessing, it is only recently that his works have come to be a subject of investigation, and his position in German literature to be fully understood.

Freiherr von Meusebach, whose valuable collection of Fischart's works has passed into the possession of the royal library in Berlin, deals in his *Fischartstudien* (Halle, 1879) with the great satirist. Fischart's poetical works were published by Hermann Kurz in three volumes (Leipzig, 1866-1868); and selections by K. Goedeke (Leipzig, 1800) and by A. Hauffen in Kürschner's *Deutsche Nationalliteratur* (Stuttgart, 1893); *Die Geschichtklitterung* and some minor writings appeared in Scheible's *Kloster*, vols. 7 and 10 (Stuttgart, 1847-1848). *Das glückhafft Schiff* has been frequently reprinted, critical edition by J. Baechtold (1880). See for further biographical details, Erich Schmidt in the *Allgemeine deutsche Biographie*, vol. 7; A.F.C. Vilmar in Ersch and Gruber's *Encyclopaedie*; W. Wackernagel, *Johann Fischart von Strassburg und Basels Anteil an ihm* (2nd ed., Basel, 1875); P. Besson, *Étude sur Jean Fischart* (Paris, 1889); and A. Hauffen, "Fischart-Studien" (in *Euphorion*, 1896-1909).

FISCHER, EMIL (1852-), German chemist, was born at Euskirchen, in Rhenish Prussia, on the 9th of October 1852, his father being a merchant and manufacturer. After studying chemistry at Bonn, he migrated to Strassburg, where he graduated as Ph.D. in 1874. He then acted as assistant to Adolf von Baeyer at Munich for eight years, after which he was appointed to the chair of chemistry successively at Erlangen (1882) and Würzburg (1885). In 1892 he succeeded A.W. von Hofmann as professor of chemistry at Berlin. Emil Fischer devoted himself entirely to organic chemistry, and his investigations are characterized by an originality of idea and readiness of resource which make him the master of this branch of experimental chemistry. In his hands no substance seemed too complex to admit of analysis or of synthesis; and the more intricate and involved the subjects of his investigations the more strongly shown is the conspicuous skill in pulling, as it were, atom from atom, until the molecule stood revealed, and, this accomplished, the same skill combined atom with atom until the molecule was regenerated. His *forte* was to enter fields where others had done little except break the ground; and his researches in many cases completely elucidated the problem in hand, and where the solution was not entire, his methods and results almost always contained the key to the situation.

In 1875, the year following his engagement with von Baeyer, he published his discovery of the organic derivatives of a new compound of hydrogen and nitrogen, which he named hydrazine (*q.v.*). He investigated both the aromatic and aliphatic derivatives, establishing their relation to the diazo compounds, and he perceived the readiness with which they entered into combination with other substances, giving origin to a wealth of hitherto unknown compounds. Of such condensation products undoubtedly the most important are the hydrazones, which result from the interaction with aldehydes and ketones. His observations, published in 1886, that such hydrazones, by treatment with hydrochloric acid or zinc chloride, yielded derivatives of indol, the pyrrol of the benzene series and the parent substance of indigo, were a valuable confirmation of the views advanced by his master, von Baeyer, on the subject of indigo and the many substances related to it. Of greater moment was his discovery that phenyl hydrazine reacted with the sugars to form substances which he named osazones, and which, being highly crystalline and readily formed, served to identify such carbohydrates more definitely than had been previously possible. He next turned to the rosaniline dyestuffs (the magenta of Sir W.H. Perkin), and in collaboration with his cousin Otto Fischer (b. 1852), then at Munich and afterwards professor at Erlangen, who has since identified himself mainly with the compounds of this and related groups, he published papers in 1878 and 1879 which indubitably established that these dyestuffs were derivatives of triphenyl methane. Fischer's next research was concerned with compounds related to uric acid. Here the ground had been broken more especially by von Baeyer, but practically all our knowledge of the so-called purin group (the word *purin* appears to have been suggested by the phrase *purum uricum*) is due to Fischer. In 1881-1882 he published papers which established the formulae of uric acid, xanthine, caffeine, theobromine and some other compounds of this group. But his greatest work in this field was instituted in 1894, when he commenced his great series of papers, wherein the compounds above mentioned were all referred to a nitrogenous base, purin (*q.v.*). The base itself was obtained, but only after much difficulty; and an immense series of derivatives were prepared, some of which were patented in view of possible therapeutical applications.[1] These researches were published in a collected form in 1907 with the title *Untersuchungen in der Puringruppe* (1882-1906). The first stage of his purin work successfully accomplished, he next attacked the sugar group. Here the pioneer work was again of little moment, and Fischer may be regarded as the prime investigator in this field. His researches may be taken as commencing in 1883; and the results are unparalleled in importance in the history of organic chemistry. The chemical complexity of these carbohydrates, and the difficulty with which they could be got into a manageable form—they generally appeared as syrups—occasioned much experimental difficulty; but these troubles were little in comparison with the complications due to stereochemical relations. However, Fischer synthesized fructose, glucose and a great number of other sugars, and having showed how to deduce, for instance, the formulae of the 16 stereoisomeric glucoses, he prepared several stereoisomerides, thereby completing a most brilliant experimental research, and simultaneously confirming the van't Hoff theory of the asymmetric carbon atom (see STEREO-ISOMERISM). The study of the sugars brought in its train the necessity for examining the nature, properties and reactions of substances which bring about the decomposition known as fermentation (*q.v.*). Fischer attacked the problem presented by ferments and enzymes, and although we as yet know little of this complex subject, to Fischer is due at least one very important discovery, viz. that there exists some relation between the chemical constitution of a sugar and the ferment and enzyme which breaks it down. The magnitude of his researches in this field may be gauged by his collected papers, *Untersuchungen über Kohlenhydrate und Fermente* (1884-1908), pp. viii. + 912 (Berlin, 1909).

From the sugars and ferments it is but a short step to the subject of the proteins, substances which are more directly connected with life processes than any others. The chemistry of the proteins, a subject which bids fair to be Fischer's great lifework, presents difficulties which are probably without equal in the whole field of chemistry, partly on account of the extraordinary chemical complexity of the substances involved, and partly upon the peculiar manner in which chemical reactions are brought about in the living organism. But by the introduction of new methods, Fischer succeeded in breaking down the complex albuminoid substances into amino acids and other nitrogenous compounds, the constitutions of most of which have been solved; and by bringing about the recombination of these units, appropriately chosen, he prepared synthetic peptides which approximate to the natural products. His methods led to the preparation of an octadeca-peptide of the molecular weight 1213, exceeding that of any other synthetic compound; but even this compound falls far short of the simplest natural peptide, which has a molecular weight of from 2000 to 3000. He considers, however, that the synthesis of more complex products is only a matter of trouble and cost. His researches made from 1899 to 1906 have been published with the title *Untersuchungen über Aminosauren, Polypeptides und Proteine* (Berlin, 1907). The extraordinary merit of his many researches has been recognized by all the important scientific societies in the world, and he was awarded the Nobel prize for chemistry in 1902. Under his control the laboratory at Berlin became one of the most important in existence, and has attracted to it a constant stream of brilliant pupils, many of whom are to be associated with much of the experimental work indissolubly connected with Fischer.

1 For a brief review of the pharmacology of purin derivatives see F. Francis and J.M. Fortescue-Brinkdale, *The Chemical Basis of Pharmacology* (1908).

FISCHER, ERNST KUNO BERTHOLD (1824-1907), German philosopher, was born at Sandewalde in Silesia, on the 23rd of July 1824. After studying philosophy at Leipzig and Halle, he became a privat-docent at Heidelberg in 1850. The Baden government in 1853 laid an embargo on his teaching owing to his Liberal ideas, but the effect of this was to rouse considerable sympathy for his views, and in 1856 he obtained a professorship at Jena, where he soon acquired great influence by the dignity of his personal character. In 1872, on Zeller's removal to Berlin, Fischer succeeded him as professor of philosophy and the history of modern German literature at Heidelberg, where he died on the 4th of July 1907. His part in philosophy was that of historian and commentator, for which he was especially qualified by his remarkable clearness of exposition; his point of view is in the main Hegelian. His *Geschichte der neuern Philosophie* (1852-1893, new ed. 1897) is perhaps the most accredited modern book of its kind, and he made valuable contributions to the

study of Kant, Bacon, Shakespeare, Goethe, Spinoza, Lessing, Schiller and Schopenhauer.

Some of his numerous works have been translated into English: *Francis Bacon of Verulam*, by J. Oxenford (1857); *The Life and Character of Benedict Spinoza*, by Frida Schmidt (1882); *A Commentary on Kant's Kritik of Pure Reason*, by J.P. Mahaffy (1866); *Descartes and his School*, by J.P. Gordy (1887); *A Critique of Kant*, by W.S. Hough (1888); see also H. Falkenheim, *Kuno Fischer und die litterar-historische Methode* (1892); and bibliography in J.M. Baldwin's *Dictionary of Philosophy and Psychology* (1905).

FISH, HAMILTON (1808-1893), American statesman, was born in New York City on the 3rd of August 1808. His father, Nicholas Fish (1758-1833), served in the American army during the War of American Independence, rising to the rank of lieutenant-colonel. The son graduated at Columbia College in 1827, and in 1830 was admitted to the bar, but practised only a short time. In 1843-1845 he was a Whig representative in Congress. He was the Whig candidate for lieutenant-governor of New York in 1846, and was defeated by Addison Gardner (Democrat); but when in 1847 Gardner was appointed a judge of the state court of appeals, Fish was elected (November 1847) to complete the term (to January 1849). He was governor of New York state from 1849 to 1851, and was United States senator in 1851-1857, acting with the Republicans during the last part of his term. In 1861-1862 he was associated with John A. Dix, William M. Evarts, William E. Dodge, A.T. Stewart, John Jacob Astor, and other New York men, on the Union Defence Committee, which (from April 22, 1861, to April 30, 1862) co-operated with the municipal government in the raising and equipping of troops, and disbursed more than a million dollars for the relief of New York volunteers and their families. Fish was secretary of state during President Grant's two administrations (1869-1877). He conducted the negotiations with Great Britain which resulted in the treaty of the 8th of May 1871, under which (Article 1) the "Alabama claims" were referred to arbitration, and the same disposition (Article 34) was made of the "San Juan Boundary Dispute," concerning the Oregon boundary line. In 1871 Fish presided at the Peace Conference at Washington between Spain and the allied republics of Peru, Chile, Ecuador and Bolivia, which resulted in the formulation (April 12) of a general truce between those countries, to last indefinitely and not to be broken by any one of them without three years' notice given through the United States; and it was chiefly due to his restraint and moderation that a satisfactory settlement of the "Virginius Affair" was reached by the United States and Spain (1873). Fish was vice-president-general of the Society of the Cincinnati from 1848 to 1854, and president-general from 1854 until his death. He died in Garrison, New York, on the 7th of September 1893.

His son, Nicholas Fish (1846-1902), was appointed second secretary of legation at Berlin in 1871, became secretary in 1874, and was *chargé d'affaires* at Berne in 1877-1881, and minister to Belgium in 1882-1886, after which he engaged in banking in New York City.

FISH (O. Eng. *fisc*, a word common to Teutonic languages, cf. Dutch *visch*, Ger. *Fisch*, Goth. *fisks*, cognate with the Lat. *piscis*), the common name of that class of vertebrate animals which lives exclusively in water, breathes through gills, and whose limbs take the form of fins (see Ichthyology). The article Fisheries deals with the subject from the economic and commercial point of view, and Angling with the catching of fish as a sport. The constellation and sign of the zodiac known as "the fishes" is treated under Pisces.

The fish was an early symbol of Christ in primitive and medieval Christian art. The origin is to be found in the initial letters of the names and titles of Jesus in Greek, viz. Ἰησοῦς Χριστός, Θεοῦ Ὑιός, Σώτηρ, Jesus Christ, Son of God, Saviour, which together spell the Greek word for "fish," ἰχθύς. The fish is also said to be represented in the oval-shaped figure, pointed at both ends, and formed by the intersection of two circles. This figure, also known as the *vesica piscis*, is common in ecclesiastical seals and as a glory or aureole in paintings of sculpture, surrounding figures of the Trinity, saints, &c. The figure is, however, sometimes referred to the almond, as typifying virginity; the French name for the symbol is *Amande mystique*.

The word "fish" is used in many technical senses. Thus it is used of the purchase used in raising the flukes of an anchor to the bill-board; of a piece of wood or metal used to strengthen a sprung mast or yard; and of a plate of metal used, as in railway construction, for the strengthening of the meeting-place of two rails. This word is of doubtful origin, but it is probably an adaptation of the Fr. *fiche*, that which "fixes," a peg. This word also appears in the English form "fish," in the metal, pearl or bone counters, sometimes made in the form of fish, used for scoring points, &c., in many games.

FISHER, ALVAN (1792-1863), American portrait-painter, was born at Needham, Massachusetts, on the 9th of August 1792. At the age of eighteen he was a clerk in a country shop, and subsequently was employed by the village house painter, but at the age of twenty-two he began to paint portrait heads, alternating with rural scenes and animals, for which he found patrons at modest prices. In ten years he had saved enough to go to Europe, studying at the Paris schools and copying in the galleries of the Louvre. Upon his return he

became one of the recognized group of Massachusetts portrait-painters. Along with Doughty, Harding and Alexander, in 1831, he held an exhibition of his work in Boston—perhaps the first joint display by painters ever held in that city. Though he had considerable talent for landscape, a lack of patronage for such work caused him to confine himself to portraiture, in which he was moderately successful. He died at Dedham, Mass., on the 16th of February 1863.

FISHER, GEORGE PARK (1827-1909), American theologian, was born at Wrentham, Massachusetts, on the 10th of August 1827. He graduated at Brown University in 1847, and at the Andover Theological Seminary in 1851, spent three years in study in Germany, was college preacher and professor of divinity at Yale College in 1854-1861, and was Titus Street professor of ecclesiastical history in the Yale Divinity School in 1861-1901, when he was made professor *emeritus*. He was president of the American Historical Association in 1897-1898. His writings have given him high rank as an authority on ecclesiastical history. They include *Essays on the Supernatural Origin of Christianity* (1865); *History of the Reformation* (1873), republished in several revisions; *The Beginnings of Christianity* (1877); *Discussions in History and Theology* (1880); *Outlines of Universal History* (1886); *History of the Christian Church* (1887); *The Nature and Method of Revelation* (1890); *Manual of Natural Theology* (1893); *A History of Christian Doctrine*, in the "International Theological Library" (1896); and *A Brief History of Nations* (1896). He died on the 20th of December 1909.

FISHER, JOHN (*c.* 1469-1535), English cardinal and bishop of Rochester, born at Beverly, received his first education at the collegiate church there. In 1484 he went to Michael House, Cambridge, where he took his degrees in arts in 1487 and 1491, and, after filling several offices in the university, became master of his college in 1499. He took orders; and his reputation for learning and piety attracted the notice of Margaret Beaufort, mother of Henry VII., who made him her confessor and chaplain. In 1501 he became vice-chancellor; and later on, when chancellor, he was able to forward, if not to initiate entirely, the beneficent schemes of his patroness in the foundations of St. John's and Christ's colleges, in addition to two lectureships, in Greek and Hebrew. His love for Cambridge never waned, and his own benefactions took the form of scholarships, fellowships and lectures. In 1503 he was the first Margaret professor at Cambridge; and the following year was raised to the see of Rochester, to which he remained faithful, although the richer sees of Ely and Lincoln were offered to him. He was nominated as one of the English prelates for the Lateran council (1512), but did not attend. A man of strict and simple life, he did not hesitate at the legatine synod of 1517 to censure the clergy, in the presence of the brilliant Wolsey himself, for their greed of gain and love of display; and in the convocation of 1523 he freely opposed the cardinal's demand for a subsidy for the war in Flanders. A great friend of Erasmus, whom he invited to Cambridge, whilst earnestly working for a reformation of abuses, he had no sympathy with those who attacked doctrine; and he preached at Paul's Cross (12th of May 1521) at the burning of Luther's books. Although he was not the author of Henry's book against Luther, he joined with his friend, Sir Thomas More, in writing a reply to the scurrilous rejoinder made by the reformer. He retained the esteem of the king until the divorce proceedings began in 1527; and then he set himself sternly in favour of the validity of the marriage. He was Queen Catherine's confessor and her only champion and advocate. He appeared on her behalf before the legates at Blackfriars; and wrote a treatise against the divorce that was widely read.

Recognizing that the true aim of the scheme of church reform brought forward in parliament in 1529 was to put down the only moral force that could withstand the royal will, he energetically opposed the reformation of abuses, which doubtless under other circumstances he would have been the first to accept. In convocation, when the supremacy was discussed (11th of February 1531), he declared that acceptance would cause the clergy "to be hissed out of the society of God's holy Catholic Church"; and it was his influence that brought in the saving clause, *quantum per legem Dei licet*. By listening to the revelations of the "Holy Maid of Kent," the nun Elizabeth Barton (*q.v.*), he was charged with misprision of treason, and was condemned to the loss of his goods and to imprisonment at the king's will, penalties he was allowed to compound by a fine of £300 (25th of March 1534). Fisher was summoned (13th of April) to take the oath prescribed by the Act of Succession, which he was ready to do, were it not that the preamble stated that the offspring of Catherine were illegitimate, and prohibited all faith, trust and obedience to any foreign authority or potentate. Refusing to take the oath, he was committed (15th of April) to the Tower, where he suffered greatly from the rigours of a long confinement. On the passing of the Act of Supremacy (November 1534), in which the saving clause of convocation was omitted, he was attainted and deprived of his see. The council, with Thomas Cromwell at their head, visited him on the 7th of May 1535, and his refusal to acknowledge Henry as supreme head of the church was the ground of his trial. The constancy of Fisher, while driving Henry to a fury that knew no bounds, won the admiration of the whole Christian world, where he had been long known as one of the most learned and pious bishops of the time. Paul III., who had begun his pontificate with the intention of purifying the curia, was unaware of the grave danger in which Fisher lay; and in the hope of reconciling the king with the bishop, created him (20th of May 1535) cardinal priest of St Vitalis. When the news arrived in England it sealed his fate. Henry, in a rage, declared that if the pope sent Fisher a hat there should be no head for it. The cardinal was brought to trial at Westminster (17th of June 1535) on the charge that he did "openly declare in English that the king, our sovereign lord, is not supreme head on earth of the Church of England," and was condemned to a traitor's death at Tyburn, a sentence afterwards

changed. He was beheaded on Tower Hill on the 22nd of June 1535, after saying the *Te Deum* and the psalm *In te Domine speravi*. His body was buried first at All Hallows, Barking, and then removed to St. Peter's *ad vincula* in the Tower, where it lies beside that of Sir Thomas More. His head was exposed on London Bridge and then thrown into the river. As a champion of the rights of conscience, and as the only one of the English bishops that dared to resist the king's will, Fisher commends himself to all. On the 9th of December 1886 he was beatified by Pope Leo XIII.

Fisher's Latin works are to be found in the *Opera J. Fisheri quae hactenus inveniri potuerunt omnia* (Würzburg, 1595), and some of his published English works in the Early English Text Society (Extra series. No. 27, part i. 1876). There are others in manuscript at the P.R.O. (27, Henry VIII., No. 887). Besides the State papers, the main sources for his biography are *The Life and Death of that renowned John Fisher, Bishop of Rochester* (London, 1655), by an anonymous writer, the best edition being that of Van Ortroy (Brussels, 1893); Bridgett's *Life of Blessed John Fisher, Bishop of Rochester* (London, 1880 and 1890); and Thureau, *Le bienheureux Jean Fisher* (Paris, 1907).

(E. Tn.)

FISHER, JOHN ARBUTHNOT FISHER, 1st Baron (1841-), British admiral, was born on the 25th of January 1841, and entered the navy in June 1854. He served in the Baltic during the Crimean War, and was engaged as midshipman on the "Highflyer," "Chesapeake" and "Furious," in the Chinese War, in the operations required by the occupations of Canton, and of the Peiho forts in 1859. He became sub-lieutenant on the 25th of January 1860, and lieutenant on the 4th of November of the same year. The cessation of naval wars, at least of wars at sea in which the British navy had to take a part, after 1860, allowed few officers to gain distinction by actual services against the enemy. But they were provided with other ways of proving their ability by the sweeping revolution which transformed the construction, the armament, and the methods of propulsion of all the navies of the world, and with them the once accepted methods of combat. Lieutenant Fisher began his career as a commissioned officer in the year after the launching of the French "Gloire" had set going the long duel in construction between guns and armour. He early made his mark as a student of gunnery, and was promoted commander on the 2nd of August 1869, and post-captain on the 30th of October 1874. In this rank he was chosen to serve as president of the committee appointed to revise "The Gunnery Manual of the Fleet." It was his already established reputation which pointed Captain Fisher out for the command of H.M.S. "Inflexible," a vessel which, as the representative of a type, had supplied matter for much discussion. As captain of the "Inflexible" he took part in the bombardment of Alexandria (11th July 1882). The engagement was not arduous in itself, having been carried out against forts of inferior construction, indifferently armed, and worse garrisoned, but it supplied an opportunity for a display of gunnery, and it was conspicuous in the midst of a long naval peace. The "Inflexible" took a prominent part in the action, and her captain had the command of the naval brigade landed in Alexandria, where he adapted the ironclad train and commanded it in various skirmishes with the enemy. After the Egyptian campaign, he was, in succession, director of Naval Ordnance and Torpedoes (from October 1886 to May 1891); A.D.C. to Queen Victoria (18th June, 1887, to 2nd August 1890, at which date he became rear-admiral); admiral superintendent of Portsmouth dockyard (1891 to 1892); a lord commissioner of the navy and comptroller of the navy (1892 to 1897), and vice-admiral (8th May 1896); commander-in-chief on the North American and West Indian station (1897). In 1899 he acted as naval expert at the Hague Peace Conference, and on the 1st of July 1899 was appointed commander-in-chief in the Mediterranean. From the Mediterranean command, Admiral Fisher passed again to the admiralty as second sea lord in 1902, and became commander-in-chief at Portsmouth on the 31st of August 1903, from which post he passed to that of first sea lord. Besides holding the foreign Khedivial and Osmanieh orders, he was created K.C.B. in 1894 and G.C.B. in 1902. As first sea lord, during the years 1903-1909, Sir John Fisher had a predominant influence in all the far-reaching new measures of naval development and internal reform; and he was also one of the committee, known as Lord Esher's committee, appointed in 1904 to report on the measures necessary to be taken to put the administration and organization of the British army on a sound footing. The changes in naval administration made under him were hotly canvassed among critics, who charged him with autocratic methods, and in 429
1906-1909 with undue subservience to the government's desire for economy; and whatever the efficiency of his own methods at the admiralty, the fact was undeniable that for the first time for very many years the navy suffered, as a service, from the party-spirit which was aroused. It was notorious that Admiral Lord Charles Beresford in particular was acutely hostile to Sir John Fisher's administration; and on his retirement in the spring of 1909 from the position of commander-in-chief of the Channel fleet, he put his charges and complaints before the government, and an inquiry was held by a small committee under the Prime Minister. Its report, published in August, was in favour of the Admiralty, though it encouraged the belief that some important suggestions as to the organization of a naval "general staff" would take effect. On the 9th of November Sir John Fisher was created a peer as Baron Fisher of Kilverstone, Norfolk. He retired from the Admiralty in January 1910.

FISHERIES,[1] a general term for the various operations engaged in for the capture of such aquatic creatures as are useful to man. From time immemorial fish have been captured by various forms of spears, nets, hooks and more elaborate apparatus, and a historical description of the methods and appliances that have been used would comprise a considerable portion of a treatise on the history of man. For the most part the operations of fishing have been comparable with those of primitive hunting rather than with agriculture;

they have taken the least possible account of considerations affecting the supply; when one locality has been fished out, another has been resorted to. The increasing pressure on every source of food, and the enormous improvements in the catching power of the engines involved, has made some kind of regulation and control inevitable, with the result that in practically every civilized country there exists some authority for the investigation and regulation of fisheries.

The annexed table shows the department of state and the approximate expenditure on fisheries in some of the chief countries of the world. The figures are only approximate and are based on the expenditure for 1907. In the case of England and Wales the expenditure is not complete, as under the Sea Fisheries Regulation Act of 1888 the whole of the coast of England and Wales could be placed under local fisheries committees with power to levy rates for fishery purposes, and in a certain number of districts advantage has been taken of this act. But even with this addition, British expenditure on fisheries is less than that undertaken by most of the countries of northern Europe, although British fisheries are much more valuable than those of all the rest of Europe together.

Administration of Fisheries.

	Norway.	Sweden.	Denmark.	Germany.	Holland.	Belgium.
Department of State	Trade and Industry and Agriculture	Agriculture	Agriculture	Imperial Department of Interior	Agriculture	Agriculture and Woods and Forests
Approximate Annual Expenditure—						
1. Administration	£15,000	£5,500	£10,200	Conducted by Maritime States.	£12,500	. .
2. Scientific Fishery Research	5,000	4,500	6,300	£27,750	2,500	£1,000

	Canada.	U.S. America.	England and Wales.	Scotland	Ireland
Department of State	Marine and Fisheries.	Bureau of Fisheries under Commerce and Labour.	Agriculture and Fisheries.	Fishery Board	Agriculture and Technical Instruction.
Approximate Annual Expenditure—					
1. Administration	£159,000	Conducted by Costal States	£8,000	£13,000	£10,000
2. Scientific Fishery Research	48,000	£141,000	14,000 (expended through agents)	800	. .

The early years of the 20th century witnessed another great expansion of the sea fisheries of the United Kingdom. The herring fishery has been revolutionized partly by the successful introduction of steam drifters, which have markedly increased the aggregate catching power, and partly by the prosecution of the fishery on one part or other of the British coasts during the greater part of the year. The crews of many Scottish vessels which formerly worked at the herring and line fisheries in alternate seasons of the year now devote their energies almost entirely to the herring fishery, which they pursue in nomad fleets around all the coasts of Great Britain. The East Anglian drifters carry on their operations at different seasons of the year from Shetland in the north (for herrings) to Newlyn in the west (for mackerel). In Scotland the value of the nets employed on steam drifters has increased from £3000 in 1899 to £61,000 in 1906, and the average annual catch of herrings has increased from about four to about five million cwts. during the past ten years. In England also the annual catch of herrings, which reached a total of two million cwts. for the first time in 1899, has exceeded three millions in each year from 1902 to 1905.

In steam trawling also great enterprise has been shown. In 1906 Messrs Hellyer of Hull launched a new steam trawling fleet of 50 vessels for working the North Sea grounds, and the delivery of new steam trawlers at Grimsby was greater than at any previous period, these vessels being designed more especially to exploit the distant fishing grounds, the range of which has been extended from Morocco to the White Sea. About 100 vessels were added to the Grimsby fleet in the course of twelve months. These new vessels measure about 140 ft. in length and over 20 ft. in beam, and exceed 250 tons gross tonnage, the accommodation both for fish and crews being considerably in excess of that provided in vessels of this class hitherto.

Returns of the steam trawlers registered in 1907 in the chief European countries show the expanse of this industry, and the enormous preponderance of Great Britain. The numbers are as follows:—

Belgium	23
Denmark	5
France	224
Germany	239
Netherlands	81
Norway	20
Portugal	13
Spain	12-18
Sweden	11
Scotland	292
Ireland	6
England and Wales	1317

A simultaneous development of the sea fisheries has been manifested in other maritime countries of Europe, particularly in Germany and Holland, but the total number of steam trawlers belonging to those countries in 1905 scarcely exceeded the mere additions to the British fishing fleet in 1906.

The relative magnitude of British fisheries may best be gauged by a comparison with the proceeds of the chief fisheries of other European countries. The following table is based upon official returns and mainly derived from the *Bulletin Statistique* of the International Council for the Study of the Sea. It represents in pounds sterling the value of the produce of the various national fisheries during the year 1904, except in the case of France, for which country the latest available figures are those for 1902.

Values in Thousands of £.

	Herring.	Cod.	Plaice.	Other Fish.	Total.
British Isles	1870	1015	1100	5496	9,481,000
Norway	352	834	. .	443	1,629,000
Denmark	117	60	171	223	571,000
Germany	220	64[2]	40[2]	512[2]	836,000
Holland	575	53	58	311	997,000
France (1902)	635	851[3]	. .	3562	5,048,000

The total value of the sea fisheries in the three chief subdivisions of the British Isles in the year 1905, according to the official returns, was as follows:

Fish landed in	Excluding Shellfish.	Including Shellfish.
England and Wales	£7,200,644	£7,502,768
Scotland	2,649,148	2,719,810
Ireland	360,577	414,364
Total	£10,210,369	£10,636,942

These figures show an increase of £1,000,000 as compared with the total value in 1900, and of more than £3,000,000 as compared with 1895 (cf. Table I. at end).

In England and Wales the trawl fisheries for cod, haddock, and flat fish yielded about three-quarters of the total, and the drift fisheries for herring and mackerel nearly the whole of the remaining quarter. The line fisheries in England and Wales are now relatively insignificant and yield only about one-fortieth of the total (cf. Table VIII. at end).

In Scotland, on the other hand, there is not so much difference in the relative importance of the three chief fisheries. In 1905 herrings and other net-caught fish yielded rather more than one-half of the total, the trawl fisheries nearly three-eighths, and the line fisheries one-eighth (cf. Table X.).

Fishery.	Trawl and Line.		Drift and Stake-nets.		Shellfish.
	Thousands of cwt.	Thousands of £.	Thousands of cwt.	Thousands of £.	Thousands of £.
England and Wales, 1905—					
East Coast	6017	4713	3042	1145	202
South Coast	303	245	728	268	64
West Coast	1002	720	219	111	36
Scotland, 1906—					
East Coast	2296	1202	2709	819	25
Orkney and Shetland	114	42	1735	642	10
West Coast	148	62	591	210	38
Ireland, 1905—					
North Coast	9	5	177	70	7
East Coast	79	70	110	32	18
South and West Coast	46	35	577	148	28

In Ireland the mackerel and herring fisheries provide nearly three-quarters of the total yield, the mackerel forming the chief item in the south and west, and the herring on the north and east coasts. The remaining quarter is mainly derived from the trawl fisheries, the headquarters of which are at Dublin, Howth and Balbriggan on the east, and at Galway and Dingle on the west coast.

The value of the fishing boats and gear employed in the Scottish fisheries during 1905 is returned as nearly £4,120,000. Upon a moderate estimate, the total value of the boats and gear employed in the fisheries of Great Britain and Ireland cannot be less than £12,000,000.

The relative yield and value of the various fisheries on the separate coasts of the British Isles is illustrated in the table of landings from the latest data available.

From these figures it is manifest that the yield and value of the east coast fisheries of England and Scotland preponderate enormously over those of the western coasts, whether attention be paid to the drift-net fisheries for surface fish or to the fisheries for bottom fish with trawls and lines.

The preceding statistics and remarks, as well as the supplementary tables at the end of this article, indicate that the British fishing industry has enjoyed a period of unexampled prosperity. The community at large has benefited by the more plentiful supply, and the merchant by the general lowering of prices at the ports of landing (see Tables I.-IV. at end). But it is to be noted that this wave of prosperity, as on previous occasions, has been attained by the application of increased and more powerful means of capture and by the exploitation of new fishing grounds in distant waters, and not by any increase, natural or artificial, in the productivity of the home waters,—unless perhaps the abundance of herrings is to be ascribed to the destruction of their enemies by trawling. British fisheries are still pursued as a form of hunting rather than

of husbandry. In 1892 the Iceland and Bay of Biscay trawling banks were discovered, in 1898 the Faroe banks, in 1905 rich plaice grounds in the White Sea. In 1905 one-half of the cod and a quarter of the haddock and plaice landed at east coast ports of England were caught in waters beyond the North Sea.

Table showing, in Thousands of Cwt., the Quantity of Fish landed by Steam Trawlers on the East Coast of England from Fishing Grounds within and beyond the North Sea respectively.

Year.	Within the North Sea.				Beyond the North Sea.			
	Cod.	Haddock.	Plaice.	All Kinds.	Cod.	Haddock.	Plaice.	All Kinds.
1903	729	2301	812	4776	470	389	114	1189
1904	637	2032	658	4228	447	429	284	1389
1905	640	1560	621	3739	603	518	244	1682

The statistics of the English Board of Agriculture and Fisheries have distinguished since 1903 between the catch of fish within and beyond the North Sea, and between the catch of trawlers and liners. Neglecting the catch of the liners as relatively insignificant, and of the sailing trawlers as relatively small and practically constant during the three years in question, we see from the board's figures (see table above) that the total catch of English steam trawlers within the North Sea during 1904 and 1905 was in each year 500,000 cwt. less than in the year before, amounting to a gross decrease of more than 25% in 1905 as compared with 1903, and, in relation to the catching power employed, to an average decrease of 2½ cwt. per boat per diem. This decrease may be largely explained by the occurrence in 1903 of one of those periodic "floods" of small cod and haddock which take place in the North Sea from time to time; but the steady decline in the number of North Sea voyages by English steam trawlers—from 29,300 in 1903 to 26,700 in 1905—affords a clear indication of the fact that many of our trawling skippers are deserting the North Sea for more profitable fishing grounds. The number of Scottish steam trawlers "employed" at Scottish North Sea ports has also declined during the same period from 240 in 1903 to 228 in 1905.

The following table shows the number of British and foreign steam trawlers registered at North Sea ports, and for English vessels the number of fishing voyages made within and beyond the North Sea respectively:—

Year.	Boats Registered.	English Steam Trawlers. Voyages.[4]		Scottish. Employed.	German, Dutch and Belgian. Registered.
		Within North Sea.	Beyond North Sea.		
1903	1060	29,328	1822	240	181
1904	1049	28,589	2120	233	199
1905	1064	26,670	2671	228	228

Unfortunately the North Sea gains no rest from this withdrawal of British trawlers, since the place of the latter is filled year after year by increasing numbers of continental fishing boats. The number of fishing steamers (practically all trawlers) registered at North Sea ports in Germany and Holland was 159 in 1903, 177 in 1904, 205 in 1905, and 330 in 1907.

It is satisfactory under these circumstances to note the increased attention which has been paid in recent years to the acquisition of more exact knowledge upon the actual state of the fisheries and upon the biological and other factors which influence the supply.

A comprehensive programme of co-operative investigations, both scientific and statistical, was put into execution in the course of 1902 under the International Council for the Study of the Sea (see below). The Fishery Board for Scotland and the Marine Biological Association for England were commissioned to carry out the work at sea allotted to Great Britain, and the English fishery department was equipped soon afterwards with the means for collecting more adequate statistics.

Trawling investigations and the quantitative collection of fish eggs have located important spawning grounds of cod, haddock, plaice, sole, eel, &c.; marking experiments with cod, plaice and eel have thrown much light upon the migrations of these fishes; and the rate of growth of plaice, cod and herring has been elucidated in different localities. The percentage of marked plaice annually recaptured in the North Sea has been found to be remarkably high (from 25 to 50 %), and throws a significant light on the intensity of fishing under modern conditions. It seems probable that the impoverishment of the stock of plaice on the central grounds of the North Sea is mainly attributable to the excessive rate of capture of plaice during their annual off-shore migrations from the coast. On the other hand, it has been shown that the growth-rate of plaice on the Dogger Bank is constantly and markedly greater (five- or six-fold in weight) than on the coastal grounds where these fish are reared,—facts which open up the possibility of increasing the permanent supply of plaice from the North Sea by the adoption of some plan of commercial transplantation (see Pisciculture).

History.—A brief review may now be given of the history of the administration of British sea-fisheries since 1860, and of the steps which have been taken for the attainment of scientific and statistical information in relation thereto.

In 1860 a royal commission, consisting of Professor Huxley, Mr (afterwards Sir) John Caird, and Mr G. Shaw-Lefevre (afterwards Lord Eversley), was appointed to inquire into the condition of the British sea-fisheries, the harmfulness or otherwise of existing methods of fishing, and the necessity or otherwise of the existing legislation. The important report of this commission, issued in 1866, embodied the following main conclusions and recommendations:—(1) the total supply of fish obtained upon the British coasts is increasing and admits of further augmentation; (2) beam-trawling in the open sea is not a wastefully destructive mode of fishing; (3) all acts of parliament which profess to regulate or restrict the modes of fishing pursued in the open sea should be repealed and "unrestricted freedom of fishing be permitted hereafter"; (4) all fishing boats should be lettered and numbered as a condition of registration and licence.

In 1868 full effect was given to these recommendations by the passing of the Sea Fisheries Act. Regulations for the registration of fishing boats were issued by order in council in the following year. (New regulations were introduced in 1902.)

In 1878 a commission was given to Messrs Buckland and Walpole to inquire into the alleged destruction of the spawn and fry of sea fish, especially by the use of the beam-trawl and ground seine. Their report is an excellent summary of the condition of the sea fisheries at the time, and shows how little was then known with regard to the eggs and spawning habits of our marine food fishes.

In 1882 the former Board of British White Herring was dissolved and the Fishery Board for Scotland instituted, the latter being empowered to take such measures for the improvement of the fisheries as the funds under their administration might admit of. Arrangements were made in the following year with Professor M'Intosh of St Andrews which enabled the latter to fit up a small marine laboratory and to begin a series of studies on the eggs and larvae of sea fishes, which have contributed greatly to the development of more exact knowledge concerning the reproduction of fishes. Under the Sea Fisheries (Scotland) Amendment Act of 1885 the board closed the Firth of Forth and St Andrews Bay against trawlers as an experiment for the purpose of ascertaining the result of such prohibition on the supply of fish on the grounds so protected. The treasury also, by a further grant of £3000, enabled the board to purchase the steam-yacht "Garland" as a means of carrying out regular experimental trawlings over the protected grounds. Reports on the results of these experiments have been annually published, and were summarized at the end of ten years' closure in the board's report for 1895. Dr Fulton's summary showed that "no very marked change took place in the abundance of food-fishes generally, either in the closed or open waters of the Firth of Forth or St Andrews Bay," as a consequence of the prohibition of trawling. Nevertheless, among flat fishes, plaice and lemon soles, which spawn off-shore, were reported to have decreased in numbers in all the areas investigated, whether closed or open, while dabs and long rough dabs showed a preponderating, if not quite universal, increase.

The results of this classical experiment point strongly to the presumptions (1) that trawling operations in the open sea have now exceeded the point at which their effect on the supply of eggs and fry for the upkeep of the flat fisheries is inappreciable; and (2) that protection of in-shore areas alone is insufficient to check the impoverishment caused by over-fishing off-shore. (For critical examinations of Dr Fulton's account see M'Intosh, *Resources of the Sea*, London, 1889; Garstang, "The Impoverishment of the Sea," *Journ. Mar. Biol. Ass.* vol. vi., 1900; and Archer, *Report of Ichthyological Committee*, Cd. 1312, 1902.)

A laboratory and sea-fish hatchery were subsequently established by the board at Dunbar in 1893, but removed to Aberdeen in 1900.

In 1883 a royal commission, under the chairmanship of the late earl of Dalhousie, was appointed to inquire into complaints against the practice of beam-trawling on the part of line and drift-net fishermen. A small sum of money (£200) was granted to the commission for the purpose of scientific trawling experiments, which were carried out by Professor M'Intosh.

The report of this commission was an important one, and its recommendations resulted in the institution of fishery statistics for England, Scotland and Ireland (1885-1887).

In 1884 the Marine Biological Association of the United Kingdom was founded for the scientific study of marine zoology and botany, especially as bearing upon the food, habits and life-conditions of British food-fishes, crustacea and molluscs. Professor Huxley was its first president, and Professor Ray Lankester, who initiated the movement, succeeded him. A large and well-equipped laboratory was erected at Plymouth, and formally opened for work in 1888. The work of the association has been maintained by annual grants of £400 from the Fishmongers' Company and £1000 from H. M. treasury, and by the subscriptions of the members. The association publishes a half-yearly journal recording the results of its investigations.

In 1886 a fishery department of the Board of Trade was organized under the Salmon and Freshwater Fisheries Act of that year. The department publishes annually a return of statistics of sea-fish landed, a report on salmon fisheries (transferred from the home office), and a report on sea fisheries. It consists of several inspectors under an assistant secretary of the board; it has no power to make scientific investigations or bye-laws and regulations affecting the sea-fisheries. In 1894 the administration of the acts relating to the registration of fishing vessels, &c., was transferred to the fisheries department.

In 1888 the Sea Fisheries Regulation Act provided for the constitution (by provisional order of the Board of Trade) of local fisheries committees having, within defined limits, powers for the regulation of coast fisheries in England and Wales. The powers of district committees were extended under Part II. of the Fisheries Act 1891, and again under the Fisheries (Shell Fish) Regulation Act 1894. Sea-fisheries districts have now been created round nearly the whole coast of England and Wales. Under bye-laws of these committees steam-trawling has been prohibited in nearly all the territorial waters of England and Wales, and trawling by smaller boats has been placed under a variety of restrictions. Local scientific investigations have been initiated under several of the committees, especially in Lancashire by Professor Herdman of Liverpool and his assistants.

In 1890 an important survey of the fishing grounds off the west coast of Ireland was undertaken by the Royal Dublin Society, with assistance from the government, and in the hands of Mr E.W.L. Holt led to the acquisition of much valuable information concerning the spawning habits of fishes and the distribution of fish on the Atlantic seaboard.

In 1892, under powers conferred by the Herring Fishery (Scotland) Act of 1889, the Fishery Board for Scotland closed the whole of the Moray Firth—including a large tract of extra-territorial waters—against trawling, in order to test experimentally the effect of protecting certain spawning grounds in the outer parts of the firth. The closure has given rise to a succession of protests from the leaders of the trawling industry in Aberdeen and England. It seems that the difficulty of policing so large an area, as well as the absence of any power to enforce the restriction on foreign vessels, have defeated the original intention; and the bye-law

appears to be now retained mainly in deference to the wishes of the local line-fishermen, the decadence of whose industry—from economic causes which have been alluded to above—is manifest from the figures in Table X. below. The controversy has had the effect of causing the transference of a number of English trawlers to foreign flags, especially the Norwegian.

Statistics.—The following tables summarize the official statistics of fish landed on the coasts of England and Wales, Scotland and Ireland, and give some information relative to the numbers of fishing-boats and fishermen in the three countries.

TABLE I.—*Summary of Statistics of Fish landed, imported and exported for the United Kingdom.*

Year.	Fish landed (excluding Shell-fish).		Net Imports.	Exports of British Fish.
	Cwt.			
1890	12,774,010	£6,361,487	£2,315,572	£1,795,267
1895	14,068,641	7,168,025	2,453,676	2,282,406
1900	14,671,070	9,242,491	2,937,486	3,000,852
1905	20,164,276	10,210,369	2,250,259	4,164,869

Note.—Imported fish afterwards re-exported (consisting chiefly of salted or cured fish to the value of over £900,000 in 1905) are not included in the above values of imports and exports. The exports consist mainly of herrings.

TABLE II.—*Quantity and Average Landing Value of Flat Fishes landed on the Coasts of England and Wales* (*all caught with Trawl-nets, except Halibut in part*).

Year.	Quantity (in Thousands of Cwt.).					Average Price (per Cwt.).									
	Sole.	Turbot.	Brill.	Plaice.	Halibut.	Sole.		Turbot.		Brill.		Plaice.		Halibut.	
						£	s.	£	s.	£	s.	£	s.	£	s.
1890	72.1	51.9	15.4	623	95	6	7	3	13	2	8	0	19	1	10
1895	82.8	77.9	19.0	789	114	6	16	3	17	2	11	1	1	1	15
1900	75.3	60.7	20.7	752	136	7	11	4	3	2	14	1	4	1	14
1905	80.1	89.5	22.4	1074	120	5	18	3	11	2	11	0	19	1	17

TABLE III.—*Quantity and Average Landing Value of Round Fishes, caught with Trawls and Lines, landed on the Coasts of England and Wales.*

Year.	Quantity (in Thousands of Cwt.).					Average Price (per Cwt.).									
	Cod.	Haddock.	Hake.	Ling.	Sundries.	Cod.		Haddock.		Hake.		Ling.		Sundries.	
						s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
1890	363	1585	. .	96	1151	13	10	9	7	. .		14	3	14	0
1895	496	2433	132	114	1013	12	5	9	9	16	2	11	8	13	7
1900	589	2487	233	100	1190	14	8	13	8	15	10	12	10	14	10
1905	1423	2148	484	165	1425	12	4	12	5	13	4	11	3	9	8

TABLE IV.—*Quantity and Average Landing Value of Surface Fishes landed on the Coasts of England and Wales* (*caught with Drift-, Seine-, and Stow-nets*).

Year.	Quantity (in Thousands of Cwt.).				Average Price (per Cwt.).							
	Mackerel.	Herring.	Pilchard.	Sprat.	Mackerel.		Herring.		Pilchard.		Sprat.	
					s.	d.	s.	d.	s.	d.	s.	d.
1890	509	1332	61	99	15	5	7	2	5	10	3	0
1895	375	1437	65	91	16	3	5	10	5	3	3	1
1900	321	2425	106	73	15	9	7	8	4	6	4	11
1905	682	3062	169	75	8	11	7	7	5	0	3	6

TABLE V.—*Quantity and Average Landing Value of Shell-fish landed on the Coasts of England and Wales.*

Year.	Number.				Average Price.							
	Thousands.		Mills.	Thousands of Cwt.	Per Hundred.						Per Cwt.	
	Crabs.	Lobsters.	Oysters.	Sundries.	Crabs.		Lobsters.		Oysters.		Sundries.	
					£.	s.	£.	s.	s.	d.	s.	d.
1890	4808	922	47.6	505	1	4	4	18	6	1	5	0
1895	4501	677	25.3	590	1	4	4	8	6	2	4	11
1900	5177	654	37.8	539	1	2	4	7	7	0	5	8

1905	5106	503	35.4	423	1	3	4	15	5	9	5	6

TABLE VI.—*Total Quantity of the more important Fishes and Shell-fish landed in Scotland.*

Year.	In Thousands of Cwt.									Cwt.	Number (Thousands).		
	Herring.	Lemon Sole.	Flounder, Plaice, and Brill.	Halibut.	Cod.	Ling.	Haddock.	Whiting.	Skate.	Mussels.	Crabs.	Lobsters.	Oyster
1890	3980	17	81	20	449	170	754	75	54	181	2882	643	350
1895	4077	19	80	29	459	165	1001	43	59	194	2548	610	239
1900	3520	21	102	26	434	157	761	75	72	143	3128	680	796
1905	5343	31	561	36	677	151	932	184	100	103	1990	760	218

TABLE VII.—*Total Quantity of the more important Fishes and Shell-fish returned as landed on the Irish Coasts.*

Year.	In Thousands of Cwt.									Number (Thousands).		
	Mackerel.	Herring.	Sole.	Turbot.	Cod.	Ling.	Haddock.	Whiting.	Hake.	Oysters.	Crabs.	Lobsters.
1890	502	85	4.5	1.4	39.6	14.8	16.4	13.5	25.3	576	228	238
1895	339	171	1.8	1.0	43.6	29.7	30.9	11.9	18.7	563	240	276
1900	278	284	3.1	1.5	33.6	11.9	12.4	11.9	16.3	236	202	286
1905	505	354	3.5	0.8	18.6	9.1	11.3	18.3	7.1	348	175	236

Note.—The Irish statistics of shell-fish are very incomplete, owing to the inadequate means at the disposal of the authorities for collecting statistics over large sections of the coast.

TABLE VIII.—*Classified List of British Fishing Boats on the Register for 1905, omitting 2nd Class Steamers and Vessels under 18 Ft. Keel or Navigated by Oars only and Vessels unemployed.*

Mode of Fishing.	England and Wales.			Scotland.			Ireland.		
	Steamers.	Sailing.		Steamers.	Sailing.		Steamers.	Sailing.	
	1st Cl.	1st Cl.	2nd Cl.	1st cl.	1st Cl.	2nd Cl.	1st Cl.	1st Cl.	2nd Cl.
Trawling	1173	904	586	244	..	68	10	142	283
Drift-nets	263	562	539	..	..	..	..	..	..
Lines	56	29	685	209	3403	2910	..	229	2776
Various	21	215	2277	..	..	..	..	..	..
Total	1513	1710	4087	453	3403	2978	10	371	3059

Note.—1st class = steamers of at least 15 tons gross tonnage, and other boats of at least 15 tons registered tonnage (in Scotland exceeding 30 ft. keel).

2nd class = less than 15 tons tonnage, or from 18 to 30 ft. keel.

TABLE IX.—*Number* (*A*) *of Men and Boys constantly employed and* (*B*) *of other Persons occasionally employed in Fishing.*

Year.	England and Wales.		Scotland.		Ireland.		United Kingdom.	
	A.	B.	A.	B.	A.	B.	A.	B.
1890	32,503	9312	34,319	20,829	10,121	13,981	78,450	46,337
1895	32,229	8995	31,044	12,329	8,692	18,218	73,090	41,230
1900	31,589	7994	27,288	10,288	8,677	18,982	68,708	37,814
1905	34,318	8132	29,064	10,487	8,744	17,079	73,293	36,131

TABLE X.—*Catch and Value of Line-caught and Trawled Fish landed in Scotland.*

Year.	Line-caught Fish.		Trawled Fish.	
	Cwt.		Cwt.	
1890	1,577,299	£591,059	291,812	£203,620
1895	1,479,654	548,629	531,695	291,165
1900	757,416	371,173	1,077,082	703,427
1905	735,654	348,610	1,745,431	948,117

In 1893 a select committee of the House of Commons took evidence as to the expediency of adopting measures for the preservation of the sea-fisheries in the seas around the British Islands, with especial reference to the alleged wasteful destruction of under-sized fish. They recommended the adoption of a size-limit of 8 in. for soles and plaice, and 10 in. for turbot and brill, below which the sale of these fishes should

be prohibited, on the ground that these limits would approximate to those already adopted by foreign countries.

In 1899 the Agriculture and Technical Instruction (Ireland) Act transferred the powers and duties of the inspectors of Irish fisheries to the Department of Agriculture and Technical Instruction for Ireland. The department is provided with a steam cruiser, the “Helga,” 375 tons, fully equipped for fishery research, as well as with a floating marine laboratory. Mr Holt, formerly of the Marine Biological Association, was appointed to take charge of the scientific work.

In 1900 another select committee of the House of Commons was appointed to consider and take evidence on the proposals of the Sea Fisheries Bill, which had been framed in accordance with the recommendations of the select committee of 1893, but had failed to pass in several sessions of parliament. Owing to marked divergencies of opinion on the question whether the low size-limits proposed would be effectual in keeping the trawlers from working on the grounds where small fish congregated, the committee reported against the bill, and urged the immediate equipment of the government departments with means for undertaking the necessary scientific investigations.

In 1901 an international conference of representatives of all the countries bordering upon the North and Baltic Seas met at Christiania to revise proposals which had been drafted at Stockholm in 1899 for a scientific exploration of these waters in the interest of the fisheries, to be undertaken concurrently by all the participating countries. The British government was represented by Sir Colin Scott-Moncrieff, K.C.M G., with Professor D’Arcy W. Thompson, Mr (afterwards Professor) W. Garstang and Dr H.R. Mill as advisers. The proposals were subsequently accepted, with some restrictions, and an international council of management was appointed by the participating governments. The Fishery Board for Scotland and the Marine Biological Association from England were commissioned in 1902 to carry out the work at sea allotted to Great Britain, and a special grant of £5500 per annum was made to each body by the Treasury for this purpose. Two steamers, the “Huxley” and the “Goldseeker,” were chartered for the investigations and began work in 1902 and 1903 from Lowestoft and Aberdeen respectively. Reports on the work of the first five years were published in 1909.

In 1901 the Board of Trade appointed a committee (the Committee on Ichthyological Research) to inquire and report as to the best means by which scientific fishery research could be organized and assisted in relation to the state or local authorities. The committee consisted of Sir Herbert Maxwell, M.P. (chairman), Mr W.F. Archer, Mr Donald Crawford, Rev. W.S. Green, Professor W.A. Herdman, Hon. T.H.W. Pelham, Mr S.E. Spring Rice and Professor J.A. Thomson. Sir Herbert Maxwell resigned his chairmanship before the report was drawn up (September 1902), and was succeeded by Sir Colin Scott-Moncrieff. The committee recommended the provision of more complete statistics; the provision and maintenance of five special steamers (where not already existing) to work in connexion with as many marine laboratories, viz. one for each of the three coasts of England and Wales, and one each for Scotland and Ireland; the provision of three biological assistants at each laboratory; the grant of statutory powers to local sea-fisheries committees to expend money on fishery research; the constitution of a fishery council for England and Wales, and of a conference of representatives of the central authorities in England, Scotland and Ireland. In 1903 the fishery department of the Board of Trade was transferred to the Board of Agriculture, Mr W.E. Archer, chief inspector of fisheries, becoming an assistant secretary of the new Board of Agriculture and Fisheries.

In 1907 a departmental treasury committee was appointed to inquire into the scientific and statistical investigations carried on in relation to the fishing industry of the United Kingdom. The committee consisted of Mr H.J. Tennant, M.P. (chairman), Lord Nunburnholme, Sir Reginald MacLeod, Mr N.W. Helms, M.P., Mr A. Williamson, M.P., Dr P. Chalmers Mitchell, F.R.S., Mr J.S. Gardiner, F.R.S., the Rev. W.S. Green, Mr R.H. Rew and Mr L.S. Hewby. This committee reviewed the work that had already been done and urged its continuation and extension under the direction of a central council composed of representatives of the government departments concerned with fishery matters in England, Scotland and Ireland, with a scientific chairman and director, and further insisted on the need of international co-operation in the investigations.

United States Fisheries.—The administration of the fisheries of the United States of America is under the control of the several coastal states, but the Bureau of Fisheries at Washington, which reports to the secretary of commerce and labour, conducts a vast amount of scientific fishery investigation, issues admirable statistical and biological reports, and conducts on a very large scale work on the replenishment of the fishing stations by artificial means (see Pisciculture). Although in recent years Canada has given an increasing amount of state support to the investigation, control and assistance of her fisheries, an amount actually and relatively far exceeding that given in Great Britain, the fishing industry of the United States still far exceeds that of Canada. A considerable bulk of fish, taken by American ships from the Newfoundland coasts and from those of other British provinces, is landed at American ports, but as the following recent table shows, it is much less than that taken from American waters.

Quantities and Values of Fish landed by American Vessels at Boston and Gloucester, Mass., in 1905.

	Quantities.	Value.
(*a*) From fishing grounds off U.S. coasts	152,241,139	£669,640
(*b*) From fishing grounds off Newfoundland	17,165,083	103,145
(*c*) From fishing grounds off other British provinces	32,608,343	192,517

The fisheries of the United States show a substantial increase from year to year. There has been a decline in some important branches owing to indiscreet fishing and to the inevitable effects of civilization on certain kinds of animal life and in certain restricted areas. Such diminution has been more than compensated for by growth resulting from the invasion of new fishing grounds made possible by increase in the sea-going capacity of the vessels employed, by improvement in the preservation and handling of the catch, and by the

greater utilization of products which until comparatively recently were disregarded or considered without economic value. The annual value of the water products taken and sold by the United States fishermen now amounts to over £11,000,000, and this sum does not include the very large quantities taken by the fishermen for home consumption or captured by sportsmen and amateurs. Between two and three hundred thousand persons make a livelihood by the industry, and the capital involved exceeds £16,000,000.

The oyster is the most valuable single product, and the output of the United States industry exceeds the combined output of all other countries in the world. The most notable feature of this fishery is that nearly half the total yield now comes from cultivated grounds, so that the business is being placed on a secure basis. Virginia has now taken the first rank as an oyster-producing state, oyster farming being now highly developed with an annual yield of nearly nine million bushels.

The high-sea fisheries for cod, haddock, hake, halibut, mackerel, herring, and so forth are on the whole not increasing in prosperity, the annual value being between one and two million pounds. The lobster fishery shows a markedly diminishing yield, the diminution having been progressive since about 1890, and being attributed to over-fishing and violation of the restrictive regulations. At present a large part of the lobsters consumed in the United States comes from Nova Scotia, but there is evidence of useful results coming from the extensive cultural operations now being carried out.

The whale fishery, at one time the leading fishing industry of the country, is now conducted chiefly in the North Pacific and Arctic oceans, but is decaying, being now expensive, uncertain and often unremunerative. The annual value of the take is now under £200,000.

The important group of anadromous fishes (those like salmon, shad, alewife, striped bass and sea perches, which ascend the rivers from the ocean) has continued to provide an increasing source of income to fishermen, the combined value of the catch on the Atlantic and Pacific seaboards now amounting to over £3,000,000 annually. The fisheries of the Great Lakes yield about £600,000 annually.

(W. Ga.; P. C. M.)

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1 For fisheries in the cases of Coral, Oyster, Pearl, Salmon, Sponges and Whale, see these articles; for fishing as a sport see Angling.

2 Estimated as regards about one-third of the total.

3 Including the Newfoundland fishery.

4 Excluding the voyages of the fleeting trawlers which supply London by means of carriers.

FISHERY (Law of). This subject has (1) its international aspect; (2) its municipal aspect. On the high seas outside territorial waters the right of fishery is now recognized as common to all nations. Claims were made in former times by single nations to the exclusive right of fishing in tracts of open sea; such as that set up by Denmark in respect of the North Sea, as lying between its possessions of Norway and Iceland, against England in the 17th century, and against England and Holland in the 18th century, when she prohibited any foreigners fishing within 15 German miles of the shores of Greenland and Iceland. This claim, however, was always effectively resisted on the ground stated in Queen Elizabeth's remonstrance to Denmark on the subject in 1602, that "the law of nations alloweth of fishing in the sea everywhere, even in seas where a nation hath propertie of command." The enunciation of this principle is to be found, also, in the award of the arbitration court which decided the question of the fur-seal fishery in Bering Sea in 1894. (See Bering Sea Arbitration; Arbitration, International.) The right of nations to take fish in the sea may, however, be restrained or regulated by treaty or custom; and Great Britain has entered into conventions with other nations with regard to fishing in certain parts of the sea. The provisions of such conventions are made binding on British subjects by statutes.

> Instances of these are the conventions of 1818 and 1872 between Great Britain and the United States as to the fisheries on the eastern coasts of British North America and the United States within certain limits, and the award of the Bering Sea arbitration tribunal under the treaty of 1892; the conventions between Great Britain and France in 1839 and 1867 as regards fishing in the seas adjoining these countries, the latter of which will come into force on the repeal of the former; the agreement of 1904 with respect to the Newfoundland fisheries (see Newfoundland); the convention of 1882 between Belgium, Denmark, France, Germany, Great Britain and Holland, regarding the North Sea fisheries; that of 1887 between the same parties concerning the liquor traffic in the North Sea; and the declaration regarding the same waters made between Great Britain and Belgium for the settlement of differences between their fishermen subjects in such extra-territorial waters. At the instance of the Swedish government the British parliament also passed an act in 1875 to establish a close time for the seal fishery in the seas adjacent to the eastern coasts of Greenland.

Cases have come before British courts with regard to the whale fishery in northern and southern seas; and the customs proved to exist among the whaling ships of the nations engaged in a particular trade have been upheld if known to the parties to the action. In territorial waters, on the other hand, fishery is a right exclusively belonging to the subjects of the country owning such waters, and no foreigners can fish there except by convention.

(*a*) *Tidal Waters.*—-In British territorial waters, it may be stated, as the general rule, that fishery is a right incidental to the soil covered by the waters in which that right is exercised.

> The bed of all navigable rivers where the tide flows and reflows, and of all estuaries or arms of the sea, is vested in the crown; and therefore, in Lord Chief Justice Hale's words, "the right of the fishery in the sea and

the creeks and arms thereof is originally lodged in the crown, as the right of depasturing is originally lodged in the owner of the waste whereof he is lord, or as the right of fishing belongs to him that is the owner of a private or inland river." "But," he continues, "though the king is the owner of this great waste, and as a consequent of his propriety hath the primary right of fishing in the sea and the creeks and arms thereof, yet the common people of England have regularly a liberty of fishing therein as a public common of piscary, and may not without injury to their right be restrained of it unless in such places or creeks or navigable rivers where either the king or some particular subject hath gained a propriety exclusive of that common liberty." (*De Jure Maris*, ch. iv.).

This right extends to all fish floating in the sea or left on the seashore, except certain fish known as royal fish, which, when taken in territorial waters, belong to the crown or its grantee, though caught by another person. These are whales, sturgeons and porpoises; and grampuses are also sometimes added (whales, porpoises and grampuses being "fishes" only in a legal sense). In Scotland only whales which are of large size can be so claimed; but the rights of salmon fishing in the sea and in public and private rivers, and those 435
of mussel and oyster fishing, except in private rivers, are *inter regalia*, and are only enjoyable by the crown or persons deriving title under it. As salmon fishery was formerly practised by nets and engines on the shore, and the mussel and oyster fisheries were necessarily carried on on the shore, the opinion was held at one time that angling for salmon was a public right, but the later decisions have established that the right of salmon fishing by whatever means is a *jus regale* in Scotland. In England the crown in early times made frequent grants of fisheries to subjects in tidal waters, and instances of such fisheries belonging to persons and corporations are very common at the present day: but by Magna Carta the crown declared that "no rivers shall be defended from henceforth, but such as were in defence in the time of King Henry, our grandfather, by the same places and the same bounds as they were wont to be in his time"; and thus bound itself not to create a private fishery in any navigable tidal river. Judicial decision and commentators having interpreted this statute according to the spirit and not the letter, at the present day the right of fishery in tidal waters prima facie belongs to the public, and they can only be excluded by a particular person or corporation on proof of an exclusive right to fish there not later in its origin than Magna Carta; and for this it is necessary either to prove an actual grant from the crown of that date to the claimant's predecessor in title, or a later grant or immemorial custom or prescription to that effect, from which such an original grant may be presumed. This exclusive right of fishing may be either a franchise derived from the crown, or may arise by virtue of ownership of the soil covered by the waters.

In Lord Hale's words: "Fishing may be of two kinds ordinarily, viz. fishing with a net, which may be either as a liberty without the soil, or as a liberty arising by reason of and in concomitance with the soil or an interest or propriety of it; or otherwise it is a local fishing that ariseth by or from the propriety of the soil,—such are *gurgites*, wears, fishing-places, *borachiae*, *stachiae*, which are the very soil itself, and so frequently agreed by our books. And such as these a subject may have by usage; either in gross, as many religious houses had, or as parcel of or appurtenant to their manors, as both corporations and others have had; and this not only in navigable rivers and arms of the sea but in creeks and ports and havens, yea, and in certain known limits in the open sea contiguous to the shore. And these kinds of fishings are not only for small sea-fish, such as herrings, &c., but for great fish, as salmons, and not only for them but for royal fish.... Most of the precedents touching such rights of fishing in the sea, and the arms and creeks thereof belonging by usage to subjects, appear to be by reason of the propriety of the very water and soil wherein the fishing is, and some of them even within parts of the seas" (*De Jure Maris*, ch. v.)

An instance of the former kind of fishery is to be found in the old case of *Royal Fishery of the River Bann* (temp. James I., Davis 655), and the modern one of *Wilson* v. *Crossfield*, 1885, 1 T.L.R. 601, where a right of fishery in gross was established; but the latter kind, as Hale says, is much more common, and the presumption is always in its favour; *à fortiori* where the fishing is proved to have been carried on by means of engines or structures fixed in the soil. In England the public have not at common law, as incidental to their right of fishing in tidal waters, the right to make use of the banks or shores for purposes incidental to the fishery, such as beaching their boats upon them, landing there, or drying their nets there (though they can do so by proving a custom from which such a grant may be presumed); but statutes relating to particular parts of the realm, such as Cornwall for the pilchard fishery, give them such rights. In Scotland a right of salmon fishing separate from land implies the right of access to and use of the banks, foreshores or beach for the purposes of the fishing; and so does white fishing by statute. But otherwise there is no right to do so, *e.g.* in a public river for trout fishing. A similar privilege is given to Irish fishermen for the purpose of sea fishery by special statute. There is no property in fish in the sea, and they belong to the first taker; and the custom of the trade decides when a fish is taken or not, *e.g.* in the whale fishery the question whether a fish is "loose" or not has come before English courts.

(*b*) *Fresh Waters.*—In non-tidal waters in England and Ireland, for the reason given above, the presumption is in favour of the fishery in such waters belonging to the owners of the adjacent lands; "fresh waters of what kind soever do of common right belong to the owners of the soil adjacent, so that the owners of the one side have of common right the property of the soil, and consequently the right of fishing *usque ad filum aquae*, and the owners of the other side the right of soil or ownership and fishing unto the *filum aquae* on their side; and if a man be owner of the land on both sides, in common presumption he is owner of the whole river, and hath the right of fishing according to the extent of his land in length" (Hale, ch. i.). There is a similar presumption that the owner of the bed of a river has the exclusive right of fishery there, and this is so even though he does not own the banks; but these presumptions may be displaced by proof of a different state of things, *e.g.* where the banks of a stream are separately owned the owner of one bank may show by acts of ownership exercised over the whole stream that he has the fishery over it all. The crown prerogative of fishery, never it seems, extended to non-tidal waters flowing over the land of a subject, and it could not therefore grant such a franchise to a subject, nor has it any right *de jure* to the soil or fisheries of an inland lake such as Lough Neagh (*Bristow* v. *Cormican*, 1878, 3 App. Cas. 641). The public cannot acquire the right to fish in fresh waters by prescription or otherwise although they are navigable; such a right is unknown to law, because a profit *à prendre in alieno solo* is neither to be acquired by custom nor by prescription under the Prescription Act. It has been decided that the "dwellers" in a parish cannot acquire such a right, being of

too vague a class; but the commoners in a manor may have it by custom; and the “free inhabitants of ancient tenements” in a borough have been held capable of acquiring a right to dredge for oysters in a fishery belonging to the corporation of the borough on certain days in each year by giving proof of uninterrupted enjoyment of it from time immemorial, on the presumption that this was a condition to which the grant made to the corporation was subject.

In Scotland the law is similar. The right to fish for trout in private streams is a pertinent of the land adjacent, and owners of opposite banks may fish *usque ad medium filum aquae*; and where two owners own land round a private loch, both have a common of fishing over it. The public cannot prescribe for it, for a written title either to adjacent lands or to the fishery is necessary. A right of way along the bank of a river or loch does not give it, nor does the right of the public to be on or at a navigable but non-tidal river. The right of salmon fishing carries with it the right of trout fishing: and eel fishing passes in the same way.

