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THE ENCYCLOPÆDIA BRITANNICA

A DICTIONARY OF ARTS, SCIENCES, LITERATURE AND GENERAL INFORMATION

ELEVENTH EDITION

VOLUME VIII SLICE V

Dinard to Dodsworth

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DINGHY	DISTRACTION
DINGLE	DISTRESS
DINGO	DISTRIBUTION

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DIZFUL
DJAKOVO
DLUGOSZ, JAN
DMITRIEV, IVAN IVANOVICH
DNIEPER
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DOAB
DOANE, GEORGE WASHINGTON
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DIP
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DISABILITY
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DISCOUNT
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DISINFECTANTS
DISMAL
DISORDERLY HOUSE
DISPATCH
DISPENSATION
DISPERSION
D'ISRAELI, ISAAC
DISS
DÖBELN
DOBERAN
DÖBEREINER, JOHANN WOLFGANG
DOBREE, PETER PAUL
DÖBRENTEI, GABOR
DOBRITCH
DOBRIZHOFFER, MARTIN
DOBROWSKY, JOSEPH
DOBRUDJA
DOBSINA
DOBSON, HENRY AUSTIN
DOBSON, WILLIAM
DOCETAE
DOCHMIAC
DOCK
DOCK (botany)
DOCK (marine and river engineering)
DOCKET
DOCK WARRANT
DOCKYARDS
DOCTOR
DOCTORS' COMMONS
DOCTRINAIRES
DOCUMENT
DODD, WILLIAM
DODDER
DODDRIDGE, PHILIP
DODDS, ALFRED AMÉDÉE
DODECAHEDRON
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DÖDERLEIN, JOHANN WILHELM LUDWIG
DODGE, THEODORE AYRAULT
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DODO
DODONA
DODS, MARCUS
DODSLEY, ROBERT
DODSWORTH, ROGER

DINARD, a seaside town of north-western France, in the department of Ille-et-Vilaine. The town, which is the chief watering-place of Brittany, is situated on a rocky promontory at the mouth of the Rance opposite St Malo, which is about 1 m. distant. It is a favourite resort of English and Americans as well as of the French, its attractions being the beauty of its situation, the mildness of the climate and the good bathing. It has two casinos and numerous luxurious hotels and elegant villas. Together with the adjoining watering-place of St Enogat, Dinard has a population of 4882 (1906).

DINDIGUL, a town of British India, in the Madura district of Madras, 880 ft. above the sea, 40 m. from Madura by rail. Pop. (1901) 25,182. Dindigul has risen into importance as the centre of a trade in tobacco and manufacture of cigars, which are exported to England. There are two large European cigar factories here. The town has manufactures oe silk, muslim#and blankets, and an export trade in hides and cardamoms; and there is a large native Christian population, with two churches. The ancient fort, well preserved, stands on a rock rising 350 ft. above the town; this was formerly a position of great strategic importance, commanding passes into Madura from Coimbatore, and figured prominently in the military operations of the Mahrattas in the 17th and 18th centuries, and of Hyder Ali in 1755 seq., being thrice captured by the British (1767, 1783, 1790). After

the two first captures it was restored to Hyder Ali under treaty; after the third it was ceded to the East India Company.

KARL WILHELM DINDORF (1802-1883), German classical scholar, was born at Leipzig on the 2nd of January 1802. From his earliest years he showed a strong taste for classical studies, and after completing F. Invernizi's edition of Aristophanes at an early age, and editing several grammarians and rhetoricians, was in 1828 appointed extraordinary professor of literary history in his native city. Disappointed at not obtaining the ordinary professorship when it became vacant in 1833, he resigned his post in the same year, and devoted himself entirely to study and literary work. His attention had at first been chiefly given to Athenaeus, whom he edited in 1827, and to the Greek dramatists, all of whom he edited separately and combined in his *Poetae scenici Graeci* (1830 and later editions). He also wrote a work on the metres of the Greek dramatic poets, and compiled special lexicons to Aeschylus and Sophocles. He edited Procopius for Niebuhr's *Corpus* of the Byzantine writers, and between 1846 and 1851 brought out at Oxford an important edition of Demosthenes; he also edited Lucian and Josephus for the Didot classics. His last important editorial labour was his *Eusebius of Caesarea* (1867-1871). Much of his attention was occupied by the republication of Stephanus's *Thesaurus* (Paris, 1831-1865), chiefly executed by him and his brother Ludwig, a work of prodigious labour and utility. His reputation suffered somewhat through the imposture practised upon him by the Greek Constantine Simonides, who succeeded in deceiving him by a fabricated fragment of the Greek historian

Uranius. The book was printed, and a few copies had been circulated, when the forgery was discovered, just in time to prevent its being given to the world under the auspices of the university of Oxford. Shortly after the death of his brother, he lost all his property and his library by rash speculations. He died on the 1st of August 1883.

His brother LUDWIG (1805-1871) was born at Leipzig on the 3rd of January 1805, and died there on the 6th of September 1871. He never held any academical position, and led so secluded a life that many doubted his existence, and declared that he was a mere pseudonym. The important share which he took in the edition of the *Thesaurus* is nevertheless authenticated by his own signature to his contributions. He also published valuable editions of Polybius, Dio Cassius and other Greek historians.

D'INDY, PAUL-MARIE-THÉODORE-VINCENT (1851-), French musical composer, was born in Paris, on the 27th of March 1851. He studied composition and the organ at the Paris Conservatoire under César Franck, and obtained the grand prize offered by the city of Paris in 1885 with *Le Chant de la Cloche*, a dramatic legend after Schiller. His principal works, beside the above, are the symphonic trilogy *Wallenstein*, the symphonic works entitled *Saugefleurie*, *La Forêt enchantée*, *Istar*, *Symphonie sur un air montagnard français*; overture to *Anthony and Cleopatra*; *Ste Marie Magdeleine*, a cantata; *Attendez-moi sous l'orme*, a one-act opera; *Fervaal*, a musical drama in three acts. Vincent d'Indy is perhaps the most prominent among the disciples of César Franck. Imbued with very high aims, he was always guided by a lofty ideal, and few

musicians have attained so complete a mastery over the art of instrumentation. His music, however, lacks simplicity, and can never become popular in the widest sense. His opera *Fervaal*, which is styled "action musicale", is constructed upon the system of *Leit-motifs*. Its legendary subject recalls both *Parsifal* and *Tristan*, and the music is also suggestive of Wagnerian influence. D'Indy can scarcely be considered so typical a representative of modern French music as his juniors Alfred Bruneau, the composer of *Le Rêve*, *L'Attaque du moulin*, *Messidor*, or Gustave Charpentier, the author of *Louise*, who chose subjects of modern life for their operatic works.

DINEIR, a small town in Asia Minor, built amidst the ruins of Celaenae-Apamea, near the sources of the Maeander (Menderes). It is the terminus of the Smyrna-Aidin-Dineir railway. Pop. 1400. (See APAMEA.)

DINGELSTEDT, FRANZ VON (1814-1881), German poet and dramatist, was born at Halsdorf, in Hesse Cassel, on the 30th of June 1814. Having studied at the university of Marburg, he became in 1836 a master at the Lyceum in Cassel, from which he was transferred to Fulda in 1838. In 1839 he produced a novel, *Unter der Erde*, which obtained considerable success, and in 1841 published the book by which he is best remembered,

the *Lieder eines kosmopolitischen Nachtwächters*. These poems, animated as they are by a spirit of bitter opposition to everything that savours of despotism, were an effective contribution to the political poetry of the day. The popularity of this book determined Dingelstedt to take up a literary career, and in 1841 he obtained an appointment on the staff of the *Augsburger allgemeine Zeitung*. In 1843, however, the satirist of German princes accepted, to the general surprise, the appointment of private librarian to the king of Württemberg, and in the same year he married the celebrated Bohemian opera singer, Jenny Lutzer. In 1845 he published a volume of poems, some of which, treating of modern life, possessed great literary rather than strictly poetical merit. A subsequent collection, published in 1852, attracted little attention. The success of his tragedy *Das Haus der Barneveldt* (1850) obtained for him the position of intendant at the court theatre at Munich, where he soon became the centre of literary society. He incurred, however, the animosity of the Jesuit clique at the court, and in 1856 was suddenly dismissed on the most frivolous charges. A similar position was offered to him at Weimar through the influence of Liszt, and he remained there until 1867. His administration was most successful, and he especially distinguished himself by presenting all Shakespeare's historical plays upon the stage in an unbroken cycle. In 1867 he became director of the court opera house in Vienna, and in 1872 of the Hofburgtheater, a position he held until his death on the 15th of May 1881. Among his other works may be noticed an autobiographical sketch of his Munich career, entitled *Münchener Bilderbogen* (1879), *Die Amazone*, an art novel of considerable merit (1869), translations of several of Shakespeare's comedies, and several writings dealing with questions of practical dramaturgy. He was ennobled in 1867 by the king of Bavaria and in 1876 was created *Freiherr* by the emperor of Austria.

Dingelstedt's *Sämtliche Werke* appeared in 12 vols. (1877-1878), but this edition is far from complete. On his life see, besides the

autobiography mentioned above, J. Rodenberg, *Heimaterinnerungen an F. Dingelstedt* (Berlin, 1882), and by the same author, *F. Dingelstedt, Blätter aus seinem Nachlass* (2 vols., 1891). Also an essay by A. Stern in *Zur Literatur der Gegenwart* (Leipzig, 1880).

DINGHY, or DINGEY (from the Hindu *dēngī* a small boat, the diminutive of *denga*, a sloop or coasting vessel), a boat of greatly varying size and shape, used on the rivers of India; the term is applied also, in certain districts, to a larger boat used for coasting purposes. The name was adopted by the merchantmen trading with India, and is now generally used to designate the small extra boat kept for general purposes on a man-of-war or merchant vessel, and also, on the Thames, for small pleasure boats built for one or two pairs of sculls.

DINGLE, a seaport and market town of county Kerry, Ireland, in the west parliamentary division, the terminus of the Tralee and Dingle railway. Pop. (1901) 1786. This may be considered the most westerly town in the United Kingdom unless Knightstown at Valencia Island be excepted; it lies on the south side of the northernmost of the great promontories which protrude into the Atlantic on the south-western coast of Ireland, on the fine natural harbour of Dingle Bay, in a wild hilly district abundant in relics of

antiquity. The town, which is the centre of a considerable fishing industry, especially in mackerel, was in the 16th century of no little importance as a seaport; it had also a noted manufacture of linen. It was incorporated by Queen Elizabeth, and returned two members to the Irish parliament until the Union.

DINGO, a name applied apparently by Europeans to the warrigal, or native Australian dog, the Canis dingo of J. F. Blumenbach. The dingo is a stoutly-built, rather short-legged, sandy-coloured dog, intermediate in size between a jackal and a wolf, and measuring about 51 in. in total length, of which the tail takes up about eleven. In general appearance it is very like some of the pariah dogs of India and Egypt; and, except on distributional grounds, there is no reason for regarding it as specifically distinct from such breeds. Dingos, which are found both wild and tame, interbreed freely with European dogs introduced into the country, and it may be that the large amount of black on the back of many specimens may be the result of crossing of this nature.

The main point of interest connected with the dingo relates to its origin; that is to say, whether it is a member of the indigenous Australian fauna (among which it is the only large placental mammal), or whether it has been introduced into the country by man. There seems to be no doubt that fossilized remains of the dingo occur intermingled with those of the extinct Australian mammals, such as giant kangaroos, giant wombats and the still more gigantic *Diprotodon*. And since remains of man have apparently not yet been detected in these deposits, it has been thought by some naturalists

that the dingo must be an indigenous species. This was the opinion of Sir Frederick McCoy, by whom the deposits in question were regarded as probably of Pliocene age. A similar view is adopted by D. Ogilvy in a *Catalogue of Australian Mammals*, published at Sydney in 1892; the writer going however one step further and expressing the belief that the dingo is the ancestor of all domesticated dogs. The latter contention cannot for a moment be sustained; and there are also strong arguments against the indigenous origin of the dingo. That the animal now occurs in a wild state is no argument whatever as to its being indigenous, seeing that a domesticated breed introduced by man into a new country abounding in game would almost certainly revert to the wild state. The apparent absence of human remains in the beds yielding dingo teeth and bones (which are almost certainly not older than the Pleistocene) is of only negative value, and liable to be upset by new discoveries. Then, again (as has been pointed out by R. I. Pocock in the first part of the *Kennel Encyclopaedia*, 1907), the absence of any really wild species of the typical group of the genus *Canis* between Burma and Siam on the one hand and Australia on the other is a very strong argument against the dingo being indigenous, seeing that, whether brought by man or having travelled thither of its own accord, the dingo must have reached its present habitat by way of the Austro-Malay archipelago. If it had followed that route in the course of nature, it is inconceivable that it would not still be found on some portions of the route. On the supposition that the dingo was introduced by man, we have now fairly decisive evidence that the native Australian, in place of being (as formerly supposed) a member of the negro stock, is a low type of Caucasian allied to the Veddahs of Ceylon and the Toalas of Celebes. Consequently the Australian natives must be presumed to have reached the island-continent by way of Malaya; and if this be admitted, nothing is more likely than that they should have been accompanied by pariah dogs of the Indian type. Confirmation of this is afforded by the occurrence in the mountains of Java of a pariah-like dog

which has reverted to an almost completely wild condition; and likewise by the fact that the old voyagers met with dogs more or less similar to the dingo in New Guinea, New Zealand and the Solomon and certain other of the smaller Pacific islands. On the whole, then, the most probable explanation of the case is that the dingo is an introduced species closely allied to the Indian pariah dog. Whether the latter represents a truly wild type now extinct, cannot be determined. If so, all pariahs should be classed with the Australian warrigal under the name of *Canis dingo*. If, on the other hand, pariahs, and consequently the dingo, cannot be separated specifically from the domesticated dogs of western Europe, then the dingo should be designated *Canis familiaris dingo*.

(R. L.*)

DINGWALL, a royal and police burgh and county town of the shire of Ross and Cromarty, Scotland. Pop. (1901) 2519. It is situated near the head of Cromarty Firth where the valley of the Peffery unites with the alluvial lands at the mouth of the Conon, 18½ m. N.W. of Inverness by the Highland railway. Its name, derived from the Scandinavian *Thingvöllr*, "field or meeting-place of the *thing*," or local assembly, preserves the Norse origin of the town; its Gaelic designation is Inverpefferon, "the mouth of the Peffery." The 18th-century town house, and some remains of the ancient mansion of the once powerful earls of Ross still exist. There is also a public park. An obelisk, 57 ft. high, was erected over the grave of the 1st earl of Cromarty. The town belongs to the Wick district group of parliamentary burghs. It is a flourishing distributing centre and has an important corn market and auction marts. Some shipping is carried on at the harbour at the

mouth of the Peffery, about a mile below the burgh. Branch lines of the Highland railway run to Strathpeffer and to Strome Ferry and Kyle of Lochalsh (for Skye). Alexander II. created Dingwall a royal borough in 1226, and its charter was renewed by James IV. On the top of Knockfarrel (Gaelic, *cnoc*, hill; *faire*, watch, or guard), a hill about 3 m. to the west, is a large and very complete vitrified fort with ramparts.

DINKA (called by the Arabs *Jange*), a widely spread negro people dwelling on the right bank of the White Nile to about 12° N., around the mouth of the Babr-el-Ghazal, along the right bank of that river and on the banks of the lower Sobat. Like the Shilluk, they were greatly harried from the north by Nuba-Arabic tribes, but remained comparatively free owing to the vast extent of their country, estimated to cover 40,000 sq. m., and their energy in defending themselves. They are a tall race with skins of almost blue black. The men wear practically no clothes, married women having a short apron, and unmarried girls a fringe of iron cones round the waist. They tattoo themselves with tribal marks, and extract the lower incisors; they also pierce the ears and lip for the attachment of ornaments, and wear a variety of feather, iron, ivory and brass ornaments. Nearly all shave the head, but some give the hair a reddish colour by moistening it with animal matter. Polygamy is general; some headmen have as many as thirty or more wives; but six is the average number. They are great cattle and sheep breeders; the men tend their beasts with great devotion, despising agriculture, which is left to the women; the cattle are called by means of drums. Save under stress of famine cattle are never killed for food, the

people subsisting largely on durra. The Dinkas reverence the cow, and snakes, which they call “brothers.” Their folklore recognizes a good and evil deity; one of the two wives of the good deity created man, and the dead go to live with him in a great park filled with animals of enormous size. The evil deity created cripples. The Dinka came, in 1899, under the control of the Sudan government, justice being administered as far as possible in accord with tribal custom. A compendium of Dinka laws was compiled by Captain H. D. E. O’Sullivan.

See G. A. Schweinfurth, *The Heart of Africa* (1874); W. Junker, *Travels in Africa*, Eng. edit. (London, 1890-1892); *The Anglo-Egyptian Sudan*, edited by Count Gleichen (London, 1905).

DINKELSBÜHL, a town of Germany, in the kingdom of Bavaria, on the Wörnitz, 16 m. N. from Nördlingen, on the railway to Dombühl. Pop. 5000. It is an interesting medieval town, still surrounded by old walls and towers, and has an Evangelical and two Roman Catholic churches. Notable is the so-called *Deutsches Haus*, the ancestral home of the counts of Drechsel-Deufstetten, a fine specimen of the German renaissance style of wooden architecture. There are a Latin and industrial school, several benevolent institutions, and a monument to Christoph von Schmid (1768-1854), a writer of stories for the young. The inhabitants carry on the manufacture of brushes, gloves, stockings and gingerbread, and deal largely in cattle.

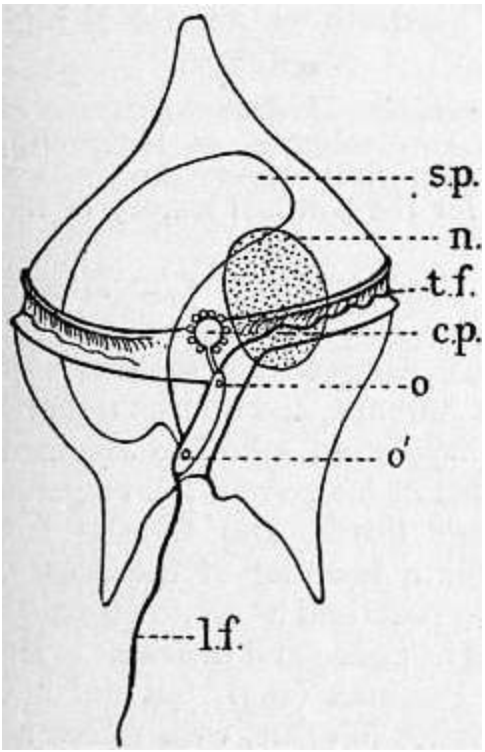
Fortified by the emperor Henry I., Dinkelsbühl received in 1305 the same municipal rights as Ulm, and obtained in 1351 the position of a free

imperial city, which it retained till 1802, when it passed to Bavaria. Its municipal code, the *Dinkelsbuhler Recht*, published in 1536, and revised in 1738, contained a very extensive collection of public and private laws.

DINNER, the chief meal of the day, eaten either in the middle of the day, as was formerly the universal custom, or in the evening. The word "dine" comes through Fr. from Med. Lat. *disnare*, for *disjejunare*, to break one's fast (*jejunium*); it is, therefore, the same word as Fr. *déjeuner*, to breakfast, in modern France, to take the midday meal, *dîner* being used for the later repast. The term "dinner-wagon," originally a movable table to hold dishes, is now used of a two-tier sideboard.

DINOCRATES, a great and original Greek architect, of the age of Alexander the Great. He tried to captivate the ambitious fancy of that king with a design for carving Mount Athos into a gigantic seated statue. This plan was not carried out, but Dinocrates designed for Alexander the plan of the new city of Alexandria, and constructed the vast funeral pyre of Hephaestion. Alexandria was, like Peiraeus and Rhodes (see HIPPODAMUS), built on a regular plan; the streets of most earlier towns being narrow and confused.

DINOFLAGELLATA, so called by O. Bütschli (= the CILIOFLAGELLATA of E. Claparide and H. Lachmann), a group of Protozoa, characterized as Mastigophora, provided with two flagella, the one anterior extended in locomotion, the other coiled round its base, or lying in a transverse groove. The body is bounded by a firm pellicle, often supplemented by an armour ("lorica") of cuticular cellulose plates, with usually a marked longitudinal groove from which the anterior flagellum springs, and an oblique or spiral transverse groove for the second flagellum. In *Polykrikos* (fig. 2, 9) there are eight transverse grooves each with its flagellum. The armour-plates are often exquisitely sculptured, and may be produced into spines or perpendicular plates to give greater surface extension, as we find in other plankton organisms. The cortical plasma may protrude pseudopodia in the longitudinal groove; it contains trichocysts in several species, true nematocysts in *Polykrikos*. It contains



After F. Schutt in Engler and Prantl's *Pflanzenfamilien*, by permission of Wm Engelmann.

FIG. 1.—*Peridinium divergens* showing longitudinal and transverse grooves in which lie the respective flagella l.f., t.f.; s.p., large "sack pusule" discharging through a tube by pore o'; c.p., "collective pusule discharging at o, and surrounded by a ring of formative" or "daughter pusules"; n, nucleus.

chromatophores in many species, coloured by a mixed lipochrome pigment which appears to be distinct from diatomin. The endoplasm is ramified between alveoli; it contains a large nucleus (in *Polykrikos* there are eight nuclei, accompanied by smaller, more numerous bodies regarded by O. Butschli as micro-nuclei). Besides the other spaces are definite rounded or oval vacuoles with a permanent pellicular wall termed by Schutt "pusules"; these open by a duct or ducts into the longitudinal groove. They enlarge and diminish, and are possibly excretory like the "contractile vacuoles" of other Protista; though it has been suggested that by their communication with the medium they subserve nutrition. Nutrition is of course holozoic or saprophytic in the colourless forms, holophytic in the coloured; but these divergent methods are exhibited by different species of the same genus, or even by individuals of one and the same species under different conditions. Binary fission has been widely observed, both in the active condition or after loss of the flagella: it differs from that of true Flagellates in not being longitudinal, but transverse or oblique (fig, 2, 2). Repeated fission (brood-formation) within a cyst has also been observed, as in *Pyrocystis* and *Ceratium*; and possibly the chains of *Ceratium* and other (fig. 2, 5 and 6) genera are due to the non-separation of the brood-cells. Conjugation of adults has been observed in several species, the most complete account being that of Zederbauer on *Ceratium hirundinella* (marine): either mate puts forth a tube which meets and opens into that of the other (as in some species of *Chlamydomonas* and Desmids); the two cell-bodies fuse in this tube, and encyst to form a resting zygospore. The Dinoflagellates are relatively large for Mastigophora, many attaining 50 μ (1/500") in length. The majority are marine; but some genera (*Ceratium*, *Peridinium*) include fresh-water species. Many are highly phosphorescent and some by their abundance colour the water of the sea or pool which they dwell in. Like so many coloured Protista, they frequently possess a pigmented "eye-spot" in which may be sunk a spheroidal refractive body ("lens").

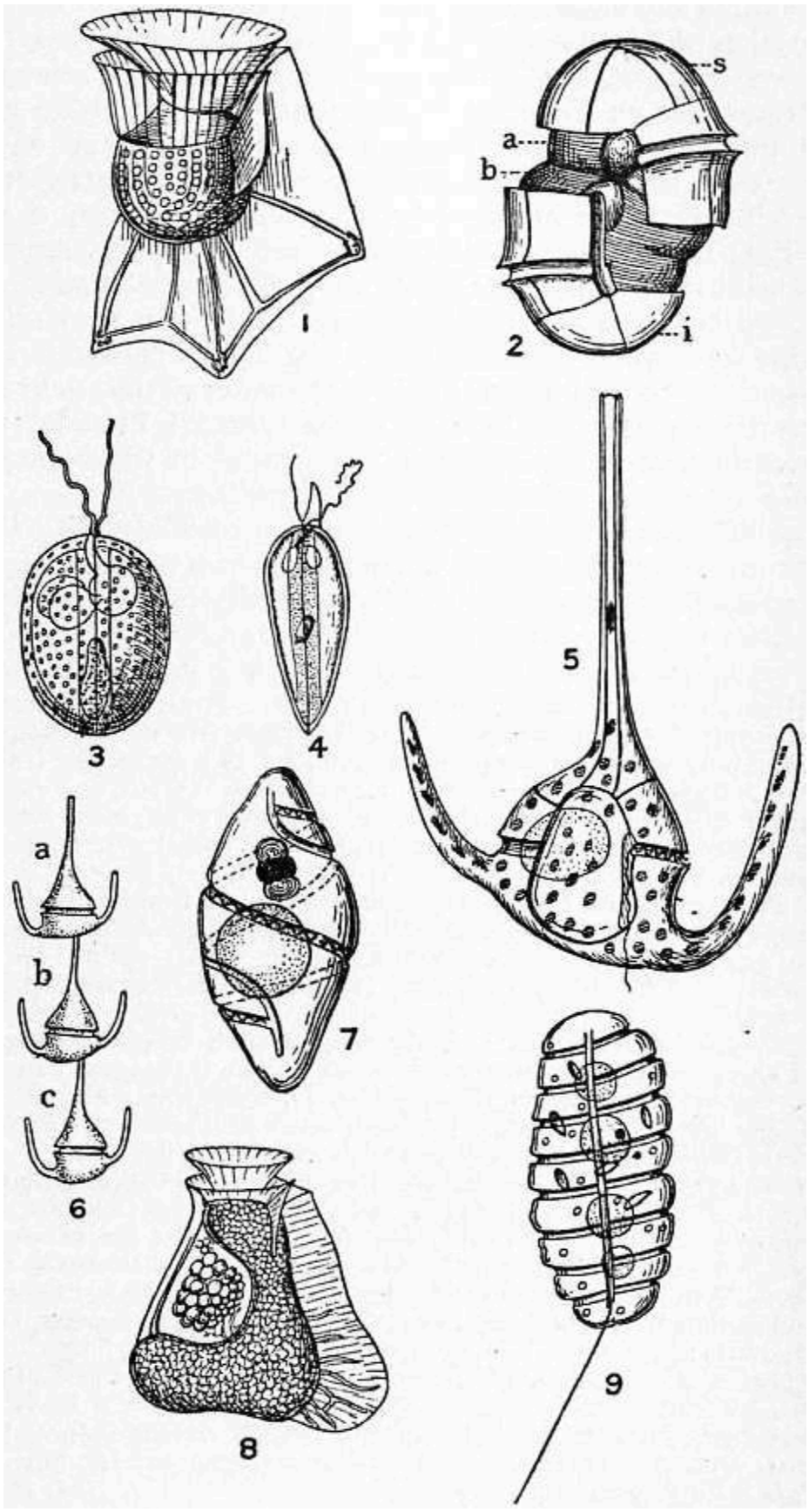

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FIG. 2.

From Delage and Hérouard's *Traité de zoologie concrete*, by permission of Schleicher Frères.

1. Modified from Schütt, *Ornithoceras*.
2. Diagram of transverse fission of a Dinoflagellate.
3. After Schutt, *Exuviaeella*.
4. After Stein, *Prorocentrum*.
5, 6. *Ceratium*, single and series.
7. *Pouchetia fusus* (Schutt).
8. *Citharistes*.
9. After Butschli, *Polykrikos*.

The affinities of the Dinoflagellata are certainly with those Cryptomonadine Flagellates which possess two unequal flagella; the zoospores or young of the Cystoflagellates are practically colourless Dinoflagellates.

1. *Gymnodiniaceae*: body naked, or with a simple cellulose or gelatinous envelope; both grooves present. *Pyrocystis* (Murray), often encysted, spherical or crescentic, becoming free within cyst wall, and escaping whole or after brood-divisions as a form like *Gymnodinium*; *Gymnodinium* (Stein); *Hemidinium* (Stein); *Pouchetia* (Schütt) (fig. 2, 7) with complex eye-spot; to this group we may refer *Polykrikos* (Bütschli) (fig. 2, 9), with its metameric transverse grooves and flagella.

2. *Prorocentraceae* (Schütt) (= the Adinida of Bergh); body surrounded by a firm shell of two valves without a girdle band; transverse groove absent; transverse flagellum coiled round base of longitudinal. *Exuviaeella* (Cienk.) (fig. 2, 3); *Prorocentrum* (Ehrb.) (fig. 2, 4).

3. *Peridiniaceae* (Schütt); body with a shell of plates, a girdle band along the transverse groove, in which the transverse flagellum lies. Genera, *Peridinium* (Ehrb.) (fig. 1), fresh-water and marine; *Ceratium* (Schrank) (fig. 2, 5, 6), fresh-water and marine; *Citharistes* (Stein); *Ornithoceras* (Claparède and Lachmann) (fig. 2, 1).

LITERATURE.—R. S. Bergh, "Der Organismusder Cilioflagellaten," *Morphol. Jahrbuch*, vii. (1881); F. von Stein, *Organismus der Infusionsthiere*, Abth. 3, 2. Hälfte; *Die Naturgeschichte der arthrodelen Flagellaten* (1883); Bütschli, "Mastigophora" (in Bronn's *Thierreich*, i. Abth. 2), 1881-1887; G. Pouchet, various observations on Dinoflagellates, *Journal de l'anatomie et de la physiologie* (1885, 1887, 1891); F. Schütt, "Die Peridineen der Plankton Expedition" (*Ergebnisse d. Pl. Exed.* i. Th. vol. iv. 1895); and "Peridiniales" in Engler and Prantl's *Pflanzenfamilien*, vol. i. Abt. 2 b. (1896); Zederbauer, *Berichte d. deutschen botanischen Gesellschaft*, vol. xx. (1900); Delage and Hérouard, *Traité de zoologie concrète*, vol. i. *La Cellule et les protozoaires* (1896). (M. HA.)

DINOTHERIUM, an extinct mammal, fossil remains of which occur in the Miocene beds of France, Germany, Greece and Northern India. These consist chiefly of teeth and the bones of the head. An entire skull, obtained from the Lower Pliocene beds of Eppelsheim, Hesse-Darmstadt, in 1836, measured 4½ ft. in length and 3 ft. in breadth, and indicates an animal exceeding the elephant in size. The upper jaw is apparently destitute of incisor and canine teeth, but possesses five molars on each side, with a corresponding number in the jaw beneath. The most remarkable feature, however, consists in the front part of the lower jaw being bent downwards and bearing two tusk-like incisors also directed downwards and backwards. *Dinotherium* is a member of the group Proboscidea, of the line of descent of the elephants.

DINWIDDIE, ROBERT (1693-1770), English colonial governor of Virginia, was born near Glasgow, Scotland, in 1693. From the position of customs clerk in Bermuda, which he held in 1727-1738, he was promoted to be surveyor-general of the customs "of the southern ports of the continent of America," as a reward for having exposed the corruption in the West Indian customs service. In 1743 he was commissioned to examine into the customs service in the Barbadoes and exposed similar corruption there. In 1751-1758 he was lieutenant-governor of Virginia, first as the deputy of Lord Albemarle and then, from July 1756 to January 1758, as deputy for Lord Loudon. He was energetic in the discharge of his duties, but aroused much animosity among the colonists by his zeal in looking after the royal quit-rents, and by exacting heavy fees for the issue of land-patents. It was his chief concern to prevent the French from building in the Ohio Valley a chain of forts connecting their settlements in the north with those on the Gulf of Mexico; and in the autumn of 1753 he sent George Washington to Fort Le Bœuf, a newly established French post at what is now Waterford, Pennsylvania, with a message demanding the withdrawal of the French from English territory. As the French refused to comply, Dinwiddie secured from the reluctant Virginia assembly a grant of £10,000 and in the spring of 1754 he sent Washington with an armed force toward the forks of the Ohio river "to prevent the intentions of the French in settling those lands." In the latter part of May Washington encountered a French force at a spot called Great Meadows, near the Youghiogheny river, in what is now south-western Pennsylvania, and a skirmish followed which precipitated the French and Indian War. Dinwiddie was especially active at this time in urging the co-operation of the colonies against the French in the Ohio Valley; but none of

the other governors, except William Shirley of Massachusetts, was then much concerned about the western frontier, and he could accomplish very little. His appeals to the home government, however, resulted in the sending of General Edward Braddock to Virginia with two regiments of regular troops; and at Braddock's call Dinwiddie and the governors of Massachusetts, New York, Pennsylvania and Maryland met at Alexandria, Virginia, in April 1755, and planned the initial operations of the war. Dinwiddie's administration was marked by a constant wrangle with the assembly over money matters; and its obstinate resistance to military appropriations caused him in 1754 and 1755 to urge the home government to secure an act of parliament compelling the colonies to raise money for their protection. In January 1758 he left Virginia and lived in England until his death on the 27th of July 1770 at Clifton, Bristol.

The Official Records of Robert Dinwiddie, Lieutenant-Governor of Virginia (1751-1758), published in two volumes, at Richmond, Va., in 1883-1884, by the Virginia Historical Society, and edited by R. A. Brock, are of great value for the political history of the colonies in this period.

DIO CASSIUS (more correctly CASSIUS DIO), COCCEIANUS (c. A.D. 150-235), Roman historian, was born at Nicaea in Bithynia. His father was Cassius Apronianus, governor of Dalmatia and Cilicia under Marcus Aurelius, and on his mother's side he was the grandson of Dio Chrysostom, who had assumed the surname of Cocceianus in honour of his patron the emperor Cocceius Nerva. After his father's death, Dio Cassius left Cilicia

for Rome (180) and became a member of the senate. During the reign of Commodus, Dio practised as an advocate at the Roman bar, and held the offices of aedile and quaestor. He was raised to the praetorship by Pertinax (193), but did not assume office till the reign of Septimius Severus, with whom he was for a long time on the most intimate footing. By Macrinus he was entrusted with the administration of Pergamum and Smyrna; and on his return to Rome he was raised to the consulship about 220. After this he obtained the proconsulship of Africa, and again on his return was sent as legate successively to Dalmatia and Pannonia. He was raised a second time to the consulship by Alexander Severus, in 229; but on the plea of ill health soon afterwards retired to Nicaea, where he died. Before writing his history of Rome (Ῥωμαικά or Ῥωμαικὴ Ἱστορία), Dio Cassius had dedicated to the emperor Severus an account of various dreams and prodigies which had presaged his elevation to the throne (perhaps the Ἐνόδια attributed to Dio by Suidas), and had also written a biography of his fellow-countryman Arrian. The history of Rome, which consisted of eighty books,—and, after the example of Livy, was divided into decades,—began with the landing of Aeneas in Italy, and was continued as far as the reign of Alexander Severus (222-235). Of this great work we possess books 36-60, containing the history of events from 68 B.C.-A.D. 47; books 36 and 55-60 are imperfect. We also have part of 35 and 36-80 in the epitome of John Xiphilinus, an 11th-century Byzantine monk. For the earlier period the loss of Dio's work is partly supplied by the history of Zonaras, who followed him closely. Numerous fragments are also contained in the excerpts of Constantine Porphyrogenitus. Dio's work is a most important authority for the history of the last years of the republic and the early empire. His industry was great and the various important offices he held afforded him ample opportunities for historical investigation. His style, though marred by Latinisms, is clearer than that of his model Thucydides, and his narrative shows the hand of the practised soldier and politician; the language is correct and free from

affectation. But he displays a superstitious regard for miracles and prophecies; he has nothing to say against the arbitrary acts of the emperors, which he seems to take as a matter of course; and his work, although far more than a mere compilation, is not remarkable for impartiality, vigour of judgment or critical historical faculty.

The best edition with notes is that of H. S. Reimar (1750-1752), new ed. by F. G. Sturz (1824-1836); text by I. Melber (1890 foll.), with account of previous editions, and U. P. Boissevain (1895-1901); translation by H. B. Foster (Troy, New York, 1905 foll.), with full bibliography; see also W. Christ, *Geschichte der griechischen Litteratur* (1898), p. 675; E. Schwartz in Pauly-Wissowa's *Realencyclopadie*, iii. pt. 2 (1899); C. Wachsmuth, *Einleitung in das Studium der alten Geschichte* (1895).

DIOCESE (formed on Fr. *diocèse*, in place of the Eng. form *diocess*—current until the 19th century—from Lat. *dioecesis*, med. Lat. variant *diocesis*, from Gr. διοίκησις, "housekeeping," "administration," διοικεῖν, "to keep house," "to govern"), the sphere of a bishop's jurisdiction. In this, its sole modern sense, the word diocese (*dioecesis*) has only been regularly used since the 9th century, though isolated instances of such use occur so early as the 3rd, what is now known as a diocese having been till then usually called a *parochia* (parish). The Greek word διοίκησις, from meaning "administration," came to be applied to the territorial circumscription in which administration was exercised. It was thus first applied *e.g.* to the three districts of Cibyra, Apamea and Synnada, which

were added to Cilicia in Cicero's time (between 56 and 50 B.C.). The word is here equivalent to "assize-districts" (Tyrrell and Purser's edition of Cicero *Epist. ad fam.* iii. 8. 4; xiii. 67; cf. Strabo xiii. 628-629). But in the reorganization of the empire, begun by Diocletian and completed by Constantine, the word "diocese" acquired a more important meaning, the empire being divided into twelve dioceses, of which the largest—Oriens—embraced sixteen provinces, and the smallest—Britain—four (see ROME: *Ancient History*; and W. T. Arnold, *Roman Provincial Administration*, pp. 187, 194-196, which gives a list of the dioceses and their subdivisions). The organization of the Christian church in the Roman empire following very closely the lines of the civil administration (see CHURCH HISTORY), the word diocese, in its ecclesiastical sense, was at first applied to the sphere of jurisdiction, not of a bishop, but of a metropolitan.[1] Thus Anastasius Bibliothecarius (d. c. 886), in his life of Pope Dionysius, says that he assigned churches to the presbyters, and established dioceses (*parochiae*) and provinces (*dioeceses*). The word, however, survived in its general sense of "office" or "administration," and it was even used during the middle ages for "parish" (see Du Cange, *Glossarium*, s. "Dioecesis" 2).

The practice, under the Roman empire, of making the areas of ecclesiastical administration very exactly coincide with those of the civil administration, was continued in the organization of the church beyond the borders of the empire, and many dioceses to this day preserve the limits of long vanished political divisions. The process is well illustrated in the case of English bishoprics. But this practice was based on convenience, not principle; and the limits of the dioceses, once fixed, did not usually change with the changing political boundaries. Thus Hincmar, archbishop of Reims, complains that not only his metropolitanate (*dioecesis*) but his bishopric (*parochia*) is divided between two realms under two kings; and this inconvenient overlapping of jurisdictions remained, in fact, very common in Europe until the readjustments of national boundaries by the

territorial settlements of the 19th century. In principle, however, the subdivision of a diocese, in the event of the work becoming too heavy for one bishop, was very early admitted, *e.g.* by the first council at Lugo in Spain (569), which erected Lugo into a metropolitanate, the consequent division of diocese being confirmed by the king of the second council, held in 572. Another reason for dividing a diocese, and establishing a new see, has been recognized by the church as duly existing "if the sovereign should think fit to endow some principal village or town with the rank and privileges of a city" (Bingham, lib. xvii. c. 5). But there are canons for the punishment of such as might induce the sovereign so to erect any town into a city, solely with the view of becoming bishop thereof. Nor could any diocese be divided without the consent of the primate.

In England an act of parliament is necessary for the creation of new dioceses. In the reign of Henry VIII. six new dioceses were thus created (under an act of 1539); but from that time onward until the 19th century they remained practically unchanged. The Ecclesiastical Commissioners Act 1836, which created two new dioceses (Ripon and Manchester), remodelled the state of the old dioceses by an entirely new adjustment of the revenues and patronage of each see, and also extended or curtailed the parishes and counties in the various jurisdictions.

By the ancient custom of the church the bishop takes his title, not from his diocese, but from his see, *i.e.* the place where his cathedral is established. Thus the old episcopal titles are all derived from cities. This tradition has been broken, however, by the modern practice of bishops in the United States and the British colonies, *e.g.* archbishop of the West Indies, bishop of Pennsylvania, Wyoming, &c. (see BISHOP).

See Hinschius, *Kirchenrecht*, ii. 38, &c.; Joseph Bingham, *Origines ecclesiasticae*, 9 vols. (1840); Du Cange, *Glossarium*, s. "Dioecesis"; *New English Dictionary* (Oxford, 1897), s. "Diocese."

1 For exceptions see Hinschius ii. p. 39, note 1.

DIO CHRYSOSTOM (c. A.D. 40-115), Greek sophist and rhetorician, was born at Piusa (mod. *Brusa*), a town at the foot of Mount Olympus in Bithynia. He was called Chrysostom ("golden-mouthed") from his eloquence, and also to distinguish him from his grandson, the historian Dio Cassius; his surname Cocceianus was derived from his patron, the emperor Cocceius Nerva. Although he did much to promote the welfare of his native place, he became so unpopular there that he migrated to Rome, but, having incurred the suspicion of Domitian, he was banished from Italy. With nothing in his pocket but Plato's *Phaedo* and Demosthenes' *De falsa legatione*, he wandered about in Thrace, Mysia, Scythia and the land of the Getae. He returned to Rome on the accession of Nerva, with whom and his successor Trajan he was on intimate terms. During this period he paid a visit to Prusa, but, disgusted at his reception, he went back to Rome. The place and date of his death are unknown; it is certain, however, that he was alive in 112, when the younger Pliny was governor of Bithynia.

Eighty orations, or rather essays on political, moral and philosophical subjects, have come down to us under his name; the *Corinthiaca*, however, is generally regarded as spurious, and is probably the work of Favorinus of Arelate. Of the extant orations the following are the most important:—*Borysthenitica* (xxxvi.), on the advantages of monarchy, addressed to the inhabitants of Olbia, and containing interesting information on the history of the Greek colonies on the shores of the Black Sea; *Olympica* (xii.), in which Pheidias is represented as setting forth the principles which he had

followed in his statue of Zeus, one passage being supposed by some to have suggested Lessing's *Laocoon*; *Rhodiaca* (xxxi.), an attack on the Rhodians for altering the names on their statues, and thus converting them into memorials of famous men of the day (an imitation of Demosthenes' *Leptines*); *De regno* (i.-iv.), addressed to Trajan, a eulogy of the monarchical form of government, under which the emperor is the representative of Zeus upon earth; *De Aeschylo et Sophocle et Euripide* (lii.), a comparison of the treatment of the story of Philoctetes by the three great Greek tragedians; and *Philoctetes* (lix.), a summary of the prologue to the lost play by Euripides. In his later life, Dio, who had originally attacked the philosophers, himself became a convert to Stoicism. To this period belong the essays on moral subjects, such as the denunciation of various cities (Tarsus, Alexandria) for their immorality. Most pleasing of all is the *Euboica* (vii.), a description of the simple life of the herdsmen and huntsmen of Euboea as contrasted with that of the inhabitants of the towns. *Troica* (xi.), an attempt to prove to the inhabitants of Ilium that Homer was a liar and that Troy was never taken, is a good example of a sophistical rhetorical exercise. Amongst his lost works were attacks on philosophers and Domitian, and *Getica* (wrongly attributed to Dio Cassius by Suïdas), an account of the manners and customs of the Getae, for which he had collected material on the spot during his banishment. The style of Dio, who took Plato and Xenophon especially as his models, is pure and refined, and on the whole free from rhetorical exaggeration. With Plutarch he played an important part in the revival of Greek literature at the end of the 1st century of the Christian era.

Editions: J. J. Reiske (Leipzig, 1784); A. Emperius (Brunswick, 1844); L. Dindorf (Leipzig, 1857), H. von Arnim (Berlin, 1893-1896). The ancient authorities for his life are Philostratus, *Vit. Soph.* i. 7; Photius, *Bibliotheca*, cod. 209; Suidas, *s.v.*; Synesius, Δίων. On Dio generally see H. von Arnim, *Leben und Werke des Dion von Prusa*

(Berlin, 1898); C. Martha, *Les Moralistes sous l'empire romain* (1865); W. Christ, *Geschichte der griechischen Litteratur* (1898), § 520; J. E. Sandys, *History of Classical Scholarship* (2nd ed., 1906); W. Schmid in Pauly-Wissowa's *Realencyclopädie*, v. pt. 1 (1905). The *Euboica* has been abridged by J. P. Mahaffy in *The Greek World under Roman Sway* (1890), and there is a translation of *Select Essays* by Gilbert Wakefield (1800).

DIOCLETIAN (Gaius Aurelius Valerius Diocletianus) (a.d. 245-313), Roman emperor 284-305, is said to have been born at Dioclea, near Salona, in Dalmatia. His original name was Diocles. Of humble origin, he served with high distinction and held important military commands under the emperors Probus and Aurelian, and accompanied Carus to the Persian War. After the death of Numerianus he was chosen emperor by the troops at Chalcedon, on the 17th of September 284, and slew with his own hands Arrius Aper, the praefect of the praetorians. He thus fulfilled the prediction of a druidess of Gaul, that he would mount a throne as soon as he had slain a wild boar (*aper*). Having been installed at Nicomedia, he received general acknowledgment after the murder of Carinus. In consequence of the rising of the Bagaudae in Gaul, and the threatening attitude of the German peoples on the Rhine, he appointed Maximian Augustus in 286; and, in view of further dangers and disturbances in the empire, proclaimed Constantius Chlorus and Galerius Caesars in 293. Each of the four rulers was placed at a separate capital—Nicomedia, Mediolanum (Milan), Augusta Trevirorum (Trier), Sirmium. This amounted to an entirely new organization of the

empire, on a plan commensurate with the work of government which it now had to carry on. At the age of fifty-nine, exhausted with labour, Diocletian abdicated his sovereignty on the 1st of May 305, and retired to Salona, where he died eight years afterwards (others give 316 as the year of his death). The end of his reign was memorable for the persecution of the Christians. In defence of this it may be urged that he hoped to strengthen the empire by reviving the old religion, and that the church as an independent state over whose inner life at least he possessed no influence, appeared to be a standing menace to his authority. Under Diocletian the senate became a political nonentity, the last traces of republican institutions disappeared, and were replaced by an absolute monarchy approaching to despotism. He wore the royal diadem, assumed the title of lord, and introduced a complicated system of ceremonial and etiquette, borrowed from the East, in order to surround the monarchy and its representative with mysterious sanctity. But at the same time he devoted his energies to the improvement of the administration of the empire; he reformed the standard of coinage, fixed the price of provisions and other necessaries of daily life, remitted the tax upon inheritances and manumissions, abolished various monopolies, repressed corruption and encouraged trade. In addition, he adorned the city with numerous buildings, such as the thermae, of which extensive remains are still standing (Aurelius Victor, *De Caesaribus*, 39; Eutropius ix. 13; Zonaras xii. 31).

See A. Vogel, *Der Kaiser Diocletian* (Gotha, 1857), a short sketch, with notes on the authorities; T. Preuss, *Kaiser Diocletian und seine Zeit* (Leipzig, 1869); V. Casagrandi, *Diocleziano* (Faenza, 1876); H. Schiller, *Gesch. der römischen Kaiserzeit*, ii. (1887); T. Bernhardt, *Geschichte Roms von Valerian bis zu Diocletians Tod* (1867); A. J. Mason, *The Persecution of Diocletian* (1876); P. Allard, *La Persécution de Dioclétien* (1890); V. Schultze in Herzog-Hauck's *Realencyklopädie für protestantische Theologie*, iv. (1898); Gibbon.

Decline and Fall, chaps. 13 and 16; A. W. Hunzinger, *Die Diocletianische Staatsreform* (1899); O. Seeck, "Die Schatzungsordnung Diocletians" in *Zeitschrift für Social- und Wirthschaftsgeschichte* (1896), a valuable paper with notes containing references to sources; and O. Seeck, *Geschichte des Untergangs der antiken Welt*, vol. i. cap. 1. On his military reforms see T. Mommsen in *Hermes*, xxiv., and on his tariff system, DIOCLETIAN, EDICT OF.

DIOCLETIAN, EDICT OF (*De pretiis rerum venalium*), an imperial edict promulgated in A.D. 301, fixing a maximum price for provisions and other articles of commerce, and a maximum rate of wages. Incomplete copies of it have been discovered at various times in various places, the first (in Greek and Latin) in 1709, at Stratonicea in Caria, by W. Sherard, British consul at Smyrna, containing the preamble and the beginning of the tables down to No. 403. This partial copy was completed by W. Bankes in 1817. A second fragment (now in the museum at Aix in Provence) was brought from Egypt in 1809; it supplements the preamble by specifying the titles of the emperors and Caesars and the number of times they had held them, whereby the date of publication can be accurately determined. For other fragments and their localities see *Corpus Inscriptionum Latinarum* (iii., 1873, pp. 801 and 1055; and supplement i, 1893, p. 1909); special mention may be made of those of Elatea, Plataea and Megalopolis. Latin being the official language all over the empire, there was no official Greek translation (except for Greece proper), as is shown by the variations in those portions of the text of which more than one Greek version is extant. Further, all the

fragments come from the provinces which were under the jurisdiction of Diocletian, from which it is argued that the edict was only published in the eastern portion of the empire; certainly the phrase *universo orbi* in the preamble is against this, but the words may merely be an exaggerated description of Diocletian's special provinces, and if it had been published in the western portion as well, it is curious that no traces have been found of it. The articles mentioned in the edict, which is chiefly interesting as giving their relative values at the time, include cereals, wine, oil, meat, vegetables, fruits, skins, leather, furs, foot-gear, timber, carpets, articles of dress, and the wages range from the ordinary labourer to the professional advocate. The unit of money was the denarius, not the silver, but a copper coin introduced by Diocletian, of which the value has been fixed approximately at 1/5th of a penny. The punishment for exceeding the prices fixed was death or deportation. The edict was a well-intended but abortive attempt, in great measure in the interests of the soldiers, to meet the distress caused by several bad harvests and commercial speculation. The actual effect was disastrous: the restrictions thus placed upon commercial freedom brought about a disturbance of the food supply in non-productive countries, many traders were ruined, and the edict soon fell into abeyance.

See Lactantius, *De mortibus persecutorum*, vii., a contemporary who, as a Christian, writes with natural bias against Diocletian; T. Mommsen, *Das Edict Diocletians* (1851); W. M. Leake, *An Edict of Diocletian* (1826); W. H. Waddington, *L'Édit de Dioclétien* (1864), and E. Lépaulle, *L'Édit de maximum* (1886), both containing introductions and ample notes; J. C. Rolfe and F. B. Tarbell in *Papers of the American School of Classical Studies at Athens*, v. (1892) (Plataea); W. Loring in *Journal of Hellenic Studies*, xi. (1890) (Megalopolis); P. Paris in *Bulletin de correspondance hellénique*, ix. (1885) (Elatea). There is an edition of the whole by Mommsen, with notes by H. Blümner (1893).

DIODATI, GIOVANNI (1576-1649), Swiss Protestant divine, was born at Geneva on the 6th of June 1576, of a noble family originally belonging to Lucca, which had been expatriated on account of its Protestantism. At the age of twenty-one he was nominated professor of Hebrew at Geneva on the recommendation of Theodor Beza. In 1606 he became professor of theology, in 1608 pastor, or parish minister, at Geneva, and in the following year he succeeded Beza as professor of theology. As a preacher he was eloquent, bold and fearless. He held a high place among the reformers of Geneva, by whom he was sent on a mission to France in 1614. He had previously visited Italy, and made the acquaintance of Paolo Sarpi, whom he endeavoured unsuccessfully to engage in a reformation movement. In 1618-1619 he attended the synod of Dort, and took a prominent part in its deliberations, being one of the six divines appointed to draw up the account of its proceedings. He was a thorough Calvinist, and entirely sympathized with the condemnation of the Arminians. In 1645 he resigned his professorship, and died at Geneva on the 3rd of October 1649. Diodati is chiefly famous as the author of the translation of the Bible into Italian (1603, edited with notes, 1607). He also undertook a translation of the Bible into French, which appeared with notes in 1644. Among his other works are his *Annotationes in Biblia* (1607), of which an English translation (*Pious and Learned Annotations upon the Holy Bible*) was published in London in 1648, and various polemical treatises, such as *De fictitio Pontificiorum Purgatorio* (1619); *De justa secessione Reformatorum ab Ecclesia Romana* (1628); *De Antichristo*, &c. He also published French translations of Sarpi's *History of the Council of Trent*, and of Edwin Sandys's *Account of the State of Religion in the West*.

DIODORUS CRONUS (4th century B.C.), Greek philosopher of the Megarian school. Practically nothing is known of his life. Diogenes Laërtius (ii. 111) tells a story that, while staying at the court of Ptolemy Soter, Diodorus was asked to solve a dialectical subtlety by Stilpo. Not being able to answer on the spur of the moment, he was nicknamed Κρόνος (the God, equivalent to "slowcoach") by Ptolemy. The story goes that he died of shame at his failure. Strabo, however, says (xiv. 658; xvii. 838) that he took the name from Apollonius, his master. Like the rest of the Megarian school he revelled in verbal quibbles, proving that motion and existence are impossible. His was the famous sophism known as the Κυριεύων. The impossible cannot result from the possible; a past event cannot become other than it is; but if an event, at a given moment, had been possible, from this possible would result something impossible; therefore the original event was impossible. This problem was taken up by Chrysippus, who admitted that he could not solve it. Apart from these verbal gymnastics, Diodorus did not differ from the Megarian school. From his great dialectical skill he earned the title ὁ διαλεκτικός, or διαλεκτικώτατος, a title which was borne by his five daughters, who inherited his ability.

See Cicero, *De Fato*, 6, 7, 9; Aristotle, *Metaphysica*, θ 3; Sext. Empiric., *adv. Math.* x. 85; Ritter and Preller, *Hist. philos. Gr. et Rom.* chap. v. §§ 234-236 (ed. 1869); and bibliography appended to article MEGARIAN SCHOOL.

DIODORUS SICULUS, Greek historian, born at Agyrium in Sicily, lived in the times of Julius Caesar and Augustus. From his own statements we learn that he travelled in Egypt between 60-57 B.C. and that he spent several years in Rome. The latest event mentioned by him belongs to the year 21 B.C. He asserts that he devoted thirty years to the composition of his history, and that he undertook frequent and dangerous journeys in prosecution of his historical researches. These assertions, however, find little credit with recent critics. The history, to which Diodorus gave the name βιβλιοθήκη ἱστορική (*Bibliotheca historica*, "Historical Library"), consisted of forty books, and was divided into three parts. The first treats of the mythic history of the non-Hellenic, and afterwards of the Hellenic tribes, to the destruction of Troy; the second section ends with Alexander's death; and the third continues the history as far as the beginning of Caesar's Gallic War. Of this extensive work there are still extant only the first five books, treating of the mythic history of the Egyptians, Assyrians, Ethiopians and Greeks; and also the 11th to the 20th books inclusive, beginning with the second Persian War, and ending with the history of the successors of Alexander, previous to the partition of the Macedonian empire (302). The rest exists only in fragments preserved in Photius and the excerpts of Constantine Porphyrogenitus. The faults of Diodorus arise partly from the nature of the undertaking, and the awkward form of annals into which he has thrown the historical portion of his narrative. He shows none of the critical faculties of the historian, merely setting down a number of unconnected details. His narrative contains frequent repetitions and contradictions, is without colouring, and monotonous; and his simple diction, which stands intermediate between pure Attic and the colloquial Greek of his time, enables us to detect in the narrative the undigested fragments of the materials which he employed. In spite of its defects, however, the *Bibliotheca* is of considerable value as to some extent supplying the loss of the works of older authors, from which it is compiled.

Unfortunately, Diodorus does not always quote his authorities, but his general sources of information were—in history and chronology, Castor, Ephorus and Apollodorus; in geography, Agatharchides and Artemidorus. In special sections he followed special authorities—*e.g.* in the history of his native Sicily, Philistus and Timaeus.

Editio princeps, by H. Stephanus (1559); of other editions the best are: P. Wesseling (1746), not yet superseded; L. Dindorf (1828-1831); (text) L. Dindorf (1866-1868, revised by F. Vogel, 1888-1893 and C. T. Fischer, 1905-1906). The standard works on the sources of Diodorus are C. G. Heyne, *De fontibus et auctoribus historiarum Diodori*, printed in Dindorf's edition, and C. A. Volquardsen, *Die Quellen der griechischen und sicilischen Geschichten bei Diodor* (1868); A. von Mess, *Rheinisches Museum* (1906); see also L. O. Bröcker, *Untersuchungen über Diodor* (1879), short, but containing much information; O. Maass, *Kleitarch und Diodor* (1894-); G. J. Schneider, *De Diodori fontibus*, i.-iv. (1880); C. Wachsmuth, *Einleitung in das Studium der alten Geschichte* (1895); Greece; *Ancient History*, "Authorities."

DIODOTUS, Seleucid satrap of Bactria, who rebelled against Antiochus II. (about 255) and became the founder of the Graeco-Bactrian kingdom (Trogus, *Prol.* 41; Justin xli. 4, 5, where he is wrongly called Theodotus; Strabo xi. 515). His power seems to have extended over the neighbouring provinces. Arsaces, the chieftain of the nomadic (Dahan) tribe of the Parni, fled before him into Parthia and here became the founder of the Parthian

kingdom (Strabo l.c.). When Seleucus II. in 239 attempted to subjugate the rebels in the east he seems to have united with him against the Parthians (Justin xli. 4, 9). Soon afterwards he died and was succeeded by his son Diodotus II., who concluded a peace with the Parthians (Justin l.c.). Diodotus II. was killed by another usurper, Euthydemus (Polyb. xi. 34, 2). Of Diodotus I. we possess gold and silver coins, which imitate the coins of Antiochus II.; on these he sometimes calls himself Soter, "the saviour." As the power of the Seleucids was weak and continually attacked by Ptolemy II., the eastern provinces and their Greek cities were exposed to the invasion of the nomadic barbarians and threatened with destruction (Polyb. xi. 34, 5); thus the erection of an independent kingdom may have been a necessity and indeed an advantage to the Greeks, and this epithet well deserved. Diodotus Soter appears also on coins struck in his memory by the later Graeco-Bactrian kings Agathocles and Antimachus. Cf. A. v. Sallet, *Die Nachfolger Alexanders d. Gr. in Baktrien und Indien*; Percy Gardner, *Catal. of the Coins of the Greek and Scythian Kings of Bactria and India* (Brit. Mus.); see also BACTRIA.

(ED. M.)

DIOGENES, "the Cynic," Greek philosopher, was born at Sinope about 412 B.C., and died in 323 at Corinth, according to Diogenes Laërtius, on the day on which Alexander the Great died at Babylon. His father, Icesias, a money-changer, was imprisoned or exiled on the charge of adulterating the coinage. Diogenes was included in the charge, and went to Athens with one attendant, whom he dismissed, saying, "If Manes can live without Diogenes, why not Diogenes without Manes?" Attracted by the ascetic

teaching of Antisthenes, he became his pupil, despite the brutality with which he was received, and rapidly excelled his master both in reputation and in the austerity of his life. The stories which are told of him are probably true; in any case, they serve to illustrate the logical consistency of his character. He inured himself to the vicissitudes of weather by living in a tub belonging to the temple of Cybele. The single wooden bowl he possessed he destroyed on seeing a peasant boy drink from the hollow of his hands. On a voyage to Aegina he was captured by pirates and sold as a slave in Crete to a Corinthian named Xeniades. Being asked his trade, he replied that he knew no trade but that of governing men, and that he wished to be sold to a man who needed a master. As tutor to the two sons of Xeniades, he lived in Corinth for the rest of his life, which he devoted entirely to preaching the doctrines of virtuous self-control. At the Isthmian games he lectured to large audiences who turned to him from Antisthenes. It was, probably, at one of these festivals that he craved from Alexander the single boon that he would not stand between him and the sun, to which Alexander replied "If I were not Alexander, I would be Diogenes." On his death, about which there exist several accounts, the Corinthians erected to his memory a pillar on which there rested a dog of Parian marble. His ethical teaching will be found in the article CYNICS (*q.v.*). It may suffice to say here that virtue, for him, consisted in the avoidance of all physical pleasure; that pain and hunger were positively helpful in the pursuit of goodness; that all the artificial growths of society appeared to him incompatible with truth and goodness; that moralization implies a return to nature and simplicity. He has been credited with going to extremes of impropriety in pursuance of these ideas; probably, however, his reputation has suffered from the undoubted immorality of some of his successors. Both in ancient and in modern times, his personality has appealed strongly to sculptors and to painters. Ancient busts exist in the museums of the Vatican, the Louvre and the Capitol. The interview between Diogenes and Alexander

is represented in an ancient marble bas-relief found in the Villa Albani. Rubens, Jordaens, Steen, Van der Werff, Jeaurat, Salvator Rosa and Karel Dujardin have painted various episodes in his life.

The chief ancient authority for his life is Diogenes Laërtius vi. 20; see also Mayor's notes on Juvenal, *Satires*, xiv. 305-314; and article CYNICS.

DIOGENES APOLLONIATES (c. 460 B.C.), Greek natural philosopher, was a native of Apollonia in Crete. Although of Dorian stock, he wrote in the Ionic dialect, like all the *physiologi* (physical philosophers). There seems no doubt that he lived some time at Athens, where it is said that he became so unpopular (probably owing to his supposed atheistical opinions) that his life was in danger. The views of Diogenes are transferred in the *Clouds* (264 ff.) of Aristophanes to Socrates. Like Anaximenes, he believed air to be the one source of all being, and all other substances to be derived from it by condensation and rarefaction. His chief advance upon the doctrines of Anaximenes is that he asserted air, the primal force, to be possessed of intelligence—"the air which stirred within him not only prompted, but instructed. The air as the origin of all things is necessarily an eternal, imperishable substance, but as soul it is also necessarily endowed with consciousness." In fact, he belonged to the old Ionian school, whose doctrines he modified by the theories of his contemporary Anaxagoras, although he avoided his dualism. His most important work was Περὶ φύσεως (*De natura*), of which considerable fragments are extant (chiefly in Simplicius); it is possible that he wrote also Against the Sophists and *On*

the Nature of Man, to which the well-known fragment about the veins would belong; possibly these discussions were subdivisions of his great work.

Fragments in F. Mullach, *Fragmenta philosophorum Graecorum*, i. (1860); F. Panzerbieter, *Diogenes Apolloniates* (1830), with philosophical dissertation; J. Burnet, *Early Greek Philosophy* (1892); H. Ritter and L. Preller, *Historia philosophiae* (4th ed., 1869), §§ 59-68; E. Krause, *Diogenes von Apollonia* (1909). See IONIAN SCHOOL.

DIOGENES LAËRTIUS (or LAËRTIUS DIOGENES), the biographer of the Greek philosophers, is supposed by some to have received his surname from the town of Laërte in Cilicia, and by others from the Roman family of the Laërtii. Of the circumstances of his life we know nothing. He must have lived after Sextus Empiricus (c. A.D. 200), whom he mentions, and before Stephanus of Byzantium (c. A.D. 500), who quotes him. It is probable that he flourished during the reign of Alexander Severus (A.D. 222-235) and his successors. His own opinions are equally uncertain. By some he was regarded as a Christian; but it seems more probable that he was an Epicurean. The work by which he is known professes to give an account of the lives and sayings of the Greek philosophers. Although it is at best an uncritical and unphilosophical compilation, its value, as giving us an insight into the private life of the Greek sages, justly led Montaigne to exclaim that he wished that instead of one Laërtius there had been a dozen. He treats his subject in two divisions which he describes as the Ionian and the Italian schools; the division is quite unscientific. The biographies of the former

begin with Anaximander, and end with Clitomachus, Theophrastus and Chrysippus; the latter begins with Pythagoras, and ends with Epicurus. The Socratic school, with its various branches, is classed with the Ionic; while the Eleatics and sceptics are treated under the Italic. The whole of the last book is devoted to Epicurus, and contains three most interesting letters addressed to Herodotus, Pythocles and Menoeceus. His chief authorities were Diocles of Magnesia's *Cursory Notice* (Ἐπιδρομή) *of Philosophers* and Favorinus's *Miscellaneous History* and *Memoirs*. From the statements of Burlaeus (Walter Burley, a 14th-century monk) in his *De vita et moribus philosophorum* the text of Diogenes seems to have been much fuller than that which we now possess. In addition to the *Lives*, Diogenes was the author of a work in verse on famous men, in various metres.

BIBLIOGRAPHY.—*Editio princeps* (1533); H. Hübner and C. Jacobitz with commentary (1828-1833); C. G. Cobet (1850), text only. See F. Nietzsche, "De Diogenis Laërtii fontibus" in *Rheinisches Museum*, xxiii., xxiv. (1868-1869); J. Freudenthal, "Zu Quellenkunde Diog. Laërt.," in *Hellenistische Studien*, iii. (1879); O. Maass, *De biographis Graecis* (1880); V. Egger, *De fontibus Diog. Laërt.* (1881). There is an English translation by C. D. Yonge in Bohn's Classical Library.

DIOGENIANUS, of Heraclea on the Pontus (or in Caria), Greek grammarian, flourished during the reign of Hadrian. He was the author of an alphabetical lexicon, chiefly of poetical words, abridged from the great lexicon (Περὶ γλωσσῶν) of Pamphilus of Alexandria (fl. A.D. 50) and other similar works. It was also known by the title Περιεργοπένητες (for

the use of “industrious poor students”). It formed the basis of the lexicon, or rather glossary, of Hesychius of Alexandria, which is described in the preface as a new edition of the work of Diogenianus. We still possess a collection of proverbs under his name, probably an abridgment of the collection made by himself from his lexicon (ed. by E. Leutsch and F. W. Schneidewin in *Paroemiographi Graeci*, i. 1839). Diogenianus was also the author of an Anthology of epigrams, of treatises on rivers, lakes, fountains and promontories; and of a list (with map) of all the towns in the world.

DIOGNETUS, EPISTLE TO, one of the early Christian apologies. Diognetus, of whom nothing is really known, has expressed a desire to know what Christianity really means—“What is this new race” of men who are neither pagans nor Jews? “What is this new interest which has entered into men’s lives now and not before?” The anonymous answer begins with a refutation of the folly of worshipping idols, fashioned by human hands and needing to be guarded if of precious material. The repulsive smell of animal sacrifices is enough to show their monstrous absurdity. Next Judaism is attacked. Jews abstain from idolatry and worship one God, but they fall into the same error of repulsive sacrifice, and have absurd superstitions about meats and sabbaths, circumcision and new moons. So far the task is easy; but the mystery of the Christian religion “think not to learn from man.” A passage of great eloquence follows, showing that Christians have no obvious peculiarities that mark them off as a separate race. In spite of blameless lives they are hated. Their home is in heaven, while they live on earth. “In a word, what the soul is in a body, this the Christians are in the

world.... The soul is enclosed in the body, and yet itself holdeth the body together: so Christians are kept in the world as in a prison-house, and yet they themselves hold the world together." This strange life is inspired in them by the almighty and invisible God, who sent no angel or subordinate messenger to teach them, but His own Son by whom He created the universe. No man could have known God, had He not thus declared Himself. "If thou too wouldst have this faith, learn first the knowledge of the Father. For God loved men, for whose sake He made the world.... Knowing Him, thou wilt love Him and imitate His goodness; and marvel not if a man can imitate God; he can, if God will." By kindness to the needy, by giving them what God has given to him, a man can become "a god of them that receive, an imitator of God." "Then shalt thou on earth behold God's life in heaven; then shalt thou begin to speak the mysteries of God." A few lines after this the letter suddenly breaks off.

Even this rapid summary may show that the writer was a man of no ordinary power, and there is no other early Christian writing outside the New Testament which appeals so strongly to modern readers. The letter has been often classed with the writings of the Apostolic Fathers, and in some ways it seems to mark the transition from the sub-apostolic age to that of the Apologists. Bishop Lightfoot, who speaks of the letter as "one of the noblest and most impressive of early Christian apologies," places it c. A.D. 150, and inclines to identify Diognetus with the tutor of Marcus Aurelius. Harnack and others would place it later, perhaps in the 3rd century. There are some striking parallels in method and language to the Apology of Aristides (*q.v.*), and also to the early "Preaching of Peter."

The one manuscript which contained this letter perished by fire at Strassburg in 1870, but happily it had been accurately collated by Reuss nine years before. It formed part of a collection of works supposed to be by Justin Martyr, and to this mistaken attribution its preservation is no doubt

due. Both thought and language mark the author off entirely from Justin. The end of the letter is lost, but there followed in the codex the end of a homily,[1] which was attached without a break to the epistle: this points to the loss in some earlier codex of pages containing the end of the letter and the beginning of the homily.

The Epistle may be read in J. B. Lightfoot's *Apostolic Fathers* (ed. min.), where there is also a translation into English.

(J. A. R.)

1 Chapters xi. and xii., which Lightfoot suggested might be the work of Pantaenus.

DIOMEDES, in Greek legend, son of Tydeus, one of the bravest of the heroes of the Trojan War. In the *Iliad* he is the favourite of Athena, by whose aid he not only overcomes all mortals who venture to oppose him, but is even enabled to attack the gods. In the post-Homeric story, he made his way with Odysseus by an underground passage into the citadel of Troy and carried off the Palladium, the presence of which within the walls secured Troy against capture (Virgil, *Aeneid*, ii. 164). On his return to Argos, finding that his wife had been unfaithful, he removed to Aetolia, and thence to Daunia (Apulia), where he married the daughter of King Daunus. He was buried or mysteriously disappeared on one of the islands in the Adriatic called after him Diomedeae, his sorrowing companions being changed into birds by the gods out of compassion (Ovid, *Metam.* xiv. 457 ff.). He was the reputed founder of Argyrippa (Arpi) and other Italian cities (*Aeneid*, xi. 243 ff.). He was worshipped as a hero not only in Greece, but

on the coast of the Adriatic, as at Thurii and Metapontum. At Argos, his native place, during the festival of Athena, his shield was carried through the streets as a relic, together with the Palladium, and his statue was washed in the river Inachus.

DIOMEDES, Latin grammarian, flourished at the end of the 4th century A.D. He was the author of an extant *Ars grammatica* in three books, dedicated to a certain Athanasius. The third book is the most important, as containing extracts from Suetonius's *De poëtis*. Diomedes wrote about the same time as Charisius (*q.v.*) and used the same sources independently. The works of both grammarians are valuable, but whereas much of Charisius has been lost, the Ars of Diomedes has come down to us complete. In book i. he treats of the eight parts of speech; in ii. of the elementary ideas of grammar and of style; in iii. of quantity and metres.

The best edition is in H. Keil's *Grammatici Latini*, i.; see also C. von Paucker, *Kleinere Studien*, i. (1883), on the Latinity of Diomedes.

DION, tyrant of Syracuse (408-353 B.C.), the son of Hipparinus, and brother-in-law of Dionysius the Elder. In his youth he was an admirer and pupil of Plato, whom Dionysius had invited to Syracuse; and he used every

effort to inculcate the maxims of his master in the mind of the tyrant. The stern morality of Dion was distasteful to the younger Dionysius, and the historian Philistus, a faithful supporter of despotic power, succeeded in procuring his banishment on account of alleged intrigues with the Carthaginians. The exiled philosopher retired to Athens, where he was at first permitted to enjoy his revenues in peace; but the intercession of Plato (who had again visited Syracuse to procure Dion's recall) only served to exasperate the tyrant, and at length provoked him to confiscate the property of Dion, and give his wife to another. This last outrage roused Dion. Assembling a small force at Zacynthus, he sailed to Sicily (357) and was received with demonstrations of joy. Dionysius, who was in Italy, returned to Sicily, but was defeated and obliged to flee. Dion himself was soon after supplanted by the intrigues of Heracleides, and again banished. The incompetency of the new leader and the cruelties of Apollocrates, the son of Dionysius, soon led to his recall. He had, however, scarcely made himself master of Sicily when the people began to express their discontent with his tyrannical conduct, and he was assassinated by Callippus, an Athenian who had accompanied him in his expedition.

See *Lives* by Plutarch and Cornelius Nepos (cf. Diod. Sic. xvi. 6-20) and in modern times by T. Lau (1860); see also SYRACUSE and SICILY : *History*.

DIONE, in the earliest Greek mythology, the wife of Zeus. As such she is associated with Zeus Naïus (the god of fertilizing moisture) at Dodona (Strabo vii. p. 329), by whose side she sits, adorned with a bridal veil and

garland and holding a sceptre. As the oracle declined in importance, her place as the wife of Zeus was taken by Hera. It is probable that in very early times the cult of Dione existed in Athens, where she had an altar before the Erechtheum. After her admission to the general religious system of the Greeks, Dione was variously described. In the *Iliad* (v. 370) she is the mother by Zeus of Aphrodite, who is herself in later times called Dione (the epithet Dionaeus was given to Julius Caesar as claiming descent from Venus). In Hesiod (*Theog.* 353) she is one of the daughters of Oceanus; in Pherecydes (ap. schol. *Iliad*, xviii. 486), one of the nymphs of Dodona, the nurses of Dionysus; in Euripides (frag. 177), the mother of Dionysus; in Hyginus (fab. 9. 82), the daughter of Atlas, wife of Tantalus and mother of Pelops and Niobe. Others make her a Titanid, the daughter of Uranus and Gaea (Apollodorus i. 1). Speaking generally, Dione may be regarded as the female embodiment of the attributes of Zeus, to whose name her own is related as Juno (= Jovino) to Jupiter.

DIONYSIA, festivals in honour of the god Dionysus generally, but in particular the festivals celebrated in Attica and by the branches of the Attic-Ionic race in the islands and in Asia Minor. In Attica there were two festivals annually. (1) The lesser Dionysia, or τὰ κατ᾽ ἀγρούς, was held in the country places for four days (about the 19th to the 22nd of December) at the first tasting of the new wine. It was accompanied by songs, dance, phallic processions and the impromptu performances of itinerant players, who with others from the city thronged to take part in the excitement of the rustic sports. A favourite amusement was the Ascoliasmus, or dancing on

one leg upon a leathern bag (ἀσκός), which had been smeared with oil. (2) The *greater* Dionysia, or τὰ ἐν ἄστει, was held in the city of Athens for six days (about the 28th of March to the 2nd of April). This was a festival of joy at the departure of winter and the promise of summer, Dionysus being regarded as having delivered the people from the wants and troubles of winter. The religious act of the festival was the conveying of the ancient image of the god, which had been brought from Eleutherae to Athens, from the ancient sanctuary of the Lenaeum to a small temple near the Acropolis and back again, with a chorus of boys and a procession carrying masks and singing the dithyrambus. The festival culminated in the production of tragedies, comedies and satyric dramas in the great theatre of Dionysus. Other festivals in honour of Dionysus were the Anthesteria (*q.v.*); the Lenaea (about the 28th to the 31st of January), or festival of vats, at which, after a great public banquet, the citizens went through the city in procession to attend the dramatic representations; the Oschophoria (October-November), a vintage festival, so called from the branches of vine with grapes carried by twenty youths from the ephebi, two from each tribe, in a race from the temple of Dionysus in Athens to the temple of Athena Sciras in Phalerum.

See A. Mommsen, *Feste der Stadt Athen* (1898); L. Preller, *Griechische Mythologie*; L. C. Purser in Smith's *Dictionary of Antiquities* (3rd ed., 1890); article DIONYSOS in W. H. Roscher's *Lexikon der Mythologie*; and the exhaustive account with bibliography by J. Girard in Daremberg and Saglio's *Dictionnaire des antiquités*.

DIONYSIUS, pope from 259 to 268. To Dionysius, who was elected pope in 259 after the persecution of Valerian, fell the task of reorganizing the Roman church, which had fallen into great disorder. At the protest of some of the faithful at Alexandria, he demanded from the bishop of Alexandria, also called Dionysius, explanations touching his doctrine. He died on the 26th of December 268.

DIONYSIUS (c. 432-367 B.C.), tyrant of Syracuse, began life as a clerk in a public office, but by courage and diplomacy succeeded in making himself supreme (see SYRACUSE). He carried on war with Carthage with varying success; his attempts to drive the Carthaginians entirely out of the island failed, and at his death they were masters of at least a third of it. He also carried on an expedition against Rhegium and its allied cities in Magna Graecia. In one campaign, in which he was joined by the Lucanians, he devastated the territories of Thurii, Croton and Locri. After a protracted siege he took Rhegium (386), and sold the inhabitants as slaves. He joined the Illyrians in an attempt to plunder the temple of Delphi, pillaged the temple of Caere on the Etruscan coast, and founded several military colonies on the Adriatic. In the Peloponnesian War he espoused the side of the Spartans, and assisted them with mercenaries. He also posed as an author and patron of literature; his poems, severely criticized by Philoxenus, were hissed at the Olympic games; but having gained a prize for a tragedy on the *Ransom of Hector* at the Lenaea at Athens, he was so elated that he engaged in a debauch which proved fatal. According to others, he was poisoned by his physicians at the instigation of his son. His

life was written by Philistus, but the work is not extant. Dionysius was regarded by the ancients as a type of the worst kind of despot—cruel, suspicious and vindictive. Like Peisistratus, he was fond of having distinguished literary men about him, such as the historian Philistus, the poet Philoxenus, and the philosopher Plato, but treated them in a most arbitrary manner.

See Diod. Sic. xiii., xiv., xv.; J. Bass, *Dionysius I. von Syrakus* (Vienna, 1881), with full references to authorities in footnotes; articles SICILY and SYRACUSE.

His son DIONYSIUS, known as "the Younger," succeeded in 367 B.C. He was driven from the kingdom by Dion (356) and fled to Locri; but during the commotions which followed Dion's assassination, he managed to make himself master of Syracuse. On the arrival of Timoleon he was compelled to surrender and retire to Corinth (343), where he spent the rest of his days in poverty (Diodorus Siculus xvi.; Plutarch, *Timoleon*).

See SYRACUSE and TIMOLEON; and, on both the Dionysii, articles by B. Niese in Pauly-Wissowa's *Realencyclopädie*, v. pt. 1 (1905).

DIONYSIUS AREOPAGITICUS (or "the Areopagite"), named in Acts xvii. 34 as one of those Athenians who believed when they had heard Paul preach on Mars Hill. Beyond this mention our only knowledge of him is the statement of Dionysius, bishop of Corinth (fl. A.D. 171), recorded by Eusebius (*Church Hist.* iii. 4; iv. 23), that this same Dionysius the Areopagite was the first "bishop" of Athens. Some hundreds of years after

the Areopagite's death, his name was attached by the Pseudo-Areopagite to certain theological writings composed by the latter. These were destined to exert enormous influence upon medieval thought, and their fame led to the extension of the personal legend of the real Dionysius. Hilduin, abbot of St Denys (814-840), identified him with St Denys, martyr and patron-saint of France. In Hilduin's *Areopagitica*, the Life and Passion of the most holy Dionysius (Migne, *Patrol. Lat.* tome 106), the Areopagite is sent to France by Clement of Rome, and suffers martyrdom upon the hill where the monastery called St Denys was to rise in his honour. There is no earlier trace of this identification, and Gregory of Tours (d. 594) says (*Hist. Francorum*, i. 18) that St Denys came to France in the reign of Decius (A.D. 250), which falls about midway between the presumptive death of the real Areopagite and the probable date of the writings to which he owed his adventitious fame.

Traces of the influence of these writings appear in the works of Eastern theologians in the early part of the 6th century. They also were cited at the council held in Constantinople in 533, which is the first certain dated reference to them. In the West, Gregory the Great (d. 604) refers to them in his thirty-fourth sermon on the gospels (Migne, *Pat. Lat.* tome 76, col. 1254). They did not, however, become generally known in the Western church till after the year 827, when the Byzantine emperor Michael the Stammerer sent a copy to Louis the Pious. It was given over to the care of the above-mentioned abbot Hilduin. In the next generation the scholar and philosopher Joannes Scotus Erigena (*q.v.*) translated the Dionysian writings into Latin. This appears to have been the only Latin translation until the 12th century when another was made, followed by several others.

Thus, the author, date and place of composition of these writings are unknown. External evidence precludes a date later than the year 500, and the internal evidence from the writings themselves precludes any date prior

to 4th-century phases of Neo-platonism. The extant writings of the Pseudo-Areopagite are: (a) Περὶ τῆς οὐρανίας ἱεραρχίας, *Concerning the Celestial Hierarchy*, in fifteen chapters. (b) Περὶ τῆς ἐκκλησιαστικῆς ἱεραρχίας , *Concerning the Ecclesiastical Hierarchy*, in seven chapters. (c) Περὶ θείων ὀνομάτων, *Concerning Divine Names*, in thirteen chapters. (d) Περὶ μυστικῆς θεολογίας, *Concerning Mystic Theology*, in five chapters. (e) Ten letters addressed to various worthies of the apostolic period.

Although these writings seem complete, they contain references to others of the same author. But of the latter nothing is known, and they may never have existed.

The writings of the Pseudo-Areopagite are of great interest, first as a striking presentation of the heterogeneous elements that might unite in the mind of a gifted man in the 5th century, and secondly, because of their enormous influence upon subsequent Christian theology and art. Their ingredients—Christian, Greek, Oriental and Jewish—are not crudely mingled, but are united into an organic system. Perhaps theological philosophic fantasy has never constructed anything more remarkable. The system of Dionysius was a proper product of its time,—lofty, apparently complete, comparable to the *Enneads* of Plotinus which formed part of its materials. But its materials abounded everywhere, and offered themselves temptingly to the hand strong enough to build with them. There was what had entered into Neo-platonism, both in its dialectic form as established by Plotinus, and in its magic-mystic modes devised by Iamblichus (d. c. 333). There was Jewish angel lore and Eastern mood and fancy; and there was Christianity so variously understood and heterogeneously constituted among Syro-Judaic Hellenic communities. Such Christianity held materials for formula and creed; also principles of liturgic and sacramental doctrine and priestly function; also a mass of popular beliefs as to intermediate

superhuman beings who seemed nearer to men than any member of the Trinity.

Out of this vast spiritual conglomerate, Pseudo-Dionysius formed his system. It was not juristic,—not Roman, Pauline or Augustinian. Rather he borrowed his constructive principles from Hellenism in its last great creation, Neo-platonism. That had been able to gather and arrange within itself the various elements of latter-day paganism. The Neo-platonic categories might be altered in name and import, and yet the scheme remain a scheme; since the general principle of the transmission of life from the ultimate Source downward through orders of mediating beings unto men, might readily be adapted to the Christian God and his ministering angels. Pseudo-Dionysius had lofty thoughts of the sublime transcendence of the ultimate divine Source. That source was not remote or inert; but a veritable Source from which life streamed to all lower orders of existence,—in part directly, and in part indirectly as power and guidance through the higher orders to the lower. Life, creation, every good gift, is from God directly; but his flaming ministers also intervene to guide and aid the life of man; and the life which through love floods forth from God has its counterflow whereby it draws its own creations to itself. God is at once absolutely transcendent and universally immanent. To live is to be united with God; evil is the nonexistent, that is, severance from God. Whatever is, is part of the forth-flowing divine life which ever purifies, enlightens and perfects, and so draws all back to the Source.

The transcendent Source, as well as the universal immanence, is the Triune God. Between that and men are ranged the three triads of the Celestial Hierarchy: Seraphim, Cherubim and Thrones; Dominations, Virtues, Powers; Principalities, Archangels, Angels. Collectively their general office is to raise mankind to God through purification, illumination and perfection; and to all may be applied the term angel. The highest triad,

which is nearest God, contemplates the divine effulgence, and reflects it onward to the second; the third, and more specifically angelic triad, immediately ministers to men. The sources of these names are evident: seraphim and cherubim are from the Old Testament; later Jewish writings gave names to archangels and angels, who also fill important functions in the New Testament. The other names are from Paul (Eph. i. 21; Col. i. 16).

Such is the system of Pseudo-Dionysius, as presented mainly in *The Celestial Hierarchy*. That work is followed by *The Ecclesiastical Hierarchy*, its counterpart on earth. What the primal triune Godhead is to the former, Jesus is to the latter. The Ecclesiastical Hierarchy likewise is composed of Triads. The first includes the symbolic sacraments: Baptism, Communion, Consecration of the Holy Chrism. Baptism signifies purification; Communion signifies enlightening; the Holy Chrism signifies perfecting. The second triad is made up of the three orders of Bishops, Presbyters and Deacons, or rather, as the Areopagite names them: Hierarchs, Light-bearers, Servitors. The third triad consists of monks, who are in a state of perfection, the initiated laity, who are in a state of illumination, and the catechumens, in a state of purification. All worship, in this treatise, is a celebration of mysteries, and the pagan mysteries are continually suggested by the terms employed.

The work *Concerning the Divine Names* is a noble discussion of the qualities which may be predicated of God, according to the warrant of the terms applied to him in Scripture. The work *Concerning Mystic Theology* explains the function of symbols, and shows that he who would know God truly must rise above them and above the conceptions of God drawn from sensible things.

The works of Pseudo-Dionysius began to influence theological thought in the West from the time of their translation into Latin by Erigena. Their use may be followed through the writings of scholastic philosophers, *e.g.* Peter

Lombard, Albertus Magnus, Thomas Aquinas and many others. In poetry we find their influence in Dante, Spenser, Milton. The fifteenth chapter of *The Celestial Hierarchy* constituted the canon of symbolical angelic lore for the literature and art of the middle ages. Therein the author explains in what respect theology ascribes to angels the qualities of fire, why the thrones are said to be *fiery* (πυρίνους); why the seraphim are *burning* (ἐμπρηστάς) as their name indicates. The fiery form signifies, with Celestial Intelligences, likeness to God. Dionysius explains the significance of the parts of the human body when given to celestial beings: feet are ascribed to angels to denote their unceasing movement on the divine business, and their feet are winged to denote their celerity. He likewise explains the symbolism of wands and axes, of brass and precious stones, when joined to celestial beings; and what wheels and a chariot denote when furnished to them,—and much more besides.

BIBLIOGRAPHY.—There is an enormous literature on Pseudo-Dionysius. The reader may be first referred to the articles in Smith's *Dictionary of Christian Biography* and Hauck's *Realencyklopadie fur protestantische Theologie* (Leipzig, 1898). The bibliography in the latter is very full. Some other references, especially upon the later influence of these works, are given in H. O. Taylor's *Classical Heritage of the Middle Ages* (Macmillan, 1903). The works themselves are in Migne's *Patrologia Graeca*, tomes 3 and 4, with a Latin version. Erigena's version is in Migne, *Patrol. Lat.* t. 122. *Vita Dionysii* by Hilduin is in Migne, *Pat. Lat.* 106. There is an English version by Parker (London, 1894 and 1897).

(H. O. T.)

DIONYSIUS EXIGUUS, one of the most learned men of the 6th century, and especially distinguished as a chronologist, was, according to the statement of his friend Cassiodorus, a Scythian by birth, "*Scytha natione*." This may mean only that he was a native of the region bordering on the Black Sea, and does not necessarily imply that he was not of Greek origin. Such origin is indicated by his name and by his thorough familiarity with the Greek language. His surname "Exiguus" is usually translated "the Little," but he probably assumed it out of humility. He was living at Rome in the first half of the 6th century, and is usually spoken of as abbot of a Roman monastery. Cassiodorus, however, calls him simply "monk," while Bede calls him "abbot." But as it was not unusual to apply the latter term to distinguished monks who were not heads of their houses, it is uncertain whether Dionysius was abbot in fact or only by courtesy. He was in high repute as a learned theologian, was profoundly versed in the Holy Scriptures and in canon law, and was also an accomplished mathematician and astronomer. We owe to him a collection of 401 ecclesiastical canons, including the apostolical canons and the decrees of the councils of Nicaea, Constantinople, Chalcedon and Sardis, and also a collection of the decretals of the popes from Siricius (385) to Anastasius II. (498). These collections, which had great authority in the West (see CANON LAW), were published by Justel in 1628. Dionysius did good service to his contemporaries by his translations of many Greek works into Latin; and by these translations some works, the originals of which have perished, have been handed down to us. His name, however, is now perhaps chiefly remembered for his chronological labours. It was Dionysius who introduced the method of reckoning the Christian era which we now use (see CHRONOLOGY). His friend Cassiodorus depicts in glowing terms the character of Dionysius as a saintly ascetic, and praises his wisdom and simplicity, his accomplishments and his lowly-mindedness, his power of eloquent speech and his capacity of silence. He died at Rome, some time before A.D. 550.

His works have been published in Migne, *Patrologia Latina*, tome 67; see especially A. Tardif, *Histoire des sources du droit canonique* (Paris, 1887), and D. Pitra, *Analecta novissima, Spicilegii Solesmensis continuatio*, vol. i. p. 36 (Paris, 1885).

DIONYSIUS HALICARNASSENSIS ("of Halicarnassus"), Greek historian and teacher of rhetoric, flourished during the reign of Augustus. He went to Rome after the termination of the civil wars, and spent twenty-two years in studying the Latin language and literature and preparing materials for his history. During this period he gave lessons in rhetoric, and enjoyed the society of many distinguished men. The date of his death is unknown. His great work, entitled Ῥωμαϊκὴ ἀρχαιολογία (Roman Antiquities), embraced the history of Rome from the mythical period to the beginning of the first Punic War. It was divided into twenty books,—of which the first nine remain entire, the tenth and eleventh are nearly complete, and the remaining books exist in fragments in the excerpts of Constantine Porphyrogenitus and an epitome discovered by Angelo Mai in a Milan MS. The first three books of Appian, and Plutarch's *Life of Camillus* also embody much of Dionysius. His chief object was to reconcile the Greeks to the rule of Rome, by dilating upon the good qualities of their conquerors. According to him, history is philosophy teaching by examples, and this idea he has carried out from the point of view of the Greek rhetorician. But he has carefully consulted the best authorities, and his work and that of Livy are the only connected and detailed extant accounts of early Roman history.

Dionysius was also the author of several rhetorical treatises, in which he shows that he has thoroughly studied the best Attic models:—*The Art of Rhetoric* (which is rather a collection of essays on the theory of rhetoric), incomplete, and certainly not all his work; *The Arrangement of Words* (Περὶ συνθέσεως ὀνομάτων), treating of the combination of words according to the different styles of oratory; *On Imitation* (Περὶ μιμήσεως), on the best models in the different kinds of literature and the way in which they are to be imitated—a fragmentary work; *Commentaries on the Attic Orators* (Περὶ τῶν ἀρχαίων ῥητόρων ὑπομνηματισμοί), which, however, only deal with Lysias, Isaeus, Isocrates and (by way of supplement) Dinarchus; *On the admirable Style of Demosthenes* (Περὶ τῆς λεκτικῆς Δημοσθένους δεινότητος); and *On the Character of Thucydides* (Περὶ τοῦ Θουκυδίδου χαρακτῆρος), a detailed but on the whole an unfair estimate. These two treatises are supplemented by letters to Cn. Pompeius and Ammaeus (two).

Complete edition by J. J. Reiske (1774-1777); of the *Archaeologia* by A. Kiessling and V. Prou (1886) and C. Jacoby (1885-1891); Opuscula by Usener and Radermacher (1899); Eng. translation by E. Spelman (1758). A full bibliography of the rhetorical works is given in W. Rhys Roberts's edition of the Three Literary Letters (1901); the same author published an edition of the *De compositione verborum* (1910, with trans.); see also M. Egger, *Denys d'Halicarnasse* (1902), a very useful treatise. On the sources of Dionysius see O. Bocksch, "De fontibus Dion. Halicarnassensis" in *Leipziger Studien*, xvii. (1895). Cf. also J. E. Sandys, *Hist. of Class. Schol.* i. (1906).