In England and Ireland private fisheries have been divided into (*a*) several (*separalis*), (*b*) free (*libera*), (*c*) common of piscary (*communis*), whether in tidal or non-tidal waters. The distinction between several and free fisheries has always been uncertain. Blackstone’s opinion was that several fishery implied a fishery in right of the soil under the water, while free fishery was confined to a public river and did not necessarily comprehend the soil. He is supported by later writers, such as Woolrych and Paterson. On the other hand, the opinions of Coke and Hale are opposed to this view. “A man may prescribe to have a several fishery in such a water, and the owner shall not fish there; but if he claim to have common of fishery or free fishery the owner of the soil shall fish there” (Co Littl. 122 A); “one man may have the river and others the soil adjacent: or one man may have the river and soil thereof, and another the free or several fishing in that river” (*De Jure Maris*, ch. i.). Lord Holt, though in one instance he distinguished them, in a later case thought that they were “all one.” Later decisions have established the latter view, and it is now settled that although the owner of the several fishery is prima facie owner of the soil of the waters, this presumption may be displaced by showing that the terms of the grant only convey an incorporeal hereditament, and that the words “sole and exclusive fishery” give a several fishery *in alieno solo*. In the words of Mr Justice Willes, “the only substantial distinction is between an exclusive right of fishery, usually called ‘several,’ and sometimes ‘free,’ as in ‘free warren,’ and a right in common with others, usually called ‘common of fishery,’ and sometimes ‘free,’ as in ‘free port.’ A several fishery means an exclusive right to fish in a given place, either with or without the property in the soil” (*Malcolmson* v. *O’Dea*, 1863, 10 H.L.). A common of piscary, or “a right to fish in common with certain other persons in a particular stream,” is usually found in manors, the commoners of which may have the right to enjoy it to an extent sufficient for the sustenance of their tenements; but they cannot, except by immemorial special prescription, exclude the lord of the manor therefrom, and have no rights over the soil itself. Decisions also establish that a grant of “fishery” will prima facie pass an exclusive fishery; a grant of soil covered by water or a lease of lands including water will pass the fishery therein; a several fishery will not merge on being resumed by the crown; and a fishery situate within a manor is presumed to belong to the owners of adjacent land, and not to the lord. A several fishery, as already seen, being an incorporeal hereditament, can only be transferred by deed, and therefore cannot be abandoned, and so acquired by the public, even on proof that the public have, as far back as living memory, exercised the right of fishing in the *locus in quo* to the knowledge of and without interruption from the claimant of the fishery. But to establish a title to a several fishery, a “paper title,” *i.e.* one founded on documentary evidence only, is not sufficient; it must be supported by evidence of acts of ownership in recent times, for otherwise it will be presumed that a person other than the alleged owner is the real owner. If the waters of a tidal river leave their old channel and flow into another, the owner of a several fishery in the old channel cannot claim to have it in the new one; but, on the other hand, the owner of a several fishery can take advantage of a gradual encroachment by the river upon and into the land of a riparian owner, the limits of whose land are ascertained. The owner of an exclusive fishery, whether in tidal or fresh waters, has the right to take as many fish as he can, and may do so by means of fixed engines or dredging, provided that in navigable waters he does not interfere with the right of navigation, and that in navigable and other waters he does not interfere with the fishing rights of his neighbours or infringe the provisions made by old or modern statutes as to the methods of taking the fish, *e.g.* by weirs. These were forbidden in rivers by Magna Carta and later statutes, and on the seashore by a statute of James I.; but all weirs in navigable fresh waters traceable to a date not later than 25 Edward III. are lawful, for the statutes forbidding weirs do not apply to navigable waters. It seems, however, that at common law any fixed structures put up by the owner of a fishery in his part of a river, which at all prevent the free passage of fish to the waters above or below, give the owners of fisheries therein a right of action against him. So the grantee of an exclusive fishery with rod and line in an unnavigable river can prevent any person from polluting the river higher up and so damaging the fishery. At common law there is no property in fish when enjoying their natural liberty; the taker is entitled to keep them unless they are caught from a tank or small pond; or except in the case of salmon by statute.

Modern statutes now regulate all fisheries, sea or fresh, in territorial or inland waters. As regards sea fishery in England, the Board of Agriculture and Fisheries has (since 1903, when it took it over from the Board of Trade) power by order to create sea fisheries districts, comprising any part of the sea within which British subjects have, by international law, the exclusive right of fishing, and to provide for the constitution of a local fisheries committee to regulate the sea fisheries in such district, which can make by-laws for that purpose. It appoints fishery officers to enforce them, prescribes a close time for sea fish (which does not include salmon as defined in the Salmon Act), has summary jurisdiction over offences committed on the sea coast or at sea beyond the ordinary jurisdiction of a court of summary jurisdiction, can enforce the Sea Fisheries Acts, or regulate, protect and develop fisheries for all or any kind of shell fish. Special provision is also made by statute for the oyster fishery and herring fishery (applicable also to Scotland), and that of mussels, cockles, lobsters and crabs (applicable to all the United Kingdom). In Scotland the Fishery Board can constitute sea fishery districts, and boards with like powers to those in England, and has general control over the coast and deep-sea fisheries of Scotland; and there are acts relative to herring, mussel and oyster fisheries, and allowing the appropriation of money intended to relieve local distress and taxation towards the encouragement of sea fisheries, and marine superintendence and enforcement of Scottish sea fisheries laws. In Ireland the sea fisheries are under the direction of the inspectors of Irish fisheries, who have replaced the

former fishery commissioners and special commissioners for Irish fisheries; special statutes, besides the general ones applying to all the United Kingdom, deal with oyster fisheries and mussel fisheries; and money is also appropriated for sea fisheries under the head of technical instruction. In all three component parts of the United Kingdom there are also special statutes relative to salmon and freshwater fish: for England, the Salmon and Freshwater Fisheries Acts 1861-1907, and the Freshwater Fisheries Acts 1878-1886; for Scotland the chief Salmon Acts are those of 1862-1868, and for trout and freshwater fish those of 1845-1902; for Ireland, the Fisheries (Ireland) Acts 1842-1901. A similar scheme is adopted in each case, namely, fishery districts and district boards are set up which regulate the fishing by by-laws and protect the fish by fixing a close time, and prescribing passes, licences, inspection and the like, breaches of which are punishable by courts of summary jurisdiction. The supreme authorities in each case are—for England the Board of Agriculture and Fisheries, for Scotland the Fishery Board, and for Ireland the inspectors of fisheries, and in England a certain official number of conservators on such boards are appointed by the county councils. The Salmon and Freshwater Fisheries Act 1907 gives the Board of Agriculture and Fisheries power to make provisional orders for the regulation of salmon fisheries or freshwater fisheries within any area on the application of any board of conservators, or of a county council, or of the owners of one-fourth in value of private fisheries. There are also special acts dealing with the fishing in certain rivers, such as the Thames, Medway, Severn, Tweed and Esk. (The act of 1907 applies, however, to the Esk, but not otherwise to Scotland nor to Ireland.) Throughout the United Kingdom the use of dynamite or other explosive substance to catch or destroy fish in any public fishery is prohibited, as it is also in England in any private waters subject to the Salmon and Freshwater Fisheries Acts 1878, in which it is also forbidden to use poison or other noxious substance for destroying fish. Officers in the army or marines are forbidden (under penalty) to kill fish without written leave from the person entitled to grant it. There are also provisions of the criminal law dealing with the protection of fisheries generally, as well as the provisions of the acts already mentioned dealing with special kinds of fish.

Special provision is made by the Merchant Shipping Acts 1894-1906 for sea-fishing boats (except in Scotland and the colonies), relating to their registration, carrying official papers, carrying boats in proportion to their tonnage, the punishment of offences on board, the wages of their crews, and keeping record of all casualties, punishments and the like on board. As regards trawlers, especially in the case of those of 25 tons and upwards, a statutory form of agreement with the crew is prescribed, as well as accounts of wages and discharges; and skippers and second hands must have certificates of competency, which are granted under similar conditions to those required in the case of sea-going ships and are registered with the Board of Trade. Scottish fishing boats are regulated by a special statute of 1886 (except as regards agreements to pay crew by share of profits, dealt with by the above act) and by the Sea Fisheries Act of 1868, which applies to all British fishing boats. Particular lights must be carried by fishing boats in navigation. An act of 1908 (The Cran Measures Act) legalized the use of cran measures in connexion with trading in fresh herrings in England and Wales, the Board of Agriculture and Fisheries being empowered to make regulations under the act.

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(G. G. P.*)

FISHGUARD (*Abergwaun*), a market town, urban district, contributory parliamentary borough and seaport of Pembrokeshire, Wales, near the mouth of the river Gwaun, which here flows into Fishguard Bay of St George’s Channel. Pop. (1901) 2002. Its railway station, which is the chief terminus of the South Wales system of the Great Western railway, is at the hamlet of Goodwick across the bay, a mile distant to the south-west. Fishguard Bay is deep and well sheltered from all winds save those of the N. and N.E., and its immense commercial value has long been recognized. After many years of labour and at a great expenditure of money the Great Western railway has constructed a fine breakwater and railway pier at Goodwick across the lower end of the bay, and an important passenger and goods traffic with Rosslare on the opposite Irish coast was inaugurated in 1906.

The importance of Fishguard is due to the local fisheries and the excellence of its harbour, and its early history is obscure. The chief historical interest of the town centres round the so-called “Fishguard Invasion” of 1797, in which year on the 22nd of February three French men-of-war with troops on board, under the command of General Tate, an Irish-American adventurer, appeared off Carreg Gwastad Point in the adjoining parish of Llanwnda. To the great alarm of the inhabitants a body of about 1400 men disembarked, but it quickly capitulated, practically without striking a blow, to a combined force of the local militias under Sir Richard Philipps, Lord Milford and John Campbell, Lord Cawdor; the French frigates meanwhile sailing away towards Ireland. For many years the castles and prisons of Haverfordwest and Pembroke were filled to overflowing with French prisoners of war. Close to the banks of the Gwaun is the pretty estate of Glyn-y-mel, for many years the residence of Richard Fenton (1746-1821), the celebrated antiquary and historian of Pembrokeshire.

FISHKILL LANDING, or FISHKILL-ON-THE-HUDSON, a village of Fishkill township, Dutchess county, New York, U.S.A., about 58 m. N. of New York City, on the E. bank of the Hudson river, opposite Newburgh. Pop. (1890) 3617; (1900) 3673, of whom 540 were foreign-born; (1905) 3939; (1910) 3902, of Fishkill township (1890) 11,840; (1900) 13,016; (1905) 13,183; (1910) 13,858. In the township are also the villages of Matteawan (*q.v.*), Fishkill and Glenham. Fishkill Landing is served by the New York Central & Hudson River and the New York, New Haven & Hartford railways; by railway ferry and passenger ferries to Newburgh, connecting with the West Shore railway; by river steamboats and by electric railway to Matteawan. Four miles farther N. on Fishkill Creek is the village of Fishkill (incorporated in 1899), pop. (1905) 579. In this village are two notable old churches, Trinity (1769), and the First Dutch Reformed (1731), in which the New York Provincial Congress met in August and September 1776. At the old Verplanck mansion in Fishkill Landing the Society of the Cincinnati was organized in 1783. Among the manufactures of Fishkill Landing are rubber-goods, engines (Corliss) and other machinery, hats, silks, woollens, and brick and tile. The village of Fishkill Landing was incorporated in 1864. The first settlement in the township was made about 1690. The township of Fishkill was, like Newburgh, an important military post during the War of Independence, and was a supply depot for the northern Continental Army.

FISK, JAMES (1834-1872), American financier, was born at Bennington, Vermont, on the 1st of April 1834. After a brief period in school he ran away and joined a circus. Later he became a hotel waiter, and finally adopted the business of his father, a pedlar. He then became a salesman for a Boston dry goods firm, his aptitude and energy eventually winning for him a share in the business. By his shrewd dealing in army contracts during the Civil War, and it is said by engaging in cotton smuggling, he accumulated a considerable capital which he soon lost in speculation. In 1864 he became a stockbroker in New York and was employed by Daniel Drew as a buyer. He aided Drew in his war against Vanderbilt for the control of the Erie railway, and as a result of the compromise that was reached he and Jay Gould became members of the Erie directorate. The association with Gould thus began continued until his death. Subsequently by a well-planned “raid,” Fisk and Gould obtained control of the road. They carried financial “buccaneering” to extremes, their programme including open alliance with the Tweed “ring,” the wholesale bribery of legislatures and the buying of judges. Their attempt to corner the gold market culminated in the fateful Black Friday of the 24th of September 1869. Fisk was shot and killed in New York City by E.S. Stokes, a former business associate, on the 6th of January 1872.

FISK, WILBUR (1792-1839), American educationist, was born in Brattleboro, Vermont, on the 31st of August 1792. He studied at the university of Vermont in 1812-1814, and then entered Brown University, where he graduated in 1815. He studied law, and in 1817 came under the influence of a religious revival in Vermont, where at Lyndon in the following year he was licensed as a local preacher and was admitted to the New England conference. His influence with the conference turned that body from its opposition to higher education as immoral in tendency to the establishment of secondary schools and colleges. Upon the removal in 1824 of the conference’s academy at New Market, New Hampshire, to Wilbraham, Massachusetts, Fisk became one of its agents and trustees, and in 1826 its principal. He drafted the report of the committee on education to the general conference in 1828, at which time he declined the bishopric of the Canada conference. He was first president of Wesleyan University from the opening of the university in 1831 until his death on the 22nd of February 1839 in Middletown, Connecticut. His successful administration of the Wesleyan Academy at Wilbraham and of Wesleyan University were remarkable. He was an able controversialist, and in the interests of Arminianism attacked both New England Calvinism and Unitarianism; he published in 1837 *The Calvinistic Controversy*. He also wrote *Travels on the Continent of Europe* (1838).

See *Life and Writings of Wilbur Fisk* (New York, 1842), edited by Joseph Holdich, and the biography by George Prentice (Boston, 1890), in the *American Religious Leaders Series*; also a sketch in *Memoirs of Teachers and Educators* (New, York, 1861), edited by Henry Barnard.

FISKE, JOHN (1842-1901), American historical, philosophical and scientific writer, was born in Hartford, Connecticut, on the 30th of March 1842, and died at Gloucester, Massachusetts, on the 4th of July 1901. His name was originally Edmund Fiske Green, but in 1855 he took the name of a great-grandfather, John Fiske. His boyhood was spent with a grandmother in Middletown, Connecticut; and prior to his entering college he had read widely in English literature and history, had surpassed most boys in the extent of his Greek and Latin work, and had studied several modern languages. He graduated at Harvard in 1863, continuing to study languages and philosophy with zeal; spent two years in the Harvard law school, and opened an office in Boston; but soon devoted the greater portion of his time to writing for periodicals. With the exception of one year, he resided at Cambridge, Massachusetts, from the time of his graduation until his death. In 1869 he gave a course of lectures at Harvard on the Positive Philosophy; next year he was history tutor; in 1871

he delivered thirty-five lectures on the Doctrine of Evolution, afterwards revised and expanded as *Outlines of Cosmic Philosophy* (1874); and between 1872 and 1879 he was assistant-librarian. After that time he devoted himself to literary work and lecturing on history. Nearly all of his books were first given to the public in the form of lectures or magazine articles, revised and collected under a general title, such as *Myths and Myth-Makers* (1872), *Darwinism and Other Essays* (1879), *Excursions of an Evolutionist* (1883), and *A Century of Science* (1899). He did much, by the thoroughness of his learning and the lucidity of his style, to spread a knowledge of Darwin and Spencer in America. His *Outlines of Cosmic Philosophy*, while Setting 438 forth the Spencerian system, made psychological and sociological additions of original matter, in some respects anticipating Spencer's later conclusions. Of one part of the argument of this work Fiske wrote in the preface of one of his later books (*Through Nature to God*, 1899): "The detection of the part played by the lengthening of infancy in the genesis of the human race is my own especial contribution to the Doctrine of Evolution." In *The Idea of God as affected by Modern Knowledge* (1885) Fiske discusses the theistic problem, and declares that the mind of man, as developed, becomes an illuminating indication of the mind of God, which as a great immanent cause includes and controls both physical and moral forces. More original, perhaps, is the argument in the immediately preceding work, *The Destiny of Man, viewed in the Light of his Origin* (1884), which is, in substance, that physical evolution is a demonstrated fact; that intellectual force is a later, higher and more potent thing than bodily strength; and that, finally, in most men and some "lower animals" there is developed a new idea of the advantageous, a moral and non-selfish line of thought and procedure, which in itself so transcends the physical that it cannot be identified with it or be measured by its standards, and may or must be enduring, or at its best immortal.

It is principally, however, through his work as a historian that Fiske's reputation will live. His historical writings, with the exception of a small volume on *American Political Ideas* (1885), an account of the system of *Civil Government in the United States* (1890), *The Mississippi Valley in the Civil War* (1900), a school history of the United States, and an elementary story of the American Revolution, are devoted to studies, in a unified general manner, of separate yet related episodes in American history. The volumes have not appeared in chronological order of subject, but form a nearly complete colonial history, as follows: *The Discovery of America, with some Account of Ancient America, and the Spanish Conquest* (1892, 2 vols.); *Old Virginia and her Neighbours* (1897, 2 vols.); *The Beginnings of New England*; or, *The Puritan Theocracy in its Relations to Civil and Religious Liberty* (1889); *Dutch and Quaker Colonies in America* (1899); *The American Revolution* (1891, 2 vols.); and *The Critical Period of American History*, 1783-1789 (1888). Of these the most original and valuable is the *Critical Period* volume, a history of the consolidation of the states into a government, and of the formation of the constitution.

(C. F. R.)

FISKE, MINNIE MADDERN (1865-), American actress, was born in New Orleans, the daughter of Thomas Davey. As a child she played, under her mother's name of Maddern, with several well-known actors. In 1882 she first appeared as a "star," but in 1890 she married Harrison Grey Fiske and was absent from the stage for several years. In 1893 she reappeared in *Hester Crewe*, a play written by her husband, and afterwards acted a number of Ibsen's heroines, and in *Becky Sharp*, a dramatization of Thackeray's *Vanity Fair*. In 1901 she opened, in opposition to the American theatrical "trust," an independent theatre in New York, the Manhattan. She won a considerable reputation in the United States as an emotional actress.

FISTULA (Lat. for a pipe or tube), a term in surgery used to designate an abnormal communication leading either from the surface of the body to a normal cavity or canal, or from one normal cavity or canal to another. These communications are the result of disease or injury. They receive different names according to their situation: *lachrymal fistula* is the small opening left after the bursting of an abscess in the upper part of the tear-duct, near the root of the nose; *salivary fistula* is an opening into the salivary duct on the cheek; *anal fistula*, or *fistula in ano*, is a suppurating track near the outlet of the bowel; *urethral fistula* is the result of a giving way of the tissues behind a stricture. These are examples of the variety of the first kind of fistula; while *recto-vesical fistula*, a communication between the rectum and bladder, and *vesico-vaginal fistula*, a communication between the bladder and vagina, are examples of the second. The abnormal passage may be straight or tortuous, of considerable diameter or of narrow calibre. Fistulae may be caused by an obstruction of the normal channel, the result of disease or injury, which prevents, for example, the tears, saliva or urine, as the case may be, from escaping; their retention gives rise to inflammation and ulceration in order that an exit may be obtained by the formation of an abscess, which bursts, for example, into the gut or through the skin; the cavity does not close, and a fistula is the result. The fistulous channel remains open as long as the contents of the cavity or canal with which it is connected can pass through it. To obliterate the fistula one must remove the obstruction and encourage the flow along the natural channel; for example, one must open up the nasal duct so as to allow the tears to reach the nasal cavity, and the *lachrymal fistula* will close; and so also in the *salivary* and *urethral* fistulae. Sometimes it may be necessary to lay the channel freely open, to scrape out the unhealthy material which lines the track, and to encourage it to fill up from its deepest part, as in *anal fistula*; in other cases it may be necessary to pare the edges of the abnormal opening and stitch them together.

(E. O.*)

FIT, a word with several meanings. (1) A portion or division of a poem, a canto, in this sense often spelled “fytte.” (2) A sudden but temporary seizure or attack of illness, particularly one with convulsive paroxysms accompanied by unconsciousness, especially an attack of apoplexy or epilepsy, but also applied to a transitory attack of gout, of coughing, fainting, &c., also of an outburst of tears, of merriment or of temper. In a transferred sense, the word is also used of any temporary or irregular periods of action or inaction, and hence in such expressions as “by fits and starts.” (3) As an adjective, meaning suitable, proper, becoming, often with the idea of having necessary qualifications for a specific purpose, “a fit and proper person”; and also as prepared for, or in a good condition for, any enterprise. The verb “to fit” is thus used intransitively and transitively, to be adapted for, to suit, particularly to be of the right measurement or shape, of a dress, of parts of a mechanism, &c., and to make or render a thing in such a condition. Hence the word is used as a substantive.

The etymology of the word is difficult; the word may be one in origin, or may be a homonymous term, one in sound and spelling but with different origin in each different meaning. In Skeat’s *Etymological Dictionary* (ed. 1898) (1) and (2) are connected and derived from the root of “foot,” which appears in Lat. *pes*, *pedis*. The evolution of the word is: step, a part of a poem, a struggle, a seizure. (3) A word of Scandinavian origin, with the idea of “knitted together” (cf. Ice. *fitja*, to knit together, Goth, *fetjan*, to adorn); the ultimate origin is a Teutonic root meaning to seize (cf. “fetch”). The *New English Dictionary* suggests that this last root may be the origin of all the words, and that the underlying meaning is junction, meeting; the early use of “fit” (2) is that of conflict. It is also pointed out that the meanings of “fit,” suitable, proper, have been modified by “feat,” which comes through Fr. *fait*, from Lat. *factum*, *facere*, to do, make.

FITCH, JOHN (1743-1798), American pioneer of steam navigation, was born at Windsor, Connecticut, on the 21st of January 1743. He was the son of a farmer, and received the usual common school education. At the age of seventeen he went to sea, but he discontinued his sailor life after a few voyages and became successively a clockmaker, a brassfounder and a silversmith. During the War of Independence he was a sutler to the American troops, and amassed in that way a considerable sum of money, with which he bought land in Virginia. He was appointed deputy-surveyor for Kentucky in 1780, and when returning to Philadelphia in the following year he was captured by the Indians, but shortly afterwards regained his liberty. About this time he began an exploration of the north-western regions, with the view of preparing a map of the district; and while sailing on the great western rivers, the idea occurred to him that they might be navigated by steam. He endeavoured by the sale of his map to find money for the carrying out of his projects, but was unsuccessful. He next applied for assistance to the legislatures of different states, but though each reported in favourable terms of his invention, none of them would agree to grant him any pecuniary assistance. He was successful, however, in 1786, in forming a company for the prosecution of his enterprise, and shortly afterwards a steam-packet of his invention was launched on the Delaware. His claim to be the inventor of steam-navigation was disputed by James Rumsey of Virginia, but Fitch obtained exclusive rights in steam-navigation in New Jersey, Pennsylvania and Delaware, while a similar privilege was granted to Rumsey in Virginia, Maryland and New York. A steam-boat built by Fitch conveyed passengers for hire on the Delaware in the summer of 1790, but the undertaking was a losing one, and led to the dissolution of the company. In 1793 he endeavoured to introduce his invention into France, but met with no success. On his return to America he found his property overrun by squatters, and reaping from his invention nothing but disappointment and poverty, he committed suicide at Bardstown, Kentucky, on the 2nd of July 1798.

He left behind him a record of his adventures and misfortunes, “inscribed to his children and future posterity”; and from this a biography was compiled by Thompson Westcott (Philadelphia, 1857.)

FITCH, SIR JOSHUA GIRLING (1824-1903), English educationist, second son of Thomas Fitch, of a Colchester family, was born in Southwark, London, in 1824. His parents were poor but intellectually inclined, and at an early age Fitch started work as an assistant master in the British and Foreign School Society’s elementary school in the Borough Road, founded by Thomas Lancaster. But he continued to educate himself by assiduous reading and attending classes at University College; he was made headmaster of another school at Kingsland; and in 1850 he took his B.A. degree at London University, proceeding MA. two years later. In 1852 he was appointed by the British and Foreign School Society to a tutorship at their Training College in the Borough Road, soon becoming vice-principal and in 1856 principal. He had previously done some occasional teaching there, and he was thoroughly imbued with the Lancasterian system. In 1863 he was appointed a government inspector of schools for the York district, from which, after intervals in which he was detached for work as an assistant commissioner (1865-1867) on the Schools Inquiry Commission, as special commissioner (1869), and as an assistant commissioner under the Endowed Schools Act (1870-1877), he was transferred in 1877 to East Lambeth. In 1883 he was made a chief inspector, to superintend the eastern counties, and in 1885 chief inspector of training colleges, a post he held till he retired in 1894. In the course of an extraordinarily active career, he acquired a unique acquaintance with all branches of education, and became a recognized authority on the subject, his official reports, lectures and books having a great influence on the development of education in England. He was a strong advocate and supporter of the movement for the higher education of women, and he was constantly looked to for counsel and direction on every sort of educational subject; his wide knowledge, safe judgment

and amiable character made his co-operation of exceptional value, and after he retired from official life his services were in active request in inquiries and on boards and committees. In 1896 he was knighted; and besides receiving such academic distinctions as the LL.D. degree from St Andrews University, he was made a chevalier of the French Legion of Honour in 1889. He was a constant contributor to the leading reviews; he published an important series of *Lectures on Teaching* (1881), *Educational Aims and Methods, Notes on American Schools and Colleges* (1887), and an authoritative criticism of *Thomas and Matthew Arnold, and their Influence on English Education* (see also the article on ARNOLD, MATTHEW) in 1901; and he wrote the article on EDUCATION in the supplementary volumes (10th edition) of this encyclopaedia (1902). He died on the 14th of July 1903 in London. A civil list pension was given to his widow, whom, as Miss Emma Wilks, he had married in 1856.

See also *Sir Joshua Fitch*, by the Rev. A.L. Lilley (1906),

FITCH, RALPH (fl. 1583-1606), London merchant, one of the earliest English travellers and traders in Mesopotamia, the Persian Gulf and Indian Ocean, India proper and Indo-China. In January 1583 he embarked in the "Tiger" for Tripoli and Aleppo in Syria (see Shakespeare, *Macbeth*, Act I. sc. 3), together with J. Newberie, J. Eldred and two other merchants or employees of the Levant Company. From Aleppo he reached the Euphrates, descended the river from Bir to Fallujah, crossed southern Mesopotamia to Bagdad, and dropped down the Tigris to Basra (May to July 1583). Here Eldred stayed behind to trade, while Fitch and the rest sailed down the Persian Gulf to Ormuz, where they were arrested as spies (at Venetian instigation, as they believed) and sent prisoners to the Portuguese viceroy at Goa (September to October). Through the sureties procured by two Jesuits (one being Thomas Stevens, formerly of New College, Oxford, the first Englishman known to have reached India by the Cape route in 1579) Fitch and his friends regained their liberty, and escaping from Goa (April 1584) travelled through the heart of India to the court of the Great Mogul Akbar, then probably at Agra. In September 1585 Newberie left on his return journey overland via Lahore (he disappeared, being presumably murdered, in the Punjab), while Fitch descended the Jumna and the Ganges, visiting Benares, Patna, Kuch Behar, Hugli, Chittagong, &c. (1585-1586), and pushed on by sea to Pegu and Burma. Here he visited the Rangoon region, ascended the Irawadi some distance, acquired a remarkable acquaintance with inland Pegu, and even penetrated to the Siamese Shan states (1586-1587). Early in 1588 he visited Malacca; in the autumn of this year he began his homeward travels, first to Bengal; then round the Indian coast, touching at Cochin and Goa, to Ormuz; next up the Persian Gulf to Basra and up the Tigris to Mosul (Nineveh); finally via Urfa, Bir on the Euphrates, Aleppo and Tripoli, to the Mediterranean. He reappeared in London on the 29th of April 1591. His experience was greatly valued by the founders of the East India Company, who specially consulted him on Indian affairs (*e.g.* 2nd of October 1600; 29th of January 1601; 31st of December 1606).

See Hakluyt, *Principal Navigations* (1599), vol. ii. part i. pp. 245-271, esp. 250-268; Linschoten, *Voyages* (*Itineraris*), part i. ch. xcii. (vol. ii. pp. 158-169, &c., Hakluyt Soc. edition); Stevens and Birdwood, *Court Records of the East India Company 1599-1603* (1886), esp. pp. 26, 123; *State Papers, East Indies*, &c., *1513-1616* (1862), No. 36; Pinkerton, *Voyages and Travels* (1808-1814), ix. 406-425.

FITCHBURG, a city and one of the county-seats of Worcester county, Massachusetts, U.S.A., situated, at an altitude varying from about 433 ft. to about 550 ft., about 23 m. N. of Worcester and about 45 m. W.N.W. of Boston. Pop. (1880) 12,429; (1890) 22,037; (1900) 31,531, of whom 10,917 were foreign-born, including 4063 French Canadians, 836 English Canadians, 2306 Irish and 963 Finns; (1910 census) 37,826. Fitchburg is traversed by the N. branch of the Nashua river, and is served by the Boston & Maine, and the New York, New Haven & Hartford railways, and by three interurban electric lines. The city area (27.7 sq.m.) is well watered, and is very uneven, with hill spurs running in all directions, affording picturesque scenery. The court house and the post office (in a park presented by the citizens) are the principal public buildings. Fitchburg is the seat of a state normal school (1895), with model and training schools; has a free public library (1859; in the Wallace library and art building), the Burbank hospital, the Fitchburg home for old ladies, and an extensive system of parks, in one of which is a fine fountain, designed by Herbert Adams. Fitchburg has large mercantile and financial interests, but manufacturing is the principal industry. The principal manufactures are paper and wood pulp, cotton and woollen goods, yarn and silk, machinery, saws, horn goods, and bicycles and firearms (the Iver Johnson Arms and Cycle Works being located here). In 1905 the city's total factory product was valued at $15,390,507, of which $3,019,118 was the value of the paper and wood pulp product, $2,910,572 was the value of the cotton goods, and $1,202,421 was the value of the foundry and machine shop products. The municipality owns and operates its (gravity) water works system. Fitchburg was included in Lunenburg until 1764, when it was incorporated as a township and was named in honour of John Fitch, a citizen who did much to secure incorporation; it was chartered as a city in 1872.

See W.A. Emerson, *Fitchburg, Massachusetts, Past and Present* (Fitchburg, 1887).

FITTIG, RUDOLF (1835-), German chemist, was born at Hamburg on the 6th of December 1835. He studied chemistry at Göttingen, graduating as Ph.D. with a dissertation on acetone in 1858. He subsequently held several appointments at Göttingen, being privat docent (1860), and extraordinary professor (1870). In 1870 he obtained the chair at Tübingen, and in 1876 that at Strassburg, where the laboratories were erected from his designs. Fittig's researches are entirely in organic chemistry, and cover an exceptionally wide field. The aldehydes and ketones provided material for his earlier work. He observed that aldehydes and ketones may suffer reduction in neutral, alkaline, and sometimes acid solution to secondary and tertiary glycols, substances which he named pinacones; and also that certain pinacones when distilled with dilute sulphuric acid gave compounds, which he named pinacolines. The unsaturated acids, also received much attention, and he discovered the internal anhydrides of oxyacids, termed lactones. In 1863 he introduced the reaction known by his name. In 1855 Adolph Wurtz had shown that when sodium acted upon alkyl iodides, the alkyl residues combined to form more complex hydrocarbons; Fittig developed this method by showing that a mixture of an aromatic and alkyl haloid, under similar treatment, yielded homologues of benzene. His investigations on Perkin's reaction led him to an explanation of its mechanism which appeared to be more in accordance with the facts. The question, however, is one of much difficulty, and the exact course of the reaction appears to await solution. These researches incidentally solved the constitution of coumarin, the odoriferous principle of woodruff. Fittig and Erdmann's observation that phenyl isocrotonic acid readily yielded α-naphthol by loss of water was of much importance, since it afforded valuable evidence as to the constitution of naphthalene. They also investigated certain hydrocarbons occurring in the high boiling point fraction of the coal tar distillate and solved the constitution of phenanthrene. We also owe much of our knowledge of the alkaloid piperine to Fittig, who in collaboration with Ira Remsen established its constitution in 1871. Fittig has published two widely used text-books; he edited several editions of Wohler's *Grundriss der organischen Chemie* (11th ed., 1887) and wrote an *Unorganische Chemie* (1st ed., 1872; 3rd, 1882). His researches have been recognized by many scientific societies and institutions, the Royal Society awarding him the Davy medal in 1906.

FITTON, MARY (*c.* 1578-1647), identified by some writers with the "dark lady" of Shakespeare's sonnets, was the daughter of Sir Edward Fitton of Gawsworth, Cheshire, and was baptized on the 24th of June 1578. Her elder sister, Anne, married John Newdigate in 1587, in her fourteenth year. About 1595 Mary Fitton became maid of honour to Queen Elizabeth. Her father recommended her to the care of Sir William Knollys, comptroller of the queen's household, who promised to defend the "innocent lamb" from the "wolfish cruelty and fox-like subtlety of the tame beasts of this place." Sir William was fifty and already married, but he soon became suitor to Mary Fitton, in hope of the speedy death of the actual Lady Knollys, and appears to have received considerable encouragement. There is no hint in her authenticated biography that she was acquainted with Shakespeare. William Kemp, who was a clown in Shakespeare's company, dedicated his *Nine Daies Wonder* to Mistress Anne (perhaps an error for Mary) Fitton, "Maid of Honour to Elizabeth"; and there is a sonnet addressed to her in an anonymous volume, *A Woman's Woorth defended against all the Men in the World* (1599). In 1600 Mary Fitton led a dance in court festivities at which William Herbert, later earl of Pembroke, is known to have been present; and shortly afterwards she became his mistress. In February 1601 Pembroke was sent to the Fleet in connexion with this affair, but Mary Fitton, whose child died soon after its birth, appears to have simply been dismissed from court. Mary Fitton seems to have gone to her sister, Lady Newdigate, at Arbury. A second scandal has been fixed on Mary Fitton by George Ormerod, author of *History of Cheshire*, in a MS. quoted by Mr. T. Tyler (*Academy*, 27th Sept. 1884). Ormerod asserted, on the strength of the MSS. of Sir Peter Leycester, that she had two illegitimate daughters by Sir Richard Leveson, the friend and correspondent of her sister Anne. He also gives the name of her first husband as Captain Logher, and her second as Captain Polwhele, by whom she had a son and daughter. Polwhele died in 1609 or 1610, about three years after his marriage. But Ormerod was mistaken in the order of Mary Fitton's husbands, for her second husband, Logher, died in 1636. Her own will, which was proved in 1647, gives her name as "Mary Lougher." In Gawsworth church there is a painted monument of the Fittons, in which Anne and Mary are represented kneeling behind their mother. It is stated that from what remains of the colouring Mary was a dark woman, which is of course essential to her identification with the lady of the sonnets, but in the portraits at Arbury described by Lady Newdigate-Newdegate in her *Gossip from a Muniment Room* (1897) she has brown hair and grey eyes.

The identity of the Arbury portrait with Mary Fitton was challenged by Mr Tyler and by Dr Furnivall. For an answer to their remarks see an appendix by C.G.O. Bridgeman in the 2nd edition of Lady Newdigate-Newdegate's book.

The suggestion that Mary Fitton should be regarded as the false mistress of Shakespeare's sonnets rests on a very thin chain of reasoning, and by no means follows on the acceptance of the theory that William Herbert was the addressee of the sonnets, though it of course fails with the rejection of that supposition. Mr William Archer (*Fortnightly Review*, December 1897) found some support for Mary Fitton's identification with the "dark lady" in the fact that Sir William Knollys was also her suitor, thus numbering three "Wills" among her admirers. This supplies a definite interpretation, whether right or wrong, to the initial lines of Sonnet 135:—

"Whoever hath her wish, thou hast thy 'Will,'
And 'Will' to boot, and 'Will' in overplus."

Arguments in favour of her adoption into the Shakespeare circle will be found in Mr Thomas Tyler's *Shakespeare's Sonnets* (1890, pp. 73-92), and in the same writer's *Herbert-Fitton Theory of Shakespeare's Sonnets* (1898).

FITTON, WILLIAM HENRY (1780-1861), British geologist was born in Dublin in January 1780. Educated at Trinity College, in that city, he gained the senior scholarship in 1798, and graduated in the following year. At this time he began to take interest in geology and to form a collection of fossils. Having adopted the medical profession he proceeded in 1808 to Edinburgh, where he attended the lectures of Robert Jameson, and thenceforth his interest in natural history and especially in geology steadily increased. He removed to London in 1809, where he further studied medicine and chemistry. In 1811 he brought before the Geological Society of London a description of the geological structure of the vicinity of Dublin, with an account of some rare minerals found in Ireland. He took a medical practice at Northampton in 1812, and for some years the duties of his profession engrossed his time. He was admitted M.D. at Cambridge in 1816. In 1820, having married a lady of means, he settled in London, and devoted himself to the science of geology with such assiduity and thoroughness that he soon became a leading authority, and in the end, as Murchison said, "one of the British worthies who have raised modern geology to its present advanced position." His "Observations on some of the Strata between the Chalk and the Oxford Oolite, in the South-east of England" (*Trans. Geol. Soc.* ser. 2, vol. iv.) embodied a series of researches extending from 1824 to 1836, and form the classic memoir familiarly known as Fitton's "Strata below the Chalk." In this great work he established the true succession and relations of the Upper and Lower Greensand, and of the Wealden and Purbeck formations, and elaborated their detailed structure. He had been elected F.R.S. in 1815, and he was president of the Geological Society of London 1827-1829. His house then became a meeting place for scientific workers, and during his presidency he held a conversazione open on Sunday evenings to all fellows of the Geological Society. From 1817 to 1841 he contributed to the *Edinburgh Review* many admirable essays on the progress of geological science; he also wrote "Notes on the Progress of Geology in England" for the *Philosophical Magazine* (1832-1833). His only independent publication was *A Geological Sketch of the Vicinity of Hastings* (1833). He was awarded the Wollaston medal by the Geological Society in 1852. He died in London on the 13th of May 1861.

Obituary by R.I. Murchison in *Quart. Journ. Geol. Soc.*, vol. xviii., 1862, p. xxx.

FITZBALL, EDWARD (1792-1873), English dramatist, whose real patronymic was Ball, was born at Burwell, Cambridgeshire, in 1792. His father was a well-to-do farmer, and Fitzball, after receiving his schooling at Newmarket, was apprenticed to a Norwich printer in 1809. He produced some dramatic pieces at the local theatre, and eventually the marked success of his *Innkeeper of Abbeville, or The Ostler and the Robber* (1820), together with the friendly acceptance of one of his pieces at the Surrey theatre by Thomas Dibdin, induced him to settle in London. During the next twenty-five years he produced a great number of plays, most of which were highly successful. He had a special talent for nautical drama. His *Floating Beacon* (Surrey theatre, 19th of April 1824) ran for 140 nights, and his *Pilot* (Adelphi, 1825) for 200 nights. His greatest triumph in melodrama was perhaps *Jonathan Bradford, or the Murder at the Roadside Inn* (Surrey theatre, 12th of June 1833). He was at one time stock dramatist and reader of plays at Covent Garden, and afterwards at Drury Lane. He had a considerable reputation as a song-writer and as a librettist in opera. The last years of his life were spent in retirement at Chatham, where he died on the 27th of October 1873.

His autobiography, *Thirty-Five Years of a Dramatic Author's Life* (2 vol., 1859), is a naïve record of his career. Numbers of his plays are printed in *Cumberland's Minor British Theatre, Dick's Standard Plays* and *Lacy's Acting Edition of Plays*.

FITZGERALD, the name of an historic Irish house, which descends from Walter, son of Other, who at the time of the Domesday Survey (1086) was castellan of Windsor and a tenant-in-chief in five counties. From his eldest son William, known as "de Windsor," descended the Windsors of Stanwell, of whom Andrew Windsor was created Lord Windsor of Stanwell (a Domesday possession of the house) by Henry VIII., which barony is now vested in the earl of Plymouth, his descendant in the female line. Of Walter's younger sons, Robert was given by Henry I. the barony of Little Easton, Essex; Maurice obtained the stewardship (*dapiferatus*) of the great Suffolk abbey of Bury St Edmunds; Reinald the stewardship to Henry I.'s queen, Adeliza; and Gerald (also a *dapifer*) became the ancestor of the FitzGeralds. As constable and captain of the castle that Arnulf de Montgomery raised at Pembroke, Gerald strengthened his position in Wales by marrying Nesta, sister of Griffith, prince of South Wales, who bore to him famous children, "by whom the southern coast of Wales was saved for the English and the bulwarks of Ireland stormed." Of these sons William, the eldest, was succeeded by his son Odo, who was known as "de Carew," from the fortress of that name at the neck of the Pembroke peninsula, the eldest son Gerald having been slain by the Welsh. The descendants of Odo held Carew and the manor of Moulsford, Berks, and some of them acquired lands in Ireland. But the wild claims of Sir Peter Carew, under Queen Elizabeth, to vast Irish estates, including half of "the kingdom of Cork," were based on a fictitious pedigree. Odo de Carew's brothers, Reimund "Fitz William" (known as "Le Gros") and Griffin "Fitz William," took an active part in the conquest of Ireland.

Returning to Gerald and Nesta, their son David “Fitz Gerald” became bishop of St David’s (1147-1176), and their daughter Angharat mother of Gerald de Barri (Giraldus Cambrensis, *q.v.*), the well-known historian and the eulogist of his mother’s family. A third son, Maurice, obtained from his brother the stewardship (*dapiferatus*) of St David’s, c. 1174, and having landed in Ireland in 1169, on the invitation of King Dermod, founded the fortunes of his house there, receiving lands at Wexford, where he died and was buried in 1176. His eventual territory, however, was the great barony of the Naas in Ophaley (now in Kildare), which Strongbow granted him with Wicklow Castle; but his sons were forced to give up the latter. His eldest son William succeeded him as baron of the Naas and steward of St David’s, but William’s granddaughter carried the Naas to the Butlers and so to the Loundreses. Gerald, a younger son of Maurice, who obtained lands in Ophaley, was father of Maurice “Fitz Gerald,” who held the great office of justiciar of Ireland from 1232 to 1245. In 1234 he fought and defeated his overlord, the earl marshal, Richard, earl of Pembroke, and he also fought for his king against the Irish, the Welsh, and in Gascony, dying in 1257. He held Maynooth Castle, the seat of his descendants.

Much confusion follows in the family history, owing to the justiciar leaving a grandson Maurice (son of his eldest son Gerald) and a younger son Maurice, of whom the latter was justiciar for a year in 1272, while the former, as heir male and head of the race, inherited the Ophaley lands, which he is said to have bequeathed at his death (1287) to John “Fitz Thomas,” whose fighting life was crowned by a grant of the castle and town of Kildare, and of the earldom of Kildare to him and the heirs male of his body (May 14th, 1316), Dying shortly after, he was succeeded by his son Thomas, son-in-law of Richard (de Burgh) the “red earl” of Ulster, who received the hereditary shrievalty of Kildare in 1317, and was twice (1320, 1327) justiciar of Ireland for a year. His younger son Maurice “Fitz Thomas,” 4th earl (1331-1390), was frequently appointed justiciar, and was great-grandfather of Thomas, the 7th earl (1427-1477), who between 1455 and 1475 was repeatedly in charge of the government of Ireland as “deputy,” and who founded the “brotherhood of St George” for the defence of the English Pale. He was also made lord chancellor of Ireland in 1463. His son Gerald, the 8th earl (1477-1513), called “More” (the Great), was deputy governor of Ireland from 1481 for most of the rest of his life, though imprisoned in the Tower two years (1494-1496) on suspicion as a Yorkist. He was mortally wounded while fighting the Irish as “deputy.” Gerald, the 9th earl (1513-1534), followed in his father’s steps as deputy, fighting the Irish, till the enmity of the earl of Ormonde, the hereditary rival of his house, brought about his deposition in 1520. In spite of temporary restorations he finally died a prisoner in the Tower.

In his anger at his rival’s successes the 9th earl had been led, it was suspected, into treason, and while he was a prisoner in England his son Lord Thomas Fitzgerald, “Silken Thomas,” broke out into open revolt (1534), and declared war on the government; his followers slew the archbishop of Dublin and laid siege to Dublin Castle. Meanwhile he made overtures to the native Irish, to the pope and to the emperor; but the Butlers took up arms against him, an English army laid siege to his castle of Maynooth, and, though its fall was followed by a long struggle in the field, the earl, deserted by O’Conor, had eventually to surrender himself to the king’s deputy. He was sent to the Tower, where he was subsequently joined by his five uncles, arrested as his accomplices. They were all six executed as traitors in February 1537, and acts of attainder completed the ruin of the family.

But the earl’s half-brother, Gerald (whose sister Elizabeth was the earl of Surrey’s “fair Geraldine”), a mere boy, had been carried off, and, after many adventures at home and abroad, returned to England after Henry VIII.’s death, and to propitiate the Irish was restored to his estates by Edward VI. (1552). Having served Mary in Wyat’s rebellion, he was created by her earl of Kildare and Lord Offaley, on the 13th of May 1554, but the old earldom (though the contrary is alleged) remained under attainder. Although he conformed to the Protestant religion under Elizabeth and served against the Munster rebels and their Spanish allies, he was imprisoned in the Tower on suspicion of treason in 1583. But the acts attainting his family had been repealed in 1569, and the old earldom was thus regained. In 1585 he was succeeded by his son Henry (“of the Battleaxes”), who was mortally wounded when fighting the Tyrone rebels in 1597. On the death of his brother in 1599 the earldom passed to their cousin Gerald, whose claim to the estates was opposed by Lettice, Lady Digby, the heir-general. She obtained the ancestral castle of Geashill with its territory and was recognized in 1620 as Lady Offaley for life. George, the 16th earl (1620-1660), had his castle of Maynooth pillaged by the Roman Catholics in 1642, and after its subsequent occupation by them in 1646 it was finally abandoned by the family.

The history of the earls after the Restoration was uneventful, save for the re-acquisition in 1739 of Carton, which thenceforth became the seat of the family, until James the 20th earl (1722-1773), who obtained a viscounty of Great Britain in 1747, built Leinster House in Dublin, and formed a powerful party in the Irish parliament. In 1756 he was made lord deputy; in 1760 he raised the royal Irish regiment of artillery; and in 1766 he received the dukedom of Leinster, which remained the only Irish dukedom till that of Abercorn was created in 1868. His wealth and connexions secured him a commanding position. Of his younger children one son was created Lord Lecale; another was the well-known rebel, Lord Edward Fitzgerald; another was the ancestor of Lord De Ros; and a daughter was created Baroness Rayleigh. William Robert, the 2nd duke (1749-1804), was a cordial supporter of the Union, and received nearly £30,000 for the loss of his borough influence. In 1883 the family was still holding over 70,000 acres in Co. Kildare; but, after a tenure of nearly 750 years, arrangements were made to sell them to the tenants under the recent Land Purchase Acts. In 1893 Maurice Fitzgerald (b. 1887) succeeded his father Gerald, the 5th duke (1851-1893), as 6th duke of Leinster.

The other great Fitzgerald line was that of the earls of Desmond, who were undoubtedly of the same stock and claimed descent from Maurice, the founder of the family in Ireland, through a younger son Thomas. It would seem that Maurice, grandson of Thomas, was father of Thomas “Fitz Maurice” *Nappagh* (“of the ape”), justice of Ireland in 1295, who obtained a grant of the territory of “Decies and Desmond” in 1292, and died in 1298. His son Maurice Fitz Thomas or Fitzgerald, inheriting vast estates in Munster, and strengthening his position by marrying a daughter of Richard de Burgh, earl of Ulster, was created earl of Desmond (*i.e.* south Munster) on the 22nd of August 1329, and Kerry was made a palatine liberty for him. The greatest Irish noble of his day, he led the Anglo-Irish party against the English representatives of the

king, and was attacked as the king's enemy by the viceroy in 1345. He surrendered in England to the king and was imprisoned, but eventually regained favour, and was even made viceroy himself in 1355. He died, however, the following year. Two of his sons succeeded in turn, Gerald, the 3rd earl (1359-1398), being appointed justiciar (*i.e.* viceroy) in 1367, despite his adopting his father's policy which the crown still wished to thwart. But he was superseded two years later, and defeated and captured by the native king of Thomond shortly after. Yet his sympathies were distinctly Irish. The remote position of Desmond in the south-west of Ireland tended to make the succession irregular on native lines, and a younger son succeeded as 6th or 7th earl about 1422. His son Thomas, the next earl (1462-1467), governed Ireland as deputy from 1463 to 1467, and upheld the endangered English rule by stubborn conflict with the Irish. Yet Tiptoft, who superseded him, procured his attainder with that of the earl of Kildare, on the charge of alliance with the Irish, and he was beheaded on the 14th of February 1468, his followers in Munster avenging his death by invading the Pale. His younger son Maurice, earl from 1487 to 1520, was one of Perkin Warbeck's Irish supporters, and besieged Waterford on his behalf. His son James (1520-1529) was proclaimed a rebel and traitor for conspiring with the French king and with the emperor. At his death the succession reverted to his uncle Thomas (1529-1534), then an old man, at whose death there was a contest between his younger brother Sir John "of Desmond" and his grandson James, a court page of Henry VIII. Old Sir John secured possession till his death (1536), when his son James succeeded *de facto*, and *de jure* on the rightful earl being murdered by the usurper's younger brother in 1540. Intermarriage with Irish chieftains had by this time classed the earls among them, but although this James looked to their support before 1540, he thenceforth played so prudent a part that in spite of the efforts of the Butlers, the hereditary foes of his race, he escaped the fate of the Kildare branch and kept Munster quiet and in order for the English till his death in 1558. His four marriages produced a disputed succession and a break-up of the family. His eldest son Thomas "Roe" (the Red) was disinherited, and failed to obtain the earldom, which was confirmed by Elizabeth to his half-brother Gerald "the rebel earl" (1558-1582), but Gerald had other enemies in his uncle Maurice (the murderer of 1540) and his son especially, the famous James "Fitz Maurice" Fitz Gerald. Gerald's turbulence and his strife with the Butlers led to his detention in England (1562-1564) and again in 1565-1566. In 1567 Sidney imprisoned him in Dublin Castle, whence, with his brother, Sir John "of Desmond," he was sent to England and the Tower, and not allowed to return to Ireland till 1573. Meanwhile the above James, in spite of the protests of Thomas "Roe," had usurped his position in his absence and induced the natives to choose him as "captain" or chieftain of Desmond. He formed a strong Irish Catholic party and broke into revolt in 1569. Suppressed by Sidney, he rebelled again, till crushed by Perrot in 1573. As Earl Gerald on his return would not join James in revolt, the latter withdrew to France. But Gerald himself, after some trimming, rose in rebellion (July 1574), though he soon submitted to the queen's forces. On the continent James Fitz Maurice offered the crown of Ireland in succession to France and to Spain, and finally to the nephew of Pope Gregory XIII. With the papal nuncio and a few troops he landed at Dingle in Kerry (June 1579) and called on the earls of Kildare and Desmond to join him, but the latter assured the English government of his loyalty, and James was killed in a skirmish. Yet Desmond was viewed with suspicion and finally forced, by being proclaimed as a traitor (Nov. 1st, 1579), into a miserable rebellion. His castles were soon captured, and he was hunted as a fugitive, till surprised and beheaded on the 11th of November 1583, after long wanderings, his head being fixed on London Bridge. His ruin is attributable to his restless turbulence and lack of settled policy. The vast estates of the earls, estimated at 600,000 acres, were forfeited by act of parliament.

But the influence of his mighty house was still great among the Irish. The disinherited Thomas "Roe" left a son James "Fitz Thomas," who, succeeding him in 1595 and finding that the territory of the earls would never be restored, assumed the earldom and joined O'Neill's rebellion in 1598, at the head of 8000 of his men. Long sheltered from capture by the fidelity of the peasantry, he was eventually seized (1601) by his kinsman the White Knight, Edmund Fitz Gibbon, whose sister-in-law he had married, and sent to the Tower. The "sugan" (sham) earl lingered there obscurely as "James M'Thomas" till his death. In consequence of his rebellion and the devotion of the Irish to his race, James, son of Gerald "the rebel earl," who had remained in the Tower since his father's death (1583), was restored as earl of Desmond and sent over to Munster in 1600, but he, known as "the queen's earl," could, as a Protestant, do nothing, and he died unmarried in 1601. The "sugan" earl's brother John, who had joined in his rebellion, escaped into Spain, and left a son Gerald, who appears to have assumed the title and was known as the Conde de Desmond. He was killed in the service of the emperor Ferdinand in 1632. The common origin of the earls of Desmond and of Kildare had never been forgotten, and intermarriage had cemented the bond. Just before his death the exile wrote as "Desmond *alias* Gerratt Fitz Gerald" to his "Most Noble Cosen" the earl of Kildare, that "wee must not be oblivious of the true amity and love that was inviolably observed betweene our antenates and elders."

There can be no doubt that the house of Fitzmaurice was also of this stock, although their actual origin, in the 12th century, is doubtful. From a very early date they were feudal lords of Kerry, and their dignity was recognized as a peerage by Henry VII. in 1489. The isolated position of their territory ("Clanmaurice") threw them even more among the Irish than the earls of Desmond, and they often adopted the native form of their name, "MacMorrish." Under Elizabeth the lords of Kerry narrowly escaped sharing the ruin of the earls. The conduct of Thomas in the rebellion of James "Fitz Maurice" was suspicious, and his sons joined in that of the earl of Desmond, while he himself was a rebel in 1582. Patrick, his successor (1590-1600), was captured in rebellion (1587), and when free, joined the revolt of 1598, as did his son and heir Thomas, who continued in the field till he obtained pardon and restoration in 1603, though suspect till his death in 1630. His grandson withdrew to France with James II., but the next peer became a supporter of the Whig cause, married the eventual heiress of Sir William Petty, and was created earl of Kerry in 1723. From him descend the family of Petty-Fitzmaurice, who obtained the marquessate of Lansdowne (*q.v.*) in 1818, and still hold among their titles the feudal barony of Kerry together with vast estates in that county.

From the three sons by a second wife of one of the earls of Desmond's ancestors, descended the hereditary White Knights, Knights of Glin and Knights of Kerry, these feudal dignities having, it is said, been bestowed upon them by their father, as Lord of Decies and Desmond. Glin Castle, county Limerick, is still the seat of the (Fitzgerald) Knight of Glin. Valencia Island is now the seat of the Knights of Kerry, who received a baronetcy in 1880.

AUTHORITIES.—Calendars of Irish documents and state papers and Carew papers; Gilbert's *Viceroys of Ireland*; Lord Kildare's *Earls of Kildare*; G.E. C[okayne]'s *Complete Peerage*; Haymond Graves, *Unpublished Geraldine Documents*; *Annals of the Four Masters*; Calendar of the duke of Leinster's MSS. in 9th *Report on Historical MSS.*, part ii.; Ware's *Annals*; J.H. Round's "Origin of the Fitzgeralds" and "Origin of the Carews" in the *Ancestor*; his "Earldom of Kildare and Barony of Offaley" in *Genealogist*, ix., and "Barons of the Naas" in *Genealogist*, xv.; and his "Decies and Desmond" in *Eng. Hist. Rev.* xviii.

(J. H. R.)

FITZGERALD, EDWARD (1809-1883), English writer, the poet of Omar Khayyám, was born as EDWARD PURCELL, at Bredfield House, in Suffolk, on the 31st of March 1809. His father, John Purcell, who had married a Miss FitzGerald, assumed in 1818 the name and arms of his wife's family. From 1816 to 1821 the FitzGeralds lived at St Germain and at Paris, but in the latter year Edward was sent to school at Bury St Edmunds. In 1826 he proceeded to Trinity College, Cambridge, where, some two years later, he became acquainted with Thackeray and W.H. Thompson. With Tennyson, "a sort of Hyperion," his intimacy began about 1835. In 1830 he went to live in Paris, but in 1831 was in a farm-house on the battlefield of Naseby. He adopted no profession, and lived a perfectly stationary and rustic life, presently moving into his native county of Suffolk, and never again leaving it for more than a week or two. Until 1835 the FitzGeralds lived at Wherstead; from that year until 1853 the poet resided at Boulge, near Woodbridge; until 1860 at Farlingay Hall; until 1873 in the town of Woodbridge; and then until his death at his own house hard by, called Little Grange.

During most of this time FitzGerald gave his thoughts almost without interruption to his flowers, to music and to literature. He allowed friends like Tennyson and Thackeray, however, to push on far before him, and long showed no disposition to emulate their activity. In 1851 he published his first book, *Euphranor*, a Platonic dialogue, born of memories of the old happy life at Cambridge. In 1852 appeared *Polonius*, a collection of "saws and modern instances," some of them his own, the rest borrowed from the less familiar English classics. FitzGerald began the study of Spanish poetry in 1850, when he was with Professor E.B. Cowell at Elmsett and that of Persian in Oxford in 1853. In the latter year he issued *Six Dramas of Calderon*, freely translated. He now turned to Oriental studies, and in 1856 he anonymously published a version of the *Salámán and Absál* of Jámi in Miltonic verse. In March 1857 the name with which he has been so closely identified first occurs in FitzGerald's correspondence—"Hafiz and *Omar Khayyám* ring like true metal." On the 15th of January 1859 a little anonymous pamphlet was published as *The Rubáiyát of Omar Khayyám*. In the world at large, and in the circle of FitzGerald's particular friends, the poem seems at first to have attracted no attention. The publisher allowed it to gravitate to the fourpenny or even (as he afterwards boasted) to the penny box on the bookstalls. But in 1860 Rossetti discovered it, and Swinburne and Lord Houghton quickly followed. The *Rubáiyát* became slowly famous, but it was not until 1868 that FitzGerald was encouraged to print a second and greatly revised edition. Meanwhile he had produced in 1865 a version of the *Agamemnon*, and two more plays from Calderon. In 1880-1881 he issued privately translations of the two Oedipus tragedies; his last publication was *Readings in Crabbe*, 1882. He left in manuscript a version of Attar's *Mantic-Uttair* under the title of *The Bird Parliament*.

From 1861 onwards FitzGerald's greatest interest had centred in the sea. In June 1863 he bought a yacht, "The Scandal," and in 1867 he became part-owner of a herring-lugger, the "Meum and Tuum." For some years, till 1871, he spent the months from June to October mainly in "knocking about somewhere outside of Lowestoft." In this way, and among his books and flowers, FitzGerald gradually became an old man. On the 14th of June 1883 he passed away painlessly in his sleep. He was "an idle fellow, but one whose friendships were more like loves." In 1885 a stimulus was given to the steady advance of his fame by the fact that Tennyson dedicated his *Tiresias* to FitzGerald's memory, in some touching reminiscent verses to "Old Fitz." This was but the signal for that universal appreciation of Omar Khayyám in his English dress, which has been one of the curious literary phenomena of recent years. The melody of FitzGerald's verse is so exquisite, the thoughts he rearranges and strings together are so profound, and the general atmosphere of poetry in which he steeps his version is so pure, that no surprise need be expressed at the universal favour which the poem has met with among critical readers. But its popularity has gone much deeper than this; it is now probably better known to the general public than any single poem of its class published since the year 1860, and its admirers have almost transcended common sense in the extravagance of their laudation. FitzGerald married, in middle life, Lucy, the daughter of Bernard Barton, the Quaker poet. Of FitzGerald as a man practically nothing was known until, in 1889, Mr W. Aldis Wright, his intimate friend and literary executor, published his *Letters and Literary Remains* in three volumes. This was followed in 1895 by the *Letters to Fanny Kemble*. These letters constitute a fresh bid for immortality, since they discovered that FitzGerald was a witty, picturesque and sympathetic letter-writer. One of the most unobtrusive authors who ever lived, FitzGerald has, nevertheless, by the force of his extraordinary individuality, gradually influenced the whole face of English *belles-lettres*, in particular as it was manifested between 1890 and 1900.

The Works of Edward FitzGerald appeared in 1887. See also a chronological list of FitzGerald's works (Caxton Club, Chicago, 1899); notes for a bibliography by Col. W.F. Prideaux, in *Notes and Queries* (9th series, vol. vi.), published separately in 1901; *Letters and Literary Remains* (ed. W. Aldis Wright, 1902-1903); and the *Life of Edward FitzGerald*, by Thomas Wright (1904), which contains a bibliography (vol. ii. pp. 241-243) and a list of sources (vol. i. pp. xvi.-xvii.). The volume on FitzGerald in the "English Men of Letters" series is by A.C. Benson. The FitzGerald centenary was celebrated in March 1909. See the *Centenary Celebrations Souvenir* (Ipswich, 1909) and *The Times* for March 25, 1909.

(E. G.)

FITZGERALD, LORD EDWARD (1763-1798), Irish conspirator, fifth son of James, 1st duke of Leinster, by his wife Emilia Mary, daughter of Charles Lennox, 2nd duke of Richmond, was born at Carton House, near Dublin, on the 15th of October 1763. In 1773 the duke of Leinster died, and his widow soon afterwards married William Ogilvie, who superintended Lord Edward's early education. Joining the army in 1779, Lord Edward served with credit in America on the staff of Lord Rawdon (afterwards marquess of Hastings), and at the battle of Eutaw Springs (8th of September 1781) he was severely wounded, his life being saved by a negro named Tony, whom Lord Edward retained in his service till the end of his life. In 1783 Fitzgerald returned to Ireland, where his brother, the duke of Leinster, had procured his election to the Irish parliament as member for Athy. In parliament he acted with the small Opposition group led by Grattan (*q.v.*), but took no prominent part in debate. After spending a short time at Woolwich to complete his military education, he made a tour through Spain in 1787; and then, dejected by unrequited love for his cousin Georgina Lennox (afterwards Lady Bathurst), he sailed for New Brunswick to join the 54th regiment with the rank of major. The love-sick mood and romantic temperament of the young Irishman found congenial soil in the wild surroundings of unexplored Canadian forests, and the enthusiasm thus engendered for the "natural" life of savagery may have been already fortified by study of Rousseau's writings, for which at a later period Lord Edward expressed his admiration. In February 1789, guided by compass, he traversed the country, practically unknown to white men, from Frederickstown to Quebec, falling in with Indians by the way, with whom he fraternized; and in a subsequent expedition he was formally adopted at Detroit by the Bear tribe of Hurons as one of their chiefs, and made his way down the Mississippi to New Orleans, whence he returned to England.

Finding that his brother had procured his election for the county of Kildare, and desiring to maintain political independence, Lord Edward refused the command of an expedition against Cadiz offered him by Pitt, and devoted himself for the next few years to the pleasures of society and his parliamentary duties. He was on terms of intimacy with his relative C.J. Fox, with R.B. Sheridan and other leading Whigs. According to Thomas Moore, Lord Edward Fitzgerald was the only one of the numerous suitors of Sheridan's first wife whose attentions were received with favour; and it is certain that, whatever may have been its limits, a warm mutual affection subsisted between the two. His Whig connexions combined with his transatlantic experiences to predispose Lord Edward to sympathize with the doctrines of the French Revolution, which he embraced with ardour when he visited Paris in October 1792. He lodged with Thomas Paine, and listened to the debates in the Convention. At a convivial gathering on the 18th of November he supported a toast to "the speedy abolition of all hereditary titles and feudal distinctions," and gave proof of his zeal by expressly repudiating his own title—a performance for which he was dismissed from the army. While in Paris Fitzgerald became enamoured of a young girl whom he chanced to see at the theatre, and who is said to have had a striking likeness to Mrs Sheridan. Procuring an introduction he discovered her to be a *protégée* of Madame de Sillery, comtesse de Genlis. The parentage of the girl, whose name was Pamela (?1776-1831), is uncertain; but although there is some evidence to support the story of Madame de Genlis that Pamela was born in Newfoundland of parents called Seymour or Sims, the common belief that she was the daughter of Madame de Genlis herself by Philippe (Égalité), duke of Orleans, was probably well founded. On the 27th of December 1792 Fitzgerald and Pamela were married at Tournay, one of the witnesses being Louis Philippe, afterwards king of the French; and in January 1793 the couple reached Dublin.

Discontent in Ireland was now rapidly becoming dangerous, and was finding a focus in the Society of the United Irishmen, and in the Catholic Committee, an organization formed a few years previously, chiefly under the direction of Lord Kenmare, to watch the interests of the Catholics. French revolutionary doctrines had become ominously popular, and no one sympathized with them more warmly than Lord Edward Fitzgerald, who, fresh from the gallery of the Convention in Paris, returned to his seat in the Irish parliament and threw himself actively into the work of opposition. Within a week of his arrival he denounced in the House of Commons a government proclamation, which Grattan had approved, in language so violent that he was ordered into custody and required to apologize at the bar of the House. As early as 1794 the government had information that placed Lord Edward under suspicion; but it was not till 1796 that he joined the United Irishmen, whose aim after the recall of Lord Fitzwilliam in 1795 was avowedly the establishment of an independent Irish republic. In May 1796 Theobald Wolfe Tone was in Paris endeavouring to obtain French assistance for an insurrection in Ireland. In the same month Fitzgerald and his friend Arthur O'Connor proceeded to Hamburg, where they opened negotiations with the Directory through Reinhard, French minister to the Hanseatic towns. The duke of York, meeting Pamela at Devonshire House on her way through London with her husband, had told her that "all was known" about his plans, and advised her to persuade him not to go abroad. The proceedings of the conspirators at Hamburg were made known to the government in London by an informer, Samuel Turner. Pamela was entrusted with all her husband's secrets and took an active part in furthering his designs; and she appears to have fully deserved the confidence placed in her, though there is reason to suppose that at times she counselled prudence. The result of the Hamburg negotiations was Hoche's abortive expedition to Bantry Bay in December 1796. In September 1797 the government learnt from the informer MacNally that Lord Edward was among those directing the conspiracy of the United Irishmen, which was now quickly maturing. He was specially concerned with the military organization, in which he held the post of colonel of the Kildare regiment and head of the military committee. He had papers showing that 280,000 men were ready to rise. They possessed some arms, but the supply was insufficient, and the leaders were hoping for a French invasion to make good the deficiency and to give support to a popular uprising. But French help proving dilatory and uncertain, the rebel leaders in Ireland were divided in opinion as to the expediency of taking the field without waiting for foreign aid. Lord Edward was among the advocates of the bolder course. His opinions and his proposals for action were alike violent. He was on intimate terms with apologists for assassination; there is some evidence that he favoured a project for the massacre of the Irish peers while in procession to the House of Lords for the trial of Lord Kingston in May 1798. It was probably abhorrence of such measures that converted Thomas Reynolds from a conspirator to an informer; at all events, by him and several others the authorities were kept posted in what was going on, though lack of evidence producible in court delayed the arrest of the ringleaders. But on the 12th of March 1798 Reynolds' information led to the seizure of a number of conspirators at the house of Oliver Bond. Lord Edward Fitzgerald, warned by Reynolds, was not among them. The government were

anxious to save him from the consequences of his own folly, and Lord Clare said to a member of his family, “for God’s sake get this young man out of the country; the ports shall be thrown open, and no hindrance whatever offered.” Fitzgerald with chivalrous recklessness refused to desert others who could not escape, and whom he had himself led into danger. On the 30th of March a proclamation establishing martial law and authorizing the military to act without orders from the civil magistrate, which was acted upon with revolting cruelty in several parts of the country, precipitated the crisis.

The government had now no choice but to secure if possible the person of Lord Edward Fitzgerald, whose social position more than his abilities made him the most important factor in the conspiracy. On the 11th of May a reward of £1000 was offered for his apprehension. The 23rd of May was the date fixed for the general rising. Since the arrest at Bond’s, Fitzgerald had been in hiding, latterly at the house of one Murphy, a feather dealer, in Thomas Street, Dublin. He twice visited his wife in disguise; was himself visited by his stepfather, Ogilvie, and generally observed less caution than his situation required. The conspiracy was honeycombed with treachery, and it was long a matter of dispute to whose information the government were indebted for Fitzgerald’s arrest; but it is no longer open to doubt that the secret of his hiding place was disclosed by a Catholic barrister named Magan, to whom the stipulated reward was ultimately paid through Francis Higgins, another informer. On the 19th of May Major Swan and a Mr. Ryan proceeded to Murphy’s house with Major H.C. Sirr and a few soldiers. Lord Edward was discovered in bed. A desperate scuffle took place, Ryan being mortally wounded by Fitzgerald with a dagger, while Lord Edward himself was only secured after Sirr had disabled him with a pistol bullet in the shoulder. He was conveyed to Newgate gaol, where by the kindness of Lord Clare he was visited by two of his relatives, and where he died of his wound on the 4th of June 1798. An Act of Attainder (repealed in 1819) was passed, confiscating his property; and his wife—against whom the government probably possessed sufficient evidence to secure a conviction for treason—was compelled to leave the country before her husband had actually expired.

Pamela, who was scarcely less celebrated than Lord Edward himself, and whose remarkable beauty made a lasting impression on Robert Southey, repaired to Hamburg, where in 1800 she married J. Pitcairn, the American consul. Since her marriage with Lord Edward she had been greatly beloved and esteemed by the whole Fitzgerald family; and although after her second marriage her intimacy with them ceased, there is no sufficient evidence for the tales that represented her subsequent conduct as open to grave censure. She remained to the last passionately devoted to the memory of her first husband; and she died in Paris in November 1831. A portrait of Pamela is in the Louvre. She had three children by Lord Edward Fitzgerald: Edward Fox (1794-1863); Pamela, afterwards wife of General Sir Guy Campbell; and Lucy Louisa, who married Captain Lyon, R.N.

Lord Edward Fitzgerald was of small stature and handsome features. His character and career have been made the subject of eulogies much beyond their merits. He had, indeed, a winning personality, and a warm, affectionate and generous nature, which made him greatly beloved by his family and friends; he was humorous, light-hearted, sympathetic, adventurous. But he was entirely without the weightier qualities requisite for such a part as he undertook to play in public affairs. Hotheaded and impulsive, he lacked judgment. He was as conspicuously deficient in the statesmanship as he was in the oratorical genius of such men as Flood, Plunket or Grattan. One of his associates in conspiracy described him as “weak and not fit to command a sergeant’s guard, but very zealous.” Reinhard, who considered Arthur O’Connor “a far abler man,” accurately read the character of Lord Edward Fitzgerald as that of a young man “incapable of falsehood or perfidy, frank, energetic, and likely to be a useful and devoted instrument; but with no experience or extraordinary talent, and entirely unfit to be chief of a great party or leader in a difficult enterprise.”

See Thomas Moore, *Life and Death of Lord Edward Fitzgerald* (2 vols., London, 1832), also a revised edition entitled *The Memoirs of Lord Edward Fitzgerald*, edited with supplementary particulars by Martin MacDermott (London, 1897); R.R. Madden, *The United Irishmen* (7 vols., Dublin, 1842-1846); C.H. Teeling, *Personal Narrative of the Irish Rebellion of 1798* (Belfast, 1832); W.J. Fitzpatrick, *The Sham Squire, The Rebellion of Ireland and the Informers of 1798* (Dublin, 1866), and *Secret Service under Pitt* (London, 1892); J.A. Froude, *The English in Ireland in the Eighteenth Century* (3 vols., London, 1872-1874); W.E.H. Lecky, *History of England in the Eighteenth Century*, vols. vii. and viii. (London, 1896); Thomas Reynolds the younger, *The Life of Thomas Reynolds* (London, 1839); *The Life and Letters of Lady Sarah Lennox*, edited by the countess of Ilchester and Lord Stavordale (London, 1901); Ida A. Taylor, *The Life of Lord Edward Fitzgerald* (London, 1903), which gives a prejudiced and distorted picture of Pamela. For particulars of Pamela, and especially as to the question of her parentage, see Gerald Campbell, *Edward and Pamela Fitzgerald* (London, 1904); *Memoirs of Madame de Genlis* (London, 1825); Georgette Ducrest, *Chroniques populaires* (Paris, 1855); Thomas Moore, *Memoirs of the Life of R.B. Sheridan* (London, 1825).

(R. J. M.)

FITZGERALD, RAYMOND, or Redmond (d. *ca.* 1182), surnamed Le Gros, was the son of William Fitzgerald and brother of Odo de Carew. He was sent by Strongbow to Ireland in 1170, and landed at Dundunnolf, near Waterford, where he was besieged in his entrenchments by the combined Irish and Ostmen, whom he repulsed. He was Strongbow’s second in command, and had the chief share in the capture of Waterford and in the successful assault on Dublin. He was sent to Aquitaine to hand over Strongbow’s conquests to Henry II., but was back in Dublin in July 1171, when he led one of the sallies from the town. Strongbow offended him later by refusing him the marriage of his sister Basilea, widow of Robert de Quenci, constable of Leinster. Raymond then retired to Wales, and Hervey de Mountmaurice became constable in his place. At the outbreak of a general rebellion against the earl in 1174 Raymond returned with his uncle Meiler Fitz Henry, after receiving a promise of marriage with Basilea. Reinstated as constable he secured a

series of successes, and with the fall of Limerick in October 1175 order was restored. Mountmaurice meanwhile obtained Raymond's recall on the ground that his power threatened the royal authority, but the constable was delayed by a fresh outbreak at Limerick, the earl's troops refusing to march without him. On the death of Strongbow he was acting governor until the arrival of William Fitz Aldhelm, to whom he handed over the royal fortresses. He was deprived of his estates near Dublin and Wexford, but the Geraldines secured the recall of Fitz Aldhelm early in 1183, and regained their power and influence. In 1182 he relieved his uncle Robert Fitzstephen, who was besieged in Cork. The date of his death, sometimes stated to be 1182, is not known.

FITZGERALD, LORD THOMAS (10th earl of Kildare), (1513-1537), the eldest son of Gerald Fitzgerald, 9th earl of Kildare, was born in London in 1513. He spent much of his youth in England, but in 1534 when his father was for the third time summoned to England to answer for his maladministration as lord deputy of Ireland, Thomas, at the council held at Drogheda, in February was made vice-deputy. In June the Ormond faction spread a report in Ireland that the earl had been executed in the Tower, and that his son's life was to be attempted. Inflamed with rage at this apparent treachery, Thomas rode at the head of his retainers[1] into Dublin, and before the council for Ireland (the 11th of June 1534) formally renounced his allegiance to the king and proclaimed a rebellion. His enemies, including Archbishop John Allen (of Dublin), who had been set by Henry VIII. to watch Fitzgerald, took refuge in Dublin Castle. In attempting to escape to England, Allen was taken by the rebels, and on the 28th of July 1534, was murdered by Fitzgerald's servants in his presence, but whether actually by his orders is uncertain. In any case he sent to the pope for absolution, but was solemnly excommunicated by the Irish Church. Leaving part of his army (with the consent of the citizens) to besiege Dublin Castle, Fitzgerald himself went against Piers Butler, earl of Ossory, and succeeded at first in making a truce with him. But the citizens of Dublin now rose against him, Ossory invaded Kildare, and the approach of an English army forced Fitzgerald to raise the siege. Part of the English army landed on the 17th of October, the rest a week later, but taking advantage of the inactivity of the new lord deputy, Sir William Skeffington, Fitzgerald from his stronghold at Maynooth ravaged Kildare and Meath throughout the winter. He had now succeeded to the earldom of Kildare, his father having died in the Tower on the 13th of December 1534, but he does not seem to have been known by that title. In March Skeffington stormed the castle, the stronghold of the Geraldines, which was defended, and some said betrayed, by Christopher Parese, Fitzgerald's foster-brother. It fell on the 23rd of March 1535, and most of the garrison were put to the sword. This proved the final blow to the rebellion. The news of what is known as the "pardon of Maynooth" reached Fitzgerald as he was returning from levying fresh troops in Offaley; his men fell away from him, and he retreated to Thomond, intending to sail for Spain. Changing his mind he spent the next few months in raids against the English and their allies, but his party gradually deserting him, on the 18th of August 1535 he surrendered himself to Lord Leonard Grey (d. 1541). It seems likely that he made some conditions, but what they were is very uncertain. He was taken to England and placed in the Tower. In February 1536 his five uncles were also, some of them with great injustice, seized and brought to England. The six Geraldines were hanged at Tyburn on the 3rd of February 1537. Acts of attainder against them and Gerald the 9th earl were passed by both the Irish and English parliaments; but the family estates were restored by Edward VI. to Gerald, 11th earl of Kildare (stepbrother of Thomas), and the attainder was repealed by Queen Elizabeth. Lord Thomas Fitzgerald married Frances, youngest daughter of Sir Adrian Fortescue, but had no children.

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1 Fitzgerald was known by the sobriquet of "Silken Thomas," either from the silken fringes on his helmet, or from his distinguished manners.

FITZHERBERT, SIR ANTHONY (1470-1538), English jurist, was born at Norbury, Derbyshire. After studying at Oxford, he was called to the English bar, and in 1523 became justice of the Court of Common Pleas, the duties of which office he continued to discharge till within a short time of his death in 1538. As a judge he left behind him a high reputation for fairness and integrity, and his legal learning is sufficiently attested by his published works.

He is the author of *La Graunde Abridgement*, a digest of important legal cases written in Old French, first printed in 1514; *The Office and Authority of Justices of the Peace*, first printed in 1538 (last ed. 1794); the *New Natura Brevium* (1534, last ed. 1794), with a commentary ascribed to Sir Matthew Hale. To Fitzherbert are sometimes attributed the *Book of Husbandry* (1523), the first published work on agriculture in the English language, and the *Book of Surveying and Improvements* (1523) (see AGRICULTURE).

FITZHERBERT, THOMAS (1552-1640), English Jesuit, was the eldest son and heir of William Fitzherbert of Swynnerton in Staffordshire, and grandson of Sir Anthony Fitzherbert, judge of the common pleas. He was educated at Oxford, where, at the age of twenty, he was imprisoned for recusancy. On his release he went to London, where he was a member of the association of young men founded in 1580 to assist the Jesuits Edmund Campion and Robert Parsons. In 1582 he withdrew to the continent, where he was active in the cause of Mary, queen of Scots. He married in this year Dorothy, daughter of Edward East of Bledlow in Buckinghamshire. After the death of his wife (1588) he went to Spain, where on the recommendation of the duke of Feria he received a pension from the king. He continued his intrigues against the English government, and in 1598 he was charged with complicity in a plot to poison Queen Elizabeth. After this he was for a short while in the service of the duke of Feria at Milan, then went to Rome, where he was ordained priest (1601-1602) and became agent for the English clergy. He was unpopular with them, however, owing to his subserviency to the Jesuits, and resigned the agency in 1607 owing to the remonstrances of the English arch-priest George Birkhead. In 1613 he joined the Society of Jesus, and was appointed superior of the English mission at Brussels in 1616, and in 1618 rector of the English college at Rome. He held this post to within a year of his death, which occurred at Rome on the 7th of August (O.S.) 1640.

Father Fitzherbert, who is described as “a person of excellent parts, a notable politician, and of graceful behaviour and generous spirit,” wrote many controversial works, a list of which is given in the article on him by Mr Thompson Cooper in the *Dictionary of National Biography*, together with authorities for his life.

FITZ NEAL or (Fitz Nigel), **RICHARD** (d. 1198), treasurer of Henry II. and Richard I. of England, and bishop of London, belonged to a great administrative family whose fortunes were closely linked with those of Henry I., Henry II. and Richard I. The founder of the family was Roger, bishop of Salisbury, the great minister of Henry I. Before the death of that sovereign (1135) the care of the treasury passed from Roger to his nephew, Nigel, bishop of Ely (d. 1169), who held that office until the whole family were disgraced by Stephen (1139). Becoming a partisan of the empress, Nigel reaped his reward at the accession of her son, Henry II., who made him at first chancellor and then treasurer. Nigel’s son, Richard, who was born before his father’s elevation to the episcopate (1133), succeeded to the office of treasurer in 1158, and held it continuously for forty years. His name appears in the lists of itinerant justices for 1179 and 1194, but these are the only occasions on which he exercised that office. Before 1184 he became dean of Lincoln, and was in that year presented by the chapter of Lincoln among three select candidates for the vacant see. The king passed him over in favour of Hugh of Avalon, having resolved on this occasion to make a disinterested appointment. Richard I., however, rewarded the treasurer’s services with the see of London (1189).

Richard Fitz Neal is best remembered as an author. He lacked the broad statesmanship of his father and great-uncle; he avoided any connexion with political parties; he is only once mentioned as taking part in a debate of the Great Council (1193), and then spoke, in his character as a bishop, to support a royal demand for a special aid. But his work *De necessariis observantiis Scaccarii dialogus*, commonly called the *Dialogus de Scaccario*, is of unique interest to the historian. It is an account, in two books, of the procedure followed by the exchequer in the author’s time. Richard handles his subject with the more enthusiasm because, as he explains, the “course” of the exchequer was largely the creation of his own family. When read in connexion with the Pipe Rolls the *Dialogus* furnishes a most faithful and detailed picture of English fiscal arrangements under Henry II. The speakers in the dialogue are Richard himself and an anonymous pupil. The latter puts leading questions which Richard answers in elaborate fashion. The date of the conversation is given in the prologue as 1176-1177. This probably marks the date at which the book was begun; it was not completed before 1178 or 1179. Soon after the author’s death we find it already recognized as the standard manual for exchequer officials. It was frequently transcribed and has been used by English antiquarians of every period. Hence it is the more necessary to insist that the historical statements which the treatise contains are sometimes demonstrably erroneous; the author appears to have relied excessively upon oral tradition. But, as the work is only known to us through transcripts, it is possible that some of the blunders which it now contains are due to the misdirected zeal of editors. Richard Fitz Neal also compiled in his earlier years a register or chronicle of contemporary affairs, arranged in three parallel columns. This was preserved in the exchequer at the time when he wrote the *Dialogus*, but has since disappeared. Stubbs’ conjectural identification of this *Liber tricolumnis* with the first part of the *Gesta Henrici* (formerly attributed to Benedictus Abbas) is now abandoned as untenable.

See Madox’s edition in his *History of the Exchequer* (1769); and that of A. Hughes, C.G. Crump and C. Johnson (Oxford, 1902). F. Liebermann’s *Einleitung in den Dialogus de Scaccario* (Göttingen, 1875) contains the fullest account of the author.

(H. W. C. D.)

FITZ-OSBERN, ROGER (fl. 1070), succeeded to the earldom of Hereford and the English estate of William Fitz-Osbern in 1071. He did not keep on good terms with William the Conqueror, and in 1075, disregarding the king’s prohibition, married his sister Emma to Ralph Guader, earl of Norfolk, at the famous bridal of Norwich. Immediately afterwards the two earls rebelled. But Roger, who was to bring his force from the west to join the earl of Norfolk, was held in check at the Severn by the Worcestershire fyrd which the English bishop Wulfstan brought into the field against him. On the collapse of his confederate’s rising,

Roger was tried before the Great Council, deprived of his lands and earldom, and sentenced to perpetual imprisonment; but he was released, with other political prisoners, at the death of William I. in 1087.

FITZ-OSBERN, WILLIAM, Earl of Hereford (d. 1071), was an intimate friend of William the Conqueror, and the principal agent in preparing for the invasion of England. He received the earldom of Hereford with the special duty of pushing into Wales. During William's absence in 1067, Fitz-Osbern was left as his deputy in central England, to guard it from the Welsh on one side, and the Danes on the other. He also acted as William's lieutenant during the rebellions of 1069. In 1070 William sent him to assist Queen Matilda in the government of Normandy. But Richilde, widow of Baldwin VI. of Flanders, having offered to marry him if he would protect her son Arnulf against Robert the Frisian, Fitz-Osbern accepted the proposal and joined Richilde in Flanders. He was killed, fighting against Robert, at Cassel in 1071.

See Freeman, *Norman Conquest*, vols. iii. and iv.; Sir James Ramsay, *Foundations of England*, vol. ii.

FITZ OSBERT, WILLIAM (d. 1196), was a Londoner of good position who had served in the Third Crusade, and on his return took up the cause of the poorer citizens against the magnates who monopolized the government of London and assessed the taxes, as he alleged, with gross partiality. It is affirmed that he entered on this course of action through a quarrel with his elder brother who had refused him money. But this appears to be mere scandal; the chronicler Roger of Hoveden gives Fitz Osbert a high character, and he was implicitly trusted by the poorer citizens. He attempted to procure redress for them from the king; but the city magistrates persuaded the justiciar Hubert Walter that Fitz Osbert and his followers meditated plundering the houses of the rich. Troops were sent to seize the demagogue. He was smoked out of the sanctuary of St Mary le Bow, in which he had taken refuge, and summarily dragged to execution at Tyburn.

FITZ PETER, GEOFFREY (d. 1213), earl of Essex and chief justiciar of England, began his official career in the later years of Henry II., whom he served as a sheriff, a justice itinerant and a justice of the forest. During Richard's absence on Crusade he was one of the five justices of the king's court who stood next in authority to the regent, Longchamp. It was at this time (1190) that Fitz Peter succeeded to the earldom of Essex, in the right of his wife, who was descended from the famous Geoffrey de Mandeville. In attempting to assert his hereditary rights over Walden priory Fitz Peter came into conflict with Longchamp, and revenged himself by taking an active part in the baronial agitation through which the regent was expelled from his office. The king, however, forgave Fitz Peter for his share in these proceedings; and, though refusing to give him formal investiture of the Essex earldom, appointed him justiciar in succession to Hubert Walter (1198). In this capacity Fitz Peter continued his predecessor's policy of encouraging foreign trade and the development of the towns; many of the latter received, during his administration, charters of self-government. He was continued in his office by John, who found him a useful instrument and described him in an official letter as "indispensable to the king and kingdom." He proved himself an able instrument of extortion, and profited to no small extent by the spoliation of church lands in the period of the interdict. But he was too closely connected with the baronage to be altogether trusted by the king. The contemporary *Histoire des ducs* describes Fitz Peter as living in constant dread of disgrace and confiscation. In the last years of his life he endeavoured to act as a mediator between the king and the opposition. It was by his mouth that the king promised to the nation the laws of Henry I. (at the council of St Albans, August 4th, 1213). But Fitz Peter died a few weeks later (Oct. 2), and his great office passed to Peter des Roches, one of the unpopular foreign favourites. Fitz Peter was neither a far-sighted nor a disinterested statesman; but he was the ablest pupil of Hubert Walter, and maintained the traditions of the great bureaucracy which the first and second Henries had founded.

See the original authorities specified for the reigns of Richard I. and John. Also Miss K. Norgate's *Angevin England*, vol. ii. (1887), and *John Lackland* (1902); A. Ballard in *English Historical Review*, xiv. p. 93; H.W.C. Davis' *England under the Normans and Angevins* (1905).

(H. W. C. D.)

FITZROY, ROBERT (1805-1865), English, vice-admiral, distinguished as a hydrographer and meteorologist, was born at Ampton Hall, Suffolk, on the 5th of July 1805, being a grandson, on the father's side, of the third duke of Grafton, and on the mother's, of the first marquis of Londonderry. He entered the navy from the Royal Naval College, then a school for cadets, on the 19th of October 1819, and on the 7th of September 1824 was promoted to the rank of lieutenant. After serving in the "Thetis" frigate in the

Mediterranean and on the coast of South America, under the command of Sir John Phillimore and Captain Bingham, he was in August 1828 appointed to the “Ganges,” as flag-lieutenant to Rear-Admiral Sir Robert Otway, the commander-in-chief on the South American station; and on the death of Commander Stokes of the “Beagle,” on the 13th of November 1828, was promoted to the vacant command. The “Beagle,” a small brig of about 240 tons, was then, and had been for the two previous years, employed on the survey of the coasts of Patagonia and Tierra del Fuego, under the orders of Commander King in the “Adventure,” and, together with the “Adventure,” returned to England in the autumn of 1830. Fitzroy had brought home with him four Fuegians, one of whom died of smallpox a few weeks after arriving in England; to the others he endeavoured, with but slight success, to impart a rudimentary knowledge of religion and of some useful handicrafts; and, as he had pledged himself to restore them to their native country, he was making preparations in the summer of the following year to carry them back in a merchant ship bound to Valparaiso, when he received his reappointment to the “Beagle,” to continue the survey of the same wild coasts. The “Beagle” sailed from Plymouth on the 27th of December 1831, carrying as a supernumerary Charles Darwin, the afterwards famous naturalist. After an absence of nearly five years, and having, in addition to the survey of the Straits of Magellan and a great part of the coast of South America, run a chronometric line round the world, thus fixing the longitude of many secondary meridians with sufficient exactness for all the purposes of ordinary navigation, the “Beagle” anchored at Falmouth on the 2nd of October 1836. In 1835 Fitzroy had been advanced to the rank of captain and was now for the next few years principally employed in reducing and discussing his numerous observations. In 1837 he was awarded the gold medal of the Royal Geographical Society; and in 1839 he published, in two thick 8vo volumes, the narrative of the voyage of the “Adventure” and “Beagle,” 1826-1830, and of the “Beagle,” 1831-1836, with a third volume by Darwin—a book familiarly known as a record of scientific travel. Of Fitzroy’s work as a surveyor, carried on under circumstances of great difficulty, with scanty means, and with an outfit that was semi-officially denounced as “shabby,” Sir Francis Beaufort, the Hydrographer to the Admiralty, wrote, in a report to the House of Commons, 10th of February 1848, that “from the equator to Cape Horn, and from thence round to the river Plata on the eastern side of America, all that is *immediately* wanted has been already achieved by the splendid survey of Captain Robert Fitzroy.” This was written before steamships made the Straits of Magellan a high-road to the Pacific. The survey that was sufficient then became afterwards very far from sufficient.

In 1841 Fitzroy unsuccessfully contested the borough of Ipswich, and in the following year was returned to parliament as member for Durham. About the same time he accepted the post of conservator of the Mersey, and in his double capacity obtained leave to bring in a bill for improving the condition and efficiency of officers in the mercantile marine. This was not proceeded with at the time, but gave rise to the “voluntary certificate” instituted by the Board of Trade in 1845, and furnished some important clauses to the Mercantile Marine Act of 1850.

Early in 1843 Fitzroy was appointed governor and commander-in-chief of New Zealand, then recently established as a colony. He arrived in his government in December, whilst the excitement about the Wairau massacre was still fresh, and the questions relating to the purchase of land from the natives were in a very unsatisfactory state. The early settlers were greedy and unscrupulous; Fitzroy, on the other hand, had made no secret of his partiality for the aborigines. Between such discordant elements agreement was impossible: the settlers insulted the governor; the governor did not conciliate the settlers, who denounced his policy as adverse to their interests, as unjust and illegal; colonial feeling against him ran very high; petition after petition for his recall was sent home, and the government was compelled to yield to the pressure brought to bear on it. Fitzroy was relieved by Sir George Grey in November 1845.

In September 1848 he was appointed acting superintendent of the dockyard at Woolwich, and in the following March to the command of the “Arrogant,” one of the early screw frigates which had been fitted out under his supervision, and with which it was desired to carry out a series of experiments and trials. When these were finished he applied to be superseded, on account at once of his health and of his private affairs. In February 1850 he was accordingly placed on half-pay; nor did he ever serve again, although advanced in due course by seniority to the ranks of rear-and vice-admiral on the retired list (1857, 1863). In 1851 he was elected a fellow of the Royal Society, and in 1854, after serving for a few months as private secretary to his uncle, Lord Hardinge, then commander-in-chief of the army, he was appointed to the meteorological department of the Board of Trade, with, in the first instance, the peculiar title of “Meteorological Statist.”

From the date of his joining the “Beagle” in 1828 he had paid very great attention to the different phenomena foreboding or accompanying change of weather, and his narratives of the voyages of the “Adventure” and “Beagle” are full of interesting and valuable details concerning these. Accordingly, when in 1854 Lord Wrottesley, the president of the Royal Society, was asked by the Board of Trade to recommend a chief for its newly forming meteorological department, he, almost without hesitation, nominated Fitzroy, whose name and career became from that time identified with the progress of practical meteorology. His *Weather Book*, published in 1863, embodies in broad outline his views, far in advance of those then generally held; and in spite of the rapid march of modern science, it is still worthy of careful attention and exact study. His storm warnings, in their origin, indeed, liable to a charge of empiricism, were gradually developed on a more scientific basis, and gave a high percentage of correct results. They were continued for eighteen months after his death by the assistants he had trained, and though stopped when the department was transferred to the management of a committee of the Royal Society, they were resumed a few months afterwards; and under the successive direction of Dr R.H. Scott and Dr W.N. Shaw, have been developed into what we now know them. But though it is perhaps by these storm warnings that Fitzroy’s name has been most generally known, seafaring men owe him a deeper debt of gratitude, not only for his labours in reducing to a more practical form the somewhat complicated wind charts of Captain Maury, but also for his great exertions in connexion with the life-boat association. Into this work, in its many ramifications, he threw himself with the energy of an excitable temperament, already strained by his long and anxious service in the Straits of Magellan. His last years were fully and to an excessive degree occupied by it; his health, both of body and mind, threatened to give way; but he refused to take the rest that was prescribed. In a fit of mental aberration he put an end to his existence on the 30th of April 1865.

Besides his works already named mention may be made of *Remarks on New Zealand* (1846); *Sailing Directions for South America* (1848); his official reports to the Board of Trade (1857-1865); and occasional papers in the journal of the Royal Geographical Society and of the Royal United Service Institution.

(J. K. L.)

FITZROY, a city of Bourke county, Victoria, Australia, 2 m. by rail N.E. of and suburban to Melbourne. Pop. (1901) 31,610. It is a prosperous manufacturing town, well served with tramways and containing many fine residences.

FITZ STEPHEN, ROBERT (fl. 1150), son of Nesta, a Welsh princess and former mistress of Henry I., by Stephen, constable of Cardigan, whom Robert succeeded in that office, took service with Dermot of Leinster when that king visited England (1167), In 1169 Robert led the vanguard of Dermot's Anglo-Welsh auxiliaries to Ireland, and captured Wexford, which he was then allowed to hold jointly with Maurice Fitz Gerald. Taken prisoner by the Irish in 1171, he was by them surrendered to Henry II., who appointed him lieutenant of the justiciar of Ireland, Hugh de Lacy. Robert rendered good service in the troubles of 1173, and was rewarded by receiving, jointly with Miles Cogan, a grant of Cork (1177). He had difficulty in maintaining his position and was nearly overwhelmed by a rising of Desmond in 1182. The date of his death is uncertain.

FITZ STEPHEN, WILLIAM (d. *c.* 1190), biographer of Thomas Becket and royal justice, was a Londoner by origin. He entered Becket's service at some date between 1154 and 1162. The chancellor employed Fitz Stephen in legal work, made him sub-deacon of his chapel and treated him as a confidant. Fitz Stephen appeared with Becket at the council of Northampton (1164) when the disgrace of the archbishop was published to the world; but he did not follow Becket into exile. He joined Becket's household again in 1170, and was a spectator of the tragedy in Canterbury cathedral. To his pen we owe the most valuable among the extant biographies of his patron. Though he writes as a partisan he gives a precise account of the differences between Becket and the king. This biography contains a description of London which is our chief authority for the social life of the city in the 12th century. Despite his connexion with Becket, William subsequently obtained substantial preferment from the king. He was sheriff of Gloucestershire from 1171 to 1190, and a royal justice in the years 1176-1180 and 1189-1190.

See his "Vita S. Thomae" in J.C. Robertson's *Materials for the History of Thomas Becket*, vol. iii. (Rolls series, 1877). Sir T.D. Hardy, in his *Catalogue of Materials*, ii. 330 (Rolls series, 1865), discusses the manuscripts of this biography and its value. W.H. Hutton, *St Thomas of Canterbury*, pp. 272-274 (1889), gives an account of the author.

(H. W. C. D.)

FITZ THEDMAR, ARNOLD (d. 1274), London chronicler and merchant, was born in London on the 9th of August 1201. Both his parents were of German extraction. The family of his mother migrated to England from Cologne in the reign of Henry II.; his father, Thedmar by name, was a citizen of Bremen who had been attracted to London by the privileges which the Plantagenets conferred upon the Teutonic Hanse. Arnold succeeded in time to his father's wealth and position. He held an honourable position among the Hanse traders, and became their "alderman." He was also, as he tells us himself, alderman of a London ward and an active partisan in municipal politics. In the Barons' War he took the royal side against the populace and the mayor Thomas Fitz Thomas. The popular party planned, in 1265, to try him for his life before the folk-moot, but he was saved by the news of the battle of Evesham which arrived on the very day appointed for the trial. Even after the king's triumph Arnold suffered from the malice of his enemies, who contrived that he should be unfairly assessed for the tallages imposed upon the city. He appealed for help to Henry III., and again to Edward I., with the result that his liability was diminished. In 1270 he was one of the four citizens to whose keeping the muniments of the city were entrusted. To this circumstance we probably owe the compilation of his chronicle. *Chronica Maiorum et Vicecomitum*, which begins at the year 1188 and is continued to 1274. From 1239 onwards this work is a mine of curious information. Though municipal in its outlook, it is valuable for the general history of the kingdom, owing to the important part which London played in the agitation against the misrule of Henry III. We have the king's word for the fact that Arnold was a consistent royalist; but this is apparent from the whole tenor of the chronicle. Arnold was by no means blind to the faults of Henry's government, but preferred an autocracy to the mob-rule which Simon de Montfort countenanced in London. Arnold died in 1274; the last fact recorded of him is that, in this year, he joined in a successful appeal to the king against the illegal grants which had been made by the mayor,

Walter Hervey.

The *Chronica Maiorum et Vicecomitum*, with the other contents of Arnold's common-place book, were edited for the Camden Society by T. Stapleton (1846), under the title *Liber de Antiquis Legibus*. Our knowledge of Arnold's life comes from the *Chronica* and his own biographical notes. Extracts, with valuable notes, are edited in G.H. Pertz's *Mon. Germaniae historica, Scriptores*, vol. xxviii. See also J.M. Lappenberg's *Urkundliche Geschichte des Hansischen Stahlhofes zu London* (Hamburg, 1851).

(H. W. C. D)

FITZWALTER, ROBERT (d. 1235), leader of the baronial opposition against King John of England, belonged to the official aristocracy created by Henry I. and Henry II. He served John in the Norman wars, and was taken prisoner by Philip of France, and forced to pay a heavy ransom. He was implicated in the baronial conspiracy of 1212. According to his own statement the king had attempted to seduce his eldest daughter; but Robert's account of his grievances varied from time to time. The truth seems to be that he was irritated by the suspicion with which John regarded the new baronage. Fitzwalter escaped a trial by flying to France. He was outlawed, but returned under a special amnesty after John's reconciliation with the pope. He continued, however, to take the lead in the baronial agitation against the king, and upon the outbreak of hostilities was elected "marshal of the army of God and Holy Church" (1215). To his influence in London it was due that his party obtained the support of the city and used it as their base of operations. The famous clause of Magna Carta (§ 39) prohibiting sentences of exile, except as the result of a lawful trial, refers more particularly to his case. He was one of the twenty-five appointed to enforce the promises of Magna Carta; and his aggressive attitude was one of the causes which contributed to the recrudescence of civil war (1215). His incompetent leadership made it necessary for the rebels to invoke the help of France. He was one of the envoys who invited Louis to England, and was the first of the barons to do homage when the prince entered London. Though slighted by the French as a traitor to his natural lord, he served Louis with fidelity until captured at the battle of Lincoln (May 1217). Released on the conclusion of peace he joined the Damietta crusade of 1219, but returned at an early date to make his peace with the regency. The remainder of his career was uneventful; he died peacefully in 1235.

See the list of chronicles for the reign of John. The *Histoire des ducs de Normandie et des rois d'Angleterre* (ed. F. Michel, Paris, 1840) gives the fullest account of his quarrel with the king. Miss K. Norgate's *John Lackland* (1902), W. McKechnie's *Magna Carta* (1905), and Stubbs's *Constitutional History*, vol. i. ch. xii. (1897), should also be consulted.

FITZWILLIAM, SIR WILLIAM (1526-1599), lord deputy of Ireland, was the eldest son of Sir William Fitzwilliam (d. 1576) of Milton, Northamptonshire, where he was born, and grandson of another Sir William Fitzwilliam (d. 1534), alderman and sheriff of London, who was also treasurer and chamberlain to Cardinal Wolsey, and who purchased Milton in 1506. On his mother's side Fitzwilliam was related to John Russell, 1st earl of Bedford, a circumstance to which he owed his introduction to Edward VI. In 1559 he became vice-treasurer of Ireland and a member of the Irish House of Commons; and between this date and 1571 he was (during the absences of Thomas Radclyffe, earl of Sussex, and of his successor, Sir Henry Sidney) five times lord justice of Ireland. In 1571 Fitzwilliam himself was appointed lord deputy, but like Elizabeth's other servants he received little or no money, and his period of government was marked by continuous penury and its attendant evils, inefficiency, mutiny and general lawlessness. Moreover, the deputy quarrelled with the lord president of Connaught, Sir Edward Fitton (1527-1579), but he compelled the earl of Desmond to submit in 1574. He disliked the expedition of Walter Devereux, earl of Essex; he had a further quarrel with Fitton, and after a serious illness he was allowed to resign his office. Returning to England in 1575 he was governor of Fotheringhay Castle at the time of Mary Stuart's execution. In 1588 Fitzwilliam was again in Ireland as lord deputy, and although old and ill he displayed great activity in leading expeditions, and found time to quarrel with Sir Richard Bingham (1528-1599), the new president of Connaught. In 1594 he finally left Ireland, and five years later he died at Milton. From Fitzwilliam, whose wife was Anne, daughter of Sir William Sidney, were descended the barons and earls Fitzwilliam.

See R. Bagwell, *Ireland under the Tudors*, vol. ii. (1885).

FITZWILLIAM, WILLIAM WENTWORTH FITZWILLIAM, 2ND EARL (1748-1833), English statesman, was the son of the 1st earl (peerage of the United Kingdom), who died in 1756. The English family of Fitzwilliam claimed descent from a natural son of William the Conqueror, and among its earlier members were a Sir William Fitzwilliam (1460-1534), sheriff of London, who in 1506 acquired the family seat of Milton Manor in Northamptonshire, and his grandson Sir William Fitzwilliam (see above). The latter's grandson was made an Irish baron in 1620; and in later generations the Irish titles of Viscount Milton and Earl Fitzwilliam (1716) and the English titles of Baron Milton (1742) and Viscount Milton and Earl Fitzwilliam (1746), were added. These were all in the English house of the Fitzwilliams of Milton Manor. They were distinct from the

Irish Fitzwilliams of Meryon, who descended from a member of the English family who went to Ireland with Prince John at the end of the 12th century, and whose titles of Baron and Viscount Fitzwilliam died out with the 8th viscount in 1833; the best known of these was Richard, 7th viscount (1745-1816), who left the Fitzwilliam library and a fund for creating the Fitzwilliam Museum to Cambridge University.

The 2nd earl inherited not only the Fitzwilliam estates in Northamptonshire, but also, on the death of his uncle the marquess of Rockingham in 1782, the valuable Wentworth estates in Yorkshire, and thus became one of the wealthiest noblemen of the day. He had been at Eton with C.J. Fox, and became an active supporter of the Whig party; and in 1794, with the duke of Portland, Windham and other “old Whigs” he joined Pitt’s cabinet, becoming president of the council. At the end of the year, however, he was sent to Ireland as viceroy. Fitzwilliam, however, had set his face against the jobbery of the Protestant leaders, and threw himself warmly into Grattan’s scheme for admitting the Catholics to political power; and in March 1795 he was recalled, his action being disavowed by Pitt, the result of a series of misunderstandings which appeared to Fitzwilliam to give him just cause of complaint. The quarrel was, however, made up, and in 1798 Fitzwilliam was appointed lord-lieutenant of the West Riding of Yorkshire. He continued to take an active part in politics, and in 1806 was president of the council, but his Whig opinions kept him mainly in opposition. He died in February 1833, his son, Charles William Wentworth, the 3rd earl (1786-1857), and later earls, being notable figures in the politics and social life of the north of England.

FIUME (Slav. *Rjeka*, *Rieka* or *Reka*, Ger. *St Veit am Flaum*), a royal free town and port of Hungary; situated at the northern extremity of the Gulf of Quarnero, an inlet of the Adriatic, and on a small stream called the Rjeka, Recina or Fiumara, 70 m. by rail S.E. of Trieste. Pop. (1900) 38,955; including 17,354 Italians, 14,885 Slavs (Croats, Serbs and Slovenes), 2482 Hungarians and 1945 Germans. Geographically, Fiume belongs to Croatia; politically the town, with its territory of some 7 sq. m., became a part of Hungary in August 1870. The picturesque old town occupies an outlying ridge of the Croatian Karst; while the modern town, with its wharves, warehouses, electric light and electric trams, is crowded into the amphitheatre left between the hills and the shore. On the north-west there is a fine public garden. The most interesting buildings are the cathedral church of the Assumption, founded in 1377, and completed with a modern façade copied from that of the Pantheon in Rome; the church of St Veit, on the model of Santa Maria della Salute in Venice; and the Pilgrimage church, hung with offerings from shipwrecked sailors, and approached by a stairway of 400 steps. In the old town is a Roman triumphal arch, said to have been erected during the 3rd century A.D. in honour of the emperor Claudius II. Fiume also possesses a theatre and a music-hall; palaces for the governor and the Austrian emperor; a high court of justice for commerce and marine; a chamber of commerce; an asylum for lunatics and the aged poor; an industrial home for boys; and several large schools, including the marine academy (1856) and the school of seamanship (1903). Municipal affairs are principally managed by the Italians, who sympathize with the Hungarians against the Slavs.

Fiume is the only seaport of Hungary, with which country it was connected, in 1809, by the Maria Louisa road, through Karlstadt. It has two railways, opened in 1873; one a branch of the southern railway from Vienna to Trieste, the other of the Hungarian state railway from Karlstadt. There are several harbours, 450
including the *Porto Canale*, for coasting vessels; the *Porto Baross*, for timber; and the *Porto Grande*, sheltered by the *Maria Theresia* mole and breakwater, besides four lesser moles, and flanked by the quays, with their grain-elevators. The development of the *Porto Grande*, originally named the *Porto Nuovo*, was undertaken in 1847, and carried on at intervals as trade increased. In 1902, arrangements were made for the construction of a new mole and an enlargement of the quays and breakwater; these works to be completed within 5 years, at a cost of £420,000. The exports, worth £6,460,000 in 1902, chiefly consisted of grain, flour, sugar, timber and horses; the imports, worth £3,678,000 in the same year, of coal, wine, rice, fruit, jute and various minerals, chemicals and oils. A large share in the carrying trade belongs to the Cunard, Adria, Ungaro-Croat and Austrian Lloyd Steamship Companies, subsidized by the state. A steady stream of Croatian and Hungarian emigrants, officially numbered in 1902 at 7500, passes through Fiume. Altogether 11,550 vessels, of 1,963,000 tons, entered at Fiume in 1902; and 11,535, of 1,956,000, cleared. Foremost among the industrial establishments are Whitehead’s torpedo factory, Messrs Smith & Meynie’s paper-mill, the royal tobacco factory, a chemical factory, and several flour-mills, tanneries and rope manufactories. In 1902 the last shipbuilding yard was closed. The soil of the surrounding country is stony, but the climate is warm, and wine is extensively produced. The Gulf of Quarnero yields a plentiful supply of fish, and the tunny trade with Trieste and Venice is of considerable importance. Steamboats ply daily from Fiume to the Istrian health-resort of Abbazia, the Croatian port of Buccari, and the islands of Veglia and Cherso.

Fiume is supposed to occupy the site of the ancient Liburnian town *Tersatica*; later it received the name of *Vitopolis*, and eventually that of *Fanum Sancti Viti ad Flumen*, from which its present name is derived. It was destroyed by Charlemagne in 799, from which time it probably long remained under the dominion of the Franks. It was held in feudal tenure from the patriarch of Aquileia by the bishop of Pola, and afterwards, in 1139, by the counts of Duino, who retained it till the end of the 14th century. It next passed into the hands of the counts of Wallsee, by whom it was surrendered in 1471 to the emperor Frederick III., who incorporated it with the dominions of the house of Austria. From this date till 1776 Fiume was ruled by imperial governors. In 1723 it was declared a free port by Charles VI., in 1776 united to Croatia by the empress Maria Theresa, and in 1779 declared a *corpus separatum* of the Hungarian crown. In 1809 Fiume was occupied by the French; but it was retaken by the British in 1813, and restored to Austria in the following year. It was ceded to Hungary in 1822, but after the revolution of 1848-1849 was annexed to the crown lands of Croatia, under the government of which it remained till it came under Hungarian control in 1870.

FIVES, a ball-game played by two or four players in a court enclosed on three or four sides, the ball being struck with the hand, usually protected by a glove, whence the game is known in America as “handball.” The origin of the game is probably the French *jeu de paume*, tennis played with the hand, the hand in that case being eventually superseded by the racquet. Fives and racquets are probably both descended from the *jeu de paume*, of which they are simplified forms. The name fives may be derived from *la longue paume*, in which five on a side played, or from the five fingers, or from the fact that five points had to be made by the winners (in modern times the game consists of fifteen points). Fives is played in Great Britain principally at the schools and universities, although its encouragement is included in the functions of the Tennis Racquets and Fives Association, founded in 1908. In America it is much affected for training purposes by professional athletes and boxers. There are two forms of fives—the Eton game and the Rugby game—which require separate notice, though the main features of the two games are the serving of the ball to the taker of the service, the necessity of hitting the ball before the second bounce, and of hitting it above a line and within the limits of the court.

Eton Fives.—The peculiar features of the Eton court arose from the fact that in early times the game was played against the chapel-wall, so that buttresses formed side walls and the balustrade of the chapel-steps projected into the court, while a step divided the court latitudinally. These were reproduced in the regular courts, the buttress being known as the “pepper-box” and the space between it and the step as the “hole.” The riser of the step is about 5 in. The floor of the court is paved; there is no back wall. On the front wall is a ledge, known as the “line,” 4 ft. 6 in. from the floor, and a vertical line, painted; 3 ft. 8 in. from the right-hand wall. Four people usually play, two against two; one of each pair plays in the forward court, the other in the back court. The server stands on the left of the forward court, his partner in the right-hand corner of the back court; the taker of the service by the right wall of the forward court, his partner at the left-hand corner of the back court. The forward court is known as “on-wall,” the other as “off-wall.” The server must toss the ball gently against the front wall, above the line, so that it afterwards hits the right wall and falls on the “off-wall,” but the server’s object is not, as at tennis and racquets, to send a service that cannot be returned. At fives he must send a service that hand-out can take easily; indeed hand-out can refuse to take any service that he does not like, and if he fails to return the ball above the line no stroke is counted. After the service has been returned either of the opponents returns the ball if he can, and so on, each side and either member of it returning the ball above the line alternately till one side or the other hits it below the line or out of court. Only hand-in can score. If hand-in wins a stroke, his side scores a point; if he misses a stroke he loses his innings and his partner becomes server, unless he has already served in this round, in which case the opponents become hand-in. The game is fifteen points. If the score is “13 all,” the out side may “set” the game to 5 or 3; *i.e.* the game becomes one of 5 or 3 points; at “14 all” it may be set to three. The game and its terminology being somewhat intricate, can best be learnt in the court. No apparatus is required except padded gloves and fives-balls, which are covered with white leather tightly stretched over a hard foundation of cork, strips of leather and twine. The Eton balls are 1¾ in. in diameter and weigh about 1¼ oz. apiece.

Rugby Fives is much less complicated owing to the simpler form of the court. The rules as to service, taking the balls, &c., are the same as in Eton Fives. The balls are rather smaller. The courts are larger, measuring about 34 ft. by 19 ft. 6 in. and may be roofed or open. The side walls slope from 20 ft. to 12 ft. Some courts have a dwarf back wall, some have none. The back wall, when there is one, is 5 ft. 8 in. in height. In some courts the side walls are plain; in others, where there is no back wall, a projection about 3 in. deep is built at right angles to the two side walls; in others a buttress, similar to the *tambour* of the tennis-court, is built out from the left-hand wall about 10 ft. from the front wall, and continued to the end of the court. The line is generally a board fixed across the front wall, its upper edge 34 in. from the ground, but the height varies slightly.

Handball, of ancient popularity in Ireland and much played in the United States, is practically identical with fives, though there are minor differences. The usual American court is about 60 ft. long, 24½ ft. wide and 35 ft. high at the front, tapering to 33 ft. at the back wall. The front wall is of brick faced with marble, the sides of cement and the floor of white pine laid on beams 10 in. apart. These are the dimensions of the Brooklyn court of the former American champion, Phil Casey (d. 1904), which has been extensively copied. Twenty-one aces constitute a game and gloves are not usually worn. The American ball is a trifle larger and softer than the Irish, which is called a “red ace” when made of solid red rubber, and “black ace” when made of black rubber. Baggs of Tipperary, who was in his prime about 1855, was the most celebrated Irish handball player. In his day nearly every village tavern in Ireland had a court. Browning and Lawlor, who won the Irish championship in 1885, were his most prominent successors. In America Phil Casey and Michael Egan are the best-known names.

See A. Tait’s *Fives* in the All England Series: “Fives” in the *Encyclopaedia of Sport*; and *Official Handball Guide* in Spalding’s Athletic Library.

FIX, THÉODORE (1800-1846), French journalist and economist, was born at Soleure in Switzerland in 1800. His father was a French physician whose ancestors had been expatriated by the revocation of the edict of Nantes. At first a land surveyor, he in 1830 became connected with the *Bulletin universal des sciences*, to which he contributed most of the geographical articles. In 1833 he founded the *Revue mensuelle d’économie*

politique, which he edited during the three years of its existence. He then became engaged in journalistic work, till his essay on *L'Association des douanes allemandes* won him a prize from the Académie des Sciences Morales et Politiques in 1840, and also procured him work on the report on the progress of sciences since the Revolution, which the Institute was preparing. A few months before his death he published *Observations sur les classes ouvrières*, in which he argued against all attempts to regulate artificially the rate of wages, and attributed the condition of the working classes to their own thriftlessness and intemperance. He died suddenly at Paris on the 31st of July 1846.

FIXTURES (Lat. *figere*, to fix), in law, chattels which have been so fixed or attached to land (as it is expressed in English law, "so annexed to the freehold"), as to become, in contemplation of law, a part of it. All systems of law make a marked distinction for certain purposes, between immovables and movables, between real and personal property, between land and all other things. In the case of fixtures the question arises under which set of rights they are to fall—under those of real or of personal property. The general rule of English law is that everything attached to the land goes with the land—*quicquid plantatur solo, solo cedit*. This, like many other rules of English law, is all in favour of the freeholder; but its hardship has been modified by a large number of exceptions formulated from time to time by the courts as occasion arose.

In order to constitute a fixture there must be some degree of annexation to the land, or to a building which forms part of it. Thus it has been held that a barn laid on blocks of timber, but not fixed to the ground itself, is not a fixture; and the onus of showing that articles not otherwise attached to the land than by their own weight have ceased to be chattels, rests with those who assert the fact. On the other hand, an article, even slightly affixed to the land, is to be considered part of it, unless the circumstances show that it was intended to remain a chattel. The question is one of fact in each case—depending mainly on the mode, degree and object of the annexation, and the possibility of the removal of the article without injury to itself or the freehold. In certain cases the courts have recognized a constructive annexation, when the articles, though not fixed to the soil, pass with the freehold as if they were, *e.g.* the keys of a house, the stones of a dry wall, and the detached or duplicate portions of machines.

Questions as to the property in fixtures principally arise—(1) between landlord and tenant, (2) between heir and executor, (3) between executor and remainder-man or reversioner, (4) between seller and buyer.

1. At common law, if the tenant has affixed anything to the freehold during his occupation, he cannot remove it without the permission of his landlord. But an exception was established in favour of *trade fixtures*. In a case before Lord Holt it was held that a soap-boiler might, *during his term*, remove the vats he had set up for trade purposes, and that not by virtue of any special custom, but "by the common law in favour of trade, and to encourage industry," and it may be stated as a general rule that things which a tenant has fixed to the freehold for the purpose of trade or manufacture may be taken away by him, whenever the removal is not contrary to any prevailing practice, or the particular terms of the contract of tenancy, and can be effected without causing material injury to the estate or destroying the essential character of the articles themselves (*Lambourn* v. *M^c^Lellan*, 1903, 2 Ch. 269). Agricultural tenants are not entitled, at common law, to remove trade fixtures. But the Landlord and Tenant Act 1851 granted such a right of removal in the case of buildings or machinery erected by a tenant at his own expense, and with his landlord's consent in writing, provided that the freehold was not injured or that any injury was made good, and that before removal a month's written notice was given to the landlord, who had an option of purchase. Under the Agricultural Holdings Act 1883 the tenant might, under similar conditions, remove fixtures, although the landlord had not consented to their erection. The Agricultural Holdings Act 1900 extended this provision to fixtures or buildings acquired, although not annexed or erected, by the tenant. Similar rights were created by the Allotments Compensation Act 1887, and by the Market Gardeners' Compensation Act 1895. All these provisions were re-enacted by the Agricultural Holdings Act 1908.

Again, *ornamental* fixtures, set up by the tenant for ornament and convenience, such as hangings and looking-glasses, tapestry, iron-backs to chimneys, wainscot fixed by screws, marble chimney-pieces, are held to belong to the tenant, and to be removable without the landlord's consent. Here again the extent of the privilege has been a matter of some uncertainty.

In all these cases the fixtures must be removed during the term. If the tenant gives up possession of the premises without removing the fixtures, it will be presumed, it appears, that he has made a gift of them to the landlord, and that presumption probably could not be rebutted by positive evidence of a contrary intention. His right to the fixtures is not, however, destroyed by the mere expiry of the term, if he still remains in possession; but if he has once left the premises he cannot come back and claim his fixtures. In one case where the fixtures had actually been severed from the freehold after the end of the term, it was held that the tenant had no right to recover them.

2. As between heir and executor or administrator. The question of fixtures arises between these parties on the death of a person owning land. The executor has no right to remove trade fixtures, set up for the benefit of the inheritance. As regards ornamental objects, the rule *quicquid plantatur solo, solo cedit* was in early times somewhat relaxed in favour of the executor. As far back as 1701, it was held that hangings fixed to a wall for ornament passed to the executor; and, although the effect of this relaxation was subsequently cut down, it is supported by the decisions of the courts affirming the executor's right to valuable tapestries affixed by a tenant for life to the walls of a house for ornament and their better enjoyment as chattels (*Leigh* v. *Taylor*, 1902, App. Cas. 157); and the same has been held as to statues and bronze groups set on pedestals in the grounds of a mansion house.

3. When a tenant for life of land dies, the question of fixtures arises between his representatives and the persons next entitled to the estate (the remainder-man or reversioner). The remainder-man is not so great a favourite of the law as the heir, and the right to fixtures is construed more favourably for executors than in

the preceding cases between heir and executor. Whatever are executor's fixtures against the heir would therefore be executor's fixtures against the remainder-man. And the result of the cases seems to be that, as against the remainder, the executor of the tenant for life would be certainly entitled to trade fixtures. Agricultural fixtures are not removable by the executor of a tenant for life.

4. As between seller and buyer, a purchase of the lands includes a purchase of all the fixtures. But here the intention of the parties is of great importance. Similar questions may arise in other cases, *e.g.* as between mortgagor and mortgagee. When land is mortgaged the fixtures pass with it, unless a contrary intention is expressed in the conveyance; and this even where the chattels affixed are the subject of a hire purchase agreement (*Reynolds* v. *Ashby*, 1903, 1 K.B. 87). Again, in reference to bills of sale the question arises. Bills of sale are dispositions of personal property similar to mortgages, the possession remaining with the person selling them. To make them valid they must be registered, and so the question has arisen whether deeds conveying fixtures ought not to have been registered as bills of sale. Unless it was the intention of the parties to make the fixtures a distinct security, it seems that a deed of mortgage embracing them does not require to be registered as a bill of sale. The question of what is or is not a fixture must also often be considered in questions of rating or assessment.

The law of Scotland as to fixtures is the same as that of England. The Agricultural Holdings (Scotland) Acts 1883 (ss. 35, 42) and 1900 (as to market gardens) give a similar statutory right of removal. The law of Ireland has been the subject of the special legislation sketched in the article LANDLORD AND TENANT. The French Code Civil recognizes the right of the usufructuary to remove articles attached by him to the subject of his estate on the expiry of his term, on making good the place from which they were taken (Art. 599); and there are similar provisions in the Civil Codes of Italy (Art. 495), Spain (Arts. 487, 489), Portugal (Art. 2217) and Germany (Arts. 1037, 1049).

The law of the United States as to fixtures is substantially identical with English common law. Constructive, as well as actual, annexation is recognized. The same relaxations (from the common law rule *quicquid plantatur solo, solo cedit*) as regards trade fixtures, and ornamental fixtures, such as tapestry, have been recognized.

In Mauritius the provisions of the Code Civil are in force without modification. In Quebec (Civil Code, Arts. 374 et seq.) and St Lucia (Civil Code, Arts. 368 et seq.) they have been re-enacted in substance. Some of the British colonies have conferred a statutory right to remove fixtures on tenants (cf. Tasmania, Landlord and Tenant Act 1874). In certain of the colonies acquired by cession or settlement (*e.g.* New Zealand) the English Landlord and Tenant Act 1851 is in force.

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(A. W. R.)

FIZEAU, ARMAND HIPPOLYTE LOUIS (1819-1896), French physicist, was born at Paris on the 23rd of September 1819. His earliest work was concerned with improvements in photographic processes; and then, in association with J.B.L. Foucault, he engaged in a series of investigations on the interference of light and heat. In 1849 he published the first results obtained by his method for determining the speed of propagation of light (see LIGHT), and in 1850 with E. Gounelle measured the velocity of electricity. In 1853 he described the employment of the condenser as a means for increasing the efficiency of the induction-coil. Subsequently he studied the expansion of solids by heat, and applied the phenomena of interference of light to the measurement of the dilatations of crystals. He died at Venteuil on the 18th of September 1896. He became a member of the French Academy in 1860 and of the Bureau des Longitudes in 1878.

FJORD, or FIORD, the anglicized Norwegian word for a long narrow arm of the sea running far inland, with more or less precipitous cliffs on each side. These "sea-lochs," as they are sometimes called, present many peculiar features. They differ entirely from an estuary in the fact that they are bounded seawards by a rocky sill, covered by shallow water, and they deepen inland for some distance before the bottom again curves up to the surface. They are thus true rock basins drowned in sea-water. It is pointed out by Dr H.R. Mill that Loch Morar on the west coast of Scotland, a fresh-water basin 178 fathoms deep, with its surface 30 ft. above sea-level, which is connected with the sea by a short river, is exactly similar in configuration to Loch Etive, 80 fathoms deep, filled with sea-water which pours over the seaward sill in a waterfall with the retreating tide; that Loch Nevis with a depth of 70 fathoms has its sill 8 fathoms below the surface, while the gigantic Sogne Fjord in Norway, more than 100 m. in length, is a rock basin with a maximum depth of 700 fathoms. Any inland rock basin such as Loch Morar would become a fjord if the seaward portion sank below sea-level. The origin of these rock basins has not yet been satisfactorily determined. Recent work upon somewhat similar basins in the high Alps has suggested local weathering of surface rock in fracture belts or faulted areas, or dikes, where material is easily eroded, thus producing a trough bounded by high walls in which a lake forms under favourable conditions. But investigations in such regions as the Rocky Mountains and the Yosemite Valley, where there is frequently a "reversed grade" similar to that near the seaward end of rock basins and fjords, seem to show, in some cases at least, that such a formation may be due to the

"gouging" effect of a glacier coming down the valley which it constantly deepens where the ice pressure and the supply of eroding material are greatest. There may be several causes, but the results are the same in all these drowned valleys. The mass of sea-water in the depth of the basin is either unaffected by the seasonal changes in surface temperature, which in Norway penetrate no deeper than 200 fathoms, or else, as in Loch Goil, the fresher film of surface water responds quickly to seasonal changes, while the heat of advancing summer penetrates so slowly to the depth of the basin that it takes six months to reach the bottom, arriving there in winter. It has been found that where the fresher surface water has been frozen over, the temperature may be as much as 45° F. at a few fathoms from the surface. When the surface is warmest, on the other hand, the depths are coldest.

FLACCUS, a cognomen in the plebeian gens Fulvia, one of the most illustrious in ancient Rome. Cicero and Pliny state that the family came from Tusculum, where some were still living in the middle of the 1st century B.C. Of the Fulvii Flacci the most important were the following:

QUINTUS FULVIUS FLACCUS, son of the first of the family, Marcus, who was consul with Appius Claudius Caudex in 264. He especially distinguished himself during the second Punic War. He was consul four times (237, 224, 212, 209), censor (231) pontifex maximus (216), praetor urbanus (215). During his first consulships he did good service against the Ligurians, Gauls and Insubrians. In 212 he defeated Hanno near Beneventum, and with his colleague Appius Claudius Pulcher began the siege of Capua. The capture of this place was considered so important that their imperium was prolonged, but on condition that they should not leave Capua until it had been taken. Hannibal's unexpected diversion against Rome interfered with the operations for the moment, but his equally unexpected retirement enabled Flaccus, who had been summoned to Rome to protect the city, to return, and bring the siege to a successful conclusion. He punished the inhabitants with great severity, alleging in excuse that they had shown themselves bitterly hostile to Rome. He was nominated dictator to hold the consular elections at which he was himself elected (209). He was appointed to the command of the army in Lucania and Bruttium, where he crushed all further attempts at rebellion. Nothing further is known of him. The chief authority for his life is the part of Livy dealing with the period (see PUNIC WARS).

His brother GNAEUS was convicted of gross cowardice against Hannibal near Herdoniae in 210, and went into voluntary exile at Tarquinii. His son, QUINTUS, waged war with signal success against the Celtiberians in 182-181, and the Ligurians in 179. Having vowed to build a temple to Fortuna Equestris, he dismantled the temple of Juno Lacinia in Bruttium of its marble slabs. This theft became known and he was compelled to restore them, though they were never put back in their places. Subsequently he lost his reason and hanged himself.

MARCUS FULVIUS FLACCUS, grandnephew of the first Quintus, lived in the times of the Gracchi, of whom he was a strong supporter. After the death of Tiberius Gracchus (133 B.C.) he was appointed in his place one of the commission of three for the distribution of the land. He was suspected of having had a hand in the sudden death of the younger Scipio (129), but there was no direct evidence against him. When consul in 125, he proposed to confer the Roman citizenship on all the allies, and to allow even those who had not acquired it the right of appeal to the popular assembly against penal judgments. This proposal, though for the time successfully opposed by the senate, eventually led to the Social War. The attack made upon the Massilians (who were allies of Rome) by the Salluvii (Salyes) afforded a convenient excuse for sending Flaccus out of Rome. After his return in triumph, he was again sent away (122), this time with Gaius Gracchus to Carthage to found a colony, but did not remain absent long. In 121 the disputes between the optimates and the party of Gracchus culminated in open hostilities, during which Flaccus was killed, together with Gracchus and a number of his supporters. It is generally agreed that Flaccus was perfectly honest in his support of the Gracchan reforms, but his hot-headedness did more harm than good to the cause. Cicero (*Brutus*, 28) speaks of him as an orator of moderate powers, but a diligent student.

See Livy, *Epit.* 59-61; Val. Max. ix. 5. 1; Vell. Pat. ii. 6; Appian, *Bell. Civ.* i. 18, 21, 24-26; Plutarch, *C. Gracchus*, 10. 13; also A.H.J. Greenidge, *Hist. of Rome* (1904), and authorities quoted under GRACCHUS.

FLACH, GEOFROI JACQUES (1846-), French jurist and historian, was born at Strassburg, Alsace, on the 16th of February 1846, of a family known at least as early as the 16th century, when Sigismond Flach was the first professor of law at Strassburg University. G.J. Flach studied classics and law at Strassburg, and in 1869 took his degree of doctor of law. In his theses as well as in his early writings—such as *De la subrogation réelle, La Bonorum possessio*, and *Sur la durée des effets de la minorité* (1870)—he endeavoured to explain the problems of laws by means of history, an idea which was new to France at that time. The Franco-German War engaged Flach's activities in other directions, and he spent two years (described in his *Strasbourg après le bombardement*, 1873) at work on the rebuilding of the library and the museum, which had been destroyed by Prussian shells. When the time came for him to choose between Germany and France, he settled definitely in Paris, where he completed his scientific training at the École des Chartes and the École des Hautes Études. Having acted for some time as secretary to Jules Sénard, ex-president of the Constituent Assembly, he published an original paper on artistic copyright, but as soon as possible resumed the history of law. In 1879 he became assistant to the jurist Edouard Laboulaye at the

Collège de France, and succeeded him in 1884 in the chair of comparative legislation. Since 1877 he had been professor of comparative law at the free school of the political sciences. To qualify himself for these two positions he had to study the most diverse civilizations, including those of the East and Far East (*e.g.* Hungary, Russia and Japan) and even the antiquities of Babylonia and other Asiatic countries. Some of his lectures have been published, particularly those concerning Ireland: *Histoire du régime agraire de l'Irlande* (1883); *Considérations sur l'histoire politique de l'Irlande* (1885); and *Jonathan Swift, son action politique en Irlande* (1886).

His chief efforts, however, were concentrated on the history of ancient French law. A celebrated lawsuit in Alsace, pleaded by his friend and compatriot Ignace Chauffour, aroused his interest by reviving the question of the origin of the feudal laws, and gradually led him to study the formation of those laws and the early growth of the feudal system. His great work, *Les Origines de l'ancienne France*, was produced slowly. In the first volume, *Le Régime seigneurial* (1886), he depicts the triumph of individualism and anarchy, showing how, after Charlemagne's great but sterile efforts to restore the Roman principle of sovereignty, the great landowners gradually monopolized the various functions in the state; how society modelled on antiquity disappeared; and how the only living organisms were vassalage and clientship. The second volume, *Les Origines communales, la féodalité et la chevalerie* (1893), deals with the reconstruction of society on new bases which took place in the 10th and 11th centuries. It explains how the Gallo-Roman *villa* gave place to the village, with its fortified castle, the residence of the lord; how new towns were formed by the side of old, some of which disappeared; how the townspeople united in corporations; and how the communal bond proved to be a powerful instrument of cohesion. At the same time it traces the birth of feudalism from the germs of the Gallo-Roman personal *comitatus*; and shows how the bond that united the different parties was the contract of the fief; and how, after a slow growth of three centuries, feudalism was definitely organized in the 12th century. In 1904 appeared the third volume, *La Renaissance de l'état*, in which the author describes the efforts of the Capetian kings to reconstruct the power of the Frankish kings over the whole of Gaul; and goes on to show how the clergy, the heirs of the imperial tradition, encouraged this ambition; how the great lords of the kingdom (the "princes," as Flach calls them), whether as allies or foes, pursued the same end; and how, before the close of the 12th century, the Capetian kings were in possession of the organs and the means of action which were to render them so powerful and bring about the early downfall of feudalism.

In these three volumes, which appeared at long intervals, the author's theories are not always in complete harmony, nor are they always presented in a very luminous or coherent manner, but they are marked by originality and vigour. Flach gave them a solid basis by the wide range of his researches, utilizing charters and cartularies (published and unpublished), chronicles, lives of saints, and even those dangerous guides, the *chansons de geste*. He owed little to the historians of feudalism who knew what feudalism was, but not how it came about. He pursued the same method in his *L'Origine de l'habitation et des lieux habités en France* (1899), in which he discusses some of the theories circulated by A. Meitzen in Germany and by Arbois de Jubainville ville in France. Following in the footsteps of the jurist F.C. von Savigny, Flach studied the teaching of law in the middle ages and the Renaissance, and produced *Cujas, les glossateurs et les Bartolistes* (1883), and *Études critiques sur l'histoire du droit romain au moyen âge, avec textes inédits* (1890).

FLACIUS (Ger. *Flach*; Slav. *Vlakich*), **MATTHIAS** (1520-1575), surnamed Illyricus, Lutheran reformer, was born at Albona, in Illyria, on the 3rd of March 1520. Losing his father in childhood, he was in early years self-educated, and made himself able to profit by the instructions of the humanist, Baptista Egnatius in Venice. At the age of seventeen he decided to join a monastic order, with a view to sacred learning. His intention was diverted by his uncle, Baldo Lupetino, provincial of the Franciscans, in sympathy with the Reformation, who induced him to enter on a university career, from 1539, at Basel, Tübingen and Wittenberg. Here he was welcomed (1541) by Melanchthon, being well introduced from Tübingen, and here he came under the decisive influence of Luther. In 1544 he was appointed professor of Hebrew at Wittenberg. He married in the autumn of 1545, Luther taking part in the festivities. He took his master's degree on the 24th of February 1546, ranking first among the graduates. Soon he was prominent in the theological discussions of the time, opposing strenuously the "Augsburg Interim," and the compromise of Melanchthon known as the "Leipzig Interim" (see Adiaphorists). Melanchthon wrote of him with venom as a renegade ("aluimus in sinu serpentem"), and Wittenberg became too hot for him. He removed to Magdeburg (Nov. 9, 1551), where his feud with Melanchthon was patched up. On the 17th of May 1557 he was appointed professor of New Testament theology at Jena; but was soon involved in controversy with Strigel, his colleague, on the synergistic question (relating to the function of the will in conversion). Affirming the natural inability of man, he unwittingly fell into expressions consonant with the Manichaean view of sin, as not an accident of human nature, but involved in its substance, since the Fall. Resisting ecclesiastical censure, he left Jena (Feb. 1562) to found an academy at Regensburg. The project was not successful, and in October 1566 he accepted a call from the Lutheran community at Antwerp. Thence he was driven (Feb. 1567) by the exigencies of war, and betook himself to Frankfort, where the authorities set their faces against him. He proceeded to Strassburg, was well received by the superintendent Marbach, and hoped he had found an asylum. But here also his religious views stood in his way; the authorities eventually ordering him to leave the city by Mayday 1573. Again betaking himself to Frankfort, the prioress, Catharina von Meerfeld, of the convent of White Ladies, harboured him and his family in despite of the authorities. He fell ill at the end of 1574; the city council ordered him to leave by Mayday 1575; but death released him on the 11th of March 1575. His first wife, by whom he had twelve children, died in 1564; in the same year he remarried and had further issue. His son Matthias was professor of philosophy and medicine at Rostock. Of a life so

tossed about the literary fruit was indeed remarkable. His polemics we may pass over; he stands at the fountain-head of the scientific study of church history, and—if we except, a great exception, the work of Laurentius Valla—of hermeneutics also. No doubt his impelling motive was to prove popery to be built on bad history and bad exegesis. Whether that be so or not, the extirpation of bad history and bad exegesis is now felt to be of equal interest to all religionists. Hence the permanent and continuous value of the principles embodied in Flacius' *Catalogus testium veritatis* (1556; revised edition by J.C. Dietericus, 1672) and his *Clavis scripturae sacrae* (1567), followed by his *Glossa compendiaria in N. Testamentum* (1570). His characteristic formula, "historia est fundamentum doctrinae," is better understood now than in his own day.

See J.B. Ritter, *Flacius's Leben u. Tod* (1725); M. Twesten, *M. Flacius Illyricus* (1844); W. Preger, *M. Flacius Illyricus u. seine Zeit* (1859-1861); G. Kawerau, in Herzog-Hauck's *Realencyklopädie* (1899).

(A. Go.*)

FLACOURT, ÉTIENNE DE (1607-1660), French governor of Madagascar, was born at Orleans in 1607. He was named governor of Madagascar by the French East India Company in 1648. Flacourt restored order among the French soldiers, who had mutinied, but in his dealings with the natives he was less successful, and their intrigues and attacks kept him in continual harassment during all his term of office. In 1655 he returned to France. Not long after he was appointed director general of the company; but having again returned to Madagascar, he was drowned on his voyage home on the 10th of June 1660. He is the author of a *Histoire de la grande isle Madagascar* (1st edition 1658, 2nd edition 1661).

See A. Malotet, *Ét. de Flacourt, ou les origines de la colonisation française à Madagascar (1648-1661)*, (Paris, 1898).

FLAG (or "Flagge," a common Teutonic word in this sense, but apparently first recorded in English), a piece of bunting or similar material, admitting of various shapes and colours, and waved in the wind from a staff or cord for use in display as a standard, ensign or signal. The word may simply be derived onomatopoeically, or transferred from the botanical "flag"; or an original meaning of "a piece of cloth" may be connected with the 12th-century English "flage," meaning a baby's garment; the verb "to flag," *i.e.* droop, may have originated in the idea of a pendulous piece of bunting, or may be connected with the O. Fr. *flaguir*, to become flaccid. It is probable that almost as soon as men began to collect together for common purposes some kind of conspicuous object was used, as the symbol of the common sentiment, for the rallying point of the common force. In military expeditions, where any degree of organization and discipline prevailed, objects of such a kind would be necessary to mark out the lines and stations of encampment, and to keep in order the different bands when marching or in battle. In addition, it cannot be doubted that flags or their equivalents have often served, by reminding men of past resolves, past deeds and past heroes, to arouse to enthusiasm those sentiments of *esprit de corps*, of family pride and honour, of personal devotion, patriotism or religion, upon which, as well as upon good leadership, discipline and numerical force, success in warfare depends.

History.—Among the remains of the people which has left the earliest traces of civilization, the records of the forms of objects used as ensigns are frequently to be found. From their carvings and paintings, supplemented by ancient writers, it appears that several companies of the Egyptian army had their own particular standards. These were formed of such objects as, there is reason to believe, were associated in the minds of the men with feelings of awe and devotion. Sacred animals, boats, emblems or figures, a tablet bearing a king's name, fan and feather-shaped symbols, were raised on the end of a staff as standards, and the office of bearing them was looked upon as one of peculiar privilege and honour (Fig. 1). Somewhat similar seem to have been the customs of the Assyrians and Jews. Among the sculptures unearthed by Layard and others at Nineveh, only two different designs have been noticed for standards: one is of a figure drawing a bow and standing on a running bull, the other of two bulls running in opposite directions (Fig. 2). These may resemble the emblems of war and peace which were attached to the yoke of Darius's chariot. They are borne upon and attached to chariots; and this method of bearing such objects was the custom also of the Persians, and prevailed during the middle ages. That the custom survived to a comparatively modern period is proved from the fact that the "Guns," which are the "standards" of the artillery, have from time immemorial been entitled to all the parade honours prescribed by the usages of war for the flag, that is, the symbol of authority. In days comparatively recent there was a "flag gun," usually the heaviest piece, which emblemized authority and served also as the "gun of direction" in the few concerted movements then attempted. No representations of Egyptian or Assyrian naval standards have been found, but the sails of ships were embroidered and ornamented with devices, another custom which survived into the middle ages.