DIONYSIUS PERIEGETES, author of a Περιήγησις τῆς οἰκουμένης, a description of the habitable world in Greek hexameter verse, written in a terse and elegant style. Nothing certain is known of the date or nationality of the writer, but there is some reason for believing that he was an Alexandrian, who wrote in the time of Hadrian (some put him as late as the end of the 3rd century). The work enjoyed a high degree of popularity in ancient times as a school-book; it was translated into Latin by Rufus Festus Avienus, and by the grammarian Priscian. The commentary of Eustathius is valuable.

The best editions are by G. Bernhardy (1828) and C. Müller (1861) in their *Geographici Graeci minores*; see also E. H. Bunbury, *Ancient Geography* (ii. p. 480), who regards the author as flourishing from the reign of Nero to that of Trajan, and U. Bernays, *Studien zu Dion. Perieg.* (1905). There are two old English translations: T. Twine (1572, black letter), J. Free (1789, blank verse).

DIONYSIUS TELMAHARENSIS ("of Tell-Maḥrē"), patriarch or supreme head of the Syrian Jacobite Church during the years 818-848, was born at Tell-Maḥrē near Raḳḳa (ar-Raḳḳah) on the Balīkh. He was the author of an important historical work, which has seemingly perished except for some passages quoted by Barhebraeus and an extract found by Assemani in Cod. *Vat.* 144 and published by him in the *Bibliotheca orientalis* (ii. 72-77). He spent his earlier years as a monk at the convent of Ḳen-neshrē on the upper Euphrates; and when this monastery was destroyed by fire in 815, he migrated northwards to that of Kaisūm in the

district of Samosāta. At the death of the Jacobite patriarch Cyriacus in 817, the church was agitated by a dispute about the use of the phrase "heavenly bread" in connexion with the Eucharist. An anti-patriarch had been appointed in the person of Abraham of Ḳartamīn, who insisted on the use of the phrase in opposition to the recognized authorities of the church. The council of bishops who met at Raḳḳa in the summer of 818 to choose a successor to Cyriacus had great difficulty in finding a worthy occupant of the patriarchal chair, but finally agreed on the election of Dionysius, hitherto known only as an honest monk who devoted himself to historical studies. Sorely against his will he was brought to Raḳḳa, ordained deacon and priest on two successive days, and raised to the supreme ecclesiastical dignity on the 1st of August. From this time he showed the utmost zeal in fulfilling the duties of his office, and undertook many journeys both within and without his province. The ecclesiastical schism continued unhealed during the thirty years of his patriarchate. The details of this contest, of his relations with the caliph Ma'mūn, and of his many travels—including a journey to Egypt, on which he viewed with admiration the great Egyptian monuments,—are to be found in the *Ecclesiastical Chronicle* of Barhebraeus.[1] He died in 848, his last days having been especially embittered by Mahommedan oppression. We learn from Michael the Syrian that his *Annals* consisted of two parts each divided into eight chapters, and covered a period of 260 years, viz. from the accession of the emperor Maurice (582-583) to the death of Theophilus (842-843).

In addition to the lost *Annals*, Dionysius was from the time of Assemani until 1896 credited with the authorship of another important historical work —a *Chronicle*, which in four parts narrates the history of the world from the creation to the year A.D. 774-775 and is preserved entire in *Cod. Vat.* 162. The first part (edited by Tullberg, Upsala, 1850) reaches to the epoch of Constantine the Great, and is in the main an epitome of the Eusebian Chronicle.[2] The second part reaches to Theodosius II. and follows closely

the *Ecclesiastical History* of Socrates; while the third, extending to Justin II., reproduces the second part of the *History* of John of Asia or Ephesus, and also contains the well-known chronicle attributed to Joshua the Stylite. The fourth part[3] is not like the others a compilation, but the original work of the author, and reaches to the year 774-775—apparently the date when he was writing. On the publication of this fourth part by M. Chabot, it was discovered and clearly proved by Nöldeke (*Vienna Oriental Journal*, x. 160-170), and Nau (*Bulletin critique*, xvii. 321-327), who independently reached the same conclusion, that Assemani's opinion was a mistake, and that the chronicle in question was the work not of Dionysius of Tell-Maḥrē but of an earlier writer, a monk of the convent of Zuḳnīn near Āmid (Diarbekr) on the upper Tigris. Though the author was a man of limited intelligence and destitute of historical skill, yet the last part of his work at least has considerable value as a contemporary account of events during the middle period of the 8th century.

(N. M.)

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1 Ed. Abbeloos and Lamy, i. 343-386; cf. Wright, *Syriac Literature*, 196-200, and Chabot's introduction to his translation of the fourth part of the *Chronicle* of (pseudo) Dionysius.

2 See the studies by Siegfried and Gelzer, *Eusebii canonum epitome ex Dionysii Telmaharensis chronico petita* (Leipzig, 1884), and von Gutschmid, *Untersuchungen über die syrische Epitome der Eusebischen Canones* (Stuttgart, 1886).

3 Text and translation by J.-B. Chabot (Paris, 1895).

DIONYSIUS THRAX (so called because his father was a Thracian), the author of the first Greek grammar, flourished about 100 B.C. He was a

native of Alexandria, where he attended the lectures of Aristarchus, and afterwards taught rhetoric in Rhodes and Rome. His Τέχνη γραμματική, which we possess (though probably not in its original form), begins with the definition of grammar and its functions. Dealing next with accent, punctuation marks, sounds and syllables, it goes on to the different parts of speech (eight in number) and their inflections. No rules of syntax are given, and nothing is said about style. The authorship of Dionysius was doubted by many of the early middle-age commentators and grammarians, and in modern times its origin has been attributed to the oecumenical college founded by Constantine the Great, which continued in existence till 730. But there seems no reason for doubt; the great grammarians of imperial times (Apollonius Dyscolus and Herodian) were acquainted with the work in its present form, although, as was natural considering its popularity, additions and alterations may have been made later. The τέχνη was first edited by J. A. Fabricius from a Hamburg MS. and published in his *Bibliotheca Graeca*, vi. (ed. Harles). An Armenian translation, belonging to the 4th or 5th century, containing five additional chapters, was published with the Greek text and a French version, by M. Cirbied (1830). Dionysius also contributed much to the criticism and elucidation of Homer, and was the author of various other works—amongst them an account of Rhodes, and a collection of Μελέται (literary studies), to which the considerable fragment in the *Stromata* (v. 8) of Clement of Alexandria probably belongs.

Editions, with scholia, by I. Bekker in *Anecdota Graeca*, ii. and G. Uhlig (1884), reviewed exhaustively by P. Egenolff in Bursian's *Jahresbericht*, vol. xlvi. (1888); Scholia, ed. A. Hilgard (1901); see also W. Hörschelmann, *De Dionysii Thracis interpretibus veteribus* (1874); J. E. Sandys, *Hist. of Classical Scholarship*, i. (1906).

DIONYSUS (probably = "son of Zeus," from Διός and νῦσος, a Thracian word for "son"), in Greek mythology, originally a nature god of fruitfulness and vegetation, especially of the vine; hence, distinctively, the god of wine. The names Bacchus (Βάκχος, in use among the Greeks from the 5th century), Sabazius, and Bassareus, are also Thracian names of the god. The two first (like Iacchus, Bromius and Euios) have been connected with the loud "shout" (σαβάζειν = βάζειν = εὐάζειν) of his worshippers, Bassareus with βασσάραι, the fox-skin garments of the Thracian Bacchanals. It has been suggested (J. E. Harrison *Prolegomena to Greek Religion*) that Sabazius and Bromius = "beer-god," "god of a cereal intoxicant" (cf. Illyrian *sabaia* and modern Greek βρῶμι, "oats"), while W. Ridgeway (*Classical Review*, January 1896), comparing Apollo Smintheus, interprets Bassareus as "he who keeps away the foxes from the vineyards" (for various interpretations of these and other cult-titles, see O. Gruppe, *Griechische Mythologie*, ii. pp. 1408, 1532, especially the notes).

In Homer, notwithstanding the frequent mention of the use of wine, Dionysus is never mentioned as its inventor or introducer, nor does he appear in Olympus; Hesiod is the first who calls wine the gift of Dionysus. On the other hand, he is spoken of in the *Iliad* (vi. 130 foll., a passage belonging to

the latest period of epic), as “raging,” an epithet that indicates that in those comparatively early times the orgiastic character of his worship was recognized. In fact, Dionysus may be regarded under two distinct aspects: that of a popular national Greek god of wine and cheerfulness, and that of a foreign deity, worshipped with ecstatic and mysterious rites introduced from Thrace. According to the usual tradition, he was born at Thebes—originally the local centre of his worship in Greece—and was the son of Zeus, the fertilizing rain god, and Semele, the daughter of Cadmus, a personification of earth. Before the child was mature, Zeus appeared to Semele at her request in his majesty as god of lightning, by which she was killed, but the infant was saved from the flames by Zeus (or Hermes). The epithet περικιόνιος, originally referring to an ivy-crowned, pillar-shaped fetish of the god, afterwards gave rise to the legend of a miraculous growth of ivy “round the pillars” of the royal palace, whereby the infant Dionysus was preserved from the flames. Zeus took him up, enclosed him within his own thigh till he came to maturity, and then brought him to the light, so that he was twice born; it was to celebrate this double birth that the *dithyrambus* (also used as an epithet of the god) was sung (see *Etym. Mag. s.v.*). It has been suggested that this is an allusion to the *couvade* of certain barbarous tribes, amongst whom it is customary, when a child is born, for the husband to take to his bed and receive medical treatment, as if he shared the pains of maternity (see COUVADE, and references there). Dionysus was then conveyed by Hermes to be brought up by the nymphs of Nysa, a purely imaginary spot, afterwards localized in different parts of the world, which claimed the honour of having been the birthplace of the god. As soon as Dionysus was grown up, he started on a journey through the world, to teach the cultivation of the vine and spread his worship among men. While so engaged he met with opposition, even in his own country, as in the case of Pentheus, king of Thebes, who opposed the orgiastic rites introduced by Dionysus among the women of Thebes, and, having been discovered watching one of these ceremonies, was mistaken for some animal of the chase, and slain by his own mother (see A. G. Bather,

Journ. Hell. Studies, xiv. 1894). A similar instance is that of Lycurgus, a Thracian king, from whose attack Dionysus saved himself by leaping into the sea, where he was kindly received by Thetis. Lycurgus was blinded by Zeus and soon died, or became frantic and hewed down his own son, mistaking him for a vine. At Orchomenus, the three daughters of Minyas refused to join the other women in their nocturnal orgies, and for this were transformed into birds (see AGRIONIA). These and similar stories point to the vigorous resistance offered to the introduction of the mystic rites of Dionysus, in places where an established religion already existed. On the other hand, when the god was received hospitably he repaid the kindness by the gift of the vine, as in the case of Icarius of Attica (see ERIGONE).

The worship of Dionysus was actively conducted in Asia Minor, particularly in Phrygia and Lydia. Here, as Sabazius, he was associated with the Phrygian goddess Cybele, and was followed in his expeditions by a *thiasos* (retinue) of centaurs, and satyrs, with Pan and Silenus. In Lydia his triumphant return from India was celebrated by an annual festival on Mount Tmolus; in Lydia he assumed the long beard and long robe which were afterwards given him in his character of the "Indian Bacchus," the conqueror of the East, who, after the campaigns of Alexander, was reported to have advanced as far as the Ganges. The other incidents in which he appears in a purely triumphal character are his transforming into dolphins the Tyrrhene pirates who attacked him, as told in the Homeric hymn to Dionysus and represented on the monument of Lysicrates at Athens, and his part in the war of the gods against the giants. The former story has been connected with the sailors' custom of hanging vine leaves, ivy and bunches of grapes round the masts of vessels in honour of vintage festivals. The adventure with the pirates occurred on his voyage to Naxos, where he found Ariadne abandoned by Theseus. At Naxos Ariadne (probably a Cretan goddess akin to Aphrodite) was associated with Dionysus as his wife, by whom he was the father of Oenopion (wine-drinker), Staphylus (grape), and Euanthes (blooming), and their marriage was annually celebrated by a festival. Having compelled all the

world to recognize his divinity, he descended to the underworld to bring up his mother, who was afterwards worshipped with him under the name of Thyone ("the raging"), he himself being called after her Thyoneus.

Another phase in the myth of Dionysus originated in observing the decay of vegetation in winter, to suit which he was supposed to be slain and to join the deities of the lower world. This phase of his character was developed by the Orphic poets, he having here the name of Zagreus ("torn in pieces"), and being no longer the Theban god, but a son of Zeus and Persephone. The child was brought up secretly, watched over by Curetes; but the jealous Hera discovered where he was, and sent Titans to the spot, who, finding him at play, tore him to pieces, and cooked and ate his limbs, while Hera gave his heart to Zeus. The tearing in pieces is referred by some to the torture experienced by the grape (*Naturschmerz*) when crushed for making into wine (cf. Burns's *John Barleycorn*); but it is better to refer it to the tearing of the flesh of the victim at sacrifices at which the deity or the sacred animal was slain, and sacramentally eaten raw (cf. the title ὠμηστής given to Dionysus in certain places, probably pointing to human sacrifice.) To connect this with the myth of the Theban birth of Dionysus, it is said that Zeus gave the child's heart to Semele, or himself swallowed it and gave birth to the new Dionysus (called Iacchus from his worshippers' cry of rejoicing), who was cradled and swung in a winnowing fan (λίκνος; see J. E. Harrison, *Journ. Hellenic Studies*, xxiii.), the swinging being supposed to act as a charm in awakening vegetation from its winter sleep. The conception of Zagreus, or the winter Dionysus, appears to have originated in Crete, but it was accepted also in Delphi, where his grave was shown, and sacrifice was secretly offered at it annually on the shortest day. The story is in many respects similar to that of Osiris. According to others, Zagreus was originally a god of the chase, who became a hunter of men and a god of the underworld, more akin to Hades than to Dionysus (see also TITANS).

Dionysus further possessed the prophetic gift, and his oracle at Delphi was as important as that of Apollo. Like Hermes, Dionysus was a god of the productiveness of nature, and hence Priapus was one of his regular companions, while not only in the mysteries but in the rural festivals his symbol, the phallus, was carried about ostentatiously. His symbols from the animal kingdom were the bull (perhaps a totemistic attribute and identified with him), the panther, the lion, the tiger, the ass, the goat, and sometimes also the dolphin and the snake. His personal attributes are an ivy wreath, the thyrsus (a staff with pine cone at the end), the laurel, the pine, a drinking cup, and sometimes the horn of a bull on his forehead. Artistically he was represented mostly either as a youth of soft, nearly feminine form, or as a bearded and draped man, but frequently also as an infant, with reference to his birth or to his bringing up in "Nysa." His earliest images were of wood with the branches still attached in parts, whence he was called Dionysus Dendrites, an allusion to his protection of trees generally (according to Pherecydes in C. W. Müller, *Frag. Hist. Graec.* iv. p. 637, the word νῦσα signified "tree"). It is suggested that the cult of Dionysus absorbed that of an old tree-spirit. He was figured also, like Hermes, in the form of a pillar or term surmounted by his head. For the connexion of Dionysus with Greek tragedy see DRAMA.

See Farnell, *Cults of the Greek States*, v. (1910); also O. Rapp, *Beziehungen des Dionysuskultus zu Thrakien* (1882); O. Ribbeck, *Anfange und Entwickelung des Dionysuskultes in Attica* (1869); A. Lang, *Myth, Ritual and Religion*, ii. p. 241; L. Dyer, *The Gods in Greece* (1891); J. E. Harrison, *Prolegomena to the Study of Greek Religion* (1903); J. G. Frazer, *The Golden Bough*, ii (1900), pp. 160, 291, who regards the bull and goat form of Dionysus as expressions of his proper character as a deity of vegetation; F. A. Voigt in Roscher's *Lexikon der Mythologie*; L. Preller, *Griechische Mythologie* (4th ed. by C. Robert); F. Lenormant (*s.v.* "Bacchus") in Daremberg and Saglio's *Dictionnaire des antiquités*; O. Kern in Pauly-Wissowa's *Realencyclopadie* (with list of cult titles); W. Pater, *Greek Studies* (1895); E. Rohde, *Psyche*, ii., who

finds the origin of the Hellenic belief in the immortality of the soul in the "enthusiastic" rites of the Thracian Dionysus, which lifted persons out of themselves, and exalted them to a fancied equality with the gods; O. Gruppe, *Griechische Mythologie und Religionsgeschichte*, ii. (1907), who considers Boeotia, not Thrace, to have been the original home of Dionysus; P. Foucart, "Le Culte de Dionysos en Attique" in *Mémoires de l'Institut national de France*, xxxvii. (1906), who finds the prototype of Dionysus in Egypt. *The Great Dionysiak Myth* (1877-1878) by R. Brown contains a wealth of material, but is weak in scholarship. For a striking survival of Dionysiac rites in Thrace (Bizye), see Dawkins, in *J.H.S.* (1906), p. 191.

DIOPHANTUS, of Alexandria, Greek algebraist, probably flourished about the middle of the 3rd century. Not that this date rests on positive evidence. But it seems a fair inference from a passage of Michael Psellus (*Diophantus*, ed. P. Tannery, ii. p. 38) that he was not later than Anatolius, bishop of Laodicea from A.D. 270, while he is not quoted by Nicomachus (fl. c. A.D. 100), nor by Theon of Smyrna (c. A.D. 130), nor does Greek arithmetic as represented by these authors and by Iamblichus (end of 3rd century) show any trace of his influence, facts which can only be accounted for by his being later than those arithmeticians at least who would have been capable of understanding him fully. On the other hand he is quoted by Theon of Alexandria (who observed an eclipse at Alexandria in A.D. 365); and his work was the subject of a commentary by Theon's daughter Hypatia (d. 415). The *Arithmetica*, the greatest treatise on which the fame of Diophantus rests, purports to be in thirteen Books, but none of the Greek MSS. which have

survived contain more than six (though one has the same text in seven Books). They contain, however, a fragment of a separate tract on *Polygonal Numbers*. The missing books were apparently lost early, for there is no reason to suppose that the Arabs who translated or commented on Diophantus ever had access to more of the work than we now have. The difference in form and content suggests that the *Polygonal Numbers* was not part of the larger work. On the other hand the *Porisms*, to which Diophantus makes three references ("we have it in the Porisms that ..."), were probably not a separate book but were embodied in the *Arithmetica* itself, whether placed all together or, as Tannery thinks, spread over the work in appropriate places. The "Porisms" quoted are interesting propositions in the theory of numbers, one of which was clearly that *the difference between two cubes can be resolved into the sum of two cubes*. Tannery thinks that the solution of a complete quadratic promised by Diophantus himself (I. def. 11), and really assumed later, was one of the Porisms.

> Among the great variety of problems solved are problems leading to determinate equations of the first degree in one, two, three or four variables, to determinate quadratic equations, and to indeterminate equations of the first degree in one or more variables, which are, however, transformed into determinate equations by arbitrarily assuming a value for one of the required numbers, Diophantus being always satisfied with a rational, even if fractional, result and not requiring a solution in integers. But the bulk of the work consists of problems leading to indeterminate equations of the second degree, and these universally take the form that one or two (and never more) linear or quadratic functions of one variable x are to be made rational square numbers by finding a suitable value for x. A few problems lead to indeterminate equations of the third and fourth degrees, an easy indeterminate equation of the sixth degree being also found. The general type of problem is to find two, three or four numbers such that different expressions involving them in the first and second, and sometimes the

third, degree are squares, cubes, partly squares and partly cubes, &c. E.g. *To find three numbers such that the product of any two added to the sum of those two gives a square* (III. 15, ed. Tannery); *To find four numbers such that, if we take the square of their sum ± any one of them singly, all the resulting numbers are squares* (III. 22); *To find two numbers such that their product ± their sum gives a cube* (IV. 29); *To find three squares such that their continued product added to any one of them gives a square* (V. 21). Book VI. contains problems of finding rational *right-angled triangles* such that different functions of their parts (the sides and the area) are squares. A word is necessary on Diophantus' notation. He has only one symbol (written somewhat like a final sigma) for an unknown quantity, which he calls ἀριθμός (defined as "an undefined number of units"); the symbol may be a contraction of the initial letters αρ, as ΔΥ, ΚΥ, ΔΥΔ, &c., are for the powers of the unknown (δύναμις, square; κύβος, cube; δυναμοδύναμις, fourth power, &c.). The only other algebraical symbol is for minus; plus being expressed by merely writing terms one after another. With one symbol for an unknown, it will easily be understood what scope there is for adroit assumptions, for the required numbers, of expressions in the one unknown which are at once seen to satisfy some of the conditions, leaving only one or two to be satisfied by the particular value of x to be determined. Often assumptions are made which lead to equations in x which cannot be solved "rationally," *i.e.* would give negative, surd or imaginary values; Diophantus then traces how each element of the equation has arisen, and formulates the auxiliary problem of determining how the assumptions must be corrected so as to lead to an equation (in place of the "impossible" one) which can be solved rationally. Sometimes his x has to do duty twice, for different unknowns, in one problem. In general his object is to reduce the final equation to a simple one by making such an assumption for the side of the square or cube to which the expression in x is to be equal as will make the necessary number of coefficients vanish.

The book is valuable also for the propositions in the theory of numbers, other than the "porisms," stated or assumed in it. Thus Diophantus knew that *no number of the form 8n + 7 can be the sum of three squares*. He also says that, if 2n + 1 is to be the sum of two squares, "n must not be odd" (*i.e. no number of the form 4n + 3, or 4n − 1, can be the sum of two squares*), and goes on to add, practically, the condition stated by Fermat, "and the double of it [n] increased by one, when divided by the greatest square which measures it, must not be divisible by a prime number of the form 4n − 1," except for the omission of the words "when divided ... measures it."

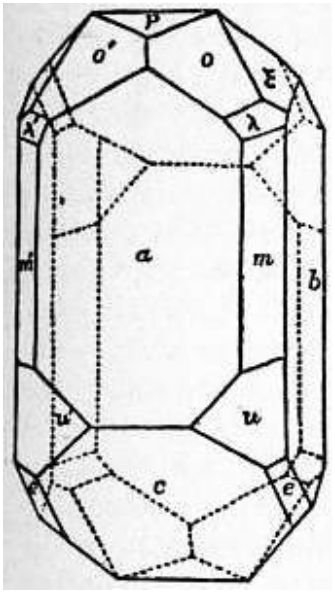
AUTHORITIES.—The first to publish anything on Diophantus in Europe was Rafael Bombelli, who embodied in his Algebra (1572) all the problems of Books I.-IV. and some of Book V. interspersing them with his own problems. Next Xylander (Wilhelm Holzmann) published a Latin translation (Basel, 1575), an altogether meritorious work, especially having regard to the difficulties he had with the text of his MS. The Greek text was first edited by C. G. Bachet (*Diophanti Alexandrini arithmeticorum libri sex, et de numeris multangulis liber unus, nunc primum graece et latine editi atque absolutissimis commentariis illustrati* ... Lutetiae Parisiorum ... MDCXXI.). A reprint of 1670 is only valuable because it contains P. de Fermat's notes; as far as the Greek text is concerned it is much inferior to the other. There are two German translations, one by Otto Schulz (1822) and the other by G. Wertheim (Leipzig, 1890), and an English edition in modern notation (T. L. Heath, *Diophantos of Alexandria: A Study in the History of Greek Algebra* (Cambridge, 1885)). The Greek text has now been definitively edited (with Latin translation, Scholia, &c.) by P. Tannery (Teubner, vol. i., 1893; vol. ii., 1895). General accounts of Diophantus' work are to be found in H. Hankel and M. Cantor's histories of mathematics, and more elaborate analyses are those of Nesselmann (*Die Algebra der Griechen*,

Berlin, 1842) and G. Loria (*Le Scienze esatte nell' antica Grecia*, libro v., Modena, 1902, pp. 95-158).

(T. L. H.)

DIOPSIDE, an important member of the pyroxene group of rock-forming minerals. It is a calcium-magnesium metasilicate, $CaMg(SiO_3)_2$, and crystallizes in the monoclinic system. Usually some iron is present replacing magnesium, and when this predominates there is a passage to hedenbergite, $CaFe(SiO_3)_2$, a closely allied variety of monoclinic pyroxene. These are distinguished from augite by containing little or no aluminium. Diopside is colourless, white, pale green to dark green or nearly black in colour, the depth of the colour depending on the amount of iron present. The specific gravity and optical constants also vary with the chemical composition; the sp. gr. of diopside is 3.2, increasing to 3.6 in hedenbergite, and the angle of optical extinction in the plane of symmetry varies between 38° and 47° in the two extremes of the series. Crystals are usually prismatic in habit with a rectangular cross-section as shown in the figure: the angle between the prism faces m, parallel to which there are perfect cleavages, is 92° 50′.

Several varieties, depending on differences in structure and chemical composition, have been distinguished, viz. coccolite (from κόκκος, a grain), a granular variety; salite or sahlite, from Sala in Sweden; malacolite; diallage; violane, a lamellar variety of a dark violet-blue colour; chrome-diopside, a bright green variety containing a small amount of chromium; and many others. Belonging to the same series with diopside and hedenbergite is a manganese pyroxene, known as schefierite, which has the composition (Ca, Mg) (Fe, Mn) $(Si0_3)_2$.

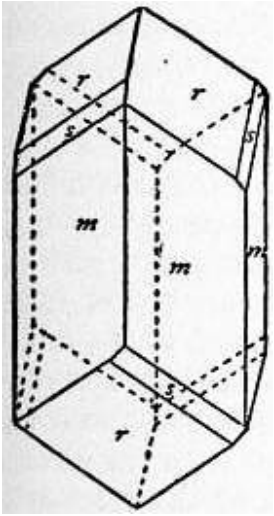


Diopside is the characteristic pyroxene of metamorphic rocks, occurring especially in crystalline limestones, and often in association with garnet and epidote. It is also an essential constituent of some pyroxene-granites, diorites and a few other igneous rocks, but the characteristic pyroxene of this class of rocks is augite. Fine transparent crystals of a pale green colour occur, with crystals of yellowish-red garnet (hessonite) and chlorite, in veins traversing serpentine in the Ala valley near Turin in Piedmont: a crystal of this variety ("alalite") is represented in the accompanying figure. These, as well as the long, transparent, bottle-green crystals from the Zillerthal in the Tyrol, have occasionally been cut as gem-stones. Good crystals have been found also at Achmatovsk near Zlatoust in the Urals, Traversella near Ivrea in Piedmont ("traversellite"), Nordmark in Sweden, Monroe in New York, Burgess in Lanark county, Ontario, and several other places: at Nordmark the large, rectangular black crystals occur with magnetite in the iron mines.

(L. J. S.)

DIOPTASE, a rare mineral species consisting of acid copper orthosilicate, H_2CuSiO_4, crystallizing in the parallel-faced hemihedral class of the rhombohedral system. The degree of symmetry is the same as in the mineral phenacite, there being only an axis of triad symmetry and a centre of symmetry. The crystals have the form of a hexagonal prism m terminated by a rhombohedron r, the alternate edges between these being sometimes replaced

by the faces of a rhombohedron s. The faces are striated parallel to the edges between r, s and m. There are perfect cleavages parallel to the faces of a rhombohedron which truncate the polar edges of r: from the cleavage cracks internal reflections are often to be seen in the crystal, and it was on account of this that the mineral was named dioptase, by R. J. Haüy in 1797, from διοπτεύειν, "to see into." The crystals vary from transparent to translucent with a vitreous lustre, and are bright emerald-green in colour; they thus have a certain resemblance to emerald, hence the early name emerald-copper (German, *Kupfer-Smaragd*). Hardness 5; sp. gr. 3.3. The mineral is decomposed by hydrochloric acid with separation of gelatinous silica. At a red heat it blackens and gives off water. The fine crystals from Mount Altyn-Tübe on the western slopes of the Altai Mountains in the Kirghiz Steppes, Asiatic Russia, line cavities in a compact limestone; they were first sent to Europe in 1785 by Achir Mahmed, a Bucharian merchant, after whom the mineral has been named archirite. More recently, in 1890, good crystals of similar habit, but rather darker in colour, have been found with quartz and malachite near Komba in the French Congo. As drusy crystalline crusts it has been found at Copiapo in Chile and in Arizona.



Dioptase has occasionally been used as a gem-stone, especially in Russia and Persia; it has a fine colour, but a low degree of hardness and the transparency is imperfect.

(L. J. S.)

DIORITE (from the Gr. διορίζειν to distinguish, from διά through, ὅρος, a boundary), in petrology, the name given by Haüy to a family of rocks of granitic texture, composed of plagioclase felspar and hornblende. As they are richer in the dark coloured ferromagnesian minerals they are usually grey or dark grey, and have a higher specific gravity than granite. They also rarely show visible quartz. But there are diorites of many kinds, as the name applies rather to a family of rocks than to a single species. Some contain biotite, others augite or hypersthene; many have a small amount of quartz. Orthoclase is rarely entirely absent, and when it is fairly common the rock becomes a tonalite; in this way a transition is furnished between diorites and granites. It is rare to find the pure types of "hornblende-diorite," "augite-diorite," &c., but in most cases the rocks contain two or more ferromagnesian silicates, and such combinations as "hornblende-biotite-diorite" are commonest in nature.

The felspar of the diorites ranges in composition from oligoclase to labradorite, and is often remarkably zonal, the external layers being more alkaline than the internal. Small fluid enclosures and black grains, probably iron oxides, often occur in it in great numbers. Weathering produces epidote, calcite, sericite and kaolin. The biotite is always brown or yellow; the hornblende usually green, but sometimes brown or yellowish brown in those diorites which have affinities to lamprophyres. The augite is nearly always green but sometimes has a reddish tinge; bronzite and hypersthene have their usual green and brown shades. Apatite, iron oxides and zircon are almost invariably present; sphene, garnet and orthite are occasionally observed; calcite, chlorite, muscovite, kaolin, epidote and bastite are secondary. The structure is not essentially different from that of granite. The ferromagnesian minerals crystallize comparatively early and have some idiomorphism; the felspar usually follows and only in part shows good crystalline outlines. Orthoclase and quartz, if present, are last to separate out, and fill the spaces between the other minerals; often they interpenetrate to form micropegmatite. In many diorites the plagioclase felspar has crystallized before the hornblende, which consequently has less perfect outlines and forms irregular plates which

enclose sharply formed individuals of felspar. This produces the ophitic structure (very common also in the dolerites). More rarely biotite and augite exhibit the same relations to the plagioclase. Orbicular structure also occasionally appears in these rocks; in fact the orbicular diorite of Corsica (also called “Napoleonite” or “Corsite”) was for a long time the best-known example of this structure. The rock seems composed of spheroids, about an inch in diameter, surrounded by a smaller amount of dark-coloured dioritic matrix. The spheroids have a radiate structure and often show concentric dark and pale shells. These consist of hornblende (dark green) and basic plagioclase felspar, labradorite and bytownite (grey or nearly white). Occasionally diorites have a parallel banded or foliated structure, but these must not be confounded with the epidiorites, which are metamorphic rocks and also have a conspicuous foliation.

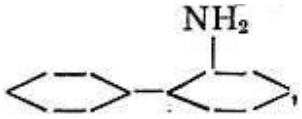
Diorites must also be distinguished from hornblendic gabbros, which contain more basic felspars, rarely quartz and occasionally olivine; but the boundary lines between diorites and gabbros are admittedly somewhat vague, *e.g.* some authors would call rocks gabbro which others would regard as augite-diorite. The hornblendites differ from the diorites in containing little felspar, and consist principally of hornblende. Among varietal designations given to rocks of the diorite family are “banatite” for an augite-diorite with or without quartz (from the Schemnitz district), “granodiorite” for a quartz-hornblende-diorite (essentially the same as tonalite) from California, &c., “adamellite” for the quartz-mica-diorite or tonalite of Monte Adamello (Alps), “ornite” for a hornblende-diorite rich in felspar, from Sweden.

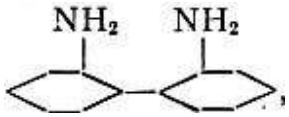
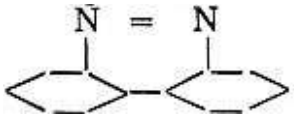
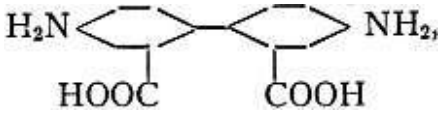
(J. S. F.)

DIP (Old Eng. *dyppan*, connected with the common Teutonic root seen in "deep"), the angle which the magnetic needle makes with the horizon. A freely suspended magnetic needle will not maintain a horizontal position except at the magnetic equator. Over the N. magnetic pole the north-seeking end of the needle points directly downwards and dips at an intermediate angle at intermediate distances between the magnetic poles and equator. There are secular progressive variations of dip as well as of declination and the maxima are independent of each other. In 1576 the dip at London was 71° 50′, in 1720 (max.) 74° 42′, in 1900 67° 9′. (For Dip Circle see INCLINOMETER.)

DIPHENYL (phenyl benzene), $C_6H_5 \cdot C_6H_5$, a hydrocarbon found in that fraction of the coal-tar distillate boiling between 240-300° C., from which it may be obtained by warming with sulphuric acid, separating the acid layer and strongly cooling the undissolved oil. It may be artificially prepared by passing benzene vapour through a red-hot tube; by the action of sodium on brombenzene dissolved in ether; by the action of stannous chloride on phenyldiazonium chloride; or by the addition of solid phenyldiazonium sulphate to warm benzene (R. Möhlau, *Berichte, 1893, 26*, 1997) $C_6H_5N_2 \cdot HSO_4 + C_6H_6 = H_2SO_4 + N_2 + C_6H_5 \cdot C_6H_5$. L. Gattermann (*Berichte, 1890, 23*, 1226) has also prepared it by the decomposition of a solution of phenyldiazonium sulphate with alcohol and copper powder. It crystallizes in plates (from alcohol) melting at 70-71° C. and boiling at 254° C. It is oxidized by chromic acid in glacial acetic acid solution to benzoic acid, dilute nitric acid and chromic acid mixture being without effect. It is not reduced by hydriodic acid and phosphorus, but sodium in the presence of amyl alcohol reduces it to tetrahydrodiphenyl $C_{12}H_{14}$.

Many substitution derivatives are known: the monosubstitution derivatives being capable of existing in three isomeric forms. Of the disubstitution derivatives the most important are those derived from diparadiaminodiphenyl or benzidine (*q.v.*).

Orthoaminodiphenyl,  is prepared by the action of bromine and caustic soda on orthophenylbenzamide (R. Hirsch, *Berichte, 1892, 25*, 1974); when its vapour is passed over heated lime, carbazol (*q.v.*) is formed.

Diorthodiaminodiphenyl,  is obtained by the reduction of the corresponding nitro compound (obtained by the action of ethyl nitrite at 0° C. on metadinitrobenzidine hydrochloride). Its tetrazo compound on reduction gives a hydrazine which, on warming with hydrochloric acid at 150° C., decomposes into ammonium chloride and *phenazone*,  ($C_{12}H_8N_2$). One of the most important derivatives of diphenyl, from the theoretical point of view, is *diphenic acid* or diorthodiphenyl carboxylic acid, which can be obtained from diparadiaminodiphenyldiorthocarboxylic acid,  or from phenanthrene (*q.v.*), the constitution of which it determines. See BENZIDINE for diparadiaminodiphenyl.

DIPHILUS, of Sinope, poet of the new Attic comedy and contemporary of Menander (342-291 B.C.). Most of his plays were written and acted at Athens, but he led a wandering life, and died at Smyrna. He was on intimate terms with the famous courtesan Gnathaena (Athenaeus xiii. pp. 579, 583). He is said to have written 100 comedies, the titles of fifty of which are preserved. He sometimes acted himself. To judge from the imitations of Plautus. (*Casina* from the Κληρούμενοι, *Asinaria* from the Ὀναγός, *Rudens* from some other play), he was very skilful in the construction of his plots. Terence also tells us that he introduced into the *Adelphi* (ii. 1) a scene from the Συναποθνήσκοντες, which had been omitted by Plautus in his adaptation (*Commorientes*) of the same play. The style of Diphilus was simple and natural, and his language on the whole good Attic; he paid great attention to versification, and was supposed to have invented a peculiar kind of metre. The ancients were undecided whether to class him among the writers of the New or Middle comedy. In his fondness for mythological subjects (*Hercules*, *Theseus*) and his introduction on the stage (by a bold anachronism) of the poets Archilochus and Hipponax as rivals of Sappho, he approximates to the spirit of the latter.

Fragments in H. Koch, *Comicorum Atticorum fragmenta*, ii.; see J. Denis, *La Comédie grecque* (1886), ii. p. 414; R. W. Bond in *Classical Review* (Feb. 1910, with trans. of *Emporos* fragm.).

DIPHTHERIA (from διφθέρα, a skin or membrane), the term applied to an acute infectious disease, which is accompanied by a membranous exudation on a mucous surface, generally on the tonsils and back of the throat or pharynx.

In general the symptoms at the commencement of an attack of diphtheria are comparatively slight, being those commonly accompanying a cold, viz. chilliness and depression. Sometimes more severe phenomena usher in the attack, such as vomiting and diarrhoea. A slight feeling of uneasiness in the throat is experienced along with some stiffness of the back of the neck. When looked at the throat appears reddened and somewhat swollen, particularly in the neighbourhood of the tonsils, the soft palate and upper part of pharynx, while along with this there is tenderness and swelling of the glands at the angles of the jaws. The affection of the throat spreads rapidly, and soon the characteristic exudation appears on the inflamed surface in the form of greyish-white specks or patches, increasing in extent and thickness until a yellowish-looking false membrane is formed. This deposit is firmly adherent to the mucous membrane beneath or incorporated with it, and if removed leaves a raw, bleeding, ulcerated surface, upon which it is reproduced in a short period. The appearance of the exudation has been compared to wet parchment or washed leather, and it is more or less dense in texture. It may cover the whole of the back of the throat, the cavity of the mouth, and the posterior nares, and spread downwards into the air-passages on the one hand and into the alimentary canal on the other, while any wound on the surface of the body is liable to become covered with it. This membrane is apt to be detached spontaneously, and as it loosens it becomes decomposed, giving a most offensive and characteristic odour to the breath. There is pain and difficulty in swallowing, but unless the disease has affected the larynx no affection of the breathing. The voice acquires a snuffling character. When the disease invades the posterior nares an acrid, fetid discharge, and sometimes also copious bleeding, takes place from the nostrils. Along with these local phenomena there is evidence of constitutional disturbance of the most severe character. There may be no great amount of fever, but there is marked depression and loss of strength. The pulse becomes small and frequent, the countenance pale, the swelling of the glands of the neck increases, which, along with the presence of albumen in the urine, testifies to a condition of

blood poisoning. Unless favourable symptoms emerge death takes place within three or four days or sooner, either from the rapid extension of the false membrane into the air-passage, giving rise to asphyxia, or from a condition of general collapse, which is sometimes remarkably sudden. In cases of recovery the change for the better is marked by an arrest in the extension of the false membrane, the detachment and expectoration of that already formed, and the healing of the ulcerated mucous membrane beneath. Along with this there is a general improvement in the symptoms, the power of swallowing returns, and the strength gradually increases, while the glandular enlargement of the neck diminishes, and the albumen disappears from the urine. Recovery, however, is generally slow, and it is many weeks before full convalescence is established. Even, however, where diphtheria ends thus favourably, the peculiar sequelae already mentioned are apt to follow, generally within a period of two or three weeks after all the local evidence of the disease has disappeared. These secondary affections may occur after mild as well as after severe attacks, and they are principally in the form of paralysis affecting the soft palate and pharynx, causing difficulty in swallowing with regurgitation of food through the nose, and giving a peculiar nasal character to the voice. There are, however, other forms of paralysis occurring after diphtheria, especially that affecting the muscles of the eye, which produces a loss of the power of accommodation and consequent impairment of vision. There may be, besides, paralysis of both legs, and occasionally also of one side of the body (hemiplegia). These symptoms, however, after continuing for a variable length of time, almost always ultimately disappear.

Under the name of the *Malum Egyptiacum*, Aretaeus in the 2nd century gives a minute description of a disease which in all its essential characteristics corresponds to diphtheria. In the 16th, 17th and 18th centuries epidemics of diphtheria appear to have frequently prevailed in many parts of Europe, particularly in Holland, Spain, Italy, France, as well as in England, and were described by physicians belonging to those countries under various titles; but it is probable that other diseases of a similar nature were included in their

descriptions, and no accurate account of this affection had been published till M. Bretonneau of Tours in 1821 laid his celebrated treatise on the subject before the French Academy of Medicine. By him the term *La Diphthérite* was first given to the disease.

Great attention has been paid to diphtheria in recent years, with some striking results. Its cause and nature have been definitely ascertained, the conditions which influence its prevalence have been elucidated, and a specific "cure" has been found. In the last respect it occupies a unique position at the present time. In the case of several other zymotic diseases much has been done by way of prevention, little or nothing for treatment; in the case of diphtheria prevention has failed, but treatment has been revolutionized by the introduction of antitoxin, which constitutes the most important contribution to practical medicine as yet made by bacteriology.

Causation.

The exciting cause of diphtheria is a micro-organism, identified by Klebs and Loffler in 1883 (see PARASITIC DISEASES). It has been shown by experiment that the symptoms of diphtheria, including the after-effects, are produced by a toxin derived from the micro-organisms which lodge in the air-passages and multiply in a susceptible subject. The natural history of the organism outside the body is not well understood, but there is some reason to believe that it lives in a dormant condition in suitable soils. Recent research does not favour the theory that it is derived from defective drains or "sewer gas," but these things, like damp and want of sunlight, probably promote its spread, by lowering the health of persons exposed to them, and particularly by causing an unhealthy condition of the throat, rendering it susceptible to the contagion. Defective drainage, or want of drainage, may also act, by polluting the ground, and so providing a favourable soil for the germ, though it is to be noted that "the steady increase in the diphtheria mortality has coincided, in point of time, with steady improvement in regard of such sanitary circumstances as water supply, sewerage, and drainage" (Thorne Thorne).

Cats and cows are susceptible to the diphtheritic bacillus, and fowls, turkeys and other birds have been known to suffer from a disease like diphtheria, but other domestic animals appear to be more or less resistant or immune. In human beings the mere presence of the germ is not sufficient to cause disease; there must also be susceptibility, but it is not known in what that consists. Individuals exhibit all degrees of resistance up to complete immunity. Children are far more susceptible than adults, but even children may have the Klebs-Loffler bacillus in their throats without showing any symptoms of illness. Altogether there are many obscure points about this micro-organism, which is apt to assume a puzzling variety of forms. Nevertheless its identification has greatly facilitated the diagnosis of the disease, which was previously a very difficult matter, often determined in an arbitrary fashion on no particular principles.

Diphtheria, as at present understood, may be defined as sore throat in which the bacillus is found; if it cannot be found, the illness is regarded as something else, unless the clinical symptoms are quite unmistakable. One result of this is a large transference of registered mortality from other throat affections, and particularly from croup, to diphtheria. Croup, which never had a well-defined application, and is not recognized by the College of Physicians as a synonym for diphtheria, appears to be dying out from the medical vocabulary in Great Britain. In France the distinction has never been recognized.

Prevalence.

Diphtheria is endemic in all European and American countries, and is apparently increasing, but the incidence varies greatly. It is far more prevalent on the continent than in England, and still more so in the United States and Canada. The following table, compiled from figures collected by Dr Newsholme, shows how London compares with some foreign cities. The figures give the mean death-rate from diphtheria and croup for the term of years during which records have been kept. The period varies in different cases, and therefore the comparison is only a rough one.

Mean Death-Rates from Diphtheria and Croup per Million living.

New York	1610	Munich	990
Chicago	1400	Milan	990
Buenos Aires	1360	Florence	830
Trieste	1300	Vienna	770
Dresden	1290	Stockholm	720
Berlin	1190	St Petersburg	650
Boston	1160	Moscow	640
Marseilles	1130	Paris	630
Christiania	1090	Hamburg	490
Budapest	1880	London	386

There is comparatively little diphtheria in India and Japan, but in Egypt, the Cape and Australasia it prevails very extensively among the urban populations. The mortality varies greatly from year to year in all countries and cities. In Berlin, for instance, it has oscillated between a maximum of 2420 in 1883 and a minimum of 340 in 1896; in New York between 2760 in 1877 and 680 in 1868; in Christiania between 3290 in 1887 and 170 in 1871. In some American cities still higher maxima have been recorded. In other words, diphtheria, though always endemic, exhibits at times a great increase of activity, and becomes epidemic or even pandemic. The following table for 1859-99 shows fairly well the periodical rise and fall in England and Wales. Diphtheria and croup are given both separately and together, showing the increasing transference from one to the other of late years. Diphtheria was first entered separately in the year 1859.

Deaths from Diphtheria and Croup per Million living in England and Wales.

Years.	Diphtheria.	Croup.	Diphtheria and Croup.
1859	517	286	803
1860	261	220	481
1861-70	185	246	431
1871-80	121	168	289
1881-90	163	144	307
1891-95	254	70	324
1896-97	269	43	312
1898	244	27	271
1899	293	32	325

The combined figures for diphtheria and croup in later years are:—(1900) 316; (1901) 296; (1902) 255; (1903) 195; (1904) 184; (1905) 174; (1906) 190; (1907) 175; (1908) 166.

Several facts are roughly indicated by the table. It begins with an extremely severe epidemic, which has not been approached since. Then follows a fall extending over twenty years. On the whole this diminution was progressive, though not in reality so steady as the decennial grouping makes it appear, being interrupted by smaller oscillations in single years and groups of years. Still the main fact holds good. After 1880 an opposite movement began, likewise interrupted by minor oscillations, but on the whole progressive, and culminating in the year 1893 with a death-rate of 389, the highest recorded since 1865. After 1896 a marked fall again took place. This is partly accounted for by the use of antitoxin, which only began on a considerable scale in 1895, and did not become general until a year or two later at least. Its effects were only then fully felt. The registrar-general's returns record mortality, not prevalence—that is to say, the number of deaths, not of cases.