In both Egyptian and Assyrian examples, the staff bearing the emblem is frequently ornamented immediately below with flag-like streamers. Rabbinical writers have assigned the different devices of the different Jewish tribes, but the authenticity of their testimony is extremely doubtful. Banners, standards and ensigns are frequently mentioned in the Bible. "Every man of the children of Israel shall pitch by his standard, with the ensign of their father's house" (Num. ii. 2). "Who is she that looketh forth as the morning, fair as the moon, clear as the sun, terrible as an army with banners?" (Cant. vi. 10. See also Num. ii. 10, x. 14; Ps. xx. 5, lx. 4; Cant. ii. 4; Is. v. 26, x. 18, lix. 19; Jer. iv. 21).

Fig. 1.—Egyptian Standards.

The Persians bore an eagle fixed to the end of a lance, and the sun, as their divinity, was also represented upon their standards, which appear to have been formed of some kind of textile, and were guarded with the greatest jealousy by the bravest men of the army. The Carian soldier who slew Cyrus, the brother of Artaxerxes, was allowed the honour of carrying a golden cock at the head of the army, it being the custom of the Carians to wear that bird as a crest on their helmets. The North American Indians carried poles fledged with feathers from the wings of eagles, and similar customs seem to have prevailed among other semi-savage peoples.

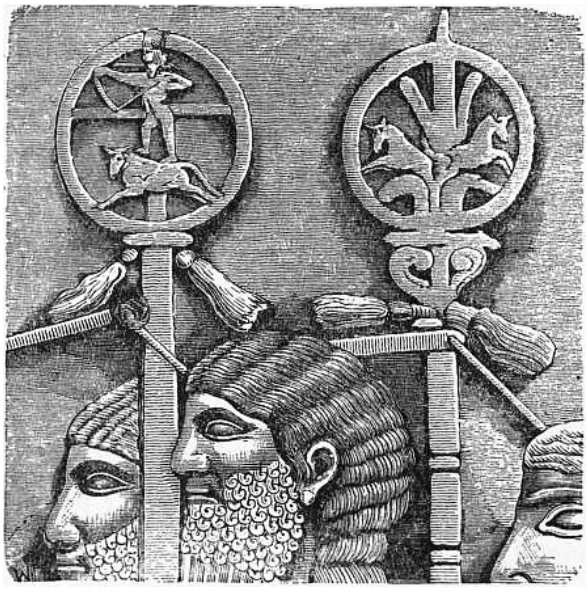


Fig. 2.—Assyrian Standards.

The Greeks bore a piece of armour upon a spear in early times; afterwards the several cities bore sacred emblems or letters chosen for their particular associations—the Athenians the olive and the owl, the Corinthians a pegasus, the Thebans a sphinx, in memory of Oedipus, the Messenians their initial M, and the Lacedaemonians A. A purple dress was placed on the end of a spear as the signal to advance. The Dacians carried a standard representing a contorted serpent, while the dragon was the military sign of many peoples —of the Chinese, Dacians and Parthians among others—and was probably first used by the Romans as the ensign of barbarian auxiliaries (see fig. 3).

Fig. 3.—Roman Standards.

The question of the *signa militaria* of the Romans is a wide and very important one, having direct bearing on the history of heraldry, and on the origin of national, family and personal devices. With them the custom was reduced to system. “Each century, or at least each maniple,” says Meyrick, “had its proper standard and standard-bearer.” In the early days of the republic a handful of hay was borne on a pole, whence probably came the name *manipulus* (Lat. *manus*, a hand). The forms of standards in later times were very various; sometimes a cross piece of wood was placed at the end of a spear and surmounted by the figure of a hand in silver, below round or oval discs, with figures of Mars or Minerva, or in later times portraits of emperors or eminent generals (Fig. 3). Figures of animals, as the wolf, horse, bear and others, were borne, and it was not till a later period that the eagle became the special standard of the legion. According to Pliny, it was Gaius Marius who, in his second consulship, ordained that the Roman legions should only have the eagle for their standard; “for before that time the eagle marched foremost with four others—wolves, minotaurs, horses and bears—each one in its proper order. Not many years passed before the eagle alone began to be advanced in battle, and the rest were left behind in the camp. But Marius rejected them altogether, and since this it is observed that scarcely is there a camp of a legion wintered at any time without having a pair of eagles.”

The *vexillum*, which was the cavalry flag, is described by Livy as a square piece of cloth fastened to a piece of wood fixed crosswise to the end of a spear, somewhat resembling the medieval *gonfalon*. Examples of these vexilla are to be seen on various Roman coins and medals, on the sculptured columns of Trajan and Antoninus, and on the arch of Titus. The *labarum*, which was the imperial standard of later emperors, resembled in shape and fixing the vexillum. It was of purple silk richly embroidered with gold, and sometimes was not suspended as the vexillum from a horizontal crossbar, but displayed as our modern flags, that is to say, by the attachment of one of its sides to a staff. After Constantine, the labarum bore the monogram of Christ (fig. 5, A). It is supposed that the small scarf, which in medieval days was often attached to the pastoral staff or crook of a bishop, was derived from the labarum of the first Christian emperor, Constantine the Great. The Roman standards were guarded with religious veneration in the temples at Rome; and the reverence of this people for their ensigns was in proportion to their superiority to other nations in all that tends to success in war. It was not unusual for a general to order a standard to be cast into the ranks of the enemy, to add zeal to the onset of his soldiers by exciting them to recover what to them was perhaps the most sacred thing the earth possessed. The Roman soldier swore by his ensign.

Although in earlier times drapery was occasionally used for standards, and was often appended as ornament to those of other material, it was probably not until the middle ages that it became the special material of military and other ensigns; and perhaps not until the practice of heraldry had attained to definite nomenclature and laws does anything appear which is in the modern sense a flag.

Early flags were almost purely of a religious character. In Bede’s description of the interview between the heathen king Æthelberht and the Roman missionary Augustine, the followers of the latter are said to have borne banners on which silver crosses were displayed. The national banner of England for centuries—the red cross of St George—was a religious one; in fact the aid of religion seems ever to have been sought to give sanctity to national flags, and the origin of many can be traced to a sacred banner, as is notably the case with the oriflamme of France and the Dannebrog of Denmark. Of the latter the legend runs that King Waldemar of Denmark, leading his troops to battle against the enemy in 1219, saw at a critical moment a cross in the sky. This was at once taken as an answer to his prayers, and an assurance of celestial aid. It was forthwith adopted as the Danish flag and called the “Dannebrog,” *i.e.* the strength of Denmark. Apart from all legend, this flag undoubtedly dates from the 13th century, and the Danish flag is therefore the oldest now in existence.

The ancient kings of France bore the blue hood of St Martin upon their standards. The Chape de St Martin was originally in the keeping of the monks of the abbey of Marmoutier, and the right to take this blue flag into battle with them was claimed by the counts of Anjou. Clovis bore this banner against Alaric in 507, for victory was promised him by a verse of the Psalms which the choir were chanting when his envoy entered the church of St Martin at Tours. Charlemagne fought under it at the battle of Narbonne, and it frequently led the French to victory. At what precise period the oriflamme, which was originally simply the banner of the abbey of St Denis, supplanted the Chape de St Martin as the sacred banner of all France is not known. Probably, however, it gradually became the national flag after the kings of France had transferred the seat

of government to Paris, where the great local saint, St Denis, was held in high honour, and the banner hung over the tomb of the saint in the abbey church. The king of France himself was one of the vassals of the abbey of St Denis for the fief of the Vexin, and it was in his quality of count of Vexin that Louis VI., le Gros, bore this banner from the abbey to battle, in 1124. He is credited with having been the first French king to have taken the banner to war, and it appeared for the last time on the field of fight at Agincourt in 1415. The accounts also of its appearance vary considerably. Guillaume Guiart, in his *Chronicle* says:—

"Oriflambe est une bannière
De cendal voujoiant et simple
Sans portraiture d'autre affaire."

It would, therefore, seem to have been a plain scarlet flag; whilst an English authority states "the celestial auriflamb, so by the French admired, was but of one colour, a square redde banner." The *Chronique de Flandres* describes it as having three points with tassels of green silk attached. The banner of William the Conqueror was sent to him by the pope, and the early English kings fought under the banners of Edward the Confessor and St Edmund; while the blended crosses of St George, St Andrew and St Patrick still form the national ensign of the united kingdoms of England, Scotland and Ireland, whose patron saints they severally were.

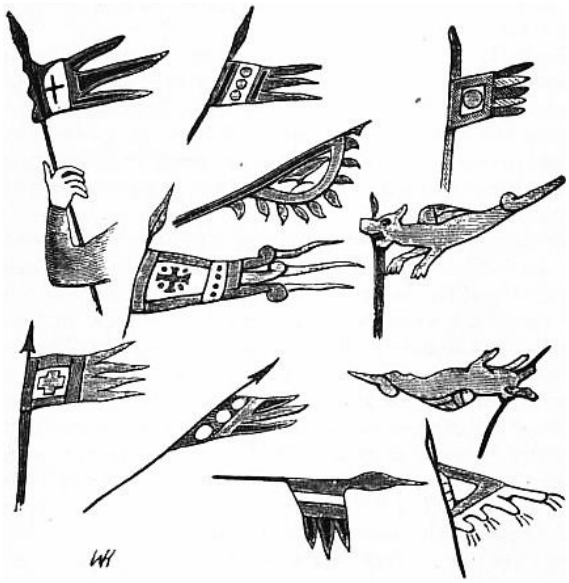


Fig. 4—Pennons and Standards from the Bayeux Tapestry.

The Bayeux tapestry, commemorating the Norman conquest of England, contains abundant representations of the flags of the period borne upon the lances of the knights of William's army. They appear small in size, and pointed, frequently indented into three points and bearing pales, crosses and roundels. One, a Saxon pennon, is triangular, and roundly indented into four points; one banner is of segmental shape and rayed, and bears the figure of a bird, which has been supposed to represent the raven of the war-flag of the Scandinavian Vikings (fig. 4). In all, thirty-seven pennons borne on lances by various knights are represented in the Bayeux tapestry, and of these twenty-eight have triple points, whilst others have two, four or five. The devices on these pennons are very varied and distinctive, although the date is prior to the period in which heraldry became definitely established. In fact, the flags and their charges are probably not really significant of the people bearing them; for, even admitting that personal devices were used at the time, the figures may have been placed without studied intention, and so give the general figure only of such flags as happened to have come under the observation of the artists. The figures are probably rather ornamental and symbolic than strictly heraldic,—that is, personal devices, for the same insignia do not appear on the shields of the several bearers. The dragon standard which he is known to have borne is placed near Harold; but similar figures appear on the shields of Norman warriors, which fact has induced a writer in the *Journal of the Archaeological Association* (vol. xiii. p. 113) to suppose that on the spears of the Saxons they represent only trophies torn from the shields of the Normans, and that they are not ensigns at all. Standards in form much resembling these dragons appear on the Arch of Titus and the Trajan column as the standards of barbarians.

At the battle of the Standard in 1138 the English standard was formed of the mast of a ship, having a silver pyx at the top and bearing three sacred banners, dedicated severally to St Peter, St John of Beverley and St Wilfrid of Ripon, the whole being fastened to a wheeled vehicle. Representations of three-pointed, cross-bearing pennons are found on seals of as early date as the Norman era, and the warriors in the first crusade bore three-pointed pennons. It is possible that the three points with the three roundels and cross, which so often appear on these banners, have some reference to the faith of the bearers in the Trinity and in the Crucifixion, for in contemporary representations of Christ's resurrection and descent into hell he bears a three-pointed banner with cross above. The triple indentation so common on the flags of this period has been supposed to be the origin of one of the honourable ordinaries—the pile. The "pile," it may be explained, is in the form of a wedge, and unless otherwise specified in the blazon, occupies the central portion of the escutcheon, issuing from the middle chief. It may, however, issue from any other extremity of the shield, and there may be more than one. More secular characters were, however, not uncommon. In 1244 Henry III. gave order for a "dragon to be made in fashion of a standard of red silk sparkling all over with fine gold, the tongue of which should be made to resemble burning fire and appear to be continually moving, and the eyes

of sapphires or other suitable stones.” *The Siege of Carlaverock*, an Anglo-Norman poem of the 14th century, describes the heraldic bearings on the banners of the knights at the siege of that fortress. Of the king himself the writer says:—

“En sa bannière trois luparte
De or fin estoient mis en rouge;”

and he goes on to describe the kingly characteristics these may be supposed to symbolize. A MS. in the British Museum (one of Sir Christopher Barker’s heraldic collection, Harl. 4632) gives drawings of the standards of English kings from Edward III. to Henry VIII., which are roughly but artistically coloured.

The principal varieties of flags borne during the middle ages were the pennon, the banner and the standard. The “guydhommes” or “guidons,” “banderolls,” “pennoncells,” “streamers” or pendants, may be considered as minor varieties. The pennon (fig. 5, B) was a purely personal ensign, sometimes pointed, but more generally forked or swallow-tailed at the end. It was essentially the flag of the knight simple, as apart from the knight banneret, borne by him on his lance, charged with his personal armorial bearings so displayed that they stood in true position when he couched his lance for action. A MS. of the 16th century (Harl. 2358) in the British Museum, which gives minute particulars as to the size, shape and bearings of the standards, banners, pennons, guydhommes, pennoncells, &c., says “a pennon must be two yards and a half long, made round at the end, and conteyneth the armes of the owner,” and warns that “from a standard or streamer a man may flee but not from his banner or pennon bearing his arms.”

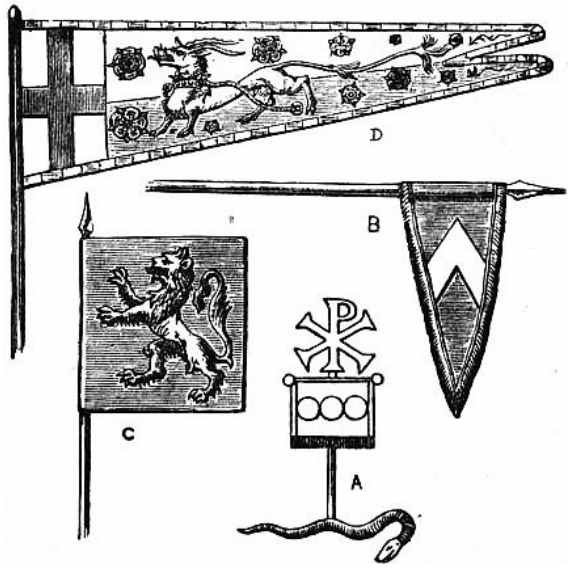


Fig. 5.—A, Labarum from medallion of Constantine; B, Medieval Pennon; C. Medieval Banner; D., Standard of Henry V.

A pennoncell (or penselle) was a diminutive pennon carried by the esquires. Flags of this character were largely used on any special occasion of ceremony, and more particularly at state funerals. For instance, we find “XII. doz. penselles” amongst the items that figured at the funeral of the duke of Norfolk in 1554, and in the description of the lord mayor’s procession in the following year we read of “ij goodly pennes (state barges) deckt with flages and stremers, and a m (1000) penselles.” Amongst the items that ran the total cost of the funeral of Oliver Cromwell up to an enormous sum of money, we find mention of thirty dozen of pennoncells a foot long and costing twenty shillings a dozen, and twenty dozen of the same kind of flags at twelve shillings a dozen.

The banner was, in the earlier days of chivalry, a square flag, though at a later date it is often found greater in length than in depth, precisely as is the case in the ordinary national flags of to-day. In some very early examples it is found considerably longer in the depth on the staff than in its outward projection from the staff. The banner was charged in a manner exactly similar to the shield of the owner, and it was borne by knights banneret and all above them in rank. As a rough guide it may be taken that the banner of an emperor was 6 ft. square; of a king, 5 ft.; of a prince or duke, 4 ft.; of a marquis, earl, viscount or baron, 3 ft. square. As the function of the banner was to display the armorial bearings of the dignitary who had the right to carry it, it is evident that the square form was the most convenient and akin to the shield of primal heraldry. In fact, flags were originally heraldic emblems, though in modern devices the strict laws of heraldry have often been departed from.

The rank of knights bannerets was higher than that of ordinary knights, and they could be created on the field of battle only. To create a knight banneret, the king or commander-in-chief in person tore off the fly of the pennon on the lance of the knight, thus turning it roughly into the square flag or banner, and so making the knight a banneret. The date in which this dignity originated is uncertain, but it was probably about the period of Edward I. John Chandos is said to have been made a banneret by the Black Prince and the king of Castile at Najara on the 3rd of April 1367; John of Copeland was made a banneret in the reign of Edward III., he having taken prisoner David Bruce, the Scottish king, at the battle of Durham. In more modern times Captain John Smith, of Lord Bernard Stuart’s troop of the King’s Guards, who saved the royal banner from the parliamentary troops at Edgehill, was made a knight banneret by Charles I. From this time the custom of creating knights banneret ceased until it was revived by George II. after Dettingen in 1743, when the dignity was again conferred. It is true, however, that, when in 1763 Sir William Erskine presented to George III. sixteen stands of colours captured by his regiment [now the 15th (king’s) Hussars] at Emsdorf, he was raised

to the dignity of knight banneret, but as the ceremony was not performed on the field of battle, the creation was considered irregular, and his possession of the rank was not generally recognized.

The banner was therefore not only a personal ensign, but it also denoted that he who bore it was the leader of a military force, large or small according to his degree or estate. It was, in fact, the battle flag of the leader who controlled the particular force that followed it into the fight. Every baron who in time of war had furnished the proper number of men to his liege was entitled to charge with his arms the banner which they followed. There could indeed be at present found no better representative of the medieval "banner" than what we now term the "royal standard"; it is essentially the personal battle flag of the king of the United Kingdom of Great Britain and Ireland. It and other royal and imperial standards have now become "standards," inasmuch as they are to-day used for display in the same fashion, and for the same purposes as was the "standard" of old. The "gonfalon" or "gonfannon" was a battle flag differing from the ordinary banner in that it was not attached to the pole but hung from it crosswise, and was not always square in shape but serrated, so that the lower edge formed streamers. The gonfalon was in action borne close to the person of the commander-in-chief and denoted his position. In certain of the Italian cities chief magistrates had the privilege of bearing a gonfalon, and for this reason were known as "gonfaloniere."

The standard (fig. 5, D) was a flag of noble size, long, tapering towards the fly (the "fly" is that portion of the flag farther from the pole, the "hoist" the portion of the flag attached to the pole), the edges of the flag fringed or bordered, and with the ends split and rounded off. The shape was not, however, by any means uniform during the middle ages nor were there any definite rules as to its charges. It varied in size according to the rank of the owner. The Tudor MS. mentioned above says of the royal standard of that time—"the Standard to be sett before the king's pavilion or tente, and not to be borne in battayle; to be in length eleven yards." A MS. of the time of Henry VII. gives the following dimensions for standards: "The King's had a length of eight yards; that of a duke, seven; a marquis, six and a half; an earl, six; a viscount, five and a half; a baron, five; a knight banneret, four and a half; and a knight four yards." The standard was, in fact, from its size, and as its very name implies, not meant to be carried into action, as was the banner, but to denote the actual position of its possessor on occasions of state ceremonial, or on the tilting ground, and to denote the actual place occupied by him and his following when the hosts were assembled in camp preparatory for battle. It was essentially a flag denoting position, whereas the banner was the rallying point of its followers in the actual field. Its uses are now fulfilled, as far as royalties are concerned, by the "banner" which has now become the "royal standard," and which floats over the palace where the king is in residence, is hoisted at the saluting point when he reviews his troops, and is broken from the mainmast of any ship in his navy the moment that his foot treads its deck. The essential condition of the standard was that it should always have the cross of St. George conspicuous in the innermost part of the hoist immediately contiguous to the staff; the remainder of the flag was then divided fesse-wise by two or more stripes of colours exactly as the heraldic "ordinary" termed "fesse" crosses the shield horizontally. The colours used as stripes, as also those used in the fringe or bordering of the standard, were those which prevailed in the arms of the bearer or were those of his livery. The standard here depicted (fig. 5, D) is that of Henry V.; the colours white and blue, a white antelope standing between two red roses, and in the interspaces more red roses. To quote again from the Harleian MS. above mentioned: "Every standard and guidon to have in the chief the cross of St George, the beast or crest with his devyce and word, and to be slitt at the end." The motto indeed usually figured on most standards, though occasionally it was missing. An excellent type of the old standard is that of the earls of Percy, which bore the blue lion, the crescent, and the fetterlock—all badges of the family—whilst, as tokens of matrimonial alliances with the families of Poynings, Bryan and Fitzpayne, a silver key, a bugle-horn and a falchion were respectively displayed. There was also the historic Percy motto, *Espérance en Dieu*. No one, whatsoever his rank, could possess more than one banner, since it displayed his heraldic arms, which were unchangeable. A single individual, however, might possess two or three standards since this flag displayed badges that he could multiply at discretion, and a motto that he could at any time change. For example, the standards of Henry VII., mostly green and white—the colours of the Tudor livery—had in one "a red firye dragon," in another "a donne kowe," in a third "a silver greyhound and two red roses." The standard was always borne by an eminent person, and that of Henry V. at Agincourt is supposed to have been carried upon a car that preceded the king. At Nelson's funeral his banner and standard were borne in the procession, and around his coffin were the banderolls—square, bannerlike flags bearing the various arms of his family lineage. Nelson's standard bore his motto, *Palmam qui meruit ferat*, but, in lieu of the cross of St George, it bore the union of the crosses of St George, St Andrew and St Patrick, the medieval England having expanded into the United Kingdom of Great Britain and Ireland. Again, at the funeral of the duke of Wellington we find amongst the flags his personal banner and standard, and ten banderolls of the duke's pedigree and descent.

The guidon, a name derived from the Fr. *Guyd-homme*, was somewhat similar to the standard, but without the cross of St George, rounded at the end, less elongated and altogether less ornate. It was borne by a leader of horse, and according to a medieval writer "must be two and a half yards or three yards long, and therein shall no armes be put, but only the man's crest, cognisance, and devyce."

The streamer, so called in Tudor days but now better known as the pennant or pendant, was a long, tapering flag, which it was directed "shall stand in the top of a ship or in the forecastle, and therein be put no armes, but the man's cognisance or devyce, and may be of length twenty, thirty, forty or sixty yards, and is slitt as well as a guidon or standard." Amongst the fittings of the ship that took Beauchamp, earl of Warwick, to France in the reign of Henry VII. was a "grete stremour for the shippe xl yardes in length viij yardes in brede." In the hoist was "a grete bere holding a raggid staffe," and the rest of the fly "powdrid full of raggid staves."

National Flags.—*British.* The royal standard of England was, when it was hoisted on the Tower on the 1st of January 1801, thus heraldically described:—"Quarterly; first and fourth, gules, three lions passant gardant, in pale, or, for England; second, or, a lion rampant, gules, within a double tressure flory counter flory of the last, for Scotland; third, azure, a harp or, stringed argent, for Ireland." The present standard connects in direct descent from the arms of the Conqueror. These were two leopards passant on a red field,

and remained the same until the reign of Henry II., when lions were substituted for leopards, and a third added. The next change that took place was in the reign of Edward III. when the royal arms were for the first time quartered; *fleurs-de-lis* in the first and fourth quarters, and the three lions of England in the second and third. The *fleurs-de-lis* were assumed in token of the monarch's claim to the throne of France. In the "coats" of Edward III. and the two monarchs that succeeded him, the *fleurs-de-lis* were powdered over a blue ground, but under Henry V. the *fleurs-de-lis* were reduced in number to three, and the "coat" so devised remained the same until the death of Queen Elizabeth. The lion of Scotland and the Irish harp were added to the flag on the accession of James I., and the flag then had the French and English arms quartered in the first and fourth quarters, the lion of Scotland, red on a yellow ground, in the second quarter, and the harp of Ireland, gold on a blue ground, in the third quarter. With the exception of the period of the Commonwealth, to which reference will be made later, the flag remained thus until the accession of William III., who imposed upon the Stuart standard a central shield carrying the arms of Nassau. Queen Anne made further alterations; the first and fourth quarters were subdivided, the three lions of England being in one half, the lion of Scotland in the other. The *fleurs-de-lis* were in the second quarter; the Irish harp in the third. Under George I. and George II. the first, second and third quarters remained the same, the arms of Hanover being placed in the fourth quarter, and this continued to be the royal standard until 1801, when the standard was rearranged as first described with the addition of the Hanoverian arms displayed on a shield in the centre. On the accession of Queen Victoria, the Hanoverian arms were removed, and the flag remained as it to-day exists. It is worthy of note, however, that in the royal standard of King Edward VII. which hangs in the chapel of St George at Windsor, the ordinary "winged woman" form of the harp in the Irish third quartering is altered to a harp of the old Irish pattern. At King Edward's accession this banner replaced that of Queen Victoria which for sixty-two years had hung in this, the chapel of the order of the Garter.

Up to the time of the Stuarts it had been the custom of the lord high admiral or person in command of the fleet to fly the royal standard as deputy of the sovereign. When royalty ceased to be, a new flag was devised by the council of state for the Commonwealth, which comprised the "arms of England and Ireland in two several escutcheons in a red flag within a compartment." In other words, it was a red flag containing two shields, the one bearing the cross of St George, red on a white ground, the other the harp, gold on a blue ground, and round the shields was a wreath of palm and shamrock leaves. One of these flags is still in existence at Chatham dockyard, where it is kept in a wooden chest which was taken out of a Spanish galleon at Vigo by Admiral Sir George Rooke in 1704. When Cromwell became protector of the commonwealth of England, Scotland and Ireland, he devised for himself a personal standard. This had the cross of St George in the first and fourth quarters, the cross of St Andrew, a white saltire on a blue ground, in the second, and the Irish harp in the third. His own arms—a lion on a black shield—were imposed on the centre of the flag. No one but royalty has a right to fly the royal standard, and though it is constantly seen flying for purposes of decoration its use is irregular. There has, however, always been one exception, namely, that the lord high admiral when in executive command of a fleet has always been entitled to fly the royal standard. For example, Lord Howard flew it from the mainmast of the "Ark Royal" when he defeated the Spanish Armada; the duke of Buckingham flew it as lord high admiral in the reign of Charles I., and the duke of York fought under it when he commanded during the Dutch Wars.

The national flag of the British empire is the Union Jack, in which are combined in union the crosses of St George, St Andrew and St Patrick. St George had long been a patron saint of England, and his banner, argent, a cross gules, its national ensign. St Andrew in the same way was the patron saint of Scotland, and his banner, azure, a saltire argent, the national ensign of Scotland. On the union of the two crowns James I. issued a proclamation ordaining that "henceforth all our subjects of this Isle and Kingdom of Greater Britain and the members thereof, shall bear in their main-top the red cross commonly called St George's cross, and the white cross commonly called St Andrew's cross, joined together according to a form made by our heralds, and sent by us to our admiral to be published to our said subjects; and in their fore-top our subjects of south Britain shall wear the red cross only, as they were wont, and our subjects of north Britain in their fore-top, the white cross only as they were accustomed." This was the first Union Jack, as it is generally termed, though strictly the name of the flag is the "Great Union," and it is only a "Jack" when flown on the jackstaff of a ship of war. Probably the name of the Stuart king "Jacques," which James I. always signed, gave the name to the flag, and then to the staff at which it was hoisted. At the death of Charles I., the union with Scotland being dissolved, the ships of the parliament reverted to the simple cross of St George, but the union flag was restored when Cromwell became protector, with the Irish harp imposed upon its centre. On the Restoration, Charles II. removed the harp and so the original union flag was restored, and continued as described until the year 1801, when, on the legislative union with Ireland, the cross of St Patrick, a saltire gules, on a field argent, was incorporated in the union flag. To so combine these three crosses without losing the distinctive features of each was not easy; each cross must be distinct, and retain equally distinct its fimbriation, or bordering, which denotes the original ground. In the first union flag, the red cross of St George with the white fimbriation that represented-the original white field was simply imposed upon the white saltire of St Andrew with its blue field. To place the red saltire of St Patrick on the white saltire of St Andrew would have been to obliterate the latter, nor would the red saltire have its proper bordering denoting its original white field; even were the red saltire narrowed in width the portion of the white saltire that would appear would not be the St Andrew saltire, but only the fimbriation appertaining to the saltire of St Patrick. The difficulty has been got over by making the white broader on one side of the red than the other. In fact, the continuity of direction of the arms of the St Patrick red saltire has been broken by its portions being removed from the centre of the oblique points that form the St Andrew's saltire. Thus both the Irish and Scottish saltires can be easily distinguished from one another, whilst the red saltire has its due white fimbriation.

The Union Jack is the most important of all British ensigns, and is flown by representatives of the empire all the world over. It flies from the jackstaff of every man-of-war in the navy. With the Irish harp on a blue shield displayed in the centre, it is flown by the lord-lieutenant of Ireland. When flown by the governor-general of India the star and device of the order of the Star of India are borne in the centre. Colonial governors fly it with the badge of their colony displayed in the centre. Diplomatic representatives use it with

the royal arms in the centre. As a military flag, it is flown over fortresses and headquarters, and on all occasions of military ceremonial. Hoisted at the mainmast of a man-of-war it is the flag of an admiral of the fleet.

Military flags in the shape of regimental standards and colours, and flags used for signalling, are described elsewhere, and it will here be only necessary to deal with the navy and admiralty flags.

The origin of the three ensigns—the red, white, and blue—had its genesis in the navy. In the days of huge fleets, such as prevailed in the Tudor and Stuart navies, there were, besides the admiral in supreme command, a vice-admiral as second in command, and a rear-admiral as third in command, each controlling his own particular group or squadron. These were designated centre, van, and rear, the centre almost invariably being commanded by the admiral, the vice-admiral taking the van and the rear-admiral the rear squadron. In order that any vessel in any group could distinguish its own admiral's ship, the flagships of centre, van, and rear flew respectively a plain red, white, or blue flag, and so came into being those naval ranks of admiral, vice-admiral, and rear-admiral of the red, white, and blue which continued down to as late as 1864. As the admiral in supreme command flew the union at the main, there was no rank of admiral of the red, and it was not until November 1805 that the rank of admiral of the red was added to the navy as a special compliment to reward Trafalgar. About 1652, so that each individual ship in the squadron should be distinguishable as well as the flagships, each vessel carried a large red, white, or blue flag according as to whether she belonged to the centre, van, or rear, each flag having in the left-hand upper corner a canton, as it is termed, of white bearing the St George's cross. These flags were called ensigns, and it is, of course, due to the fact that the union with Scotland was for the time dissolved that they bore only the St George's cross. Even when the restoration of the Stuarts restored the *status quo* the cross of St George still remained alone on the ensign, and it was not altered until 1707 when the bill for the Union of England and Scotland passed the English parliament. In 1801, when Ireland joined the Union, the flag, of course, became as we know it to-day. All these three ensigns belonged to the royal navy, and continued to do so until 1864, but as far back as 1707 ships of the mercantile marine were instructed to fly the red ensign. As ironclads replaced the wooden vessels and fleets became smaller the inconvenience of three naval ensigns was manifest, and in 1864 the grades of flag officer were reduced again to admiral, vice-admiral, and rear-admiral, and the navy abandoned the use of the red and blue ensigns, retaining only the white ensign as its distinctive flag. The mercantile marine retained the red ensign which they were already using, whilst the blue ensign was allotted to vessels employed on the public service whether home or colonial.

The white ensign is therefore essentially the flag of the royal navy. It should not be flown anywhere or on any occasion except by a ship (or shore establishment) of the royal navy, with but one exception. By a grant of William IV. dating from 1829 vessels belonging to the Royal Yacht Squadron, the chief of all yacht clubs, are allowed to fly the white ensign. From 1821 to 1829 ships of the squadron flew the red ensign, as that of highest dignity, but as it was also used by merchant ships, they then obtained the grant of the white ensign as being more distinctive. Some few other yacht clubs flew it until 1842, when the privilege was withdrawn by an admiralty minute. By some oversight the order was not conveyed to the Royal Western of Ireland, whose ships flew the white ensign until in 1857 the usage was stopped. Since that date the Royal Yacht Squadron has alone had the privilege. Any vessel of any sort flying the white ensign, or pennant, of the navy is committing a grave offence, and the ship can be boarded by any officer of His Majesty's service, the colours seized, the vessel reported to the authorities, and a penalty inflicted on the owners or captain or both. The penalty incurred is £500 fine for each offence, as laid down in the 73rd section of the Merchant Shipping Act 1894. In 1883 Lord Annesley's yacht, belonging to the Royal Yacht Squadron, was detained at the Dardanelles in consequence of her flying the white ensign of the royal navy which brought her under the category of a man-of-war, and no foreign man-of-war is allowed to pass the Dardanelles without first obtaining an imperial *irade*. Since then owners belonging to the squadron have been warned that they must either sail their ships through the straits under the red ensign common to all ships British owned, or obtain imperial permission if they wish to display the white ensign.

Besides the white ensign the ship of war flies a long streamer from the maintopgallant masthead. This, which is called a pennant, is flown only by ships in commission; it is, in fact, the sign of command, and is first hoisted when a captain commissions his ship. The pennant, which was really the old "pennoncell," was of three colours for the whole of its length, and towards the end left separate in two or three tails, and so continued till the end of the great wars in 1816. Now, however, the pennant is a long white streamer with the St George's cross in the inner portion close to the mast. Pennants have been carried by men-of-war from the earliest times, prior to 1653 at the yard-arm, but since that date at the maintopgallant masthead.

The blue ensign is exclusively the flag of the public service other than the royal navy, and is as well the flag of the royal naval reserve. It is flown also by certain authorized vessels of the British mercantile marine, the conditions governing this privilege being that the captain and a certain specified portion of the officers and crew shall belong to the ranks of the royal naval reserve. When flown by ships belonging to British government offices the seal or badge of the office is displayed in the fly. For example, hired transports fly it with the yellow anchor in the fly; the marine department of the Board of Trade has in the fly the device of a ship under sail; the telegraph branch of the post-office shows in the fly a device representing Father Time with his hour-glass shattered by lightning; the ordnance department displays upon the fly a shield with a cannon and cannon balls upon it. Certain yacht clubs are also authorized by special admiralty warrant to fly the blue ensign. Some of these display it plain; others show in the fly the distinctive badge of the club. Consuls-general, consuls and consular agents also have a right to fly the blue ensign, the distinguishing badge in their case being the royal arms.

The red ensign is the distinguishing flag of the British merchant service, and special orders to this effect were issued by Queen Anne in 1707, and again by Queen Victoria in 1864. The order of Queen Anne directed that merchant vessels should fly a red flag "with a Union Jack described in a canton at the upper corner thereof next the staff," and this is probably the first time that the term "Union Jack" was officially used. In some cases those yacht clubs which fly the red ensign change it slightly from that flown by the merchant

service, for they are allowed to display the badge of the club in the fly. Colonial merchantmen usually display the ordinary red ensign, but, provided they have a warrant of authorization from the admiralty, they can use the ensign with the badge of the colony in the fly.

In regard to ensigns it is important to remember that they are purely maritime flags, and though the rule is more honoured in the breach than in the observance, the only flag that a private individual or a corporation has a right to display on shore is the national flag, the Union Jack, in its plain condition and without any emblazonment.

There are two other British sea flags which are worthy of brief notice. These are the admiralty flag and the flag of the master of Trinity House. The admiralty flag is a plain red flag with a clear anchor in the centre in yellow. In a sense it is a national flag, for the sovereign hoists it when afloat in conjunction with the royal standard and the Union Jack. It would appear to have been first used by the duke of York as lord high admiral, who flew it when the sovereign was afloat and had the royal standard flying in another ship. When a board of commissioners was appointed to execute the office of lord high admiral this was the flag adopted, and in 1691 we find the admiralty, minuting the navy board, then a subordinate department, “requiring and directing it to cause a fitting red silk flag, with the anchor and cable therein, to be provided against Tuesday morning next, for the barge belonging to this board.” In 1725, presumably as being more pretty and artistic, the cable in the device was twisted round the stock of the anchor. It was thus made into a “foul anchor,” the thing of all others that a sailor most hates, and this despite the fact that the first lord at the time, the earl of Berkeley, was himself a sailor. The anchor retained its unseamanlike appearance, and was not “cleared” till 1815, and even to this day the buttons of the naval uniform bear a “foul anchor.” The “anchor” flag is solely the emblem of an administrative board; it does not carry the executive or combatant functions which are vested in the royal standard, the union or an admiral’s flag, but on two occasions it has been made use of as an executive flag. In 1719 the earl of Berkeley, who at the time was not only first lord of the admiralty, but vice-admiral of England, obtained the special permission of George I. to hoist it at the main instead of the union flag. Again in 1869, when Mr Childers, then first lord, accompanied by some members of his board, went on board the “Agincourt” he hoisted the admiralty flag and took command of the combined Mediterranean and Channel squadrons, thus superseding the flags of the two distinguished officers who at the time were in command of these squadrons. It is hardly necessary to add that throughout the navy there was a very distinct feeling of dissatisfaction at the innovation. When the admiralty flag is flown by the sovereign it is hoisted at the fore, his own standard being of course at the main, and the union at the mizzen.

The flag of the master of the Trinity House is the red cross of St George on its white ground, but with an ancient ship on the waves in each quarter; in the centre is a shield with a precisely similar device and surmounted by a lion.

The sign of a British admiral’s command afloat is always the same. It is the St George’s cross. Of old it was borne on the main, the fore, or the mizzen, according as to whether the officer to whom it pertained was admiral, vice-admiral, or rear-admiral, but, as ironclads superseded wooden ships, and a single pole mast took the place of the old three masts, a different method of indicating rank was necessitated. To-day the flag of an admiral is a square one, the plain St George’s cross. When flown by a vice-admiral it bears a red ball on the white ground in the upper canton next to the staff; if flown by a rear-admiral there is a red ball in both the upper and lower cantons. As nowadays most battleships have two masts, the admiral’s flag is hoisted at the one which has no masthead semaphore. The admiral’s flag is always a square one, but that of a commodore is a broad white pennant with the St George’s cross. If the commodore be first class the flag is plain; if of the second class the flag has a red ball in the upper canton next to the staff. The same system of differentiating rank prevails in most navies, though very often a star takes the place of the ball. In some cases, however, the indications of rank are differently shown. For instance, both in the Russian and Japanese navies the distinction is made by a line of colour on the upper or lower edges of the flag.

The flags of the British colonies are the same as those of the mother country, but differentiated by the badge of the colony being placed in the centre of the flag if it is the Union Jack, or in the fly if it be the blue or red ensign. Examples of these are shown in the Plate, where the blue ensign illustrated is that of New Zealand, the device of the colony being the southern cross in the fly. Precisely the same flag, with a large six-pointed star, emblematic of the six states immediately under the union, forms the flag of the federated commonwealth of Australia. The red ensign shown is that of the Dominion of Canada, the device in the fly being the armorial bearings of the Dominion. As the lord-lieutenant of Ireland, as the representative of royalty, flies the Union Jack with a harp in the centre, or the viceroy of India flies the same flag with, in the centre, the badge of the order of the Star of India, so too colonial governors or high commissioners fly the union flag with the arms of the colony they preside over on a white shield in the centre and surrounded by a laurel wreath. In the case of Canada the wreath, however, is not of laurel but of maple, which is the special emblem of the Dominion.

French.—To come to flags of other countries, nowhere have historical events caused so much change in the standards and national ensigns of a country as in the case of France. The oriflamme and the Chape de St Martin were succeeded at the end of the 16th century, when Henry III., the last of the house of Valois, came to the throne, by the white standard powdered with *fleurs-de-lis*. This in turn gave place to the famous tricolour. The tricolour was introduced at the time of the Revolution, but the origin of this flag and its colours is a disputed question. Some maintain that the intention was to combine in the flag the blue of the Chape de St Martin, the red of the oriflamme, and the white flag of the Bourbons. By others the colours are said to be those of the city of Paris. Yet again, other authorities assert that the flag is copied from the shield of the Orleans family as it appeared after Philippe Égalité had knocked off the *fleurs-de-lis*. The tricolour is divided vertically into three parts of equal width—blue, white and red, the red forming the fly, the white the middle, and the blue the hoist of the flag. During the first and second empires the tricolour became the imperial standard, but in the centre of the white stripe was placed the eagle, whilst all three stripes were richly powdered over with the golden bees of the Napoleons. The tricolour is now the sole flag of France.

American.—Before the Declaration of Independence the flags of those colonies which now form the United

States of America were very various. In the early days of New England the Puritans objected to the red cross of St George, not from any disloyalty to the mother country, but from a conscientious objection to what they deemed an idolatrous symbol. By the year 1700 most of the colonies had devised badges to distinguish their vessels from those of England and of each other. In the early stages of the revolution each state adopted a flag of its own; thus, that of Massachusetts bore a pine tree, South Carolina displayed a rattlesnake, New York had a white flag with a black beaver, and Rhode Island a white flag with a blue anchor upon it. Even after the Declaration of Independence, and the introduction of the stars and stripes, the latter underwent many changes in the manner of their arrangement before taking the position at present established. In 1775 a committee was appointed to consider the question of a single flag for the thirteen states. It recommended that the union be retained in the upper corner next to the staff, the remainder of the field of the flag to be of thirteen horizontally disposed stripes, alternately red and white. This flag, curiously enough, was precisely the same as the flag of the old Honourable East India Company. On the 14th of June 1777 congress resolved "that the flag of the United States be thirteen stripes, alternate red and white; that the Union be thirteen stars, white in a blue field, representing a new constellation." This was the origin of the national flag, but at first, as the number of the stripes were unequal, the flag very often varied, sometimes having seven white and six red stripes, and at other times seven red and six white, and it was not for some considerable time that it was authoritatively laid down that the latter arrangement was the one to be adopted. It has also been held that the stars and stripes of the American national flag, as well as the eagle, were suggested by the crest and arms of the Washington family. The latter supposition is absurd, for the Washington crest was a raven. The Washington arms were a white shield having two horizontal red bars, and above these a row of three red stars. This might, by a stretch of imagination, be supposed to have inspired the original idea of the flag which was that each state in the Union should be represented in the national flag by a star and stripe. Naturally other states coming into the Union expected the same privilege. After Vermont in 1790 and Kentucky in 1792 had entered the Union, the stars and stripes were changed in number from thirteen to fifteen. Later on other states joined, and soon the flag came to consist of twenty stars and stripes. It was, however, found objectionable to be constantly altering the national flag, and in the year 1818 it was determined to go back to the original thirteen stripes, but to place a star for each state in the blue union canton in the top corner of the flag next the staff. Thus the stars always show the exact number of states that are in the Union, whilst the stripes denote the original number of the states that formed the union.[1] The presidential flag of the president of the United States is an eagle on a blue field, bearing on its breast a shield displaying stripes, and above the national motto *E pluribus unum*, and a design of the stars of the original thirteen states of the union.

Other Countries.—The most general and important of the various national flags are figured in the Plate. In the top line representing Great Britain are shown the royal standard, the Union Jack (the national flag), the white ensign of the royal navy, the blue ensign of government service, and the red ensign of the commercial marine, colonial flags being shown in the case of the two latter ensigns. The two Japanese flags shown are the man-of-war ensign—a rising sun, generally known as the sun-burst—and the flag of the mercantile marine, in which the red ball is used without the rays and placed in the centre of the white field. The imperial standard of Japan is a golden chrysanthemum on a red field. It is essential that the chrysanthemum should invariably have sixteen petals. Heraldry in Japan is of a simpler character than that of Europe, and is practically limited to the employment of "Mon," which correspond very nearly to the "crests" of European heraldry. The great families of Japan possess at least one, and in many cases even three, "Mon." The imperial family use two, the one *Kiku no go Mon* (the august chrysanthemum crest) and *Kiri no go Mon* (the august Kiri crest). The first represents the sixteen-petalled chrysanthemum, and, although the use of the chrysanthemum flower as a badge is not necessarily confined to the imperial family, they alone have the right to use the sixteen-petalled form. If used by any other family, or society or corporation, it must be with a number of petals less or more than sixteen. The second imperial "Mon" is composed of three leaves and three flower spikes of the Kiri (*Paulownia imperialis*). This, however, is not displayed as an official emblem, that being reserved for the chrysanthemum. The Kiri is used for more private purposes. For example, the chrysanthemum figures in the imperial standard, and the Kiri "Mon" adorns the harness of the emperor's horses. It is very probable that the chrysanthemum crest did not originally represent the chrysanthemum flower at all but the sun with sixteen rays, and it will be noticed that in the "sun-burst" flag the sun's rays are sixteen in number. The use of the number sixteen is probably traceable to Chinese geomantic ideas.

The German imperial navy and mercantile marine flags are next depicted. The "iron cross" in the navy flag is that of the Teutonic Order, and dates from the close of the 12th century. For five centuries black and white have been the Hohenzollern colours, and the first verse of the German war song, *Ich bin ein Preusse*, runs:—

"I am a Prussian! Know ye not my banner?
Before me floats my flag of black and white!
My fathers died for freedom, 'twas their manner,
So say these colours floating in your sight."

The mercantile marine tricolour of black, white and red is emblematic of the joining of the Hohenzollern black and white with the red and white, which was the ensign of the Hanseatic League. This flag came into being when the North German Confederacy was established (November 25th, 1867) at the close of the Austro-Prussian War.

The German imperial standard has the iron cross with its white border displayed on a yellow field, diapered over in each of the four quarters with three black eagles and a crown. In the centre of the cross is a shield bearing the arms of Prussia surmounted by a crown, and surrounded by a collar of the Order of the Black Eagle. In the four arms of the crown are the legend *Gott mit uns* 1870. The United States flag and the tricolour of France have already been fully dealt with, and in both countries the one flag is common to both men-of-war and ships of the mercantile marine.

The next depicted are the imperial navy and the mercantile marine flags of the Austro-Hungarian empire. In the latter the introduction of the green half stripe denotes the combination of the Austrian red, white and

red with the Hungarian red, white and green. The shields with which the flag is charged contain respectively the arms of Austria and of Hungary. The former shield only is borne on the man-of-war ensign, and displays the heraldic device of the ancient dukes of Austria, which dates back to the year 1191. The Austrian imperial standard has, on a yellow ground, the black double-headed eagle, on the breast and wings of which are imposed shields bearing the arms of the provinces of the empire. The flag is bordered all round, the border being composed of equal-sided triangles with their apices alternately inwards and outwards, those with their apices pointing inwards being alternately yellow and white, the others alternately scarlet and black.

The green, white and red Italian tricolour was adopted in 1805, when Napoleon I. formed Italy into one kingdom. It was adopted again in 1848 by the Nationalists of the peninsula, accepted by the king of Sardinia, and, charged by him with the arms of Savoy, it became the flag of a united Italy. The man-of-war flag is precisely similar to that of the mercantile marine, except that in the case of the former the shield of Savoy is surmounted by a crown. The royal standard is a blue flag. In the centre is a black eagle crowned and displaying on its breast the arms of Savoy, the whole surrounded by the collar of the Most Sacred Annunziata, the third in rank of all European orders. In each corner of the flag is the royal crown.

For Portugal the flag is one of the few national flags that are parti-coloured. It is half blue, half white, with, in the centre, the arms of Portugal surmounted by the royal crown, and it is the same both in the mercantile marine and in the Portuguese navy. The royal standard of Portugal is an all-red flag charged in the centre with the royal arms, as shown in the national flag.

In the Spanish ensigns red and yellow are the prevailing colours, and here again the arrangement differs from that generally used. The navy flag has a yellow central stripe, with red above and below. To be correct the yellow should be half the width of the flag, and each of the red stripes a quarter of the width of the flag. The central yellow stripe is charged in the hoist with an escutcheon containing the arms of Castile and Leon, and surmounted by the royal crown. In the mercantile flag the yellow centre is without the escutcheon, and is one-third of the entire depth of the flag, the remaining thirds being divided into equal stripes of red and yellow, the yellow above in the upper part of the flag, the red in the lower. Of all royal standards that of Spain is the most elaborate, for it contains quarterings of the Spanish royal escutcheon, many of the bearings being as much an anachronism as if the royal arms of England were to-day to be quartered with the *fleur-de-lis*. In all, the quarterings displayed are those of Leon, Castile, Aragon, Sicily, Austria, Burgundy, Flanders, Antwerp, Brabant, Portugal and France. The flag is usually depicted as composed entirely of the quarterings. We believe, however, that it is more correctly a purple flag in the centre of which the quarterings are displayed on an oval shield surmounted by a crown and encircled by the collar of the order of the Golden Fleece.

The flag of the Russian mercantile marine is a horizontal tricolour of white, blue and red. Originally, it was a tricolour of blue, white and red, and it is said that the idea of its colouring was taken by Peter the Great when learning shipbuilding in Holland, for as the flag then stood it was simply the Dutch ensign reversed. Later, to make it more distinctive, the blue and white stripes changed places, leaving the tricolour as it stands to-day. The flag of the Russian navy is the blue saltire of St Andrew on a white ground. St Andrew is the patron saint of Russia, from whence the emblem. The imperial standard is of a character akin to that of Austria; the ground is yellow, and the centre bears the imperial double-headed eagle, a badge that dates back to 1472, when Ivan the Great married a niece of Constantine Palaeologus and assumed the arms of the Greek empire. On the breast of the eagle is an escutcheon charged with the emblem of St George and the Dragon on a red ground, and this is surrounded by the collar of the order of St Andrew. On the splayed wings of the eagle are small shields bearing the arms of the various provinces of the empire.

The Rumanian flag is a blue, yellow and red tricolour, the stripes vertical, with the blue stripe forming the fly. The Servian flag is a horizontal tricolour, the top stripe red, the middle blue and the lower white. When these tricolours are flown as royal standards the royal arms are displayed on the central stripe. The flag of Montenegro is a horizontal tricolour, the top stripe red, the centre blue, the lowermost white. The Bulgarian flag is a similar tricolour, white, green and red, the white stripe uppermost, but when flown as a war ensign there is a canton in the upper corner of the hoist in which is a golden lion on a red ground.

The flags of all the three Scandinavian kingdoms are somewhat similar in design. That of Denmark, the Dannebrog, has been already alluded to, and it is shown in our illustration as flown by the Danish navy. The mercantile marine flag is precisely similar, but rectangular instead of being swallow-tailed. The Swedish flag is a yellow cross on a blue ground. When flown from a man-of-war it is forked as in the Danish, but the longer arm of the cross is not cut off but pointed, thus making it a three-pointed flag as illustrated. For the mercantile marine the flag is rectangular. When Norway separated from Denmark in 1814, the first flag was red with a white cross on it, and the arms of Norway in the upper corner of the hoist, but as this was found to resemble too closely the Danish flag, a blue cross with a white border was substituted for the white cross. This, it will be seen, is the Danish flag with a blue cross imposed upon the white one. For a man-of-war the flag is precisely similar to that of Sweden in shape; that is to say, converted from the rectangular into the three-pointed design. While Sweden and Norway remained united the flag of each remained distinct, but each bore in the top canton of the hoist a union device, being the combination of the Norwegian and Swedish national colours and crosses. In each of the three above nationalities the flag used for a royal standard is the man-of-war flag with the royal arms imposed on the centre of the cross.

The Belgian tricolour is vertical, the stripes being black next the hoist, yellow in the centre and red in the fly. That of the Netherlands is a horizontal tricolour, red above, white in the centre and blue below. In both countries the same flag is common to both navy and mercantile marine, but when the flag is used as a royal standard the royal arms are displayed in the central stripe. The black, yellow and red of the Belgian flag are the colours of the duchy of Brabant, and were adopted in 1831 when the monarchy was founded. The original Dutch colours adopted when Holland declared its independence were orange, white and blue, the colours of the house of Orange, and when and how the orange became red is not quite clear, though it was certainly prior to 1643.

The blue and white which form the colouring of the Greek flag shown in our illustration are the colours of the house of Bavaria, and were adopted in 1832, when Prince Otho of Bavaria was elected to the throne of Greece. The stripes are nine in number—five blue and four white—with, in the upper corner of the hoist, a canton bearing a white cross on a blue ground. The flag for the royal navy is similar to that flown by the

mercantile marine, with the exception that it has the addition of a golden crown in the centre of the cross. The royal standard is a blue flag with a white cross, on the centre of which the royal arms are imposed. The cross is exactly similar to that in the Danish flag, that is to say, the arms of the cross are not of equal length, the shorter end being in the hoist of the flag.

The very simple flag of Switzerland is one of great antiquity, for it was the emblem of the nation as far back as 1339, and probably considerably earlier. In addition to the national flag of the Swiss confederation, each canton has its own cantonal colours. In each case the flag has its stripes disposed horizontally. Basel, for instance, is half black, half white; Berne, half black, half red; Glarus, red, black and white, &c., &c.

The Turkish crescent moon and star were the device adopted by Mahomet II. when he captured Constantinople in 1453. Originally they were the symbol of Diana, the patroness of Byzantium, and were adopted by the Ottomans as a triumph, for they had always been the special emblem of Constantinople, and even now in Moscow and elsewhere the crescent emblem and the cross may be seen combined in Russian churches, the crescent badge, of course, indicating the Byzantine origin of the Russian church. The symbol originated at the time of the siege of Constantinople by Philip the father of Alexander the Great, when a night attempt of the besiegers to undermine the walls was betrayed by the light of a crescent moon, and in acknowledgment of their escape the Byzantines raised a statue to Diana, and made her badge the symbol of the city. Both the man-of-war and mercantile marine flags are the same, but the imperial standard of the sultan is scarlet, and bears in its centre the device of the reigning sovereign. This device is known as the "Tughra," and consists of the name of the sultan, the title of khan, and the epithet *al-Muzaffar Daima*, which means "the ever victorious." The origin of the "Tughra" is that the sultan Murad I., who was not of scholarly parts, signed a treaty by wetting his open hand with ink, and pressing it on the paper, the first, second and third fingers making smears close together, the thumb and fourth finger leaving marks apart. Within the marks thus made the scribes wrote in the name of Murad, his title, and the epithet above quoted. The "Tughra" dates from the latter part of the 14th century. The smaller characters in the "Tughra" change, of course, on the accession of every fresh sovereign, but the leading form of the device always remains the same, namely, rounded lines to the left denoting the thumb, lines to the right denoting where the little finger made impression, and three upright lines indicating the other fingers.

The Mahommedan states tributary to Turkey also display the crescent and star. Morocco, Muscat and other Arab states where they use an ensign display a red flag, that of the Zanzibar protectorate having the British union in the centre of the red field.

The Persian flag is white with a border, green on the upper edge of the flag and in the fly, and red in the hoist and on the lower edge. On the white ground are the lion and sun.

The flag of Siam is a white elephant on a red ground. That of Korea, a white flag with, in the centre, a ball, half red, half blue, the colours being curiously intermixed, the whole being precisely as if two large commas of equal size, one red and the other blue, were united to form a complete circle.

The Chinese flag is a yellow one, bearing on it the emblem of the dragon devouring the sun. As at present used, it is a square flag, but an earlier version was a triangular right-angled flag, hoisted with the right-angle in the base of the hoist. The merchant flag is red with a yellow ball in the centre.

Among the South American republics the Brazilian flag is peculiar inasmuch as it is the only national flag which carries a motto.

Mexico flies precisely the same tricolour as Italy, but plain in the case of the merchant ensign, and charged on the central stripe with the Mexican arms (as illustrated) when flown as a man-of-war ensign.

The Argentine flag is as illustrated flown by the navy, but, when used by the mercantile marine, the sun emblazoned on the central white stripe is omitted, the flag otherwise being precisely the same.

The Venezuelan flag shown is also that of the navy. The flag of the mercantile marine is the same, but the shield bearing the arms of the state is not introduced into the yellow top stripe in the corner near the hoist, as in the naval flag.

The Chilean ensign illustrated is used alike by men-of-war and vessels in the mercantile marine, but, when flown as the standard of the president, the Chilean arms and supporters are placed in the centre of the flag.

The plain red, white, red in vertical stripes, is the flag of the mercantile marine of Peru, and becomes the naval ensign when charged on the central stripe with the Peruvian arms as shown in our illustration. In fact, in nearly every case with the South American republics, the ordinary mercantile marine flag becomes that of the war navy by the addition of the national arms, and in some cases is used in the same way as a presidential flag.

In nearly every case the flags of the lesser American republics are tricolours, and in a very great many of them the flags are by no means such combinations as would meet with the approval of European heralds. All flag devising should be in accordance with heraldic laws, and one of the most important of these is that colour should not be placed on colour, nor metal on metal, yellow in blazonry being the equivalent of gold and white of silver. Hence, properly devised tricolours are such as, for example, those of France, where the red and blue are divided by white, or Belgium, where the black and red are divided by yellow. On the other hand, the yellow, blue, red of Venezuela is heraldically an abomination.

Manufacture and Miscellaneous Uses.—Flags, the manufacture, of which is quite a large industry, are almost invariably made from bunting, a very light, tough and durable woollen material. The regulation bunting as used in the navy is made in 9 in. widths, and the flag classes in size according to the number of breadths of bunting of which it is composed. The great centre of the manufacture of flags, as far as the royal navy is concerned, is the dockyard at Chatham. Ensigns and Jacks are made in different sizes; the largest ensign made is 33 ft. long by 16½ ft. in width; the largest Jack issued is 24 ft. long and 12 ft. wide.

The dimensions of a flag according to heraldry should be either square or in the proportion of two to one, and it is this latter dimension that is used in the navy and generally.

Signalling flags are dealt with elsewhere (see SIGNAL), and here it will only be necessary to make brief allusion to some international customs with regard to the use of flags to indicate certain purposes. For long a blood-red flag has always been used as a symbol of mutiny or of revolution. The black flag was in days gone by the symbol of the pirate; to-day, in the only case in which it survives, it is flown after an execution to indicate that the requirements of the law have been duly carried out. All over the world a yellow flag is the signal of infectious illness. A ship hoists it to denote that there are some on board suffering from yellow fever, cholera or some such infectious malady, and it remains hoisted until she has received quarantine. This flag is also hoisted on quarantine stations. The white flag is universally used as a flag of truce.

At the sea striking of the flag denotes surrender. When the flag of one country is placed over that of another the victory of the former is denoted, hence in time of peace it would be an insult to hoist the flag of one friendly nation above that of another. If such were done by mistake, say in "dressing ship" for instance, an apology would have to be made. This custom of hoisting the flag of the vanquished beneath that of the victor is of comparatively modern date, as up to about a century ago the sign of victory was to trail the enemy's flag over the taffrail in the water. Each national flag must be flown from its own flagstaff, and this is 463 often seen when the allied forces of two or more powers are in joint occupation of a town or territory. To denote honour and respect a flag is "dipped." Ships at sea salute each other by "dipping" the flag, that is to say, by running it smartly down from the masthead, and then as quickly replacing it. When troops parade before the sovereign the regimental flags are lowered as they salute him. A flag flying half-mast high is the universal symbol of mourning. When a ship has to make the signal of distress, this is done by hoisting the national ensign reversed, that is to say, upside down. If it is wished to accentuate the imminence of the danger it is done by making the flag into a "weft," that is, by knotting it in the middle. This means of showing distress at sea is of very ancient usage, for in naval works written as far back as the reign of James I. we find the "weft" mentioned as a method of showing distress.

We have already alluded to the Union Jack as used for denoting nationality, and as a flag of command, but it also serves many other purposes. For instance, if a court-martial is being held on board any ship the Union Jack is displayed while the court is sitting, its hoisting being accompanied by the firing of a gun. In a fleet in company the ship that has the guard for the day flies it. With a white border it forms the signal for a pilot, and in this case is known as a Pilot Jack. In all combinations of signalling flags which denote a ship's name the Union Jack forms a unit. Lastly, it figures as the pall of every sailor or soldier of the empire who receives naval or military honours at his funeral.

BIBLIOGRAPHY.—See *Flags: Some Account of their History and Uses*, by A. MacGeorge (1881); *National Banners: Their History and Construction*, by W. Bland (1892) (one of a series of Heraldic Tracts, 1850-1892, Br. Museum Library, No. 9906, b. 9; this pamphlet gives the design of the national banners of St George, St Andrew and St Patrick, and illustrates and tells the story of the composition of the three flags into the great union flag, commonly known as the Union Jack); *Our Flags: Their Origin, Use and Traditions*, by Rear-Admiral S. Eardley-Wilmot (1901), an excellent treatise, historical and narrative, on all the flags of the British empire; *A History of the Flag of the United States* (Boston, 1872), by G.H. Preble; *Flags of the World: Their History, Blazonry and Associations*, by Edward Hulme, F.L.S., F.S.A. (1897), a most complete monograph on the subject, illustrated with a very complete series of plates; *Admiralty Book of Flags of all Nations*, printed for H.M. Stationery office, 1889, kept up to date by the publication periodically of Errata, officially issued under an admiralty covering letter; *Flags of Maritime Nations*, prepared by the Bureau of Equipment department of the navy, printed by authority (Washington, 1899). The last two works have no letterpress beyond titles, but contain, to scale, delineations of all the flags at present used officially by all nations. Between the two there are no discrepancies, and the delineation of a flag taken from either may be assumed as absolutely correct. Both are respectively the guides for flag construction in the royal navy and the United States navy.

(H. L. S.)

1 By the admission of Oklahoma as a state in 1907 the number of stars became 46, arranged from the top in horizontal rows thus: 8, 7, 8, 7, 8, 8 = 46.

FLAGELLANTS (from Lat. *flagellare*, to whip), in religion, the name given to those who scourge themselves, or are scourged, by way of discipline or penance. Voluntary flagellation, as a form of exalted devotion, occurs in almost all religions. According to Herodotus (ii. 40. 61), it was the custom of the ancient Egyptians to beat themselves during the annual festival in honour of their goddess Isis. In Sparta children were flogged before the altar of Artemis Orthia till the blood flowed (Plutarch, *Instit. Laced.* 40). At Alea, in the Peloponnese, women were flogged in the temple of Dionysus (Pausanias, Arcad. 23). The priests of Cybele, or *archigalli*, submitted to the discipline in the temple of the goddess (Plutarch, *Adv. Colot.* p. 1127; Apul., *Metam.* viii. 173). At the Roman Lupercalia women were flogged by the celebrants to avert sterility or as a purificatory ceremony (W. Mannhardt, *Mythol. Forsch.*, Strassburg, 1884, p. 72 seq.).

Ritual flagellation existed among the Jews, and, according to Buxtorf (*Synagoga judaica*, Basel, 1603), was one of the ceremonies of the day of the Great Pardon. In the Christian church flagellation was originally a punishment, and was practised not only by parents and schoolmasters, but also by bishops, who thus corrected offending priests and monks (St Augustine, *Ep. 159 ad Marcell.*; cf. *Conc. Agd.* 506, can. ii.). Gradually, however, voluntary flagellation appeared in the *libri poenitentiales* as a very efficacious means of penance. In the 11th century this new form of devotion was extolled by some of the most ardent reformers in the monastic houses of the west, such as Abbot Popon of Stavelot, St Dominic Loricatus (so called from his practice of wearing next his skin an iron *lorica*, or cuirass of thongs), and especially Cardinal Pietro Damiani. Damiani advocated the substitution of flagellation for the recitation of the penitential psalms, and drew up a

scale according to which 1000 strokes were equivalent to ten psalms, and 15,000 to the whole psalter. The majority of these reformers exemplified their preaching in their own persons, and St Dominic gained great renown by inflicting upon himself 300,000 strokes in six days. The custom of collective flagellation was introduced into the monastic houses, the ceremony taking place every Friday after confession.

The early Franciscans flagellated themselves with characteristic rigour, and it is no matter of surprise to find the Franciscan, St Anthony of Padua, preaching the praises of this means of penance. It is incorrect, however, to suppose that St Anthony took any part in the creation of the flagellant fraternities, which were the result of spontaneous popular movements, and later than the great Franciscan preacher; while Ranieri, a monk of Perugia, to whom the foundation of these strange communities has been attributed, was merely the leader of the flagellant brotherhood in that region. About 1259 these fraternities were distributed over the greater part of northern Italy. The contagion spread very rapidly, extending as far as the Rhine provinces, and, across Germany, into Bohemia. Day and night, long processions of all classes and ages, headed by priests carrying crosses and banners, perambulated the streets in double file, reciting prayers and drawing the blood from their bodies with leathern thongs. The magistrates in some of the Italian towns, and especially Uberto Pallavicino at Milan, expelled the flagellants with threats, and for a time the sect disappeared. The disorders of the 14th century, however, the numerous earthquakes, and the Black Death, which had spread over the greater part of Europe, produced a condition of ferment and mystic fever which was very favourable to a recrudescence of morbid forms of devotion. The flagellants reappeared, and made the state of religious trouble in Germany, provoked by the struggle between the papacy and Louis of Bavaria, subserve their cause. In the spring of 1349 bands of flagellants, perhaps from Hungary, began their propaganda in the south of Germany. Each band was under the command of a leader, who was assisted by two lieutenants; and obedience to the leader was enjoined upon every member on entering the brotherhood. The flagellants paid for their own personal maintenance, but were allowed to accept board and lodging, if offered. The penance lasted 33½ days, during which they flogged themselves with thongs fitted with four iron points. They read letters which they said had fallen from heaven, and which threatened the earth with terrible punishments if men refused to adopt the mode of penance taught by the flagellants. On several occasions they incited the populations of the towns through which they passed against the Jews, and also against the monks who opposed their propaganda. Many towns shut their gates upon them; but, in spite of discouragement, they spread from Poland to the Rhine, and penetrated as far as Holland and Flanders. Finally, a band of 100 marched from Basel to Avignon to the court of Pope Clement VI., who, in spite of the sympathy shown them by several of his cardinals, condemned the sect as constituting a menace to the priesthood. On the 20th of October 1349 Clement published a bull commanding the bishops and inquisitors to stamp out the growing heresy, and in pursuance of the pope's orders numbers of the sectaries perished at the stake or in the cells of the inquisitors and the episcopal justices. In 1389 the leader of a flagellant band in Italy called the *bianchi* was burned by order of the pope, and his following dispersed. In 1417, however, the Spanish Dominican St Vincent Ferrer pleaded the cause of the flagellants with great warmth at the council of Constance, and elicited a severe reply from John Gerson (*Epistola ad Vincentium*), who declared that the flagellants were showing a tendency to slight the sacramental confession and penance, were refusing to perform the *cultus* of the martyrs venerated by the church, and were even alleging their own superiority to the martyrs.

The justice of Gerson's protest was borne out by events. In Germany, in 1414, there was a recrudescence of the epidemic of flagellation, which then became a clearly-formulated heresy. A certain Conrad Schmidt placed himself at the head of a community of Thuringian flagellants, who took the name of Brethren of the Cross. Schmidt gave himself out as the incarnation of Enoch, and prophesied the approaching fall of the Church of Rome, the overthrow of the ancient sacraments, and the triumph of flagellation as the only road to salvation. Numbers of Beghards joined the Brethren of the Cross, and the two sects were confounded in the rigorous persecution conducted in Germany by the inquisitor Eylard Schöneveld, who almost annihilated the flagellants. This mode of devotion, however, held its ground among the lower ranks of Catholic piety. In the 16th century it subsisted in Italy, Spain and southern France. Henry III. of France met with it in Provence, and attempted to acclimatize it at Paris, where he formed bands divided into various orders, each distinguished by a different colour. The king and his courtiers joined in the processions in the garb of penitents, and scourged themselves with ostentation. The king's encouragement seemed at first to point to a successful revival of flagellation; but the practice disappeared along with the other forms of devotion that had sprung up at the time of the league, and Henry III.'s successor suppressed the Paris brotherhood. Flagellation was occasionally practised as a means of salvation by certain Jansenist convulsionaries in the 18th century, and also, towards the end of the 18th century, by a little Jansenist sect known as the Fareinists, founded by the brothers Bonjour, *curés* of Fareins, near Trévoux (Ain). In 1820 a band of flagellants appeared during a procession at Lisbon; and in the Latin countries, at the season of great festivals, one may still see brotherhoods of penitents flagellating themselves before the assembled faithful.

For an account of flagellation in antiquity see S. Reinach, *Cultes, mythes et religions* (vol. i. pp. 173-183, 1906), which contains a bibliography of the subject. For a bibliography of the practice in medieval times, see M. Röhricht, "Bibliographische Beiträge zur Gesch. der Geissler" in *Briegers Zeitschrift für Kirchengeschichte*, i. 313.

(P. A.)

FLAGELLATA, the name given to the Protozoa whose dominant phase is a "flagellula," or cell-body provided with one, few or rarely many long actively vibratile, cytoplasmic processes. Nutrition is variable:—(1) "Holozoic"; food taken in by ingestion, by amoeboid action either unspecialized or at one or more well-defined oral spots, or through an aperture (mouth); (2) "Saprophytic"; food taken in in solution through the

general surface of the body; (3) “Holophytic”; food-material formed in the coloured plasm by fixation of carbon from the medium, with liberation of oxygen, in presence of light, as in green plants. Fission in the “active” state occurs and is usually longitudinal. Multiple fission rarely occurs save in a sporocyst, and produces microzoospores, which in some cases may conjugate with others as isogametes or with larger forms (megagametes). “Hypnocysts” to tide over unfavourable conditions are not infrequent, but have no necessary relation to reproduction. Many have a firm pellicle which may form a hard shell: again a distinct cell-wall of chitin or cellulose may be formed: finally, an open cup, “theca,” of firm or gelatinous material may be present, with or without a stalk: such a cup and stalk are often found in colonial species, and are subject to much the same conditions as in Infusoria. The nucleus is simple in most cases; but in Haemoflagellates it is connected with a second nucleus, which again is in immediate relation with the motile apparatus; the former is termed the “tropho-nucleus,” the latter the “kineto-nucleus.”

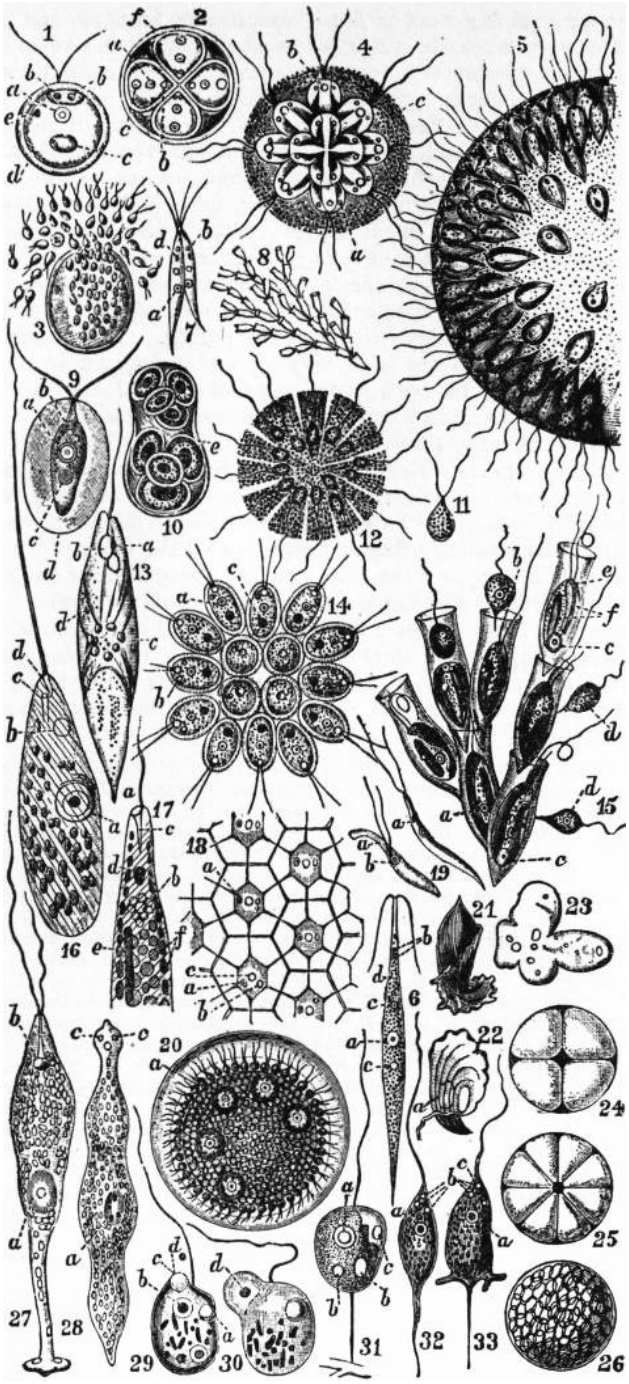


FIG. 1.—Flagellata.

1. *Chlamydomonas pulvisculus*, Ehr. (*Chlamydomonadidae*) free-swimming individual.
   a = nucleus.
   b = contractile vacuole.
   c = starch corpuscle.
   d = cellulose investment.
   e = stigma (eye-spot).
2. Resting stage of the same, with fourfold division of the cell-contents. Letters as before.
3. Breaking up of the cell-
16. *Peranema trichophorum*, Ehr. (Peranemidae), creeping individual seen from the back; × 140.
   c = pharynx.
   d = mouth.
17. Anterior end of *Euglena acus*, Ehr., in profile.
   a = mouth.
   b = vacuoles.
   c = pharynx.
   d = stigma (eye-spot).
   e = paramylum-body.
   f = chlorophyll

contents into minute biflagellate swarm-spores, which escape, and whose history is not further known.

4. *Syncrypta volvox*, Ehr. (*Chrysomonadidae*). A colony enclosed by a common gelatinous test c.
   a = stigma.
   b = vacuole (non-contractile).
5. *Uroglena volvox*, Ehr. (*Chrysomonadidae*). Half of a large colony, the flagellates embedded in a common jelly.
6. *Chlorogonium euchlorum*, Ehr. (*Chlamydomonadidae*).
   a = nucleus.
   b = contractile vacuole.
   c = starch grain.
   d = eye-spot.
7. *Chlorogonium euchlorum*, Ehr. (*Chlamydomonadidae*). Copulation of two liberated microgonidia.
   a = nucleus.
   b = contractile vacuole.
   d = eye-spot (so-called).
8. Colony of *Dinobryon sertularia*, Ehr. (*Chrysomonadidae*).
9. *Haematococcus palustris*, Girod (= *Chlamydococcus*, Braun, *Protococcus*, Cohn), one of the *Chrysomonadidae*; ordinary individual with widely separated test.
   a = nucleus.
   b = contractile vacuole.
   c = amylon nucleus (pyrenoid).
10. Dividing resting stage of the same, with eight fission products in the common test e.
11. A microgonidium of the same.
12. *Phalansterium consociatum*, Cienk. (*Choanoflagellata*); × 325. Disk-like colony.
13. *Euglena viridis*, Ehr.; × 300 (*Euglenidae*).
   a = pigment spot (stigma).
   b = clear space.
   c = paramylum granules.
   d = chromatophor (endochrome plate).
14. *Gonium pectorale*, O. F. Müller (*Volvocineae*). Colony seen from the flat side; × 300.
   a = nucleus.
   b = contractile vacuole.
   c = amylon nucleus.
15. *Dinobryon sertularia*, Ehr. (*Chrysomonadidae*).
   a = nucleus.
   b = contractile vacuole.
   c = amylon nucleus.
   d = free colourless flagellates, probably not belonging to Dinobryon.
   e = stigma (eye-spot).
   f = chromatophors.
16. Part of the surface of a colony of *Volvox globator*, L. (*Volvocidae*), showing the intercellular connective fibrils.
   a = nucleus.
   b = contractile vacuole.
   c = starch granule.
17. Two microgametes (spermatozoa) of *Volvox globator*, L.
   a = nucleus.
   b = contractile vacuole.
18. Ripe asexually produced daughter-individual of *Volvox minor*, Stein, still enclosed in the cyst of the partheno-gonidium.
   a = young, partheno-gonidia.
19. 22. *Trypanosoma sanguinis*, Gruby (*Haematoflagellates*), from the blood of *Rana esculenta*.
   a = nucleus; × 500.
20. 23-26. Reproduction of *Bodo caudatus*, Duj. (*Bodonidae*), after Dallinger and Drysdale:—23, fusion of several individuals (plasmodium); 24, encysted fusion-product dividing into four; 25, later into eight; 26, cyst filled with swarm-spores.
21. *Distigma proteus*, Ehbg., O.F. Müller (*Euglenidae*); × 440. Individual with the two flagella, and strongly contracting hinder region of the body.
22. The same devoid of flagella.
   c, *c* = the two dark pigment spots (so-called eyes) near the mouth.
23. *Oicomonas termo* (*Monas termo*) Ehr. (one of the *Oicomonadidae*).
   c = food-ingesting vacuole.
   d = food-particle; × 440.
24. The food-particle *d* has now been ingested by the vacuole.
25. *Oicomonas mutabilis*, Kent (*Oicomonadidae*), with adherent stalk.
   a = nucleus.
   b = contractile vacuole.
   c = food-particle in food vacuole.
26. 33. *Cercomonas crassicauda*, Duj. (*Oicomonadidae*), showing two conditions of the pseudo-podium-protruding tail.
   a = nucleus.
   b = contractile vacuoles.
   c = mouth.

As reserves the protoplasm may contain oil, starch, paramylum, leucosin (a substance soluble in water,

and of doubtful composition), proteid granules. In the holophytic forms the cytoplasm contains specialized parts of more or less definite form, known generally as “plastids” or “chromatophores” impregnated with a lipochrome pigment, whether green (chlorophyll), yellow or brown (diatomin or some allied pigment), or again red (chlorophyll with phycoerythrin). In the active condition of such coloured holophytic forms there is usually at least one anterior “eye-spot,” of a refractive globule embedded behind in a collection of red pigment granules. The single anterior “flagellum tractellum” of so many of the larger forms acts by the bending over of its free end in consecutive meridians, so as to describe a hollow cone with its apex backwards: we may imitate this by bending the head of a slender sapling round and round while it is implanted in the soil; and the result is to push the water backwards, or in other words to pull the body forwards, the whole rotating on its longitudinal axis as it moves on (Y. Delage). An anterior lateral trailing flagellum may modify this axial rotation, and help in steering. When the animal is at rest—attached by its base or with its body so curved as to resist onward motion—the current produced by the tractellum will bring suspended particles up against the protoplasm at its base of insertion. As noted by E.R. Lankester, the posterior flagellum of many Haemoflagellates, like that of the spermatozoon of Metazoa, propels the cell by a sculling motion behind; he terms it a “pulsellum.” Such flagellar motion is distinct from that of cilia, which always move backwards and forwards, with a swift downstroke and a slower recovery in the same plane; though where the flagella are numerous they may behave in this way, and indeed flagella agree with cilia in being mere vibratory extensions of cytoplasm. Symmetrically placed flagella may have a symmetrical reciprocating motion like that of cilia.

Many of the Flagellata are parasitic (some haematozoic); the majority live in the midst of putrefying organic matter in sea and fresh waters, but are not known to be active as agents of putrefaction. Dallinger and Drysdale have shown that the spores of *Bodo* and others will survive an exposure to a higher temperature than do any known Schizomycetes (Bacteria), viz. 250° to 300° Fahr., for ten minutes, although the adults are killed at 180°.

The Flagellata are for the most part very minute; the Protomastigopoda rarely exceeding 20 μ in length. The Euglenaceae contain the largest species, up to 130 μ in length, exclusive of the flagellum.

Our classification is modified from those of Senn (in Engler and Prantl, *Pflanzenfamilien*) and Hartog (in *Cambridge Natural History*).

I. RHIZOFLAGELLATA (PANTOSTOMATA)

Food taken in by pseudopodia at any part of the body.

Order 1.—**HOLOMASTIGACEAE**. Body homaxial with uniform flagella. *Multicilia* (Cienkowski); *Grassia* (Fisch, in frog’s blood and gastric mucus).

Order 2.—**RHIZOMASTIGACEAE**. Flagellum 1, 2 or few, diverging from anterior end. *Mastigamoeba* (F.E. Schulze).

II. EUFLAGELLATA

Food taken in at one or more definite mouth-spots, or by a true mouth, or by absorption; or nutrition holophytic.

Order 1.—**PROTOMASTIGACEAE**. Contractile vacuole simple, one or more, or absent; either holozoic, ingesting food by a mouth-spot (or 2 or more), saprophytic, or parasitic.

Family 1.—Oicomonadidae. Flagellum 1, sometimes with a tail-like posterior prominence passing into a temporary flagellum, but without other cytoplasmic processes. *Oicomonas* (Kent); *Cercomonas* (Dujardin) (Fig. 1, *32, 33*); *Codonoeca* (James-Clark), with a gelatinous theca.

Family 2.—Bicoecidae. Differs from *Oicomonadidae* in a unilateral proboscidiform process next the flagellum; often thecate and stalked, forming branched colonies, like Choanoflagellates in habit. *Bicoeca* (J.-Cl.), *Poteriodendron*.

Family 3.—Choanoflagellidae (Choanoflagellata, Kent; Craspedomonadina, Stein). As in previous families, but with flagellum surrounded by an obconical or cylindrical rim of cytoplasm, at the base of which is the ingestive area. The cells of this group have the morphology of the flagellate cells (choanocytes) of sponges. They are often colonial, and in the gelatinous colony of *Proterospongia*, the more internal cells (Fig. 2, *15*) pass into a definite “reproductive state.” Many stalked forms are epizoic on Entomostracan Crustacea.

(*a*) Naked forms often stalked: *Monosiga* (Kent), stalked solitary; *Codosiga* (Kent) (Fig. 2, *3*), stalked social; *Desmarella* (Kent), unstalked, and *Astrosiga* (Kent), stalked, form floating colonies.

(*b*) Forms enclosed in a vase-like shell: *Salpingoeca* (J.-Cl.); (Fig. 2, *1, 6, 7*) recalling the habit of *Monosiga* and *Cod siga*; *Polyoeca* forming a branched free swimming colony.

(*c*) Forms surrounded by a gelatinous sheath: *Proterospongia* (Kent) (Fig. 2, *15*); *Phalansterium* (Cienk.) (Fig. 1, *12*), has a slender cylindrical collar, and a branching tubular stalk.

Family 4.—Haemoflagellidae. Forms with a complex nuclear apparatus, and a muscular undulating membrane with which one or two flagella are connected, parasitic in Metazoa (often in the blood). *Trypanosoma* (Gruby) (Fig. 1, *21, 22*), *Herpetomonas*(Kent), *Treponema* (Vuillemin)(= *Spirochaete*, auctt., nec. Ehrbg.).

Family 5.—Amphimonadidae. Flagella 2 anterior, both directed forward, equal and similar; in stalk sheath, &c., often recalling Choanoflagellata, *Amphimonas* (Kent), *Diplomitus* (Kent); *Spongomonas* (St.), with thick branching gelatinous sheath.

Family 6.—Monadidae. Flagella 2 (3), anterior all directed forwards, one long the other (or 2) accessory, short.
Monas (St.); *Anthophysa* (Bory) (Fig. 2, *12, 13*), with the stalk composed of the accumulation of faeces at the hinder end of the cells of the colony.

Family 7.—Bodonidae. Flagella 2 (or 3) 1 anterior, the other (1 or 2) antero-lateral and trailing or becoming fixed at the end to form a temporary anchor.
Bodo (Ehrb.) (figs. 1, *23-26* and 2, *10*). *B. lens* is the “hooked” and *B. saltans* the “springing monad” of Dallinger and Drysdale; *Dallingeria* (Kent) with a pair of antero-lateral flagella; *Costia necatrix* (Leclerq) is also 3-flagellate; causes destructive epidemics in fish-hatcheries.

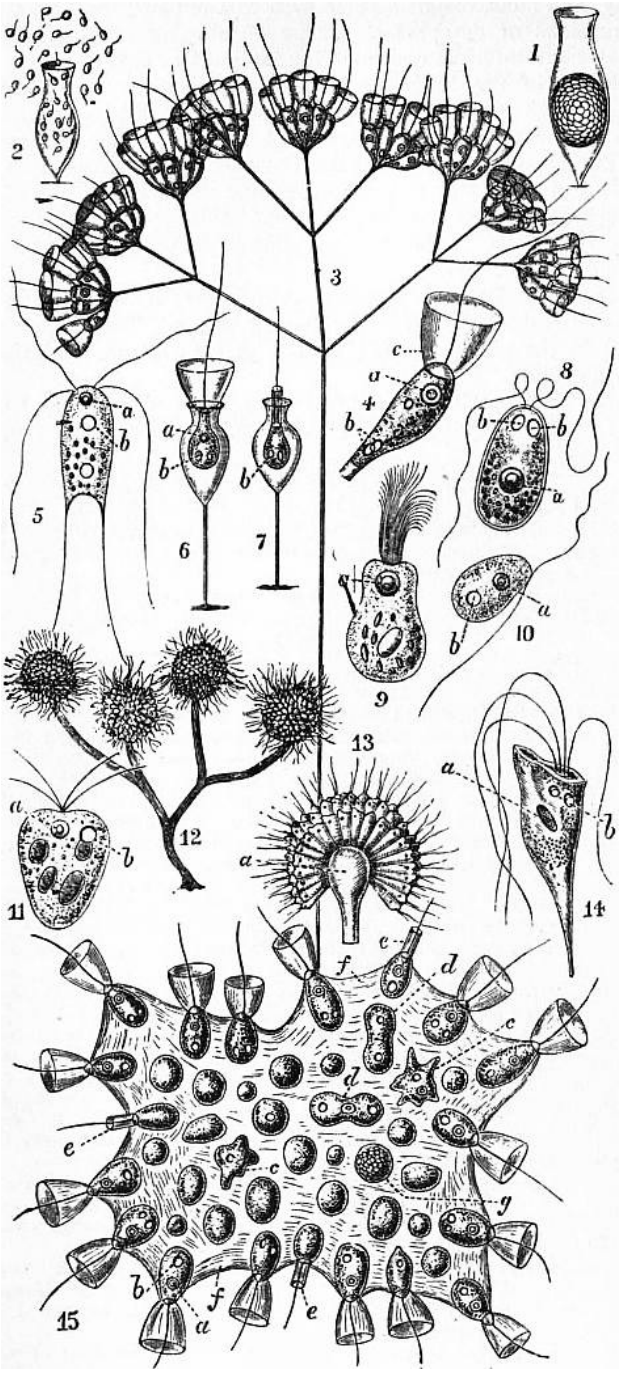


FIG. 2.—Flagellata.

1. *Salpingoeca fusiformis*, S. Kent (Choanoflagellata). The protoplasmic body is drawn together within the goblet-shaped shell, and divided into numerous spores.
2. Escape of the spores of the same as monoflagellate and swarm-spores.
3. *Codosiga umbellata*, Tatem (Choanoflagellata); adult colony formed by dichotomous growth.
4. A single zooid of the same.
   a = nucleus.
   b = contractile vacuole.
   c = the characteristic "collar" of naked streaming protoplasm.
5. *Hexamita inflata*, Duj. (*Distomatidae*); normal adult.
6, 7 *Salpingoeca urceolata*, S Kent (*Choanoflagellata*)—6, with collar extended; 7, with collar retracted within the stalked cup.
12. *Anthophysa vegetans*, O.F. Müller (*Monadidae*). A typical, erect, shortly-branching colony stock with four terminal monad-clusters.
13. Monad cluster of the same in optical section, showing the relation of the individual monads or flagellate zooids to the stem *d*.
14. *Tetramitus rostratus*, Perty (*Tetramitidae*).
   a = nucleus.
   b = contractile vacuole.
15. *Proterospongia Haeckeli*, Saville Kent (Choanoflagellata); A social colony of about forty flagellate zooids.
   a = nucleus.
   b = contractile vacuole.
   c = amoebiform cell sunk within the colonial gelatinous test compared by S. Kent to a mesoderm cell of the sponges.

8 *Polytoma uvella*, Mull. sp. (*Chlamydomonadidae*).
9. *Lophomonas blattarum*, Stein (*Trichonymphidae*) from the intestine of *Blatta orientalis*.
10. *Bodolens*, Mull. (*Bodonidae*), the wavy filament is a tractellum, the straight one is a trailing thread.
11. *Tetramitus sulcatus*, Stein (*Tetramitidae*)

d = similar cell reproducing by transverse fission.
e = normal cells, with their collars contracted.
f = substance of test.
g = individual reproducing by multiple fission, producing microzoospores, comparable to the spermatozoa of sponges.

Family 8.—Tetramitidae. Body pyriform, the pointed end posterior; flagella 4 anterior.

Tetramitus (Perty) (*T. calycinus* of Kent, Fig. 2, *11, 14*), is the "calycine monad" of Dallinger and Drysdale; *Trichomonas*, Donné, possesses a longitudinal undulating membrane, and is an innocuous human parasite; it is possibly related to Haemoflagellates on one hand and to *Trichonymphidae* on the other.

Family 9.—Distomatidae. Mouth-spots two, or one, with a distinct construction; flagella symmetrically arranged; nucleus bilobed or geminate. *Hexamitus* (Duj.) (Fig. 2, *5*), saprophytic and parasitic; *Trepomonas* (Duj.), freshwater; *Megastoma* (Grassi) (= *Lamblia* of Blanchard), with constricted mouth-spot and blepharoplast (kineto-nucleus) parasitic in the small intestine of Mammals, including Man.

Family 10.—Trichonymphidae. Flagella numerous, sometimes accompanied by one or more undulating membranes; cytoplasm highly differentiated; contractile vacuole absent; all parasitic in insects (all except *Lophomonas* in Termites—the so-called White Ants.)
Lophomonas(St.) (Fig. 2, *9*); parasitic in the cockroach; *Dinenympha* (Leidy), *Pyrsonympha* (Leidy); *Trichenympha* (Leidy) (Fig. 3, *1*).

Family 11.—Opalinidae. Flagella short, numerous, ciliform. uniformly distributed over the flat oval body; nuclei small, numerous, uniform.
Only genus, *Opalina* (Purkinje and Valentin) (Fig. 3, *2-6*), in bladder and cloaca of the frog (usually regarded as an aberrant ciliate, but E.R. Lankester expressed doubts as to its position in the 9th edition of this encyclopaedia).

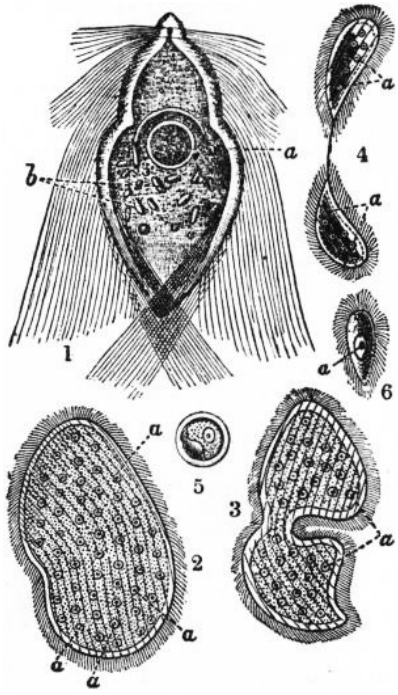


Fig. 3.

1. *Trichonympha agilis*, Leidy, from gut of White Ant (Termite).
2. *Opalina ranarum*, Purkinje parasitic in frog rectum multinucleate adult.
3, 4. Binary fissions of same, 1-nucleat individual at final stage of fission.
5. Same encysted dejected from rectum to be swallowed by tadpole.
6. Young 1-nucleate individual emerged from cyst, destined to grow, proliferating its nuclei to adult form.
a = nucleus.
b = food (?) particles in Fig. 1.

Order 2.—**CHRYSOMONADACEAE.** Contractile vacuole simple (in freshwater forms) or absent; plastids yellow or brown always present; reserves fat.

Family 1.—Chrysomonadidae. Body naked, often amoeboid in active state, or sometimes with a cup-like theca, a gelatinous investment, a firm cuticle, or silicified shell; reserves fat or leucosin (starch in *Zooxanthella*); eye-spot present. *Chromulina* (Cienk.) often forms a golden scum on tanks; *Chrysamoeba* (Klebs); *Hydrurus* (Agardh), theca of colony forming branching tubes, simulating a yellow Conferva in mountain torrents; *Dinobryon* (Ehrb.) (Fig. 1, *8, 15*); *Stylochrysalis* (St.); *Uroglena* (Ehrb.); *Syncrypta* (Ehrb.), and *Synura* (Ehrb.) (Fig. 1, *5*) form floating spherical colonies; *Zooxanthella* (Brandt), symbiotic as "yellow cells" in Radiolaria *Foraminifera*, *Millepora*, and many Actinozoa.

Family 2.—Coccolithophoridae. Body invested in a spherical test strengthened by calcareous elements, tangential circular plates, "coccoliths," "discoliths," "cyatholiths," or radiating rods "rhabdoliths." These are often found in Foraminiferal ooze and its fossil condition, chalk; when coherent as in the complete test, they are known as "coccospheres" and "rhabdospheres." *Coccolithophora* (Lohmann), *Rhabdosphaera* (Haeckel).

Order 3.—**CRYPTOMONADACEAE.** Contractile vacuole (in freshwater forms) simple; plastids green, more rarely red, brown or absent; reserves starch; holophytic or saprophytic. *Cryptomonas* (Ehrb.); *Paramoeba* (Greeff) has yellow plastids and shows two cycles, in the one amoeboid, finally encysting to produce a brood of flagellulae; in the other flagellate, and multiplying by longitudinal fission (it differs from *Mastigamoeba* in possessing no flagellum in the amoeboid state, though it takes in food amoeba-fashion); *Chilomonas* (Ehrb.).

Order 4.—**CHLOROMONADACEAE.** Contractile vacuoles 1-3, a complex of variable arrangement; pellicle delicate; plastids discoid chlorophyll-bodies; reserves oil; eye-spot absent even in active state; holophytic or saprophytic, though with an anterior blind tubular depression simulating a pharynx. *Coelomonas* (St.), *Vacuolaria* (Cienk.).

Order 5.—**EUGLENACEAE.** Vacuole large, a reservoir for one or more accessory vacuoles, contractile and opening to the surface by a canal ("pharynx") in which are planted one or two strong flagella; pellicle strong often striated; nucleus large, chromatophores green, complex or absent; reserves paramylum granules of definite shape, and oil; nutrition variable; body stiff or "metabolic," never amoeboid. Among the true Flagellates these are the largest, few being below 40 μ and several attaining 130 μ in length of cell-body (excluding flagellum). Encysted condition common; the green forms sometimes multiply in this state and simulate unicellular Algae.

Family 1.—Euglenidae. Radial (monaxial) forms; nutrition saprophytic or holophytic, mostly one flagellate. (1) Chromatophore large; eye-spot conspicuous. *Euglena* (Ehrb.) (Fig. 1, *13, 17*), with flexible cuticle and metabolic

movements (this is probably Priestley's "green matter" through which he obtained oxygen gas)—a very common genus; *Colacium* (Ehbg.), in its resting state epizoic on Copepoda, which it colours green; *Eutreptia* (Perty), biflagellate; *Ascoglena* (St.); *Trachelomonas* (Ehrb.), with a hard brown cuticle; *Phacus* (Nitszche), with a firm rigid pellicle, often symmetrically flattened; *Cryptoglena* (Ehbg.). (2) Chromatophores absent. *Astasia* (Duj.), body metabolic; *Menoidium* (Perty), body not metabolic, somewhat inflected and crescentic; *Sphenomonas* (Stein), with a short accessory trailing flagellum in front peeled; *Distigma* (Ehbg.) (Fig. 1, *27, 28*), very metabolic, with two unequal flagella and two dark pigment spots.

Family 2.—Peranemidae. Bilaterally symmetrical, often creeping, pharynx highly developed, with a firm rod-like skeleton, sometimes protrusible; nutrition saprophytic and holozoic. *Peranema* (Ehbg.) and *Urceolus* (Mereschowsky), uni-flagellate creeping, very metabolic. *Petalomonas* (St.), uni-flagellate flattened with a deep ventral groove, not metabolic; *Heteronema* (Duj.) and *Tropidoscyphus* (St.), with a small accessory anterior trailing flagellum; *Anisonema* (Duj.) and *Entosiphon* (St.), with the trailing flagellum as long as the tractellum or even much longer.

Order 6.—**VOLVOCACEAE.** Contractile vacuole simple anterior; cell always enclosed in a cellulose wall (sometimes gelatinous) perforated by the two (more rarely four, five) diverging anterior flagella; reserves starch; chlorophyll almost always present, except in *Polytoma*, sometimes masked by a red pigment; nutrition usually holophytic, rarely saprophytic, never holozoic. Brood-division in active state common, radial.

Family 1.—Chlamydomonadidae. Cell-wall firm not gelatinous, rarely forming colonies. Fore-end of the body with two or four (seldom five) flagella. Almost always green in consequence of the presence of a very large single chromatophore. Generally a delicate shell-like envelope of membranous consistence. 1 to 2 simple contractile vacuoles at the base of the flagella. Usually one eye-speck. Division of the protoplasm within the envelope may produce four, eight or more new individuals. This may occur in the swimming or in a resting stage. Also by more continuous fission microgametes of various sizes are formed. Conjugation is frequent.

Genera.—*Chlorangium* (Stein), lacking green chlorophyll; *Chlorogonium* (Ehr.) (Fig. 1, *6, 7*); *Polytoma* (Ehr.) (Fig. 2, *8*); *Chlamydomonas* (Ehr.) (Fig. 1, *1, 2, 3*); *Haematococcus* (Agardh) (= *Chlamydococcus*, A. Braun, Stein); *Protococcus* (Conn, Huxley and Martin); *Chlamydomonas* (Cienkowski), causes red snow and "bloody rain"; *Carteria* (Diesing), quadri-flagellate; *Spondytomorum* (Ehrb.), forming floating colonies; *Coccomonas* (St.); *Phacotus* (Perty); *Zoochlorella* (Brandt), is the name given to undetermined Chlamydomonads found multiplying in the resting state within and in symbiotic relation to other Protozoa, to the freshwater sponge, *Ephydatia*, *Hydra viridis*, and to the Turbellarian, *Convoluta viridis* (in which last species the active form has been recognized as a *Carteria*).

Family 2.—Volvocidae. Cell-wall gelatinous; always associated in colonies; cells, as in Family 1. The number of individuals united to form a colony varies very much, as does the shape of the colony. Reproduction by the continuous division of all or of only certain individuals of the colony, resulting in the production of a daughter colony (from each such individual). In some, probably in all, at certain times copulation of the individuals of distinct sexual colonies takes place, without or with a differentiation of the colonies and of the copulating cells as male and female. The result of the copulation is a resting zygospore (also called zygote or oospermo or fertilized egg), which after a time develops itself into one or more new colonies.

Genera.—*Gonium* (O.F. Müller) (Fig. 1, *14*); *Stephanosphaera* (Cohn); *Pandorina* (Bory de Vine); *Eudorina* (Ehr.); *Volvox* (Ehr.) (Fig. 1, *18, 20*).

The sexual reproduction of the colonies of the Volvocaceae is one of the most important phenomena presented by the Protozoa. In some families of Flagellata full-grown individuals become amoeboid, fuse, encyst, and then break up into flagellate spores which develop simply to the parental form (Fig. 1, *23* to *26*). In the *Chlamydomonadidae* a single adult individual by division produces small individuals, so-called "microgametes." These conjugate with one another or with similar microgametes formed by other adults (as in Chlorogonium, Fig. 1, *7*); or more rarely in certain genera a microgamete conjugates with an ordinary individual megagamete. The result in either case is a "zygote," a cell formed by fusion of two which divides in the usual way to produce new individuals. The microgamete in this case is the male element and equivalent to a spermatozoon; the megagamete is the female and equivalent to an egg-cell. The zygote is a "fertilized egg," or oosperm. In some colony-building forms we find that only certain cells produce by division microgametes; and, regarding the colony as a multicellular individual, we may consider these cells as testis-cells and their microgametes as spermatozoa.

Cystoflagellata(Rhynchoflagellata of E.R. Lankester) and Dinoflagellata are scarcely more than subdivisions of Flagellata; but, following O. Bütschli, we describe them separately; the three groups being united into his Mastigophora.

Further Remarks on the Flagellates.—Besides the work of special Protozoologists, such as F. Cienkowski, O. Bütschli, F. v. Stein, F. Schaudinn, W. Saville Kent, &c., the Flagellates have been a favourite study with botanists, especially algologists: we may cite N. Pringsheim, F. Cohn, W.C. Williamson, W. Zopf, P.A. Dangeard, G. Klebs, G. Senn, F. Schütt; the reason for this is obvious. They present a wide range of structure, from the simple amoeboid genera to the highly differentiated cells of Euglenaceae, and the complex colonies of *Proterospongia* and *Volvox*. By some they are regarded as the parent-group of the whole of the Protozoa—a position which may perhaps better be assigned to the Proteomyxa; but they seem undoubtedly ancestral to Dinoflagellates and to Cystoflagellates, as well as to Sporozoa, and presumably to Infusoria. Moreover, the only distinction between the *Chlamydomonadidae* and the true green Algae or Chlorophyceae is that when the former divide in the resting condition, or are held together by gelatinization of the older cell-walls (*Palmella* state), they round off and separate, while the latter divide by a "party wall" so as to give rise either to a cylindrical filament when the partitions are parallel and the axis of growth constant (*Conferva* type), or to a plate of tissue when the directions alternate in a plane. The same holds good for the Chrysomonadaceae and Cryptomonadaceae, so that these little groups are included in all text-books of botany. Again among Fungi, the zoospores of the Zoosporous Phycomycetes (Chytrydiaceae, Peronosporaceae, Saprolegniaceae) have the characters of the *Bodonidae*. Thus in two directions the Flagellates lead up to undoubted Plants. Probably also the Chlamydomonads have an ancestral relation to the Conjugatae in the widest sense, and the Chrysomonadaceae to the Diatomaceae; both groups of obscure affinity, since even the reproductive bodies have no special organs of locomotion. For these reasons the Volvocaceae, Chloromonadaceae, Chrysomonadaceae and Cryptomonadaceae have been united as Phytoflagellates; and the Euglenaceae might well be added to these. It is easy to understand the relation of the saprophytic and the holophytic Flagellates to true plants. The capacity to absorb nutritive matter in solution (as contrasted with the ingestion of solid matter) renders the encysted condition compatible with active growth, and what in holozoic forms is a true hypnocyst, a state in which all functions are put to sleep, is here only a rest from active locomotion, nutrition being only limited by the supply of nutritive matter from without, and—in the case of holophytic species—by the illumination: this latter condition naturally limits the possible growth in thickness in holophytes with undifferentiated tissues. The same considerations apply indeed to the larger parasitic organisms among Sporozoa, such as Gregarines and Myxosporidia and Dolichosporidia, which are giants among Protozoa.

Literature.—W.S. Kent, *Manual of the Infusoria*, vol. i. Protozoa (1880-1882); O. Bütschli, *Die Flagellaten* (in Bronn's *Thierreich*, vol. i. Protozoa, 1885); these two works contain full bibliographies of the antecedent

authors. See also J. Goroschankin (on Chlamydomonads) in *Bull. Soc. Nat.* (Moscow, iv. v., 1890-1891); G. Klebs, "Flagellatenstudien" in *Zeitsch. Wiss. Zool.* lv. (1892); Doflein, *Protozoen als Krankheitserreger* (1900); Senn, "Flagellaten," in Engler and Prantl's *Pflanzenfamilien*, 1 Teil, Abt. 1a (1900); R. Francé, *Der Organismus der Craspedomonaden* (1897); Grassi and Sandias, "Trichonymphidae," in *Quart. J. Micr. Sci.* xxxix.-xl. (1897); Bezzenberger, "Opa inidae" in *Arch. Protist*, iii. (1903); Marcus Hartog, "Protozoa," in *Cambridge Nat. Hist.* vol. i. (1906).

(M. Ha.)

FLAGEOLET, in music, a kind of *flute-à-bec* with a new fingering, invented in France at the end of the 16th century, and in vogue in England from the end of the 17th to the beginning of the 19th century. The instrument is described and illustrated by Mersenne,[1] who states that the most famous maker and player in his day was Le Vacher. The flageolet differed from the recorder in that it had four finger-holes in front and two thumb-holes at the back instead of seven finger-holes in front and one thumb-hole at the back. This fingering has survived in the French flageolet still used in the provinces of France in small orchestras and for dance music. The arrangement of the holes was as follows: 1, left thumb-hole at the back near mouthpiece; 2 and 3, finger-holes stopped by the left hand; 4, finger-hole stopped by right hand; 5, thumb-hole at the back; 6, hole near the open end. According to Dr Burney (*History of Music*) the flageolet was invented by the Sieur Juvigny, who played it in the *Ballet comique de la Royne*, 1581. Dr Edward Browne,[2] writing to his father from Cologne on the 20th of June 1673, relates, "We have with us here one ... and Mr Hadly upon the flagelet, which instrument he hath so improved as to invent large ones and outgoe in sweetnesse all the basses whatsoever upon any other instrument." About the same time was published Thomas Greeting's *Pleasant Companion; or New Lessons and Instructions for the Flagelet* (London, 1675 or 1682), a rare book of which the British Museum does not possess a copy. The instrument retained its popularity until the beginning of the 19th century, when Bainbridge constructed double and triple flageolets.[3] The three tubes were bored parallel through one piece of wood communicating near the mouthpiece which was common to all three. The lowest notes of the respective tubes were 

The word flageolet was undoubtedly derived from the medieval Fr. *flajol*, the primitive whistle-pipe.

(K. S.)

1 *Harmonie universelle* (Paris, 1636), bk. v. pp. 232-237.

2 See Sir Thomas Browne's Works, vol. i. p. 206.

3 See Capt. C.R. Day, *Descriptive Catalogue of Musical Instruments* (London, 1891), pp. 18-22 and pl. 4; also *Complete Instructions for the Double Flageolet* (London, 1825); and *The Preceptor, or a Key to the Double Flageolet* (London, 1815).

FLAGSHIP, the vessel in a fleet which carries the flag, the symbol of authority of an admiral.

FLAHAUT DE LA BILLARDERIE, AUGUSTE CHARLES JOSEPH, Comte de (1785-1870), French general and statesman, son of Alexandre Sébastien de Flahaut de la Billarderie, comte de Flahaut, beheaded at Arras in February 1793, and his wife Adélaide Filleul, afterwards Mme de Souza (*q.v.*), was born in Paris on the 21st of April 1785. Charles de Flahaut was generally recognized to be the offspring of his mother's liaison with Talleyrand, with whom he was closely connected throughout his life. His mother took him with her into exile in 1792, and they remained abroad until 1798. He entered the army as a volunteer in 1800, and received his commission after the battle of Marengo. He became aide-de-camp to Murat, and was wounded at the battle of Landbach in 1805. At Warsaw he met Anne Poniatowski, Countess Potocka, with whom he rapidly became intimate. After the battle of Friedland he received the Legion of Honour, and returned to Paris in 1807. He served in Spain in 1808, and then in Germany. Meanwhile the Countess Potocka had established herself in Paris, but Charles de Flahaut had by this time entered on his liaison with Hortense de Beauharnais, queen of Holland. The birth of their son was registered in Paris on the 21st of October 1811 as Charles Auguste Louis Joseph Demorny, known later as the due de Morny. Flahaut fought with distinction in the Russian campaign of 1812, and in 1813 became general of brigade, aide-de-camp to the emperor, and, after the battle of Leipzig, general of division. After Napoleon's abdication in 1814 he submitted to the new government, but was placed on the retired list in September. He was assiduous in his attendance on Queen Hortense until the Hundred Days brought him into active service again. A mission to Vienna to secure the return of Marie Louise resulted in failure. He was present at Waterloo, and afterwards sought to place Napoleon II. on the throne. He was saved from exile by Talleyrand's influence, but was placed under police surveillance. Presently he elected to retire to Germany, and thence to England, where he married Margaret, daughter of Admiral George Keith Elphinstone, Lord Keith, and after the latter's death Baroness Keith in her own right. The French ambassador opposed the marriage, and Flahaut resigned his

commission. His eldest daughter, Emily Jane, married Henry, 4th marquess of Lansdowne. The Flahauts returned to France in 1827, and in 1830 Louis Philippe gave the count the grade of lieutenant-general and made him a peer of France. He remained intimately associated with Talleyrand's policy, and was, for a short time in 1831, ambassador at Berlin. He was afterwards attached to the household of the duke of Orleans, and in 1841 was sent as ambassador to Vienna, where he remained until 1848, when he was dismissed and retired from the army. After the *coup d'état* of 1851 he was again actively employed, and from 1860 to 1862 was ambassador at the court of St James's. He died on the 1st of September 1870. The comte de Flahaut is perhaps better remembered for his exploits in gallantry, and the elegant manners in which he had been carefully trained by his mother, than for his public services, which were not, however, so inconsiderable as they have sometimes been represented to be.

See A. de Haricourt, *Madame de Souza et sa famille* (1907).

FLAIL (from Lat. *flagellum*, a whip or scourge, but used in the Vulgate in the sense of "flail"; the word appears in Dutch *vlegel*, Ger. *Flegel*, and Fr. *fléau*), a farm hand-implement formerly used for threshing corn. It consists of a short thick club called a "swingle" or "swipple" attached by a rope or leather thong to a wooden handle in such a manner as to enable it to swing freely. The "flail" was a weapon used for military purposes in the middle ages. It was made in the same way as a threshing-flail but much stronger and furnished with iron spikes. It also took the form of a chain with a spiked iron ball at one end swinging free on a wooden or iron handle. This weapon was known as the "morning star" or "holy water sprinkler." During the panic over the Popish plot in England from 1678 to 1681, clubs, known as "Protestant flails," were carried by alarmed Protestants (see Green Ribbon Club).

FLAMBARD, RANULF, or Ralph (d. 1128), bishop of Durham and chief minister of William Rufus, was the son of a Norman parish priest who belonged to the diocese of Bayeux. Migrating at an early age to England, the young Ranulf entered the chancery of William I. and became conspicuous as a courtier. He was disliked by the barons, who nicknamed him Flambard in reference to his talents as a mischief-maker; but he acquired the reputation of an acute financier and appears to have played an important part in the compilation of the Domesday survey. In that record he is mentioned as a clerk by profession, and as holding land both in Hants and Oxfordshire. Before the death of the old king he became chaplain to Maurice, bishop of London, under whom he had formerly served in the chancery. But early in the next reign Ranulf returned to the royal service. He is usually described as the chaplain of Rufus; he seems in that capacity to have been the head of the chancery and the custodian of the great seal. But he is also called treasurer; and there can be no doubt that his services were chiefly of a fiscal character. His name is regularly connected by the chroniclers with the ingenious methods of extortion from which all classes suffered between 1087 and 1100. He profited largely by the tyranny of Rufus, farming for the king a large proportion of the ecclesiastical preferments which were illegally kept vacant, and obtaining for himself the wealthy see of Durham (1099). His fortunes suffered an eclipse upon the accession of Henry I., by whom he was imprisoned in deference to the popular outcry. A bishop, however, was an inconvenient prisoner, and Flambard soon succeeded in effecting his escape from the Tower of London. A popular legend represents the bishop as descending from the window of his cell by a rope which friends had conveyed to him in a cask of wine. He took refuge with Robert Curthose in Normandy and became one of the advisers who pressed the duke to dispute the crown of England with his younger brother; Robert rewarded the bishop by entrusting him with the administration of the see of Lisieux. After the victory of Tinchebrai (1106) the bishop was among the first to make his peace with Henry, and was allowed to return to his English see. At Durham he passed the remainder of his life. His private life was lax; he had at least two sons, for whom he purchased benefices before they had entered on their teens; and scandalous tales are told of the entertainments with which he enlivened his seclusion. But he distinguished himself, even among the bishops of that age, as a builder and a pious founder. He all but completed the cathedral which his predecessor, William of St Carilef, had begun; fortified Durham; built Norham Castle; founded the priory of Mottisfout and endowed the college of Christchurch, Hampshire. As a politician he ended his career with his submission to Henry, who found in Roger of Salisbury a financier not less able and infinitely more acceptable to the nation. Ranulf died on the 5th of September 1128.

See Orderic Vitalis, *Historia ecclesiastica*, vols. iii. and iv. (ed. le Prévost, Paris, 1845); the first continuation of Symeon's *Historia Ecclesiae Dunelmensis* (Rolls ed., 1882); William of Malmesbury in the *Gesta pontificum* (Rolls ed., 1870); and the *Peterborough Chronicle* (Rolls ed., 1861). Of modern writers E.A. Freeman in his *William Rufus* (Oxford, 1882) gives the fullest account. See also T.A. Archer in the *English Historical Review*, ii. p. 103; W. Stubbs's *Constitutional History of England*, vol. i. (Oxford, 1897); J.H. Round's *Feudal England* (London, 1895).

(H. W. C. D.)

FLAMBOROUGH HEAD, a promontory on the Yorkshire coast of England, between the Filey and

Bridlington bays of the North Sea. It is a lofty chalk headland, and the resistance it offers to the action of the waves may be well judged by contrast with the low coast of Holderness to the south. The cliffs of the Head, however, are pierced with caverns and fringed with rocks of fantastic outline. Remarkable contortion of strata is seen at various points in the chalk. Sea-birds breed abundantly on the cliffs. A lighthouse marks the point, in 54° 7′ N., 0° 5′ W.

FLAMBOYANT STYLE, the term given to the phase of Gothic architecture in France which corresponds in period to the Perpendicular style. The word literally means “flowing” or “flaming,” in consequence of the resemblance to the curved lines of flame in window tracery. The earliest examples of flowing tracery are found in England in the later phases of the Decorated style, where, in consequence of the omission of the enclosing circles of the tracery, the carrying through of the foliations resulted in a curve of contrary flexure of ogee form and hence the term flowing tracery. In the minster and the church of St Mary at Beverley, dating from 1320 and 1330, are the earliest examples in England; in France its first employment dates from about 1460, and it is now generally agreed that the flamboyant style was introduced from English sources. One of the chief characteristics of the flamboyant style in France is that known as “interpenetration,” in which the base mouldings of one shaft are penetrated by those of a second shaft of which the faces are set diagonally. This interpenetration, which was in a sense a *tour de force* of French masons, was carried to such an extent that in a lofty rood-screen the mouldings penetrating the base-mould would be found to be those of a diagonal buttress situated 20 to 30 ft. above it. It was not limited, however, to internal work; in late 15th and early 16th century ecclesiastical architecture it is found on the façades of some French cathedrals, and often on the outside of chapels added in later times.

FLAME (Lat. *flamma*; the root *flag*-appears in *flagrare*, to burn, blaze, and Gr. φλέγειν). There is no strict scientific definition of flame, but for the purpose of this article it will be regarded as a name for gas which is temporarily luminous in consequence of chemical action. It is well known that the luminosity of gases can be induced by the electrical discharge, and with rapidly alternating high-tension discharges in air an oxygen-nitrogen flame is produced which is long and flickering, can be blown out, yields nitrogen peroxide, and is in fact indistinguishable from an ordinary flame except by its electrical mode of maintenance. The term “flame” is also applied to solar protuberances, which, according to the common view, consist of gases whose glow is of a purely thermal origin. Even with the restricted definition given above, difficulties present themselves. It is found, for example, with a hydrogen flame that the luminosity diminishes as the purity of the hydrogen is increased and as the air is freed from dust, and J.S. Stas declared that under the most favourable conditions he was only able, even in a dark room, to localize the flame by feeling for it, an observation consistent with the fact that the line spectrum of the flame lies wholly in the ultra-violet. On the other hand, there are many examples of chemical combination between gases where the attendant radiation is below the pitch of visibility, as in the case of ethylene and chlorine. It will be obvious from these facts that a strict definition of flame is hardly possible. The common distinction between luminous and non-luminous flames is, of course, quite arbitrary, and only corresponds to a rough estimate of the degree of luminosity.

The chemical energy necessary for the production of flame may be liberated during combination or decomposition. A single substance like gun-cotton, which is highly endothermic and gives gaseous products, will produce a bright flame of decomposition if a single piece be heated in an evacuated flask. Combination is the more common case, and this means that we have two separate substances involved. If they be not mixed *en masse* before combination, the one which flows as a current into the other is called conventionally the “combustible,” but the simple experiment of burning air in coal gas suffices to show the unreality of this distinction between combustible and supporter of combustion, which, in fact, is only one of the many partial views that are explained and perhaps justified by the dominance of oxygen in terrestrial chemistry.

Although hydrocarbon flames are the commonest and most interesting, it will be well to consider simpler flames first in order to discuss some fundamental problems. In hydrocarbon flames the complexity of the combustible, its susceptibility to change by heating, and the possibilities of fractional oxidation, create special difficulties. In the flame of hydrogen and oxygen or carbon monoxide and oxygen we have simpler conditions, though here, too, things may be by no means so simple as they seem from the equations $2H_2 + O_2 = 2H_2O$ and $2CO + O_2 = 2CO_2$. The influence of water vapour on both these actions is well known, and the molecular transactions may in reality be complicated. We shall, however, assume for the sake of clearness that in these cases we have a simple reaction taking place throughout the mass of flame. There are various ways in which a pair of gases may be burned, and these we shall consider separately. Let us first suppose the two gases to have been mixed *en masse* and a light to be applied to the stationary mixture. If the mixture be made within certain limiting proportions, which vary for each case, a flame spreads from the point where the light is applied, and the flame traverses the mixture. This flame may be very slow in its progress or it may attain a velocity of the order of one or two thousand metres per second. Until comparatively recent times great misunderstanding prevailed on this subject. The slow rate of movement of flame in short lengths of gaseous mixtures was taken to be the velocity of explosion, but more recent researches by M.P.E. Berthelot, E. Mallard and H.L. le Chatelier and H.B. Dixon have shown that a distinction must be made between the slow *initial rate of inflammation* of gaseous mixtures and the *rapid rate of detonation*, or rate of the *explosive wave*, which in many cases is subsequently set up. We shall here

deal only with the slow movements of flame. The development of a flame in such a gaseous mixture requires that a small portion of it should be raised to a temperature called the *temperature of ignition*. Here again considerable misunderstanding has prevailed. The temperature of ignition has often been regarded as the temperature at which chemical combination begins, whereas it is really the temperature at which combination has reached a certain rate. The combination of hydrogen and oxygen begins at temperatures far below that of ignition. It may indeed be supposed that the combination occurs with extreme slowness even at ordinary temperatures, and that as the temperature is raised the velocity of the reaction increases in accordance with the general expression according to which an increase of 10°C. will approximately double the rate. However that may be, it has been proved experimentally by J.H. van't Hoff, Victor Meyer and others that the combination of hydrogen and oxygen proceeds at perceptible rates far below the temperature of ignition. The phenomenon appears to be greatly influenced by the solid surfaces which are present; thus in a plain glass vessel the combination only began to be perceptible at 448°, whilst in a silvered glass vessel it would be detected at 182°C.

The same kind of thing is true for most oxidizable substances, including ordinary combustibles. We must look upon the application of heat to a combustible mixture as resulting in an increase of the rate of combination locally. Let us suppose that we are dealing with a stratum of the mixture in small contiguous sections. If we raise the temperature of the first section *a*°C., an increased rate of combination is set up. The heat produced by this combination will be dissipated by conduction and radiation, and we will suppose that it does not quite suffice to raise the adjacent section of the mixture to *a*°C. The combination in that section, therefore, will not be as rapid as in the first one, and so evidently the impulse to combination will go on abating as we pass along the stratum. Suppose now we start again and heat the first section of the mixture to a temperature *c*°C., such that the rate of combination is very rapid and the heat developed by combination suffices to raise the adjacent section of the mixture to a temperature higher than *c*°C. The rate of combination will then be greater than in the first section, and the impulse to combination will be intensified in the same way from section to section along the stratum until a maximum temperature is reached. It is obvious that there must be a temperature of *b*°C. between *a*° and *c*° which will satisfy this condition, that the heat which results from the combination stimulated in the first section just suffices to raise the temperature of the second section to *b*°. This temperature *b*° is the temperature of ignition of the mixture; so soon as it is attained by a portion of the mixture the combustion becomes self-sustaining and flame spreads through the mixture. Ignition temperature may be defined briefly as the temperature at which the initial loss of heat due to conduction, &c., is equal to the heat evolved in the same time by the chemical reaction (van't Hoff). From the above considerations we see that the temperature of ignition will vary not only when the gases are varied, but when the proportions of the same gases are varied, and also when the pressure is varied. We can see also that outside certain limiting proportions a mixture of gases will have no practicable ignition temperature, that is to say, the cooling effect of the gas which is in excess will carry off so much heat that no attainable initial heating will suffice to set up the transmission of a constant temperature. Thus in the case of hydrogen and air, mixtures containing less than 5 and more than 72% of hydrogen are not inflammable. The theory of ignition temperature enables us to understand why in an explosive mixture a very small electric spark may not suffice to induce explosion. Combination will indeed take place in the path of the spark, but the amount of it is not sufficient to meet the loss of heat by conduction, &c. It must be added that the theory of ignition temperatures given above does not explain all the observed facts. F. Emich states that the inflammability of gaseous mixtures is not necessarily greatest when the gases are mixed in the proportions theoretically required for complete combination, and the influence of foreign gases does not appear to follow any simple law. The presence of a small quantity of a gas may exercise a profound influence on the ignition temperature as in the case of the addition of ethylene to hydrogen (Sir Edward Frankland), and again when a mixture of methane and air is raised to its ignition temperature a sensible interval (about 10 seconds) elapses before inflammation occurs.

The rate at which a flame will traverse a mixture of two gases which has been ignited depends on the proportions in which the gases are mixed. Fig. 1 (Bunte) represents this relationship for several common gases.

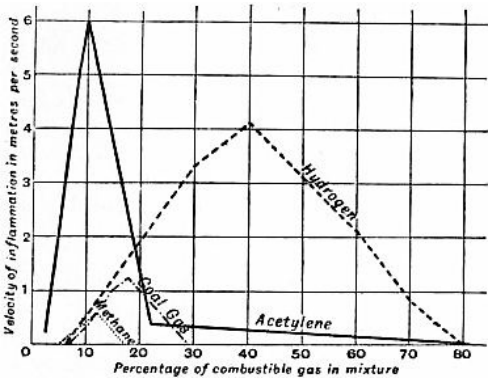


FIG. 1.—Rates of inflammation of combustible gases with air.

If a ready-made gaseous mixture is to be used for the production of a steady flame, it may be forced through a tube and ignited at the end; it is obvious that the velocity of efflux must be greater than the initial rate of inflammation of the mixture, for otherwise the mixture would fire back down the tube. If the velocity of efflux be considerably greater than the rate of inflammation, the flame will be separated from the end of the tube, and only appear as a flickering crown where the velocity and inflammability of the issuing gas have been diminished by admixture with air. With much increased velocity of efflux the flame will be blown out. J.B.A. Dumas used to show the experiment of blowing out a candle with electrolytic gas. A steady

flame formed by burning a ready-made gaseous mixture at the end of a tube of circular section has the form shown in fig. 2. The small internal cone marks the lower limiting surface of the flame; it is the locus of all points where the velocity of efflux is just equal to the velocity of inflammation, and its conical form is explained by the fact that the rate of efflux of gas is greatest in the vertical axis of the tube where the flow is not retarded by friction with the walls, as well as by the further fact that the gas issuing from such an orifice spreads outwards, the inflammation proceeding directly against it. The flame, it will be seen, is of considerable thickness. If the gaseous mixture be hydrogen and oxygen, or carbon monoxide and oxygen, it will have no obvious features of structure beyond those shown in the figure; that is to say, the shaded region of burning gas has the appearance of homogeneity and uniform colour which might be expected to accompany a uniform chemical condition. Some admixture of the external air will, of course, take place, especially in the upper parts of the flame, and detectable quantities of oxides of nitrogen may be found in the products of combustion, but this is an inconsiderable feature. The flame just described is essentially that of a blowpipe.

FIG. 2.

A second way of producing a flame is the more common one of allowing one gas to stream into the other. Using the same gases as before, hydrogen or carbon monoxide with oxygen, we find again that the flame is conical in form and uniform in colour, but in this case, if the velocity of efflux be not immoderate, the burning gas only extends over a comparatively thin shell, limited on the inside by the pure combustible and on the outside by a mixture of the products of combustion with oxygen. The combustible gas has to make its own inflammable mixture with the circumambient oxygen, and we may suppose the column of gas to be burned through as it ascends. The core of unburned gas thus becomes thinner as it ascends and the flame tapers to a point. The external surface of a flame of this kind will for the same consumption of gas be larger than that of a flame where the ready-made mixture of gases is used. If a jet of one gas be sent with a sufficient velocity into another, turbulent admixture takes place and an unsteady sheet of flame of uniform colour is obtained.

A third way of forming a flame is to allow the whole of one gas, mixed with a less quantity of the second than is sufficient for complete combustion, to issue into an atmosphere of the second. This is the case with what are generally known as atmospheric burners, of which the Bunsen burner is the prototype. The development of a flame of this kind can be well studied in the case of carbon monoxide and air. The carbon monoxide is fed into a Bunsen burner with closed air-valve, the burner-tube being prolonged by affixing a glass tube to it by means of a cork. The flame consists of a single conical blue sheet. If now the air-valve be opened very slightly, an internal cone of the same blue colour makes its appearance. The air which has entered through the air-valve (“primary” air) has become mixed with the carbon monoxide and so oxidizes its quota in an internal cone, the rest of the carbon monoxide (diluted now, of course, with carbon dioxide and nitrogen) wandering into the external atmosphere to burn (with “secondary” air) in a second cone. The existence of the internal cone and the subsequent thermal effect lead to slight convexity of surface in the outer cone. If the quantity of primary air be increased more internal combustion can take place. This, however, does not lead to an enlargement of the inner cone, for the increase of air increases the rate of inflammation of the mixture, and the inner cone (which only maintains its stability because the rate of efflux of the mixture is greater than the velocity of inflammation) contracts, and will, as the proportion of primary air is increased, soon evince a tendency to enter the burner-tube. At this stage an interesting phenomenon is to be noticed. When we have reached the point of aeration where the velocity of inflammation of the mixture just surpasses the velocity of efflux, the inner cone enters the burner-tube as a disk and descends, but this downward motion checks the suction flow of air through the valve at the base of the burner, whilst it does not appreciably check the pressure flow of the carbon monoxide through the gas nozzle. The result is that a stratum of gas-mixture poor in air, and therefore of low rate of inflammation, is formed, and when the descending disk of flame meets it, the descent is arrested and the disk returns to the top of the tube, reproducing the inner cone. The full air suction is now restored and the course of events is repeated. This oscillatory action can be maintained almost indefinitely long if the pressure and other conditions be maintained constant. With still more primary air the inner cone of flame simply fires back to the burner nozzle, or, in the last stage, we may have enough air entering to produce a flame of the blast blowpipe type, namely, one where the carbon monoxide mixed with an *excess* of primary air burns with a single cone in a steady flame.

By means of a simple contrivance devised by A. Smithells a two-coned flame of the kind described may be resolved into its components. The apparatus is like a half-extended telescope made of two glass tubes, and it is evident that the velocity of a mixture of gases flowing through it must be greater in the narrow tube than in the wider one. If the end of the narrower tube be fixed to a Bunsen burner and the flame be formed at the end of the wider one, then when the air-supply is increased to a certain point the inner cone will descend into the wide tube and attach itself to the upper end of the narrower one. This occurs when the velocity of inflammation is just greater than the upward velocity of the gaseous stream in the wide tube and less than the upward velocity in the narrow tube. If the outer tube be now drawn down, a two-coned flame burns at the end of the inner tube; if the outer tube be slid up again, it detaches the outer cone and carries it upward. This apparatus has been of use in investigating the progress of combustion in various flames.

Temperature of Flames.—The term “flame-temperature” is used very vaguely and has no clear meaning unless qualified by some description. It is least ambiguous when used in reference to flames where the combining gases are mixed in theoretical proportions before issuing from the burner. The flame in such a case has considerable thickness and uniformity, and, though the temperature is not constant throughout, flames of this type given by different combustibles admit of comparison. In other flames where the shells of combustion are thin and envelop large regions of unburned or partly-burned gas, it is not clear how temperature should be specified. An ordinary gas-flame will not, from the point of view of the practical arts, give a sufficient temperature for melting platinum, yet a very thin platinum wire may be melted at the edge of the lower part of such a flame. The maximum temperature of the flame is therefore not in any serious sense an available temperature. It will suffice to point out here that in order to burn a gas so that it may

have the highest available temperature, we must burn it with the smallest external flame-surface obtainable. This is done when the combining gases are completely mixed before issuing from the burner. Where this is impracticable we may employ a burner of the Bunsen type, and arrange matters so that a large amount of primary air is supplied. It is in this direction that modern improvements have been made with a view to obtaining hot flames for heating the Welsbach mantle. The Kern burner, for example, employs the principle of the Venturi tube. Where much primary air is drawn in it is usual to provide for it being well mixed with the gas, otherwise an unsteady flame may be produced with a great tendency to light back. The burner head is therefore usually provided with a mixing chamber and the mixture issues through a slit or a mesh. A great many modified Bunsen burners have been produced, the aim in all of them being to produce a flame which shall combine steadiness with the smallest attainable external surface.

To estimate the temperature of flames several methods have been employed. The method of calculation, based on the supposition that the whole heat of combustion is localized in the product (or products) of combustion and heats it to a temperature depending on its specific heat, cannot be applied in a simple way. Apart from the assumption (which there is reason to suppose incorrect) that none of the chemical energy assumes the radiant form directly, we have to regard the possible change of specific heat at high temperatures, the likelihood of dissociation and the time of reaction. Any practical consideration of temperature must have regard to a large assemblage of molecules and not to a single one, and therefore any influence which means delay in combination will result in reduction of temperature by radiation and conduction. It can hardly be maintained that in the present state of knowledge we have the requisite data for the calculation of flame temperature, though good approximations may be made. Many attempts have been made to determine flame temperatures by means of thermo-electric couples and by radiation pyrometers. The couple most employed is that known as H.L. le Chatelier’s, consisting of two wires, one of platinum and the other an alloy of 90% platinum and 10% of rhodium. When all possible precautions are taken it is possible by means of such thermo-couples to measure local flame temperatures with a considerable degree of accuracy. Subjoined are some results obtained at different times and by different observers with regard to the maximum temperatures of flames:—

Coal gas in Bunsen burner				(Waggener, 1896)	1770° C.
”	”	”	”	(Berkenbusch, 1899)	1830°
”	”	”	”	(White & Traver, 1902)	1780°
”	”	”	”	(Féry, 1905)	1871°

The following are given by Féry:—

Acetylene	2548° C.
Alcohol	1705°
Hydrogen (in air)	1900°
Oxy-hydrogen	2420°
Oxy-coal gas blowpipe	2200°

Source of Light in Flames.—We may consider first those flames where solid particles are out of the question; for example, the flame of carbon monoxide in air. The old idea that the luminosity was due to the thermal glow of the highly heated product of combustion has been challenged independently by a number of observers, and the view has been advanced that the emission of light is due to radiation attendant upon a kind of discharge of chemical energy between the reacting molecules. E. Wiedemann proposed the name “chemi-luminescence” for radiation of this kind. The fact is that colourless gases cannot be made to glow by any purely thermal heating at present available, and products of combustion heated to the average temperature of the flames in which they are produced are non-luminous. On the other hand, it must be remembered that in a mass of burning gas only a certain proportion of the molecules are engaged at one instant in the act of chemical combination, and that the energy liberated in such individual transactions, if localized momentarily as heat, would give individual molecules a unique condition of temperature far transcending that of the average, and the distribution of heat in a flame would be very different from that existing in the same mixture of gases heated from an external source to the same average temperature. The view advocated by Smithells is that in the chemical combination of gases the initial phase of the formation of the new molecule is a vibratory one, which directly furnishes light, and that the damping down of this vibration by colliding molecules is the source of that translatory motion which is evinced as heat. This, it will be seen, is an exact reversal of the older view.

The view of Sir H. Davy that “whenever a flame is remarkably brilliant and dense it may always be concluded that some solid matter is produced in it” can be no longer entertained. The flames of phosphorus in oxygen and of carbon disulphide in nitric oxide contain only gaseous products, and Frankland showed that the flames of hydrogen and carbon monoxide became highly luminous under pressure. From his experiments Frankland was led to the generalization that high luminosity of flames is associated with high density of the gases, and he does not draw a distinction in this respect between high density due to high molecular weight and high density due to the close packing of lighter molecules. The increased luminosity of a compressed flame is not difficult to understand from the kinetic theory of gases, but no explanation has appeared of the luminosity considered by Frankland to be due merely to high molecular weight. It is possible that the electron theory may ultimately afford a better understanding of these phenomena.

Structure of Flame.—The vagueness of the term structure, as applied to flames, is to be seen from the very conflicting accounts which are current as to the number of differentiated parts in different flames. Unless this term is restricted to sharp differences in appearance, there is no limit to the number of parts which may be selected for mention. The flame of carbon monoxide, when the gas is not mixed with air before it issues from the burner, shows no clearly differentiated structure, but is a shell of blue luminosity of shaded intensity—a hollow cone if the orifice of the burner be circular and the velocity of the gas not immoderate, or

a double sheet of fan shape if the burner have a slit or two inclined pores which cause the jets of issuing gas to spread each other out. Such a flame has but one single distinct feature, and this is not surprising, as there is no reason to suppose that there is any difference in the chemical process or processes that are occurring in different quarters of the flame. The amount of materials undergoing this transformation in different parts of the flame may and does vary; the gases become diluted with products of combustion, and the molecular vibrations gradually die down. These things may cause a variation in the intensity of the light in different quarters, but the differences induced are not sharp or in any proper sense structural. A flame of this kind may develop a secondary feature of structure. If carbon monoxide be burnt in oxygen which is mixed or combined with another element there may be an additional chemical process that will give light; flames in air are sometimes surrounded by a faintly luminous fringe of a greenish cast, apparently associated with the combination of nitrogen with oxygen (H.B. Dixon). Carbon monoxide on being strongly heated begins to dissociate into carbon and carbon dioxide; if the unburnt carbon monoxide within a flame of that gas were so highly heated by its own burning walls as to reach the temperature of dissociation, we might expect to see a special feature of structure due to the separated carbon. Such a temperature does not, however, appear to be reached.

Apart from hydrocarbon flames not much has been published in reference to the structure of flames. The case of cyanogen is of peculiar interest. The beautiful flame of this gas consists of an almost crimson shell surrounded by a margin of bright blue. Investigations have shown that these two colours correspond to two steps in the progress of the combustion, in the first of which the carbon of the cyanogen is oxidized to carbon monoxide and in the second the carbon monoxide oxidized to carbon dioxide.

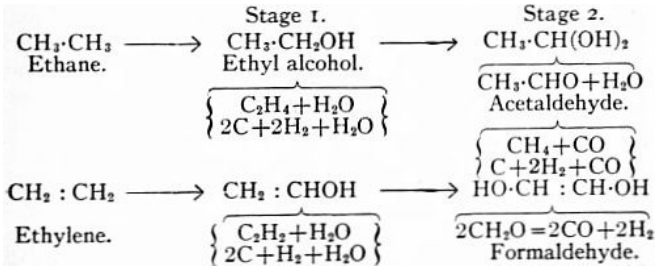
The inversion of combustion may bring new features of structure into existence; thus when a jet of cyanogen is burnt in oxygen no solid carbon can be found in the flame, but when a jet of oxygen is burnt in cyanogen solid carbon separates on the edge of the flame.

Hydrocarbon Flames.—As already stated the flames of carbon compounds and especially of hydrocarbons have been much more studied than any other kind, as is natural from their common use and practical importance. The earliest investigations were made with coal gas, vegetable oils and tallow, and the composite and complex nature of these substances led to difficulties and confusion in the interpretation of results. One such difficulty may be illustrated by the fact, often overlooked, that when a mixed gaseous combustible issues into air the individual component gases will separate spontaneously in accordance with their diffusibilities: hydrogen will thus tend to get to the outer edge of a flame and heavy hydrocarbons to lag behind.