On the whole, we get clear evidence of an epidemic rise and fall, which may serve to dispose of some erroneous conceptions. The belief, held until

recently, that diphtheria is steadily increasing in Great Britain was obviously premature; it did rise over a series of years, but has now ebbed again. Moreover, the general prevalence during the last thirty years has been notably less than in the previous twelve years. Yet it is during years since 1870 that compulsory education has been in existence and main drainage chiefly carried out. It follows that neither school attendance nor sewer gas exercises such an important influence over the epidemicity of diphtheria as some other conditions. What are those conditions? Dr Newsholme has advanced the theory, based on an elaborate examination of statistics in various countries, that the activity of diphtheria is connected with the rainfall, and he lays down the following general induction from the facts: “Diphtheria only becomes epidemic in years in which the rainfall is deficient, and the epidemics are on the largest scale when three or more years of deficient rainfall follow each other.” He points out that the comparative rarity of diphtheria in tropical climates, which are characterized by excessive rainfall, and its greater prevalence in continental than in insular countries, confirm his theory. His observations seem quite contrary to the view laid down by various authorities, and hitherto accepted, that wet weather favours diphtheria. The two, however, are not irreconcilable. The key to the problem—and possibly to many other epidemiological problems—may perhaps be found in the movements of the subsoil water. It has been suggested by different observers, and particularly by Mr M. A. Adams, who has for some years made a study of the subsoil water at Maidstone, that there is a definite connexion between it and diphtheria. In England the underground water normally reaches its lowest level at the end of the summer; then it gradually rises, fed by percolation from the winter rains, reaching a maximum level about the end of March, after which it gradually sinks. This maximum level Mr Adams calls the annual spring cleaning of the soil, and his observations go to show that when the normal movement is arrested or disturbed, diphtheria becomes active. Now that is what happens in periods of drought. The underground water does not rise to its usual level, and there is no spring cleaning. The hypothesis, then, is this: The diphtheria

bacillus lives in the soil, but is “drowned out” in wet periods by the subsoil water. In droughty ones it lives and flourishes in the warm, dry soil; then when rain comes, it is driven out with the ground air into the houses. This process will continue for some time, so that epidemic outbreaks may well seem to be associated with wet. But they begin in drought, and are stopped by long-continued periods of copious rainfall. This is quite in keeping with the observed fact that diphtheria is a seasonal disease, always most prevalent in the last quarter of the year. The summer develops the poison in the soil, the autumnal rains bring it out. The fact that the same cause does not produce the same effect in tropical countries may perhaps be explained by the extreme violence of the alternations, which are too great to suit this particular micro-organism, or possibly the regularity of the rainfall prevents its development.

The foregoing hypothesis is supported by a good deal of evidence, and notably by the concurrence of the great epidemic or pandemic prevalence in Great Britain, culminating in 1859, with a prolonged period of exceptionally deficient rainfall. Again, the highest death-rate registered since 1865 was in 1893, a year of similarly exceptional drought. But it is no more than an hypothesis, and the fate of former theories is a warning against drawing conclusions from statistics and records extending over too short a period of time. The warning is particularly necessary in connexion with meteorological conditions, which are apt to upset all calculations. As it happens, a period of deficient rainfall even greater than that of 1854-1858 has recently been experienced. It began in 1893 and culminated in the extraordinary season of 1899. The dry years were 1893, 1895, 1896, 1898 and 1899, and the deficiency of rainfall was not made good by any considerable excess in 1894 and 1897. It surpassed all records at Greenwich; streams and wells ran dry all over the country, and the flow of the Thames and Lea was reduced to the lowest point ever recorded. There should be, according to the theory, at least a very large increase in the prevalence of diphtheria. To a certain extent it has held good. There was a marked rise in 1893-1896 over the preceding period, though not so large as might have been expected, but it was followed by a

decided fall in 1897-1898. The experience of 1898 contradicts, that of 1899 supports, the theory. Further light is therefore required; but perhaps the failure of the recent drought to produce results at all comparable with the epidemic of the ’fifties may be due to variations in the resistance of the disease, which differs widely in different years. It may also be due in part to improved sanitation, to the notification of infectious diseases, the use of isolation hospitals, which have greatly developed in quite recent years, and, lastly, to the beneficial effects of antitoxin. If these be the real explanations, then scientific and administrative work has not been thrown away after all in combating this very painful and fatal enemy of the young.

Dissemination.

The conditions governing the general prevalence of diphtheria, and its epidemic rise and fall, which have just been discussed, do not touch the question of actual dissemination. The contagion is spread by means which are in constant operation, whether the general amount of disease is great or small. Water, so important in some epidemic diseases, is believed not to be one of them, though a negative proof based on absence of evidence cannot be accepted as conclusive. On the other hand, milk is undoubtedly a means of dissemination. Several outbreaks of an almost explosive character, besides minor extensions of disease from one place to another, have been traced to this cause. Milk may be contaminated in various ways—at the dairy, for instance, or on the way to customers,—but several cases, investigated by the officers of the Local Government Board and others, have been thought to point to infection from cows suffering from a diphtheritic affection of the udder. The part played by aërial convection is undetermined, but there is no reason to suppose that the infecting material is conveyed any distance by wind or air currents. Instances which seem to point to the contrary may be explained in other ways, and particularly by the fact, now fully demonstrated, that persons suffering from minor sore throats, not recognized as diphtheria, may carry the disease about and introduce it into other localities. Human intercourse is the most important means of dissemination, the contagion passing from person to person either by

actual contact, as in kissing, or by the use of the same utensils and articles, or by mere proximity. In the last case the germs must be supposed to be air-borne for short distances, and to enter with the breath. Rooms appear liable to become infected by the presence of diphtheritic cases, and so spread the disease among other persons using them. At a small outbreak which occurred at Darenth Asylum in 1898 the infection clung obstinately to a particular ward, in spite of the prompt removal of all cases, and fresh ones continued to occur until it had been thoroughly disinfected, after which there were no more. The part played by human intercourse in fostering the spread of the disease suggests that it would naturally be more prevalent in urban communities, where people congregate together more, than in rural ones. This is at variance with the conclusion laid down by some authorities, that in this country diphtheria used to affect chiefly the sparsely populated districts, and though tending to become more urban, is still rather a rural disease. That view is based upon an analysis of the distribution by counties in England and Wales from 1855 to 1880, and it has been generally accepted and repeated until it has become a sort of axiom. Of course the facts of distribution are facts, but the general inference drawn from them, that diphtheria peculiarly affects the country and is changing its *habitat*, may be erroneous. Dr Newsholme, by taking a wider basis of experience, has arrived at the opposite conclusion, and finds that diphtheria does not, in fact, flourish more in sparsely-peopled districts. “When a sufficiently long series of years is taken,” he says, “it appears clear that there is more diphtheria in urban than in rural communities.” The rate for London has always been in excess of that for the whole of England and Wales. Its distribution at any given time is determined by a number of circumstances, and by their incidental co-operation, not by any property or predilection for town or country inherent in the disease. There are the epidemic conditions of soil and rainfall, previously discussed, which vary widely in different localities at different times; there is the steady influence of regular intercourse, and the accidental element of special distribution by various means. These things may combine to alter the

incidence. In short, accident plays too great a part to permit any general conclusion to be drawn from distribution, except from a very wide basis of experience. The variations are very great and sometimes very sudden. For instance, the county of London for some years headed the list, having a far higher death-rate than any other. In 1898 it dropped to the fifth place, and was surpassed by Rutland, a purely rural county, which had the lowest mortality of all in the previous year and very nearly the lowest for the previous ten years. Again, South Wales, which had had a low mortality for some years, suddenly came into prominence as a diphtheria district, and in 1898 had the highest death-rate in the country. Staffordshire and Bedfordshire show a similar rise, the one an urban, the other a rural, county. All the northern counties, both rural and urban,—namely, Northumberland, Durham, Cumberland, Westmorland, Lancashire, Yorkshire, Cheshire and Lincolnshire,—had a very high rate in 1861-1870, and a low one in 1896-1898. It is obviously unsafe to draw general conclusions from distribution data on a small scale. Diphtheria appears to creep about very slowly, as a rule, from place to place, and from one part of a large town to another; it forsakes one district and appears in another; occasionally it attacks a fresh locality with great energy, presumably because the local conditions are exceptionally favourable, which may be due to the soil or, possibly, to the susceptibility of the inhabitants, who are, so to speak, virgin ground. But through it all personal infection is the chief means of spread.

The acceptance of this doctrine has directed great attention to the practical question of school influence. There is no doubt whatever that it plays a very considerable part in spreading diphtheria. The incidence of the disease is chiefly on children, and nothing so often and regularly brings large numbers together in close contact under the same roof as school attendance. Nothing, in fact, furnishes such constant and extensive opportunities for personal infection. Many outbreaks have definitely been traced to schools. In London the subject has been very fully investigated by Sir Shirley Murphy, the medical officer of health to the London County Council, and by Dr W. R.

Smith, formerly medical officer of health to the London School Board. Sir Shirley Murphy has shown that a special incidence on children of school age began to manifest itself after the adoption of compulsory education, and that the summer holidays are marked by a distinct diminution of cases, which is succeeded by an increase on the return to school. Dr W. R. Smith's observations are directed rather to minimizing the effect of school influence, and to showing that it is less important than other factors; which is doubtless true, as has been already remarked. It appears that the heaviest incidence falls upon infants under school age, and that liability diminishes progressively after school age is reached. But this by no means disposes of the importance of school influence, as the younger children at home may be infected by older ones, who have picked up the contagion at school, but, being less susceptible, are less severely affected and exhibit no worse symptoms than a sore throat. From a practical point of view the problem is a difficult one to deal with, as it is virtually impossible to ensure the exclusion of all infection, on account of the deceptively mild forms it may assume; but considering how very often outbreaks of diphtheria necessitate the closing of schools, it would probably be to the advantage of the authorities to discourage, rather than to compel, the attendance of children with sore throats. A fact of some interest revealed by statistics is that in the earliest years of life the incidence of diphtheria is greater upon male than upon female children, but from three years onwards the position is reversed, and with every succeeding year the relative female liability becomes greater. This is probably due to the habit of kissing maintained among females, but more and more abandoned by boys from babyhood onwards.

All these considerations suggest the importance of segregating the sick in isolation hospitals. Of late years this preventive measure has been carried out with increasing efficiency, owing to the better provision of such hospitals and the greater willingness of the public to make use of them; and probably the improvement so effected has had some share in keeping down the prevalence of the disease to comparatively moderate proportions. Unfortunately, the

complete segregation of infected persons is hardly possible, because of the mild symptoms, and even absence of symptoms, exhibited by some individuals. A further difficulty arises with reference to the discharge of patients. It has been proved that the bacillus may persist almost indefinitely in the air-passages in certain cases, and in a considerable proportion it does persist for several weeks after convalescence. On returning home such cases may, and often do, infect others.

Treatment.

Since the antitoxin treatment was introduced in 1894 it has overshadowed all other methods. We owe this drug originally to the Berlin school of bacteriologists, and particularly to Dr Behring. The idea of making use of serum arose about 1890, out of researches made in connexion with Mechnikov's theory of phagocytosis, by which is meant the action of the phagocytes or white corpuscles of the blood in destroying the bacteria of disease. It was shown by the German bacteriologists that the serum or liquid part of the blood plays an equally or more important part in resisting disease, and the idea of combating the toxins produced by pathogenic bacteria with resistant serum injected into the blood presented itself to several workers. The idea was followed up and worked out independently in France and Germany, so successfully that by the year 1894 the serum treatment had been tried on a considerable scale with most encouraging results. Some of these were published in Germany in the earlier part of that year, and at the International Hygienic Congress, held in Budapest a little later, Dr Roux, of the Institut Pasteur, whose experience was somewhat more extensive than that of his German colleagues, read a paper giving the result of several hundred cases treated in Paris. When all allowance for errors had been made, they showed a remarkable and even astonishing reduction of mortality, fully confirming the conclusions drawn from the German experiments. This consensus of independent opinion proved a great stimulus to further trial, and before long one *clinique* after another told the same tale. The evidence was so favourable that Professor Virchow—the last man to be carried away by a novelty—declared it "the imperative duty of

medical men to use the new remedy" (*The Times*, 19th October 1894). Since then an enormous mass of facts has accumulated from all quarters of the globe, all testifying to the value of antitoxin in the treatment of diphtheria. The experience of the hospitals of the London Metropolitan Asylums Board for five years before and after antitoxin may be given as a particularly instructive illustration; but the subsequent reduction in the rate of mortality (12 in 1900, 11.3 in 1901, 10.8 in 1902, 9.3 in 1903, and an average of 9 in 1904-1908) added further confirmation.

Annual Case Mortality in Metropolitan Asylums Board's Hospitals.

Before Antitoxin.		After Antitoxin.	
Year.	Mortality per cent.	Year.	Mortality per cent.
1890	33.55	1895	22.85
1891	30.61	1896	21.20
1892	29.51	1897	17.79
1893	30.42	1898	15.37
1894	29.29	1899	13.95

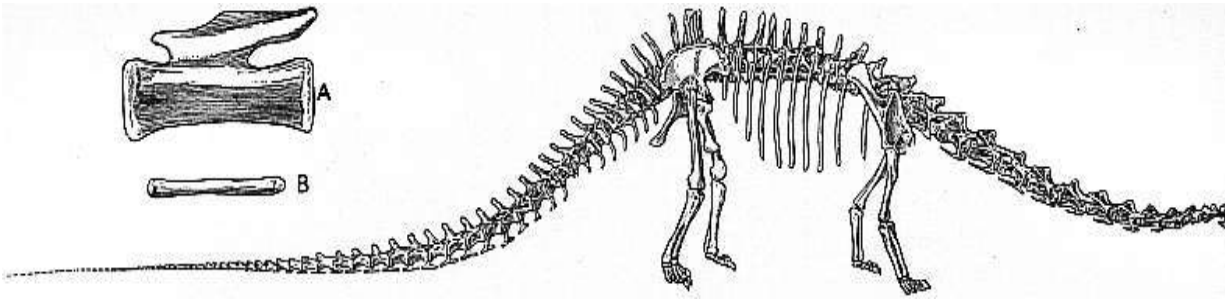
The number of cases dealt with in these five antitoxin years was 32,835, or an average of 6567 a year, and the broad result is a reduction of mortality by more than one-half. It is a fair inference that the treatment saves the lives of about 1000 children every year in London alone. This refers to all cases. Those which occur in the hospitals as a sequel to scarlet fever, and consequently come under treatment from the commencement, show very much more striking results. The case mortality, which was 46.8% in 1892 and 58.8% in 1893, has been reduced to 3.6% since the introduction of antitoxin. But the evidence is not from statistics alone. The beneficial effect of the treatment is equally attested by clinical observation. Dr Roux's original account has been confirmed by a cloud of witnesses year after year. "One may say," he wrote, "that the appearance of most of the patients is totally different

from what it used to be. The pale and leaden faces are scarcely seen in the wards; the expression of the children is brighter and more lively." Adult patients have described the relief afforded by inoculation; it acts like a charm, and lifts the deadly feeling of oppression off like a cloud in the course of a few hours. Finally, the counteracting effect of antitoxin in preventing the disintegrating action of the diphtheritic toxin on the nervous tissues has been demonstrated pathologically. There are some who still affect scepticism as to the value of this drug. They cannot be acquainted with the evidence, for if the efficacy of antitoxin in the treatment of diphtheria has not been proved, then neither can the efficacy of any treatment for anything be said to be proved. Prophylactic properties are also claimed for the serum; but protection is necessarily more difficult to demonstrate than cure, and though there is some evidence to support the claim, it has not been fully made out.

AUTHORITIES.—Adams, *Public Health*, vol. vii.; Thorne Thorne, *Milroy Lectures* (1891); Newsholme, *Epidemic Diphtheria*; W. R. Smith, *Harben Lectures* (1899); Murphy, *Report to London County Council* (1894); Sims Woodhead, *Report to Metropolitan Asylums Board* (1901).

DIPLODOCUS, a gigantic extinct land reptile discovered in rocks of Upper Jurassic age in western North America, the best-known example of a Sauropodous Dinosaur. The first scattered remains of a skeleton were found in 1877 by Prof. S.W. Williston near Cañon City, Colorado; and the tail and hind-limb of this specimen were described in the following year by Prof. O.C. Marsh. He noticed that in the part of the tail which dragged on the ground, each chevron bone below the vertebral column consisted of a pair of bars; and as so peculiar an arrangement for the protection of the artery and vein beneath

the tail had not previously been observed in any animal, he proposed the name *Diplodocus* (“double beam” or “double bar”) for the new reptile, adding the specific name *longus* in allusion to the elongated shape of the tail vertebrae. In 1884 Prof. Marsh described the head, vertebrae and pelvis of the same skeleton, which is now in the National Museum, Washington. In 1897 the next important specimen, a tail associated with other fragments, apparently of *Diplodocus longus*, was obtained by the American Museum of Natural History, New York, from Como Bluffs, Wyoming. In 1899-1900 large parts of two skeletons of another species, in a remarkable state of preservation, were disinterred by Messrs J. L. Wortman, O. A. Peterson and J. B. Hatcher in Sheep Creek, Albany county, Wyo., and these are now exhibited with minor discoveries in the Carnegie Museum, Pittsburg. There are also other specimens in New York, Chicago and the University of Wyoming. In 1901 Mr J. B. Hatcher studied the new species at Pittsburg, named it *Diplodocus carnegii*, and published the first restored sketch of a complete skeleton. Shortly afterwards plaster casts of the finest specimens were prepared under the direction of Mr J. B. Hatcher and Dr W. J. Holland, and these were skilfully combined to form the cast of a completely reconstructed skeleton, which was presented to the British Museum by Andrew Carnegie in 1905. This reconstruction is based primarily on a well-preserved chain of vertebrae, extending from the second cervical to the twelfth caudal, associated with the ribs, pelvis and several limb-bones. The tail is completed from two other specimens in the Carnegie Museum, having caudals 13 to 36 and 37 to 73 respectively in apparently unbroken series. Prof. Marsh’s specimen in Washington supplied the greater part of the skull; and the fore-foot is copied from a specimen in New York.



Reconstructed Skeleton of *Diplodocus carnegii*, Hatcher, about one-hundredth natural size. A and B, Caudal Vertebrae Nos. 36 and 70 of the same are about one-quarter natural size.

The cast of the reconstructed skeleton of *Diplodocus carnegii* measures 84 ft. in length and 12 ft. 9 in. in maximum height at the hind-limbs. It displays the elongated neck and tail and the relatively small head so characteristic of the Sauropodous Dinosaurs. The skull is inclined to the axis of the neck, denoting a browsing animal; while the feeble blunt teeth and flat expanded snout suggest feeding among succulent water-weeds. The large narial opening at the highest point of the head probably indicates an aquatic mode of life, and there seems to have been a soft valve to close the nostrils when under water. The diminutive brain-cavity, scarcely large enough to contain a walnut, is noteworthy. There are 104 vertebrae, namely, 15 in the neck, 11 in the back, 5 in the sacrum and 73 in the tail. The presacral vertebrae are of remarkably light construction, the plates and struts of bone being arranged to give the greatest strength with the least weight. The end of the tail is a flexible lash, which would probably be used as a weapon, like the tail of some existing lizards. The feet, notwithstanding the weight they had to support, are as unsymmetrical as those of a crocodile, with claws only on the three inner toes. There is no external armour.

See O. C. Marsh, *Amer. Journ. Sci.* ser. 3, vol. xvi. (1878), p. 414, pl. viii., and loc. cit. vol. xxvii. (1884), p. 161, pls. iii., iv.; H. F. Osborn, Mem. *Amer. Mus. Nat. Hist.* vol. i. pt. v. (1899); J. B. Hatcher, *Mem. Carnegie Mus.* vol. i. No. 1 (1901), and vol. ii. No. 1 (1903); W. J. Holland, *Mem. Carnegie Mus.* vol. ii. No. 6 (1906).

(A. S. Wo.)

DIPLOMACY (Fr. *diplomatie*), the art of conducting international negotiations. The word, borrowed from the French, has the same derivation as Diplomatic (*q.v.*), and, according to the *New English Dictionary*, was first used in England so late as 1796 by Burke. Yet there is no other word in the English language that could supply its exact sense. The need for such a term was indeed not felt; for what we know as diplomacy was long regarded, partly as falling under the *Jus gentium* or international law, partly as a kind of activity morally somewhat suspect and incapable of being brought under any system. Moreover, though in a certain sense it is as old as history, diplomacy as a uniform system, based upon generally recognized rules and directed by a diplomatic hierarchy having a fixed international status, is of quite modern growth even in Europe. It was finally established only at the congresses of Vienna (1815) and Aix-la-Chapelle (1818), while its effective extension to the great monarchies of the East, beyond the bounds of European civilization, was comparatively an affair of yesterday. So late as 1876 it was possible for the writer on this subject in the 9th edition of the *Encyclopaedia Britannica* to say that "it would be an historical absurdity to suppose diplomatic relations connecting together China, Burma and Japan, as they connect the great European powers."

Principles.—Though diplomacy has been usually treated under the head of international law, it would perhaps be more consonant with the facts to place international law under diplomacy. The principles and rules governing the intercourse of states, defined by a long succession of international lawyers, have no sanction save the consensus of the powers, established and

maintained by diplomacy (see BALANCE OF POWER); in so far as they have become, by international agreement, more than mere pious opinions of theorists, they are working rules established for mutual convenience, which it is the function of diplomacy to safeguard or to use for its own ends. In any case they by no means cover the whole field of diplomatic activity; and, were they swept away, the art of diplomacy, developed through long ages of experience, would survive.

This experience may perhaps be called the science, as distinct from the art, of diplomacy. It covers not only the province of international law, but the vast field of recorded experience which we know as history, of which indeed international law is but a part; for, as Bielfeld in his *Institutions politiques* (La Haye, 1760, t. I. ch. ii. § 13) points out, "public law is founded on facts. To know it we must know history, which is the soul of this science as of politics in general." The broad outlook on human affairs implied in "historical sense" is more necessary to the diplomatist under modern conditions than in the 18th century, when international policy was still wholly under the control of princes and their immediate advisers. Diplomacy was then a game of wits played in a narrow circle. Its objects too were narrower; for states were practically regarded as the property of their sovereigns, which it was the main function of their "agents" to enlarge or to protect, while scarcely less important than the preservation or rearrangement of territorial boundaries was that of precedence and etiquette generally, over which an incredible amount of time was wasted. The *haute diplomatie* thus resolved itself into a process of exalted haggling, conducted with an utter disregard of the ordinary standards of morality, but with the most exquisite politeness and in accordance with ever more and more elaborate rules. Much of the outcome of these dead debates has become stereotyped in the conventions of the diplomatic service; but the character of diplomacy itself has undergone a great change. This change is threefold: firstly, as the result of the greater sense of the community of interests among nations, which was one of the outcomes of the French Revolution; secondly, owing to the rise of democracy, with its expression in

parliamentary assemblies and in the press; thirdly, through the alteration in the position of the diplomatic agent, due to modern means of communication.

The first of these changes may be dated to the circular of Count Kaunitz of the 17th of July 1791, in which, in face of the Revolution, he impressed upon the powers the duty of making common cause for the purpose of preserving "public peace, the tranquillity of states, the inviolability of possessions, and the faith of treaties." The duty of watching over the common interests of Europe, or of the world, was thus for the first time officially recognized as a function of diplomacy, since common action could only be taken as the result of diplomatic negotiations. It would be easy to exaggerate the effective results of this idea, even when it had crystallized in the Grand Alliance of 1814 and been proclaimed to the world in the Holy Alliance of the 26th of September 1815 and the declaration of Aix-la-Chapelle. The cynical picture given by La Bruyère of the diplomatist of the 18th century still remained largely true: "His talk is only of peace, of alliances, of the public tranquillity, and of the public interests; in reality he is thinking only of his own, that is to say, of those of his master or of his republic."[1] The proceedings of the congress of Vienna proved how little the common good weighed unless reinforced by particular interests; but the conception of "Europe" as a political entity none the less survived. The congresses, notably the congress of Aix-la-Chapelle (*q.v.*) in 1818, were in a certain sense European parliaments, and their ostensible object was the furtherance of common interests. Had the imperial dreamer Alexander I. of Russia had his way, they would have been permanently established on the broad basis of the Holy Alliance, and would have included, not the great powers only, but representatives of every state (see ALEXANDER I. and EUROPE : *History*). Whatever the effective value of that "Concert of Europe" which was the outcome of the period of the congresses, it certainly produced a great effect on the spirit and the practice of diplomacy. In the congresses and conferences diplomacy assumes international functions both legislative and administrative. The diplomat is responsible, not only to his own government, but to "Europe." Thus Castlereagh was accused of subordinating the interests

of Great Britain to those of Europe; and the same charge was brought, perhaps with greater justice, against Metternich in respect of Austria. Canning's principle of "Every nation for itself and God for us all!" prevailed, it is true, over that of Alexander's "Confederation of Europe"; yet, as one outcome of the congresses, every diplomatic agent, though he represents the interests of his own state, has behind him the whole body of the treaties which constitute the public law of the world, of which he is in some sort the interpreter and the guardian.

Parallel with this development runs the second process making for change: the increasing responsibility of diplomacy to public opinion. To discuss all the momentous issues involved in this is impossible; but the subject is too important to be altogether passed over, since it is one of the main problems of modern international intercourse, and concerns every one who by his vote may influence the policy of the state to which he belongs. The question, broadly speaking, is: how far has the public discussion of international affairs affected the legitimate functions of diplomacy for better or for worse? To the diplomatist of the old school the answer seems clear. For him diplomacy was too delicate and too personal an art to survive the glare and confusion of publicity. Metternich, the last representative of the old *haute diplomatie*, lived to moralize over the ruin caused by the first manifestations of the "new diplomacy," the outcome of the rise of the power of public opinion. He had early, from his own point of view, unfavourably contrasted the "limited" constitutional monarchies of the west with the "free" autocracies of the east of Europe, free because they were under no obligation to give a public account of their actions. He himself was a master of the old diplomatic art, of intrigue, of veiling his purpose under a cloud of magniloquence, above all, of the art of personal fascination. But public opinion was for him only a dangerous force to be kept under control; and, even had he realized the necessity for appealing to it, he had none of the qualities that would have made the appeal successful. In direct antagonism to him was George Canning, who may be called the great prototype of the "new diplomacy," and to Metternich was a "malevolent

meteor hurled by divine providence upon Europe." Canning saw clearly the immense force that would be added to his diplomatic action if he had behind him the force of public opinion. In answer to Metternich's complaint of the tone of speeches in parliament and of the popular support given in England to revolutionary movements, he wrote, "Our influence, if it is to be maintained abroad, must be secure in its sources of strength at home: and the sources of that strength are in the sympathy between the people and the government; in the union of the public sentiment with the public counsels; in the reciprocal confidence of the House of Commons and the crown."[2]

It would be a mistake to jump to the conclusion that Canning was wholly right and Metternich wholly wrong. The conditions of the Habsburg monarchy were not those of Great Britain,[3] and even if it had been possible to speak of a public opinion in the Austrian empire at all, it certainly possessed no such organ as the British parliament. But the argument may be carried yet further. In the abstract the success of the policy of a minister in a democratic state must ultimately rest upon the support of public opinion; yet the necessity for this support has in the conduct of foreign affairs its peculiar dangers. In the difficult game of diplomacy a certain reticence is always necessary. Secret sources of information would be dried up were they to be lightly revealed; a plain exposition of policy would often give an undue advantage to the other party to a negotiation. Thus, even in Great Britain, the diplomatic correspondence laid before parliament is carefully edited, and all governments are jealous of granting access to their modern archives. Yet a representative assembly is apt to be resentful of such reservations. Its members know little or nothing of the conditions under which foreign affairs are conducted, and they are not unnaturally irritated by explanations which seem to lack candour or completeness. Canning himself had experience of this in the affair of the capture of the Danish fleet at Copenhagen; and Castlereagh's diplomacy was hampered by the bitter attacks of an opposition which accused him, with little justice, of pursuing a policy which he dared not reveal in its full scope to parliament. Moreover, the appeal to public opinion may be used as a

diplomatic weapon for ends no less "selfish" than any aimed at by the old diplomacy. Bismarck, whose statesmanship was at least as cynical as that of Metternich, was a master of the art of taking the world into his confidence—when it suited him to do so; and the "reptile press," hired to give a seemingly independent support to his policy, was one of his most potent weapons. So far the only necessary consequence of the growth of the power of public opinion on the art of diplomacy has been to extend the sphere of its application; it is but one more factor to be dealt with; and experience has proved that it is subject to the wiles of a skilful diplomatist no less than were the princes and statesmen with whom the old diplomacy was solely concerned.

The third factor making for change—the revolution in the means of communication which has brought all the world into closer touch—remains to be discussed. It is obvious that before the invention of the telegraph, the diplomatic agent was in a far more responsible position than he is now, when he can, in most cases, receive immediate instructions from his government on difficult questions as they arise. When communication was still slow there was often no time to await instructions, or the instructions when they arrived were not seldom already out of date and had to be set aside on the minister's own responsibility. It would, however, be easy to exaggerate the importance of this change as affecting the character and status of diplomatic agents. It is true that the tendency has been for ministers of foreign affairs to hold the threads of diplomacy in their own hands to a far greater extent than was formerly the case; but they must still depend for information and advice on the "man on the spot," and the success of their policy largely depends upon his qualities of discretion and judgment. The growth of democracy, moreover, has given to the ambassador a new and peculiar importance; for he represents not only the sovereign to the sovereign, but the nation to the nation; and, as a succession of notable American ambassadors to Great Britain has proved, he may by his personal qualities do a large amount to remove the prejudices and ignorances which stand as a barrier between the nations. It marks an immense advance in the comity of international intercourse when the representatives of

friendly powers are no longer regarded as “spies rather than ambassadors,” to be “quickly heard and dismissed,” as Philippe de Commines would have them, but as agreeable guests to be parted from with regret.

As to the qualifications for an ambassador, it is clearly impossible to lay down a general rule, for the same qualities are obviously not required in Washington as in Vienna, nor in Paris as in Pekin. Yet the effort to depict the ideal ambassador bulks largely in the works of the earlier theorists, and the demands they make are sufficiently alarming. Ottaviano Maggi, himself a diplomatist of the brilliant age of the Renaissance, has left us in his *De legato* (Hanoviae, 1596) his idea of what an ambassador should be. He must not only be a good Christian but a learned theologian; he must be a philosopher, well versed in Aristotle and Plato, and able at a moment’s notice to solve in correct dialectical form the most abstruse problems; he must be well read in the classics, and an expert in mathematics, architecture, music, physics and civil and canon law. He must not only know how to write and speak Latin with classical refinement, but he must be a master of Greek, Spanish, French, German and Turkish. He must have a sound knowledge of history, geography and the science of war; but at the same time is not to neglect the poets, and never to be without his Homer. Add to this that he must be well born, rich and of a handsome presence, and we have a portrait of a diplomatist whose original can hardly have existed even in that age of brilliant versatility. The Dutchman Frederikus de Marselaer, in his κηρυκεῖον *sive legationum insigne* (Antwerp, 1618), is scarcely less exacting than the Venetian. His ideal ambassador is a nobleman of fine presence and in the prime of life, famous, rich, munificent, abstemious, not violent, nor quarrelsome, nor morose, no flatterer, learned, eloquent, witty without being talkative, a good linguist, widely read, prudent and cautious, but brave and—as he adds somewhat superfluously—many-sided.

With these theoretical perfections one or two instances of the qualifications demanded by the exigencies of practical politics may be cited by way of

illuminating contrast. At the court of the empress Elizabeth of Russia good looks were a surer means of diplomatic success than all the talents and virtues, and the princess of Zerbst (mother of the empress Catherine II.) wrote to Frederick of Prussia advising him to replace his elderly ambassador by a handsome young man with a good complexion; and the essential qualification for an ambassador to Switzerland, Germany, Poland, Denmark and Russia used to be that he should be able to drink the native diplomatists, seasoned from babyhood to strong liquors, under the table.

History.—In its widest sense the history of diplomacy is that of the intercourse between nations, in so far as this has not been a mere brute struggle for the mastery;[4] in a narrower sense, with which the present article is alone concerned, it is that of the methods and spirit of diplomatic intercourse and of the character and status of diplomatic agents. Earlier writers on the office and functions of ambassadors, such as Gentilis or Archbishop Germonius, conscientiously trace their origin to God himself, who created the angels to be his legates; and they fortify their arguments by copious examples drawn from ancient history, sacred and profane. But, whatever the influence upon it of earlier practice, modern diplomacy really dates from the rise of permanent missions, and the consequent development of the diplomatic hierarchy as an international institution. Of this the first beginnings are traceable to the 15th century and to Italy. There had, of course, during the middle ages been embassies and negotiations; but the embassies had been no more than temporary missions directed to a particular end and conducted by ecclesiastics or nobles of a dignity appropriate to each occasion; there were neither permanent diplomatic agents nor a professional diplomatic class. To the evolution of such a class the Italy of the Renaissance, the nursing-ground of modern statecraft, gave the first impetus. This was but natural; for Italy, with its numerous independent states, between which there existed a lively intercourse and a yet livelier rivalry, anticipated in miniature the modern states' system of Europe. In feudal Europe there had been little room for diplomacy; but in northern and central Italy feudalism had never taken root,

and in the struggles of the peninsula diplomacy had early played a part as great as, or greater than, war. Where all were struggling for the mastery, the existence of each depended upon alliances and counter-alliances, of which the object was the maintenance of the balance of power. In this school there was trained a notable succession of men of affairs. Thus, in the 13th and 14th centuries Florence counted among her envoys Dante, Petrarch and Boccaccio, and later on could boast of agents such as Capponi, Vettori, Guicciardini and Machiavelli. Papal Rome, too, as was to be expected, had always been a fruitful nursing-mother of diplomatists; and some authorities have traced the beginnings of modern diplomacy to a conscious imitation of her legatine system.[5]

It is, however, in Venice, that the origins of modern diplomacy are to be sought.[6] So early as the 13th century the republic, with a view to safeguarding the public interests, began to lay down a series of rules for the conduct of its ambassadors. Thus, in 1236, envoys to the court of Rome are forbidden to procure a benefice for anyone without leave of the doge and little council; in 1268 ambassadors are commanded to surrender on their return any gifts they may have received, and by another decree they are compelled to take an oath to conduct affairs to the honour and advantage of the republic. About the same time it was decided that diplomatic agents were to hand in, on their return, a written account of their mission; in 1288 this was somewhat expanded by a law decreeing that ambassadors were to deposit, within fifteen days of their return, a written account of the replies made to them during their mission, together with anything they might have seen or heard to the honour or in the interests of the republic. These provisions, which were several times renewed, notably in 1296, 1425 and 1533, are the origin of the famous reports of the Venetian ambassadors to the senate, which are at once a monument to the political genius of Venetian statesmen and a mine of invaluable historical material.[7]

These are but a few examples of a long series of regulations, many others also dating to the 13th century, by which the Venetian government sought to systematize its diplomatic service. That permanent diplomatic agencies were not established by it earlier than was the case is probably due to the distrust of its agents by which most of this legislation of the republic is inspired. In the 13th century two or three months was considered over-long a period for an ambassador to reside at a foreign court; in the 15th century the period of residence was extended to two years, and in the 16th century to three. This latter rule continued till the end of the republic; the embassy had become permanent, but the ambassador was changed every three years.

The origin of the change from temporary to permanent missions has been the subject of much debate and controversy. The theory that it was due, in the first instance, to the evolution of the Venetian consulates (*bajulats*) in the Levant into permanent diplomatic posts, and that the idea was thence transferred to the West, is disproved by the fact that Venice had established other permanent embassies before the baylo (*q.v.*) at Constantinople was transformed into a diplomatic agent of the first rank. Nor is the first known instance of the appointment of a permanent ambassador Venetian. The earliest record[8] is contained in the announcement by Francesco Sforza, duke of Milan, in 1455, of his intention to maintain a permanent embassy at Genoa[9]; and in 1460 the duke of Savoy sent Eusebio Margaria, archdeacon of Vercelli, as his permanent representative to the Curia.[10] Though, however, the early records of such appointments are rare, the practice was probably common among the Italian states. Its extension to countries outside Italy was a somewhat later development. In 1494 Milan is already represented in France by a permanent ambassador. In 1495 Zacharia Contarini, Venetian ambassador to the emperor Maximilian, is described by Sanuto (*Diarii*, i. 294) as *stato ambasciatore*; and from the time of Charles V. onwards the succession of ambassadors of the republic at the imperial court is fairly traceable. In 1496 “as the way to the British Isles is very long and very dangerous,” two merchants resident in London, Pietro Contarini and Luca Valaressa, were appointed by the republic

subambasciatores; and in June of the same year Andrea Trevisano arrived in London as permanent ambassador at the court of Henry VII.[11] Florence, too, from 1498 onwards, was represented at the courts of Charles V. and of France by permanent ambassadors.

During the same period the practice had been growing up among the other European powers. Spain led the way in 1487 by the appointment of Dr Roderigo Gondesalvi de Puebla as ambassador in England. As he was still there in 1500, the Spanish embassy in London may be regarded as the oldest still surviving post of the new permanent diplomacy. Other states followed suit, but only fitfully; it was not till late in the 16th century that permanent embassies were regarded as the norm. The precarious relations between the European powers during the 16th century, indeed, naturally retarded the development of the system. Thus it was not till after good relations had been established with France by the treaty of London that, in 1519, Sir Thomas Boleyn and Dr West were sent to Paris as resident English ambassadors, and, after the renewed breach between the two countries, no others were appointed till the reign of Elizabeth. Nine years before, Sir Robert Wingfield, whose simplicity earned him the nickname of "Summer-shall-be-green," had been sent as ambassador to the court of Charles V., where he remained from 1510 to 1517; and in 1520 the mutual appointment of resident ambassadors was made a condition of the treaty between Henry VIII. and Charles V. In 1517 Thomas Spinelly, who had for some years represented England at the court of the Netherlands, was appointed "resident ambassador to the court of Spain," where he remained till his death on the 22nd of August 1522. These are the most important early instances of the new system. Alone of the great powers, the emperor remained permanently unrepresented at foreign courts. In theory this was the result of his unique dignity, which made him superior to all other potentates; actually it was because, as emperor, he could not speak for the practically independent princes nominally his vassals. It served all practical purposes if he were represented abroad by his agents as king of Spain or archduke of Austria.

All the evidence now available goes to prove that the establishment of permanent diplomatic agencies was not an unconscious and accidental development of previous conditions, but deliberately adopted as an obvious convenience. But, while all the powers were agreed as to the convenience of maintaining such agencies abroad, all were equally agreed in viewing the representatives accredited to them by foreign states with extreme suspicion. This attitude was abundantly justified by the peculiar ethics of the new diplomacy. The old "orators" of the Summer-shall-be-green type could not long hold their own against the new men who had studied in the school of Italian statecraft, for whom the end justified the means. Machiavelli had gathered in *The Prince* and *The Discourses on Livy* the principles which underlay the practice of his day in Italy; Francis I., the first monarch to establish a completely organized diplomatic machinery, did most to give these principles a European extension. By the close of the 16th century diplomacy had become frankly "Machiavellian," and the ordinary rules of morality were held not to apply to the intercourse between nations. This was admitted in theory as well as in practice. Germonius, after a vigorous denunciation of lying in general, argues that it is permissible for the safety or convenience (*commodo*) of princes, since *salus populi suprema lex*, and *quod non permittit naturalis ratio, admittit civilis*; and he adduces in support of this principle the answer given by Ulysses to Neoptolemus, in the *Ajax* of Sophocles, and the examples of Abraham, Jacob and David. Paschalius, while affirming that an ambassador must study to speak the truth, adds that he is not such a "rustic boor" as to say that an "official lie" (*officiosum mendacium*) is never to be employed, or to deny that an ambassador should be, on occasion, *splendide mendax*.[12] The situation is summed up in the famous definition of Sir Henry Wotton, which, though excused by himself as a jest, was held to be an indiscreet revelation of the truth: "An ambassador is an honest man sent to lie abroad for the good of his country."[13] The most successful liar, in fact, was esteemed the most successful diplomatist. "A prime article of the catechism of ambassadors," says Bayle in his *Dictionnaire critique* (1699), "whatever their

religion, is to invent falsehoods and to go about making society believe them." So universally was this principle adopted that, in the end, no diplomatist even expected to be believed; and the best way to deceive was—as Bismarck cynically avowed—to tell the truth.

But, in addition to being a liar *ex officio*, the ambassador was also "an honourable spy." "The principal functions of an envoy," says Francois de Callières, himself an ex-ambassador of Louis XIV., "are two; the first is to look after the affairs of his own prince; the second is to discover the affairs of the other." A clever minister, he maintains, will know how to keep himself informed of all that goes on in the mind of the sovereign, in the councils of ministers or in the country; and for this end "good cheer and the warming effect of wine" are excellent allies.[14] This being so, it is hardly to be wondered at that foreign ambassadors were commonly regarded as perhaps necessary, but certainly very unwelcome, guests. The views of Philippe de Commines have already been quoted above, and they were shared by a long series of theoretical writers as well as by men of affairs. Gentilis is all but alone in his protest against the view that all ambassadors were *exploratores magis quam oratores*, and to be treated as such. So early as 1481 the government of Venice had decreed the penalty of banishment and a heavy fine for any one who should talk of affairs of state with a foreign envoy, and though the more civilized princes did not follow the example of the sultan, who by way of precaution locked the ambassador of Ferdinand II., Jerome Laski, into "a dark and stinking place without windows," they took the most minute precautions to prevent the ambassadors of friendly powers from penetrating into their secrets. Charles V. thought it safest to keep them as far away as possible from his court. So did Francis I.; and, when affairs were critical, he made his frequent changes of residence and his hunting expeditions the excuse for escaping from their presence. Henry VII. forbade his subjects to hold any intercourse with them, and, later on, set spies upon them and examined their correspondence—a practice by no means confined to England. If the system of permanent embassies survived, it is clear that this was mainly due to the

belief of the sovereigns that they gained more by maintaining "honourable spies" at foreign courts than they lost by the presence of those of foreign courts at their own. It was purely a question of the balance of advantage. Neither among statesmen nor among theorists was there any premonition of the great part to be played by the permanent diplomatic body in the development and maintenance of the concert of Europe. To Paschalius the permanent embassies were "a miserable outgrowth of a miserable age."[15] Grotius himself condemned them as not only harmful, but useless, the proof of the latter being that they were unknown to antiquity.[16]

Development of the Diplomatic Hierarchy.—The history of the diplomatic body[17] is, like that of other bodies, that of the progressive differentiation of functions. The middle ages knew no classification of diplomatic agents; the person sent on mission is described indifferently as *legatus*, *orator*, *nuntius*, *ablegatus*, *commissarius*, *procurator*, *mandatarius*, *agens* or *ambaxator* (*ambassator,* &c.). In Gundissalvus, *De legato* (1485), the oldest printed work on the subject, the word *ambasiator*, first found in a Venetian decree of 1268, is applied to any diplomat. Florence was the first to make distinction; the *orator* was appointed by the council of the republic; the *mandatorio*, with inferior powers, by the Council of Ten. In 1500 Machiavelli, who held only the latter rank, wrote from France urging the Signoria to send *ambasiadori*. This was, however, rather a question of powers than of dignity. But the causes which ultimately led to the elaborate differentiation of diplomatic ranks were rather questions of dignity than of functions.[18] The breakdown of feudalism, with the consequent rise of a series of sovereign states or of states claiming to be sovereign, of very various size and importance, led to a certain confusion in the ceremonial relation between them, which had been unknown to the comparatively clearly defined system of the middle ages. The smaller states were eager to assert the dignity of their actual or practical independence; the greater powers were equally bent on "keeping them in their place." If the emperor, as has been stated above, was too exalted to send ambassadors,

certain of the lesser states were soon esteemed too humble to be represented at the courts of the great powers save by agents of an inferior rank. By the second half of the 16th century, then, there are two classes of diplomatists, ambassadors and residents or agents, the latter being accounted ambassadors of the second class.[19] At first the difference of rank was determined by the status of the sovereign by whom or to whom the diplomatic agent was accredited; but early in the 16th century it became fairly common for powers of the first rank to send agents of the second class to represent them at courts of an equal status. The reasons were various, and not unamusing. First and foremost came the question of expense. The ambassador, as representing the person of his sovereign, was bound by the sentiment of the age to display an exaggerated magnificence. His journeys were like royal progresses, his state entries surrounded with every circumstance of pomp, and it was held to be his duty to advertise the munificence of his prince by boundless largesses. Had this munificence been as unlimited in fact as in theory, all might have been well, but, in that age of vaulting ambitions, depleted exchequers were the rule rather than the exception in Europe; the records are full of pitiful appeals from ambassadors for arrears of pay, and appointment to an embassy often meant ruin, even to a man of substance. To give but one example, Sir Richard Morison, Edward VI.'s ambassador in Germany, had to borrow money to pay his debts before he could leave Augsburg (*Cal. State Pap. Edw. VI.*, No. 467), and later on he writes from Hamburg (April 9, 1552) that he could buy nothing, because everyone believed that he had packed up in readiness to flit secretly, for "How must they buy things, where men know their stuff is ready trussed up, and they fleeting every day?" (ib. No. 544). But the dignity of ambassador carried another drawback besides expense; his function of "honourable spy" was seriously hampered by the trammels of his position. He was unable to move freely in society, but lived a ceremonial existence in the midst of a crowd of retainers, through whom alone it was proper for him to communicate with the world outside. It followed that, though the office of ambassador was more dignified, that of agent was more generally useful.