The features of structure in a hydrocarbon flame depend of course on the manner in which the air is supplied. The extreme cases are (i.) when the issuing gas is supplied before it leaves the burner with sufficient air for complete combustion, as in the blast blowpipe, in which case we have a sheet of blue undifferentiated flame; and (ii.) when the gas has to find all the air it requires after leaving the burner. The intermediate stage is when the issuing gas is supplied before leaving the burner with a part of the air that is required. In this case a two-coned flame is produced. The general theory of such phenomena has already been discussed. It must be remarked that the transition of one kind of flame into the others can be effected gradually, and this is seen with particular ease and distinctness by burning benzene vapour admixed with gradually increasing quantities of air. The key to the explanation of the structure of an ordinary luminous flame, such as that of a candle, is to be found, according to Smithells, by observing the changes undergone by a well-aerated Bunsen flame as the “primary” air is gradually cut off by closing the air-ports at the base of the burner. It is then seen that the two cones of flame evolve or degenerate into the two recognizable blue parts of an ordinary luminous flame, whilst the appearance of the bright yellow luminous patch becomes increasingly emphasized as a hollow dome lying within the upper part of the blue sheath. There are thus three recognizable features of structure in an ordinary luminous flame, each region being as it were a mere shell and the interior of the flame filled with gas which has not yet entered into active combustion. If, as is suggested, the blue parts of an ordinary luminous flame are the relics of the two cones of a Bunsen flame, the chemistry of a Bunsen flame may be appropriately considered first. What happens chemically when a hydrocarbon is burned in a Bunsen burner? The air sent in with the gas is insufficient for complete combustion so that the inner cone of the flame may be considered as air burning in an excess of coal gas. What will be the products of this combustion? This question has been answered at different times in very different ways. There are many conceivable answers: part of the hydrocarbon might be wholly oxidized and the rest left unaltered to mix with the outside air and burn as the outer cone; on the other hand, there might be (as has been so commonly assumed) a selective oxidation in the inner cone whereby the hydrogen was fully oxidized and the carbon set free or oxidized to carbon monoxide; or again the carbon might be oxidized to carbon dioxide or monoxide and the hydrogen set free. There might of course be other intermediate kinds of action. Now it is important at this point to insist upon a distinction between what can be found by direct analysis as to the products of partial combustion, and what can be imagined or inferred as the transitory existence of substances of which the products actually found in analysis are the outcome. We shall consider only in the first instance what substances are found by analysis. Earlier experiments on the Bunsen burner in which coal gas was used, and the gases withdrawn directly from the flame by aspiration, gave no very clear results, but the introduction of the cone-separating apparatus and the use of single hydrocarbons led to more definite conclusions. The analysis of the inter-conal gases from an ethylene flame gave the following numbers:—carbon dioxide = 3.6; water = 9.5; carbon monoxide = 15.6; hydrocarbons = 1.3; hydrogen = 9.4; nitrogen = 60.6.

It appears therefore, and it may be stated as a fact, that a considerable amount of hydrogen is left unoxidized, whilst practically all the carbon is converted into monoxide or dioxide. As the gases have cooled down before analysis and as the reaction $CO + H_2O \rightleftarrows CO_2 + H_2$ is reversible, it may be objected that the inter-conal gases may have a composition when they are hot very different from what they show when cold. Experiments made to test this question have not sustained the objection. Subsequent experiments on the oxidation of hydrocarbons have made it appear undesirable to use the expression “preferential combustion” or “selective combustion” in connexion with the facts just stated; but for the purpose of describing in brief

the chemistry of a hydrocarbon flame it is necessary to say that in the inner cone of a Bunsen flame hydrogen and carbon monoxide are the result of the limited oxidation, and that the combustion of these gases with the external air generates the outer cone of the flame. As to the actual stages in the limited oxidation of a hydrocarbon a large amount of very valuable work has been carried out by W.A. Bone and his collaborators. Different hydrocarbons mixed with oxygen have been circulated continuously through a vessel heated to various temperatures, beginning with that (about 250° C.) at which the rate of oxidation is easily appreciable. Proceeding in this way, Bone, without effecting a complete transformation of the hydrocarbon into partially oxidized substances, has isolated large quantities of such products, and concludes that the oxidation of a hydrocarbon involves nothing in the nature of a selective or preferential oxidation of either the hydrogen or the carbon. He maintains that it occurs in several well-defined stages during which oxygen enters into and is incorporated with the hydrocarbon molecule, forming oxygenated intermediate products among which are alcohols and aldehydes. The reactions between ethane and ethylene with an equal volume of oxygen would be represented as follows:—



The affinity between the hydrocarbon and oxygen at a high temperature is so great that, when the supply of oxygen is sufficient to carry the oxidation as far as the second stage, practically no decomposition of the monohydroxy molecule formed in the first stage occurs. This is especially the case with unsaturated hydrocarbons.

As a crucial test decisive against the hypothesis of preferential carbon oxidation, Bone cites the experiment of firing a mixture of equal volumes of ethane and oxygen sealed up in a glass bulb. In such a case a lurid flame fills the vessel, accompanied by a black cloud of carbon particles and considerable condensation of water. About 10% of methane is also found. It is impossible within the limits of this article to give a more extended account of these later researches on the oxidation of hydrocarbons. They make it evident that the relative oxidizability of carbon and hydrogen cannot form the basis of a general theory of the combustion of hydrocarbons, and that both the a priori view that hydrogen is the more oxidizable element, and the inference from the behaviour of ethylene when exploded with its own volume of oxygen, viz. that carbon is the more oxidizable element in hydrocarbons, are not in harmony with experimental facts.

The view that the bright luminosity of hydrocarbon flames is due “to the deposition of solid charcoal” was first put forward by Sir Humphry Davy in 1816. In explaining the origin of this charcoal, Davy used somewhat ambiguous language, stating that it “might be owing to a decomposition of a part of the gas towards the interior of the flame where the air was in smallest quantity.” This statement was interpreted commonly as implying that the charcoal became free by the preferential combustion of the hydrogen, and such an interpretation was given explicitly by Faraday. Whatever may have been Davy’s view with regard to this part of the theory, his conclusion that finely divided carbon was the cause of luminosity in hydrocarbon flames was not questioned until 1867, when E. Frankland, in connexion with researches already alluded to, maintained that the luminosity of such flames was not due in any important degree to solid particles of carbon, but to the incandescence of dense hydrocarbon vapours. Among the arguments adduced against this view the most decisive is furnished by the optical test first used by J.L. Soret. If the image of the sun be focussed upon the glowing part of a hydrocarbon flame the scattered light is found to be polarized, and it is indisputable that the luminous region is pervaded by a cloud of finely divided solid matter. The quantity of this solid (estimated by H.H.C. Bunte to be 0.1 milligram in a coal-gas flame burning 5 cub. ft. per hour) is sufficient to account for the luminosity, so that Davy’s original view may be said to be now universally accepted.

The remaining question with regard to the luminosity of a hydrocarbon flame relates to the manner in which the carbon is set free. The fact-that hydrocarbons when strongly heated in absence of air will deposit carbon has long been known and is daily evident in the operation of coal-gas making, when gas carbon accumulates as a hard deposit in the highly-heated crown of the retorts. There is no difficulty in supposing therefore that the carbon in a flame is separated from the hydrocarbon within it by the purely thermal action of the blue burning walls of the flame. Many experiments might be adduced to confirm this view. It is sufficient to name two. If a ring of metal wire be so disposed in a small flame as to make a girdle within the blue walls towards the base, the withdrawal of heat is rapid enough to prevent the maintenance of a temperature sufficient to cause a separation of carbon, and the bright luminosity disappears. Again, if the flame of a Bunsen burner be fed through the air-ports not with air but with some neutral gas such as nitrogen, carbon dioxide or steam, the dilution of the burning gas and the hydrocarbon within it becomes so great that the temperature of separation is not attained, no carbon is separated and the flame consists of a single blue shell.

Whilst it is thus easy to understand generally why carbon becomes separated as a solid within a flame, it is not easy to trace the processes by which the carbon becomes separated in the case of a given hydrocarbon. According to M.P.E. Berthelot, who made prolonged and elaborate researches on the pyrogenetic relationships of hydrocarbons, these compounds only liberate carbon by a process of the continual coalescence of hydrocarbon molecules with the elimination of hydrogen, until there is left the limiting solid

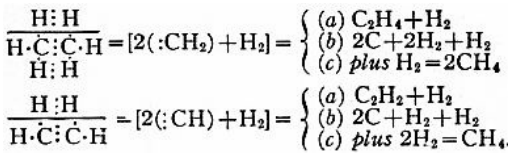
hydrocarbon hardly distinguishable from carbon itself and constituting the glowing soot of flames.

V.B. Lewes, on the other hand, basing his conclusions on a study of the thermal decomposition of hydrocarbons, on temperature measurements of flames and analysis of their gases, has more recently developed a theory of flame luminosity in which the formation and sudden exothermic decomposition of acetylene are regarded as the essential incidents productive of carbon separation and luminosity. Smithells has disputed the evidence on which this theory is based and it appears to have gained no adherence from those who have worked in the same field; but as it has not been formally disavowed by the author and has found its way into some text-books, it is mentioned here.

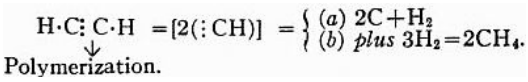
W.A. Bone and H.F. Coward (*Journ. Chem. Soc.*, 1908) published the results of a very careful study of the decomposition of hydrocarbons when heated in a stationary condition and when continually circulated through hot vessels. Their results disclose once more the great difficulty of tracing the processes of decomposition and of arriving at a generalization of wide applicability, but they appear to be conclusive against the views both of Berthelot and of Lewes.

They do not think that the decomposition of hydrocarbons can be adequately represented by ordinary chemical equations owing to the complexity of the changes which really take place. Methane, which is the most stable of the hydrocarbons, appears to be resolved at high temperatures directly into carbon and hydrogen, but the phenomenon is dependent mainly on surface action; ethane, ethylene and acetylene undergo decomposition throughout the body of the gas (*loc. cit.* p. 1197 et seq.).

> "In the cases of ethane and ethylene it may be supposed that the *primary* effect of high temperature is to cause an elimination of hydrogen with a simultaneous loosening or dissolution of the bond between the carbon atoms, giving rise to (in the event of dissolution) residues such as : CH_2 and ⋮ CH. These residues, which can only have a very fugitive separate existence, may either (*a*) form $H_2C : CH_2$ and HC ⋮ CH, as the result of encounters with other similar residues, or (*b*) break down directly into carbon and hydrogen, or (*c*) be directly hydrogenized to methane in an atmosphere rich in hydrogen. These three possibilities may all be realized simultaneously in the same decomposing gas in proportions dependent on the temperature, pressure and amount of hydrogen present. The whole process may be represented by the following scheme, the dotted line indicating the tendency to dissolve a bond between the carbon atoms which becomes actually effective at higher temperatures:—



> "In the ease of acetylene, the main primary change may be either one of polymerization or of dissolution according to the temperature, and if the latter, it may be supposed that the molecule breaks down across the triple bond between the carbon atoms, giving rise to 2(: CH), and that these residues are subsequently either resolved into carbon and hydrogen or "hydrogenized" according to circumstances, thus:—



> "Acetylene is, moreover, distinguished by its power of polymerization at moderate temperatures so that whether it is the gas initially heated or whether it is a prominent product of the decomposition of another hydrocarbon polymerization will occur to an extent dependent on temperature."

We may describe briefly the view to which we are led as to the genesis of an ordinary luminous hydrocarbon flame:—

The gaseous hydrocarbon issues from the burner or wick, let us suppose, in a cylindrical column. This column is not sharply marked off from the air but is so penetrated by it that we must suppose a gradual transition from the pure hydrocarbon in the centre of column to the pure air on the outside. Let us take a thin transverse slice of the flame, near the lower part of the wick or close to the burner tube. At what lateral distance from the centre will combustion begin? Clearly, where enough oxygen has penetrated the column to give such partial combustion as takes place in the inner cone of a Bunsen burner. This then defines the blue region. Outside this the combustion of the carbon monoxide, hydrogen and any hydrocarbons which pass from the blue region takes place in a faintly luminous fringe. These two layers form a sheath of active combustion, surrounding and intensely heating the enclosed hydrocarbons in the middle of the column. These heated hydrocarbons rise and are heated to a higher temperature as they ascend. They are accordingly decomposed with separation of carbon in the higher parts of the flame, giving the region of bright yellow luminosity. There remains a central core in which neither is there any oxygen for combustion nor a sufficiently high temperature to cause carbon separation. This constitutes the dark interior region of the flame. We thus account for the different parts of the flame. It is to be noted, however, that the bright blue layer only surrounds the lower part of the flame, whilst the pale, faintly-luminous fringe surrounds the whole flame. The flame also is conical and not cylindrical. The foregoing explanation is therefore not quite complete. Let us suppose that the changes have gone on in the small section of the flame exactly as described and consider how the processes will differ in parts above this section. The central core of unburned gases will pass upwards and we may treat it as a new cylindrical column which will undergo changes just as the original one, leaving, however, a smaller core of unburned gases, or, in other words, each succeeding section of the flame will be of smaller diameter. This gives us the conical form of the flame.

Again, the higher we ascend the flame the greater proportionally is the amount of separated carbon, for we have not only the heat of laterally outlying combustion to effect decomposition, but also that of the lower parts of the flame. The lower part of a luminous flame accordingly contains less separated carbon than the upper. Where the hydrocarbon is largely decomposed before combustion we have no longer the conditions of the Bunsen flame, and so in the upper parts of a luminous flame the bright blue part fades away. The luminous fringe would, however, be continued, for the separated hydrogen has still to burn. In this way then we may reasonably account for the existence, position and relative sizes of the four regions of an ordinary luminous flame.

(A. S.)

FLAMEL, NICOLAS (*c.* 1330-1418), reputed French alchemist and scrivener to the university of Paris, was born in Paris or Pontoise about 1330, and died in Paris in 1418, bequeathing the bulk of his property to the church of Saint-Jacques-la-Boucherie, where he was buried. During his life he contributed freely to charitable and religious purposes from the considerable wealth he amassed either by the practice of his craft, or, as some surmise without definite proof, by fortunate speculation or money lending, or, as legend has it, by alchemy. According to a document purporting to be written by himself in 1413 (printed in Waite's *Lives of the Alchemystical Philosophers*, London, 1888), there fell into his hands in 1357, at the cost of two florins, a book on alchemy by Abraham the Jew, which taught in plain words the transmutation of metals. It did not, however, explain the *materia prima*, but merely figured or depicted it, and for more than 20 years Flamel strove in vain to find out the secret. Then, returning from a journey to Spain, he fell in with a Christian Jew, named Canches, who gave him the explanation, and after three more years' work he succeeded in preparing the *materia prima*, thus being enabled in 1382 to transmute mercury into both silver and gold. But this fantastic story was disposed of by the facts, derived from parish records, set forth in Vilain's *Essai sur l'histoire de Saint-Jacques-la-Boucherie*, 1758, and his *Histoire critique de Nicolas Flamel et de Pernelle sa femme, recueillie d'actes anciens qui justifient l'origine et la médiocrité de leur fortune contre les imputations des alchimistes*, 1761.

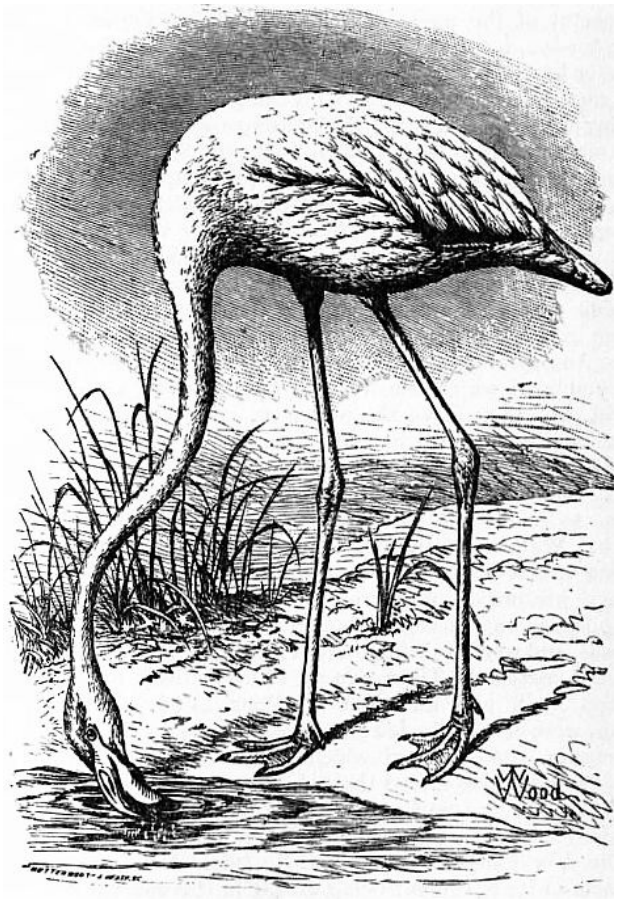
A book on alchemy in the Paris Bibliothèque, *Le Trésor de philosophie*, professing to be written and illuminated by Flamel with his own hand, is of very doubtful authenticity, and other treatises bearing his name, such as the *Sommaire philosophique de Nicolas Flamel*, published in 1561 in a collection of alchemist treatises entitled *Transformation métallique*, are certainly spurious.

FLAMEN (from *flare*, "to blow up" the altar fire), a Roman sacrificial priest. The flamens were subject to the pontifex (*q.v.*) maximus, and were consecrated to the service of some particular deity. The highest in rank were the *flamen Dialis*, *flamen Martialis* and *flamen Quirinalis*, who were always selected from among the patricians. Their institution is generally ascribed to Numa. When the number of flamens was raised from three to fifteen, those already mentioned were entitled *majores*, in contradistinction to the other twelve, who were called *minores*, as connected with less important deities, and were chosen from the plebs. Towards the end of the republic the number of the lesser flamens seems to have diminished. The flamens were held to be elected for life, but they might be compelled to resign office for neglect of duty, or on the occurrence of some ill-omened event (such as the cap falling off the head) during the performance of their rites. The characteristic dress of the flamens in general was the *apex*, a white conical cap, the *laena* or mantle, and a laurel wreath. The official insignia of the *flamen Dialis* (of Jupiter), the highest of these priests, were the white cap (*pileus, albogalerus*), at the top of which was an olive branch and a woollen thread; the *laena*, a thick woollen *toga praetexta* woven by his wife; the sacrificial knife; and a rod to keep the people from him when on his way to offer sacrifice. He was never allowed to appear without these emblems of office, every day being considered a holy day for him. By virtue of his office he was entitled to a seat in the senate and a curule chair. The sight of fetters being forbidden him, his toga was not allowed to be tied in a knot but was fastened by means of clasps, and the only kind of ring permitted to be worn on his finger was a broken one. If a person in fetters took refuge in his house he was immediately loosed from his bonds; and if a criminal on his way to the scene of his punishment met him and threw himself at his feet he was respited for that day. The *flamen Dialis* was not allowed to leave the city for a single night, to ride or even touch a horse (a restriction which incapacitated him for the consulship), to swear an oath, to look at an army, to touch anything unclean, or to look upon people working. His marriage, which was obliged to be performed with the ceremonies of *confarreatio* (*q.v.*), was dissoluble only by death, and on the death of his wife (called *flaminica Dialis*) he was obliged to resign his office. The *flaminica Dialis* assisted her husband at the sacrifices and other religious duties which he performed. She wore long woollen robes; a veil and a kerchief for the head, her hair being plaited up with a purple band in a conical form (*tutulus*); and shoes made of the leather of sacrificed animals; like her husband, she carried the sacrificial knife. The main duty of the flamens was the offering of daily sacrifices; on the 1st of October the three major flamens drove to the Capitol and sacrificed to *Fides Publica* (the Honour of the People). Some of the municipal towns in Italy had flamens as well as Rome.

We may mention, as distinct from the above, the *flamen curialis*, who assisted the curio, the priest who attended to the religious affairs of each curia (*q.v.*); the flamens of various sacerdotal corporations, such as the Arval Brothers; the *flamen Augustalis*, who superintended the worship of the emperor in the provinces.

See Marquardt, *Römische Staatsverwaltung*, iii. (1885), pp. 326-336, 473; H. Dessau, in *Ephemeris epigraphica*, iii. (1877); and the exhaustive article by C. Jullian in Daremberg and Saglio, *Dictionnaire des antiquités*.

FLAMINGO (Port. *Flamingo*, Span. *Flamenco*), one of the tallest and most beautiful birds, conspicuous for the bright flame-coloured or scarlet patch upon its wings, and long known by its classical name *Phoenicopterus*, as an inhabitant of most of the countries bordering the Mediterranean Sea. Flamingos have a very wide distribution, and the sole genus comprises only a few species. *Ph. roseus* or *antiquorum*, white, with a rosy tinge above, and with scarlet wing-coverts, while the remiges are black (as in all species), ranges from the Cape Verde Islands to India and Ceylon, north as far as Lake Baikal; southwards through Africa and Madagascar, eventually as *P. minor*. *P. ruber*, entirely light vermilion, extends from Florida to Para and the Galapagos; *P. chilensis* s. *ignipalliatus*, from Peru to Patagonia, more resembles the classical species; while *P. andinus*, the tallest of all, which lacks the hallux, inhabits the salt lakes of the elevated desert of Atacama, whence it extends into Chile and Argentina. Fossil remains of flamingos have been described from the Lower Miocene of France as *P. croizeti*, and from the Pliocene of Oregon. From the Mid-Miocene to the Oligocene of France are known several species of *Palaelodus*, *Elornis* and *Agnopterus*, which have relatively shorter legs, longer toes and a complicated hypotarsus, and represent an earlier family, less specialized although not directly ancestral to the flamingos. *Palaelodidae* and *Phoenicopteridae* together form the larger group Phoenicopteri. These are in many respects exactly intermediate between Anserine and stork-like birds, so much so in fact that T.H. Huxley preferred to keep them separate as *Amphimorphae*. However, if we carefully sift their characters, the flamingos obviously reveal themselves as much nearer related to the *Ciconiae*, especially to *Platalea* and *Ibis*, than to the Anseres. This is the opinion arrived at by W.F.R. Weldon, M. Fuerbringer and Gadow, while others prefer the goose-like voice and the webbed toes as reliable characters. (For a detailed analysis of this instructive question see Bronn's *Thierreich*, Aves Syst. p. 146.)



The Flamingo.

The food of the flamingo seems to consist chiefly of small aquatic invertebrate animals which live in the mud of lagoons, for instance Mollusca, but also of Confervae and other low salt-water algae. Whilst feeding, the bird wades about, stirs up the mud with its feet, and, reversing the ordinary position of its head so as to hold the crown downwards and to look backwards, sifts the mud through its bill. This is abruptly bent down in the middle, as if broken; the upper jaw is rather flat and narrow, while the lower jaw is very roomy and furnished with numerous lamellae, which, together with the thick and large tongue, act like a sieve, an arrangement enhanced by the considerable movability of the upper jaw. Then the bird erects its long neck to swallow the selected food. When flying, flamingos present a striking and beautiful sight, with legs and neck stretched out straight, looking like white and rosy or scarlet crosses with black arms. Not less fascinating is a flock of these sociable birds when at rest, standing on one or both legs, with their long necks twisted or coiled upon the body in any conceivable position.

The nest is likewise peculiar. It is built of mud, a somewhat conical structure rising above the water according to the depth, of which the cone is from a few inches to 2 ft. in height. If, as often happens, the water-level sinks, the nests stand out higher. On the top is a shallow cup for the reception of the one or two eggs, which have a bluish-white shell with chalky incrustation. Of course the hen sits with her legs doubled up under her, as does any other long-legged bird. It seems strange that many ornithologists should have given credence to W. Dampier's statement of the mode of incubation (*New Voyage round the World*, ed. 2, i. p. 71, London, 1699): "And when they lay their eggs, or hatch them, they stand all the while, not on the hillock, but close by it with their legs on the ground and in the water, resting themselves against the hillock, and covering the hollow nest upon it with their rumps," &c. P.S. Pallas (*Zoograph. Rosso-Asiatica*, ii. p. 208) tried to improve upon this by stating that the standing bird leans upon the nest with its breast! The young, which are hatched after about four weeks' incubation, look very different from the adult. The small bill is still quite straight and the legs are short. The whole body is covered with a thick coat of short nestling feathers, pure white in colour. These *neossoptiles* or first feathers bear no resemblance to those of the Anseriform birds, but agree in detail with those of spoonbills, the young of which the little flamingos resemble to a striking extent, but they leave the nest soon after their birth to shift for themselves like ducks and geese.

(H. F. G.)

FLAMINIA, VIA, an ancient high road of Italy, constructed by C. Flaminius during his censorship (220 B.C.). It led from Rome to Ariminum, and was the most important route to the north. We hear of frequent improvements being made in it during the imperial period. Augustus, when he instituted a general restoration of the roads of Italy, which he assigned for the purpose among various senators, reserved the Flaminia for himself, and rebuilt all the bridges except the Pons Mulvius, by which it crosses the Tiber, 2 m. N. of Rome (built by M. Scaurus in 109 B.C.), and an unknown Pons Minucius. Triumphal arches were erected in his honour on the former bridge and at Ariminum, the latter of which is still preserved. Vespasian constructed a new tunnel through the pass of Intercisa, modern Furlo, in A.D. 77 (see CALES), and Trajan, as inscriptions show, repaired several bridges along the road.

The Via Flaminia runs due N. from Rome, considerable remains of its pavement being extant in the modern high road, passing slightly E. of the site of the Etruscan Falerii, through Ocriculi and Narnia. Here it crossed the Nar by a splendid four-arched bridge to which Martial alludes (*Epigr.* vii. 93, 8), one arch of which and all the piers are still standing; and went on, followed at first by the modern road to Sangemini which passes over two finely preserved ancient bridges, past Carsulae to Mevania, and thence to Forum Flaminii. Later on a more circuitous route from Narnia to Forum Flaminii was adopted, passing by Interamna, Spoletium and Fulginium (from which a branch diverged to Perusia), and increasing the distance by 12 m. The road thence went on to Nuceria (whence a branch road ran to Septempeda and thence either to Ancona or to Tolentinum and Urbs Salvia) and Helvillum, and then crossed the main ridge of the Apennines, a temple of Jupiter Apenninus standing at the summit of the pass. Thence it descended to Cales (where it turned N.E.), and through the pass of Intercisa to Forum Sempronii (Fossombrone) and Forum Fortunae, when it reached the coast of the Adriatic. Thence it ran N.W. through Pisaurum to Ariminum. The total distance from Rome was 210 m. by the older road and 222 by the newer. The road gave its name to a juridical district of Italy from the 2nd century A.D. onwards, the former territory of the Senones, which was at first associated with Umbria (with which indeed under Augustus it had formed the sixth region of Italy), but which after Constantine was always administered with Picenum.

(T. As.)

FLAMININUS, TITUS QUINCTIUS (*c.* 228-174 B.C.), Roman general and statesman. He began his public life as a military tribune under M. Claudius Marcellus, the conqueror of Syracuse. In 199 he was quaestor, and the next year, passing over the regular stages of aedile and praetor, he obtained the consulship.

Flamininus was one of the first and most successful of the rising school of Roman statesmen, the opponents of the narrow patriotism of which Cato was the type, the disciples of Greek culture, and the advocates of a wide imperial policy. His winning manners, his polished address, his knowledge of men, his personal fascination, and his intimate knowledge of Greek, all marked him out as the fittest representative of Rome in the East. Accordingly, the province of Macedonia, and the conduct of the war with Philip V. of Macedon, in which, after two years, Rome had as yet gained little advantage, were assigned to him. Flamininus modified both the policy and tactics of his predecessors. After an unsuccessful attempt to come to terms, he drove the Macedonians from the valley of the Aous by skilfully turning an impregnable position. Having thus practically made himself master of Macedonia, he proceeded to Greece, where Philip still had allies and supporters. The Achaean League (*q.v.*) at once deserted the cause of Macedonia, and Nabis, the tyrant of Sparta, entered into an alliance with Rome; Acarnania and Boeotia submitted in less than a year, and, with the exception of the great fortresses, Flamininus had the whole of Greece under his control. The demand of the Greeks for the expulsion of Macedonian garrisons from Demetrias, Chalcis and Corinth, as the only guarantee for the freedom of Greece, was refused, and negotiations were broken off. Hostilities were renewed in the spring of 197, and Flamininus took the field supported by nearly the whole of Greece. At Cynoscephalae the Macedonian phalanx and the Roman legion for the first time met in open fight, and the day decided which nation was to be master of Greece and perhaps of the world. It was a victory of superior

tactics. The left wing of the Roman army was retiring in confusion before the Macedonian right led by Philip in person, when Flamininus, leaving them to their fate, boldly charged the left wing under Nicanor, which was forming on the heights. Before the left wing had time to form, Flamininus was upon them, and a massacre rather than a fight ensued. This defeat was turned into a general rout by a nameless tribune, who collected twenty companies and charged in the rear the victorious Macedonian phalanx, which in its pursuit had left the Roman right far behind. Macedonia was now at the mercy of Rome, but Flamininus contented himself with his previous demands. Philip lost all his foreign possessions, but retained his Macedonian kingdom almost entire. He was required to reduce his army, to give up all his decked ships except five, and to pay an indemnity of 1000 talents (£244,000). Ten commissioners arrived from Rome to regulate the final terms of peace, and at the Isthmian games a herald proclaimed to the assembled crowds that "the Roman people, and T. Quinctius their general, having conquered King Philip and the Macedonians, declare all the Greek states which had been subject to the king henceforward free and independent." Flamininus's last act before returning home was characteristic. Of the Achaeans, who vied with one another in showering upon him honours and rewards, he asked but one personal favour, the redemption of the Italian captives who had been sold as slaves in Greece during the Hannibalic War. These, to the number of 1200, were presented to him on the eve of his departure (spring, 194), and formed the chief ornament of his triumph.

In 192, on the rupture between the Romans and Antiochus III. the Great, Flamininus returned to Greece, this time as the civil representative of Rome. His personal influence and skilful diplomacy secured the wavering Achaean states, cemented the alliance with Philip, and contributed mainly to the Roman victory at Thermopylae (191). In 183 he undertook an embassy to Prusias, king of Bithynia, to induce him to deliver up Hannibal, who forestalled his fate by taking poison. Nothing more is known of Flamininus, except that, according to Plutarch, his end was peaceful and happy.

There seems no doubt that Flamininus was actuated by a genuine love of Greece and its people. To attribute to him a Machiavellian policy, which foresaw the overthrow of Corinth fifty years later and the conversion of Achaea into a Roman province, is absurd and disingenuous. There is more force in the charge that his Hellenic sympathies prevented him from seeing the innate weakness and mutual jealousies of the Greek states of that period, whose only hope of peace and safety lay in submitting to the protectorate of the Roman republic. But if the event proved that the liberation of Greece was a political mistake, it was a noble and generous mistake, and reflects nothing but honour on the name of Flamininus, "the liberator of the Greeks."

His life has been written by Plutarch, and in modern times by F.D. Gerlach (1871); see also Mommsen, *Hist. of Rome* (Eng. tr.), bk. iii. chs. 8, 9.

FLAMINIUS, GAIUS, Roman statesman and general, of plebeian family. During his tribuneship (232 B.C.), in spite of the determined opposition of the senate and his own father, he carried a measure for distributing among the plebeians the *ager Gallicus Picenus*, an extensive tract of newly-acquired territory to the south of Ariminum (Cicero, *De senectute*, 4, *Brutus*, 14). As praetor in 227, he gained the lasting gratitude of the people of his province (Sicily) by his excellent administration. In 223, when consul with P. Furius Philus, he took the field against the Gauls, who were said to have been roused to war by his agrarian law. Having crossed the Po to punish the Insubrians, he at first met with a severe check and was forced to capitulate. Reinforced by the Cenomani, he gained a decisive victory on the banks of the Addua. He had previously been recalled by the optimates, but ignored the order. The victory seems to have been due mainly to the admirable discipline and fighting qualities of the soldiers, and he obtained the honour of a triumph only after the decree of the senate against it had been overborne by popular clamour. During his censorship (220) he strictly limited the freedmen to the four city tribes (see Comitia). His name is further associated with two great works. He erected the Circus Flaminius on the Campus Martius, for the accommodation of the plebeians, and continued the military road from Rome to Ariminum, which had hitherto only reached as far as Spoletium (see Flaminia, Via). He probably also instituted the "plebeian" games. In 218, as a leader of the democratic opposition, Flaminius was one of the chief promoters of the measure brought in by the tribune Quintus Claudius, which prohibited senators and senators' sons from possessing sea-going vessels, except for the transport of the produce of their own estates, and generally debarred them from all commercial speculation (Livy xxi. 63). His effective support of this measure vastly increased the popularity of Flaminius with his own order, and secured his second election as consul in the following year (217), shortly after the defeat of T. Sempronius Longus at the Trebia. He hastened at once to Arretium, the termination of the western high road to the north, to protect the passes of the Apennines, but was defeated and killed at the battle of the Trasimene lake (see Punic Wars).

The testimony of Livy (xxi., xxii.) and Polybius (ii., iii.)—no friendly critics—shows that Flaminius was a man of ability, energy and probity. A popular and successful democratic leader, he cannot, however, be ranked among the great statesmen of the republic. As a general he was headstrong and self-sufficient and seems to have owed his victories chiefly to personal boldness favoured by good fortune.

His son, Gaius Flaminius, was quaestor under P. Scipio Africanus the elder in Spain in 210, and took part in the capture of New Carthage. Fourteen years later, when curule aedile, he distributed large quantities of grain among the citizens at a very low price. In 193, as praetor, he carried on a successful war against the insubordinate populations of his recently constituted province of Hispania Citerior. In 187 he was consul with M. Aemilius Lepidus, and subjugated the warlike Ligurian tribes. In the same year the branch of the Via Aemilia connecting Bononia with Arretium was constructed by him. In 181 he founded the colony of Aquileia. The chief authority for his life is the portion of Livy dealing with the history of the period.

FLAMSTEED, JOHN (1646-1719), English astronomer, was born at Denby, near Derby, on the 19th of August 1646. The only son of Stephen Flamsteed, a maltster, he was educated at the free school of Derby, but quitted it finally in May 1662, in consequence of a rheumatic affection of the joints, due to a chill caught while bathing. Medical aid having proved of no avail, he went to Ireland in 1665 to be "stroked" by Valentine Greatrakes, but "found not his disease to stir." Meanwhile, he solaced his enforced leisure with astronomical studies. Beginning with J. Sacrobosco's *De sphaera*, he read all the books on the subject that he could buy or borrow; observed a partial solar eclipse on the 12th of September 1662; and attempted the construction of measuring instruments. A tract on the equation of time, written by him in 1667, was published by Dr John Wallis with the *Posthumous Works* of J. Horrocks (1673); and a paper embodying his calculations of appulses to stars by the moon, which appeared in the *Philosophical Transactions* (iv. 1099), signed *In Mathesi a sole fundes*, an anagram of "Johannes Flamsteedius," secured for him, from 1670, general scientific recognition.

On his return from a visit to London in 1670 he became acquainted with Isaac Newton at Cambridge, entered his name at Jesus college, and took, four years later, a degree of M.A. by letters-patent. An essay composed by him in 1673 on the true and apparent diameters of the planets furnished Newton with data for the third book of the *Principia*, and he fitted numerical elements to J. Horrocks's theory of the moon. In 1674, and again in 1675, he was invited to London by Sir Jonas Moore, governor of the Tower, who proposed to establish him in a private observatory at Chelsea, but the plan was anticipated by the determination of Charles II. to have the tables of the heavenly bodies corrected, and the places of the fixed stars rectified "for the use of his seamen," and Flamsteed was appointed "astronomical observator" by a royal warrant dated 4th of March 1675. His salary of £100 a year was cut down by taxation to £90; he had to provide his own instruments, and to instruct, into the bargain, two boys from Christ's hospital. Sheer necessity drove him, in addition, to take many private pupils; but having been ordained in 1675, he was presented by Lord North in 1684 to the living of Burstow in Surrey; and his financial position was further improved by a small inheritance on his father's death in 1688. He now ordered, at an expense of £120, a mural arc from Abraham Sharp, with which he began to observe systematically on the 12th of September 1689 (see Astronomy: *History*). The latter part of Flamsteed's life passed in a turmoil of controversy regarding the publication of his results. He struggled to withhold them until they could be presented in a complete form; but they were urgently needed for the progress of science, and the astronomer-royal was a public servant. Sir Isaac Newton, who depended for the perfecting of his lunar theory upon "places of the moon" reluctantly doled out from Greenwich, led the movement for immediate communication; whence arose much ill-feeling between him and Flamsteed. At last, in 1704, Prince George of Denmark undertook the cost of printing; a committee of the Royal Society was appointed to arrange preliminaries, and Flamsteed, protesting and exasperated, had to submit. The work was only partially through the press when the prince died, on the 28th of October 1708, and its completion devolved upon a board of visitors to the observatory endowed with ample powers by a royal order of the 12th of December 1712. As the upshot, the *Historia coelestis*, embodying the first Greenwich star-catalogue, together with the mural arc observations made 1689-1705, was issued under Edmund Halley's editorship in 1712. Flamsteed denounced the production as surreptitious; he committed to 478
the flames three hundred copies, of which he obtained possession through the favour of Sir Robert Walpole; and, in defiance of bodily infirmities, vigorously prosecuted his designs for the entire and adequate publication of the materials he continued to accumulate. They were but partially executed when he died on the 31st of December 1719. The preparation of his monumental work, *Historia coelestis Britannica* (3 vols. folio, 1725), was finished by his assistant, Joseph Crosthwait, aided by Abraham Sharp. The first two volumes included the whole of Flamsteed's observations at Derby and Greenwich; the third contained the *British Catalogue* of nearly 3000 stars. Numerous errors in this valuable record having been detected by Sir William Herschel, Caroline Herschel drew up a list of 560 stars observed, but not catalogued, while 111 of those catalogued proved to have never been observed (*Phil. Trans.* lxxxvii. 293; see also F. Baily, *Memoirs Roy. Astr. Society*, iv. 129). The appearance of the *Atlas coelestis*, corresponding to the *British Catalogue*, was delayed until 1729. A portrait of Flamsteed, painted by Thomas Gibson in 1712, hangs in the rooms of the Royal Society. The extent and quality of his performance were the more remarkable considering his severe physical sufferings, his straitened means, and the antagonism to which he was exposed. Estimable in private life, he was highly susceptible in professional matters, and hence failed to keep on terms with his contemporaries.

Francis Baily's *Account of the Rev. John Flamsteed* (1835) is the leading authority for his life. It comprises an autobiographical narrative pieced together from various sources, a large collection of Flamsteed's letters, a revised and enlarged edition of the *British Catalogue*, besides authoritative and detailed introductory discussions. Some clamour was raised by a publication in which blame for harsh dealings was freely imputed to Newton, but W. Whewell vindicated his character in *Flamsteed and Newton* (1836).

See also *General Dictionary*, vol. v. (1737), from materials supplied by James Hodgson, Flamsteed's nephew-in-law; *Biographia Britannica*, iii. 1943 (1750); S. Rigaud's *Correspondence of Scientific Men*; Cunningham's *Lives of Eminent Englishmen*, iv. 366 (1835); Mark Noble's Continuation of James Granger's Biog. *Hist. of England*, ii. 132; R. Grant's *Hist. of Phys. Astronomy*, p. 467; W. Whewell's *Hist. of the Inductive Sciences*, ii. 162; J.S. Bailly's *Hist. de l'astronomie moderne*, ii. 423, 589, 650; J. Delambre's *Hist. de l'astronomie au XVIII^{e} siècle*, p. 93; *Observatory*, xv. 355, 379, 382.

(A. M. C.)

FLANDERS (Flem. *Vlaanderen*), a territorial name for part of the Netherlands, Europe. Originally it applied only to Bruges and the immediate neighbourhood. In the 8th and 9th centuries it was gradually extended to the whole of the coast region from Calais to the Scheldt. In the middle ages this was divided into two parts, one looking to Bruges as its capital, and the other to Ghent. The name is retained in the two Belgian provinces of West and East Flanders.

1. West Flanders is the portion bordering the North Sea, and its coast-line extends from the French to the Dutch frontier for a little over 40 m. Its capital is Bruges, and the principal towns of the province are Ostend, Courtrai, Ypres and Roulers. Agriculture is the chief occupation of the population, and the country is under the most careful and skilful cultivation. The admiration of the foreign observer for the Belgian system of market gardening is not diminished on learning that the subsoil of most of this tract is the sand of the "dunes." Fishing employs a large proportion of the coast population. The area of West Flanders is officially computed at 808,667 acres or 1263 sq. m. In 1904 the population was 845,732, giving an average of 669 to the sq. m.

2. East Flanders lies east and north-east of the western province, and extends northwards to the neighbourhood of Antwerp. It is still more productive and richer than Western Flanders, and is well watered by the Scheldt. The district of Waes, land entirely reclaimed within the memory of man, is supposed to be the most productive district of its size in Europe. The principal towns are Ghent (capital of the province), St Nicolas, Alost, Termonde, Eecloo and Oudenarde. The area is given at 749,987 acres or 1172 sq. m. In 1904 the population was 1,073,507, showing an average of 916 per sq. m.

History.—The ancient territory of Flanders comprised not only the modern provinces known as East and West Flanders, but the southernmost portion of the Dutch province of Zeeland and a considerable district in north-western France. In the time of Caesar it was inhabited by the Morini, Atrebates and other Celtic tribes, but in the centuries that followed the land was repeatedly overrun by German invaders, and finally became a part of the dominion of the Franks. On the break-up of the Carolingian empire the river Scheldt was by the treaty of Verdun (843) made the line of division between the kingdom of East Francia (Austrasia) under the emperor Lothaire, and the kingdom of West Francia (Neustria) under Charles the Bald. In virtue of this compact Flanders was henceforth attached to the West Frankish monarchy (France). It thus acquired a position unique among the provinces of the territory known in later times as the Netherlands, all of which were included in that northern part of Austrasia assigned on the death of the emperor Lothaire (855) to King Lothaire II., and from his name called Lotharingia or Lorraine.

The first ruler of Flanders of whom history has left any record is Baldwin, surnamed *Bras-de-fer* (Iron-arm). This man, a brave and daring warrior under Charles the Bald, fell in love with the king's daughter Judith, the youthful widow of two English kings, married her, and fled with his bride to Lorraine. Charles, though at first very angry, was at last conciliated, and made his son-in-law margrave (*Marchio Flandriae*) of Flanders, which he held as an hereditary fief. The Northmen were at this time continually devastating the coast lands, and Baldwin was entrusted with the possession of this outlying borderland of the west Frankish dominion in order to defend it against the invaders. He was the first of a line of strong rulers, who at some date early in the 10th century exchanged the title of margrave for that of count. His son, Baldwin II.—the Bald—from his stronghold at Bruges maintained, as did his father before him, a vigorous defence of his lands against the incursions of the Northmen. On his mother's side a descendant of Charlemagne, he strengthened the dynastic importance of his family by marrying Aelfthryth, daughter of Alfred the Great. On his death in 918 his possessions were divided between his two sons Arnulf the Elder and Adolphus, but the latter survived only a short time and Arnulf succeeded to the whole inheritance. His reign was filled with warfare against the Northmen, and he took an active part in the struggles in Lorraine between the emperor Otto I. and Hugh Capet. In his old age he placed the government in the hands of Baldwin, his son by Adela, daughter of the count of Vermandois, and the young man, though his reign was a very short one, did a great deal for the commercial and industrial progress of the country, establishing the first weavers and fullers at Ghent, and instituting yearly fairs at Ypres, Bruges and other places.

On Baldwin III.'s death in 961 the old count resumed the control, and spent the few remaining years of his life in securing the succession of his grandson Arnulf II.—the Younger. The reign of Arnulf was terminated by his death in 989, and he was followed by his son Baldwin IV., named *Barbatus* or the Bearded. This Baldwin fought successfully both against the Capetian king of France and the emperor Henry II. Henry found himself obliged to grant to Baldwin IV. in fief Valenciennes, the burgraveship of Ghent, the land of Waes, and Zeeland. The count of Flanders thus became a feudatory of the empire as well as of the French crown. The French fiefs are known in Flemish history as Crown Flanders (*Kroon-Vlaanderen*), the German fiefs as Imperial Flanders (*Rijks-Vlaanderen*). Baldwin's son—afterwards Baldwin V.—rebelled in 1028 against his father at the instigation of his wife Adela, daughter of Robert II. of France; but two years later peace was sworn at Oudenaarde, and the old count continued to reign till his death in 1036. Baldwin V. proved a worthy successor, and acquired from the people the surname of *Débonnaire*. He was an active enterprising man, and greatly extended his power by wars and alliances. He obtained from the emperor Henry IV. the territory between the Scheldt and the Dender as an imperial fief, and the margraviate of Antwerp. So powerful had he become that the Flemish count on the decease of Henry I. of France in 1060 was appointed regent during the minority of Philip I. (see France). Before his death he saw his eldest daughter Matilda (d. 1083) sharing the English throne with William the Conqueror, his eldest son Baldwin of Mons in possession of Hainaut in right of his wife Richilde, heiress of Regnier V. (d. 1036) and widow of Hermann of Saxony (d. 1050/1) (see Hainaut), and his second son Robert the Frisian regent (*voogd*) of the county of Holland during the minority of Dirk V., whose mother, Gertrude of Saxony, widow of Floris I. of Holland (d. 1061), Robert had married (see Holland). On his death in 1067 his son Baldwin of Mons, already count of Hainaut, succeeded to the countship of Flanders. Baldwin V. had granted to Robert the Frisian on his marriage in 1063 his imperial fiefs. His right to these was disputed by Baldwin VI., and war broke out between the two brothers. Baldwin was killed in battle in 1070. Robert now claimed the tutelage of Baldwin's children and obtained the support of the emperor Henry IV., while Richilde, Baldwin's widow, appealed to Philip I. of France. The contest was decided at Ravenshoven, near Cassel, on the 22nd of

February 1071, where Robert was victorious. Richilde was taken prisoner and her eldest son Arnulf III. was slain. Robert obtained from Philip I. the investiture of Crown Flanders, and from Henry IV. the fiefs which formed Imperial Flanders.

The second son of Richilde was recognized as count of Hainaut (see HAINAUT), which was thus after a brief union separated from Flanders. Robert died in 1093, and was succeeded by his son Robert II., who acquired great renown by his exploits in the first crusade, and won the name of the Lance and Sword of Christendom. His fame was second only to that of Godfrey of Bouillon. Robert returned to Flanders in 1100. He fought with his suzerain Louis the Fat of France against the English, and was drowned in 1111 by the breaking of a bridge. His son and successor, Baldwin VII., or Baldwin with the Axe, also fought against the English in France. He died at the age of twenty-seven from the wound of an arrow, in 1119, leaving no heir. He nominated as his successor his cousin Charles, son of Knut IV. of Denmark and of Adela, daughter of Robert the Frisian. Charles tried his utmost to put down oppression and to promote the welfare of his subjects, and obtained the surname of "the Good." His determination to enforce the right made him many enemies, and he was foully murdered on Ash Wednesday, 1127, at Bruges. He died childless, and there were no less than six candidates to the countship. The contest lay between two of these, William Clito, son of Robert of Normandy and grandson of William the Conqueror and Matilda of Flanders, and Thierry or Dirk of Alsace, whose mother Gertrude was a daughter of Robert the Frisian. William Clito, through the support of Louis of France, was at first accepted by the Flemish nobles as count, but he gave offence to the communes, who supported Thierry. A struggle ensued and William was killed before Alost. Thierry then became count without further opposition. He married the widow of Charles the Good, Marguerite of Clermont, and proved himself at home a wise and prudent prince, encouraging the growth of popular liberty and of commerce. In 1146 he took part in the second crusade and distinguished himself by his exploits. In 1157 he resigned the countship to his son Philip of Alsace and betook himself once more to Jerusalem. On his return from the East twenty years later Thierry retired to a monastery to die in his own land.

Count Philip of Alsace was a strong and able man. He did much to promote the growth of the municipalities for which Flanders was already becoming famous. Ghent, Bruges, Ypres, Lille and Douai under him made much progress as flourishing industrial towns. He also conferred rights and privileges on a number of ports, Hulst, Nieuwport, Sluis, Dunkirk, Axel, Damme, Gravelines and others. But while encouraging the development of the communes and "free towns," Philip sternly repressed any spirit of independence or attempted uprisings against his authority. This count was a powerful prince. He acted for a time as regent in France during the minority of his godson Philip Augustus, and married his ward to his niece Isabella of Hainaut (1180). Philip took part in the third crusade, and died in the camp before Acre of the pestilence in 1191.

As he had no children, the succession passed to Baldwin of Hainaut, who had married Philip's sister Margaret. The countships of Flanders and Hainaut were thus united under the same ruler. Baldwin did not obtain possession of Flanders without strong opposition on the part of the French king, and he was obliged to cede Artois, St Omer, Lens, Hesdin and a great part of southern Flanders to France, and to allow Matilda of Portugal, the widow of Philip of Alsace, to retain certain towns in right of her dowry. Margaret died in 1194 and Baldwin the following year, and their eldest son Baldwin IX. succeeded to both countships. Baldwin IX. is famous in history as the founder of the Latin empire at Constantinople. He perished in Bulgaria in 1206. The emperor's two daughters were both under age, and the government was carried on by their uncle Philip, marquess of Namur, whom Baldwin had appointed regent on his departure to Constantinople. Philip proved faithless to his charge, and he allowed his nieces to fall into the hands of Philip Augustus, who married the elder sister Johanna of Constantinople to his nephew Ferdinand of Portugal. The Flemings were averse to the French king's supremacy, and Ferdinand, who acted as governor in the name of his wife, joined himself to the confederacy formed by Germany, England, and the leading states of the Netherlands against Philip Augustus. Ferdinand was, however, taken prisoner at the disastrous battle of Bouvines (1214) and was kept for twelve years a prisoner in the Louvre. The countess Johanna ruled the united countships with prudence and courage. On Ferdinand's death she married Thomas of Savoy, but died in 1244, leaving no heirs. She was succeeded in her dignities by her younger sister Margaret of Constantinople, commonly known amongst her contemporaries as "Black Meg" (*Zwarte Griet*). Margaret had been twice married. Her first husband was (1212) Buchard of Avesnes, one of the first of Hainaut's nobles and a man of knightly prowess, but originally destined for the church. On this ground he was excommunicated by Innocent III. and imprisoned by the countess Johanna, with the result that Margaret at last was driven to repudiate him. She married in second wedlock (1225) William of Dampierre. Two sons were the issue of the first marriage, three sons and three daughters of the second.

When Margaret in 1244 became countess of Flanders and Hainaut, she wished her son William of Dampierre to be acknowledged as her successor. John of Avesnes, her eldest son, strongly protested against this and was supported by the French king. A civil war ensued, which ended in a compromise (1246), the succession to Flanders being granted to William of Dampierre, that of Hainaut to John of Avesnes. Margaret, however, ruled with a strong hand for many years and survived both her sons, dying at the age of eighty in 1280. On her death her grandson, John II. of Avesnes, became count of Hainaut: Guy of Dampierre, her second son by her second marriage, count of Flanders.

The two counties were once more under separate dynasties. The government of Guy of Dampierre was unfortunate. It was the interest of the Flemish weavers to be on good terms with England, the wool-producing country, and Guy entered into an alliance with Edward I. against France. This led to an invasion and conquest of Flanders by Philip the Fair. Guy with his sons and the leading Flemish nobles were taken prisoners to Paris, and Flanders was ruled as a French dependency. But though in the principal towns, Ghent, Bruges and Ypres, there was a powerful French faction—known as *Leliaerts* (adherents of the lily)—the arbitrary rule of the French governor and officials stirred up the mass of the Flemish people to rebellion. The anti-French partisans (known as *Clauwaerts*) were strongest at Bruges under the leadership of Peter de Conync, master of the cloth-weavers, and John Breydel, master of the butchers. The French garrison at Bruges were massacred (May 19th, 1302), and on the following 11th of July a splendid French army of

invasion was utterly defeated near Courtray. Peace was concluded in 1305, but owing to Guy of Dampierre, and the leading Flemish nobles being in the hands of the French king, on terms very disadvantageous to Flanders. Very shortly afterwards the aged count Guy died, as did also Philip the Fair. Robert of Bethune, his son and successor, had continual difficulties with France during the whole of his reign, the Flemings offering a stubborn resistance to all attempts to destroy their independence. Robert was succeeded in 1322 by his grandson Louis of Nevers. Louis had been brought up at the French court, and had married Margaret of France. His sympathies were entirely French, and he made use of French help in his contests with the communes.

Under Louis of Nevers Flanders was practically reduced to the status of a French province. In his time the long contest between Flanders and Holland for the possession of the island of Zeeland was brought to an end by a treaty signed on the 6th of March 1323, by which West Zeeland was assigned to the count of Holland, the rest to the count of Flanders. The latter part of the reign of Louis of Nevers was remarkable for the successful revolt of the Flemish communes, now rapidly advancing to great material prosperity under Jacob van Artevelde (see Artevelde, Jacob van). Artevelde allied himself with Edward III. of England in his contest with Philip of Valois for the French crown, while Louis of Nevers espoused the cause of Philip. He fell at the battle of Crécy (1346). He was followed in the countship by his son Louis II. of Mâle. The reign of this count was one long struggle with the communes, headed by the town of Ghent, for political supremacy. Louis was as strong in his French sympathies as his father, and relied upon French help in enforcing his will upon his refractory subjects, who resented his arbitrary methods of government, and the heavy taxation imposed upon them by his extravagance and love of display. Had the great towns with their organized gilds and great wealth held together in their opposition to the count's despotism, they would have proved successful, but Ghent and Bruges, always keen rivals, broke out into open feud. The power of Ghent reached its height under Philip van Artevelde (see Artevelde, Philip van) in 1382. He defeated Louis, took Bruges and was made *ruward* of Flanders. But the triumph of the White Hoods, as the popular party was called, was of short duration. On the 27th of November 1382 Artevelde suffered a crushing defeat from a large French army at Roosebeke and was himself slain. Louis of Male died two years later, leaving an only daughter Margaret, who had married in 1369 Philip the Bold, duke of Burgundy.

Flanders now became a portion of the great Burgundian domain, which in the reign of Philip the Good, Margaret's grandson, had absorbed almost the whole of the Netherlands (see Burgundy; Netherlands). The history of Flanders as a separate state ceases from the time of the acquisition of the countship by the Burgundian dynasty. There were revolts from time to time of great towns against the exactions even of these powerful princes, but they were in vain. The conquest and humiliation of Bruges by Philip the Good in 1440, and the even more relentless punishment inflicted on rebellious Ghent by the emperor Charles V. exactly a century later are the most remarkable incidents in the long-continued but vain struggle of the Flemish communes to maintain and assert their privileges. The Burgundian dukes and their successors of the house of Habsburg were fully alive to the value to them of Flanders and its rich commercial cities. It was Flanders that furnished to them no small part of their resources, but for this very reason, while fostering the development of Flemish industry and trade, they were the more determined to brook no opposition which sought to place restrictions upon their authority.

The effect of the revolt of the Netherlands and the War of Dutch Independence which followed was ruinous to Flanders. Albert and Isabel on their accession to the sovereignty of the southern Netherlands in 1599 found "the great cities of Flanders and Brabant had been abandoned by a large part of their inhabitants; agriculture hardly in a less degree than commerce and industry had been ruined." In 1633 with the death of Isabel, Flanders reverted to Spanish rule (1633). By the treaty of Munster the north-western portion of Flanders, since known as States (or Dutch) Flanders, was ceded by Philip IV. to the United Provinces (1648). By a succession of later treaties—of the Pyrenees (1659), Aix-la-Chapelle (1668), Nijmwegen (1679) and others—a large slice of the southern portion of the old county of Flanders became French territory and was known as French Flanders.

From 1795 to 1814 Flanders, with the rest of the Belgic provinces, was incorporated in France, and was divided into two departments—*département de l'Escaut* and *département de la Lys*. This division has since been retained, and is represented by the two provinces of East Flanders and West Flanders in the modern kingdom of Belgium. The title of count of Flanders was revived by Leopold I. in 1840 in favour of his second son, Philip Eugene Ferdinand (d. 1905).

(G. E.)

FLANDRIN, JEAN HIPPOLYTE (1809-1864), French painter, was born at Lyons in 1809. His father, though brought up to business, had great fondness for art, and sought himself to follow an artist's career. Lack of early training, however, disabled him for success, and he was obliged to take up the precarious occupation of a miniature painter. Hippolyte was the second of three sons, all painters, and two of them eminent, the third son Paul (b. 1811) ranking as one of the leaders of the modern landscape school of France. Auguste (1804-1842), the eldest, passed the greater part of his life as professor at Lyons, where he died. After studying for some time at Lyons, Hippolyte and Paul, who had long determined on the step and economized for it, set out to walk to Paris in 1829, to place themselves under the tuition of Hersent. They chose finally to enter the atelier of Ingres, who became not only their instructor but their friend for life. At first considerably hampered by poverty, Hippolyte's difficulties were for ever removed by his taking, in 1832, the Grand Prix de Rome, awarded for his picture of the "Recognition of Theseus by his Father." This allowed him to study five years at Rome, whence he sent home several pictures which considerably raised his fame. "St Clair healing the Blind" was done for the cathedral of Nantes, and years after, at the exhibition of 1855, brought him a medal of the first class. "Jesus and the Little Children" was given by the government to the

town of Lisieux. “Dante and Virgil visiting the Envious Men struck with Blindness,” and “Euripides writing his Tragedies,” belong to the museum at Lyons. Returning to Paris through Lyons in 1838 he soon received a commission to ornament the chapel of St John in the church of St Séverin at Paris, and reputation increased and employment continued abundant for the rest of his life. Besides the pictures mentioned above, and others of a similar kind, he painted a great number of portraits. The works, however, upon which his fame most surely rests are his monumental decorative paintings. Of these the principal are those executed in the following churches:—in the sanctuary of St Germain des Prés at Paris (1842-1844), in the choir of the same church (1846-1848), in the church of St Paul at Nismes (1848-1849), of St Vincent de Paul at Paris (1850-1854), in the church of Ainay at Lyons (1855), in the nave of St Germain des Prés (1855-1861). In 1856 Hippolyte Flandrin was elected to the Académie des Beaux-Arts. In 1863 his failing health, rendered worse by incessant toil and exposure to the damp and draughts of churches, induced him again to visit Italy. He died of smallpox at Rome on the 21st of March 1864. As might naturally be expected in one who looked upon painting as but the vehicle for the expression of spiritual sentiment, he had perhaps too little pride in the technical qualities of his art. There is shown in his works much of that austerity and coldness, expressed in form and colour, which springs from a faith which feels itself in opposition to the tendencies of surrounding life. He has been compared to Fra Angelico; but the faces of his long processions of saints and martyrs seem to express rather the austerity of souls convicted of sin than the joy and purity of never-corrupted life which shines from the work of the early master.

See Delaborde, *Lettres et pensées de H. Flandrin* (Paris, 1865); Beulé, *Notice historique sur H. F.* (1869).

FLANNEL, a woollen stuff of various degrees of weight and fineness, made usually from loosely spun yarn. The origin of the word is uncertain, but in the 16th century flannel was a well-known production of Wales, and a Welsh origin has been suggested. The French form *flanelle* was used late in the 17th century, and the Ger. *Flanell* early in the 18th century. Baize, a kind of coarse flannel with a long nap, is said to have been first introduced to England about the middle of the 16th century by refugees from France and the Netherlands. The manufacture of flannel has naturally undergone changes, and, in some cases, deteriorations. Flannels are frequently made with an admixture of silk or cotton, and in low varieties cotton has tended to become the predominant factor. Formerly a short staple wool of fine quality from a Southdown variety of the Sussex breed was principally in favour with the flannel manufacturers of Rochdale, who also used largely the wool from the Norfolk breed, a cross between the Southdown and Norfolk sheep. In Wales the short staple wool of the mountain sheep was used, and in Ireland that of the Wicklow variety of the Cottagh breed, but now the New Zealand, Cape and South American wools are extensively employed, and English wools are not commonly used alone. Over 2000 persons are employed in flannel manufacture in Rochdale alone, which is the historic seat of the industry, and a good deal of flannel is now made in the Spen Valley district, Yorkshire. Blankets, which constitute a special branch of the flannel trade, are largely made at Bury in Lancashire and Dewsbury in Yorkshire. Welsh flannels have a high reputation, and make an important industry in Montgomeryshire. There are also flannel manufactories in Ireland.

A moderate export trade in flannel is done by Great Britain. The following table gives the quantities exported during three years:—

	1904.	1905.	1906.
Yards	9,758,300	9,220,500	8,762,200

In 1877 the export was 9,273,429 yds., so it appears that this trade has varied comparatively little. The imports of flannel are not very large.

Many so-called flannels have been made with a large admixture of cotton, but the Merchandise Marks Act has done something to limit the indiscriminate use of names. Unquestionably the development of the flannel trade has been checked by the great increase in the production of flannelettes, the better qualities of which have become formidable competitors with flannel. There must, however, be a regular and large demand for flannel while theory and experience confirm its value as a clothing particularly suitable for immediate contact with the body.

FLANNELETTE, a cotton cloth made to imitate flannel. The word seems to have been first used in the early ’eighties, and there is a reference in the *Daily News* of 1887 to “a poverty-stricken article called flannelette.” Now it is used very extensively for underclothing, night gear, dresses, dressing-gowns, shirts, &c. It is usually made with a much coarser weft than warp, and its flannel-like appearance is obtained by the raising or scratching up of this weft, and by various finishing processes. Some kinds are raised equally on both sides, and the nap may be long or short according to the purpose for which the cloth is required. A considerable trade is done in plain cloths dyed, and also in woven coloured stripes and checks, but almost any heavy or coarse cotton cloth can be made into flannelette. It is now largely used by the poorer classes of the community, and the flimsier kinds have been a frequent source of accident by fire. It is, however, when used discreetly and in a fair quality, a cheap and useful article. A flannelette, patented under the title of “Non-flam,” has been made with fire-resisting properties, but its sale has been more in the better qualities

than in the lower and more dangerous ones. Flannelette is made largely on the continent of Europe, and in the United States as well as in Great Britain.

FLASK, in its earliest meaning in Old English a vessel for carrying liquor, made of wood or leather. The principal applications in current usage are (1) to a vessel of metal or wood, formerly of horn, used for carrying gunpowder; (2) to a long-necked, round-bodied glass vessel, usually covered with plaited straw or maize leaves, containing olive or other oil or Italian wines—it is often known as a "Florence flask": similarly shaped vessels are used for experiments, &c., in a laboratory; (3) to a small metal or glass receptacle for spirits, wine or other liquor, of a size and shape to fit into a pocket or holster, usually covered with leather, basket-work or other protecting substance, and with a detachable portion of the case shaped to form a cup. "Flask" is also used in metal-founding of a wooden frame or case to contain part of the mould. The word "flagon," which is by derivation a doublet of "flask," is usually applied to a larger type of vessel for holding liquor, more particularly to a type of wine-bottle with a short neck and circular body with flattened sides. The word is also used of a jug-shaped vessel with a handle, spout and lid, into which wine may be decanted from the bottle for use at table, and of a similarly shaped vessel to contain the Eucharistic wine till it is poured into the chalice. "Flask" (in O. Eng. *flasce* or *flaxe*) is represented both in Teutonic and Romanic languages. The earliest examples are found in Med. Lat. *flasco*, *flasconis*, whence come Ital. *fiascone*, O. Fr. *flascon* (mod. *flacon*), adapted in the Eng. "flagon." Another Lat. form is *flasca*, this gave a Fr. *flasque*, which in the sense of "powder flask" remained in use till later than the 16th century. In Teutonic languages the word, in its various forms, is the common one for "bottle," so in Ger. *Flasche*, Dutch *flesch*, &c. If the word is of Romanic origin it is probably a metathesized form of the Lat. *vasculum*, diminutive of *vas*, vessel. There is no very satisfactory etymology if the word is of Teutonic origin; the New English Dictionary considers a connexion with "flat" probable phonetically, but finds no evidence that the word was used originally for a flat-shaped vessel.

FLAT (a modification of O. Eng. *flet*, an obsolete word of Teutonic origin, meaning the ground beneath the feet), a term commonly used as an adjective, signifying level in surface, level with the ground, and so, figuratively, fallen, dead, inanimate, tasteless, dull; or, by another transference, downright; or, in music, below the true pitch. In a substantival form, the term is used in physical geography for a level tract.

The word is also generally applied by modern usage to a self-contained residence or separate dwelling (in Scots law, the term *flatted house* is still used), consisting of a suite of rooms which form a portion, usually on a single floor, of a larger building, called the tenement house, the remainder being similarly divided. The approach to it is over a hall, passage and stairway, which are common to all residents in the building, but from which each private flat is divided off by its own outer door (Clode, *Tenement Houses and Flats*, pp. 1, 2).

There is in England a considerable body of special law applicable to flats. The following points deserve notice:—(i.) The occupants of distinct suites of rooms in a building divided into flats are generally, and subject, of course, to any special terms in their agreements, not lodgers but tenants with exclusive possession of separate dwelling-houses placed one above the other. They are, therefore, liable to distress by the immediate landlord, and each flat is separately rateable, though as a general rule by the contract of tenancy the rates are payable by the landlord. Flats used solely for business purposes are exempt from house tax, by the Customs and Inland Revenue Act 1878 (see *Grant*, v. *Langston*, 1900, A.C. 383); and, by the Revenue Act 1903 (s. 11), provision is made for excluding from assessment or for assessing at a low rate buildings used for providing separate dwellings at rents not exceeding £60 a year. It appears that tenants of a flat would not come within the meaning of "lodger" for the purposes of the Lodgers' Goods Protection Act 1871. (ii.) The owner of an upper storey, without any express grant or enjoyment for any given time, has a right to the support of the lower storey (*Dalton* v. *Angus*, 1881, 6 A.C. 740, 793). The owner of the lower storey, however, so long as he does nothing actively in the way of withdrawing its support, is not bound to repair, in the absence of a special covenant imposing that obligation upon him. The right of support being an easement in favour of the owner of the upper storey, it is for him to repair. He is in law entitled to enter on the lower storey for the purpose of doing the necessary repairs. It appears, however, that there is an implied obligation by the landlord to the tenants to keep the common stair and the lift or elevator in repair, and, for breach of this duty, he will be liable to a third party who, while visiting a tenant in the course of business, is injured by its defective condition (*Miller* v. *Hancock*, 1893, 2 Q.B. 177). No such liability would be involved in a mere licence to the tenants to use a part of the building not essential to the enjoyment of their flats. (iii.) In case of the destruction of the flat by fire, the rent abates *pro tanto* and an apportionment is made; *pari ratione*, where a flat is totally destroyed, the rent abates altogether (Clode, p. 14); unless the tenant has entered into an express and unqualified agreement to pay rent, when he will remain liable till the expiration of his tenancy. (iv.) Where the agreements for letting the flats in a single building are in common form, an agreement by the lessor not to depart from the kind of building there indicated may be held to be implied. Thus an injunction has been granted to restrain the conversion into a club of a large part of a building, adapted to occupation in residential flats, at the instance of a tenant who held under an agreement in a common form binding the tenants to rules suitable only for residential purposes (*Hudson* v. *Cripps*, 1896, 1 Ch. 265). (v.) The porter is usually appointed and paid by the landlord, who is liable for his acts while

engaged on his general duties; while engaged on any special duty for any tenant the porter is the servant of the latter, who is liable for his conduct within the scope of his employment.

In Scots law the rights and obligations of the lessors and lessees of flats, or—as they are called—"flatted houses," spring partly from the exclusive possession by each lessee of his own flat, partly from the common interest of all in the tenement as a whole. The "law of the tenement" may be thus summed up. The *solum* on which the flatted house stands, the area in front and the back ground are presumed to belong to the owner of the lowest floor or the owners of each floor severally, subject to the common right of the other proprietors to prevent injury to their flats, especially by depriving them of light. The external walls belong to each owner in so far as they enclose his flat; but the other owners can prevent operations on them which would endanger the security of the building. The roof and uppermost storey belong to the highest owner or owners, but he or they may be compelled to keep them in repair and to refrain from injuring them. The gables are common to the owner of each flat, so far as they bound his property, and to the owner of the adjoining house; but he and the other owners in the building have cross rights of common interest to prevent injury to the stability of the building. The floor and ceiling of each flat are divided in ownership by an ideal line drawn through the middle of the joists; they may be used for ordinary purposes, but may not be weakened or exposed to unusual risk from fire. The common passages and stairs are the common property of all to whose premises they form an access, and the walls which bound them are the common property of those persons and of the owners on their farther side.