Yet a third cause, possibly the most immediately potent, encouraged the growth of the lesser diplomatic ranks: the question of precedence among powers theoretically equal. Modern diplomacy has settled a difficulty which caused at one time much heart-burning and even bloodshed by a simple appeal to the alphabet. Great Britain feels no humiliation in signing after France, if the reason be that her name begins with G; had she not been Great, she would sign before. The vexed question of the precedence of ambassadors, too, has been settled by the rule, already referred to above, as to seniority of appointment. But while the question remained unsettled it was obviously best to evade it; and this was most easily done by sending an agent of inferior rank to a court where the precedence claimed for an ambassador would have been refused.

Thus set in motion, the process of differentiation continues until the system is stereotyped in the 19th century. It is unnecessary to trace this evolution here in any detail. It is mainly a question of names, and diplomatic titles are no exception to the general rule by which all titles tend to become cheapened and therefore, from time to time, need to be reinforced by fresh verbal devices. The method was the familiar one of applying terms that had once implied a particular quality in a fashion that implied actually nothing. The ambassador extraordinary had originally been one sent on an extraordinary mission; for the time and purpose of this mission his authority superseded that of the resident ambassador. But by the middle of the 17th century the custom had grown up of calling all ambassadors “extraordinary,” in order to place them on an equality with the others. The same process was extended to diplomatists of the second rank; and envoys (*envoyé* for *ablegatus*) were always “extraordinary,” and as such claimed and received precedence over mere “residents,” who in their day had asserted the same claim against the agents—all three terms having at one time been synonymous. Similarly a “minister plenipotentiary” had originally meant an agent armed with full powers (*plein-pouvoir*); but, by a like process, the combination came to mean as little as “envoy extraordinary”—though a plenipotentiary *tout simple* is still an agent,

of no ceremonially defined dignity, despatched with full powers to treat and conclude. Finally, the evolution of the title of a diplomatist of the second rank is crowned by the high-sounding combination, now almost exclusively used, of "envoy extraordinary and minister plenipotentiary." The ultimate fate of the simple title "resident" was the same as that of "agent." Both had been freely sold by needy sovereigns to all and sundry who were prepared to pay for what gave them a certain social status. The "agent" fell thus into utter discredit, and those "residents" who were still actual diplomatic agents became "ministers resident" to distinguish them from the common herd.

The classification of diplomatic agents was for the first time definitively included in the general body of international law by the *Règlement* of the 19th of March 1815 at Vienna[20]; and the whole question was finally settled at the congress of Aix-la-Chapelle (November 21, 1818) when, the proposal to establish precedence by the status of the accrediting powers having wisely been rejected, diplomatic agents were divided into four classes: (1) Ambassadors, legates, nuncios; (2) Envoys extraordinary and ministers plenipotentiary, and other ministers accredited direct to the sovereign; (3) Ministers resident; (4) Chargés d'affaires. With a few exceptions (*e.g.* Turkey), this settlement was accepted by all states, including the United States of America.

Rights and Privileges of Diplomatic Agents.—These are partly founded upon immemorial custom, partly the result of negotiations embodied in international law. The most important, as it is the most ancient, is the right of personal *inviolability* extended to the diplomatic agent and the members of his suite. This inviolability is maintained after a rupture between the two governments concerned, and even after the outbreak of war. The habit of the Ottoman government of imprisoning in the Seven Towers the ambassador of a power with which it quarrelled was but an exception which proved the rule. The second important right is that of exterritoriality (*q.v.*), a convenient fiction by which the house and equipages of the diplomatic agent are regarded as the

territory of the power by whom he is accredited. This involves the further principle that the agent is in no way subject to the receiving government. He is exempt from taxation and from the payment at least of certain local rates. He also enjoys immunity (1) from civil jurisdiction, *e.g.* he cannot be sued, nor can his goods be seized, for debt; (2) from criminal jurisdiction, *e.g.* he cannot be arrested and tried for a criminal offence. For a crime of violence, however, or for plotting against the state, he can be placed under the necessary restraint and expelled the country.[21] These immunities extend to all the members of an envoy's suite. The difficulties that might be supposed to arise from such exemptions have not in practice been found very serious; for though, in the case of crimes committed by servants of agents of the first or second class the procedure is not clearly defined, each case would easily be made the subject of arrangement. In certain cases, *e.g.* embassies in Turkey, the exterritoriality of ambassadors implies a fairly extensive criminal jurisdiction; in other cases the dismissal of the servant would deprive him of his diplomatic immunity and bring him under the law of the land. The right of granting asylum claimed by diplomatic agents in virtue of that of exterritoriality, at one time much abused, is now strictly limited. A political or criminal offender may seek asylum in a foreign embassy; but if, after a request has been formally made for his surrender, the ambassador refuses to deliver him up, the authorities may take the measures necessary to effect his arrest, and even force an entrance into the embassy for the purpose. The "right of chapel" (*droit de chapelle*, or *droit de culte*), enjoyed by envoys in reference to their exterritoriality, *i.e.* the right of free exercise of religious worship within their house, formerly of great importance, has been rendered superfluous by the spread of religious toleration. (See L. Oppenheim, *Internat. Law* (London, 1905) ,i. p. 441, &c.; A.W. Haffter, *Das europäische Völkerrecht* (Berlin, 1888), p. 435, &c.)

The Personnel of the "Corps diplomatique."—The establishment of diplomacy as a regular branch of the civil service is of modern growth, and even now by no means universal. From old time states naturally chose as their

agents those who would best serve their interests in the matter in hand. In the middle ages diplomacy was practically a monopoly of the clergy, who as a class alone possessed the necessary qualifications: and in later times, when learning had spread to the laity as well, there were still potent reasons why the clergy should continue to be employed as diplomatic agents. Of these reasons the most practical was that of expense; for the wealth of the church formed an inexhaustible reserve which was used without scruple for secular purposes. Francis I. of France, who by the Concordat with Rome had in his hands the patronage of all the sees and abbeys in France, used this partly to reward his clerical ministers, partly as a great secret service fund for bribing the ambassadors of other powers, partly for the payment of those high-placed spies at foreign courts maintained by the elaborately organized system known as the *Secret du Roi*.[22] None the less, in the 16th century, laymen as diplomats are already well in evidence. They are usually lawyers, rarely soldiers, occasionally even simple merchants. Not uncommonly they were foreigners, like the Italian Thomas Spinelly mentioned above, drawn from that cosmopolitan class of diplomats who were ready to serve any master. Though nobles were often employed as ambassadors by all the powers, Venice alone made nobility a condition of diplomatic service. They were professional in the sense that, for the most part, diplomacy was the main occupation of their lives; there was, however, no graded diplomatic service in which, as at present, it was possible to rise on a fixed system from the position of simple *attaché* to that of minister and ambassador. The "attaché to the embassy" existed[23]; but he was not, as is now the case, a young diplomat learning his profession, but an experienced man of affairs, often a foreigner employed by the ambassador as adviser, secret service agent and general go-between, and he was without diplomatic status.[24] The 18th century saw the rise of the diplomatic service in the modern sense. The elaboration of court ceremonial, for which Versailles had set the fashion, made it desirable that diplomatic agents should be courtiers, and young men of rank about the court began to be attached to missions for the express purpose of teaching them the art of

diplomacy. Thus arose that aristocratic diplomatic class, distinguished by the exquisite refinement of its manners, which survived from the 18th century into the 19th. Modern democracy has tended to break with this tradition, but it still widely prevails. Even in Great Britain, where the rest of the public services have been thrown open to all classes, a certain social position is still demanded for candidates for the diplomatic service and the foreign office, and in addition to passing a competitive examination, they must be nominated by someone of recognized station prepared to vouch for their social qualifications. In America, where no regular diplomatic service exists, all diplomatic agents are nominated by the president.

The existence of an official diplomatic service, however, by no means excludes the appointment of outsiders to diplomatic posts. It is, in fact, one of the main grievances of the regular diplomatic body that the great rewards of their profession, the embassies, are so often assigned to politicians or others who have not passed through the drudgery of the service. But though this practice has, doubtless, sometimes been abused, it is impossible to criticize the wisdom of its occasional application.

A word may be added as to the part played by women in diplomacy. So far as their unofficial influence upon it is concerned, it would be impossible to exaggerate its importance; it would suffice to mention three names taken at random from the annals of the 19th century, Madame de Staël, Baroness von Krüdener, and Princess Lieven. Gentz comments on the “feminine intrigues” that darkened the counsels of the congresses of Vienna and Aix-la-Chapelle, and from which the powers so happily escaped in the bachelor seclusion of Troppau. Nor is it to be supposed that statesmen will ever renounce a diplomatic weapon so easy of disguise and so potent for use. A brilliant *salon* presided over by a woman of charm may be a most valuable centre of a political propaganda; and ladies are still widely employed in the secret diplomacy of the powers. Their employment as regularly accredited diplomatic agents, however, though not unknown, has been extremely rare. An

interesting instance is the appointment of Catherine of Aragon, when princess of Wales, as representative of her father, Ferdinand the Catholic, at the court of Henry VII. (G. A. Bergenroth, *Calendar of State Papers ... England and Spain—in the Archives at Simancas, &c.*, i. pp. xxxiii, cxix).

LITERATURE.—Besides general works on international law (*q.v.*) which necessarily deal with the subject of diplomacy, a vast mass of treatises on diplomatic agents exists. The earliest printed work is the *Tractatus de legato* (Rome, 1485) of Gundissalvus (Gonsalvo de Villadiego), professor of law at Salamanca, auditor for Spain at the Roman court of the Rota, and bishop of Oviedo; but the first really systematic writer on the subject was Albericus Gentilis, *De legationibus libri iii*. (London, 1583, 1585, Hanover, 1596, 1607, 1612). For a full bibliography of works on ambassadors see Baron Diedrich H. L. von Ompteda, *Litteratur des gesammten sowohl natürlichen als positiven Völkerrechts* (Regensburg, 1785), p. 534, &c., which was completed and continued by the Prussian minister Karl Albert von Kamptz, in *Neue Literatur des Völkerrechts seit dem Jahre 1784* (Berlin, 1817), p. 231. A list of writers, with critical and biographical remarks, is also given in Ernest Nys's "Les Commencements de la diplomatie et le droit d'ambassade jusqu'à Grotius," in the *Revue de droit international*, vol. xvi. p. 167. Other useful modern works on the history of diplomacy are: E. C. Grenville-Murray, *Embassies and Foreign Courts, a History of Diplomacy* (2nd ed., 1856); J. Zeller, *La Diplomatie française vers le milieu du XVI^e siècle* (Paris, 1881); A. O. Meyer, *Die englische Diplomatie in Deutschland zur Zeit Eduards VI. und Mariens* (Breslau, 1900); and, above all, Otto Krauske, *Die Entwickelung der ständgien Diplomatie vom fünfzehnten Jahrhundert bis zu den Beschlüssen von 1815 und 1818*, in Gustav Schmoller's *Staats- und socialwissenschaftliche Forschungen*, vol. v. (Leipzig, 1885). To these may be added, as admirably illustrating in detail the early developments of modern diplomacy, Logan Pearsall Smith's *Life and Letters of Sir Henry Wotton* (Oxford, 1907). Of works on

modern diplomacy the most important are the *Guide diplomatique* of Baron Charles de Martens, new edition revised by F. H. Geffcken, 2 vols. (Leipzig, 1866), and P. Pradier-Fodéré, *Cours de droit diplomatique*, 2 vols. (Paris, 1881).

(W. A. P.)

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1 La Bruyère, *Caractères*, ii. 77 (ed. P. Jouast, Paris, 1881).

2 To Wellesley, in Stapleton's *Canning*, i. 374.

3 For the motives of Metternich's foreign policy see AUSTRIA-HUNGARY : *History* (iii. 332-333).

4 *e.g. A History of Diplomacy in the International Development of Europe*, by D. J. Hill (London and New York, 1905).

5 For this see Hinschius, *Kirchenrecht*, i. p. 498.

6 The Venetians, however, in their turn, doubtless learned their diplomacy originally from the Byzantines, with whom their trade expansion in the Levant early brought them into close contact. For Byzantine diplomacy see ROMAN EMPIRE, LATER : *Diplomacy*.

7 See Eugenio Albèri, *Le Relazioni degli ambasciatori Veneti al senato*, 15 vols. (Florence, 1839-1863).

8 The *apocrisiarii* (ἀποκρισιάριοι) or *responsales* should perhaps be mentioned, though they certainly did not set the precedent for the modern permanent missions. They were resident agents, practically legates, of the popes at the court of Constantinople. They were established by Pope Leo I., and continued until the Iconoclastic controversy broke the intimate ties between East and West. See Luxardo, *Das vordekretalische Gesandtschaftsrecht der Päpste* (Innsbruck, 1878); also Hinschius, *Kirchenrecht*, i. 501.

9 N. Bianchi, *Le Materie politiche relative all' estero degli archivi di stato piemontese* (Bologna, Modena, 1875), p. 29.

10 Ib. Note 2, *teneamus et deputemus ibidem continue mansurum.*

11 The first ambassador of Venice to visit England was Zuanne da Lezze, who came in 1319 to demand compensation for the plundering of Venetian ships by English pirates.

12 Germonius, *De legatis principum et populorum libri tres* (Rome, 1627), chap. vi. p. 164; Paschalius, *Legatus* (Rouen, 1598), p. 302. Étienne Dolet, who had been secretary to Cardinal Jean du Bellay, and was burned for atheism in 1546, in his *De officio legati* (1541) advises ambassadors to surround themselves with taciturn servants, to employ vigilant spies, and to set afoot all manner of fictions, especially when negotiating with the court of Rome or with the Italian princes.

13 See Pearsall Smith, *Sir Henry Wotton*, pp. 49, 126 et seq.

14 François de Callières, *De la manière de négocier avec les souverains* (Brussels, 1716). See also A. Sorel, *Recueil des instructions données aux ambassadeurs et ministres de France* (Paris, 1884), *e.g.* vol. *Autriche*, pp. 77, 88, 102, 112.

15 "Nova res est, quod sciam, et infelicis hujus aetatis infelix partus.... Hinc oriri securitatem universorum, hinc stabiliri pacem gentium. Quae utinam tam vere dicerentur, quam speciose. Ego quidem, ne quid dissimulem, ab istis seorsum sentio. Nimirum, effoeta virtutis, foecunda fraudis haec saecula video peperisse spissata haec imperia, sive summas potestates, unde, ut e vomitariis, hae legationes undatim se fundunt." Paschalius, *Legatus* (1598), p. 447. So too Félix de la Mothe Le Vayer (1547-1625), in his *Legatus* (Paris, 1579), says "Legatos tunc primum aut non multum post institutos fuisse cum Pandora malorum omnium semina in hunc mundum ... demisit."

16 *De jure belli et pacis* (Amsterdam, 1621), ii. c. 18, § 3, n. 2.

17 The term *corps diplomatique* originated about the middle of the 18th century. "The Chancellor Furst," says Ranke (xxx. 47, note), "does not use it as yet in his report (1754) but he knows it," and it would appear that it had just been invented at Vienna. "Corps diplomatique, nom qu'une dame donna un jour à ce corps nombreux de ministres étrangers à Vienne."

18 So too Pradier-Fodéré, vol. i. p. 262.

19 Thus Charles V. would not allow the representatives of the duke of Mantua, Ferrara, &c., to style themselves "ambassadors," on the ground that this title could be borne only by the agents of kings and of the republic of Venice, and not by those of states whose sovereignty was impaired by any feudal relation to a superior power. (See Krauske p. 155.)

20 See Pradier-Fodéré, i. 265.

21 Gentilis, who had been consulted by the government in the case of the Spanish ambassador, Don Bernardino de Mendoza, expelled for intriguing against Queen Elizabeth, lays this down definitely. An ambassador, he says, need not be received, and he may be expelled. In actual practice a diplomatic agent who has made himself objectionable is withdrawn by his government on the representations of that to which he is accredited, and it is customary, before an ambassador is despatched, to find out whether he is a *persona grata* to the power to which he is accredited.

22 See Zeller.

23 A. O. Meyer, p. 22.

24 See the amusing account of the methods of these agents in Morysine to Cecil (January 23, 1551-1552), *Cal. State Pap. Edw. VI.*, No. 530.

DIPLOMATIC, the science of diplomas, founded on the critical study of the "diplomatic" sources of history: diplomas, charters, acts, treaties, contracts, judicial records, rolls, chartularies, registers, &c. The employment of the word "diploma," as a general term to designate an historical document, is of comparatively recent date. The Roman diploma, so called because it was formed of two sheets of metal which were shut together (Gr. διπλοῦν, to double) like the leaves of a book, was the passport or licence to travel by the public post; also, the certificate of discharge, conferring privileges of citizenship and marriage on soldiers who had served their time; and, later, any imperial grant of privileges. The word was adopted, rather pedantically, by the humanists of the Renaissance and applied by them to important deeds and to acts of sovereign authority, to privileges granted by kings and by great personages; and by degrees the term became extended and embraced generally the documents of the middle ages.

History of the Study.—The term "diplomatic," the French *diplomatique*, is a modern adaptation of the Latin phrase *res diplomatica* employed in early works upon the subject, and more especially in the first great text-book, the *De re diplomatica*, issued in 1681 by the learned Benedictine, Dom Jean Mabillon, of the abbey of St Germain-des-Prés. Mabillon's treatise was called forth by an earlier work of Daniel van Papenbroeck, the editor of the *Acta Sanctorum* of the Bollandists, who, with no great knowledge or experience of archives, undertook to criticize the historical value of ancient records and monastic documents, and raised wholesale suspicions as to their authenticity in his *Propylaeum antiquarium circa veri ac falsi discrimen in vetustis membranis*, which he printed in 1675. This was a rash challenge to the Benedictines, and especially to the congregation of St Maur, or confraternity

of the Benedictine abbeys of France, whose combined efforts produced great literary works which still remain as monuments of profound learning. Mabillon was at that time engaged in collecting material for a great history of his order. He worked silently for six years before producing the work above referred to. His refutation of Papenbroeck's criticisms was complete, and his rival himself accepted Mabillon's system of the study of diplomatic as the true one. The *De re diplomatica* established the science on a secure basis; and it has been the foundation of all subsequent works on the subject, although the immediate result of its publication was a flood of controversial writings between the Jesuits and the Benedictines, which, however, did not affect its stability.

In Spain, the Benedictine Perez published, in 1688, a series of dissertations following the line of Mabillon's work. In England, Madox's *Formulare Anglicanum*, with a dissertation concerning ancient charters and instruments, appeared in 1702, and in 1705 Hickes followed with his *Linguarum septentrionalium thesaurus*, both accepting the principles laid down by the learned Benedictine. In Italy, Maffei appeared with his *Istoria diplomatica* in 1727, and Muratori, in 1740, introduced dissertations on diplomatic into his great work, the *Antiquitates Italicae*. In Germany, the first diplomatic work of importance was that by Bessel, entitled *Chronicon Gotwicense* and issued in 1732; and this was followed closely by similar works of Baring, Eckhard and Heumann.

France, however, had been the cradle of the science, and that country continued to be the home of its development. Mabillon had not taken cognizance of documents later than the 13th century. Arising out of a discussion relative to the origin of the abbey of St Victor en Caux and the authenticity of its archives, a more comprehensive work than Mabillon's was compiled by the two Benedictines, Dom Toustain and Dom Tassin, viz. the *Nouveau Traité de diplomatique*, in six volumes, 1750-1765, which embraced more than diplomatic proper and extended to all branches of Latin

palaeography. With great industry the compilers gathered together a mass of details; but their arrangement is faulty, and the text is broken up into such a multitude of divisions and subdivisions that it is tediously minute. However, its more extended scope has given the *Nouveau Traité* an advantage over Mabillon's work, and modern compilations have drawn largely upon it.

As a result of the Revolution, the archives of the middle ages lost in France their juridical and legal value; but this rather tended to enhance their historical importance. The taste for historical literature revived. The Académie des Inscriptions fostered it. In 1821 the École des Chartes was founded; and, after a few years of incipient inactivity, it received a further impetus, in 1829, by the issue of a royal ordinance re-establishing it. Thenceforth it has been an active centre for the teaching and for the encouragement of the study of diplomatic throughout the country, and has produced results which other nations may envy. Next to France, Germany and Austria are distinguished as countries where activity has been displayed in the systematic study of diplomatic archives, more or less with the support of the state. In Italy, too, diplomatic science has not been neglected. In England, after a long period of regrettable indifference to the study of the national and municipal archives of the country, some effort has been made in recent years to remove the reproach. The publications of the Public Record Office and of the department of MSS. in the British Museum are more numerous and are issued more regularly than in former times; and an awakened interest is manifested by the foundation in the universities of a few lectureships in diplomatic and palaeography, and by the attention which those subjects receive in such an institution as the London School of Economics, and in the publications of private literary societies. But such efforts can never show the systematic results which are to be attained by a special institution of the character of the French École des Chartes.

Extent of the Science.—The field covered by the study of diplomatic is so extensive and the different kinds of documents which it takes into its purview

are so numerous and various, that it is impossible to do more than give a few general indications of their nature. No nation can have advanced far on the path of civilization before discovering the necessity for documentary evidence both in public and in private life. The laws, the constitutions, the decrees of government, on the one hand, and private contracts between man and man, on the other, must be embodied in formal documents, in order to ensure permanent record. In the case of a nation advancing independently from a primitive to a later stage of civilization we should have to trace the origin of its documentary records and examine their development from a rudimentary condition. But in an inquiry into the history of the documents of the middle ages in Europe we do not begin with primitive forms. Those ages inherited the documentary system which had been created and developed by the Romans; and, imperfect and limited in number as are the earliest surviving charters and diplomas of European medieval history, they present themselves to us fully developed and cast in the mould and employing the methods and formulae of the earlier tradition. Based on this foundation the chanceries of the several countries of Europe, as they came into existence and were organized, reduced to method and rule on one general system the various documents which the exigencies of public and of private life from time to time called into existence, each individual chancery at the same time following its own line of practice in detail, and evolving and confirming particular formulas which have become characteristic of it.

Classification of Documents.—If we classify these documents under the two main heads of public and private deeds, we shall have to place in the former category the legislative, administrative, judicial, diplomatic documents emanating from public authority in public form: laws, constitutions, ordinances, privileges, grants and concessions, proclamations, decrees, judicial records, pleas, treaties; in a word, every kind of deed necessary for the orderly government of a civilized state. In early times many of these were comprised under the general term of "letters," *litterae*, and to the large number of them which were issued in open form and addressed to the community the

specific title of "letters patent," *litterae patentes*, was given. In contradistinction those public documents which were issued in closed form under seal were known as "close letters," *litterae clausae*.

Such public documents belong to the state archives of their several countries, and are the monuments of administrative and political and domestic history of a nation from one generation to another. In no country has so perfect a series been preserved as in our own. Into the Public Record Office in London have been brought together all the collections of state archives which were formerly stored in different official repositories of the kingdom. Beginning with the great survey of Domesday, long series of enrolments of state documents, in many instances extending from the times of the Angevin kings to our own day in almost unbroken sequence, besides thousands of separate deeds of all descriptions, are therein preserved (see RECORD).

Under the category of private documents must be included, not only the deeds of individuals, but also those of corporate bodies representing private interests and standing in the position of individual units in relation to the state, such as municipal bodies and monastic foundations. The largest class of documents of this character is composed of those numerous conveyances of real property and other title deeds of many descriptions and dating from early periods which are commonly described by the generic name of "charters," and which are to be found in thousands, not only in such public repositories as the Public Record Office and the British Museum, but also in the archives of municipal and other corporate bodies throughout the country and in the muniment-rooms of old families. There are also the records of the manorial courts preserved in countless court-rolls and registers; also the scattered muniments of the dissolved monasteries represented by the many collections of charters and the valuable chartularies, or registers of charters, which have fortunately survived and exist both in public and in private keeping.

It will be noticed that in this enumeration of public and private documents in England reference is made to rolls. The practice of entering records on rolls

has been in favour in England from a very early date subsequent to the Norman Conquest; and while in other countries the comprehensive term of "charters" (literally "papers": Gr. χάρτης) is employed as a general description of documents of the middle ages, in England the fuller phrase "charters and rolls" is required. The master of the rolls, the *Magister Rotulorum*, is the official keeper of the public records.

From the great body of records, both public and private, many fall easily and naturally into the class in which the text takes a simpler narrative form; such as judicial records, laws, decrees, proclamations, registers, &c., which tell their own story in formulae and phraseology early developed and requiring little change. These we may leave on one side. For fuller description we select those deeds which, conferring grants and favours and privileges, conform more nearly to the idea of the Roman diploma and have received the special attention of the chanceries in the development and arrangement of their formulae and in their methods of execution.

All such medieval deeds are composed of certain recognized members or sections, some essential, others special and peculiar to the most elaborate and solemn documents. A deed of the more elaborate character is made up of two principal divisions: 1. the TEXT, in which is set out the object of the deed, the statement of the considerations and circumstances which have led to it, and the declaration of the will and intention of the person executing the deed, together with such protecting clauses as the particular circumstances of the case may require; 2. the PROTOCOL (originally, the first sheet of a papyrus roll; Gr. πρῶτος, first, and κολλᾶν, to glue), consisting of the introductory and of the concluding formulae: superscription, address, salutation, &c., at the beginning, and date, formulae of execution, &c., at the end, of the deed. The latter portion of the protocol is sometimes styled the eschatocol (Gr. ἔσχατος, last, and κολλᾶν, to glue). While the text followed certain formulae which had become fixed by common usage, the protocol was always special and varied with the practices of the several chanceries, changing in a sovereign chancery with each successive reign.

Structure of medieval diplomas.

The different sections of a full deed, taking them in order under the heads of Initial Protocol, Text and Final Protocol or Eschatocol, are as follows:—The initial protocol consists of the Invocation, the Superscription, the Address and the Salutation. 1. The INVOCATION, lending a character of sanctity to the proceedings, might be either verbal or symbolic. The verbal invocation consisted usually of some pious ejaculation, such as *In nomine Dei, In nomine domini nostri Jesu Christi*; from the 8th century, *In nomine Sanctae et individuae Trinitatis*; and later, *In nomine Patris et Filii et Spiritus Sancti*. The

The Invocation.

symbolic form was usually the *chrismon*, or monogram composed of the Greek initials XP of the name of Christ. In the course of the 10th and 11th centuries this symbol came to be so scrawled that it had probably lost all meaning with the scribes. From the 9th century the letter C (initial of *Christus*) came gradually into use, and in German imperial diplomas it superseded the *chrismon*. Stenographic signs of the system known as Tironian notes were also sometimes added to this symbol down to the end of the 10th century, expressing such a phrase as *Ante omnia Christus*, or *Christus*, or *Amen*. From the Merovingian period, too, a cross was often used. The symbol gradually died out after the 12th century for general use, surviving only in notarial instruments and wills. 2. The SUPERSCRIPTION (*superscriptio, intitulatio*) expressed the name and titles of the grantor or person issuing the deed. 3. The ADDRESS. As diplomas were originally in epistolary form the address was then a necessity. While in Merovingian deeds the old pattern was adhered to, in the Carolingian period the address was sometimes omitted. From the 8th century it was not considered necessary, and a distinction arose in the case of royal acts, those having the address being styled letters, and those omitting it, charters. The general form of address ran in phrase as *Omnibus* (or *Universis*) *Christi fidelibus presentes litteras inspecturis*. 4. The SALUTATION was expressed in such words as *Salutem*; *Salutem et dilectionem*; *Salutem et apostolicam benedictionem*, but it was not essential.

The Superscription.

The Address.

The Salutation.

Then follows the text in five sections: the Preamble, the Notification, the Exposition, the Disposition and the Final Clauses. 5. The PREAMBLE (*prologus*, *arenga*): an ornamental introduction generally composed of pious or moral sentiments, a *prefatio ad captandam benevolentiam*

The Preamble.

The Notification.

The Exposition.

The Disposition.

The Final Clauses.

which *facit ad ornamentum*, degenerating into tiresome platitudes. It became stereotyped at an early age: in the 10th and 11th centuries it was a most ornate performance; in the 12th century it was cut short; in the 13th century it died out. 6. The NOTIFICATION (*notificatio*, *promulgatio*) was the publication of the purport of the deed introduced by such a phrase as *notum sit*, &c. 7. The EXPOSITION set out the motives influencing the issue of the deed. 8. The DISPOSITION described the object of the deed and the will and intention of the grantor. 9. The FINAL CLAUSES ensured the fulfilment of the terms of the deed; guarded against infringement, by comminatory anathemas and imprecations, not infrequently of a vehement description, or by penalties; guaranteed the validity of the deed; enumerated the formalities of subscription and execution; reserved rights, &c.

Next comes the final protocol or eschatocol comprising: the Date, the Appreciation, the Authentication. It was particularly in this portion of the deed that the varying practices of the several chanceries led to minute and intricate distinctions at different periods.

The Date.

10. The DATE. By the Roman law every act must be dated by the day and the year of execution. Yet in the middle ages, from the 9th to the 12th century, a large proportion of deeds bears no date. In the most ancient charters the date clause was frequently separated from the body of the deed and placed in an isolated position at the foot of the sheet. From the 12th century it commonly followed the text immediately. Certain classes of documents, such as decrees of councils, notarial deeds, &c., began with the date. The usual formula was *data, datum, actum, factum, scriptum*. In the Carolingian period a distinction grew up between *datum* and

actum, the former applying to the time, the latter to the place, of date. In the papal chancery from an early period down to the 12th century the use of a double date prevailed, the first following the text and being inserted by the scribe when the deed was written (*scriptum*), the second being added at the foot of the deed on its execution (*actum*), by the chancellor or other high functionary. From the Roman custom of dating by the consular year arose the medieval practice of dating by the regnal year of emperor, king or pope. Special dates were sometimes employed, such as the year of some great historical event, battle, siege, pestilence, &c. 11. The APPRECIATION. The *feliciter* of the Romans became the medieval *feliciter in Domino*, or *In Dei nomine feliciter*, or the more simple *Deo gratias* or the still more simple *Amen*, for the auspicious closing of a deed. In Merovingian and Carolingian diplomas it follows the date; in other cases it closes the text. In the greater papal bulls it appears in the form of a triple *Amen*. *Benevalete* was also employed as the appreciation in early deeds; but in Merovingian diplomas and in papal bulls this valedictory salutation becomes a mark of authentication, as will be noticed below. 12. The AUTHENTICATION was a solemn proceeding which was discharged by more than one act. The most important was the subscription or subscriptions of the person or persons from whom the deed emanated. The laws of the late Roman empire required the subscriptions and the impressions of the signet seals of the parties and of the witnesses to the deed. The subscription (*subscriptio*) comprised the name, signature and description of the person signing. The impression of the signet (not the signature) was the *signum*, sometimes *signaculum*, rarely *sigillum*. The practice of subscribing with the autograph signature obtained in the early middle ages, as appears from early documents such as those of

The Appreciation.

The Authentication.

Ravenna. But from the 7th century it began to decline, and by the 12th century it had practically ceased. In Roman deeds an illiterate person affixed his mark, or *signum manuale*, which was attested. The cross being an easy form for a mark, it was very commonly used and naturally became connected with the Christian symbol. Hence, in course of time, it came to be attached very generally to subscriptions, autograph or otherwise. Great personages who were illiterate required something more elaborate than a common mark. Hence arose the use of the monogram, the *caracter nominis*, composed of the letters of the name. The emperor Justin, who could not write, made use of a monogram, as did also Theodoric, king of the Ostrogoths. Those Merovingian kings, likewise, who were illiterate, had their individual monograms; and at length Charlemagne adopted the monogram as his regular form of signature. From his reign down to that of Philip the Fair the monogram was the recognized sign manual of the sovereigns of France (see AUTOGRAPHS). It was employed by the German emperors down to the reign of Maximilian I. The royal use of the monogram was naturally imitated by great officers and ecclesiastics. But another form of sign manual also arose out of the subscription. The closing word (usually *subscripsi*), written or abbreviated as *sub.*, or *ss.* or *s.*, was often finished off with flourishes and interlacings, sometimes accompanied with Tironian notes, the whole taking the shape of a domed structure to which the French have given the name of *ruche* or bee-hive. Thus in the early middle ages we have deeds authenticated by the subscription, usually autograph, giving the name and titles of the person executing, and stating the part taken by him in the deed, and closing with the *subscripsi*, often in shape of the ruche and constituting the *signum manuale*. If not autograph, the subscription might be impersonal in such form as *signum* (or *signum manus*) + N. In the Carolingian period, while phrases were constantly used in the body of

the deed implying that it was executed by autograph subscription, it did not necessarily follow that such subscription was actually written in person. The ruche was also adopted by chancellors, notaries and scribes as their official mark. While autograph subscriptions continued to be employed, chiefly by ecclesiastics, down to the beginning of the 12th century, the monogram was perpetuated from the 10th century by the notaries. Their marks, simple at first, became so elaborate from the end of the 13th century that they found it necessary to add their names in ordinary writing, or also to employ a less complicated design. This was the commencement of the modern practice of writing the signature which first came into vogue in the 14th century.

To lend further weight and authority to the subscription, certain symbols and forms were added at different periods. Imitating, the corroborative *Legi* of the Byzantine quaestor and the *Legimus* of the Eastern emperors, the Frankish chancery in the West made use of the same form, notably in the reign of Charles the Bald, in some of whose diplomas the *Legimus* appears written in larger letters in red. The valedictory *Benevalete*, employed in early deeds as a form of appreciation (see above), appears in Merovingian and in early Carolingian royal diplomas, and also in papal bulls, as an authenticating addition to the subscription. In the diplomas it was written in cursive letters in two lines, *Bene valete*, just to the right of the incision cut in the sheet to hold fast the seal, which sometimes even covered part of the word. In the most ancient papal bulls it was written by the pope himself at the foot of the deed. in two lines, generally in larger capital or uncial characters, placed between two crosses. From the beginning of the 11th century it became the fashion to link the letters; and, dating from the time of Leo IX., A.D. 1048-1054, the *Benevalete* was inscribed in form of a monogram. During Leo's pontificate it was also accompanied with

The Benevalete.

a flourish called the *Komma*, which was only an exaggeration of the mark of punctuation (*periodus*) which from the 9th to the 11th century closed the subscription and generally resembled the modern semicolon. Leo's successors abandoned the *Komma*, but the monogrammatic *Benevalete* continued, invariable in form, but from time to time varying in size. In Leo IX.'s pontificate also was introduced the *Rota*. This sign, when it had received its final shape in the 11th century, was in form of a wheel, composed of two concentric circles, in the space between which was written the motto or device of the pope (*signum papae*), usually a short sentence from one of the Psalms or some other portion of Scripture; preceded by a small cross, which the pontiff himself sometimes inscribed. The central space within the wheel was divided (by cross lines) into four quarters, the two upper ones being occupied by the names of the apostles St Peter and St Paul, and the two lower ones by the name of the pope. The *Rota* was placed on the left of the subscription, the monogrammatic *Benevalete* on the right. The two signs were likewise adopted by certain ecclesiastical chanceries and by feudal lords, particularly in the 12th century. From the same period also the Spanish and Portuguese monarchs adopted the *Rota*, the *signo rodado*, which is so conspicuous in the royal charters of the Peninsula.

The Rota.

Besides the subscription, an early auxiliary method of authentication was by the impression of the seal which, as noticed above, was required by the Roman law. But the general use of the signet gradually failed, and by the 7th century it had ceased. Still it survived in the royal chanceries, and the sovereigns both of the Merovingian and of the Carolingian lines had their seals; and, in the 8th century, the mayors of the palace likewise. It is interesting to find instances of the use of antique intaglios for the purpose by some of them. In England too there is

Sealing.

proof that the Mercian kings Offa and Coenwulf used seals, in imitation of the Frankish monarchs. In the 7th century, and still more so in the 8th and 9th centuries, the royal seals were of exaggerated size: the precursors of the great seals of the later sovereigns of western Europe. The waxen seals of the early diplomas were in all cases *en placard*: that is, they were attached to the face of the document and not suspended from it, being held in position by a cross-cut incision in the material, through which the wax was pressed and then flattened at the back. On the cessation of autograph signatures in subscriptions, the general use of seals revived, beginning in the 10th century and becoming the ordinary method of authentication from the 12th to the 15th century inclusive. Even when signatures had once again become universal, the seal continued to hold its place; and thus sealing is, to the present day, required for the legal execution of a deed. The attachment *en placard* was discontinued, as a general practice, in the middle of the 11th century; and seals thenceforward were, for the most part, suspended, leathern thongs being used at first, and afterwards silken and hempen cords or parchment labels. In documents of minor importance it was sometimes the custom to impress the seal or seals on one or more strips of the parchment of the deed itself, cut, but not entirely detached, from the lower margin, and left to hang loose. Besides waxen impressions of seals, impressions in metal, bearing a device on both faces, after the fashion of a coin, and suspended, were employed from an early period. The most widely known instances are the *bullae* attached to papal documents, generally of lead. The earliest surviving papal *bulla* is one of Pope Zacharias, A.D. 746, but earlier examples are known from drawings. The papal *bulla* was a disk of metal stamped on both sides. From the time of Boniface V. to Leo IV., A.D. 617-855, the name of the pontiff, in the genitive case, was impressed on the obverse, and his title as pope on the reverse, *e.g.*

Bonifati/ papae. After that period, for some time, the name was inscribed in a circle round a central ornament. Other variations followed; but at length in the pontificate of Paschal II., A.D. 1099, the *bulla* took the form which it afterwards retained: on the obverse, the heads of the apostles St Peter and St Paul; on the reverse, the pope's name, title and number in succession. In the period of time between his election and consecration, the pope made use of the half-bull, that is, the obverse only was impressed. It should be mentioned that, in order to conform to modern conditions and for convenience of despatch through the post, Leo XII., in 1878, substituted for the leaden *bulla* a red ink stamp bearing the heads of the two apostles with the name of the pope inscribed as a legend.

The Carolingian monarchs also used metal *bullae*. None of Charlemagne's have survived, but there are still extant leaden examples of Charles the Bald. The use of lead was not persisted in either in the chancery of France or in that of Germany. Golden *bullae* were employed on special occasions by both popes and temporal monarchs; for example, they were attached to the confirmations of the elections of the emperors in the 12th and 13th centuries; the bull of Leo X. conferring the title of Defender of the Faith on Henry VIII. in 1524, and the deed of alliance between Henry and Francis I. in 1527, had golden *bullae*; and other examples could be cited. But lead has always been the common metal to be thus employed. In the southern countries of Europe, where the warmth of the climate renders wax an undesirable material, leaden *bullae* have been in ordinary use, not only in Italy but also in the Peninsula, in southern France, and in the Latin East (see SEALS).

The necessity of conforming to exact phraseology in diplomas and of observing regularity in expressing formulas naturally led to the

compilation of formularies. From the early middle ages the art of composition, not only of charters but also of general correspondence, was commonly taught in the monasteries. The teacher was the *dictator*, his method of teaching was described by the verb *dictare*, and his teaching was *dictamen* or the *ars dictaminis*. For the use of these monastic schools, formularies and manuals comprising formulas and models for the composition of the various acts and documents soon became indispensable. At a later stage such formularies developed into the models and treatises for epistolary style which have had their imitations even in modern times. The widespread use of the formularies had the advantage of imposing a certain degree of uniformity on the phrasing of documents of the western nations of Europe. Those compilations which are of an earlier period than the 11th century have been systematically examined and are published; those of more recent date still remain to be thoroughly edited. The early formularies are of the simpler kind, being collections of formulas without dissertation. The *Formulae Marculfi*, compiled by the monk Marculf about the year 650, was the most important work of this nature of the Merovingian period and became the official formulary of the time; and it continued in use in a revised edition in the early Carolingian chancery. Of the same period there are extant formularies compiled at various centres, such as Angers, Tours, Bourges, Sens, Reichenau, St Gall, Salzburg, Passau, Regensburg, Cordova, &c. (see Giry, *Manuel de diplomatique*, pp. 482-488). The *Liber diurnus Romanorum Pontificum* was compiled in the 7th and 8th centuries, and was employed in the papal chancery to the end of the 11th century. Of the more developed treatises and manuals of epistolary rhetoric which succeeded, and which originated in Italy, the earliest example was the *Breviarium de dictamine* of the monk Alberic of Monte Cassino,

Formularies.

compiled about the year 1075. Another well-known work, the *Rationes dictandi*, is also attributed to the same author. Of later date was the *Ars dictaminis* of Bernard of Chartres of the 12th century. Among special works on formularies are: E. de Rozière, *Recueil général des formules usitées dans l'empire des Francs* (3 vols., Paris, 1861-1871); K. Zeumer, *Formulae Merovingici et Karolini aevi* (Hanover, 1886); and L. Rockinger, *Briefsteller und Formelbücher des 11 bis. 14 Jahrhunderts* (Munich, 1863-1864).

Organization.—The formalities observed by the different chanceries of medieval Europe, which are to be learned from a study of the documents issued by them, are so varied and often so minute, that it is impossible to give a full account of them within the limits of the present article. We can only state some of the results of the investigations of students of diplomatic.

Papal Chancery.

The chancery which stands first and foremost is the papal chancery. On account of its antiquity and of its steady development, it has served as a model for the other chanceries of Europe. Organized in remote times, it adopted for the structure of its letters a number of formulas and rules which developed and became more and more fixed and precise from century to century. The Apostolic court being organized from the first on the model of the Roman imperial court, the early pontiffs would naturally have collected their archives, as the emperors had done, into *scrinia*. Pope Julius I., A.D. 337-353, reorganized the papal archives under an official *schola notariorum*, at the head of which was a *primicerius notariorum*. Pope Damasus, A.D. 366-384, built a record office at the Lateran, *archivium sanctae Romanae ecclesiae*, where the archives were kept and registers of them compiled. The collection and orderly arrangement of the archives provided material for the establishment of regular diplomatic usages, and the science of formulae naturally followed.

For the study of papal documents four periods have been defined, each successive period being distinguished from its predecessor by some particular development of forms and procedure. The first period is reckoned from the earliest times to the accession of Leo IX., A.D. 1048. For almost the whole of the first eight centuries no original papal documents have survived. But copies are found in canonical works and registers, many of them false, and others probably not transcribed in full or in the original words; but still of use, as showing the growth of formulas. The earliest original document is a fragment of a letter of Adrian I., A.D. 788. From that date there is a series, but the documents are rare to the beginning of the 11th century, all down to that period being written on papyrus. The latest existing papyrus document in France is one of Sergius IV., A.D. 1011; in Germany, one of Benedict VIII., A.D. 1022. The earliest document on vellum is one of John XVIII., A.D. 1005. The nomenclature of papal documents even at an early period is rather wide. In their earliest form they are Letters, called in the documents themselves, *litterae*, *epistola*, *pagina*, *scriptum*, sometimes *decretum*. A classification, generally accepted, divides them into: 1. Letters or Epistles: the ordinary acts of correspondence with persons of all ranks and orders; including constitutions (a later term) or decisions in matters of faith and discipline, and encyclicals giving directions to bishops of the whole church or of individual countries. 2. Decrees, being letters promulgated by the popes of their own motion. 3. Decretals, decisions on points of ecclesiastical administration or discipline. 4. Rescripts (called in the originals *preceptum*, *auctoritas*, *privilegium*), granting requests to petitioners. But writers differ in their terms, and such subdivisions must be more or less arbitrary. The comprehensive term “bull” (the name of the leaden papal seal, *bulla*, being transferred to the document) did not come into use until the 13th century.

Copies of papal deeds were collected into registers or *bullaria*. Lists showing the chronological sequence of documents are catalogues of acts.

When into such lists indications from narrative sources are introduced they become *regesta* (*res gestae*): a term not to be confused with "register."

Clearness and conciseness have been recognized as attributes of early papal letters; but even in those of the 4th century certain rhythmical periods have been detected in their composition which became more marked under Leo the Great, A.D. 440-461, and which developed into the *cursus* or prose rhythm of the pontifical chancery of the 11th and 12th centuries.

In the most ancient deeds the pope styles himself *Episcopus*, sometimes *Episcopus Catholicae Ecclesiae*, or *Episcopus Romanae Ecclesiae*, rarely *Papa*. Gregory I, A.D. 590, was the first to adopt the form *Episcopus, servus servorum Dei*, which became general in the 9th century, and thenceforth was invariable.

The second period of papal documents extends from Leo IX. to the accession of Innocent III., A.D. 1048-1198. At the beginning of the period formulae tended to take more definite shape and to become fixed. In the superscription of bulls a distinction arose: those which conferred lasting privileges employing the words *in perpetuum* to close this clause; those whose benefaction was of a transitory character using the form of salutation, *salutem et apostolicam benedictionem*. But it was under Urban II., A.D. 1088-1099, that the principal formulae became stereotyped. Then the distinction between documents of lasting, and those of transitory, value became more exactly defined; the former class being known as greater bulls, *bullae majores* (also called *privilegia*), the latter lesser bulls, *bullae minores*. The leading characteristics of the greater bulls were these: The first line containing the superscription and closing with the words *in perpetuum* (or, sometimes, *ad perpetuam*, or *aeternam*, *rei memoriam*) was written in tall and slender ornamental letters, close packed; the final clauses of the text develop with tendency to fixity; the pope's subscription is accompanied with the *rota* on the left and the *benevalete* monogram on the

right; and certain elaborate forms of dating are punctiliously observed. The introduction of subscriptions of cardinals as witnesses had gradually become a practice. Under Victor II., A.D. 1055-1057, the practice became more confirmed, and after the time of Innocent II., A.D. 1130-1145, the subscriptions of the three orders were arranged according to rank, those of the cardinal bishops being placed in the centre under the papal subscription, those of the priests under the *rota* on the left, and those of the deacons under the *benevalete* on the right. In the lesser bulls simpler forms were employed; there was no introductory line of stilted letters; the salutation, *salutem et apostolicam benedictionem*, closed the superscription; the final clauses were shortened; there was neither papal subscription, nor *rota*, nor *benevalete*; the date was simple.