In the United States the term "apartment-house" is applied to what in England are called flats. The general law is the same as in England. The French Code Civil provides (Art. 664) that where the different storeys of a house belong to different owners the main walls and roof are at the charge of all the owners, each one in proportion to the value of the storey belonging to him. The proprietor of each storey is responsible for his own flooring. The proprietor of the first storey makes the staircase which leads to it, the proprietor of the second, beginning from where the former ended, makes the staircase leading to his and so on. There are similar provisions in the Civil Codes of Belgium (Art. 664), Quebec (Art. 521), St Lucia (Art. 471).

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(A. W. R.)

FLATBUSH, formerly a township of Kings county, Long Island, New York, U.S.A., annexed to Brooklyn in 1894, and after the 1st of January 1898 a part of the borough of Brooklyn, New York City. The first settlement was made here by the Dutch about 1651, and was variously called "Midwout," "Midwoud" and "Medwoud" (from the Dutch words, *med*, "middle" and *woud*, "wood") for about twenty years, when it became more commonly known as Vlachte Bos (*vlachte*, "wooded"; *bos*, "plain") or Flackebos, whence, by further corruption, the present name. Farming was the chief occupation of the early settlers. On the 23rd of August 1776 the village was occupied by General Cornwallis's division of the invading force under Lord Howe, and on the 27th, at the disastrous battle of Long Island (or "battle of Flatbush," as it is sometimes called), "Flatbush Pass," an important strategic point, was vigorously defended by General Sullivan's troops.

FLAT-FISH (*Pleuronectidae*), the name common to all those fishes which swim on their side, as the halibut, turbot, brill, plaice, flounder, sole, &c. The side which is turned towards the bottom, and in some kinds is the right, in others the left, is generally colourless, and called "blind," from the absence of an eye on this side. The opposite side, which is turned upwards and towards the light, is variously, and in some tropical species even vividly, coloured, both eyes being placed on this side of the head. All the bones and muscles of the upper side are more strongly developed than on the lower; but it is noteworthy that these fishes when hatched, and for a short time afterwards, are symmetrical like other fishes.

Assuming that they are the descendants of symmetrical fishes, the question has been to determine which group of Teleosteans may be regarded as the ancestors of the flat-fishes. The old notion that they are only modified Gadids (Anacanthini) was the result of the artificial classification of the past and is now generally abandoned. The condition of the caudal fin, which in the cod tribe departs so markedly from that of ordinary Teleosteans, is in itself a sufficient reason for dismissing the idea of the homocercal flat-fishes being derived from the Anacanthini, and the whole structure of the two types of fishes speaks against such an assumption. On the other hand it has been shown, as noticed in the article DORY, that considerable, deep-seated resemblances exist between the Zeidae or John Dories and the more generalized of the Pleuronectidae; and that a fossil fish from the Upper Eocene, *Amphistium paradoxum*, evidently allied to the Zeidae, appears to realize in every respect the prototype of the Pleuronectidae before they had assumed the asymmetry which characterizes them as a group. In accordance with these views the flat-fishes are placed by G.A. Boulenger in the suborder Acanthopterygii, in a division called *Zeorhombi*. The three families included in that division can be traced back to the Upper Eocene, and their common ancestors will probably be found in the Upper Cretaceous associated with the *Berycidae*, to which they will no doubt prove to be related. The very young are transparent and symmetrical, with an eye on each side, and swim in a vertical position. As they grow, the eye of one side moves by degrees to the other side, where it becomes the upper eye. If at that age the dorsal

fin does not extend to the frontal region, the migrating eye simply moves over the line of the profile, temporarily assuming the position which it preserves in some of the less modified genera, such as *Psettodes*; in other genera, the dorsal fin has already extended to the snout before the migration takes place, and the eye, passing between the frontal bone and the tissues supporting the fin, appears to make its way from side to side through the head, as was believed by some of the earlier observers.

About 500 species of flat-fish are known, mostly marine, a few species allied to the sole being confined to the fresh waters of South America, West Africa, and the Malay Archipelago, whilst a few others, such as the English flounder, ascend streams, though still breeding in the sea. They range from the Arctic Circle to the southern coasts of the southern hemisphere and may occur at great depths.

(G. A. B.)

FLATHEADS, a tribe of North American Indians of Salishan stock. They formerly occupied the mountains of north-western Montana and the country around. They have always been friendly to the whites. Curiously enough they have not the custom, so general among American tribes, of flattening the heads of their infants. Father P.J. de Smet in 1841 founded among them a mission which proved the most successful in the north-west. With the Pend d'Oreille tribe and some Kutenais they are on a reservation in Montana, and number a few hundreds.

FLAUBERT, GUSTAVE (1821-1880), French novelist, was born at Rouen on the 12th of December 1821. His father, of whom many traits are reproduced in Flaubert's character of Charles Bovary, was a surgeon in practice at Rouen; his mother was connected with some of the oldest Norman families. He was educated in his native city, and did not leave it until 1840, when he came up to Paris to study law. He is said to have been idle at school, but to have been occupied with literature from the age of eleven. Flaubert in his youth "was like a young Greek," full of vigour of body and a certain shy grace, enthusiastic, intensely individual, and apparently without any species of ambition. He loved the country, and Paris was extremely distasteful to him. He made the acquaintance of Victor Hugo, and towards the close of 1840 he travelled in the Pyrenees and Corsica. Returning to Paris, he wasted his time in sombre dreams, living on his patrimony. In 1846, his mother being left quite alone through the deaths of his father and his sister Caroline, Flaubert gladly abandoned Paris and the study of the law together, to make a home for her at Croisset, close to Rouen. This estate, a house in a pleasant piece of ground which ran down to the Seine, became Flaubert's home for the remainder of his life. From 1846 to 1854 he carried on relations with the poetess, Mlle Louise Colet; their letters have been preserved, and according to M. Émile Faguet, this was the only sentimental episode of any importance in the life of Flaubert, who never married. His principal friend at this time was Maxime du Camp, with whom he travelled in Brittany in 1846, and through the East in 1849. Greece and Egypt made a profound impression upon the imagination of Flaubert. From this time forth, save for occasional visits to Paris, he did not stir from Croisset.

On returning from the East, in 1850, he set about the composition of *Madame Bovary*. He had hitherto scarcely written anything, and had published nothing. The famous novel took him six years to prepare, but was at length submitted to the *Revue de Paris*, where it appeared in serial form in 1857. The government brought an action against the publisher and against the author, on the charge of immorality, but both were acquitted; and when *Madame Bovary* appeared in book-form it met with a very warm reception. Flaubert paid a visit to Carthage in 1858, and now settled down to the archaeological studies which were required to equip him for *Salammbô*, which, however, in spite of the author's ceaseless labours, was not finished until 1862. He then took up again the study of contemporary manners, and, making use of many recollections of his youth and childhood, wrote *L'Éducation sentimentale*, the composition of which occupied him seven years; it was published in 1869. Up to this time the sequestered and laborious life of Flaubert had been comparatively happy, but misfortunes began to gather around him. He felt the anguish of the war of 1870 so keenly that the break-up of his health has been attributed to it; he began to suffer greatly from a distressing nervous malady. His best friends were taken from him by death or by fatal misunderstanding; in 1872 he lost his mother, and his circumstances became greatly reduced. He was very tenderly guarded by his niece, Mme Commonville; he enjoyed a rare intimacy of friendship with George Sand, with whom he carried on a correspondence of immense artistic interest, and occasionally he saw his Parisian acquaintances, Zola, A. Daudet, Tourgenieff, the Goncourts; but nothing prevented the close of Flaubert's life from being desolate and melancholy. He did not cease, however, to work with the same intensity and thoroughness. *La Tentation de Saint-Antoine*, of which fragments had been published as early as 1857, was at length completed and sent to press in 1874. In that year he was subjected to a disappointment by the failure of his drama *Le Candidat*. In 1877 Flaubert published, in one volume, entitled *Trois contes, Un Cœur simple, La Légende de Saint-Julien-l'Hospitalier and Hérodias*. After this something of his judgment certainly deserted him; he spent the remainder of his life in the toil of building up a vast satire on the futility of human knowledge and the omnipresence of mediocrity, which he left a fragment. This is the depressing and bewildering *Bouvard et Pécuchet* (posthumously printed, 1881), which, by a curious irony, he believed to be his masterpiece. Flaubert had rapidly and prematurely aged since 1870, and he was quite an old man when he was carried off by a stroke of apoplexy at the age of only 58, on the 8th of May 1880. He died at Croisset, but was buried in the family vault in the cemetery of Rouen. A beautiful monument to him by Chapu was unveiled at the museum of Rouen in 1890.

The personal character of Flaubert offered various peculiarities. He was shy, and yet extremely sensitive and arrogant; he passed from silence to an indignant and noisy flow of language. The same inconsistencies marked his physical nature; he had the build of a guardsman, with a magnificent Viking head, but his health was uncertain from childhood, and he was neurotic to the last degree. This ruddy giant was secretly gnawn by misanthropy and disgust of life. His hatred of the "bourgeois" began in his childhood, and developed into a kind of monomania. He despised his fellow-men, their habits, their lack of intelligence, their contempt for beauty, with a passionate scorn which has been compared to that of an ascetic monk. Flaubert's curious modes of composition favoured and were emphasized by these peculiarities. He worked in sullen solitude, sometimes occupying a week in the completion of one page, never satisfied with what he had composed, violently tormenting his brain for the best turn of a phrase, the most absolutely final adjective. It cannot be said that his incessant labours were not rewarded. His private letters show that he was not one of those to whom easy and correct language is naturally given; he gained his extraordinary perfection with the unceasing sweat of his brow. One of the most severe of academic critics admits that "in all his works, and in every page of his works, Flaubert may be considered a model of style." That he was one of the greatest writers who ever lived in France is now commonly admitted, and his greatness principally depends upon the extraordinary vigour and exactitude of his style. Less perhaps than any other writer, not of France, but of modern Europe, Flaubert yields admission to the inexact, the abstract, the vaguely inapt expression which is the bane of ordinary methods of composition. He never allowed a *cliché* to pass him, never indulgently or wearily went on, leaving behind him a phrase which "almost" expressed his meaning. Being, as he is, a mixture in almost equal parts of the romanticist and the realist, the marvellous propriety of his style has been helpful to later writers of both schools, of every school. The absolute exactitude with which he adapts his expression to his purpose is seen in all parts of his work, but particularly in the portraits he draws of the figures in his principal romances. The degree and manner in which, since his death, the fame of Flaubert has extended, form an interesting chapter of literary history. The publication of *Madame Bovary* in 1857 had been followed by more scandal than admiration; it was not understood at first that this novel was the beginning of a new thing, the scrupulously truthful portraiture of life. Gradually this aspect of his genius was accepted, and began to crowd out all others. At the time of his death he was famous as a realist, pure and simple. Under this aspect Flaubert exercised an extraordinary influence over É. de Goncourt, Alphonse Daudet and M. Zola. But even since the decline of the realistic school Flaubert has not lost prestige; other facets of his genius have caught the light. It has been perceived that he was not merely realistic, but real; that his clairvoyance was almost boundless; that he saw certain phenomena more clearly than the best of observers had done. Flaubert is a writer who must always appeal more to other authors than to the world at large, because the art of writing, the indefatigable pursuit of perfect expression, were always before him, and because he hated the lax felicities of improvization as a disloyalty to the most sacred procedures of the literary artist.

His *Œuvres complètes* (8 vols., 1885) were printed from the original manuscripts, and included, besides the works mentioned already, the two plays, *Le Candidat* and *Le Château des cœurs*. Another edition (10 vols.) appeared in 1873-1885. Flaubert's correspondence with George Sand was published in 1884 with an introduction by Guy de Maupassant. Other posthumous works are *Par les champs et par les grèves* (1885), the result of a tour in Brittany; and four volumes of *Correspondance* (1887-1893). See also Paul Bourget, *Essais de psychologie contemporaine* (1883); Émile Faguet, *Flaubert* (1899); Henry James, *French Poets and Novelists* (1878); Émile Zola, *Les Romanciers naturalistes* (1881); C.A. Sainte-Beuve, *Causeries du lundi*, vol. xiii., *Nouveaux lundis*, vol. iv.; and the *Souvenirs littéraires* (2 vols., 1882-1883) of Maxime du Camp.

(E. G.)

FLAVEL, JOHN (*c.* 1627-1691), English Presbyterian divine, was born at Bromsgrove in Worcestershire, probably in 1627. He was the elder son of Richard Flavel, described in contemporary records as "a painful and eminent minister." After receiving his early education, partly at home and partly at the grammar-schools of Bromsgrove and Haslar, he entered University College, Oxford. Soon after taking orders in 1650 he obtained a curacy at Diptford, Devon, and on the death of the vicar he was appointed to succeed him. From Diptford he removed in 1656 to Dartmouth. He was ejected from his living by the passing of the Act of Uniformity in 1662, but continued to preach and administer the sacraments privately till the Five Mile Act of 1665, when he retired to Slapton, 5 m. away. He then lived for a time in London, but returned to Dartmouth, where he laboured till his death in 1691. He was married four times. He was a vigorous and voluminous writer, and not without a play of fine fancy.

His principal works are his *Navigation Spiritualized* (1671); *The Fountain of Life, in forty-two Sermons* (1672); *The Method of Grace* (1680); *Pneumatologia, a Treatise on the Soul of Man* (1698); *A Token for Mourners*; *Husbandry Spiritualized* (1699). Collected editions appeared throughout the 18th century, and in 1823 Charles Bradley edited a 2 vol. selection.

FLAVIAN I. (d. 404), bishop or patriarch of Antioch, was born about 320, most probably in Antioch. He inherited great wealth, but resolved to devote his riches and his talents to the service of the church. In association with Diodorus, afterwards bishop of Tarsus, he supported the Catholic faith against the Arian Leontius, who had succeeded Eustathius as bishop of Antioch. The two friends assembled their adherents outside the city walls for the observance of the exercises of religion; and, according to Theodoret, it was in

these meetings that the practice of antiphonal singing was first introduced in the services of the church. When Meletius was appointed bishop of Antioch in 361 he raised Flavian to the priesthood, and on the death of Meletius in 381 Flavian was chosen to succeed him. The schism between the two parties was, however, far from being healed; the bishop of Rome and the bishops of Egypt refused to acknowledge Flavian, and Paulinus, who by the extreme Eustathians had been elected bishop in opposition to Meletius, still exercised authority over a portion of the church. On the death of Paulinus in 383, Evagrius was chosen as his successor, but after the death of Evagrius (*c.* 393) Flavian succeeded in preventing his receiving a successor, though the Eustathians still continued to hold separate meetings. Through the intervention of Chrysostom, soon after his elevation to the patriarchate of Constantinople (398), and the influence of the emperor Theodosius, Flavian was acknowledged in 399 as legitimate bishop of Antioch by the Church of Rome; but the Eustathian schism was not finally healed till 415. Flavian, who died in February 404, is venerated in both the Western and Eastern churches as a saint.

See also the article Meletius of Antioch, and the article "Flavianus von Antiochien" by Loofs in Herzog-Hauck's *Real-encyklop.* (ed. 3). For the Meletian schism see also A. Harnack's, *Hist. of Dogma*, iv. 95.

FLAVIAN II. (d. 518), bishop or patriarch of Antioch, was chosen by the emperor Anastasius I. to succeed Palladius, most probably in 498. He endeavoured to please both parties by steering a middle course in reference to the Chalcedon (*q.v.*) decrees, but was induced after great hesitation to agree to the request of Anastasius that he should accept the Henoticon, or decree of union, issued by the emperor Zeno. His doing so, while it brought upon him the anathema of the patriarch of Constantinople, failed to secure the favour of Anastasius, who in 511 found in the riots which were occurring between the rival parties in the streets of Antioch a pretext for deposing Flavian, and banishing him to Petra, where he died in 518. Flavian was soon after his death enrolled among the saints of the Greek Church, and after some opposition he was also canonized by the Latin Church.

FLAVIAN (d. 449), bishop of Constantinople, and an adherent of the Antiochene school, succeeded Proclus in 447. He presided at the council which deposed Eutyches (*q.v.*) in 448, but in the following year he was deposed by the council of Ephesus (the "robber synod"), which reinstated Eutyches in his office. Flavian's death shortly afterwards was attributed, by a pious fiction, to ill treatment at the hands of his theological opponents. The council of Chalcedon canonized him as a martyr, and in the Latin Church he is commemorated on the 18th of February.

FLAVIGNY, a town of eastern France, in the department of Côte-d'Or, situated on a promontory overlooking the river Ozerain, 33 m. W.N.W. of Dijon by road. Pop. (1906) 725. Among its antiquities are the remains of an abbey of the 8th century, which has been rebuilt as a factory for the manufacture of anise, an industry connected with the town as early as the 17th century. There is also a church of the 13th and 15th centuries, containing carved stalls (15th century) and a fine rood-screen (early 16th century). A Dominican convent, some old houses and ancient gateways are also of interest. About 3 m. north-west of Flavigny rises Mont Auxois, the probable site of the ancient Alesia, where Caesar in A.D. 52 defeated the Gallic chieftain Vercingetorix, to whom a statue has been erected on the summit of the height. Numerous remains of the Gallo-Roman period have been discovered on the hill.

FLAVIN (Lat. *flavus*, yellow), the commercial name for an extract or preparation of quercitron bark (*Quercus tinctoria*), which is used as a yellow dye in place of the ground and powdered bark (see QUERCITRON).

FLAX. The terms flax or lint (Ger. *Flachs*, Fr. *lin*, Lat. *linum*) are employed at once to denote the fibre so called, and the plant from which it is prepared. The flax plant (*Linum usitatissimum*) belongs to the natural order *Linaceae*, and, like most plants which have been long under cultivation, it possesses numerous varieties, while its origin is doubtful. As cultivated it is an annual with an erect stalk rising to a height of

from 20 to 40 in., with alternate, sessile, narrowly lance-shaped leaves, branching only at the top, each branch or branchlet ending in a bright blue flower. The flowers are regular and symmetrical, having five sepals, tapering to a point and hairy on the margin, five petals which speedily fall, ten stamens, and a pistil bearing five distinct styles. The fruit or boll is round, containing five cells, each of which is again divided into two, thus forming ten divisions, each of which contains a single seed. The seeds of the flax plant, well known as linseed, are heavy, smooth, glossy and of a bright greenish-brown colour. They are oval in section, but their maximum contour represents closely that of a pear with the stalk removed. The contents are of an oily nature, and when liquefied are of great commercial value.

The earliest cultivated flax was *Linum angustifolium*, a smaller plant with fewer and narrower leaves than *L. usitatissimum*, and usually perennial. This is known to have been cultivated by the inhabitants of the Swiss lake-dwellings, and is found wild in south and west Europe (including England), North Africa, and western Asia. The annual flax (*L. usitatissimum*) has been cultivated for at least four or five thousand years in Mesopotamia, Assyria and Egypt, and is wild in the districts included between the Persian Gulf, the Caspian Sea and the Black Sea. This annual flax appears to have been introduced into the north of Europe by the Finns, afterwards into the west of Europe by the western Aryans, and perhaps here and there by the Phoenicians; lastly, into Hindustan by the eastern Aryans after their separation from the European Aryans. (De Candolle, *Origin of Cultivated Plants*.)

The cultivation and preparation of flax are among the most ancient of all textile industries, very distinct traces of their existence during the stone age being preserved to the present day. “The use of flax,” says Ferdinand Keller (*Lake Dwellings of Switzerland*, translated by J.E. Lee), “reaches back to the very earliest periods of civilization, and it was most extensively and variously applied in the lake-dwellings, even in those of the stone period. But of the mode in which it was planted, steeped, heckled, cleansed and generally prepared for use, we can form no idea any more than we can of the mode or tools employed by the settlers in its cultivation.... Rough or unworked flax is found in the lake-dwellings made into bundles, or what are technically called heads, and, as much attention was given to this last operation, it was perfectly clean and ready for use.” As to its applications at this early period, Keller remarks: “Flax was the material for making lines and nets for fishing and catching wild animals, cords for carrying the earthenware vessels and other heavy objects; in fact, one can hardly imagine how navigation could be carried on, or the lake-dwellings themselves be erected, without the use of ropes and cords; and the erection of memorial stones (menhirs, dolmens), at whichever era, and to whatever people these monuments may belong, would be altogether impracticable without the use of strong ropes.”

Fig. 1.—Flax Plant (*Linum usitatissimum*).

Manufacture.—That flax was extensively cultivated and was regarded as of much importance at a very early period in the world’s history there is abundant testimony. Especially in ancient Egypt the fibre occupied a most important place, linen having been there not only generally worn by all classes, but it was the only material the priestly order was permitted to wear, while it was most extensively used as wrappings for embalmed bodies and for general purposes. In the Old Testament we are told that Pharaoh arrayed Joseph “in vestures of fine linen” (Gen. xlii. 42), and among the plagues of Egypt that of hail destroyed the flax and barley crops, “for the barley was in the ear, and the flax was bolled” (Exod. ix. 31). Further, numerous pictorial representations of flax culture and preparation exist to the present day on the walls of tombs and in Egypt. Sir J. G. Wilkinson in his description of ancient Egypt shows clearly the great antiquity of the ordinary processes of preparing flax. “At Beni Hassan,” he says, “the mode of cultivating the plant, in the same square beds now met with throughout Egypt (much resembling our salt pans), the process of beating the stalks and making them into ropes, and the manufacture of a piece of cloth are distinctly pointed out.” The preparation of the fibre as conducted in Egypt is illustrated by Pliny, who says: “The stalks themselves are immersed in water, warmed by the heat of the sun, and are kept down by weights placed upon them, for nothing is lighter than flax. The membrane, or rind, becoming loose is a sign of their being sufficiently macerated. They are then taken out and repeatedly turned over in the sun until perfectly dried, and afterwards beaten by mallets on stone slabs. That which is nearest the rind is called *stupa* [’tow’],

inferior to the inner fibres, and fit only for the wicks of lamps. It is combed out with iron hooks until the rind is all removed. The inner part is of a whiter and finer quality. Men are not ashamed to prepare it" (Pliny, *N.H.* xix. 1). For many ages, even down to the early part of the 14th century, Egyptian flax occupied the foremost place in the commercial world, being sent into all regions with which open intercourse was maintained. Among Western nations it was, without any competitor, the most important of all vegetable fibres till towards the close of the 18th century, when, after a brief struggle, cotton took its place as the supreme vegetable fibre of commerce.

Flax prospers most when grown upon land of firm texture resting upon a moist subsoil. It does well to succeed oats or potatoes, as it requires the soil to be in fresh condition without being too rich. Lands newly broken up from pasture suit it well, as these are generally freer from weeds than those that have been long under tillage. It is usually inexpedient to apply manure directly to the flax crop, as the tendency of this is to produce over-luxuriance, and thereby to mar the quality of the fibre, on which its value chiefly depends. For the same reason it must be thickly seeded, the effect of this being to produce tall, slender stems, free from branches. The land, having been ploughed in autumn, is prepared for sowing by working it with the grubber, harrow and roller, until a fine tilth is obtained. On the smooth surface the seed is sown broadcast by hand or machine, at the rate of 3 bushels per acre, and covered in the same manner as clover seeds. It is advisable immediately to hand-rake it with common hay-rakes, and thus to remove all stones and clods, and to secure a uniform close cover of plants. When these are about 2 to 3 in. long the crop must be carefully hand-weeded. This is a tedious and expensive process, and hence the importance of sowing the crop on land as free as possible from weeds of all kinds. The weeders, faces to the wind, move slowly on hands and knees, and should remove every vestige of weed in order that the flax plants may receive the full benefit of the land. When flax is cultivated primarily on account of the fibre, the crop ought to be pulled before the capsules are quite ripe, when they are just beginning to change from a green to a pale-brown colour, and when the stalks of the plant have become yellow throughout about two-thirds of their height.

The various operations through which the crop passes from this point till flax ready for the market is produced are—(1) Pulling, (2) Rippling, (3) Retting, (4) Drying, (5) Rolling, (6) Scutching.

Pulling and *rippling* may be dismissed very briefly. Flax is always pulled up by the root, and under no circumstances is it cut or shorn like cereal crops. The pulling ought to be done in dry clear weather; and care is to be taken in this, as in all the subsequent operations, to keep the root-ends even and the stalks parallel. At the same time it is desirable to have, as far as possible, stalks of equal length together,—all these conditions having considerable influence on the quality and appearance of the finished sample. As a general rule the removal of the "bolls" or capsules by the process of rippling immediately follows the pulling, the operation being performed in the field; but under some systems of cultivation, as, for example, the Courtrai method, alluded to below, the crop is made up into sheaves, dried and stacked, and is only boiled and retted in the early part of the next ensuing season. The best rippler, or apparatus for separating the seed capsules from the branches, consists of a kind of comb having, set in a wooden frame, iron teeth made of round-rod iron $\frac{3}{16}$ths of an inch asunder at the bottom, and half an inch at the top, and 18 in. long, to allow a sufficient spring, and save much breaking of flax. The points should begin to taper 3 in, from the top. A sheet or other cover being spread on the field, the apparatus is placed in the middle of it, and two ripplers sitting opposite each other, with the machine between them, work at the same time. It is unadvisable to ripple the flax so severely as to break or tear the delicate fibres at the upper part of the stem. The two valuable commercial products of the flax plant, the seeds and the stalk, are separated at this point. We have here to do with the latter only.

Retting or *rotting* is an operation of the greatest importance, and one in connexion with which in recent years numerous experiments have been made, and many projects and processes put forth, with the view of remedying the defects of the primitive system or altogether supplanting it. From the earliest times two leading processes of retting have been practised, termed respectively water-retting and dew-retting; and as no method has yet been introduced which satisfactorily supersedes these operations, they will first be described.

Water-retting.—For this—the process by which flax is generally prepared—pure soft water, free from iron and other materials which might colour the fibre, is essential. Any water much impregnated with lime is also specially objectionable. The dams or ponds in which the operation is conducted are of variable size, and usually between 4 and 5 ft. in depth. The rippled stalks are tied in small bundles and packed, roots downwards, in the dams till they are quite full; over the top of the upper layer is placed a stratum of rushes and straw, or sods with the grassy side downwards, and above all stones of sufficient weight to keep the flax submerged. Under favourable circumstances a process of fermentation should immediately be set up, which soon makes itself manifest by the evolution of gaseous bubbles. After a few days the fermentation subsides; and generally in from ten days to two weeks the process ought to be complete. The exact time, however, depends upon the weather and upon the particular kind of water in which the flax is immersed. The immersion itself is a simple matter; the difficulty lies in deciding when the process is complete. If allowed to remain under water too long, the fibre is weakened by what is termed "over-retting," a condition which increases the amount of codilla in the scutching process; whilst "under-retting" leaves part of the gummy or resinous matter in the material, which hinders the subsequent process of manufacture. As the steeping is such a critical operation, it is essential that the stalks be frequently examined and tested as the process nears completion. When it is found that the fibre separates readily from the woody "shove" or core, the beets or small bundles are ready for removing from the dams. It is drained, and then spread, evenly and equally, over a grassy meadow to dry. The drying, which takes from a week to a fortnight, must be uniform, so that all the fibres may spin equally well. To secure this uniformity, it is necessary to turn the material over several times during the process. It is ready for gathering when the core cracks and separates easily from the fibre. At this point advantage is taken of fine dry weather to gather up the flax, which is now ready for scutching, but the fibre is improved by stooking and stacking it for some time before it is taken to the scutching mill.

Dew-retting is the process by which all the Archangel flax and a large portion of that sent out from St Petersburg are prepared. By this method the operation of steeping is entirely dispensed with, and the flax is, immediately after pulling, spread on the grass where it is under the influence of air, sunlight, night-dews and rain. The process is tedious, the resulting fibre is brown in colour, and it is said to be peculiarly liable to undergo heating (probably owing to the soft heavy quality of the flax) if exposed to moisture and kept close packed with little access of air. Archangel flax is, however, peculiarly soft and silky in structure, although in all probability water-retting would result in a fibre as good or even better in quality.

The theory of retting, according to the investigations of J. Kolb, is that a peculiar fermentation is set up under the influence of heat and moisture, resulting in a change of the intercellular substance—pectose or an analogue of that body—into pectin and pectic acid. The former, being soluble, is left in the water; but the latter, an insoluble body, is in part attached to the fibres, from which it is only separated by changing into soluble metapectic acid under the action of hot alkaline ley in the subsequent process of bleaching.

To a large extent retting continues to be conducted in the primitive fashions above described, although numerous and persistent attempts have been made to improve upon it, or to avoid the process altogether. The uniform result of all experiments has only been to demonstrate the scientific soundness of the ordinary process of water-retting, and all the proposed improvements of recent times seek to obviate the tediousness, difficulties and uncertainties of the process as carried on in the open air. In the early part of the 19th century much attention was bestowed, especially in Ireland, on a process invented by Mr James Lee. He proposed to separate the fibre by purely mechanical means without any retting whatever; but after the Irish Linen Board had expended many thousands of pounds and much time in making experiments and in erecting his machinery, his entire scheme ended in complete failure. About the year 1851 Chevalier Claussen sought to revive a process of “cottonizing” flax—a method of proceeding which had been suggested three-quarters of a century earlier. Claussen’s process consisted in steeping flax fibre or tow for twenty-four hours in a weak solution of caustic soda, next boiling it for about two hours in a similar solution, and then saturating it in a solution containing 5% of carbonate of soda, after which it was immersed in a vat containing water acidulated with ½% of sulphuric acid. The action of the acid on the carbonate of soda with which the fibre was impregnated caused the fibre to split up into a fine cotton-like mass, which it was intended to manufacture in the same manner as cotton. A process to turn good flax into bad cotton had, however, on the face of it, not much to recommend it to public acceptance; and Claussen’s process therefore remains only as an interesting and suggestive experiment.

The only modification of water-retting which has hitherto endured the test of prolonged experiment, and taken a firm position as a distinct improvement, is the warm-water retting patented in England in 1846 by an American, Robert B. Schenck. For open pools and dams Schenck substitutes large wooden vats under cover, into which the flax is tightly packed in an upright position. The water admitted into the tanks is raised to and maintained at a temperature of from 75° to 95° F. during the whole time the flax is in steep. In a short time a brisk fermentation is set up, gases at first of pleasant odour, but subsequently becoming very repulsive, being evolved, and producing a frothy scum over the surface of the water. The whole process occupies only from 50 to 60 hours. A still further improvement, due to Mr Pownall, comes into operation at this point, which consists of immediately passing the stalks as they are taken out of the vats between heavy rollers over which a stream of pure water is kept flowing. By this means, not only is all the slimy glutinous adherent matter thoroughly separated, but the subsequent processes of breaking and scutching are much facilitated.

A process of retting by steam was introduced by W. Watt of Glasgow in 1852, and subsequently modified and improved by J. Buchanan. The system possessed the advantages of rapidity, being completed in about ten hours, and freedom from any noxious odour; but it yielded only a harsh, ill-spinning fibre, and consequently failed to meet the sanguine expectations of its promoters.

In connexion with improvements in retting, Mr Michael Andrews, secretary of the Belfast Flax Supply Association, made some suggestions and experiments which deserve close attention. In a paper contributed to the International Flax Congress at Vienna in 1873 he entered into details regarding an experimental rettery he had formed, with the view of imitating by artificial means the best results obtained by the ordinary methods. In brief, Mr Andrews’ method consists in introducing water at the proper temperature into the retting vat, and maintaining that temperature by keeping the air of the chamber at a proper degree of heat. By this means the flax is kept at a uniform temperature with great certainty, since even should the heat of the air vary considerably through neglect, the water in the vat only by slow degrees follows such fluctuations. “It may be remarked,” says Mr Andrews, “that the superiority claimed for this method of retting flax over what is known as the ’hot-water steeping’ is uniformity of temperature; in fact the experiments have demonstrated that an absolute control can be exercised over the means adopted to produce the artificial climate in which the vats containing the flax are situated.”

Several other attempts have been made with a view of obtaining a quick and practical method of retting flax. The one by Messrs Doumer and Deswarte appears to have been well received in France, but in Ireland the invention of Messrs Loppens and Deswarte has recently received the most attention. The apparatus consists of a tank with two chambers, the partition being perforated. The flax is placed in the upper chamber and covered by two sets of rods or beams at right angles to each other. Fresh water is allowed to enter the lower chamber immediately under the perforated partition. As the tank fills, the water enters the upper chamber and carries with it the flax and the beams, the latter being prevented from rising too high. The soluble substances are dissolved by the water, and the liquid thus formed being heavier than water, sinks to the bottom of the tank where it is allowed to escape through an outlet. By this arrangement the flax is almost continually immersed in fresh water, a condition which hastens the retting. The flow of the liquids, in and out, can be so arranged that the motion is very slow, and hence the liquids of different densities do not mix. When the operation is completed, the whole of the water is run off, and the flax remains on the perforated floor, where it drains thoroughly before being removed to dry.

The Department of Agriculture and Technical Instruction for Ireland, and the Belfast Flax Supply Association, have jointly made some experiments with this method, and the following extract from the

Association's report for 1905 shows the success which attended their efforts:—

> "By desire of the department (which has taken up the position of an impartial critic of the experiment) a quantity of flax straw was divided into two equal lots. One part was retted at Millisle by the patent-system of Loppens and Deswarte; the other was sent to Courtrai and steeped in the Lys. Both lots when retted and scutched were examined by an inspector of the department and by several flax spinners. That which was retted at Millisle was pronounced superior to the other" ...
>
> "To summarise results up to date—
>
> 1. It has been proved that flax can be thoroughly dried in the field in Ireland.
> 2. That the seed can be saved, and is of first quality.
> 3. That the system of retting (Loppens and Deswarte's patent) is at least equal to the Lys, as to quality and yield of fibre produced."

Since these results appear to be satisfactory, it is natural to expect further attempts with the same object of supplanting the ordinary steeping. A really good chemical, mechanical or other method would probably be the means of reviving the flax industry in the remote parts of the British Isles.

Scutching is the process by which the fibre is freed from its woody core and rendered fit for the market. For ordinary water-retted flax two operations are required, first breaking and then scutching, and these are done either by hand labour or by means of small scutching or lint mills, driven either by water or steam power. Hand labour, aided by simple implements, is still much used in continental countries; also in some parts of Ireland where labour is cheap or when very fine material is desired; but the use of scutching mills is now very general, these being more economical. The breaking is done by passing the stalks between grooved or fluted rollers of different pitches; these rollers, of which there may be from 5 to 7 pairs, are sometimes arranged to work alternately forwards and backwards in order to thoroughly break the woody material or "boon" of the straw, while the broken "shoves" are beaten out by suspending the fibre in a machine fitted with a series of revolving blades, which, striking violently against the flax, shake out the bruised and broken woody cores. A great many modified scutching machines and processes have been proposed and introduced with the view of promoting economy of labour and improving the turn-out of fibre, both in respect of cleanness and in producing the least proportion of codilla or scutching tow.

The celebrated Courtrai flax of Belgium is the most valuable staple in the market, on account of its fineness, strength and particularly bright colour. There the flax is dried in the field, and housed or stacked during the winter succeeding its growth, and in the spring of the following year it is retted in crates sunk in the sluggish waters of the river Lys. After the process has proceeded a certain length, the crates are withdrawn, and the sheaves taken out and stooked. It is thereafter once more tied up, placed in the crates, and sunk in the river to complete the retting process; but this double steeping is not invariably practised. When finally taken out, it is unloosed and put up in cones, instead of being grassed, and when quite dry it is stored for some time previous to undergoing the operation of scutching. In all operations the greatest care is taken, and the cultivators being peculiarly favoured as to soil, climate and water, Courtrai flax is a staple of unapproached excellence.

> An experiment made by Professor Hodges of Belfast on 7770 lb of air-dried flax yielded the following results. By rippling he separated 1946 lb of bolls which yielded 910 lb of seed. The 5824 lb (52 cwt.) of flax straw remaining lost in steeping 13 cwt., leaving 39 cwt. of retted stalks, and from that 6 cwt. 1 qr. 2 lb (702 lb) of finished flax was procured. Thus the weight of the fibre was equal to about 9% of the dried flax with the bolls, 12% of the boiled straw, and over 16% of the retted straw. One hundred tons treated by Schenck's method gave 33 tons bolls, with 27.50 tons of loss in steeping; 32.13 tons were separated in scutching, leaving 5.90 tons of finished fibre, with 1.47 tons of tow and pluckings. The following analysis of two varieties of heckled Belgian flax is by Dr Hugo Müller (Hoffmann's *Berichte über die Entwickelung der chemischen Industrie*):—

Ash	0.70	1.32
Water	8.65	10.70
Extractive matter	3.65	6.02
Fat and wax	2.39	2.37
Cellulose	82.57	71.50
Intercellular substance and pectose bodies	2.74	9.41

> According to the determinations of Julius Wiesner (*Die Rohstoffe des Pflanzenreiches*), the fibre ranges in length from 20 to 140 centimetres, the length of the individual cells being from 2.0 to 4.0 millimetres, and the limits of breadth between 0.012 and 0.025 mm., the average being 0.016 mm.

Among the circumstances which have retarded improvement both in the growing and preparing of flax, the fact that, till comparatively recent times, the whole industry was conducted only on a domestic scale has had much influence. At no very remote date it was the practice in Scotland for every small farmer and cotter not only to grow "lint" or flax in small patches, but to have it retted, scutched, cleaned, spun, woven, bleached and finished entirely within the limits of his own premises, and all by members or dependents of the family. The same practice obtained and still largely prevails in other countries. Thus the flax industry was long kept away from the most powerful motives to apply to it labour-saving devices, and apart from the influence of scientific inquiry for the improvement of methods and processes. As cotton came to the front, just at the time when machine-spinning and power-loom weaving were being introduced, the result was that in many localities where flax crops had been grown for ages, the culture gradually drooped and ultimately ceased. The linen manufacture by degrees ceased to be a domestic industry, and began to centre in and become the characteristic factory employment of special localities, which depended, however, for their supply of raw material primarily on the operations of small growers, working, for the most part, on the poorer districts of remote thinly populated countries. The cultivation of the plant and the preparation of the fibre have

therefore, even at the present day, not come under the influence (except in certain favoured localities) of scientific knowledge and experience.

Cultivation.—The approximate number of acres (1905) under cultivation in the principal flax-growing countries is as follows:—

Russia	3,500,000	acres.
Caucasia	450,000	”
Austria	175,000	”
Italy	120,000	”
Poland	95,000	”
Rumania	80,000	”
Germany	75,000	”
France	65,000	”
Belgium	53,000	”
Hungary	50,000	”
Ireland	46,000	”
Holland	38,000	”

Although the amount grown in Russia exceeds considerably the combined quantity grown in the rest of the above-mentioned countries, the quality of the fibre is inferior. The fibre is cultivated in the Russian provinces of Archangel, Courland, Esthonia, Kostroma, Livonia, Novgorod, Pskov, Smolensk, Tver, Vyatka, Vitebsk, Vologda and Yaroslav or Jaroslav, while the bulk of the material is exported through the Baltic ports. Riga and St Petersburg (including Cronstadt) are the principal ports, but flax is also exported from Revel, Windau, Pernau, Libau, Narva and Königsberg. Sometimes it is exported from Archangel, but this port is frost-bound for a great period of the year; moreover, most of the districts are nearer to the Baltic.

The following Prices, taken from the Dundee Year Books, show the Change in Price of a few well-known Varieties.

	Dec. 1897.	Dec. 1898.	Dec. 1899.	Dec. 1900.	Dec. 1901.	Dec. 1902.	Dec. 1903.	Dec. 1904.	Dec. 1905.	Dec. 190
Riga—	£	£	£	£	£	£	£	£	£	£
SPK	23½	21 to 22	28 to 32	42	28 to 32	32	39	33	35	32
XHDX	27	26½	32½ to 33	43½	34	35	42	34	36	33
W	16 to 16¼	15½ to 16	22½ to 24	31	18 to 19	22	29	23	24	24
St Petersburg—										
Bajetsky	28 to 29	26 to 27	32 to 32½	46	37	33	49	36	42	38
Jaropol	24 to 25	23 to 23½	30	42	32	30	42	33	35	33
Tows—										
Mologin	24 to 24¼	23 to 23½	24½ to 25	31½	32	32	42	32	34	32½
Novgorod	[1]23½ to 24	[1]23	[1]26 to 26½	33	31½	32½	41	31½	37	34½
Archangel—										
½ and ½ tow	25	24 to 24½	26 to 27	32	31	32	41	31½	32½	31
2nd Codilla	25	24 to 24	25½ to 26	32	31	32	41	32	33	31

The raw flax is almost invariably known by the same name as the district in which it is grown, and it is further classified by special marks. The following names amongst others are given to the fibre:—Archangel, Bajetsky, Courish, Dorpat, Drogobusher, Dunaberg, Fabrichnoi, Fellin, Gjatsk, Glazoff, Griazourtz, Iwashkower, Jaransk, Janowitz, Jaropol, Jaroslav, Kama, Kashin, Königsberg, Kostroma, Kotelnitch, Kowns, Krasnoholm, Kurland (Courland), Latischki, Livonian Crowns, Malmuish, Marienberg, Mochenetz, Mologin, Newel, Nikolsky, Nolinsk, Novgorod, Opotchka, Ostroff, Ostrow, Otbornoy, Ouglitch, Pernau, Pskoff, Revel, Riga, Rjeff, St Petersburg, Seretz, Slanitz, Slobodskoi, Smolensk, Sytcheffka, Taroslav. Tchesna, Totma, Twer, Ustjuga, Viatka, Vishni, Vologda, Werro, Wiasma, Witebsk.

These names indicate the particular district in which the flax has been grown, but it is more general to group the material into classes such as Livonian Crowns, Rija Crowns, Hoffs, Wracks, Drieband, Zins, Ristens, Pernau, Archangel, &c.

The quotations for the various kinds of flaxes are made with one or other special mark termed a base mark; this usually, but not necessarily, indicates the lowest quality. The September-October 1906 quotations appeared as under:—

Livonian	basis	K	£26 to £27	per ton,
Hoffs	”	HD	£21 to £22	”
Pernau	”	D	£28 to £28 : 10	”
Dorpat	”	D	£32 to £32 : 10	”
	cleaned.			

It will, of course, be understood that the base mark is subject to variation, the ruling factors being the amount of crop, quality and demand.

The marks in the Crown flaxes have the following signification:—

K	means	Crown and is usually the base mark.	
H	”	Light and represents a rise of about	£1
P	”	Picked ” ” ”	£3
G	”	Grey ” ” ”	£3
S	”	Superior ” ” ”	£4
W	”	White ” ” ”	£4

Z	”	Zins	”	”	” £10

Each additional mark means a rise in the price, but it must be understood that it is quite possible for a quality denoted by two letters to be more valuable than one indicated by three or more, since every mark has not the same value.

If we take £25 as the value of the base mark, the value per ton for the different groups would be:—

K	£25	HSPK	£33
HK	£26	GSPK	£35
PK	£28	WSPK	£36
HPK	£29	ZK	£35
GPK	£31	HZK	£36
SPK	£32	GZK	£38, &c.

The Hoffs flaxes are reckoned in a similar way. Here H is for Hoffs, D for Drieband, P for picked, F for fine, S for superior, and R for Risten. In addition to these marks, an X may appear before, after or in both places. With £20 as base mark we have:—

HD	£20	per	ton.
PHD	£23	”	”
FPHD	£26	”	”
SFPHD	£29	”	”
XHDX	£32	”	”
XRX	£35	”	”

Of the lower qualities of Riga flax the following may be named;

W,	Wrack flax.	PW,	Picked wrack flax.
WPW,	White picked wrack.	GPW,	Grey picked wrack flax.
D,	Dreiband (Threeband).	PD,	Picked Dreiband flax.
LD,	Livonian Dreiband.	PLD,	Picked Livonian Dreiband.
SD,	Slanitz Dreiband.	PSD,	Picked Slanitz Dreiband.

The last-named (SD and PSD) are dew-retted qualities shipped from Riga either as Lithuanian Slanitz, Wellish Slanitz or Wiasma Slanitz, showing from what district they come, as there are differences in the quality of the produce of each district. The lowest quality of Riga flax is marked DW, meaning Dreiband Wrack.

Another Russian port from which a large quantity of flax is imported is Pernau, where the marks in use are comparatively few. The leading marks are:—

LOD,	indicating	Low Ordinary Dreiband (Threeband).
OD,	”	Ordinary Dreiband.
D,	”	Dreiband.
HD,	”	Light Dreiband.
R,	”	Risten.
G,	”	Cut.
M,	”	Marienburg.

Pernau flax is shipped as Livonian and Fellin sorts, the latter being the best.

Both dew-retted and water-retted flax are exported from St Petersburg, the dew-retted or Slanitz flax being marked 1st, 2nd, 3rd and 4th Crown, also Zebrack No. 1 and Zebrack No. 2, while all the Archangel flax is dew-retted.

Some idea of the extent of the Russian flax trade may be gathered from the fact that 233,000 tons were exported in 1905. Out of this quantity a little over 53,000 tons came to the United Kingdom. The Chief British ports for the landing of flax are:—Belfast, Dundee, Leith, Montrose, London and Arbroath, the two former being the chief centres of the flax industry.

The following table, taken from the annual report of the Belfast Flax Supply Association, shows the quantities received from all sources into the different parts of the United Kingdom:—

Year.	Imports to the United Kingdom.	Imports to Ireland.	Imports to England and Scotland.
	Tons.	Tons.	Tons.
1895	102,622	33,506	67,116
1896	95,199	36,650	58,549
1897	98,802	37,715	61,087
1898	97,253	34,440	62,813
1899	99,052	40,145	58,907
1900	71,586	31,563	40,023
1901	75,565	28,785	46,780
1902	73,611	29,727	43,884
1903	94,701	38,168	56,533
1904	74,917	33,024	41,893
1905	90,098	40,063	50,035

The extent of flax cultivation in Ireland is considerable, but the acreage has been gradually diminishing during late years. In 1864 it reached the maximum, 301,693 acres; next year it fell to 251,433. After 1869 it declined, there being 229,252 acres in flax crop that year, and only 122,003 in 1872. From this year to 1889 it fluctuated considerably, reaching 157,534 acres in 1880 and dropping to 89,225 acres in 1884. Then for five successive years the acreage was above 108,000. From 1890 to 1905 it only once reached 100,000, while the average in 1903, 1904 and 1905 was a little over 45,000 acres.

(T. Wo.)

1 8 and 2, which means 80% of one quality and 20% of another. Sometimes other proportions obtain, while it is not unusual to have quotations for flaxes containing four different kinds.

FLAXMAN, JOHN (1755-1826), English sculptor and draughtsman, was born on the 6th of July 1755, during a temporary residence of his parents at York. The name John was hereditary in the family, having been borne by his father after a forefather who, according to the family tradition, had fought on the side of parliament at Naseby, and afterwards settled as a carrier or farmer, or both, in Buckinghamshire. John Flaxman, the father of the sculptor, carried on with repute the trade of a moulder and seller of plaster casts at the sign of the Golden Head, New Street, Covent Garden, London. His wife's maiden name was See, and John was their second son. Within six months of his birth the family returned to London, and in his father's back shop he spent an ailing childhood. His figure was high-shouldered and weakly, the head very large for the body. His mother having died about his tenth year, his father took a second wife, of whom all we know is that her maiden name was Gordon, and that she proved a thrifty housekeeper and kind stepmother. Of regular schooling the boy must have had some, since he is reputed as having remembered in after life the tyranny of some pedagogue of his youth; but his principal education he picked up for himself at home. He early took delight in drawing and modelling from his father's stock-in-trade, and early endeavoured to understand those counterfeits of classic art by the light of translations from classic literature.

Customers of his father took a fancy to the child, and helped him with books, advice, and presently with commissions. The two special encouragers of his youth were the painter Romney, and a cultivated clergyman, Mr Mathew, with his wife, in whose house in Rathbone Place the young Flaxman used to meet the best "blue-stocking" society of those days, and, among associates of his own age, the artists Blake and Stothard, who became his closest friends. Before this he had begun to work with precocious success in clay as well as in pencil. At twelve years old he won the first prize of the Society of Arts for a medal, and became a public exhibitor in the gallery of the Free Society of Artists; at fifteen he won a second prize from the Society of Arts and began to exhibit in the Royal Academy, then in the second year of its existence. In the same year, 1770, he entered as an Academy student and won the silver medal. But all these successes were followed by a discomfiture. In the competition for the gold medal of the Academy in 1772, Flaxman, who had made sure of victory, was defeated, the prize being adjudged by the president, Sir Joshua Reynolds, to another competitor named Engleheart. But this reverse proved no discouragement, and indeed seemed to have had a wholesome effect in curing the successful lad of a tendency to conceit and self-sufficiency which made Thomas Wedgwood say of him in 1775: "It is but a few years since he was a most supreme coxcomb."

He continued to ply his art diligently, both as a student in the schools and as an exhibitor in the galleries of the Academy, occasionally also attempting diversions into the sister art of painting. To the Academy he contributed a wax model of Neptune (1770); four portrait models in wax (1771); a terracotta bust, a wax figure of a child, a figure of History (1772); a figure of Comedy, and a relief of a Vestal (1773). During these years he received a commission from a friend of the Mathew family, for a statue of Alexander. But by heroic and ideal work of this class he could, of course, make no regular livelihood. The means of such a livelihood, however, presented themselves in his twentieth year, when he first received employment from Josiah Wedgwood and his partner Bentley, as a modeller of classic and domestic friezes, plaques, ornamental vessels and medallion portraits, in those varieties of "jasper" and "basalt" ware which earned in their day so great a reputation for the manufacturers who had conceived and perfected the invention. In the same year, 1775, John Flaxman the elder moved from New Street, Covent Garden, to a more commodious house in the Strand (No. 420). For twelve years, from his twentieth to his thirty-second (1775-1787), Flaxman subsisted chiefly by his work for the firm of Wedgwood. It may be urged, of the minute refinements of figure outline and modelling which these manufacturers aimed at in their ware, that they were not the qualities best suited to such a material; or it may be regretted that the gifts of an artist like Flaxman should have been spent so long upon such a minor and half-mechanical art of household decoration; but the beauty of the product it would be idle to deny, or the value of the training which the sculptor by this practice acquired in the delicacies and severities of modelling in low relief and on a minute scale.

By 1780 Flaxman had begun to earn something in another branch of his profession, which was in the future to furnish his chief source of livelihood, viz. the sculpture of monuments for the dead. Three of the earliest of such monuments by his hand are those of Chatterton in the church of St Mary Redcliffe at Bristol (1780), of Mrs Morley in Gloucester cathedral (1784), and of the Rev. T. and Mrs Margaret Ball in the cathedral at Chichester (1785). During the rest of Flaxman's career memorial bas-reliefs of the same class occupied a principal part of his industry; they are to be found scattered in many churches throughout the length and breadth of England, and in them the finest qualities of his art are represented. The best are admirable for pathos and simplicity, and for the alliance of a truly Greek instinct for rhythmical design and composition with that spirit of domestic tenderness and innocence which is one of the secrets of the modern soul.

In 1782, being twenty-seven years old, Flaxman was married to Anne Denman, and had in her the best of helpmates until almost his life's end. She was a woman of attainments in letters and to some extent in art,

and the devoted companion of her husband's fortunes and of his travels. They set up house at first in Wardour Street, and lived an industrious life, spending their summer holidays once and again in the house of the hospitable poet Hayley, at Eartham in Sussex. After five years, in 1787, they found themselves with means enough to travel, and set out for Rome, where they took up their quarters in the Via Felice. Records more numerous and more consecutive of Flaxman's residence in Italy exist in the shape of drawings and studies than in the shape of correspondence. He soon ceased modelling himself for Wedgwood, but continued to direct the work of other modellers employed for the manufacture at Rome. He had intended to return after a stay of a little more than two years, but was detained by a commission for a marble group of a Fury of Athamas, a commission attended in the sequel with circumstances of infinite trouble and annoyance, from the notorious Comte-Évêque, Frederick Hervey, earl of Bristol and bishop of Derry. He did not, as things fell out, return until the summer of 1794, after an absence of seven years,—having in the meantime executed another ideal commission (a "Cephalus and Aurora") for Mr Hope, and having sent home models for several sepulchral monuments, including one in relief for the poet Collins in Chichester cathedral, and one in the round for Lord Mansfield in Westminster Abbey.

But what gained for Flaxman in this interval a general and European fame was not his work in sculpture proper, but those outline designs to the poets, in which he showed not only to what purpose he had made his own the principles of ancient design in vase-paintings and bas-reliefs, but also by what a natural affinity, better than all mere learning, he was bound to the ancients and belonged to them. The designs for the *Iliad* and *Odyssey* were commissioned by Mrs Hare Naylor; those for Dante by Mr Hope; those for Aeschylus by Lady Spencer; they were all engraved by Piroli, not without considerable loss of the finer and more sensitive qualities of Flaxman's own lines. 490

During their homeward journey the Flaxmans travelled through central and northern Italy. On their return they took a house, which they never afterwards left, in Buckingham Street, Fitzroy Square. Immediately afterwards we find the sculptor publishing a spirited protest against the scheme already entertained by the Directory, and carried out five years later by Napoleon, of equipping at Paris a vast central museum of art with the spoils of conquered Europe.

The record of Flaxman's life is henceforth an uneventful record of private affection and contentment, and of happy and tenacious industry, with reward not brilliant but sufficient, and repute not loud but loudest in the mouths of those whose praise was best worth having—Canova, Schlegel, Fuseli. He took for pupil a son of Hayley's, who presently afterwards sickened and died. In 1797 he was made an associate of the Royal Academy. Every year he exhibited work of one class or another: occasionally a public monument in the round, like those of Paoli (1798), or Captain Montague (1802) for Westminster Abbey, of Sir William Jones for St Mary's, Oxford (1797-1801), of Nelson or Howe for St Paul's; more constantly memorials for churches, with symbolic Acts of Mercy or illustrations of Scripture texts, both commonly in low relief [Miss Morley, Chertsey (1797), Miss Cromwell, Chichester (1800), Mrs Knight, Milton, Cambridge (1802), and many more]; and these pious labours he would vary from time to time with a classical piece like those of his earliest predilection. Soon after his election as associate, he published a scheme, half grandiose, half childish, for a monument to be erected on Greenwich Hill, in the shape of a Britannia 200 ft. high, in honour of the naval victories of his country. In 1800 he was elected full Academician. During the peace of Amiens he went to Paris to see the despoiled treasures collected there, but bore himself according to the spirit of protest that was in him. The next event which makes any mark in his life is his appointment to a chair specially created for him by the Royal Academy—the chair of Sculpture: this took place in 1810. We have ample evidence of his thoroughness and judiciousness as a teacher in the Academy schools, and his professorial lectures have been often reprinted. With many excellent observations, and with one singular merit—that of doing justice, as in those days justice was hardly ever done, to the sculpture of the medieval schools—these lectures lack point and felicity of expression, just as they are reported to have lacked fire in delivery, and are somewhat heavy reading. The most important works that occupied Flaxman in the years next following this appointment were the monument to Mrs Baring in Micheldever church, the richest of all his monuments in relief (1805-1811); that for the Worsley family at Campsall church, Yorkshire, which is the next richest; those to Sir Joshua Reynolds for St Paul's (1807), to Captain Webbe for India (1810); to Captains Walker and Beckett for Leeds (1811); to Lord Cornwallis for Prince of Wales's Island (1812); and to Sir John Moore for Glasgow (1813). At this time the antiquarian world was much occupied with the vexed question of the merits of the Elgin marbles, and Flaxman was one of those whose evidence before the parliamentary commission had most weight in favour of the purchase which was ultimately effected in 1816.

After his Roman period he produced for a good many years no outline designs for the engraver except three for Cowper's translations of the Latin poems of Milton (1810). Other sets of outline illustrations drawn about the same time, but not published, were one to the *Pilgrim's Progress*, and one to a Chinese tale in verse, called "The Casket," which he wrote to amuse his womenkind. In 1817 we find him returning to his old practice of classical outline illustrations and publishing the happiest of all his series in that kind, the designs to Hesiod, excellently engraved by the sympathetic hand of Blake. Immediately afterwards he was much engaged designing for the goldsmiths—a testimonial cup in honour of John Kemble, and following that, the great labour of the famous and beautiful (though quite un-Homeric) "Shield of Achilles." Almost at the same time he undertook a frieze of "Peace, Liberty and Plenty," for the duke of Bedford's sculpture gallery at Woburn, and an heroic group of Michael overthrowing Satan, for Lord Egremont's house at Petworth. His literary industry at the same time is shown by several articles on art and archaeology contributed to Rees's *Encyclopaedia* (1819-1820).

In 1820 Mrs Flaxman died, after a first warning from paralysis six years earlier. Her younger sister, Maria Denman, and the sculptor's own sister,, Maria Flaxman, remained in his house, and his industry was scarcely at all relaxed. In 1822 he delivered at the Academy a lecture in memory of his old friend and generous fellow-craftsman, Canova, then lately dead; in 1823 he received from A.W. von Schlegel a visit of which that writer has left us the record. From an illness occurring soon after this he recovered sufficiently to resume both work and exhibition, but on the 3rd of December 1826 he caught cold in church, and died four days later, in his seventy-second year. Among a few intimate associates, he left a memory singularly dear; having

been in companionship, although susceptible and obstinate when his religious creed—a devout Christianity with Swedenborgian admixtures—was crossed or slighted, yet in other things genial and sweet-tempered beyond most men, full of modesty and playfulness and withal of a homely dignity, a true friend and a kind master, a pure and blameless spirit.

Posterity will doubt whether it was the fault of Flaxman or of his age, which in England offered neither training nor much encouragement to a sculptor, that he is weakest when he is most ambitious, and most inspired when he makes the least effort; but so it is. Not merely does he fail when he seeks to illustrate the intensity of Dante, or to rival the tumultuousness of Michelangelo—to be intense or tumultuous he was never made; but he fails, it may almost be said, in proportion as his work is elaborate and far carried, and succeeds in proportion as it is partial and suggestive. Of his completed ideal sculptures, the “St Michael” at Petworth is the best, and is indeed admirably composed from all points of view; but it lacks fire and force, and it lacks the finer touches of the chisel; a little bas-relief like the diploma piece of the “Apollo” and “Marpessa” in the Royal Academy compares with it favourably. This is one of the very few things which he is recorded to have executed in the marble entirely with his own hand; ordinarily he entrusted the finishing work of the chisel to the Italian workmen in his employ, and was content with the smooth mechanical finish which they imitated from the Roman imitations (themselves often reworked at the Renaissance) of Greek originals. Of Flaxman’s complicated monuments in the round, such as the three in Westminster Abbey and the four in St Paul’s, there is scarcely one which has not something heavy and infelicitous in the arrangement, and something empty and unsatisfactory in the surface execution. But when we come to his simple monuments in relief, in these we find almost always a far finer quality. The truth is that he did not thoroughly understand composition on the great scale and in the round, but he thoroughly understood relief, and found scope in it for his remarkable gifts of harmonious design, and tender, grave and penetrating feeling. But if we would see even the happiest of his conceptions at their best, we must study them, not in the finished marble but rather in the casts from his studio sketches (marred though they have been by successive coats of paint intended for their protection) of which a comprehensive collection is preserved in the Flaxman gallery at University College And the same is true of his happiest efforts in the classical and poetical vein, like the well-known relief of “Pandora conveyed to Earth by Mercury.” Nay, going farther back still among the rudiments and first conceptions of his art, we can realize the most essential charm of his genius in the study, not of his modelled work at all, but of his sketches in pen and wash on paper. Of these the principal public collections are at University College, in the British Museum, and the Victoria & Albert Museum; many others are dispersed in public and private cabinets. Every one knows the excellence of the engraved designs to Homer, Dante, Aeschylus and Hesiod, in all cases save when the designer aims at that which he cannot hit, the terrible or the grotesque. To know Flaxman at his best it is necessary to be acquainted not only with the original studies for such designs as these (which, with the exception of the Hesiod series, are far finer than the engravings), but still more with those almost innumerable studies from real life which he was continually producing with pen, tint or pencil. These are the most delightful and suggestive sculptor’s notes in existence; in them it was his habit to set down the leading and expressive lines, and generally no more, of every group that struck his fancy. There are groups of Italy and London, groups of the parlour and the nursery, of the street, the garden and the gutter; and of each group the artist knows how to seize at once the structural and the spiritual secret, expressing happily the value and suggestiveness, for his art of sculpture, of the contacts, intervals, interlacements and balancings of the various figures in any given group, and not less happily the charm of the affections which link the figures together and inspire their gestures.

The materials for the life of Flaxman are scattered in various biographical and other publications; the principal are the following:—An anonymous sketch in the *European Magazine* for 1823; an anonymous “Brief Memoir,” prefixed to *Flaxman’s Lectures* (ed. 1829, and reprinted in subsequent editions); the chapter in Allan Cunningham’s *Lives of the Most Eminent British Painters*, &c., vol. iii.; notices in the *Life of Nollekens*, by John Thomas Smith; in the *Life of Josiah Wedgwood*, by Miss G. Meteyard (London, 1865); in the *Diaries and Reminiscences of H. Crabbe Robinson* (London, 1869), the latter an authority of great importance; in the *Lives* of Stothard, by Mrs Bray, of Constable, by Leslie, of Watson, by Dr Lonsdale, and of Blake, by Messrs Gilchrist and Rossetti; a series of illustrated essays, principally on the monumental sculpture of Flaxman, in the *Art Journal* for 1867 and 1868, by Mr G.F. Teniswood; *Essays in English Art*, by Frederick Wedmore; *The Drawings of Flaxman, in 32 plates, with Descriptions, and an Introductory Essay on the Life and Genius of Flaxman*, by Sidney Colvin (London, 1876); and the article “Flaxman” in the *Dictionary of National Biography*.

(S. C.)

FLEA (0. Eng. *fléah*, or *fléa*, cognate with *flee*, to run away from, to take flight), a name typically applied to *Pulex irritans*, a well-known blood-sucking insect-parasite of man and other mammals, remarkable for its powers of leaping, and nearly cosmopolitan. In ordinary language the name is used for any species of *Siphonaptera* (otherwise known as *Aphaniptera*), which, though formerly regarded as a suborder of *Diptera* (*q.v.*), are now considered to be a separate order of insects. All *Siphonaptera*, of which more than 100 species are known, are parasitic on mammals or birds. The majority of the species belong to the family *Pulicidae*, of which *P. irritans* may be taken as the type; but the order also includes the *Sarcopsyllidae*, the females of which fix themselves firmly to their host, and the *Ceratopsyllidae*, or bat-fleas.

Fleas are wingless insects, with a laterally compressed body, small and indistinctly separated head, and short thick antennae situated in cavities somewhat behind and above the simple eyes, which are always minute and sometimes absent. The structure of the mouth-parts is different from that seen in any other insects. The actual piercing organs are the mandibles, while the upper lip or labrum forms a sucking tube. The maxillae are not piercing organs, and their function is to protect the mandibles and labrum and separate the hairs or feathers of the host. Maxillary and labial palpi are also present, and the latter, together with the

labrum or lower lip, form the rostrum.

Fleas are oviparous, and undergo a very complete metamorphosis. The footless larvae are elongate, worm-like and very active; they feed upon almost any kind of waste animal matter, and when full-grown form a silken cocoon. The human flea is considerably exceeded in size by certain other species found upon much smaller hosts; thus the European *Hystrichopsylla talpae*, a parasite of the mole, shrew and other small mammals, attains a length of 5½ millimetres; another large species infests the Indian porcupine. Of the *Sarcopsyllidae* the best known species is the "jigger" or "chigoe" (*Dermatophilus penetrans*), indigenous in tropical South America and introduced into West Africa during the second half of last century. Since then this pest has spread across the African continent and even reached Madagascar. The impregnated female jigger burrows into the feet of men and dogs, and becomes distended with eggs until its abdomen attains the size and appearance of a small pea. If in extracting the insect the abdomen be ruptured, serious trouble may ensue from the resulting inflammation. At least four species of fleas (including *Pulex irritans*) which infest the common rat are known to bite man, and are believed to be the active agents in the transmission of plague from rats to human beings.

(E. E. A.)

FLÈCHE (French for "arrow"), the term generally used in French architecture for a spire, but more especially employed to designate the timber spire covered with lead, which was erected over the intersection of the roofs over nave and transepts; sometimes these were small and unimportant, but in cathedrals they were occasionally of large dimensions, as in the flèche of Notre-Dame, Paris, where it is nearly 100 ft. high; this, however, is exceeded by the example of Amiens cathedral, which measures 148 ft. from its base on the cresting to its finial.

FLÉCHIER, ESPRIT (1632-1710), French preacher and author, bishop of Nîmes, was born at Pernes, department of Vaucluse, on the 10th of June 1632. He was brought up at Tarascon by his uncle, Hercule Audiffret, superior of the Congrégation des Doctrinaires, and afterwards entered the order. On the death of his uncle, however, he left it, owing to the strictness of its rules, and went to Paris, where he devoted himself to writing poetry. His French poems met with little success, but a description in Latin verse of a tournament (*carrousel, circus regius*), given by Louis XIV. in 1662, brought him a great reputation. He subsequently became tutor to Louis Urbain Lefèvre de Caumartin, afterwards *intendant* of finances and counsellor of state, whom he accompanied to Clermont-Ferrard (*q.v.*), where the king had ordered the *Grands Jours* to be held (1665), and where Caumartin was sent as representative of the sovereign. There Fléchier wrote his curious *Mémoires sur les Grand Jours tenus à Clermont*, in which he relates, in a half romantic, half historical form, the proceedings of this extraordinary court of justice. In 1668 the duke of Montausier procured for him the post of *lecteur* to the dauphin. The sermons of Fléchier increased his reputation, which was afterwards raised to the highest pitch by his funeral orations. The most important are those on Madame de Montausier (1672), which gained him the membership of the Academy, the duchesse d'Aiguillon (1675), and, above all, Marshal Turenne (1676). He was now firmly established in the favour of the king, who gave him successively the abbacy of St Séverin, in the diocese of Poitiers, the office of almoner to the dauphiness, and in 1685 the bishopric of Lavaur, from which he was in 1687 promoted to that of Nîmes. The edict of Nantes had been repealed two years before; but the Calvinists were still very numerous at Nîmes. Fléchier, by his leniency and tact, succeeded in bringing over some of them to his views, and even gained the esteem of those who declined to change their faith. During the troubles in the Cévennes (see Huguenots) he softened to the utmost of his power the rigour of the edicts, and showed himself so indulgent even to what he regarded as error, that his memory was long held in veneration amongst the Protestants of that district. It is right to add, however, that some authorities consider the accounts of his leniency to have been greatly exaggerated, and even charge him with going beyond what the edicts permitted. He died at Montpellier on the 16th of February 1710. Pulpit eloquence is the branch of belles-lettres in which Fléchier excelled. He is indeed far below Bossuet, whose robust and sublime genius had no rival in that age; he does not equal Bourdaloue in earnestness of thought and vigour of expression; nor can he rival the philosophical depth or the insinuating and impressive eloquence of Massillon. But he is always ingenious, often witty, and nobody has carried farther than he the harmony of diction, sometimes marred by an affectation of symmetry and an excessive use of antithesis. His two historical works, the histories of Theodosius and of Ximenes, are more remarkable for elegance of style than for accuracy and comprehensive insight.