From the time of Adrian I., A.D. 772-795, the system of double dating was followed in the larger bulls. The first date was written by the scribe of the document, *scriptum per manum N.* with the month (rarely the day of the month) and year of the indiction. The second, the actual date of the execution of the deed, was entered (ostensibly) by some high official, *data*, or *datum, per manum N.*, and contained the day of the month (according to the Roman calendar), the year of indiction, the year of pontificate (in some early deeds, also the year of the empire and the post-consulate year), and the year of the Incarnation, which, however, was gradually introduced and only became more common in the course of the 11th century. For example, a common form of a full date would run thus: *Datum Laterani, per manum N., sanctae Romanae ecclesiae diaconi cardinalis, xiiii. kl. Maii, indictione V., anno dominicae Incarnationis mxcvii., pontificatus autem domini papae Urbani secundi X°*. The simpler form of the date of a lesser bull might be: *Datum Laterani, iii. non. Jan., pontificatus nostri anno iiii*.

By degrees the use of the lesser bulls almost entirely superseded that of the greater bulls, which became exceptional in the 13th century and almost

ceased after the migration to Avignon in 1309. In modern times the greater bulls occasionally reappear for very solemn acts, as *bullae consistoriales*, executed in the consistory.

The third period of papal documents extends from Innocent III. to Eugenius IV., A.D. 1198-1431. The pontificate of Innocent III. was a most important epoch in the history of the development of the papal chancery. Formulas became more exactly fixed, definitions more precise, the observation of rules and precedents more constant. The staff of the chancery was reorganized. The existing series of registers of papal documents was then commenced. The growing use of lesser bulls for the business of the papal court led to a further development in the 13th century. They were now divided into two classes: *Tituli* and *Mandamenta*. The former conferred favours, promulgated precepts, judgments, decisions, &c. The latter comprised ordinances, commissions, &c., and were executive documents. There are certain features which distinguish the two classes. In the *tituli*, the initial letter of the pope's name is ornamented with openwork and the other letters are stilted. In the *mandamenta*, the initial is filled in solid and the other letters are of the same size as the rest of the text. In the *tituli*, enlarged letters mark the beginnings of the text and of certain clauses; but not in the *mandamenta*. In the former the mark of abbreviation is a looped sign; in the latter it is a horizontal stroke. In the former the old practice of leaving a gap between the letters s and t, and c and t, whenever they occur together in a word (*e.g. is te*, *sanc tus*), and linking them by a coupling stroke above the line is continued; in the latter it disappears. The leaden bulla attached to a *titulus* (as a permanent deed) is suspended by cords of red and yellow silks; while that of a *mandamentum* (a temporary deed) hangs from a hempen cord.

In the fourth period, extending from 1431 to the present time, the *tituli* and *mandamenta* have continued to be the ordinary documents in use; but

certain other kinds have also arisen. Briefs (*brevia*), or apostolic letters, concerning the personal affairs of the pope or the administration of the temporal dominion, or conceding indulgences, came into general use in the 13th century in the pontificate of Eugenius IV. They are written in the italic hand on thin white vellum; and the name of the pope with his style as *papa* is written at the head of the sheet, *e.g. Eugenius papa iiii*. They are closed and sealed with Seal of the Fisherman, *sub anulo Piscatoris*. Briefs have almost superseded the *mandamenta*. The documents known as Signatures of the court of Rome or Latin letters, and used principally for the expedition of indulgences, were first introduced in the 15th century. They were drawn in the form of a petition to the pope, which he granted by the words *fiat ut petatur* written across the top. They were not sealed; and only the pontifical year appears in the date. Lastly, the documents to which the name of *Motu proprio* is given are also without seal and are used in the administration of the papal court, the formula *placet et ita motu proprio mandamus* being signed by the pope.

The character of the handwriting employed by the papal chancery is discussed in the article PALAEOGRAPHY. Here it will be enough to state that the early style was derived from the Lombardic hand, and that it continued in use down to the beginning of the 12th century; but that, from the 10th century, owing to the general adoption of the Caroline minuscule writing, it began to fall and gradually became so unfamiliar to the uninitiated, that, while it still continued in use for papal bulls, it was found necessary to accompany them with copies written in the more intelligible Caroline script. The intricate, fanciful character, known as the *Litera sancti Petri*, was invented in the time of Clement VIII., A.D. 1592-1605, was fully developed under Alexander VIII., 1689-1691, and was only abolished at the end of the year 1878 by Leo XIII.

Of the chancery of the Merovingian line of kings as many as ninety authentic diplomas are known, and, of these, thirty-seven are originals, the earliest being of the year 625. The most ancient examples were written on papyrus, vellum superseding that material towards the end of the 7th century. All these diplomas are technically letters, having the superscription and address and, at the foot, close to the seal, the valedictory *benevalete*. They commence with a monogrammatic invocation, which, together with the superscription and address written in fanciful elongated letters, occupies the first line. The superscription always runs in the form, *N. rex Francorum*. The most complete kinds of diplomas were authenticated by the king's subscription, that of the *referendarius* (the official charged with the custody of the royal seal), the impression of the seal, and exceptionally by subscriptions of prelates and great personages. The royal subscription was usually autograph; but, if the sovereign were too young or too illiterate to write, a monogram was traced by the scribe. The referendary, if he countersigned the royal subscription, added the word *optulit* to his own signature; if he subscribed independently, he wrote *recognovit et subscripsit*, the end of the last word being usually lost in flourishes forming a *ruche*. The date gave the place, day, month and year of the reign. The Merovingian royal diplomas are of two classes: (1) Precepts, conferring gifts, favours, immunities and confirmations, entitled in the documents themselves as *praeceptum*, *praeceptio*, *auctoritas*; some drawn up in full form, with preamble and ample final clauses; others less precise and formal. (2) Judgments (*judicia*), which required no preamble or final clauses as they were records of the sovereign's judicial decisions; they were subscribed by the referendary and were sealed with the royal seal. Other classes of documents were the *cartae de mundeburde*, taking persons under the royal protection, and *indiculi* or letters transmitting orders or notifying decisions; but no examples have survived.

Merovingian chancery.

The diplomas of the early Carolingians differed, as was natural, but little from those of their predecessors. As mayors of the palace, Charles Martel and Pippin took the style of *vir inluster*. On becoming king, Pippin retained it; *Pippinus, vir inluster, rex Francorum*, and it continued to be part of the royal title till Charlemagne became emperor. The royal subscription was in form of a sign-manual or mark, but Charlemagne elaborated this into a monogram of the letters of his name built up on a cross. In 775 the royal title of Charlemagne became *Carolus, gratia Dei rex Francorum et Langobardorum, ac patricius Romanorum*, the last words being assumed on his visit to Rome in 774. On becoming emperor in 800, he was styled *Imperator, Romanum gubernans imperium, rex Francorum et Langobardorum*. It is to be noticed that thenceforth his name was spelt with initial K (as it was on the monogram), having previously been written with C in the deeds. Most of his diplomas were authenticated by the subscription of the chancellor and impression of the seal. A novelty in the form of dating was also introduced, two words, *datum* (for time) and *actum* (for place), being now employed. The character of the writing of the diplomas, founded on the Roman cursive hand, which had become very intricate under the Merovingians, improved under their successors, yet the reform which was introduced into the literary script hardly affected the cursive writing of diplomatic until the latter part of Charlemagne's reign. The archaic style was particularly maintained in judgments, which were issued by the private chancery of the palace, a department more conservative in its methods than the imperial chancery. It was in the reign of Louis Debonair, A.D. 814-840, that the Carolingian diploma took its final shape. A variation now appears in the monogram, that monarch's sign-manual being built up, not on a cross as previously, but on the letter H., the initial of his name Hludovicus, and serving as the pattern for successive monarchs of the name of Louis.

Carolingian chancery.

In the Carolingian chancery the staff was exclusively ecclesiastical; at its head was the chancellor, whose title is traced back to the *cancellarius*, or petty officer under the Roman empire, stationed at the bar or lattice (*cancelli*) of the basilica or other law court and serving as usher. As keeper of the royal archives his subscription was indispensable for royal acts. The diplomas were drawn up by the notaries, an important body, upon whom devolved the duty of maintaining the formulae and traditions of the office. It has been observed that in the 9th century the documents were drawn carefully, but that in the 10th century there was a great degeneration in this respect. Under the early Capetian kings there was great confusion and want of uniformity in their diplomas; and it was not until the reign of Louis VI., A.D. 1108, that the formulae were again reduced to rules.

Imperial German chancery.

The acts of the imperial chancery of Germany followed the patterns of the Carolingian diplomas, with little variation down to the reign of Frederick Barbarossa, A.D. 1152-1190. The sovereign's style was *N. divina favente clementia rex*; after coronation at Rome he became *imperator augustus*. At the end of the 10th century, Otto III. developed the latter title into *Romanorum imperator augustus*. Under Henry III., and regularly from the time of Henry V., A.D. 1106-1125, the title before coronation has been *Romanorum rex*. The royal monogram did not necessarily contain all the letters of the name; but, on the other hand, from the year 976, it became more complicated and combined the imperial title with the name. For example, the monogram of Henry II. combines the words *Henricus Romanorum imperator augustus*. The flourished *ruches* also, as in the Frankish chanceries, were in vogue. Eventually they were used by certain of the chancellors as a sign-manual and took fanciful shapes, such as a building with a cupola, or even a diptych. They disappear early in the 12th century, the period when in other respects the chancery of the Holy Roman Empire largely adopted a more simple style in its

diplomas. Lists of witnesses, in support of the royal and official subscriptions, were sometimes added in the course of the 11th century, and they appear regularly in documents a hundred years later.

Diplomatic in England.

For the study of diplomatic in England, material exists in two distinct series of documents, those of the Anglo-Saxon period, and those subsequent to the Norman Conquest. The Anglo-Saxon kings appear to have borrowed, partially, the style of their diplomas from the chanceries of their Frankish neighbours, introducing at the same time modifications which give those documents a particular character marking their nationality. In some of the earlier examples we find that the lines of the foreign style are followed more or less closely; but very soon a simpler model was adopted which, while it varied in formulas from reign to reign, lasted in general construction down to the time of the Norman Conquest. The royal charters were usually drawn up in Latin, sometimes in Anglo-Saxon, and began with a preamble or exordium (in some instances preceded by an invocation headed with the chrismon or with a cross), in the early times of a simple character, but, later, drawn out not infrequently to great length in involved and bombastic periods. Then immediately followed the disposing or granting clause, often accompanied with a few words explaining the motive, such as, for the good of the soul of the grantor; and the text was closed with final clauses of varying extent, protecting the deed against infringement, &c. In early examples the dating clause gave the day and month (often according to the Roman calendar) and the year of the indiction; but the year of the Incarnation was also immediately adopted; and, later, the regnal year also. The position of this clause in the charter was subject to variation. The subscriptions of the king and of the personages witnessing the deed, each preceded by a cross, but all written by the hand of the scribe, usually closed the charter. A peculiarity was the introduction, in many instances, either in the body of the charter, or in a separate paragraph

at the end, of the boundaries of the land granted, written in the native tongue. The sovereigns of the several kingdoms of the Heptarchy, as well as those of the United Kingdom, usually styled themselves *rex*. But from the time of Æthelstan, A.D. 825-840, they also assumed fantastic titles in the text of their charters, such as: *rex et primicerius*, *rex et rector*, *gubernator et rector*, *monarchus*, and particularly the Greek *basileus*, and *basileus industrius*. At the same time the name of Albion was also frequently used for Britain.

A large number of documents of the Anglo-Saxon period, dating from the 7th century, has survived, both original and copies entered in chartularies. Of distinct documents there are nearly two hundred; but a large proportion of these must be set aside as copies (both contemporary and later) or as spurious deeds.

Although there is evidence, as above stated, of the use of seals by certain of the Mercian kings, the method of authentication of diplomas by seal impression was practically unknown to the Anglo-Saxon sovereigns, save only to Edward the Confessor, who, copying the custom which obtained upon the continent, adopted the use of a great seal.

With the Norman Conquest the old tradition of the Anglo-Saxons disappeared. The Conqueror brought with him the practice of the Roman chancery, which naturally followed the Capetian model; and his diplomas of English origin differed only from those of Normandy by the addition of his new style, *rex Anglorum*, in the superscription. But even from the first there was a tendency to simplicity in the new English chancery, not improbably suggested by the brief formalities of Anglo-Saxon charters, and, side by side with the more formal royal diplomas, others of shorter form and less ceremony were issued, which by the reign of Henry II. quite superseded the more solemn documents. These simpler charters began with the royal superscription, the address, and the salutation, *e.g. Willelmus, Dei gratia rex*

Anglorum, N. episcopo et omnibus baronibus et fidelibus suis Francis et Anglis salutem. Then followed the notification and the grant, *e.g. Sciatis me concessisse*, &c., generally without final clauses, or, if any, brief clauses of protection and warranty; and, at the end, the list of witnesses and the date. The regnal year was usually cited; but the year of the Incarnation was also sometimes given. The great seal was appended. To some of the Conqueror's charters his subscription and those of his queen and sons are attached, written by the scribe, but accompanied with crosses which may or may not be autograph. By the reign of John the simpler form of royal charters had taken final shape, and from this time the acts of the kings of England have been classified under three heads: viz. (1) Charters, generally of the pattern described above; (2) Letters patent, in which the address is general, *Universis presentes litteras inspecturis*, &c.; the corroborative clause describes the character of the document, *In cujus rei testimonium has literas nostras fieri fecimus patentes*; the king himself is his own witness, *Teste me ipso*; and the great seal is appended; (3) Close letters, administrative documents conveying orders, the king witnessing, *Teste me ipso*.

The style of the English kings down to John was, with few exceptions, *Rex Anglorum*; thenceforward, *Rex Angliae*. Henry II. added the feudal titles, *dux Normannorum et Aquitanorum et comes Andegavorum*, which Henry III. curtailed to *dux Aquitaniae*. John added the title *dominus Hiberniae*; Edward III., on claiming the crown of France, styled himself rex *Angliae et Franciae*, the same title being borne by successive kings down to the year 1801; and Henry VIII., in 1521, assumed the title of *fidei defensor*. The formula *Dei gratia* does not consistently accompany the royal title until the reign of Henry II., who adopted it in 1173 (see L. Delisle, *Mémoire sur la chronologie des chartes de Henri II.*, in the *Bibl. de l'École des Chartes*, lxvii. 361-401).

The forms adopted in the royal chanceries were naturally imitated in the composition of private deeds which in all countries form the mass of material for historical and diplomatic research. The student of English diplomatic will soon remark how readily the private charters, especially conveyances of real property, fall into classes, and how stereotyped the phraseology and formulae of each class become, only modified from time to time by particular acts of legislation. The brevity of the early conveyances is maintained through successive generations, with only moderate growth as time progresses through the 12th, 13th and 14th centuries. The different kinds of deeds which the requirements of society have from time to time called into existence must be learned by the student from the text-books. But a particular form of document which was especially in favour in England should be mentioned. This was the chirograph (Gr. χείρ, a hand, γράφειν, to write), which is found even in the Anglo-Saxon period, and which got its name from the word *chirographum*, *cirographum* or *cyrographum* being written in large letters at the head of the deed. At first the word was written, presumably, at the head of each of the two authentic copies which the two parties to a transaction would require. Then it became the habit to use the word thus written as a tally, the two copies of the deed being written on one sheet, head to head, with the word between them, which was then cut through longitudinally in a straight, or more commonly waved or indented (*in modum dentium*) line, each of the two copies thus having half of the word at the head. Any other word, or a series of letters, might thus be employed; and more than two copies of a deed could thus be made to tally. The chirograph was the precursor of the modern indenture, the commonest form of English deeds, though no longer a tally. In other countries, the notarial instrument has performed the functions which the chirograph and indenture have discharged for us.

Private deeds.

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(E. M. T.)

DIPOENUS and **SCYLLIS,** early Greek sculptors, who worked together, and are said to have been pupils of Daedalus. Pliny assigns to them the date 580 B.C., and says that they worked at Sicyon, which city from their time onwards became one of the great schools of sculpture. They also made statues for Cleonae and Argos. They worked in wood, ebony and ivory, and apparently also in marble. It is curious that no inscription bearing their names has come to light.

DIPPEL, JOHANN KONRAD (1673-1734), German theologian and alchemist, son of a Lutheran pastor, was born at the castle of Frankenstein, near Darmstadt, on the 10th of August 1673. He studied theology at Giessen. After a short visit to Wittenberg he went to Strassburg, where he lectured on alchemy and chiromancy, and occasionally preached. He gained considerable popularity, but was obliged after a time to quit the city, owing to his irregular manner of living. He had up to this time espoused the cause of the orthodox as against the pietists; but in his two first works, published under the name "Christianus Democritus," *Orthodoxia Orthodoxorum* (1697) and *Papismus vapulans Protestantium* (1698), he assailed the fundamental positions of the Lutheran theology. He held that religion consisted not in dogma but exclusively in love and self-sacrifice. To avoid persecution he was compelled to wander from place to place in Germany, Holland, Denmark and Sweden. He took the degree of doctor of medicine at Leiden in 1711. He discovered Prussian blue, and by the destructive distillation of bones prepared the evil-smelling product known as Dippel's animal oil. He died near Berleburg on the 25th of April 1734.

An enlarged edition of Dippel's collected works was published at Berleburg in 1743. See the biographies by J. C. G. Ackermann (Leipzig, 1781), H. V. Hoffmann (Darmstadt, 1783), K. Henning (1881) and W. Bender (Bonn, 1882); also a memoir by K. Bucher in the *Historisches Taschenbuch* for 1858.

DIPSOMANIA (from Gr. δίψα, thirst, and μανία, madness), a term formerly applied to the attacks of delirium (*q.v.*) caused by alcoholic

poisoning. It is now sometimes loosely used as equivalent to the condition of incurable inebriates, but strictly should be confined to the pathological and insatiable desire for alcohol, sometimes occurring in paroxysms.

DIPTERA (δίς, double, πτερά, wings), a term (first employed in its modern sense by Linnaeus, *Fauna Suecica*, 1st ed., 1746, p. 306) used in zoological classification for one of the Orders into which the *Hexapoda*, or Insecta, are divided. The relation of the Diptera (two-winged flies, or flies proper) to the other Orders is dealt with under HEXAPODA (*q.v.*).

The chief characteristic of the Diptera is expressed in the name of the Order, since, with the exception of certain aberrant and apterous forms, flies possess but a single pair of membranous wings, which are attached to the meso-thorax. Wing-covers and hind-wings are alike absent, and the latter are represented by a pair of little knobbed organs, the halteres or balancers, which have a controlling and directing function in flight. The other structural characters of the Order may be briefly summarized as:—mouth-parts adapted for piercing and sucking, or for suction alone, and consisting of a proboscis formed of the labium, and enclosing modifications of the other usual parts of the mouth, some of which, however, may be wanting; a thorax fused into a single mass; and legs with five-jointed tarsi. The wings, which are not capable of being folded, are usually transparent, but occasionally pigmented and adorned with coloured spots, blotches or bands; the wing-membrane, though sometimes clothed with minute hairs, seldom bears scales; the wing-veins, which are of great importance in the classification of Diptera, are usually few in number and chiefly

longitudinal, there being a marked paucity of cross-veins. In a large number of Diptera an incision in the posterior margin of the wing, near the base, marks off a small lobe, the posterior lobe or alula, while connected with this but situated on the thorax itself there is a pair of membranous scales, or squamae, which when present serve to conceal the halteres. The antennae of Diptera, which are also extremely important in classification, are thread-like in the more primitive families, such as the *Tipulidae* (daddy-long-legs), where they consist of a considerable number of joints, all of which except the first two, and sometimes also the last two, are similar in shape; in the more specialized families, such as the *Tabanidae* (horse-flies), *Syrphidae* (hover-flies) or *Muscidae* (house-flies, blue-bottles and their allies), the number of antennal joints is greatly reduced by coalescence, so that the antennae appear to consist of only three joints. In these forms, however, the third joint is really a complex, which in many families bears in addition a jointed bristle (arista) or style, representing the terminal joints of the primitive antenna. Although in the case of the majority of Diptera the body is more or less clothed with hair, the hairy covering is usually so short that to the unaided eye the insects appear almost bare; some forms, however, such as the bee-flies (*Bombylius*) and certain robber-flies (*Asilidae*) are conspicuously hairy. Bristles are usually present on the legs, and in the case of many families on the body also; those on the head and thorax are of great importance in classification.

Between 40,000 and 50,000 species of Diptera are at present known, but these are only a fraction of those actually in existence. The species recognized as British number some 2700, but to this total additions are constantly being made. As a rule flies are of small or moderate size, and many, such as certain blood-sucking midges of the genus *Ceratopogon*, are even minute; as extremes of size may be mentioned a common British midge, *Ceratopogon varius*, the female of which measures only 1¼ millimetre, and the gigantic *Mydaidae* of Central and South America as

well as certain Australian robber-flies, which have a body 1¾ in. long, with a wing-expanse of 3¼ in. In bodily form Diptera present two main types, either, as in the case of the more primitive and generalized families, they are gnat- or midge-like in shape, with slender bodies and long, delicate legs, or else they exhibit a more or less distinct resemblance to the common house-fly, having compact and stoutly built bodies and legs of moderate length. Diptera in general are not remarkable for brilliancy of coloration; as a rule they are dull and inconspicuous in hue, the prevailing body-tints being browns and greys; occasionally, however, more especially in species (*Syrphidae*) that mimic Hymenoptera, the body is conspicuously banded with yellow; a few are metallic, such as the species of *Formosia*, found in the islands of the East Indian Archipelago, which are among the most brilliant of all insects. The sexes in Diptera are usually alike, though in a number of families with short antennae the males are distinguished by the fact that their eyes meet together (or nearly so) on the forehead. Metamorphosis in Diptera is complete; the larvae are utterly different from the perfect insects in appearance, and, although varying greatly in outward form, are usually footless grubs; those of the *Muscidae* are generally known as maggots. The pupa either shows the appendages of the perfect insect, though these are encased in a sheath and adherent to the body, or else it is entirely concealed within the hardened and contracted larval integument, which forms a barrel-shaped protecting capsule or puparium.

Diptera are divided into some sixty families, the exact classification of which has not yet been finally settled. The majority of authors, however, follow Brauer in dividing the order into two sections, Orthorrhapha and Cyclorrhapha, according to the manner in which the pupa-case splits to admit of the escape of the perfect insect. The general characteristics of the pupae in these two sections have already been described.

In the Orthorrhapha, in the pupae of which the appendages of the perfect insect are usually visible, the pupa-case generally splits in a straight line down the back near the cephalic end; in front of this longitudinal cleft there may be a small transverse one, the two together forming a T-shaped fissure. In the Cyclorrhapha on the other hand, in which the actual pupa is concealed within the hardened larval skin, the imago escapes through a circular orifice formed by pushing off or through the head end of the puparium. The Diptera Orthorrhapha include the more primitive and less specialized families such as the *Tipulidae* (daddy-long-legs), *Culicidae* (gnats or mosquitoes), *Chironomidae* (midges), *Mycetophilidae* (fungus-midges), *Tabanidae* (horse-flies), *Asilidae* (robber-flies), &c. The Diptera Cyclorrhapha on the other hand consist of the most highly specialized families, such as the *Syrphidae* (hover-flies), *Oestridae* (bot and warble flies), and *Muscidae* (*sensu latiore*—the house-fly and its allies, including tsetse-flies, flesh-flies, *Tachininae*, or flies the larvae of which are internal parasites of caterpillars, &c). It is customary to divide the Orthorrhapha into the two divisions Nematocera and Brachycera, in the former of which the antennae are elongate and in a more or less primitive condition, as described above, while in the latter these organs are short, and, as already explained, apparently composed of only three joints.

Within the divisions named—Orthorrhapha Nematocera, Orthorrhapha Brachycera and Cyclorrhapha—the constituent families are usually grouped into a series of "superfamilies," distinguished by features of structure or habit. Certain extremely aberrant Diptera, which, in consequence of the adoption of a parasitic mode of life, have undergone great structural modification, are further remarkable for their peculiar mode of reproduction, on account of which the families composing the group are often termed Pupipara. In these forms the pregnant female, instead of laying eggs, as Diptera usually do, or even producing a number of minute living larvae, gives birth at one time but to a single larva, which is retained within

the oviduct of the mother until adult, and assumes the pupal state immediately on extrusion. The Pupipara are also termed Eproboscidea (although they actually possess a well-developed and functional proboscis), and by some dipterists the Eproboscidea are regarded as a suborder and contrasted as such with the rest of the Diptera, which are styled the suborder Proboscidea. By other writers Proboscidea and Eproboscidea are treated as primary divisions of the Cyclorrhapha. In reality, however, the families designated Eproboscidea (*Hippoboscidae*, *Braulidae*, *Nycteribiidae* and *Streblidae*), are not entitled to be considered as constituting either a suborder, or even a main division of the Cyclorrhapha; they are simply Cyclorrhapha much modified owing to parasitism, and in view of the closely similar mode of reproduction in the tsetse-flies the special designation Pupipara should be abandoned. Before leaving the subject of classification it may be noted in passing that in 1906 Professor Lameere, of Brussels, proposed a scheme for the classification of Diptera which as regards both the limits of the families and their grouping into higher categories differs considerably from that in current use.

Little light on the relationship and evolution of the various families of Diptera is afforded by fossil forms, since as a rule the latter are readily referable to existing families. With the exception of a few species from the Solenhofen lithographic Oolite, fossil Diptera belong to the Tertiary Period, during which the members of this order attained a high degree of development. In amber, as proved by the deposits on the shores of the Baltic, the proverbial “fly” is more numerous than any other creatures, and with very few exceptions representatives of all the existing families have been found. The famous Tertiary beds at Florissant, Colorado, have yielded a considerable number of remarkably well-preserved *Tipulidae* (in which family are included the most primitive of existing Diptera), as also species belonging to other families, such as *Mycetophilidae* and even *Oestridae*.

Diptera as an order are probably more widely distributed over the earth's surface than are the representatives of any similar division of the animal kingdom. Flies seem capable of adapting themselves to extremes of cold equally as well as to those of heat, and species belonging to the order are almost invariably included in the collections brought back by members of Arctic expeditions. Others are met with in the most isolated localities; thus the Rev. A. E. Eaton discovered on the desolate shores of Kerguelen's Island apterous and semi-apterous Diptera (*Tipulidae* and *Ephydridae*) of a degraded type adapted to the climatic peculiarities of the locality. Many bird parasites belonging to the *Hippoboscidae* have naturally been carried about the world by their hosts, while other species, such as the house-fly, blow-fly and drone-fly, have in like manner been disseminated by human agency. Most families and a large proportion of genera are represented throughout the world, but in some cases (*e.g. Glossina*—see TSETSE-FLY) the distribution of a genus is limited to a continent. As a rule the general *facies* as well as dimensions are remarkably uniform throughout a family, so that tropical species often differ little in appearance from those inhabiting temperate regions. Many instances of exaggerated and apparently unnatural structure nevertheless occur, as in the case of the genera *Pangonia*, *Nemestrina*, *Achias*, *Diopsis* and the family *Celyphidae*, and, as might be expected, it is chiefly in tropical species that these peculiarities are found. To a geographical distribution of the widest extent, Diptera add a range of habits of the most diversified nature; they are both animal and vegetable feeders, an enormous number of species acting, especially in the larval state, as scavengers in consuming putrescent or decomposing matter of both kinds. The phytophagous species are attached to various parts of plants, dead or alive; and the carnivorous in like manner feed on dead or living flesh, or its products, many larvae being parasitic on living animals of various classes (in Australia the larva of a species of *Muscidae* is even a parasite of frogs), especially the caterpillars of Lepidoptera, which are

destroyed in great numbers by *Tachininae*. The recent discovery of a bloodsucking maggot, which is found in native huts throughout the greater part of tropical and subtropical Africa, and attacks the inmates when asleep, is of great interest.

It may confidently be asserted that, of insects which directly or indirectly affect the welfare of man, Diptera form the vast majority, and it is a moot point whether the good effected by many species in the rapid clearing away of animal and vegetable impurities, and in keeping other insect enemies in check, counterbalances the evil and annoyance wrought by a large section of the Order. The part played by certain blood-sucking Diptera in the dissemination of disease is now well known (see MOSQUITO and TSETSE-FLY), and under the term *myiasis* medical literature includes a lengthy recital of instances of the presence of Dipterous larvae in various parts of the living human body, and the injuries caused thereby. That Diptera of the type of the common house-fly are often in large measure responsible for the spread of such diseases as cholera and enteric fever is undeniable, and as regards blood-sucking forms, in addition to those to which reference has already been made, it is sufficient to mention the vast army of pests constituted by the midges, sand-flies, horse-flies, &c., from the attacks of which domestic animals suffer equally with man, in addition to being frequently infested with the larvae of the bot and warble flies (*Gastrophilus*, *Oestrus* and *Hypoderma*). Lastly, as regards the phytophagous forms, there can be no doubt that the destruction of grass-lands by "leather-jackets" (the larvae of crane-flies, or daddy-long-legs,—*Tipula oleracea* and *T. paludosa*), of divers fruits by *Ceratitis capitata* and species of *Dacus*, and of wheat and other crops by the Hessian-fly (*Mayetiola destructor*) and species of *Oscinis*, *Chlorops*, &c., is of very serious consequence.

With many writers it is customary to treat the fleas as a sub-order of Diptera, under the title Aphaniptera or Siphonaptera. Since, however,

although undoubtedly allied to the Diptera, they must have diverged from the ancestral stem at an early period, before the existing forms of Diptera became so extremely specialized, it seems better to regard the fleas as constituting an independent order (see FLEA).

(E. E. A.)

DIPTERAL (Gr. for "double-winged"), the architectural term applied to those temples which have a double range of columns in the peristyle, as in the temple of Diana at Ephesus.

DIPTYCH (Gr. διπτυχος, two-folding), (1) A tablet made with a hinge to open and shut, used in the Roman empire for letters (especially love-letters), and official tokens of the commencement of a consul's, praetor's or aedile's term of office. The latter variety of diptych was inscribed with the magistrate's name and bore his portrait, and was issued to his friends and the public generally. They were made of boxwood or maple. More costly examples were in cedar, ivory (*q.v.*), silver or sometimes gold. They were often sent as New Year gifts.

(2)In the primitive church when the worshippers brought their own offerings of bread and wine, from which were taken the Communion

elements, the names of the contributors were recorded on diptychs and read aloud. To these names were early added those of deceased members of the community whom it was desired to commemorate. This custom rapidly developed into a kind of commemoration of saints and benefactors, living and dead; especially, in each church, were the names of those who had been its bishops recorded. The custom was maintained until the lists became so long that it was impossible to read them through, and the observance in this form had to be abandoned. The insertion of a name on the diptych, thereby securing the prayers of the church, was a privilege from which a person could be excluded on account of suspicion of heresy or by the intrigues of enemies. His name could, if written, be expunged under similar circumstances. The names thus written were read from the ambo, in which the diptych was kept. The reading of these names during the canon of the mass gave rise to the term *canonization*. By various councils it was ordained that the name of the pope should always be inserted in the diptych list.

The addition of *dates* resulted from the custom of recording baptisms and deaths; and thus the diptych developed into a calendar and formed the germ of the elaborate system of festologies, martyrologies and calendars which developed in the church.

The diptych went by various names in the early church—mystical tablets, anniversary books, ecclesiastical matriculation registers or books of the living. According to the names inscribed, bishops, the dead or the living, a diptych might be a *diptycha episcoporum*, *diptycha mortuorum* or *diptycha vivorum*.

In course of time the list of the names swelled to such proportions that the space afforded by the diptych was insufficient. A third fold was consequently provided, and the tablet became a *triptych* (though the name *diptych* was retained as a general term for the object). Further room was

afforded by the insertion of leaves of parchment or wood between the folds. The custom of reading names from the diptychs died out about the 8th century. The diptychs, however, were retained as altar ornaments. From the original consular documents onwards, the outsides of the folds had always been richly ornamented, and when they ceased to be of immediate practical use they became merely decorative. Instead of the list of names the inside was ornamented like the outer, and in the middle ages the best painters of the day would often paint them. When folded, the portraits of the donor and his wife might be shown; when open there would be three paintings, one on each fold, of a religious character.

(R. A. S. M.)

DIR, an independent state in the North-West Frontier Province of India, lying to the north-east of Swat. Its importance chiefly arises from the fact that it commands the greater part of the route between Chitral and the Peshawar frontier. The quarrels and intrigues between the khan of Dir and Umra Khan of Jandol were among the chief events that led up to the Chitral Campaign of 1895. During that expedition the khan made an agreement with the British Government to keep the road to Chitral open in return for a subsidy. Including the Bashkars, an aboriginal tribe allied to the Torwals and Garhuis, who inhabit Panjkora Kohistan, the population is estimated at about 100,000.

DIRCE, in Greek legend, daughter of Helios the sun-god, the second wife of Lycus, king of Thebes. She sorely persecuted Antiope, his first wife, who escaped to Mount Cithaeron, where her twin sons Amphion and Zethus were being brought up by a herdsman who was ignorant of their parentage. Having recognized their mother, the sons avenged her by tying Dirce to the horns of a wild bull, which dragged her about till she died. Her body was cast into a spring near Thebes, which was ever afterwards called by her name. Her punishment is the subject of the famous group called "The Farnese Bull," by Apollonius and Tauriscus of Tralles, in the Naples museum (see GREEK ART, Plate I. fig. 51).

DIRECT MOTION, in astronomy, the apparent motion of a body of the solar system on the celestial sphere in the direction from west to east; so called because this is the usual direction of revolution and rotation of the heavenly bodies.

DIRECTORS, in company law, the agents by whom a trading or public company acts, the company itself being a legal abstraction and unable to do anything. As joint-stock companies have multiplied and their enterprise has extended, the position of directors has become one of increasing influence and importance. It is they who control the colossal funds now invested in

trading companies, and who direct their policy (for shareholders are seldom more than dividend-drawers). Upon their uprightness, vigilance and sound judgment depends the welfare of the greatest part of the trade of the country concerned. It is not to be wondered at that in view of this influence and independence of action the law courts have held directors to a strict standard of duty, and that the parliament of the United Kingdom has singled out directors from other agents for special legislation in the Directors Liability Act 1890, the Larceny Act 1861, the Companies Act 1867 and the Winding-up Act 1890.

The first directors of a company are generally appointed by the articles of association. Their consent to act must now, under the Companies Act 1908, be filed with the registrar of joint-stock companies. Directors other than the first are elected at the annual general meeting, a certain proportion of the acting directors—usually one-third—retiring under the articles by rotation each year, and their places being filled up by election. A share qualification is nearly always required, on the well-recognized principle that a substantial stake in the undertaking is the best guarantee of fidelity to the company's interests. A director once appointed cannot be removed during his term of office by the shareholders, unless there is a special provision for that purpose in the articles of association; but a company may dismiss a director if the articles—as is usually the case—authorize dismissal. The authority and powers of directors are prima facie those necessary for carrying on the ordinary business of the company, but it is usual to define the more important of such powers in the articles of association. For instance, it is commonly prescribed how and when the directors may make calls, to what amount they may borrow, how they may invest the funds of the company, in what circumstances they may forfeit shares, or veto transfers, in what manner they shall conduct their proceedings, and what shall constitute a quorum of the board. Whenever, indeed, specific directions are desirable they may properly be given by the articles. But superadded to and

supplementing these specific powers there is usually inserted in the articles a general power of management in terms similar to those of clause 55 of the model regulations for a company, known as Table A (clause 71 of the revised Table). The powers, whether general or specific, thus confided to directors are in the nature of a trust, and the directors must exercise them with a single eye to the benefit of the company. For instance, in allotting shares they must consult the interests of the company, not favour their friends. So in forfeiting shares they must not use the power collusively for the purpose of relieving the shareholder from liability. To do so is an abuse of the power and a fraud on the other shareholders.

It would give a very erroneous idea of the position and functions of directors to speak of them—as is sometimes done—as trustees. They are only trustees in the sense that every agent is. They are "commercial men managing a trading concern for the benefit of themselves and the other shareholders." They have to carry on the company's business, to extend and consolidate it, and to do this they must have a free hand and a large discretion to deal with the exigencies of the commercial situation. This large discretion the law allows them so long as they keep within the limits set by the company's memorandum and articles. They are not to be held liable for mere errors of judgment, still less for being defrauded. That would make their position intolerable. All that the law requires of them is that they should be faithful to their duties as agents—"diligent and honest," to use the words of Sir George Jessel, formerly master of the rolls. Thus in the matter of diligence it is a director's duty to attend as far as possible all meetings of the board; at the same time non-attendance, unless gross, will not amount to negligence such as to render a director liable for irregularities committed by his co-directors in his absence. A director again must not sign cheques without informing himself of the purpose for which they are given. A director, on the same principle, must not delegate his duties to others unless expressly authorized to do so, as where the company's articles empower the

directors to appoint a committee. Directors may, it is true, employ skilled persons, such as engineers, valuers or accountants, to assist them, but they must still exercise their judgment as business men on the materials before them. Then in the matter of honesty, a director must not accept a present in cash or shares or in any other form whatever from the company's vendor, because such a present is neither more nor less than a bribe to betray the interests of the company, nor must he make any profit in the matter of his agency without the knowledge and consent of his principal, the company. He must not, in other words, put himself in a position in which his duty to the company and his own interest conflict or even may conflict. This rule often comes into play in the case of contracts between a company and a director. There is nothing in itself invalid in such a contract, but the onus is on the director if he would keep such a contract to show that the company assented to his making a profit out of the contract, and for that purpose he must show that he made full and fair disclosure to the company of the nature and extent of his interest under the contract. It is for this reason that when a company's vendor is also a director he does not join the board until his co-directors have exercised an independent judgment on the propriety of the purchase.

A director must also bear in mind—what is a fundamental principle of company management—that the funds of the company are entrusted to the directors for the objects of the company as defined by the company's memorandum of association and authorized by the general law, and that they must not be diverted from those objects or applied to purposes which are outside the objects of the company, *ultra vires*, as it is commonly called, or outside the powers of management given by the shareholders to the directors. This does not abridge the large discretion allowed to directors in carrying on the business of the company. The funds embarked in a trading company are intended to be employed for the acquisition of gain, and risk, greater or less according to circumstances, is necessarily incidental to such

employment; but it is quite another matter when directors pay dividends out of capital, or return capital to the shareholders, or spend money of the company in "rigging" the market, or in buying the company's shares or paying commission for underwriting the shares of the company except where such commission is authorized under acts of 1900 and 1907, incorporated in the Companies Act 1908. Directors who in these or any other ways misapply the funds of the company are guilty of what is technically known as "misfeasance" or breach of trust, and all who join in the misapplication are jointly and severally liable to replace the sums so misapplied. The remedy of the company for misfeasance, if the company is a going concern, is by action against the delinquent directors; but where a company is being wound up, the legislature has, under the Winding-up Act 1890, provided a summary mode of proceeding, by which the official receiver or liquidator, or any creditor or contributory of the company, may take out what is known as a misfeasance summons, to compel the delinquent director or officer to repay the misapplied moneys or make compensation. The departmental committee of the Board of Trade in its report (July 1906) recommended that the court should be given a discretionary power, analogous to that it already possesses in the case of trustees under the Judicial Trustees Act 1896, s. 3, to relieve a director (or a promoter) in certain cases from liability. This recommendation has been given effect to by s. 279 of the Companies Act 1908, which provides that, "If in any proceeding against a director of a company for negligence or breach of trust it appears to a court that the director is or may be liable in respect of the negligence or breach of trust, but has acted honestly and reasonably and ought fairly to be excused for the negligence or breach of trust, the court may relieve him either wholly or partly from his liability on such terms as the court may think proper."

Directors who circulate a prospectus containing statements which they know to be false, with intent to induce any person to become a shareholder,

may be prosecuted under § 84 of the Larceny Act 1861. They are also liable criminally for falsification of the company's books, and for this or any other criminal offence the court in winding up may, on the application of the liquidator, direct a prosecution. As to the liability of directors for statements or omissions in a prospectus see COMPANY.

In managing the affairs of the company directors must meet together and act as a body, for the company is entitled to their collective wisdom in council assembled. Board meetings are held at such intervals as the directors think expedient. Notice of the meeting must be given to all directors who are within reach, but the notice need not specify the particular business to be transacted. The articles usually fix, or give the directors power to fix, what number shall constitute a quorum for a board meeting. They also empower the directors to elect a chairman of the board. The directors exercise their powers by a resolution of the board which is recorded in the directors' minute-book.

The court will not as a rule interfere with the discretion of directors honestly exercised in the management of the affairs of the company. The directors have prima facie the confidence of the shareholders, and it is not for the court to say that such confidence is misplaced. If the stockholders are dissatisfied with the management the remedy is in their own hands—they can call a meeting and elect a new board.

A company's articles usually provide for the payment of a certain sum to each director for his services during the year. When this is the case it is an authority to the directors to pay themselves the amount of such remuneration. The remuneration, unless otherwise expressly provided, covers all expenses incidental to the directors' duties. A director, for instance, cannot claim to be paid in addition to his fixed remuneration his travelling expenses for attending board meetings.

When a company winds up, the directors' powers of management come to an end. Their agency is superseded in favour of that of the liquidator.

(E. MA.)

DIRECTORY, a term meaning literally that which guides or directs, and so applied to a book or set of rules giving directions for public worship. The *directorium* or *ordo* of the Roman Church contains regulations as to the Mass and office to be used on each day throughout the year, and the word is found in the *Directory for the Publick Worship of God* drawn up in 1644 at the Westminster Assembly. The term now usually signifies a book containing the names, addresses and occupations, &c. of the inhabitants of a town or district, or of a similar list of the users of a telephone supply, or of the members of a particular profession or trade. The name *Directoire* or Directory was given to the body which held the executive power in France from October 1795 until November 1799 (see FRENCH REVOLUTION).

DIRGE, a song or hymn of mourning, particularly one sung at funerals or at a Service in commemoration of the dead. It is derived from the first word of the antiphon *"Dirige, Domine, Deus meus, in conspectu tuo viam meam"* (Guide, O Lord, my God, my way in Thy sight), of the opening

psalm in the office for the dead in the Roman Church. The antiphon is adapted from verse 8 of Psalm v.

DIRK, a dagger, particularly the heavy dagger carried by the Highlanders of Scotland. The dirk as worn in full Highland costume is an elaborately ornamented weapon, with cairngorms or other stones set in the head of the handle, which has no guard. Inserted in the sheath there may be two small knives. The dirk, in the shape of a straight blade, with a small guard, some 18 in. long, is worn by midshipmen in the British navy. The origin of the word is doubtful. The earlier forms were *dork* and *durk*, and the spelling *dirk*, adopted by Johnson, represents the pronunciation of the second form. The name seems to have been early applied to the daggers of the Highlanders, but the Gaelic word is *biodag*, and the Irish *duirc*, often stated to be the origin, is only an adaptation of the English word. It may be a corruption of the German *Dolch*, a dagger. The suggestion that it is an application of the Christian name "Dirk," the short form of "Dieterich," is not borne out, according to the *New English Dictionary*, by any use of this name for a dagger, and is further disproved by the earlier English spelling.

DIRSCHAU, a town of Germany, in the kingdom of Prussia, province of West Prussia, on the left bank of the Vistula, 20 m. S. from Danzig and at

the junction of the important lines of railway Berlin-Königsberg and Danzig-Bromberg. Pop. (1905) 14,185. It has a Roman Catholic and a Protestant church and several schools. The river is here crossed by two fine iron bridges. The older structure dating from the year 1857, originally used for the railway, is now given up to road traffic, and the railway carried by a new bridge completed in 1891. Dirschau has railway workshops and manufactories of sugar, agricultural implements and cement. During the war with Poland, Gustavus Adolphus made it his headquarters for many months after its capture in 1626.

DISABILITY, a term meaning, in general, want of ability, and used in law to denote an incapacity in certain persons or classes of persons for the full enjoyment of duties or privileges, which, but for their disqualification, would be open to them; hence, legal disqualification. Thus, married women, persons under age, insane persons, convicted felons are under disability to do certain legal acts. This disability may be absolute, wholly disabling the person so long as it continues, or partial, ceasing on discontinuation of the disabling state, as attainment of full age.

DISCHARGE (adapted from the O. Fr. *descharge*, modern *décharge*, from a med. Lat. *discargare*, to unload, *dis-* and *carricare*, to load, cf.

"charge"), a word meaning relief from a load or burden, hence applied to the unloading of a ship, the firing of a weapon, the passage of electricity from an electrified body, the issue from a wound, &c. From the sense of relief from an obligation, "discharge" is also applied to the release of a soldier or sailor from military or naval service, or of the crew of a merchant vessel, or to the dismissal from an office or situation. In law, it is used of a document or other evidence that can be accepted as proof of the release from an obligation, as of a receipt, on payment of money due. Similarly it is applied to the release in accordance with law of a person in custody on a criminal charge, and to the legal release of a bankrupt from further liability for debts provable in the bankruptcy except those incurred by fraud or debts to the crown. It is also applied to the reversal of an order of a court. In the case of divorce, where the rule *nisi* is not made absolute, the rule is said to be discharged.