The last complete edition of Fléchier's works is by J.P. Migne (Paris, 1856); the *Mémoires sur les Grands Jours* was first published in 1844 by B. Gonod (2nd ed. as *Mém. sur les Gr. J. d'Auvergne*, with notice by Sainte-Beuve and an appendix by M. Chéruel, 1862). His chief works are: *Histoire de Théodose le Grand*, *Oraisons funèbres*, *Histoire du Cardinal Ximénès*, *Sermons de morale*, *Panégyriques des saints*. He left a *portrait* or *caractère* of himself, addressed to one of his friends. The *Life of Theodosius* has been translated into English by F. Manning (1693), and the "Funeral Oration of Marshal Turenne" in H.C. Fish's *History and Repository of Pulpit Eloquence* (ii., 1857). On Fléchier generally see Antonin V.D. Fabre, *La Jeunesse de Fléchier* (1882), and Adolphe Fabre, *Fléchier, orateur* (1886); A. Delacroix, *Hist, de Fléchier* (1865).

FLECKEISEN, CARL FRIEDRICH WILHELM ALFRED (1820-1899), German philologist and critic, was born at Wolfenbüttel on the 23rd of September 1820. He was educated at the Helmstedt gymnasium and the university of Göttingen. After holding several educational posts, he was appointed in 1861 to the vice-principalship of the Vitzthum'sches Gymnasium at Dresden, which he held till his retirement in 1889. He died on the 7th of August 1899. Fleckeisen is chiefly known for his labours on Plautus and Terence; in the knowledge of these authors he was unrivalled, except perhaps by Ritschl, his life-long friend and a worker in the same field. His chief works are: *Exercitationes Plautinae* (1842), one of the most masterly productions on the language of Plautus; "Analecta Plautina," printed in *Philologus*, ii. (1847); *Plauti Comoediae*, i., ii. (1850-1851, unfinished), introduced by an *Epistula critica ad F. Ritschelium; P. Terenti Afri Comoediae* (new ed., 1898). In his editions he endeavoured to restore the text in accordance with the results of his researches on the usages of the Latin language and metre. He attached great importance to the question of orthography, and his short treatise *Fünfzig Artikel* (1861) is considered most valuable. Fleckeisen also contributed largely to the *Jahrbücher fur Philologie*, of which he was for many years editor.

See obituary notice by G. Götz in C. Bursian's *Biographisches Jahrbuch für Altertumskunde* (xxiii., 1901), and article by H. Usener in *Allgemeine deutsche Biographie* (where the date of birth is given as the 20th of September).

FLECKNOE, RICHARD (*c.* 1600-1678?), English dramatist and poet, the object of Dryden's satire, was probably of English birth, although there is no corroboration of the suggestion of J. Gillow (*Bibliog. Dict. of the Eng. Catholics*, vol. ii., 1885), that he was a nephew of a Jesuit priest, William Flecknoe, or more properly Flexney, of Oxford. The few known facts of his life are chiefly derived from his *Relation of Ten Years' Travels in Europe, Asia, Affrique and America* (1655?), consisting of letters written to friends and patrons during his travels. The first of these is dated from Ghent (1640), whither he had fled to escape the troubles of the Civil War. In Brussels he met Béatrix de Cosenza, wife of Charles IV., duke of Lorraine, who sent him to Rome to secure the legalization of her marriage. There in 1645 Andrew Marvell met him, and described his leanness and his rage for versifying in a witty satire, "Flecknoe, an English Priest at Rome." He was probably, however, not in priest's orders. He then travelled in the Levant, and in 1648 crossed the Atlantic to Brazil, of which country he gives a detailed description. On his return to Europe he entered the household of the duchess of Lorraine in Brussels. In 1645 he went back to England. His royalist and Catholic convictions did not prevent him from writing a book in praise of Oliver Cromwell, *The Idea of His Highness Oliver* ... (1659), dedicated to Richard Cromwell. This publication was discounted at the restoration by the *Heroick Portraits* (1660) of Charles II. and others of the Stuart family. John Dryden used his name as a stalking horse from behind which to assail Thomas Shadwell in *Mac Flecknoe* (1682). The opening lines run: —

> "All human things are subject to decay.
> And, when fate summons, monarchs must obey.
> This Flecknoe found, who, like Augustus, young
> Was called to empire, and had governed long;
> In prose and verse was owned, without dispute,
> Throughout the realms of nonsense, absolute."

Dryden's aversion seems to have been caused by Flecknoe's affectation of contempt for the players and his attacks on the immorality of the English stage. His verse, which hardly deserved his critic's sweeping condemnation, was much of it religious, and was chiefly printed for private circulation. None of his plays was acted except *Love's Dominion*, announced as a "pattern for the reformed stage" (1654), that title being altered in 1664 to *Love's Kingdom*, with a *Discourse of the English Stage*. He amused himself, however, by adding lists of the actors whom he would have selected for the parts, had the plays been staged. Flecknoe had many connexions among English Catholics, and is said by Gerard Langbaine, to have been better acquainted with the nobility than with the muses. He died probably about 1678.

A *Discourse of the English Stage*, was reprinted in W.C. Hazlitt's *English Drama and Stage* (Roxburghe Library, 1869); Robert Southey, in his *Omniana* (1812), protested against the wholesale depreciation of Flecknoe's works. See also "Richard Flecknoe" (Leipzig, 1905, in *Munchener Beiträge zur ... Philologie*), by A. Lohr, who has given minute attention to his life and works.

FLEET, a word in all its significances, derived from the root of the verb "to fleet," from O. Eng. *fleotan*, to float or flow, which ultimately derives from an Indo-European root seen in Gr. πλέειν, to sail, and Lat. *pluere*, to rain; cf. Dutch *vliessen*, and Ger. *fliessen*. In English usage it survives in the name of many places, such as Byfleet and Northfleet, and in the Fleet, a stream in London that formerly ran into the Thames between the bottom of Ludgate Hill and the present Fleet Street. From the idea of "float" comes the application of the word to ships, when in company, and particularly to a large number of warships under the supreme command of a single officer, with the individual ships, or groups of ships, under individual and subordinate command. The distinction between a fleet and a squadron is often one of name only. In the British navy the various main divisions are or have been called fleets and squadrons indifferently. The word is also frequently used of a company of fishing vessels, and in fishing is also applied to a row of drift-nets fastened together.

From the original meaning of the word “flowing” comes the adjectival use of the word, swift, or speedy; so also “fleeting,” of something evanescent or fading away, with the idea of the fast-flowing lapse of time.

FLEET PRISON, an historic London prison, formerly situated on the east side of Farringdon Street, and deriving its name from the Fleet stream, which flowed into the Thames. Concerning its early history little is known, but it certainly dated back to Norman times. It came into particular prominence from being used as a place of reception for persons committed by the Star Chamber, and, afterwards, for debtors, and persons imprisoned for contempt of court by the court of chancery. It was burnt down in the great fire of 1666; it was rebuilt, but was destroyed in the Gordon riots of 1780 and again rebuilt in 1781-1782. In pursuance of an act of parliament (5 & 6 Vict. c. 22, 1842), by which the Marshalsea, Fleet, and Queen’s Bench prisons were consolidated into one under the name of Queen’s prison, it was finally closed, and in 1844 sold to the corporation of the city of London, by whom it was pulled down. The head of the prison was termed “the warden,” who was appointed by patent. It became a frequent practice of the holder of the patent to “farm out” the prison to the highest bidder. It was this custom which made the Fleet prison long notorious for the cruelties inflicted on prisoners. One purchaser of the office was of particularly evil repute, by name Thomas Bambridge, who in 1728 paid, with another, the sum of £5000 to John Huggins for the wardenship. He was guilty of the greatest extortions upon prisoners, and, in the words of a committee of the House of Commons appointed to inquire into the state of the gaols of the kingdom, “arbitrarily and unlawfully loaded with irons, put into dungeons, and destroyed prisoners for debt, treating them in the most barbarous and cruel manner, in high violation and contempt of the laws of this kingdom.” He was committed to Newgate, and an act was passed to prevent his enjoying the office of warden or any other office whatsoever. The liberties or rules of the Fleet were the limits within which particular prisoners were allowed to reside outside the prison walls on observing certain conditions.

Fleet Marriages.—By the law of England a marriage was recognized as valid, so long as the ceremony was conducted by a person in holy orders, even if those orders were not of the Church of England. Neither banns nor licence were necessary, and the time and place were alike immaterial. Out of this state of the marriage law, in the period of laxness which succeeded the Commonwealth, resulted innumerable clandestine marriages. They were contracted at first to avoid the expenses attendant on the public ceremony, but an act of 1696, which imposed a penalty of £100 on any clergyman who celebrated, or permitted another to celebrate, a marriage otherwise than by banns or licence, acted as a considerable check. To clergymen imprisoned for debt in the Fleet, however, such a penalty had no terrors, for they had “neither liberty, money nor credit to lose by any proceedings the bishop might institute against them.” The earliest recorded date of a Fleet marriage is 1613, while the earliest recorded in a Fleet register took place in 1674, but it was only on the prohibition of marriage without banns or licence that they began to be clandestine. Then arose keen competition, and “many of the Fleet parsons and tavern-keepers in the neighbourhood fitted up a room in their respective lodgings or houses as a chapel,” and employed touts to solicit custom for them. The scandal and abuses brought about by these clandestine marriages became so great that they became the object of special legislation. In 1753 Lord Hardwicke’s Act (26 Geo. ii. c. 33) was passed, which required, under pain of nullity, that banns should be published according to the rubric, or a licence obtained, and that, in either case, the marriage should be solemnized in church; and that in the case of minors, marriage by licence must be by the consent of parent or guardian. This act had the effect of putting a stop to these clandestine marriages, so far as England was concerned, and henceforth couples had to fare to Gretna Green (*q.v.*).

The *Fleet Registers*, consisting of “about two or three hundred large registers” and about a thousand rough or “pocket” books, eventually came into private hands, but were purchased by the government in 1821, and are now deposited in the office of the registrar-general, Somerset House. Their dates range from 1686 to 1754. In 1840 they were declared not admissible as evidence to prove a marriage.

Authorities.—J.S. Burn, *The Fleet Registers; comprising the History of Fleet Marriages, and some Account of the Parsons and Marriage-house Keepers*, &c. (London, 1833); J. Ashton, *The Fleet: its River, Prison and Marriages* (London, 1888).

FLEETWOOD, CHARLES (d. 1692), English soldier and politician, third son of Sir Miles Fleetwood of Aldwinkle, Northamptonshire, and of Anne, daughter of Nicholas Luke of Woodend, Bedfordshire, was admitted into Gray’s Inn on the 30th of November 1638. At the beginning of the Great Rebellion, like many other young lawyers who afterwards distinguished themselves in the field, he joined Essex’s life-guard, was wounded at the first battle of Newbury, obtained a regiment in 1644 and fought at Naseby. He had already been appointed receiver of the court of wards, and in 1646 became member of parliament for Marlborough. In the dispute between the army and parliament he played a chief part, and was said to have been the principal author of the plot to seize King Charles at Holmby, but he did not participate in the king’s trial. In 1649 he was appointed a governor of the Isle of Wight, and in 1650, as lieutenant-general of the horse, took part in Cromwell’s campaign in Scotland and assisted in the victory of Dunbar. The next year he was elected a member of the council of state, and being recalled from Scotland was entrusted with the command of the forces in England, and played a principal part in gaining the final triumph at Worcester. In 1652 he married [1] Cromwell’s daughter, Bridget, widow of Ireton, and was made commander-in-chief in Ireland, to which title

that of lord deputy was added. The chief feature of his administration, which lasted from September 1652 till September 1655, was the settlement of the soldiers on the confiscated estates and the transplantation of the original owners, which he carried out ruthlessly. He showed also great severity in the prosecution of the Roman Catholic priests, and favoured the Anabaptists and the extreme Puritan sects to the disadvantage of the moderate Presbyterians, exciting great and general discontent, a petition being finally sent in for his recall.

Fleetwood was a strong and unswerving follower of Cromwell's policy. He supported his assumption of the protectorate and his dismissal of the parliaments. In December 1654 he became a member of the council, and after his return to England in 1655 was appointed one of the major-generals. He approved of the "Petition and Advice," only objecting to the conferring of the title of king on Cromwell, became a member of the new House of Lords; and supported ardently Cromwell's foreign policy in Europe, based on religious divisions, and his defence of the Protestants persecuted abroad. He was therefore, on Cromwell's death, naturally regarded as a likely successor, and it is said that Cromwell had in fact so nominated him. He, however, gave his support to Richard's assumption of office, but allowed subsequently, if he did not instigate, petitions from the army demanding its independence, and finally compelled Richard by force to dissolve parliament. His project of re-establishing Richard in close dependence upon the army met with failure, and he was obliged to recall the Long Parliament on the 6th of May 1659. He was appointed immediately a member of the committee of safety and of the council of state, and one of the seven commissioners for the army, while on the 9th of June he was nominated commander-in-chief. In reality, however, his power was undermined and was attacked by parliament, which on the 11th of October declared his commission void. The next day he assisted Lambert in his expulsion of the parliament and was reappointed commander-in-chief. On Monk's approach from the North, he stayed in London and maintained order. While hesitating with which party to ally his forces, and while on the point of making terms with the king, the army on the 24th of December restored the Rump, when he was deprived of his command and ordered to appear before parliament to answer for his conduct. The Restoration therefore took place without him. He was included among the twenty liable to penalties other than capital, and was finally incapacitated from holding any office of trust. His public career then closed, though he survived till the 4th of October 1692.

1 He had lost his first wife, Frances Smith; and later he had a third wife, Mary, daughter of Sir John Coke and widow of Sir Edward Hartopp.

FLEETWOOD, WILLIAM (1656-1723), English divine, was descended of an ancient Lancashire family, and was born in the Tower of London on New Year's Day 1656. He received his education at Eton and at King's College, Cambridge. About the time of the Revolution he took orders, and was shortly afterwards made rector of St Austin's, London, and lecturer of St Dunstan's in the West. He became a canon of Windsor in 1702, and in 1708 he was nominated to the see of St Asaph, from which he was translated in 1714 to that of Ely. He died at Tottenham, Middlesex, on the 4th of August 1723. Fleetwood was regarded as the best preacher of his time. He was accurate in learning, and effective in delivery, and his character stood deservedly high in general estimation. In episcopal administration he far excelled most of his contemporaries. He was a zealous Hanoverian, and a favourite with Queen Anne in spite of his Whiggism. His opposition to the doctrine of non-resistance brought him into conflict with the tory ministry of 1712 and with Swift, but he never entered into personal controversy.

His principal writings are—-*An Essay on Miracles* (1701); *Chronicum preciosum* (an account of the English coinage, 1707); and *Free Sermons* (1712), containing discourses on the death of Queen Mary, the duke of Gloucester and King William. The preface to this last was condemned to public burning by parliament, but, as No. 384 of *The Spectator*, circulated more widely than ever. A collected edition of his works, with a biographical preface, was published in 1737.

FLEETWOOD, a seaport and watering-place in the Blackpool parliamentary division of Lancashire, England, at the mouth of the Wyre, 230 m. N.W. by N. from London, the terminus of a joint branch of the London & North-Western and Lancashire & Yorkshire railways. Pop. (1891) 9274; (1901) 12,082. It dates its rise from 1836, and takes its name from Sir Peter Hesketh Fleetwood, by whom it was laid out. The seaward views, especially northward over Morecambe Bay, are fine, but the neighbouring country is flat and of little interest. The two railways jointly are the harbour authority. The dock is provided with railways and machinery for facilitating traffic, including a large grain elevator. The shipping traffic is chiefly in the coasting and Irish trade. Passenger steamers serve Belfast and Londonderry regularly, and the Isle of Man and other ports during the season. The fisheries are important, and there are salt-works in the neighbourhood. There is a pleasant promenade, with other appointments of a watering-place. There are also barracks with a military hospital and a rifle range. Rossall school, to the S.W., is one of the principal public schools in the north of England. Rossall Hall was the seat of Sir Peter Fleetwood, but was converted to the uses of the school on its foundation in 1844. The school is primarily divided into classical and modern sides, with a special department for preparation for army, navy or professional examinations. A number of entrance scholarships and leaving scholarships tenable at the universities are offered annually. The number of boys is about 350.

FLEGEL, EDWARD ROBERT (1855-1886), German traveller in West Africa, was born on the 1st of October 1855 at Wilna, Russia. After receiving a commercial education he obtained in 1875 a position in Lagos, West Africa. In 1879 he ascended the Benue river some 125 m. above the farthest point hitherto reached. His careful survey of the channel secured him a commission from the German African Society to explore the whole Benue district. In 1880 he went up the Niger to Gomba, and then visited Sokoto, where he obtained a safe-conduct from the sultan for his intended expedition to Adamawa. This expedition was undertaken in 1882, and on the 18th of August in that year Flegel discovered the source of the Benue at Ngaundere. In 1883-1884 he made another journey up the Benue, crossing for the second time the Benue-Congo watershed. After a short absence in Europe Flegel returned to Africa in April 1885 with a commission from the German African Company and the Colonial Society to open up the Niger-Benue district to German trade. This expedition had the support of Prince Bismarck, who endeavoured, unsuccessfully, to obtain for Germany this region, already secured as a British sphere of influence by the National African Company (the Royal Niger Company). Flegel, despite a severe illness, ascended the Benue to Yola, but was unable to accomplish his mission. He returned to the coast and died at Brass, at the mouth of the Niger, on the 11th of September 1886. (See further GOLDIE, SIR GEORGE.)

Flegel wrote *Lose Blatter aus dem Tagebuche meiner Haussaafreunde* (Hamburg, 1885), and *Vom Niger-Benue. Briefe aus Afrika* (edited by K. Flegel, Leipzig, 1890).

FLEISCHER, HEINRICH LEBERECHT (1801-1888), German Orientalist, was born at Schandau, Saxony, on the 21st of February 1801. From 1819 to 1824 he studied theology and oriental languages at Leipzig, subsequently continuing his studies in Paris. In 1836 he was appointed professor of oriental languages at Leipzig University, and retained this post till his death. His most important works were editions of Abulfeda's *Historia ante-Islamica* (1831-1834), and of Beidhawi's *Commentary on the Koran* (1846-1848). He compiled a catalogue of the oriental MSS, in the royal library at Dresden (1831); published an edition and German translation of Ali's *Hundred Sayings* (1837); the continuation of Babicht's edition of *The Thousand and One Nights* (vols. ix.-xii., 1842-1843); and an edition of Mahommed Ibrihim's *Persian Grammar* (1847). He also wrote an account of the Arabic, Turkish and Persian MSS. at the town library in Leipzig. He died there on the 10th of February 1888. Fleischer was one of the eight foreign members of the French Academy of Inscriptions and a knight of the German *Ordre pour le mérite*.

FLEMING, PAUL (1609-1640), German poet, was born at Hartenstein in the Saxon Erzgebirge, on the 5th of October 1609, the son of the village pastor. At the age of fourteen he was sent to school at Leipzig and subsequently studied medicine at the university. Driven away by the troubles of the Thirty Years' War, he was fortunate enough to become attached to an embassy despatched in 1634 by Duke Frederick of Holstein-Gottorp to Russia and Persia, and to which the famous traveller Adam Olearius was secretary. In 1639 the mission returned to Reval, and here Fleming, having become betrothed, determined to settle as a physician. He proceeded to Leiden to procure a doctor's diploma, but died suddenly at Hamburg on his way home on the 2nd of April 1640.

Though belonging to the school of Martin Opitz, Fleming is distinguished from most of his contemporaries by the ring of genuine feeling and religious fervour that pervades his lyric poems, even his occasional pieces. In the sonnet, his favourite form of verse, he was particularly happy. Among his religious poems the hymn beginning "In allen meinen Taten lass ich den Höchsten raten" is well known and widely sung.

Fleming's *Teutsche Poëmata* appeared posthumously in 1642; they are edited by J.M. Lappenberg, in the Bibliothek des litterarischen Vereins (2 vols., 1863; a third volume, 1866, contains Fleming's Latin poems). Selections have been edited by J. Tittmann in the second volume of the series entitled *Deutsche Dichter des siebzehnten Jahrhunderts* (Leipzig, 1870), and by H. Österley (Stuttgart, 1885). A life of the poet will be found in Varnhagen von Ense's *Biographische Denkmale*, Bd. iv. (Berlin, 1826). See also J. Straumer, *Paul Flemings Leben und Orientreise* (1892); L.G. Wysocky, *De Pauli Flemingi Germanice scriptis et ingenio* (Paris, 1892).

FLEMING, RICHARD (d. 1431), bishop of Lincoln, and founder of Lincoln College, Oxford, was born at Crofton in Yorkshire. He was descended from a good family, and was educated at University College, Oxford. Having taken his degrees, he was made prebendary of York in 1406, and the next year was junior proctor of the university. About this time he became an ardent Wycliffite, winning over many persons, some of high rank, to the side of the reformer, and incurring the censure of Archbishop Arundel. He afterwards became

one of Wycliffe's most determined opponents. Before 1415 he was instituted to the rectory of Boston in Lincolnshire, and in 1420 he was consecrated bishop of Lincoln. In 1428-1429 he attended the councils of Pavia and Siena, and in the presence of the pope, Martin V., made an eloquent speech in vindication of his native country, and in eulogy of the papacy. It was probably on this occasion that he was named chamberlain to the pope. To Bishop Fleming was entrusted the execution of the decree of the council for the exhumation and burning of Wycliffe's remains. The see of York being vacant, the pope conferred it on Fleming; but the king (Henry V.) refused to confirm the appointment. In 1427 Fleming obtained the royal licence empowering him to found a college at Oxford for the special purpose of training up disputants against Wycliffe's heresy. He died at Sleaford, on the 26th of January 1431. Lincoln College was, however, completed by his trustees, and its endowments were afterwards augmented by various benefactors.

FLEMING, SIR SANDFORD (1827-), Canadian engineer and publicist, was born at Kirkcaldy, Scotland, on the 7th of January 1827, but emigrated to Canada in 1845. Great powers of work and thoroughness in detail brought him to the front, and he was from 1867 to 1880 chief engineer of the Dominion government. Under his control was constructed the Intercolonial railway, and much of the Canadian Pacific. After his retirement in 1880 he devoted himself to the study of Canadian and Imperial problems, such as the unification of time reckoning throughout the world, and the construction of a state-owned system of telegraphs throughout the British empire. After years of labour he saw the first link forged in the chain, in the opening in 1902 of the Pacific Cable between Canada and Australia. Though not a party man he strongly advocated Federation in 1864-1867, and in 1891 vehemently attacked the Liberal policy of unrestricted reciprocity with the United States. He took the deepest interest in education, and in 1880 became chancellor of Queen's University, Kingston.

He published *The Intercolonial: a History* (Montreal and London, 1876); *England and Canada* (London, 1884); and numerous *brochures* and magazine articles on scientific, social and political subjects.

FLEMING, SIR THOMAS (1544-1613), English judge, was born at Newport, Isle of Wight, in April 1544, and was called to the bar at Lincoln's Inn in 1574. He represented Winchester in parliament from 1584 to 1601, when he was returned for Southampton. In 1594 he was appointed recorder of London, and in 1595 was chosen solicitor-general in preference to Bacon. This office he retained under James I. and was knighted in 1603. In 1604 he was created chief baron of the exchequer and presided over many important state trials. In 1607 he was promoted to the chief justiceship of the king's bench, and was one of the judges at the trial of the *post-nati* in 1608, siding with the majority of the judges in declaring that persons born in Scotland after the accession of James I. were entitled to the privileges of natural-born subjects in England. He was praised by his contemporaries, more particularly Coke, for his "great judgments, integrity and discretion." He died on the 7th of August 1613 at his seat, Stoneham Park, Hampshire.

See Foss, *Lives of the Judges*.

FLEMISH LITERATURE. The older Flemish writers are dealt with in the article on Dutch Literature; after the separation of Belgium, however, from the Netherlands in 1830 there was a great revival of Flemish literature. The immediate result of the revolution was a reaction against everything associated with Dutch, and a disposition to regard the French language as the speech of liberty and independence. The provisional government of 1830 suppressed the official use of the Flemish language, which was relegated to the rank of a patois. For some years before 1830 Jan Frans Willems[1] (1793-1846) had been advocating the claims of the Flemish language. He had done his best to allay the irritation between Holland and Belgium and to prevent a separation. As archivist of Antwerp he made use of his opportunities by writing a history of Flemish letters. After the revolution his Dutch sympathies had made it necessary for him to live in seclusion, but in 1835 he settled at Ghent, and devoted himself to the cultivation of Flemish. He edited old Flemish classics, *Reinaert de Vos* (1836), the rhyming Chronicles of Jan van Heelu and Jan le Clerc, &c., and gathered round him a band of Flemish enthusiasts, the chevalier Philipp Blommaert (1809-1871), Karel Lodewijk Ledeganck (1805-1847), Fr. Rens (1805-1874), F.A. Snellaert (1809-1872), Prudens van Duyse (1804-1859), and others. Blommaert, who was born at Ghent on the 27th of August 1809, founded in 1834 in his native town the *Nederduitsche letteroefeningen*, a review for the new writers, and it was speedily followed by other Flemish organs, and by literary societies for the promotion of Flemish. In 1851 a central organization for the Flemish propaganda was provided by a society, named after the father of the movement, the "Willemsfonds." The Catholic Flemings founded in 1874 a rival "Davidsfonds," called after the energetic J.B. David (1801-1866), professor at the university of Louvain, and the author of a Flemish history of Belgium (*Vaderlandsche historie*, Louvain, 1842-1866). As a result of this propaganda the Flemish language was placed on an equality with French in law, and in administration, in 1873 and 1878, and in the schools in 1883. Finally in 1886 a Flemish Academy was established by royal authority at Ghent, where a course in Flemish literature

had been established as early as 1854.

The claims put forward by the Flemish school were justified by the appearance (1837) of *In't Wonderjaar* 1566 (In the Wonderful year) of Hendrik Conscience (*q.v.*), who roused national enthusiasm by describing the heroic struggles of the Flemings against the Spaniards. Conscience was eventually to make his greatest successes in the description of contemporary Flemish life, but his historical romances and his popular history of Flanders helped to give a popular basis to a movement which had been started by professors and scholars.

The first poet of the new school was Ledeganck, the best known of whose poems are those on the "three sister cities" of Bruges, Ghent and Antwerp (*Die drie zustersteden, vaderlandsche trilogie*, Ghent, 1846), in which he makes an impassioned protest against the adoption of French ideas, manners and language, and the neglect of Flemish tradition. The book speedily took its place as a Flemish classic. Ledeganck, who was a magistrate, also translated the French code into Flemish. Jan Theodoor van Rijswijck (1811-1849), after serving as a volunteer in the campaign of 1830, settled down as a clerk in Antwerp, and became one of the hottest champions of the Flemish movement. He wrote a series of political and satirical songs, admirably suited to his public. The romantic and sentimental poet, Jan van Beers (*q.v.*), was typically Flemish in his sincere and moral outlook on life. Prudens van Duyse, whose most ambitious work was the epic *Artavelde* (1859), is perhaps best remembered by a collection (1844) of poems for children. Peter Frans Van Kerckhoven (1818-1857), a native of Antwerp, wrote novels, poems, dramas, and a work on the Flemish revival (*De Vlaemsche Beweging*, 1847).

Antwerp produced a realistic novelist in Jan Lambrecht Damien Sleeckx (1818-1901). An inspector of schools by profession, he was an indefatigable journalist and literary critic. He was one of the founders in 1844 of the *Vlaemsch België*, the first daily paper in the Flemish interest. His works include a long list of plays, among them *Jan Steen* (1852), a comedy; *Grétry*, which gained a national prize in 1861; *De Visschers van Blankenberg* (1863); and the patriotic drama of *Zannekin* (1865). His talent as a novelist was diametrically opposed to the idealism of Conscience. He was precise, sober and concrete in his methods, relying for his effect on the accumulation of carefully observed detail. He was particularly successful in describing the life of the shipping quarter of his native town. Among his novels are: *In't Schipperskwartier* (1856), *Dirk Meyer* (1860), *Tybaerts en Kie* (1867), *Kunst en Liefde* ("Art and Love," 1870), and *Vesalius in Spanje* (1895). His complete works were collected in 17 vols. (1877-1884).

Jan Renier Snieders (1812-1888) wrote novels dealing with North Brabant; his brother, August Snieders (b. 1825), began by writing historical novels in the manner of Conscience, but his later novels are satires on contemporary society. A more original talent was displayed by Anton Bergmann (1835-1874), who, under the pseudonym of "Tony," wrote *Ernest Staas, Advocat*, which gained the quinquennial prize of literature in 1874. In the same year appeared the *Novellen* of the sisters Rosalie (1834-1875) and Virginie Loveling (b. 1836). These simple and touching stories were followed by a second collection in 1876. The sisters had published a volume of poems in 1870. Virginie Loveling's gifts of fine and exact observation soon placed her in the front rank of Flemish novelists. Her political sketches, *In onze Vlaamsche gewesten* (1877), were published under the name of "W.G.E. Walter." *Sophie* (1885), *Een dure Eed* (1892), and *Het Land der Verbeelding* (1896) are among the more famous of her later works. Reimond Stÿns (b. 1850) and Isidoor Teirlinck (b. 1851) produced in collaboration one very popular novel, *Arm Vlaanderen* (1884), and some others, and have since written separately. Cyril Buysse, a nephew of Mme Loveling, is a disciple of Zola. *Het Recht van den Sterkste* ("The Right of the Strongest," 1893) is a picture of vagabond life in Flanders; *Schoppenboer* ("The Knave of Spades," 1898) deals with brutalized peasant life; and *Sursum corda* (1895) describes the narrowness and religiosity of village life.

In poetry Julius de Geyter (b. 1830), author of a rhymed translation of *Reinaert* (1874), an epic poem on Charles V. (1888), &c., produced a social epic in three parts, *Drie menschen van in de wieg tot in het graf* ("Three Men from the Cradle to the Grave," 1861), in which he propounded radical and humanitarian views. The songs of Julius Vuylsteke (1836-1903) are full of liberal and patriotic ardour; but his later life was devoted to politics rather than literature. He had been the leading spirit of a students' association at Ghent for the propagation of "*flamingant*" views, and the "Willemsfonds" owed much of its success to his energetic co-operation. His *Uit het studenten leven* appeared in 1868, and his poems were collected in 1881. The poems of Mme van Ackere (1803-1884), *née* Maria Doolaeghe, were modelled on Dutch originals. Joanna Courtmans (1811-1890), née Berchmans, owed her fame rather to her tales than her poems; she was above all a moralist, and her fifty tales are sermons on economy and the practical virtues. Other poets were Emmanuel Hiel (*q.v.*), author of comedies, opera libretti and some admirable songs; the abbé Guido Gezelle (1830-1899), who wrote religious and patriotic poems in the dialect of West Flanders; Lodewijk de Koninck (b. 1838), who attempted a great epic subject in *Menschdon Verlost* (1872); J.M. Dautzenberg (1808-1869), author of a volume of charming *Volksliederen*. The best of Dautzenberg's work is contained in the posthumous volume of 1869, published by his son-in-law, Frans de Cort (1834-1878), who was himself a song-writer, and translated songs from Burns, from Jasmin and from the German. The *Makamen en Ghazelen* (1866), adapted from Rückert's version of Hariri, and other volumes by "Jan Ferguut" (J.A. van Droogenbroeck, b. 1835) show a growing preoccupation with form, and with the work of Theodoor Antheunis (b. 1840), they prepare the way for the ingenious and careful workmanship of the younger school of poets, of whom Charles Polydore de Mont is the leader. He was born at Wambeke in Brabant in 1857, and became professor in the academy of the fine arts at Antwerp. He introduced something of the ideas and methods of contemporary French writers into Flemish verse; and explained his theories in 1898 in an *Inleiding tot de Poëzie*. Among Pol de Mont's numerous volumes of verse dating from 1877 onwards are *Claribella* (1893), and *Iris* (1894), which contains amongst other things a curious "*Uit de Legende van Jeschoea-ben-Jossef*," a version of the gospel story from a Jewish peasant.

Mention should also be made of the history of Ghent (*Gent van den vroegsten Tijd tot heden*, 1882-1889) of Frans de Potter (b. 1834), and of the art criticisms of Max Rooses (b. 1839), curator of the Plantin museum at Antwerp, and of Julius Sabbe (b. 1846).

See Ida van Düringsfeld, *Von der Schelde bis zur Maas. Das geistige Leben der Vlamingen* (Leipzig, 3 vols., 1861); J. Stecher, *Histoire de la littérature néerlandaise en Belgique* (1886); *Geschiedenis der Vlaamsche Letterkunde van het jaar 1830 tot heden* (1899), by Theodoor Coopman and L. Scharpé; A. de Koninck, *Bibliographie nationale* (3 vols., 1886-1897); and *Histoire politique et littéraire du mouvement flamand* (1894), by Paul Hamelius. The *Vlaamsche Bibliographie*, issued by the Flemish Academy of Ghent, by Frans de Potter, contains a list of publications between 1830 and 1890; and there is a good deal of information in the excellent *Biographisch woordenboeck der Noord- en Zuid- Nederlandsche Letterkunde* (1878) of Dr W.J.A. Huberts and others.

(E. G.)

1 See Max Rooses, *Keus van Dicht- en Prozawerken van J.F. Willems*, and his *Brieven* in the publications of the Willemsfonds (Ghent, 1872-1874).

FLENSBURG (Danish, *Flensborg*), a seaport of Germany, in the Prussian province of Schleswig-Holstein, at the head of the Flensburg Fjord, 20 m. N.W. from Schleswig, at the junction of the main line Altona-Vamdrup (Denmark), with branches to Kiel and Glücksburg. Pop. (1905) 48,922. The principal public buildings are the Nikolai Kirche (built 1390, restored 1894), with a spire 295 ft. high; the Marienkirche, also a medieval church, with a lofty tower; the law courts; the theatre and the exchange. There are two gymnasia, schools of marine engineering, navigation, wood-carving and agriculture. The cemetery contains the remains of the Danish soldiers who fell at the battle of Idstedt (25th of July 1850), but the colossal Lion monument, erected by the Danes to commemorate their victory, was removed to Berlin in 1864. Flensburg is a busy centre of trade and industry, and is the most important town in what was formerly the duchy of Schleswig. It possesses excellent wharves, does a large import trade in coal, and has shipbuilding yards, breweries, distilleries, cloth and paper factories, glass-works, copper-works, soap-works and rice mills. Its former extensive trade with the West Indies has lately suffered owing to the enormous development of the North Sea ports, but it is still largely engaged in the Greenland whale and the oyster fisheries.

Flensburg was probably founded in the 12th century. It attained municipal privileges in 1284, was frequently pillaged by the Swedes after 1643, and in 1848 became the capital, under Danish rule, of Schleswig.

See Holdt, *Flensburg fruher und jetzt* (1884).

FLERS, a manufacturing town of north-western France, in the arrondissement of Domfront, and department of Orne, on the Vère, 41 m. S. of Caen on the railway to Laval. Pop. (1906) 11,188. A modern church in the Romanesque style and a restored château of the 15th century are its principal buildings. There is a tribunal of commerce, a board of trade-arbitrators, a communal college and a branch of the Bank of France. Flers is the centre of a cotton and linen-manufacturing region which includes the towns of Condé-sur-Noireau and La Ferté-Macé. Manufactures are very important, and include, besides cotton and linen fabrics, of which the annual value is about £1,500,000, drugs and chemicals; there are large brick and tile works, flour mills and dyeworks.

FLETA, a treatise, with the sub-title *seu Commentarius juris Anglicani*, on the common law of England. It appears, from internal evidence, to have been written in the reign of Edward I., about the year 1290. It is for the most part a poor imitation of Bracton. The author is supposed to have written it during his confinement in the Fleet prison, hence the name. It has been conjectured that he was one of those judges who were imprisoned for malpractices by Edward I. Fleta was first printed by J. Selden in 1647, with a dissertation (2nd edition, 1685).

FLETCHER, ALICE CUNNINGHAM (1845-), American ethnologist, was born in Boston, Massachusetts, in 1845. She studied the remains of Indian civilization in the Ohio and Mississippi valleys, became a member of the Archaeological Institute of America in 1879, and worked and lived with the Omahas as a representative of the Peabody Museum of American Archaeology and Ethnology, Harvard University. In 1883 she was appointed special agent to allot lands to the Omaha tribes, in 1884 prepared and sent to the New Orleans Exposition an exhibit showing the progress of civilization among the Indians of North America in the quarter-century previous, in 1886 visited the natives of Alaska and the Aleutian Islands on a mission from the commissioner of education, and in 1887 was United States special agent in the distribution of lands

among the Winnebagoes and Nez Percés. She was made assistant in ethnology at the Peabody Museum in 1882, and received the Thaw fellowship in 1891; was president of the Anthropological Society of Washington and of the American Folk-Lore Society, and vice-president of the American Association for the Advancement of Science; and, working through the Woman's National Indian Association, introduced a system of making small loans to Indians, wherewith they might buy land and houses. In 1888 she published *Indian Education and Civilization*, a special report of the Bureau of Education. In 1898 at the Congress of Musicians held at Omaha during the Trans-Mississippi Exposition she read "several essays upon the songs of the North American Indians ... in illustration of which a number of Omaha Indians ... sang their native melodies." Out of this grew her *Indian Story and Song from North America* (1900), illustrating "a stage of development antecedent to that in which culture music appeared."

FLETCHER, ANDREW, of Saltoun (1655-1716), Scottish politician, was the son and heir of Sir Robert Fletcher (1625-1664), and was born at Saltoun, the modern Salton, in East Lothian. Educated by Gilbert Burnet, afterwards bishop of Salisbury, who was then the parish minister of Saltoun, he completed his education by spending some years in travel and study, entering public life as member of the Scottish parliament which met in 1681. Possessing advanced political ideas, Fletcher was a fearless and active opponent of the measures introduced by John Maitland, duke of Lauderdale, the representative of Charles II. in Scotland, and his successor, the duke of York, afterwards King James II.; but he left Scotland about 1682, subsequently spending some time in Holland as an associate of the duke of Monmouth and other malcontents.

Although on grounds of prudence Fletcher objected to the rising of 1685, he accompanied Monmouth to the west of England, but left the army after killing one of the duke's trusted advisers. This incident is thus told by Sir John Dalrymple:

> "Being sent upon an expedition, and not esteeming times of danger to be times of ceremony, he had seized for his own riding the horse of a country gentleman (the mayor of Lynne) which stood ready equipt for its master. The master hearing this ran in a passion to Fletcher, gave him opprobrious language, shook his cane and attempted to strike. Fletcher, though rigid in the duties of morality, yet having been accustomed to foreign services both by sea and land in which he had acquired high ideas of the honour of a soldier and a gentleman and of the affront of a cane, pulled out his pistol and shot him dead on the spot. The action was unpopular in countries where such refinements were not understood. A clamour was raised against it among the people of the country, in a body they waited upon the duke with their complaints; and he was forced to desire the only soldier and almost the only man of parts in his army, to abandon him."

Another, but less probable account, represents Fletcher as quitting the rebel army because he disapproved of the action of Monmouth in proclaiming himself king.

His history during the next few years is rather obscure. He probably travelled in Spain, and fought against the Turks in Hungary; and having in his absence lost his estates and been sentenced to death, he joined William of Orange at the Hague, and returned to Scotland in 1689 in consequence of the success of the Revolution of 1688. His estates were restored to him; and he soon became a leading member of the "club," an organization which aimed at reducing the power of the crown in Scotland, and in general an active opponent of the English government. In 1703, at a critical stage in the history of Scotland, Fletcher again became a member of the Scottish parliament. The failure of the Darien expedition had aroused a strong feeling of resentment against England, and Fletcher and the national party seized the opportunity to obtain a greater degree of independence for their country.

His attitude in this matter, and also to the proposal for the union of the two crowns, is thus described by a writer in the third edition of the *Encyclopaedia Britannica*:—

> "The thought of England's domineering over Scotland was what his generous soul could not endure. The indignities and oppression which Scotland lay under galled him to the heart, so that in his learned and elaborate discourses he exposed them with undaunted courage and pathetical eloquence. In that great event, the Union, he performed essential service. He got the act of security passed, which declared that the two crowns should not pass to the same head till Scotland was secured in her liberties civil and religious. Therefore Lord Godolphin was forced into the Union, to avoid a civil war after the queen's demise. Although Mr Fletcher disapproved of some of the articles, and indeed of the whole frame of the Union, yet, as the act of security was his own work, he had all the merit of that important transaction."

Soon after the passing of the Act of Union Fletcher retired from public life. Employing his abilities in another direction, he did a real, if homely, service to his country by introducing from Holland machinery for sifting grain. He died unmarried in London in September 1716.

Contemporaries speak very highly of Fletcher's integrity, but he was also choleric and impetuous. Burnet describes him as "a Scotch gentleman of great parts and many virtues, but a most violent republican and extremely passionate." In appearance he was "a low, thin man, of a brown complexion; full of fire; with a stern, sour look." Fletcher was a fine scholar and a graceful writer, and both his writings and speeches afford bright glimpses of the manners and state of the country in his time. His chief works are: *A Discourse of Government relating to Militias* (1698); *Two Discourses concerning the Affairs of Scotland* (1698); and *An Account of a Conversation concerning a right regulation of Governments for the common good of Mankind* (1704). In Two Discourses he suggests that the numerous vagrants who infested Scotland should be brought into compulsory and hereditary servitude; and in *An Account of a Conversation* occurs his well-known remark, "I knew a very wise man so much of Sir Christopher's (Sir C. Musgrave) sentiment, that he believed if a man were permitted to make all the ballads, he need not care who should make the laws of a nation."

The Political Works of Andrew Fletcher were published in London in 1737. See D.S. Erskine, 11th earl of Buchan, *Essay on the Lives of Fletcher of Saltoun and the Poet Thomson* (1792); J.H. Burton, *History of Scotland*, vol. viii. (Edinburgh, 1905); and A. Lang, *History of Scotland*, vol. iv. (Edinburgh, 1907).

FLETCHER, GILES (*c.* 1548-1611), English author, son of Richard Fletcher, vicar of Cranbrook, Kent, and father of the poets Phineas and Giles Fletcher, was born in 1548 or 1549. He was educated at Eton and at King's College, Cambridge, taking his B.A. degree in 1569. He was a fellow of his college, and was made LL.D. in 1581. In 1580 he had married Joan Sheafe of Cranbrook. In that year he was commissary to Dr Bridgwater, chancellor of Ely, and in 1585 he sat in parliament for Winchelsea. He was employed on diplomatic service in Scotland, Germany and Holland, and in 1588 was sent to Russia to the court of the czar Theodore with instructions to conclude as alliance between England and Russia, to restore English trade, and to obtain better conditions for the English Russia Company. The factor of the company, Jerome Horsey, had already obtained large concessions through the favour of the protector, Boris Godunov, but when Dr Fletcher reached Moscow in 1588 he found that Godunov's interest was alienated, and that the Russian government was contemplating an alliance with Spain. The envoy was badly lodged, and treated with obvious contempt, and was not allowed to forward letters to England, but the English victory over the Armada and his own indomitable patience secured among other advantages for English traders exclusive rights of trading on the Volga and their security from the infliction of torture. Fletcher's treatment at Moscow was later made the subject of formal complaint by Queen Elizabeth. He returned to England in 1589 in company with Jerome Horsey, and in 1591 he published *Of the Russe Commonwealth, Or Maner of Government by the Russe Emperour* (*commonly called The Emperour of Moskovia*) *with the manners and fashions of the people of that Countrey*. In this comprehensive account of Russian geography, government, law, methods of warfare, church and manners, Fletcher, who states that he began to arrange his material during the return journey, doubtless received some assistance from the longer experience of his travelling companion, who also wrote a narrative of his travels, published in *Purchas his Pilgrimes* (1626). The Russia Company feared that the freedom of Fletcher's criticisms would give offence to the Muscovite authorities, and accordingly damage their trade. The book was consequently suppressed, and was not reprinted in its entirety until 1856, when it was edited from a copy of the original edition for the Hakluyt Society, with an introduction by Mr Edward A. Bond.

Fletcher was appointed "Remembrancer" to the city of London, and an extraordinary master of requests in 1596, and became treasurer of St Paul's in 1597. He contemplated a history of the reign of Queen Elizabeth, and in a letter to Lord Burghley he suggested that it might be well to begin with an account from the Protestant side of the marriage of Henry VIII. and Ann Boleyn. But personal difficulties prevented the execution of this plan. He had become security to the exchequer for the debts of his brother, Richard Fletcher, bishop of London, who died in 1596, and was only then saved from imprisonment by the protection of the earl of Essex. He was actually in prison in 1601, when he addressed a somewhat ambiguous letter to Burghley from which it may be gathered that his prime offence had been an allusion to Essex's disgrace as being the work of Sir Walter Raleigh. Fletcher was employed in 1610 to negotiate with Denmark on behalf of the "Eastland Merchants," and he died next year, and was buried on the 11th of March in the parish of St Catherine Colman, London.

The Russe Commonwealth was issued in an abridged form in *Hakluyt's Principal Navigations, Voyages*, &c. (vol. i. p. 473, ed. of 1598), a somewhat completer version in *Purchas his Pilgrimes* (pt. iii. ed. 1625), also as *History of Russia* in 1643 and 1657. Fletcher also wrote *De literis antiquae Britanniae* (ed. by Phineas Fletcher, 1633), a treatise on "The Tartars," printed in *Israel Redux* (ed. by S(amuel) L(ee), 1677), to prove that they were the ten lost tribes of Israel, Latin poems published in various miscellanies, and *Licia, or Poemes of Love in Honour of the admirable and singular vertues of his Lady, to the imitation of the best Latin Poets ... whereunto is added the Rising to the Crowne of Richard the third* (1593). This series of love sonnets, followed by some other poems, was published anonymously. Most critics, with the notable exception of Alexander Dyce (Beaumont and Fletcher, *Works*, i. p. xvi., 1843) have accepted it as the work of Dr Giles Fletcher on the evidence afforded in the first of the *Piscatory Eclogues* of his son Phineas, who represents his father (Thelgon), as having "raised his rime to sing of Richard's climbing."

See E.A. Bond's Introduction to the Hakluyt Society's edition; also Dr A.B. Grosart's prefatory matter to *Licia* (*Fuller Worthies Library*, Miscellanies, vol. iii., 1871), and to the works (1869) of Phineas Fletcher in the same series. Fletcher's letters relative to the college dispute with the provost, Dr Roger Goad, are preserved in the Lansdowne MSS. (xxiii. art. 18 et seq.), and are translated in Grosart's edition.

FLETCHER, GILES (*c.* 1584-1623), English poet, younger son of the preceding, was born about 1584. Fuller in his *Worthies of England* says that he was a native of London, and was educated at Westminster school. From there he went to Trinity College, Cambridge, where he took his B.A. degree in 1606, and became a minor fellow of his college in 1608. He was reader in Greek grammar (1615) and in Greek language (1618). In 1603 he contributed a poem on the death of Queen Elizabeth to *Sorrow's Joy*. His great poem of *Christ's Victory* appeared in 1610, and in 1612 he edited the *Remains* of his cousin Nathaniel Pownall. It is not known in what year he was ordained, but his sermons at St Mary's were famous. Fuller tells us that the prayer before the sermon was a continuous allegory. He left Cambridge about 1618, and soon after received, it is supposed from Francis Bacon, the rectory of Alderton, on the Suffolk coast, where

“his clownish and low-parted parishioners ... valued not their pastor according to his worth; which disposed him to melancholy and hastened his dissolution.” (Fuller, *Worthies of England*, ed. 1811, vol. ii. p. 82). His last work, *The Reward of the Faithful*, appeared in the year of his death (1623).

The principal work by which Giles Fletcher is known is *Christ’s Victorie and Triumph, in Heaven, in Earth, over and after Death* (1610). An edition in 1640 contains seven full-page illustrative engravings by George Tate. It is in four cantos and is epic in design. The first canto, “Christ’s Victory in Heaven,” represents a dispute in heaven between Justice and Mercy, assuming the facts of Christ’s life on earth; the second, “Christ’s Victory on Earth,” deals with an allegorical account of the Temptation; the third, “Christ’s Triumph over Death,” treats of the Passion; and the fourth, “Christ’s Triumph after Death,” treating of the Resurrection and Ascension, concludes with an affectionate eulogy of his brother Phineas Fletcher (*q.v.*) as “Thyrsilis.” The metre is an eight-line stanza owing something to Spenser. The first five lines rhyme ababb, and the stanza concludes with a rhyming triplet, resuming the conceit which nearly every verse embodies. Giles Fletcher, like his brother Phineas, to whom he was deeply attached, was a close follower of Spenser. In his very best passages Giles Fletcher attains to a rich melody which charmed the ear of Milton, who did not hesitate to borrow very considerably from the *Christ’s Victory and Triumph* in his *Paradise Regained*. Fletcher lived in an age which regarded as models the poems of Marini and Gongora, and his conceits are sometimes grotesque in connexion with the sacredness of his subject. But when he is carried away by his theme and forgets to be ingenious, he attains great solemnity and harmony of style. His descriptions of the Lady of Vain Delight, in the second canto, and of Justice and of Mercy in the first, are worked out with much beauty of detail into separate pictures, in the manner of the *Faerie Queene*.

Giles Fletcher’s poem was edited (1868) for the *Fuller Worthies Library*, and (1876) for the *Early English Poets* by Dr A.B. Grosart. It is also reprinted for *The Ancient and Modern Library of Theological Literature* (1888), and in R. Cattermole’s and H. Stebbing’s *Sacred Classics* (1834, &c.) vol. 20. In the library of King’s College, Cambridge, is a MS. *Aegidii Fletcherii versio poetica Lamentationum Jeremiae*.

FLETCHER, JOHN WILLIAM (1729-1785), English divine, was born at Nyon in Switzerland on the 12th of September 1729, his original name being DE LA FLÉCHIÈRE. He was educated at Geneva, but, preferring an army career to a clerical one, went to Lisbon and enlisted. An accident prevented his sailing with his regiment to Brazil, and after a visit to Flanders, where an uncle offered to secure a commission for him, he went to England, picked up the language, and in 1752 became tutor in a Shropshire family. Here he came under the influence of the new Methodist preachers, and in 1757 took orders, being ordained by the bishop of Bangor. He often preached with John Wesley and for him, and became known as a fervent supporter of the revival. Refusing the wealthy living of Dunham, he accepted the humble one of Madeley, where for twenty-five years (1760-1785) he lived and worked with unique devotion and zeal. Fletcher was one of the few parish clergy who understood Wesley and his work, yet he never wrote or said anything inconsistent with his own Anglican position. In theology he upheld the Arminian against the Calvinist position, but always with courtesy and fairness; his resignation on doctrinal grounds of the superintendency (1768-1771) of the countess of Huntingdon’s college at Trevecca left no unpleasantness. The outstanding feature of his life was a transparent simplicity and saintliness of spirit, and the testimony of his contemporaries to his godliness is unanimous. Wesley preached his funeral sermon from the words “Mark the perfect man.” Southey said that “no age ever provided a man of more fervent piety or more perfect charity, and no church ever possessed a more apostolic minister.” His fame was not confined to his own country, for it is said that Voltaire, when challenged to produce a character as perfect as that of Christ, at once mentioned Fletcher of Madeley. He died on the 14th of August 1785.

Complete editions of his works were published in 1803 and 1836. The chief of them, written against Calvinism, are *Five Checks to Antinomianism*, *Scripture Scales to weigh the Gold of Gospel Truth*, and the *Portrait of St Paul*. See lives by J. Wesley (1786); L. Tyerman (1882); F.W. Macdonald (1885); J. Maratt (1902); also C.J. Ryle, *Christian Leaders of the 18th Century*, pp. 384-423 (1869).

FLETCHER, PHINEAS (1582-1650), English poet, elder son of Dr Giles Fletcher, and brother of Giles the younger, noticed above, was born at Cranbrook, Kent, and was baptized on the 8th of April 1582. He was admitted a scholar of Eton, and in 1600 entered King’s College, Cambridge. He graduated B.A. in 1604, and M.A. in 1608, and was one of the contributors to *Sorrow’s Joy* (1603). His pastoral drama, *Sicelides or Piscatory* (pr. 1631) was written (1614) for performance before James I., but only produced after the king’s departure at King’s College. He had been ordained priest and before 1611 became a fellow of his college, but he left Cambridge before 1616, apparently because certain emoluments were refused him. He became chaplain to Sir Henry Willoughby, who presented him in 1621 to the rectory of Hilgay, Norfolk, where he married and spent the rest of his life. In 1627 he published *Locustae, vel Pietas Jesuitica*. *The Locusts or Apollyonists*, two parallel poems in Latin and English furiously attacking the Jesuits. Dr Grosart saw in this work one of the sources of Milton’s conception of Satan. Next year appeared an erotic poem, *Brittains Ida*, with Edmund Spenser’s name on the title-page. It is certainly not by Spenser, and is printed by Dr Grosart with the works of Phineas Fletcher. *Sicelides*, a play acted at King’s College in 1614, was printed in 1631. In 1632 appeared two theological prose treatises, *The Way to Blessedness* and *Joy in Tribulation*, and in 1633 his *magnum opus, The Purple Island*. The book was dedicated to his friend Edward Benlowes, and included

his *Piscatorie Eclogs and other Poetical Miscellanies*. He died in 1650, his will being proved by his widow on the 13th of December of that year. *The Purple Island, or the Isle of Man*, is a poem in twelve cantos describing in cumbrous allegory the physiological structure of the human body and the mind of man. The intellectual qualities are personified, while the veins are rivers, the bones the mountains of the island, the whole analogy being worked out with great ingenuity. The manner of Spenser is preserved throughout, but Fletcher never lost sight of his moral aim to lose himself in digressions like those of the *Faerie Queene*. What he gains in unity of design, however, he more than loses in human interest and action. The chief charm of the poem lies in its descriptions of rural scenery. The *Piscatory Eclogues* are pastorals the characters of which are represented as fisher boys on the banks of the Cam, and are interesting for the light they cast on the biography of the poet himself (Thyrsil) and his father (Thelgon). The poetry of Phineas Fletcher has not the sublimity sometimes reached by his brother Giles. The mannerisms are more pronounced and the conceits more far-fetched, but the verse is fluent, and lacks neither colour nor music.

A complete edition of his works (4 vols.) was privately printed by Dr A.B. Grosart (Fuller Worthies Library, 1869).

FLEURANGES, ROBERT (III.) DE LA MARCK, Seigneur de (1491-1537), marshal of France and historian, was the son of Robert II. de la Marck; duke of Bouillon, seigneur of Sedan and Fleuranges, whose uncle was the celebrated William de la Marck, “The Wild Boar of the Ardennes.” A fondness for military exercises displayed itself in his earliest years, and at the age of ten he was sent to the court of Louis XII., and placed in charge of the count of Angoulême, afterwards King Francis I. In his twentieth year he married a niece of the cardinal d’Amboise, but after three months he quitted his home to join the French army in the Milanese. With a handful of troops he threw himself into Verona, then besieged by the Venetians; but the siege was protracted, and being impatient for more active service, he rejoined the army. He then took part in the relief of Mirandola, besieged by the troops of Pope Julius II., and in other actions of the campaign. In 1512 the French being driven from Italy, Fleuranges was sent into Flanders to levy a body of 10,000 men, in command of which, under his father, he returned to Italy in 1513, seized Alessandria, and vigorously assailed Novara. But the French were defeated, and Fleuranges narrowly escaped with his life, having received more than forty wounds. He was rescued by his father and sent to Vercellae, and thence to Lyons. Returning to Italy with Francis I. in 1515, he distinguished himself in various affairs, and especially at Marignano, where he had a horse shot under him, and contributed so powerfully to the victory of the French that the king knighted him with his own hand. He next took Cremona, and was there called home by the news of his father’s illness. In 1519 he was sent into Germany on the difficult errand of inducing the electors to give their votes in favour of Francis I.; but in this he failed. The war in Italy being rekindled, Fleuranges accompanied the king thither, fought at Pavia (1525), and was taken prisoner with his royal master. The emperor, irritated by the defection of his father, Robert II. de la Marck, sent him into confinement in Flanders, where he remained for some years. During this imprisonment he was created marshal of France. He employed his enforced leisure in writing his *Histoire des choses mémorables advenues du règne de Louis XII et de François I, depuis 1499 jusqu’en l’an 1521*. In this work he designates himself *Jeune Adventureux*. Within a small compass he gives many curious and interesting details of the time, writing only of what he had seen, and in a very simple but vivid style. The book was first published in 1735, by Abbé Lambert, who added historical and critical notes; and it has been reprinted in several collections. The last occasion on which Fleuranges was engaged in active service was at the defence of Péronne, besieged by the count of Nassau in 1536. In the following year he heard of his father’s death, and set out from Amboise for his estate of La Marck; but he was seized with illness at Longjumeau, and died there in December 1537.

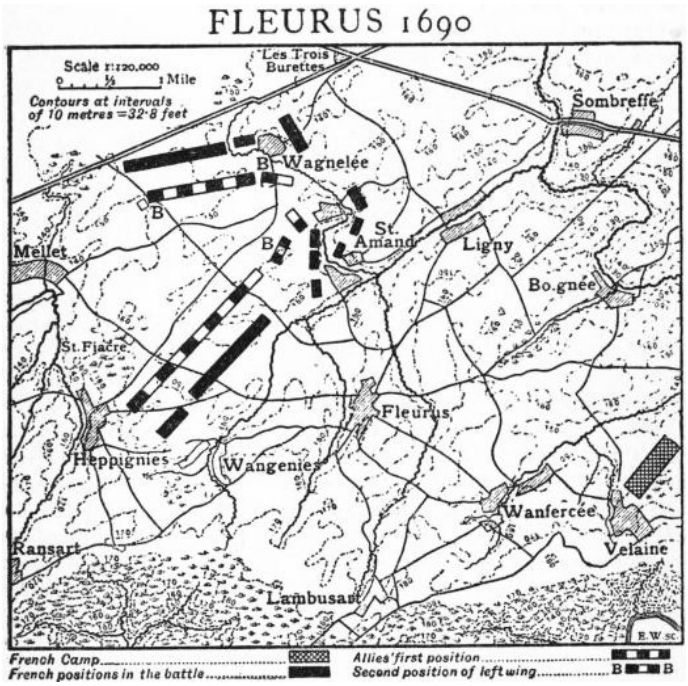
See his own book in the *Nouvelle Collection des mémoires pour servir à l’histoire de France* (edited by J.F. Michaud and J.J.F. Poujoulat, series i. vol. v. Paris, 1836 seq.).

FLEUR-DE-LIS (Fr. “lily flower”), an heraldic device, very widespread in the armorial bearings of all countries, but more particularly associated with the royal house of France. The conventional fleur-de-lis, as Littré says, represents very imperfectly three flowers of the white lily (*Lilium*) joined together, the central one erect, and each of the other two curving outwards. The fleur-de-lis is a common device in ancient decoration, notably in India and in Egypt, where it was the symbol of life and resurrection, the attribute of the god Horus. It is common also in Etruscan bronzes. It is uncertain whether the conventional fleur-de-lis was originally meant to represent the lily or white iris—the flower-de-luce of Shakespeare—or an arrow-head, a spear-head, an amulet fastened on date-palms to ward off the evil eye, &c. In Roman and early Gothic architecture the fleur-de-lis is a frequent sculptured ornament. As early as 1120 three fleurs-de-lis were sculptured on the capitals of the Chapelle Saint-Aignan at Paris. The fleur-de-lis was first definitely connected with the French monarchy in an *ordonnance* of Louis le Jeune (*c.* 1147), and was first figured on a seal of Philip Augustus in 1180. The use of the fleur-de-lis in heraldry dates from the 12th century, soon after which period it became a very common charge in France, England and Germany, where every gentleman of coat-armour desired to adorn his shield with a loan from the shield of France, which was at first *d’azur, semé de fleurs de lis d’or*. In February 1376 Charles V. of France reduced the number of fleurs-de-lis to three—in honour of the Trinity—and the kings of France thereafter bore *d’azur, à trois fleurs de lis d’or*. Tradition soon attributed the origin of the fleur-de-lis to Clovis, the founder of the Frankish monarchy, and explained that it represented the lily given to him by an angel at his baptism. Probably there was as much foundation

for this legend as for the more rationalistic explanation of William Newton (*Display of Heraldry*, p. 145), that the fleur-de-lis was the figure of a reed or flag in blossom, used instead of a sceptre at the proclamation of the Frankish kings. Whatever be the true origin of the fleur-de-lis as a conventional decoration, it is demonstrably far older than the Frankish monarchy, and history does not record the reason of its adoption by the royal house of France, from which it passed into common use as an heraldic charge in most European countries. An order of the Lily, with a fleur-de-lis for badge, was established in the Roman states by Pope Paul III. in 1546; its members were pledged to defend the patrimony of St Peter against the enemies of the church. Another order of the Lily was founded by Louis XVIII. in 1816, in memory of the silver fleurs-de-lis which the comte d'Artois had given to the troops in 1814 as decorations; it was abolished by the revolution of 1830.

Middle Ages. 17th century. 18th and 19th centuries.

FLEURUS, a village of Belgium, in the province of Hennegau, 5 m. N.E. of Charleroi, famous as the scene of several battles. The first of these was fought on August 19/29, 1622, between the forces of Count Mansfeld and Christian of Brunswick and the Spaniards under Cordovas, the latter being defeated. The second is described below, and the third and fourth, incidents of Jourdan's campaign of 1794, under French Revolutionary Wars. The ground immediately north-east of Fleurus forms the battlefield of Ligny (June 16, 1815), for which see Waterloo Campaign.



The second battle was fought on the 1st of July 1690 between 45,000 French under François-Henri de Montgomery-Bouteville, duke of Luxemburg, and 37,000 allied Dutch, Spaniards and Imperialists under George Frederick, prince of Waldeck. The latter had formed up his army between Heppignies and St Amand in what was then considered an ideal position; a double barrier of marshy brooks was in front, each flank rested on a village, and the space between, open upland, fitted his army exactly. But Luxemburg, riding up with his advanced guard from Velaine, decided, after a cursory survey of the ground, to attack the front and both flanks of the Allies' position at once—a decision which few, if any, generals then living would have dared to make, and which of itself places Luxemburg in the same rank as a tactician as his old friend and commander Condé. The left wing of cavalry was to move under cover of woods, houses and hollows to gain Wangenies, where it was to connect with the frontal attack of the French centre from Fleurus and to envelop Waldeck's right. Luxemburg himself with the right wing of cavalry and some infantry and artillery made a wide sweep round the enemy's left by way of Ligny and Les Trois Burettes, concealed by the high-standing corn. At 8 o'clock the frontal attack began by a vigorous artillery engagement, in which the French, though greatly outnumbered in guns, held their own, and three hours later Waldeck, whose attention had been absorbed by events on the front, found a long line of the enemy already formed up in his rear. He at once brought his second line back to oppose them, but while he was doing so the French leader filled up the gap

between himself and the frontal assailants by posting infantry around Wagnelée, and also guns on the neighbouring hill whence their fire enfiladed both halves of the enemy's army up to the limit of their ranging power. At 1 P.M. Luxemburg ordered a general attack of his whole line. He himself scattered the cavalry opposed to him and hustled the Dutch infantry into St Amand, where they were promptly surrounded. The left and centre of the French army were less fortunate, and in their first charge lost their leader, Lieutenant-General Jean Christophe, comte de Gournay, one of the best cavalry officers in the service. But Waldeck, hoping to profit by this momentary success, sent a portion of his right wing towards St Amand, where it merely shared the fate of his left, and the day was decided. Only a quarter of the cavalry and 14 battalions of infantry (English and Dutch) remained intact, and Waldeck could do no more, but with these he emulated the last stand of the Spaniards at Rocroi fifty years before. A great square was formed of the infantry, and a handful of cavalry joined them—the French cavalry, eager to avenge Gournay, had swept away the rest. Then slowly and in perfect order, they retired into the broken ground above Mellet, where they were in safety. The French slept on the battlefield, and then returned to camp with their trophies and 8000 prisoners. They had lost some 2500 killed, amongst them Gournay and Berbier du Metz, the chief of artillery, the Allies twice as many, as well as 48 guns, and Luxemburg was able to send 150 colours and standards to decorate Notre-Dame. But the victory was not followed up, for Louis XIV. ordered Luxemburg to keep in line with other French armies which were carrying on more or less desultory wars of manœuvre on the Meuse and Moselle.

FLEURY [ABRAHAM JOSEPH BÉNARD] (1750-1822), French actor, was born at Chartres on the 26th of October 1750, and began his stage apprenticeship at Nancy, where his father was at the head of a company of actors attached to the court of King Stanislaus. After four years in the provinces, he came to Paris in 1778, and almost immediately was made *sociétaire* at the Comédie Française, although the public was slow to recognize him as the greatest comedian of his time. In 1793 Fleury, like the rest of his fellow-players, was arrested in consequence of the presentation of Laya's *L'Ami des lois*, and, when liberated, appeared at various theatres until, in 1799, he rejoined the rehabilitated Comédie Française. After forty years of service he retired in 1818, and died on the 3rd of March 1822. He was notoriously illiterate, and it is probable that the interesting *Mémoire de Fleury* owes more to its author, Lafitte, than to the subject whose "notes and papers" it is said to contain.

FLEURY, ANDRÉ HERCULE DE (1653-1743), French cardinal and statesman, was born at Lodève (Hérault) on the 22nd of June 1653, the son of a collector of taxes. Educated by the Jesuits in Paris, he entered the priesthood, and became in 1679, through the influence of Cardinal Bonzi, almoner to Maria Theresa, queen of Louis XIV., and in 1698 bishop of Fréjus. Seventeen years of a country bishopric determined him to seek a position at court. He became tutor to the king's great-grandson and heir, and in spite of an apparent lack of ambition, he acquired over the child's mind an influence which proved to be indestructible. On the death of the regent Orleans in 1723 Fleury, although already seventy years of age, deferred his own supremacy by suggesting the appointment of Louis Henri, duke of Bourbon, as first minister. Fleury was present at all interviews between Louis XV. and his first minister, and on Bourbon's attempt to break through this rule Fleury retired from court. Louis made Bourbon recall the tutor, who on the 11th of July 1726 took affairs into his own hands, and secured the exile from court of Bourbon and of his mistress Madame de Prie. He refused the title of first minister, but his elevation to the cardinalate in that year secured his precedence over the other ministers. He was naturally frugal and prudent, and carried these qualities into the administration, with the result that in 1738-1739 there was a surplus of 15,000,000 livres instead of the usual deficit. In 1726 he fixed the standard of the currency and secured the credit of the government by the regular payment thenceforward of the interest on the debt. By exacting forced labour from the peasants he gave France admirable roads, though at the cost of rousing angry discontent. During the seventeen years of his orderly government the country found time to recuperate its forces after the exhaustion caused by the extravagances of Louis XIV. and of the regent, and the general prosperity rapidly increased. Internal peace was only seriously disturbed by the severities which Fleury saw fit to exercise against the Jansenists. He imprisoned priests who refused to accept the bull *Unigenitus*, and he met the opposition of the parlement of Paris by exiling forty of its members.

In foreign affairs his chief preoccupation was the maintenance of peace, which was shared by Sir Robert Walpole, and therefore led to a continuance of the good understanding between France and England. It was only with reluctance that he supported the ambitious projects of Elizabeth Farnese, queen of Spain, in Italy by guaranteeing in 1729 the succession of Don Carlos to the duchies of Parma and Tuscany. Fleury had economized in the army and navy, as elsewhere, and when in 1733 war was forced upon him he was hardly prepared. He was compelled by public opinion to support the claims of Louis XV.'s father-in-law Stanislaus Leszczynski, ex-king of Poland, to the Polish crown on the death of Frederick Augustus I., against the Russo-Austrian candidate; but the despatch of a French expedition of 1500 men to Danzig only served to humiliate France. Fleury was driven by Chauvelin to more energetic measures; he concluded a close alliance with the Spanish Bourbons and sent two armies against the Austrians. Military successes on the Rhine and in Italy secured the favourable terms of the treaty of Vienna (1735-1738). France had joined with the other powers in guaranteeing the succession of Maria Theresa under the Pragmatic sanction, but on the death of Charles VI. in 1740 Fleury by a diplomatic quibble found an excuse for repudiating his engagements, when he found

the party of war supreme in the king's counsels. After the disasters of the Bohemian campaign he wrote in confidence a humble letter to the Austrian general Königsegg, who immediately published it. Fleury disavowed his own letter, and died a few days after the French evacuation of Prague on the 29th of January 1743. He had enriched the royal library by many valuable oriental MSS., and was a member of the French Academy, of the Academy of Science, and the Academy of Inscriptions.

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