DISCHARGING ARCH, in architecture, an arch built over a lintel or architrave to take off the superincumbent weight. The earliest example is found in the Great Pyramid, over the lintels of the entrance passage to the tomb: it consisted of two stones only, resting one against the other. The same object was attained in the Lion Gate and the tomb of Agamemnon, both in Mycenae, and in other examples in Greece, where the stones laid in horizontal courses, one projecting over the other, left a triangular hollow space above the lintel of the door, which was subsequently filled in by vertical sculptured stone panels. The Romans frequently employed the discharging arch, and inside the portico of the Pantheon the architraves have

such arches over them. In the Golden Gateway of the palace of Diocletian at Spalato the discharging arches, semicircular in form, were adopted as architectural features and decorated with mouldings. The same is found in the synagogues in Palestine of the 2nd century; and later, in Byzantine architecture, these moulded archivolts above an architrave constitute one of the characteristics of the style. In the early Christian churches in Rome, where a colonnade divided off the nave and aisles, discharging arches are turned in the frieze just above the architraves.

DISCIPLE, properly a pupil, scholar (Lat. *discipulus*, from *discere*, to learn, and root seen in *pupillus*), but chiefly used of the personal followers of Jesus Christ, including the inner circle of the Apostles (*q.v.*).

DISCIPLES OF CHRIST, or CHRISTIANS, an American Protestant denomination, founded by Thomas Campbell, his son Alexander Campbell (*q.v.*) and Barton Warren Stone (1772-1844). Stone had been a Presbyterian minister prominent in the Kentucky revival of 1801, but had been turned against sectarianism and ecclesiastical authority because the synod had condemned Richard McNemar, one of his colleagues in the revival, for preaching (as Stone himself had done) counter to the Westminster Confession, on faith and the work of the Holy Spirit in conversion. He had

organized the Springfield Presbytery, but in 1804 with his five fellow ministers signed "The Last Will and Testament of the Springfield Presbytery," giving up that name and calling themselves "Christians." Like Stone, Alexander Campbell had adopted (in 1812) immersion, and, like him, his two great desires were for Christian unity and the restoration of the ancient order of things. But the Campbellite doctrines differed widely from the hyper-Calvinism of the Baptists whom they had joined in 1813, especially on the points on which Stone had quarrelled with the Presbyterians; and after various local breaks in 1825-1830, when there were large additions to the Restorationists from the Baptist ranks, especially under the apostolic fervour and simplicity of the preaching of Walter Scott (1796-1861), in 1832 the Reformers were practically all ruled out of the Baptist communion. The Campbells gradually lost sight of Christian unity, owing to the unfortunate experience with the Baptists and to the tone taken by those clergymen who had met them in debates; and for the sake of Christian union it was peculiarly fortunate that in January 1832 at Lexington, Kentucky, the followers of the Campbells and those of Stone (who had stressed union more than primitive Christianity) united. Campbell objected to the name "Christians" as sectarianized by Stone, but "Disciples" never drove out of use the name "Christians."

During the Civil War the denomination escaped an actual scission by following the neutral views of Campbell, who opposed slavery, war and abolition. In 1849 the American Christian Missionary Society was formed; it was immediately attacked as a "human innovation," unwarranted by the New Testament, by literalists led in later years by Benjamin Franklin (secretary of the missionary society in 1857), who opposed all church music also. Isaac Errett (1820-1888) was the most prominent leader of the progressive party, which was considered corrupt and worldly by the literalists, many of whom, in spite of his efforts, broke off from the main body, especially in Indiana, Kentucky, Tennessee, Arkansas and Texas.

The main body appointed in 1890 a standing committee on Christian union; their aim in this respect is not for absorption, as was clearly shown by their answer in 1887 to overtures from the Protestant Episcopal Church regarding Christian unity. The credal position of the Disciples is simple: great stress is put upon the phrase "the Christ, the Son of the living God," and upon the recognition by Jesus of this confession as the foundation of His church; as to baptism, agreement with Baptists is only as to the mode, immersion; this is considered "the primitive confession of Christ and a gracious token of salvation," and as being "for the remission of sins"; the Disciples generally deny the authority over Christians of the Old Covenant, and Alexander Campbell in particular held this view so forcibly that he was accused by Baptists of "throwing away the Old Testament." The Lord's Supper is celebrated every Sunday, the bread being broken by the communicants. The Disciples are not Unitarian in fact or tendency, but they urge the use of simple New Testament phraseology as to the Godhead. Their church government is congregational.

The growth of the denomination has been greatest in the states along the Ohio river, whence they have spread throughout the Union. In 1908 there were 6673 ministers and 1,285,123 communicants in the United States. There are churches in Canada, in Great Britain and in Australia. Bethany College, at Bethany, West Virginia, was chartered in 1840, and Alexander Campbell, who had founded it as Buffalo Seminary, was its president until his death in 1866; other colleges founded by the sect are: Kentucky University, Lexington, Ky.; Hiram College, Hiram, Ohio (1850, until 1867 known as Western Reserve Eclectic Institute); Butler College, Indianapolis, Indiana (1855); Christian University, Canton, Missouri (1851; coeducational); Eureka College, in Woodford county, Illinois (1855; coeducational); Union Christian College, Merom, Ind. (1859); Texas Christian University, Waco, Texas (1873, founded as Add Ran College at Thorpe's Springs, removing to Waco in 1895);

Drake University, Des Moines, Iowa (1881); Milligan College, Milligan, Tennessee (1882); Defiance College, Defiance, O. (1885); Cotner University, Lincoln, Nebraska (1889); Elon College, Elon, North Carolina (1890); American University, Harriman, Tenn. (1893); the Virginia Christian College, Lynchburg, Virginia (1903), and for negroes, the Southern Christian Institute, Edwards, Mississippi (1877), and the Christian Bible College, Newcastle, Henry County, Ky. Theological seminaries are the Berkeley Bible Seminary, Berkeley, California (1896); the Disciples' Divinity House, Chicago, Ill. (1894); and the Eugene Divinity School, Eugene, Oregon (1895). "Bible chairs" were established in state universities and elsewhere by the Disciples,—at the University of Michigan (1893), at the University of Virginia (1899), at the University of Calcutta (1900) and at the University of Kansas (1901). The denomination has publishing houses in Cincinnati, St Louis, Louisville and Nashville.

See Errett Gates's *History of the Disciples of Christ* (New York, 1905), in "The Story of the Churches" series, and his *Early Relation and Separation of Baptists and Disciples* (Chicago, 1904), a University of Chicago doctoral thesis; and B. B. Tyler's *History of the Disciples of Christ* in vol. xii. of "The American Church History Series" (New York, 1894).

DISCLAIMER, a renunciation, denial or refusal; a disavowal of claims. In law the term is used more particularly in the following senses:—(1) In the law of landlord and tenant, the direct repudiation of that relation by

some act on the part of the tenant. A disclaimer may be verbal or written, but in such case it must be something more than a mere renunciation of the tenant's title, or it may be an act which is wholly inconsistent with the existence of such relation, as the setting up by the tenant of a distinct title either in himself or some third party. (2) In the law of bankruptcy, where any part of the property of a bankrupt consists of land of any tenure burdened with onerous covenants, of stocks or shares in companies, of unprofitable contracts, or of any property that is unsaleable, or not readily saleable, by reason of its binding the possessor to the performance of any onerous act, the trustee, notwithstanding that he has endeavoured to sell or has taken possession of the property, or exercised any act of ownership in relation to it, may, subject to certain provisions, by writing signed by him, at any time within twelve months after the first appointment of a trustee, "disclaim" the property (see BANKRUPTCY). (3) In the law of trusts, disclaimer is the refusal or renunciation of the office or duties of a trustee. It is an undisputed rule that no one is compellable to undertake a trust, so that as soon as a person knows he has been appointed a trustee under some instrument, he should determine whether he will accept the office or not. Disclaimer of trust should be by deed, as admitting of no ambiguity, but it may be by conveyance to other accepting trustees, or orally, or by written declaration, or even by conduct. (4) In the law of patents, disclaimer is the renunciation, by amendment of specifications, of the portion of an inventor's claim to protection.

DISCOUNT. (1) A money-market term for the price paid in order to obtain immediate realization of a bill not yet due. If a bill for £100 due six months hence is discounted at the rate of 3% per annum, its holder will obtain £98, 10s. in cash for it. (2) A Stock-Exchange term applied to a security, not fully paid, which has fallen below its issue price, and so is said to stand at so much discount. See PREMIUM.

DISCOVERY, in law, the revealing or disclosing of any matter. The English common law courts were originally unable to compel a litigant before a trial to disclose the facts and documents on which he relied. In equity, however, a different rule prevailed, there being an absolute right to discovery of all material facts on which a case was founded. Now the practice is regulated by the Rules of the Supreme Court, 1883, Order 31. Discovery is of two kinds, namely, by interrogatories and by affidavit of documents, provision being also made for the production and inspection of documents. Where a party to a suit can make an affidavit stating that in his belief certain specified documents are or have been in the possession of some other party, the court may make an order that such party state on affidavit whether he has or ever had any of those documents in his possession, or if he has parted with them or what has become of them. A further application may then be made by notice to the party who has admitted possession of the documents for production and inspection. Copies also may be taken of the more important documents. There is also discovery of facts obtained by means of interrogatories, *i.e.* written questions addressed on behalf of one party, before trial, to the other party, who is

bound to answer them in writing upon oath. In order to prevent needless expense the party seeking discovery must first secure the cost of it by paying into court a sum of money, generally not less than five pounds. See also EVIDENCE.

DISCUS (Gr. δίσκος, disk), a circular plate of stone, later of metal, which was used by the ancient Greeks for throwing to a distance as a gymnastic exercise. Judging from specimens found by excavators, the ancient discus was about 8 or 9 in. in diameter and weighed from 4 to 5 ℔, although one of bronze, preserved in the British Museum, weighs over 8 ℔. Sometimes a kind of quoit, spherical in form, was used, through a hole in which a thong was passed to assist the athlete in throwing it. The sport of throwing the discus was common in the time of Homer, who mentions it repeatedly. It formed a part of the *pentathlon*, or quintuple games, in the ancient Olympic Games. Statius, in *Thebais*, 646-721, fully describes the use of the discus. In the British Museum there is a restored copy of a statue by Myron (see GREEK ART, Plate IV. fig. 68) of a discus-thrower (*discobolus*) in the act of hurling the missile; but the investigations of N. E. Norman Gardiner show that a wrong attitude has been adopted by the restorer.

Throwing the discus was introduced as an event in modern athletics at the revived Olympic Games, first held at Athens in 1896, and since that time it has become a recognized event in the athletic championship meetings of several European nations, as well as in the United States, where it has become very popular. According to the American rules the discus

must be of a smooth, hard-wood body without finger-holes, weighted in the centre with lead disks and capped with polished brass disks, with a steel ring on the outside. Its weight must be 4½ lb, its outside diameter 8 in. and its thickness at the centre 2 in. It must be thrown from a 7-ft. circle, which may not be overstepped in throwing, and the throw is measured from the spot where the discus first strikes the ground to the point in the circumference of the circle on a line between the centre and the point of striking.

DISINFECTANTS, substances employed to neutralize the action of pathogenic organisms, and prevent the spread of contagious or infectious disease. The efficiency of any disinfectant is due to its power of destroying, or of rendering inert, specific poisons or disease germs. Therefore antiseptic substances generally are to this extent disinfectants. So also the deodorizers, which act by oxidizing or otherwise changing the chemical constitution of volatile substances disseminated in the air, or which prevent noxious exhalations from organic substances, are in virtue of these properties effective disinfectants in certain diseases. A knowledge of the value of disinfectants, and the use of some of the most valuable agents, can be traced to very remote times; and much of the Levitical law of cleansing, as well as the origin of numerous heathen ceremonial practices, are clearly based on a perception of the value of disinfection. The means of disinfection, and the substances employed, are very numerous, as are the classes and conditions of disease and contagion they are designed to meet. Nature, in the oxidizing influence of freely circulating atmospheric air, in the purifying effect of

water, and in the powerful deodorizing properties of common earth, has provided the most potent ever-present and acting disinfecting media. Of the artificial disinfectants employed or available three classes may be recognized:—1st, volatile or vaporizable substances, which attack impurities in the air; 2nd, chemical agents, for acting on the diseased body or on the infectious discharges therefrom; and 3rd, the physical agencies of heat and cold. In some of these cases the destruction of the contagium is effected by the formation of new chemical compounds, by oxidation, deoxidation or other reaction, and in others the conditions favourable to life are removed or life is destroyed by high temperature. Among the first class, aerial or gaseous disinfectants, formic aldehyde has of late years taken foremost place. The vapour is a powerful disinfectant and deodorant, and for the surface disinfection of rooms, fulfils all requirements when used in sufficient amount. It acts more rapidly than equal quantities of sulphurous acid, and it does not affect colours. It is non-poisonous, though irritating to the eyes and throat. With the exception of iron and steel it does not attack metals. It can be obtained in paraform tabloids, and with a specially constructed spirit lamp disinfection can be carried out by any one. Twenty tabloids must be employed for every 1000 cubic ft. of space. Disinfection by sulphurous acid fumes is of great antiquity, and is still in very general use; for the purpose of destroying vermin it is more powerful than formic aldehyde. Camphor and some volatile oils have also been employed as air disinfectants, but their virtues lie chiefly in masking, not destroying, noxious effluvia. In the 2nd class—non-gaseous disinfecting compounds—all the numerous antiseptic substances may be reckoned; but the substances principally employed in practice are oxidizing agents, as potassium manganates and permanganates, “Condy’s fluid,” and solutions of the so-called “chlorides of lime,” soda and potash, with the chlorides of aluminium and zinc, soluble sulphates and sulphites, solutions of sulphurous acid, and the tar products—carbolic, cresylic and salicylic acids. Of the physical

agents heat and cold, the latter, though a powerful natural disinfectant, is not practically available by artificial means; heat is a power chiefly relied on for purifying and disinfecting clothes, bedding and textile substances generally. Different degrees of temperature are required for the destruction of the virus of various diseases; but as clothing, &c., can be exposed to a heat of about 250° Fahr. without injury, provision is made for submitting articles to nearly that temperature. For the thorough disinfection of a sick-room the employment of all three classes of disinfectants, for purifying the air, for destroying the virus at its point of origin, and for cleansing clothing, &c., may be required.

DISMAL, an adjective meaning dreary, gloomy, and so a name given to stretches of swampy land on the east coast of the United States, as the Dismal Swamp in Virginia and North Carolina. The derivation has been much discussed. In the early examples of the use the word is a substantive, especially in the expression "in the dismal," *i.e.* in the dismal time or days. Later it became adjectival, especially in combination with "days." It has been connected with "decimal," med. Latin *decimalis*, belonging to a tithe or tenth, and thus the "dismal days" are the unpleasant days connected with the extortion and oppression of exacting payment of tithes. According to the *New English Dictionary*, quoting Professor W. W. Skeat, "dismal" is derived, through an Anglo-Fr. *dis mal*, from the Lat. *dies mali*, evil or unpropitious days. This Anglo-French expression, explained as *les mal jours*, is found in a MS. of Rauf de Linham's *Art de Kalender*, 1256. These days of evil omen were known as *Dies Aegyptiaci* (Du Cange, *Glossarium,*

s.v.) or Egyptian days, either as having been instituted by Egyptian astrologers or with reference to the "ten plagues"; so Chaucer, "I trowe hit was in the dismal, That were the ten woundes of Egipte" (*Book of the Duchesse*, 1206). There were two such days in each month.

See Skeat, Trans. *Philol. Soc.* (1888), p. 2, and note on the line in the "Book of the Duchesse," *The Complete Works of Geoffrey Chaucer*, vol. i. (1894).

DISORDERLY HOUSE, in law, a house in which the conduct of its inmates is such as to become a public nuisance, or a house where persons congregate to the probable disturbance of the public peace or other commission of crime. In England, by the Disorderly Houses Act 1751, the term includes common bawdy houses or brothels,[1] common gaming houses, common betting houses and disorderly places of entertainment. The keeping of such is a misdemeanour punishable by fine or imprisonment, and in the case of a brothel also punishable on summary conviction by the Criminal Law Amendment Act 1885; the letting out for gain for indiscriminate prostitution of a room or rooms in a house will make it as much a brothel in law as if the whole house were let out for the purpose. Where, however, a woman occupies a house or room which is frequented by men for the purpose of committing fornication with her, she cannot be convicted of keeping a disorderly house. See also PROSTITUTION.

1 The etymology of this word has been confused by the early adoption into English usage of the O. Fr. *bordel*. The two words are in origin quite distinct. Brothel is an O. Eng.

word for a person, not a place. It meant an abandoned vagabond, one who had gone to ruin (*abréothan*). *Bordel*, on the contrary, is a place, literally a small hut or shelter, especially for fornication, Med. Lat. *bordellum*, diminutive of the Late Lat. *borda*, board. The words were early confused, and brothel-house, bordel-house, bordel or brothel, are all used for a disorderly house, while bordel was similarly misused, and, like brothel in its proper meaning, was applied to a disorderly person.

DISPATCH, or DESPATCH, to send off immediately, or by express; particularly in the case of the sending of official messages, or of the immediate sending of troops to their destination, or the like. The word is thus used as a substantive of written official reports of events, battles and the like, sent by ambassadors, generals, &c., by means of a special messenger, or of express correspondence generally. From the primary meaning of the prompt sending of a message, &c., the word is used of the quick disposal of business, or of the disposal of a person by violence; hence the word means to execute or murder. The etymology of the word has been obscured by the connexion with the Fr. *dépêcher*, and *dépêche*, which are in meaning the equivalents of the Eng. verb and substantive. The Fr. word is made up of the prefix *de-*, Lat. *dis-*, and the root which appears in *empêcher*, to embarrass, and means literally to disentangle. The Lat. origin of *dépêcher* and *empêcher* is a Low Lat. *pedicare*, *pedica*, a fetter. The Fr. word came into Eng. as *depeach*, which was in use from the 15th century until "despatch" was introduced. This word is certainly direct from the Ital. *dispacciare*, or Span, *despachar*, which must be derived from the Lat. root appearing in *pactus*, fixed, fastened, from *pangere*. The *New English Dictionary* finds the earliest instance of "dispatch" in a letter to Henry VIII. from Bishop Tunstall, commissioner to Spain in 1516-1517.

DISPENSATION, a term with two main applications, (1) to the action of administering, arranging or dealing out, and (2) to the action of allowing certain things, rules, &c., to be done away with, relaxed. Of these two meanings the first is to be derived from the classical Latin use of *dispensare*, literally, to weigh out, hence to distribute, especially of the orderly arrangement of a household by a steward; thus *dispensatio* was, in theology, the word chosen to translate the Greek οἰκονομία, economy, *i.e.* divine or religious systems, as in the Jewish, Mosaic, Christian dispensations. Dispensation in law is, strictly speaking, the suspension by competent authority of general rules of law in particular cases. Its object is to modify the hardships often arising from the rigorous application of general laws to particular cases, and its essence is to preserve the law by suspending its operation, *i.e.* making it non-existent, in such cases. It follows, then, that dispensation, in its strict sense, is anticipative, *i.e.* it does not absolve from the consequences of a legal obligation already contracted, but avoids a breach of the law by suspending the obligation to conform to it, *e.g.* a dispensation or licence to marry within the prohibited degrees, or to hold benefices in plurality. The term is, however, frequently used of the power claimed and exercised by the supreme legislative authority of altering or abrogating in particular cases conditions established under the existing law and of releasing individuals from obligations incurred under it, *e.g.* dispensations granted by the pope *ex plenitudine potestatis* from the obligation of celibacy, from religious and other vows, from *matrimonium ratum*, *non consummatum*, &c.

1. *Ecclesiastical Law.*—In the theory of the canon law the dispensing power is the corollary of the legislative, the authority that makes laws, and no other, having power to suspend them. It follows that the law of nature (*jus naturae*) and *a fortiori* the law of God (*jus divinum*) are not subject to dispensation of any earthly authority, and that it is only the disciplinary laws made by the Church that the Church is empowered to suspend or to abrogate. Thus, not even the pope could grant a dispensation for a marriage between persons related in the direct line of ascent or descent, *e.g.* father and daughter, or between brother and sister, while dispensations are granted for marriages within other prohibited degrees, *e.g.* uncle and niece.

The dispensing power, like the legislative authority, was formerly invested in general councils and even in provincial synods; but in the West, with the gradual centralization of authority at Rome, it became ultimately vested in the pope as the supreme lawgiver of the Church. Subject, however, to the supreme jurisdiction of the pope, the power of dispensation continued to reside in the other organs of the Church in exact proportion to their legislative capacities, *i.e.* in provincial synods in respect of regional rules laid down by them, and in bishops in respect of rules laid down by them for their dioceses. According to Du Cange, the earliest record of the use of the word *dispensatio* in this connexion is in the letter of Pope Gelasius I. of the 11th of March 494, to the bishops of Lucania (in Jaffé, *Reg. Pont. Rom.*, ed. 2, tom. i. no. 636): necessaria rerum Dispensatione constringimur, ... sic canonum paternorum decreta librare, ... ut quae praesentium necessitas temporum restaurandis Ecclesiis relaxanda deposcit, adhibita consideratione diligenti, quantum fieri potest temperemus.[1] Dispensations from the observance of traditional rules were, however, during the early centuries exceedingly rare, and there are more instances of the popes repudiating than of their exercising the power to grant them. Thus Celestine I. (d. 432) wrote: “The rules govern us, not we the rules: we are subject to the canons, since we are the servants of the precepts of the

canons" (*Epist. 3 ad Episcopos Illyrici*); and Pope Zozimus wrote even more strongly: "This see possesses no authority to make any concession or change; for with us abides antiquity firmly rooted (*inconvulsis radicibus*), reverence for which the decrees of the Fathers enjoined." As time went on, however, and the Church expanded, this rigidly conservative attitude proved impossible to maintain, and the principle of "tempering" the law when forced to do so "by the exigencies of affairs or of the times" (*rerum vel temporum angustia*), as laid down by Gelasius, was adopted into the canon law itself. The principle was, of course, singularly open to abuse. In theory it was laid down from the first that dispensations were only to be granted in cases of urgent necessity and in the highest interests of the Church; in practice, from the 11th century onwards, the power of dispensation was used by the popes as one of the most potent instruments for extending their influence. Dispensations to hold benefices in plurality formed, with provisions and the papal claim to the right of direct appointment, a powerful means for extending the patronage of the Holy See and therefore its hold over the clergy, and from the 13th century onwards this abuse assumed vast proportions (Hinschius iii. p. 250). Even more scandalous was the almost unrestrained traffic in licences and dispensations at Rome, which grew up, at least as early as the 14th century, owing to the fees charged for such dispensations having come to be regarded by the Curia as a regular source of revenue (Woker, *Das kirchliche Finanzwesen der Päpste*, Nördlingen, 1878, pp. 75, 160). Loud complaints of these abuses were raised in the reforming councils of Constance and Basel in the 15th century, but nothing was done effectually to check them.

The actual practice of the Roman Catholic Church is based upon the decisions of the council of Trent, which left the medieval theory intact while endeavouring to guard against its abuses. The proposal put forward by the Gallican and Spanish bishops to subordinate the papal power of dispensation to the consent of the Church in general council was rejected,

and even the canons of the council of Trent itself, in so far as they affected reformation of morals or ecclesiastical discipline, were decreed "saving the authority of the Holy See" (*Sess.* xxv. cap. 21, de ref.). At the same time it was laid down in respect of all dispensations, whether papal or other, that they were to be granted only for just and urgent causes, or in view of some decided benefit to the Church (urgens justaque causa et major quandoque utilitas), and in all cases *gratis*. The payment of money for a dispensation was *ipso facto* to make the dispensation void (*Sess.* xxv. cap. 18, de ref.).

Though verbal dispensations are valid, papal dispensations are given in writing. Before the constitution *Sapienti* of Pius X. (1908) all dispensations in *foro externo*, especially in matrimonial causes, were dealt with by the Dataria Apostolica, those *in foro interno* by the Penitentiary, which latter also possessed *in foro externo* the right to grant dispensations in matrimonial causes to poor people. Since 1908 the Dataria only deals with dispensations in matters concerning benefices, dispensations in matrimonial matters having been transferred to the new Congregation on the discipline of the sacraments (see CURIA ROMANA).

The regular form of dispensation is the *forma commissaria* (*Trid. Sess.* xxii. cap. 5, de ref.), *i.e.* a mandate to the bishop to grant the dispensation, after due inquiry, in the pope's name. In exceptional cases, *e.g.* sovereigns or bishops, the dispensation is sent direct to the petitioner (*forma gratiosa*). Dispensations are nominally gratuitous; but the officials are entitled to fees for drawing them up, and there are customary "compositions" (*compositiones*) which are destined for charitable objects in Rome. These fees were and are regulated according to the capacity of the petitioners to pay, the result being that the abuses which the council of Trent had sought to abolish continued to flourish. In the 17th century a specially privileged class of bankers (*banquiers expéditionnaires*) existed at Rome whose sole business was obtaining dispensations on commission, and one of these,

named Pelletier, published at Paris in 1677, under the royal *imprimatur*, a regular tariff of the sums for which in any given case a dispensation might be obtained. That the "urgent and just cause" was, in the circumstances, a very minor consideration was to be expected, and the enlightened pope Benedict XIV., himself a canon lawyer of eminence, complained "Dispensationem non raro concedi in Dataria, sine causa, nempe ob eleemosynam quae praestatur" (Inst. 87, No. 26). It may be added that the worst abuses of this system have long since disappeared. The bishops have their own correspondents at Rome, and one of the duties of the diplomatic representatives of foreign states at the Curia is to see that their nationals receive their dispensations without overcharge.

Bishops are by right (*jure ordinario*) competent to dispense in all cases expressly reserved to them by the canon law, *e.g.* in the matter of publication of banns of marriage. They possess besides special powers delegated to them by the pope and renewed every five years (*facultates quinquennales*), or by virtue of faculties granted to them personally (*facultates extraordinariae*), *e.g.* to dispense from rules of abstinence, from simple vows, and with some exceptions from the prohibition of marriage within prohibited degrees.

Church of England.—By 25 Henry VIII. cap. 21. sec 2 (1534), it was enacted that neither the king, his successors, nor any of his subjects should henceforth sue for licences, dispensations, &c., to the see of Rome, and that the power to issue such licences, dispensations, &c., "for causes not being contrary or repugnant to the Holy Scriptures and laws of God," should be vested in the archbishop of Canterbury for the time being, who at his own discretion was to issue such dispensations, &c., under his seal, to the king and his subjects. The power of dispensation thus vested in the archbishops partly fell obsolete, partly has been curtailed by subsequent statutes, *e.g.* the Pluralities Act of 1838. It is now confined to granting dispensations for

holding two benefices at once, to issuing licences for non-residence, and in matrimonial cases to the issuing of special licences. The dispensing power of bishops in the Church of England survives only in the right to grant marriage licences, *i.e.* dispensations from the obligation to publish the banns. Though, however, these licences and dispensations are given under the archiepiscopal and episcopal seals, they are actually issued by the commissaries of faculties and vicars-general (chancellors), independently, in virtue of the powers conferred on them by their patents. This has led, since the passing of the Divorce Acts and the Marriage with a Deceased Wife's Sister Act, to a curiously anomalous position, licences for the remarriage of divorced persons having been issued under the bishop's seal, while the bishop himself publicly protested that such marriages were contrary to "the law of God," but that he himself had no power to prevent his chancellor licensing them.

See Hinschius, *Kirchenrecht* (Berlin, 1883), iii. 250, &c.; article "Dispensation" by Hinschius in Herzog-Hauck, *Realencyklopadie* (Leipzig, 1898); article "Dispensation" in Wetzer and Welte's *Kirchenlexikon* (2nd ed. Freiburg im Breisgau, 1882-1901); F. Lichtenberger, *Encyclopédie des sciences religieuses* (Paris, 1878), *s.v.* "Dispense"; Phillimore, *Eccl. Law*.

2. *Constitutional Law.*—The power of dispensation from the operation of the ordinary law in particular cases is, of course, everywhere inherent in the supreme legislative authority, however rarely it may be exercised. Divorce (in Ireland) by act of parliament may be taken as an example which still actually occurs. On the other hand, the dispensing power once vested in the crown in England is now merely of historical interest, though of great importance in the constitutional struggles of the past. This power possessed by the crown of dispensing with the statute law is said to have been copied from the dispensations or non obstante clauses granted by the popes in

matters of canon law; the parallel between them is certainly very striking, and there can be no doubt that the principles of the canon law influenced the decisions of the courts in the matter. It was, for instance, very generally laid down that the king could by dispensation make it lawful to do what was *malum prohibitum* but not to do what was *malum in se*, a principle of the canon law, but one difficult to reconcile with English legal principles, since no act is legally *malum* unless forbidden by law. This was pointed out by Chief Justice Vaughan in the celebrated judgment in the case of *Thomas* v. *Sorrell*, when he rejected the distinction between *mala in se* and *mala prohibita* as confusing, and attempted to define the dispensing power of the crown by limiting it to cases of individual breaches of penal statutes where no third party loses a right of action, and where the breach is not continuous, at the same time denying the power of the crown to dispense with any general penal law. This judgment, as Sir William Anson points out, only showed the extreme difficulty of limiting the power ascribed to the crown, a standing grievance from the time that parliament had risen to be a constituent part of the state. So long as the legal principle by which the law was "the king's law" survived there was in fact no theoretical basis for such limitation, and the matter resolved itself into one of the great constitutional questions between crown and parliament which issued in the Revolution of 1688. The supreme crisis came owing to the use made by James II. of the dispensing power. His action in dispensing with the Test Act, in order to enable Roman Catholics to hold office under the crown, was supported by the courts in the test case of *Godden* v. *Hales*, but it made the Revolution inevitable. By the Bill of Rights the exercise of the dispensing power was forbidden, except as might be permitted by statute. At the same time the legality of its exercise in the past was admitted by the clause maintaining the validity of dispensations granted in a certain form before the 23rd of October 1689.

See Anson, *Law and Custom of the Constitution*, part i. "Parliament," 3rd ed. pp. 311-319; F. W. Maitland, *Const. Hist. of England* (Cambridge, 1908), pp. 302, &c.; Stubbs, *Const. Hist.* ss. 290, 291.

(W. A. P.)

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1 In this quotation the word *dispensatio* still has its meaning of "economy": "we are bound by the necessary economy of things." Possibly its use by the pope in this connexion may have led to the technical meaning of the word *dispensatio* in the medieval canon law.

DISPERSION (from Lat. *dispergere*, to scatter), the act or process of separation and distribution. Apart from the technical use of the term, especially in optics (see below), the expression particularly applied to the settlements of Jews in foreign countries outside Palestine. These were either voluntary, for purposes of trade and commerce, or the results of conquest, such as the captivities of Assyria and Babylonia. The word *diaspora* (Gr. διασπορά) is also used of these scattered communities, but is usually confined to the dispersion among the Hellenic and Roman peoples, or to the body of Christian Jews outside Palestine (see JEWS).

DISPERSION, in OPTICS. When a beam of light which is not homogeneous in character, *i.e.* which does not consist of simple vibrations of a definite wave-length, undergoes refraction at the surface of any transparent medium, the different colours corresponding to the different wave-lengths become separated or *dispersed*. Thus, if a ray of white light AO (fig. 1) enters obliquely into the surface of a block of glass at O, it gives rise to the divergent system of rays ORV, varying continuously in colour from red to

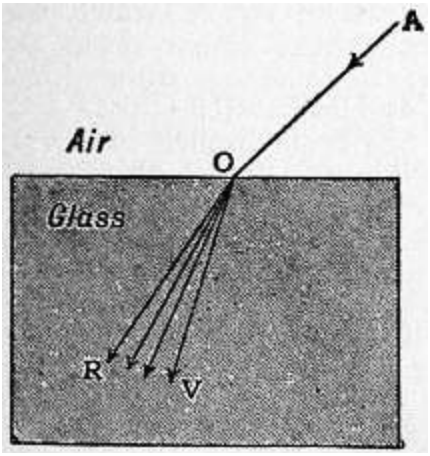


FIG. 1.

violet, the red ray OR being least refracted and the violet ray OV most so. The order of the successive colours in all colourless transparent media is red, orange, yellow, green, blue, indigo and violet. Dispersion is therefore due to the fact that rays of different colours possess different refrangibilities.

The simplest way of showing dispersion is to refract a narrow beam of sunlight through a prism of glass or prismatic vessel containing water or other clear liquid. As the light is twice refracted, the dispersion is increased, and the rays, after transmission through the prism, form a divergent system, which may be allowed to fall on a sheet of white paper, forming the well-known solar spectrum. This method was employed by Sir Isaac Newton, whose experiments constitute the earliest systematic investigation of the phenomenon. Let O (fig. 2) represent a small hole in the shutter of a darkened room, and OS a narrow beam of sunlight which is allowed to fall on a white screen so as to form an image of the sun at S. If now the prism P be interposed as in the figure, the whole beam is not only refracted upward, but also spread out into the spectrum RV, the horizontal breadth of the band of colours being the same as that of the original image S. In an experiment similar to that here represented, Newton made a small hole in the screen and another small hole in a second screen

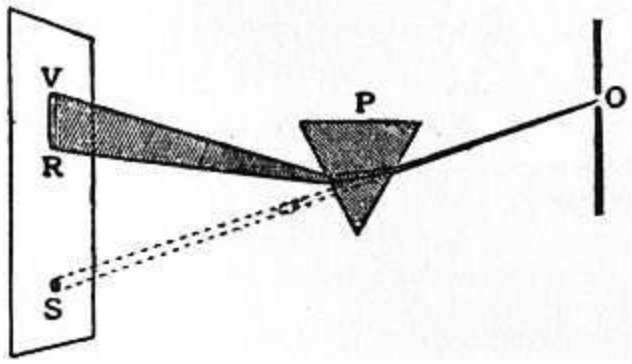


FIG. 2.

placed behind the first. By slightly turning the prism P, the position of the spectrum on the first screen could be shifted sufficiently to cause light of any desired colour to pass through. Some of this light also passed through the second hole, and thus he obtained a narrow beam of practically homogeneous light in a fixed direction (the line joining the apertures in the two screens). Operating on this beam with a second prism, he found that the homogeneous light was not dispersed, and also that it was more refracted the nearer the point from which it was taken approached to the violet end of the spectrum RV. This confirmed his previous conclusion that the rays increase in refrangibility from red to violet.

Newton also made use of the method of crossed prisms, which has been found of great use in studying dispersion. The prism P (fig. 3) refracts upwards, while the prism Q, which has its refracting edge perpendicular to that of P, refracts towards the right. The combined effect of the two is to produce a spectrum sloping up from left to right. The spectrum will be straight if the two prisms are similar in dispersive property, but if one of them is constructed of a material which possesses any peculiarity in this respect it will be revealed by the curvature of the spectrum.

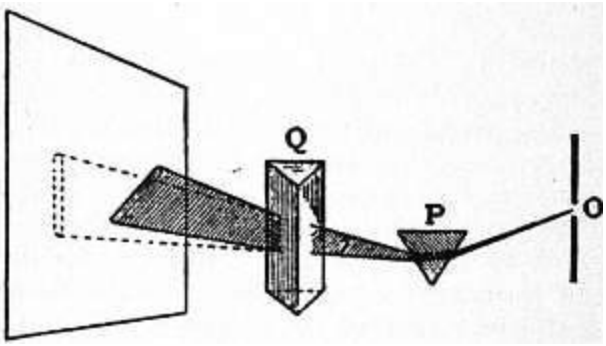


FIG. 3.—Method of Crossed Prisms.

The coloured borders seen in the images produced by simple lenses are due to dispersion. The explanation of the colours of the rainbow, which are also due to dispersion, was given by Newton, although it was known previously to be due to refraction in the drops of rain (see RAINBOW).

According to the wave-theory of light, refraction (*q.v.*) is due to a change of velocity when light passes from one medium to another. The phenomenon of dispersion shows that in dispersive media the velocity is different for lights of different wave-lengths. In free space, light of all wave-lengths is propagated with the same velocity, as is shown by the fact that stars, when occulted by the moon or planets, preserve their white colour up to the last moment of disappearance, which would not be the case if one colour reached the eye later than another. The absence of colour changes in variable stars or in the appearance of new stars is further evidence of the same fact. All material media, however, are more or less dispersive. In air and other gases, at ordinary pressures, the dispersion is very small, because the refractivity is small. The dispersive powers of gases are, however, generally comparable with those of liquids and solids.

Dispersive Power.—In order to find the amount of dispersion caused by any given prism, the deviations produced by it on two rays of any definite pure colours may be measured. The angle of difference between these deviations is called the dispersion for those rays. For this purpose the C and F lines in the spark-spectrum of hydrogen, situated in the red and blue respectively, are usually employed. If δ_F and δ_C are the angular deviations of these rays, then $\delta_F - \delta_C$ is called the mean dispersion of the prism. If the refracting angle of the prism is small, then the ratio of the dispersion to the mean deviation of the two rays is the dispersive power of the material of the prism. Instead of the mean deviation, $\frac{1}{2}(\delta_F + \delta_C)$, it is more usual to take the deviation of some intermediate ray. The exact position of the selected ray does not matter much, but the yellow D line of sodium is the most convenient. If we denote its deviation by δ_D, then we may put

$$\textit{Dispersive power} = (\delta_F - \delta_C)/\delta_D \qquad (1).$$

This quantity may readily be expressed in terms of the refractive indices for the three colours, for if A is the angle of the prism (supposedly small)

$$\delta_C = (\mu_C - 1)A,\ \delta_D = (\mu_D - 1)A,\ \delta_F = (\mu_F - 1)A,$$

where μ_C, μ_D, μ_F are the respective indices of refraction. This gives at once

$$\textit{Dispersive power} = (\mu_F - \mu_C)/(\mu_D - 1) \qquad (2).$$

The second of these two expressions is generally given as the definition of dispersive power. It is more useful than (1), as the refractive indices may be measured with a prism of any convenient angle.

By studying the dispersion of colours in water, turpentine and crown glass Newton was led to suppose that dispersion is proportional to refraction. He concluded that there could be no refraction without dispersion, and hence that achromatism was impossible of attainment (see ABERRATION). This conclusion was proved to be erroneous when Chester M. Hall in 1733 constructed achromatic lenses. Glasses can now be made differing considerably both in refractivity and dispersive power.

Irrationality of Dispersion.—If we compare the spectrum produced by refraction in a glass prism with that of a diffraction grating, we find not only that the order of colours is reversed, but also that the same colours do not occupy corresponding lengths on the two spectra, the blue and violet being much more extended in the refraction spectrum. The refraction spectra for different media also differ amongst themselves. This shows that the connexion between the refrangibility of light and its wave-length does not obey any simple law, but depends

on the nature of the refracting medium. This property is referred to as the “irrationality of dispersion.” In a diffraction spectrum the diffraction is proportional to the wave_length, and the spectrum is said to be “normal.” If the increase of the angle of refraction were proportional to the diminution of wave-length for a prism of any material, the resulting spectrum would also be normal. This, however, is not the case with ordinary refracting media, the refrangibility generally increasing more and more rapidly as the wave-length diminishes.

The irrationality of dispersion is well illustrated by C. Christiansen’s experiments on the dispersive properties of white powders. If the powder of a transparent substance is immersed in a liquid of the same refractive index, the mixture becomes transparent and a measurement of the refractive index of the liquid gives the refractivity of the powder. Christiansen found, in an investigation of this kind, that the refractivity of the liquid could only be got to match that of the powder for mono-chromatic light, and that, if white light were used, brilliant colour effects were obtained, which varied in a remarkable manner when small changes occurred in the refractive index of the liquid. These effects are due to the difference in dispersive power of the powder and the liquid. If the refractive index is, for instance, the same for both in the case of green light, and a source of white light is viewed through the mixture, the green component will be completely transmitted, while the other colours are more or less scattered by multiple reflections and refractions at the surfaces of the powdered substance. Very striking colour changes are observed, according to R. W. Wood, when white light is transmitted through a paste made of powdered quartz and a mixture of carbon bisulphide with benzol having the same refractive index as the quartz for yellow light. In this case small temperature changes alter the refractivity of the liquid without appreciably affecting

the quartz. R. W. Wood has studied the iridescent colours seen when a precipitate of potassium silicofluoride is produced by adding silicofluoric acid to a solution of potassium chloride, and found that they are due to the same cause, the refractive index of the minute crystals precipitated being about the same as that of the solution, which latter can be varied by dilution.

Anomalous Dispersion.—In some media the usual order of the colours is changed. This curious phenomenon was noticed by W. H. Fox Talbot about 1840, but does not seem to have become generally known. In 1860 F. P. Leroux discovered that iodine vapour refracted the red rays more than the violet, the intermediate colours not being transmitted; and in 1870 Christiansen found that an alcoholic solution of fuchsine refracted the violet less than the red, the order of the successive colours being violet, red, orange, yellow; the green being absorbed and a dark interval occurring between the violet and red. A. Kundt found that similar effects occur with a large number of substances, in particular with all those which possess the property of "surface colour," *i.e.*, which strongly reflect light of a definite colour, as do many of the aniline dyes. Such bodies show strong absorption bands in those colours which they reflect, while of the transmitted light that which is of a slightly greater wave-length than the absorbed light has an abnormally great refrangibility, and that of a slightly shorter wave-length an abnormally small refrangibility. The name given to this phenomenon,—"anomalous dispersion"—is an unfortunate one, as it has been found to obey a regular law.

In studying the dispersion of the aniline dyes, a prism with a very small refracting angle is made of two glass plates slightly inclined to each other and enclosing a very thin wedge of the dye, which is either melted between the plates, or is in the form of a solution retained in

position by surface-tension. Only very thin layers are sufficiently transparent to show the dispersion near or within an absorption band, and a large refracting angle is not required, the dispersion usually being very considerable. Another method, which has been used by R. W. Wood and C. E. Magnusson, is to introduce a thin film of the dye into one of the optical paths of a Michelson interferometer, and to determine the consequent displacement of the fringes. E. Mach and J. Arbes have used a method depending on total reflection (Drude's *Theory of Optics*, p. 394).

A very remarkable example of anomalous dispersion, which was first observed by A. Kundt, is that exhibited by the vapour of sodium. It has not been found practicable to make a prism of this vapour in the ordinary way by enclosing it in a glass vessel of the required shape, as sodium vapour attacks glass, quickly rendering it opaque. A. E. Becquerel, however, investigated the character of the dispersion by using prism-shaped flames strongly coloured with sodium. But the best way of exhibiting the effect is by making use of a remarkable property of sodium vapour discovered by R. W. Wood and employed for this purpose in a very ingenious manner. He found that when sodium is heated in a hard glass tube, the vapour which is formed is

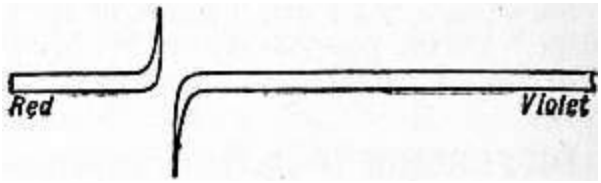


FIG. 4.—Anomalous Dispersion of Sodium Vapour.

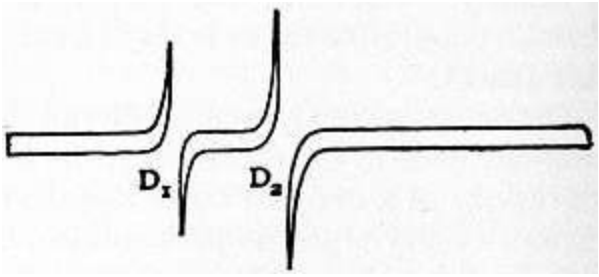


FIG. 5.

extraordinarily cohesive, only slowly spreading out in a cloud with well-defined borders, which can be rendered visible by placing the tube in front of a sodium flame, against which the cloud appears black. If a long glass tube with plane ends, and containing some pellets of sodium is heated in the middle by a row of burners, the cool ends remain practically vacuous and do not become obscured. The sodium vapour in the middle is very dense on the heated side, the density diminishing rapidly towards the upper part of the tube, so that, although not prismatic in form, it refracts like a prism owing to the variation in density. Thus if a horizontal slit is illuminated by an arc lamp, and the light-rendered parallel by a collimating lens—is transmitted through the sodium tube and focused on the vertical slit of a spectroscope, the effect of the sodium vapour is to produce its refraction spectrum vertically on the slit. The image of this seen through the glass prism of the spectroscope will appear as in fig. 4. The whole of the light, with the exception of a small part in the neighbourhood of the D lines, is practically undeviated, so that it illuminates only a very short piece of the slit and is spread out into the ordinary spectrum. But the light of slightly greater wave-length than the D lines, being refracted strongly downward by the sodium vapour, illuminates the bottom of the slit; while that of slightly shorter wave-length is refracted upward and illuminates the top of the slit. Fig. 4 represents the inverted image seen in the telescope. The light corresponding to the D lines and the space between them is absorbed, as evidenced by the dark interval. If the sodium is only gently heated, so as to produce a comparatively rarefied vapour, and a grating spectroscope employed, the spectrum obtained is like that shown in fig. 5, which was the effect noticed by Becquerel with the sodium flame. Here the light corresponding to the space between the D lines is transmitted, being strongly refracted upward near D_1, and downward near D_2.

The theory of anomalous dispersion has been applied in a very interesting way by W. H. Julius to explain the “flash spectrum” seen during a solar eclipse at the moment at which totality occurs. The conditions of this phenomenon have been imitated in the laboratory by Wood, and the corresponding effect obtained.

Theories of Dispersion.—The first attempt at a mathematical theory of dispersion was made by A. Cauchy and published in 1835. This was based on the assumption that the medium in which the light is propagated is discontinuous and molecular in character, the molecules being subject to a mutual attraction. Thus, if one molecule is disturbed from its mean position, it communicates the disturbance to its neighbours, and so a wave is propagated. The formula arrived at by Cauchy was

$$n = A + \frac{B}{\lambda 2} + \frac{C}{\lambda 4} + \ldots.$$

n being the refractive index, λ the wave-length, and A, B, C, &c., constants depending on the material, which diminish so rapidly that only the first three as here written need be taken into account. If suitable values are chosen for these constants, the formula can be made to represent the dispersion of ordinary transparent media within the visible spectrum very well, but when extended to the infra-red region it often departs considerably from the truth, and it fails altogether in cases of anomalous dispersion. There are also grave theoretical objections to Cauchy’s formula.

The modern theory of dispersion, the foundation of which was laid by W. Sellmeier, is based upon the assumption that an interaction takes place between ether and matter. Sellmeier adopted the elastic-solid theory of the ether, and imagined the molecules to be attached to the

ether surrounding them, but free to vibrate about their mean positions within a limited range. Thus the ether within the dispersive medium is loaded with molecules which are forced to perform oscillations of the same period as that of the transmitted wave. It can be shown mathematically that the velocity of propagation will be greatly increased if the frequency of the light-wave is slightly greater, and greatly diminished if it is slightly less than the natural frequency of the molecules; also that these effects become less and less marked as the difference in the two frequencies increases. This is exactly in accordance with the observed facts in the case of substances showing anomalous dispersion. Sellmeier's theory did not take account of absorption, and cannot be applied to calculate the dispersion within a broad absorption band. H. von Helmholtz, working on a similar hypothesis, but with a frictional term introduced into his equations, obtained formulae which are applicable to cases of absorption. A modified form of Helmholtz's equation, due to E. Ketteler and known as the Ketteler-Helmholtz formula, has been much used in calculating dispersion, and expresses the facts with remarkable accuracy. P. Drude has obtained a similar formula based on the electromagnetic theory, thus placing the theory of dispersion on a much more satisfactory basis. The fundamental assumption is that the medium contains positively and negatively charged ions or electrons which are acted on by the periodic electric forces which occur in wave propagation on Maxwell's theory. The equations finally arrived at are

$$n^2(1-\kappa^2) = 1 + \sum \frac{D\lambda^2(\lambda^2 - \lambda_m^2)}{(\lambda^2 - \lambda_m^2)^2 + g^2\lambda^2},$$

$$2n^2\kappa^2 = \sum \frac{Dg\lambda^3}{(\lambda^2 - \lambda_m^2)^2 + g^2\lambda^2},$$

where λ is the wave-length in free ether of light whose refractive index is n, and λ_m the wave-length of light of the same period as the electron, κ is a coefficient of absorption, and D and g are constants. The sign of summation Σ is used in cases where there are several absorption bands, and consequently several similar terms on the right-hand side, each with a different value of λ_m. This would occur if there were several kinds of ions, each with its own natural period.

In a region where there is no absorption, we have $\kappa = 0$ and therefore $g = 0$, and we have only one equation, namely,

$$n^2 = 1 + \Sigma \frac{D\lambda^2}{(\lambda^2 - \lambda_m^2)} ,$$

which is identical with Sellmeier's result. As λ_m, is a wave-length corresponding to an absorption band, this formula can be used to find values of λ_m which satisfy the observed values of n within the region of transparency, and so to determine where the absorption bands are situated. In this way the existence of bands in the infrared part of the spectrum has been predicted in the case of quartz and detected by experiments on the selective reflection of the material.

References.—For the theory of dispersion see P. Drude, *Theory of Optics* (Eng. trans.); R. W. Wood, *Physical Optics*; and A. Schuster, *Theory of Optics*. For descriptive accounts, see Wood's *Physical Optics*, T. Preston's *Theory of Light*, E. Edser's *Light*. The last work contains an elementary treatment of Sellmeier's theory.

D'ISRAELI (or DISRAELI), **ISAAC** (1766-1848), English man of letters, father of the earl of Beaconsfield (*q.v.*), was born at Enfield in May 1766. He belonged to a Jewish family which, having been driven by the Inquisition from Spain, towards the end of the 15th century, settled as merchants at Venice, and assumed the name which has become famous; it was generally spelt D'Israeli until the middle of the 19th century. In 1748 his father, Benjamin D'Israeli, then only about eighteen years of age, removed to England, where, before passing the prime of life, he amassed a competent fortune, and retired from business. He belonged to the London congregation of Spanish and Portuguese Jews, of which his son also remained a nominal member until after Benjamin D'Israeli died at the end of 1816.

The strongly marked characteristics which determined Isaac D'Israeli's career were displayed to a singular degree even in his boyhood. He spent his time over books and in long day-dreams, and evinced the strongest distaste for business and all the more bustling pursuits of life. These idiosyncrasies met with no sympathy from either of his parents, whose ambitious plans for his future career they threatened to disappoint. When he was about fourteen, in the hope of changing the bent of his mind, his father sent him to live with his agent at Amsterdam, where he worked under a tutor for four or five years. Here he studied Bayle and Voltaire, and became an ardent disciple of Rousseau. Here also he wrote a long poem against commerce, which he produced as an exposition of his opinions when, on his return to England, his father announced his intention of placing him in a

commercial house at Bordeaux. Against such a destiny D'Israeli's mind strongly revolted; and he carried his poem, with a letter earnestly appealing for advice and assistance, to Samuel Johnson; but when he called again a week after to receive an answer, the packet was returned unopened—the great Doctor was on his death-bed. He also addressed a letter to Dr Vicesimus Knox, master of Tonbridge Grammar School, begging to be received into his family, that he might enjoy the benefit of his learning and experience. How this application was answered we do not know. The evident firmness of his resolve, however, was not without effect. His parents gave up their purpose for a time. He was sent to travel in France, and allowed to occupy himself as he wished; and he had the happiness of spending some months in Paris, in the society of literary men, and devoted to the literary pursuits in which he delighted.

In the beginning of 1788 he returned home, and in the next year he attacked Peter Pindar (John Wolcot) in *The Gentleman's Magazine* in a poem in the manner of Pope, "On the Abuse of Satire." The authorship of the poem was much debated, and it was attributed by some to William Hayley, upon whom it was actually avenged, with characteristic savageness, by its victim. It is greatly to Wolcot's credit that, on learning his mistake, he sought the acquaintance of his young opponent, whose friend he remained to the end of his life. Through the success of this satire D'Israeli made the acquaintance of Henry James Pye, who helped to persuade his father that it would be a mistake to force him into a business career, and introduced him into literary circles. D'Israeli dedicated his first book, *A Defence of Poetry*, to Pye in 1790. Henceforth his life was passed in the way he best liked—in quiet and almost uninterrupted study. In 1802 he married Maria Basevi, by whom he had five children, of whom Benjamin (afterwards Lord Beaconsfield and Prime Minister of England) was the second. He was able to maintain his strenuous habits of study till he reached the advanced age of seventy-two, when he was forced, by paralysis of the optic nerve, to give up

work almost entirely. He lived ten years longer, and died at his seat at Bradenham House, Buckinghamshire, on the 19th of January 1848.

Isaac D'Israeli is most celebrated as the author of the *Curiosities of Literature* (1791, subsequent volumes in 1793, 1817, 1823 and 1834). It is a miscellany of literary and historical anecdotes, of original critical remarks, and of interesting and curious information of all kinds, animated by genuine literary feeling, taste and enthusiasm. With the *Curiosities of Literature* may be classed D'Israeli's *Miscellanies, or Literary Recreations* (1796), the *Calamities of Authors* (1812-1813), and the *Quarrels of Authors* (1814). Towards the close of his life D'Israeli projected a continuous history of English literature, three volumes of which appeared in 1841 under the title of the *Amenities of Literature*. But of all his works the most delightful is his *Essay on the Literary Character* (1795), which, like most of his writings, abounds in illustrative anecdotes. In the famous "Pope controversy" he supported Byron and Campbell against Bowles and Hazlitt by a defence of Pope in the form of a criticism of Joseph Spence's *Anecdotes* contributed to the *Quarterly Review* (July 1820). In 1797 D'Israeli published three novels; one of these, *Mejnoun and Leila, the Arabian Petrarch and Laura*, was said to be the first oriental romance in English. His last novel, *Despotism, or the Fall of the Jesuits*, appeared in 1811, but none of his romances was popular. He also published a slight sketch of Jewish history, and especially of the growth of the Talmud, entitled the *Genius of Judaism* (1833).

He was the author of two historical works—a brief defence of the literary merit and personal and political character of James I. (1816), and a learned *Commentary on the Life and Reign of King Charles I.* (1828-1831). This was recognized by the University of Oxford, which conferred upon the author the honorary degree of D.C.L. As an historian D'Israeli is distinguished by two characteristics. In the first place, he had small interest in politics, and no sympathy with the passionate fervour, or adequate

appreciation of the importance, of political struggles. And, secondly, with a laborious zeal then less common than now among historians, he sought to bring to light fresh historical material by patient search for letters, diaries and other manuscripts of value which had escaped the notice of previous students. Indeed, the honour has been claimed for him of being one of the founders of the modern school of historical research.

Of the amiable personal character and the placid life of Isaac D'Israeli a charming picture is to be found in the brief memoir prefixed to the 1849 edition of *Curiosities of Literature*, by his son Lord Beaconsfield.

DISS, a market town in the southern parliamentary division of Norfolk, England; near the river Waveney (the boundary with Suffolk), 95 m. N.E. by N. from London by the Great Eastern railway. Pop. of urban district (1901) 3745. The town lies pleasantly upon a hill rising above a mere, which drains to the Waveney, having its banks laid out as public gardens. The church of St Mary exhibits Decorated and Perpendicular stone and flint work. There is a corn exchange and the agricultural trade is considerable; brushes and matting are manufactured. The poet and satirist, John Skelton (d. 1529), was rector here in the later part of his life, and is doubtfully considered a native.

DISSECTION (from Lat. *dissecare*, to cut apart), the separation into parts by cutting, particularly the cutting of an animal or plant into parts for the purpose of examination or display of its structure.

DISSENTER (Lat. *dis-sentire*, to disagree), one who dissents or disagrees in matters of opinion, belief, &c. The term "dissenter" is, however, practically restricted to the special sense of a member of a religious body in England which has, for one reason or another, separated from the Established Church. Strictly, the term includes the English Roman Catholics, who in the original draft of the Relief Act of 1791 were styled "Protesting Catholic Dissenters." It is in practice, however, restricted to the "Protestant Dissenters" referred to in sec. ii. of the Toleration Act of 1688. The term is not applied to those bodies who dissent from the Established Church of Scotland; and in speaking of members of religious bodies which have seceded from established churches abroad it is usual to employ the term "dissidents" (Lat. *dissidere*, to dissent). In this connotation the terms "dissenter" and "dissenting," which had acquired a somewhat contemptuous flavour, have tended since the middle of the 19th century to be replaced by "nonconformist," a term which did not originally imply secession, but only refusal to conform in certain particulars (*e.g.* the wearing of the surplice) with the authorized usages of the Established Church. Still more recently the term "nonconformist" has in its turn, as the political attack on the principle of a state establishment of religion developed, tended to give place to the style of "Free Churches" and "Free Churchman." All three terms are

now in use, “nonconformist” being the most usual, as it is the most colourless. (See CONGREGATIONALISM, &c.)

DISSOCIATION, a separation or dispersal, the opposite of association. In chemistry the term is given to chemical reactions in which a substance decomposes into two or more substances, and particularly to cases in which associated molecules break down into simpler molecules. Thus the reactions $NH_4Cl \Leftrightarrow NH_3 + HCl$, and $PCl_5 \Leftrightarrow PCl_3 + Cl_2$ are instances of the first type; $N_2O_4 \Leftrightarrow 2NO_2$, of the second (see CHEMICAL ACTION). Electrolytic or ionic dissociation is the separation of a substance in solution into ions (see ELECTROLYSIS; SOLUTION).

DISSOLUTION (from Lat. *dissolvere*, to break up into parts), the act of dissolving or reducing to constituent parts, especially of the bringing to an end an association such as a partnership or building society, and particularly of the termination of an assembly. A dissolution of parliament in England is thus the end of its existence, brought about by the efflux of time in accordance with the Septennial Act 1716, or by an exercise of the royal prerogative. This is done either in person, or by commission, if parliament

is sitting; if prorogued, then by proclamation. The word is used as a synonym for end or death.

DISTAFF, in the early forms of spinning, the “rock” or short stick round one end of which the flax, cotton or wool is loosely wound, and from which it is spun off by the spindle. The word is derived from the Old English *distaef*, the first part of which is connected with *dizen*, in modern English seen in “bedizen,” to deck out or embellish, originally “to equip the distaff with flax, &c.,” cf. the German dialectal word *Diesse*, flax. The last part of the word is “staff.” “Distaff” from early times has been used to symbolize woman’s work (cf. the use of “spinster” for an unmarried woman); thus the “distaff” or “spindle” side of a family refers to the female branch, as opposed to the “spear” or male branch. The 7th of January, the day after Epiphany, was formerly known as St Distaff’s day, as women then began work again after the Christmas holiday.

DISTILLATION (from the Lat. *distillare*, more correctly *destillare*, to drop or trickle down), an operation consisting in the conversion of a substance or mixture of substances into vapours which are afterwards condensed to the liquid form; it has for its object the separation or purification of substances by taking advantage of differences in volatility.

The apparatus consists of three parts:—the “retort” or “still,” in which the substance is heated; the “condenser,” in which the vapours are condensed; and the “receiver,” in which the condensed vapours are collected. Generally the components of a mixture will be vaporized in the order of their boiling-points; consequently if the condensates or “fractions” corresponding to definite ranges of temperature be separately collected, it is obvious that a more or less partial separation of the components will be effected. If the substance operated upon be practically pure to start with, or the product of distillation be nearly of constant composition, the operation is termed “purification by distillation” or “rectification”; the latter term is particularly used in the spirit industry. If a complex mixture be operated upon, and a separation effected by collecting the distillates in several portions, the operation is termed “fractional distillation.” Since many substances decompose either at, or below, their boiling-points under ordinary atmospheric pressure, it is necessary to lower the boiling-point by reducing the pressure if it be desired to distil them. This variation is termed “distillation under reduced pressure or in a vacuum.” The vaporization of a substance below its normal boiling-point can also be effected by blowing in steam or some other vapour; this operation is termed “distillation with steam.” “Dry distillation” is the term used when solid substances which do not liquefy on heating are operated upon; “sublimation” is the term used when a solid distils without the intervention of a liquid phase.

Distillation appears to have been practised at very remote times. The Alexandrians prepared oil of turpentine by distilling pine-resin; Zosimus of Panopolis, a voluminous writer of the 5th century A.D., speaks of the distillation of a “divine water” or “panacea” (probably from the complex mixture of calcium polysulphides, thiosulphate, &c., and free sulphur, which is obtained by boiling sulphur with lime and water) and advises “the efficient luting of the apparatus, for otherwise the valuable properties would be lost.” The Arabians greatly improved the earlier apparatus, naming one

form the alembic (*q.v.*); they discovered many ethereal oils by distilling plants and plant juices, alcohol by the distillation of wine, and also distilled water. The alchemists gave great attention to the method, as is shown by the many discoveries made. Nitric, hydrochloric and sulphuric acids, all more or less impure, were better studied; and many ethereal oils were discovered. Prior to about the 18th century three forms of distillation were practised: (1) *destillatio per ascensum*, in which the retort was heated from the bottom, and the vapours escaped from the top; (2) *destillatio per latus*, in which the vapours escaped from the side; (3) *destillatio per descensum*, in which the retort was heated at the top, and the vapours led off by a pipe passing through the bottom. According to K. B. Hoffmann the earliest mention of destillatio per descensum occurs in the writings of Aetius, a Greek physician who flourished at about the end of the 5th century.

In modern times the laboratory practice of distillation was greatly facilitated by the introduction of the condenser named after Justus von Liebig; A. Kolbe and E. Frankland introduced the "reflux condenser," *i.e.* a condenser so placed that the condensed vapours return to the distilling flask, a device permitting the continued boiling of a substance with little loss; W. Dittmar and R. Anschütz, independently of one another, introduced "distillation under reduced pressure"; and "fractional distillation" was greatly aided by the columns of Wurtz (1855), E. Linnemann (1871), and of J. A. Le Bel and A. Henninger (1874). In chemical technology enormous strides have been made, as is apparent from the coal-gas, coal-tar, mineral oil, spirits and mineral acids industries.

The subject is here treated under the following subdivisions: (1) ordinary distillation, (2) distillation under reduced pressure, (3) fractional distillation, (4) distillation with steam, (5) theory of distillation, (6) dry distillation, (7) distillation in chemical technology and (8) commercial distillation of water.

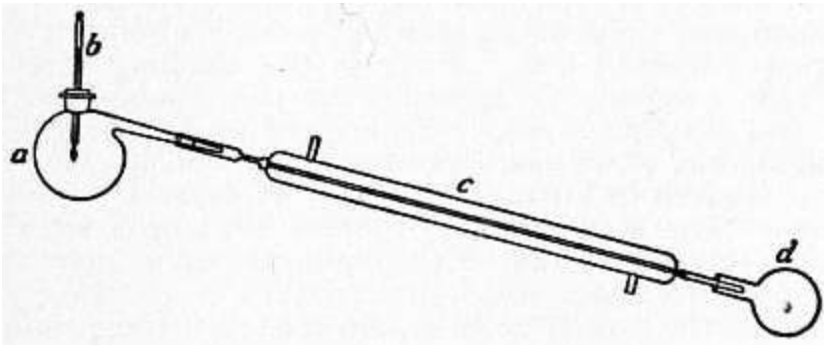


FIG. 1.

1. *Ordinary Distillation.*—The apparatus generally used is shown in fig. 1. The substance is heated in a retort a, which consists of a large bulb drawn out at the top to form a long neck; it may also be provided with a tubulure, or opening, which permits the charging of the retort, and also the insertion of a thermometer b. The retort may be replaced by a distilling flask, which is a round-bottomed flask (generally with a lengthened neck) provided with an inclined side tube. The neck of the retort, or side tube of the flask, is connected to the condenser c by an ordinary or rubber cork, according to the nature of the substance distilled; ordinary corks soaked in paraffin wax are very effective when ordinary or rubber corks cannot be used. Sometimes an "adapter" is used; this is simply a tapering tube, the side tube being corked into the wider end, and the condenser on to the narrower end. The thermometer is placed so that the bulb is near the neck of the retort or the side tube of the distilling flask. It generally happens that much of the mercury column is outside the flask and consequently at a lower temperature than the bulb, hence a correction of the observed temperature is necessary. If N be the length of the unheated mercury column in degrees, t the temperature of this column (generally determined by a small thermometer placed with its bulb at the middle of the column), and T the temperature recorded by the thermometer, then the corrected

temperature of the vapour is T + 0.000143 (T − t) N (T. E. Thorpe, *Journ. Chem. Soc.*, 1880, p. 159).

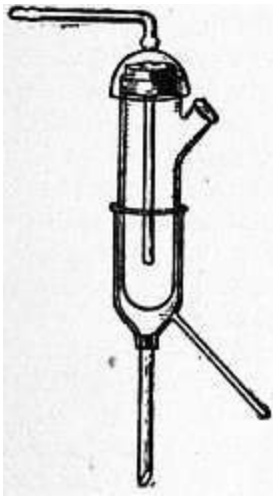


FIG. 2.

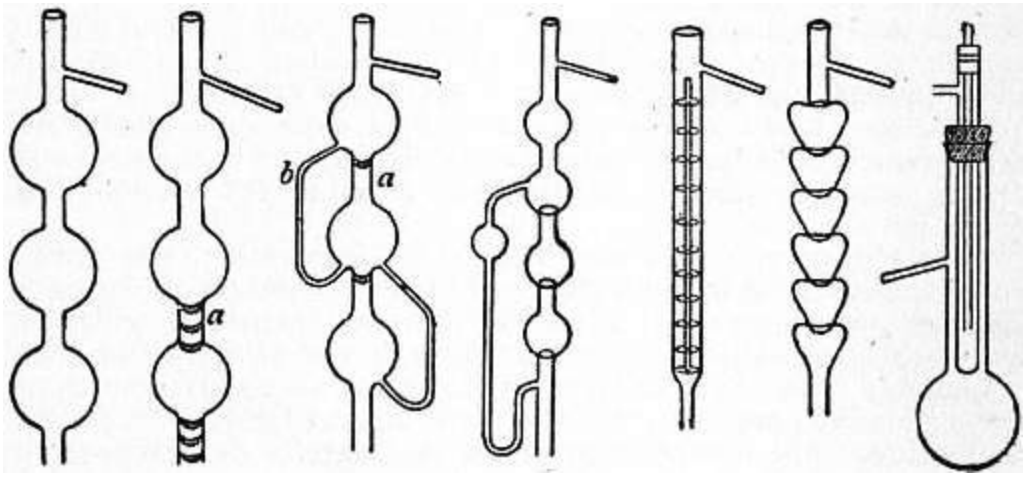
The mode of heating varies with the substance to be distilled. For highly volatile liquids, *e.g.* ether, ligroin, &c., immersion of the flask in warm water suffices; for less volatile liquids a directly heated water or sand bath is used; for other liquids the flask is heated through wire gauze or asbestos board, or directly by a Bunsen. The condensing apparatus must also be conditioned by the volatility. With difficulty volatile substances, *e.g.* nitrobenzene, air cooling of the retort neck or of a straight tube connected with the distilling flask will suffice; or wet blotting-paper placed on the tube and the receiver immersed in water may be used. For less volatile liquids the Liebig condenser is most frequently used. In its original form, this consists of a long tube surrounded by an outer tube so arranged that cold water circulates in the annular space between the two. The vapours pass through the inner tube, and the cold water enters at the end farthest from the distilling flask. For more efficient condensation—and also for shortening the apparatus—the central tube may be flattened, bent into a succession of V's, or twisted into a spiral form, the object in each case being to increase the condensing surface. Of other common types of condenser, we may notice the "spiral" or "worm" type, which consists of a glass, copper or tin worm enclosed in a vessel in which water circulates; and the ball condenser, which consists of two concentric spheres, the vapour passing through the inner sphere and water circulating in the space between this and the outer (in another form the vapour circulates in a shell, on the outside

and inside of which water circulates). A very effective type is shown in fig. 2. The condensing water enters at the top and is conducted to the bottom of the inner tube, which it fills and then flows over the outside of the outer tube; it collects in the bottom funnel and is then led off. The vapours pass between the inner and outer tubes.

Practically any vessel may serve as a receiver—test tube, flask, beaker, &c. If noxious vapours come over, it is necessary to have an air-tight connexion between the condenser and receiver, and to provide the latter with an outlet tube leading to an absorption column or other contrivance in which the vapours are taken up. If the substances operated upon decompose when heated in air, as, for example, the zinc alkyls which inflame, the air within the apparatus is replaced by some inert gas, *e.g.* nitrogen, carbon dioxide, &c., which is led in at the distilling flask before the process is started, and a slow current maintained during the operation.

2. *Distillation under Reduced Pressure.*—This method is adopted for substances which decompose at their boiling-points under ordinary pressure, and, generally, when it is desirable to work at a lower temperature. The apparatus differs very slightly from that employed in ordinary distillation. The “receiver” must be connected on the one side to the condenser, and on the other to the exhaust pump. A safety vessel and a manometer are generally interposed between the pump and receiver. For the purpose of collecting the distillates in fractions, many forms of receivers have been devised. Brühl’s is one of the simplest. It consists of a number of tubes mounted vertically on a horizontal circular disk which rotates about a vertical axis in a cylindrical vessel. This vessel has two tubulures: through one the end of the condenser projects so as to be over one of the receiving tubes; the other leads to the pump. By rotating the disk the tubes may be successively brought

under the end of the condenser. Boiling under reduced pressure has one very serious drawback, viz. the liquid boils irregularly or “bumps.” W. Dittmar showed that this may be avoided by leading a fine, steady stream of dry gas-air, carbon dioxide, hydrogen, &c., according to the substance operated upon—through the liquid by means of a fine capillary tube, the lower end of which reaches to nearly the bottom of the flask. “Bumping” is common in open boiling when the liquid is free from air bubbles and the interior of the vessel is very smooth. It may be diminished by introducing clippings of platinum foil, pieces of porcelain, glass beads or garnets into the liquid. “Frothing” is another objectionable feature with many liquids. When cold, froth can be immediately dissipated by adding a few drops of ether. In boiling liquids its formation may be prevented by adding paraffin wax; the wax melts and forms a ring on the surface of the liquid, which boils tranquilly in the centre.



Wurtz. Linnemann. Le Bel-Henninger. Glynsky. Young. Kreusler.

FIG. 3.

3. *Fractional Distillation.*—By fractional distillation is meant the separation of a mixture having components which boil at neighbouring temperatures. The distilling flask has an elongated neck so that the less volatile vapours are condensed and return to the flask, while the more volatile component passes over. The success of the operation depends upon two factors: (1) that the heating be careful, slow and steady, and (2) that the column attached to the flask be efficient to sort out, as it were, the most volatile vapour. Three types of columns are employed: (1) the elongation is simply a straight or bulb tube; (2) the column, properly termed a "dephlegmator," is so constructed that the vapours have to traverse a column of previously condensed vapour; (3) the column is encircled by a jacket through which a liquid circulates at the same temperature as the boiling-point of the most volatile component. To the first type belongs the simple straight tube, and the Wurtz tube (see fig. 3), which is simply a series of bulbs blown on a tube. These forms are not of much value. Several forms of the second type are in use. In the Linnemann column the condensed vapours temporarily collect on platinum gauzes (a) placed at the constrictions of a bulbed tube. In the Le Bel-Henninger form a series of bulbs are connected consecutively by means of syphon tubes (b) and having platinum gauzes (a) at the constrictions, so that when a certain amount of liquid collects in any one bulb it syphons over into the next lower bulb. The Glynsky form is simpler, having only one syphon tube; at the constrictions it is usual to have a glass bead. The "rod-and-disk" form of Sidney Young is a series of disks mounted on a central spindle and surrounded by a slightly wider tube. The "pear-shaped" form of the same author consists of a series of pear-shaped bulbs, the narrow end of one adjoining the wider end of the next lower one. In this class may also be placed the Hempel tube, which is simply a straight tube filled with glass beads. Of the third type is the Warren column consisting of a

spiral kept at a constant temperature by a liquid bath. Improved forms were devised by F. D. Brown. Kreusler's form is easily made and manipulated. A tube closed at the bottom is traversed by an open narrower tube, and the arrangement is fitted in the neck of the distilling flask. Water is led in by the inner tube, and leaves by a side tube fused on the wider tube. Many comparisons of the effectiveness of dephlegmating columns have been made (see Sidney Young, *Fractional Distillation*, 1903). The pear-shaped form is the most effective, second in order is the Le Bel-Henninger, which, in turn, is better than the Glynsky. The main objection to the Hempel is the retention of liquid in the beads, and the consequent inapplicability to the distillation of small quantities.

4. *Distillation with Steam.*—In this process a current of steam, which is generated in a separate boiler and superheated, if necessary, by circulation through a heated copper worm, is led into the distilling vessel, and the mixed vapours condensed as in the ordinary processes. This method is particularly successful in the case of substances which cannot be distilled at their ordinary boiling-points (it will be seen in the following section that distilling with steam implies a lowering of boiling-point), and which can be readily separated from water. Instances of its application are found in the separation of ortho- and para-nitrophenol, the o-compound distilling and the p- remaining behind; in the separation of aniline from the mixture obtained by reducing nitrobenzene; of the naphthols from the melts produced by fusing the naphthalene monosulphonic acids with potash; and of quinoline from the reaction between aniline, nitrobenzene, glycerin, and sulphuric acid (the product being first steam distilled to remove any aniline, nitrobenzene, or glycerin, then treated with alkali, and again steam distilled when quinoline comes over). With substances prone to discolorization, as, for example, certain amino compounds, the

operation may be conducted in an atmosphere of carbon dioxide, or the water may be saturated with sulphuretted hydrogen. Liquids other than water may be used: thus alcohol separates α-pipecoline and ether nitropropylene.

5. *Theory of Distillation.*—The general observation that under a constant pressure a pure substance boils at a constant temperature leads to the conclusion that the distillate which comes over while the thermometer records only a small variation is of practically constant composition. On this fact depends "rectification or purification by distillation." A liquid boils when its vapour pressure equals the superincumbent pressure (see VAPORIZATION); consequently any process which diminishes the external pressure must also lower the boiling-point. In this we have the theory of "distillation under reduced pressure." The theory of fractional distillation, or the behaviour of liquid mixtures when heated to their boiling-points, is more complex. For simplicity we confine ourselves to mixtures of two components, in which experience shows that three cases are to be recognized according as the components are (1) completely immiscible, (2) partially miscible, (3) miscible in all proportions.

When the components are completely immiscible, the vapour pressure of the one is not influenced by the presence of the other. The mixture consequently distils at the temperature at which the sum of the partial pressures equals that of the atmosphere. Both components come over in a constant proportion until one disappears; it is then necessary to raise the temperature in order to distil the residue. The composition of the distillate is determinate (by Avogadro's law) if the molecular weights and vapour pressure of the components at the temperature of distillation be known. If M_1, M_2, and P_1, P_2 be the molecular weights and vapour pressures of the components A and B, then the ratio of A to

B in the distillate is M_1P_1/M_2P_2. Although, as is generally the case, one liquid (say A) is more volatile than the other (say B), *i.e.* P_1 greater than P_2, if the molecular weight of A be much less than that of B, then it is obvious that the ratio M_1P_1/M_2P_2 need not be very great, and hence the less volatile liquid B would come over in fair amount. These conditions pertain in cases where distillation with steam is successfully practised, the relatively high volatility of water being counterbalanced by the relatively high molecular weight of the other component; for example, in the case of nitrobenzene and water the ratio is 1 to 5. In general, when the substance to be distilled has a vapour pressure of only 10 mm. at 100° C., distillation with steam can be adopted, if the product can be subsequently separated from the water.

When distilling a mixture of partially miscible components a distillate of constant composition is obtained so long as two layers are present, *i.e.* A dissolved in B and B dissolved in A, since both of these solutions emit vapours of the same composition (this follows since the same vapour must be in equilibrium with both solutions, for if it were not so a cyclic system contradicting the second law of thermodynamics would be realizable). The composition of the vapour, however, would not be the same as that of either layer. As the distillation proceeded one layer would diminish more rapidly than the other until only the latter would remain; this would then distil as a completely miscible mixture.

The distillation of completely miscible mixtures is the most common practically and the most complex theoretically. A coordination of the results obtained on the distillation of mixtures of this nature with the introduction of certain theoretical considerations led to the formation of three groups distinguished by the relative solubilities of the vapours in the liquid components.

(i.) If the vapour of A be readily soluble in the liquid B, and the vapour of B readily soluble in the liquid A, there will exist a mixture of A and B which will have a lower vapour pressure than any other mixture. The vapour pressure composition curve will be convex to the axis of compositions, the maximum vapour pressures corresponding to pure A and pure B, and the minimum to some mixture of A and B. On distilling such a mixture under constant pressure, a mixture of the two components (of variable composition) will come over until there remains in the distilling flask the mixture of minimum vapour pressure. This will then distil at a constant temperature. Thus nitric acid, boiling-point 68°, forms a mixture with water, boiling point 100°, which boils at a constant temperature of 126°, and contains 68% of acid. Hydrochloric acid forms a similar mixture which boils at 110° and contains 20.2% of acid. Another mixture of this type is formic acid and water.

(ii.) If the vapours be sparingly soluble in the liquids there will exist a mixture having a greater vapour pressure than that of any other mixture. The vapour pressure-composition curve will now be concave to the axis of composition, the minima corresponding to the pure components. On distilling such a mixture, a mixture of constant composition will distil first, leaving in the distilling flask one or other of the components according to the composition of the mixture. An example is propyl alcohol and water. At one time it was thought that these mixtures of constant boiling-point (an extended list is given in Young's *Fractional Distillation*) were definite compounds. The above theory, coupled with such facts as the variation of the composition of the constant boiling-point fraction with the pressure under which the mixture is distilled, the proportionality of the density of all mixtures to their composition, &c., shows this to be erroneous.

(iii.) If the vapour of A be readily soluble in liquid B, and the vapour of B sparingly soluble in liquid A, and if the vapour pressure of A be greater than that of B, then the vapour pressures of mixtures of A and B will continually diminish as one passes from 100% A to 100% B. The vapour tension may approximate to a linear function of the composition, and the curve will then be practically a straight line. On distilling such a mixture pure A will come over first, followed by mixtures in which the quantity of B continually increases; consequently by a sufficient number of distillations A and B can be completely separated. Examples are water and methyl or ethyl alcohol.

Van't Hoff (*Theoretical and Physical Chemistry*, vol. i. p. 51) illustrates the five cases on one diagram. In fig. 4 let AB be the axis of composition, AP be the vapour pressure of pure A, BQ the vapour pressure of pure B. For immiscible liquids the vapour pressure curve is the horizontal line ab, described so that aP = QB and bQ = AP. For partially miscible liquids the curve is Pa_1b_1Q. The horizontal line a_1b_1 corresponds to the two layers of liquid, and the inclined lines Pa_1Qb_1 to solutions of B in A and of A in B. The curves Pa_4Q, having a minimum at a_4, Pa_3Q, having a maximum at a_3, and Pa_5Q, with neither a maximum nor minimum, correspond to the types i., ii., iii. of completely miscible mixtures.

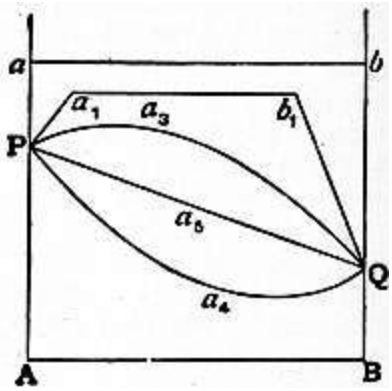


FIG. 4.

6. *Dry Distillation.*—In this process the substance operated upon is invariably a solid, the vapours being condensed and collected as in the other methods. When the substance operated upon is of uncertain composition, as, for example, coal, wood, coal-tar, &c., the term

destructive distillation is employed. A more general designation is "pyrogenic processes," which also includes such operations as leading vapours through red-hot tubes and condensing the products. We may also consider here cases of sublimation wherein a solid vaporizes and the vapour condenses without the occurrence of the liquid phase.

Dry distillation is extremely wasteful even when definite substances or mixtures, such as calcium acetate which yields acetone, are dealt with, valueless by-products being obtained and the condensate usually requiring much purification. Prior to 1830, little was known of the process other than that organic compounds generally yielded tarry and solid matters, but the discoveries of Liebig and Dumas (of acetone from acetates), of Mitscherlich (of benzene from benzoates) and of Persoz (of methane from acetates and lime) brought the operation into common laboratory practice. For efficiency the operation must be conducted with small quantities; caking may be prevented by mixing the substance with sand or powdered pumice, or, better, with iron filings, which also renders the decomposition more regular by increasing the conductivity of the mass. The most favourable retort is a shallow iron pan heated in a sand bath, and provided with a screwed-down lid bearing the delivery tube. Sidney Young has suggested conducting the operation in a current of carbon dioxide which sweeps out the vapours as they are evolved, and also heating in a vapour bath, *e.g.* of sulphur.

One of the earliest red-hot tube syntheses of importance was the formation of naphthalene from a mixture of alcohol and ether vapours. Such condensations were especially studied by M. P. E. Berthelot, and shown to be very fruitful in forming hydrocarbons. Sometimes reagents are placed in the combustion tube, for example lead oxide (litharge), which takes up bromine and sulphur. In its simplest form the apparatus

consists of a straight tube, made of glass, porcelain or iron according to the temperature required and the nature of the reacting substances, heated in an ordinary combustion furnace, the mixture entering at one end and the vapours being condensed at the other. Apparatus can also be constructed in which the unchanged vapours are continually circulated through the tube. Operating in a current of carbon dioxide facilitates the process by preventing overheating.

7. *Distillation in Chemical Technology.*—In laboratory practice use is made of a fairly constant type of apparatus, only trifling modifications being generally necessary to adapt the apparatus for any distillation or fractionation; in technology, on the other hand, many questions have to be considered which generally demand the adoption of special constructions for the economic distillation of different substances. The modes of distillation enumerated above all occur in manufacturing practice. Distillation in a vacuum is practised in two forms:—if the pump draws off steam as well as air it is termed a "wet" air-pump; if it only draws off air, it is a "dry" air-pump. In the glycerin industry the lyes obtained by saponifying the fats are first evaporated with "wet vacuum" and finally distilled with closed and live steam and a "dry vacuum." Two forms of steam distillation may be distinguished: —in one the still is simply heated by a steam coil wound inside or outside the still—this is termed heating by dry steam; in the other steam is injected into the mass within the still—this is the distillation with live steam of laboratory practice. The details of the plant—the material and fittings of the still, the manner of heating, the form of the condensing plant, receivers, &c.—have to be determined for each substance to be distilled in order to work with the maximum economy.

For the distillation of liquids the retort is usually a cylindrical pot placed vertically; cast iron is generally employed, in which case the

bottom is frequently incurved and thicker than the sides in order to take up the additional wear and tear. Sometimes linings of enamelled iron or other material are employed, which when worn can be replaced at a far lower cost than that of a new still. Glass stills heated by a sand bath are sometimes employed in the final distillation of sulphuric acid; platinum, and an alloy of platinum and iridium with a lining of gold rolled on (a discovery due to Heraeus), are used for the same purpose. Cast iron stills are provided with a hemispherical head or dome, generally attached to the body of the still by bolts, and of sufficient size to allow for any frothing. It is invariably provided with an opening to carry off the vapours produced. In its more complete form a still has in addition the following fittings:—The dome is provided with openings to admit (1) the axis of the stirring gear (in some stills the stirring gear rotates on a horizontal axis which traverses the side and not the head of the still), (2) the inlet and outlet tubes of a closed steam coil, (3) a tube reaching to nearly the bottom of the still to carry live steam, (4) a tube to carry a thermometer, (5) one or more manholes for charging purposes, (6) sight-holes through which the operation can be watched, and (7) a safety valve. The body of the still is provided with one or more openings at different heights to serve for the discharge of the residue in the still, and sometimes with a glass gauge to record the quantity of matter in the still. For dry distillations the retorts are generally horizontal cylinders, the bottom or lower surface being sometimes flattened. Iron and fireclay are the materials commonly employed; wrought iron is used in the manufacture of wood-spirit, fireclay for coal-gas (see GAS: *Manufacture*), phosphorus, zinc, &c. The vertical type, however, is employed in the manufacture of acetone and of iodine.

Several modes of heating are adopted. In some cases, especially in dry distillations, the furnace flames play directly on the retorts, in

others, such as in the case of nitric acid, the whole still comes under the action of the furnace gases to prevent condensation on the upper part of the still, while in others the furnace gases do not play directly on the base or upper portion of the still but are conducted around it by a system of flues (see COAL-TAR). Steam heating, dry or live, is employed alone and also as an auxiliary to direct firing.

The condensing plant varies with the volatility of the distillate. Air cooling is adopted whenever possible. For example, in the less modern methods for manufacturing nitric acid the vapours were conducted directly into double-necked bottles (*bombonnes*) immersed in water. A more efficient arrangement consists of a stack of vertical pipes standing up from a main or collecting trough and connected at the top in consecutive pairs by a cross tube. By an arrangement of diaphragms in the lower trough the vapours are circulated through the system. As an auxiliary to air cooling the stack may be cooled by a slow stream of water trickling down the outside of the pipes, or, in certain cases, cold water may be injected into the condenser in the form of a spray, where it meets the ascending vapours. Horizontal air-cooling arrangements are also employed. A common type of condenser consists of a copper worm placed in a water bath; but more generally straight tubes of copper or cast iron which cross and recross a rectangular tank are employed, since this form is more readily repaired and cleansed. Wood-spirit, petroleum and coal-tar distillates are condensed in plant of the latter type. In cases where the condenser is likely to become plugged there is a pipe by means of which live steam can be injected into the condenser. The supply of water to the condenser is regulated according to the volatility of the condensate. When the vapours readily condense to a solid form the condensing plant may take the form of large chambers; such conditions prevail in the manufacture of arsenic, sulphur and lampblack: in the latter case (which, however, is not

properly one of distillation) the chamber is hung with sheets on which the pigment collects. Large chambers are also used in the condensation of mercury.

Dephlegmation of the vapours arising from such mixtures as coal-tar fractions, petroleum and the "wash" of the spirit industry, is very important, and many types of apparatus are employed in order to effect a separation of the vapours. The earliest form, invented by C. B. Mansfield to facilitate the fractionation of paraffin and coal-tar distillates, consisted in having a pipe leading from the inclined delivery tube of the still to the still again, so that any vapour which condensed in the delivery tube was returned to the still. Of really effective columns Coupier's was one of the earliest. The vapours rising from the still traverse a tall vertical column, and are then conveyed through a series of bulbs placed in a bath kept at the boiling-point of the most volatile constituent. The more volatile vapours pass over to the condensing plant, while the less volatile ones condense in the bulbs and are returned to the column at varying heights by means of connecting tubes. The French column is similar in action. The Coffey still is one of the most effective and is employed in the spirit, ammonia, coal-tar and other industries. It consists of a vertical column divided into a number of sections by horizontal plates, which are perforated so that the ascending vapours have to traverse a layer of liquid. Above this "separator" is a reflux condenser, termed the "cooler," maintained at the correct temperature so that only the more volatile component passes to the receiver. The success of the operation chiefly depends upon the proper management of the cooler.

8. *Commercial Distillation of Water.*—Distilled water, *i.e.* water free from salts and to some extent of the dissolved gases which are always present in natural waters, is of indispensable value in many operations

both of scientific and industrial chemistry. The apparatus and process for distilling ordinary water are very simple. The body of the still is made of copper, with a head and worm, or condensing apparatus, either of copper or tin. The still is usually fed continuously by the heated water from the condenser. The first portion of the distillate brings over the gases dissolved in the water, ammonia and other volatile impurities, and is consequently rejected; scarcely two-fifths of the entire quantity of water can be safely used as pure distilled water.

Apparatus for the economic production of a potable water from sea-water is of vital importance in the equipment of ships. The simple distillation of sea-water, and the production thereby of a certain proportion of chemically fresh water, is a very simple problem; but it is found that water which is merely evaporated and recondensed has a very disagreeable flat taste, and it is only after long exposure to pure atmospheric air, with continued agitation, or repeated pouring from one vessel to another, that it becomes sufficiently aerated to lose its unpleasant taste and smell and become drinkable. The water, moreover, till it is saturated with gases, readily absorbs noxious vapours to which it may be exposed. For the successful preparation of potable water from sea-water, the following conditions are essential:—1st, aeration of the distilled product so that it may be immediately available for drinking purposes; 2nd, economy of coal to obtain the maximum of water with the minimum expenditure of fuel; and 3rd, simplicity of working parts, to secure the apparatus from breaking down, and enable unskilled attendants to work it with safety. The problem is a comparatively old one, for we find that R. Fitzgerald patented a process in 1683 having for its purpose the “sweetening of sea-water.” A history of early attempts is given in S. Hales’s *Philosophical Experiments*, published in 1739. Among the earlier of the modern forms of apparatus which came into practical adoption are the inventions of Dr Normandy

and of Chaplin of Glasgow, the apparatus of Rocher of Nantes, and that patented by Gallé and Mazeline of Havre. Normandy's apparatus, although economical and producing water of good quality, is very complex in its structure, consisting of very numerous working parts, with elaborate arrangements of pipes, cocks and other fittings. It is consequently expensive and requires careful attention for its working. It was extensively adopted in the British navy, the Cunard line and many other important emigrant and mercantile lines. Chaplin's apparatus, which was invented and patented later, has also since 1865 been sanctioned for use on emigrant, troop and passenger vessels. The apparatus possesses the great merit of simplicity and compactness, in consequence of which it is comparatively cheap and not liable to derangement. It was adopted by many important British and continental shipping companies, among others by the Peninsular & Oriental, the Inman, the North German Lloyd and the Hamburg American companies.

The modern distilling plant consists of two main parts termed the evaporator and condenser; in addition there must be a boiler (sometimes steam is run off the main boilers, but this practice has several disadvantages), pumps for circulating cold water in the condenser and for supplying salt water to the evaporator, and a filter through which the aerated water passes. The evaporator consists of a cylindrical vessel having in its lower half a horizontal copper coil connected to the steam supply. The cylindrical vessel is filled to a certain level with salt water and the steam turned on. The water vaporizes and is led from the dome of the evaporator to the head of the condenser. The water level is maintained in the evaporator until it contains a certain amount of salt. It is then run off, and replaced by fresh sea-water. The condenser consists of a vertical cylinder having manifolds at the head and foot and through which a number of tubes

pass. In some types, *e.g.* the Weir, the condensing water circulates upwards through the tubes; in others, *e.g.* the Quiggins, the water circulates around the tubes. Various forms of the tubes have been adopted. In the Pape-Henneberg condenser, which has been adopted in the German navy, they are oval in section and tend to become circular under the pressure of the steam; this alteration in shape makes the tubes self-scaling. In the Quiggins condenser, which has been widely adopted, *e.g.* in the "Lusitania," the steam traverses vertical copper coils tinned inside and outside; the coils are crescent-shaped, a form which gives a greater condensing surface and makes the coils self-scaling. The aeration of the water is effected by blowing air into the steam before it is condensed; as an auxiliary, the storage tanks have a false bottom perforated by fine holes so that if air be injected below it, the water is efficiently aerated by the air which traverses it in fine streams. After condensation the water is filtered through charcoal. The filter is either a separate piece of plant, or, as in the Quiggins form, it may be placed below the coils in the same outer vessel. In this plant the aeration is conducted by blowing in air at the base of the condenser. After filtration the water is pumped to the storage tanks. Many types of distilling plant are in use in addition to those mentioned above, for example the Rayner, Kirkaldy, Merlees, Normand; the United States navy has adopted a form designed by the Bureau of Engineering.

BIBLIOGRAPHY.—The general practice of laboratory distillation is discussed in all treatises on practical organic chemistry; reference may be made to Lassar-Cohn, *Manual of Organic Chemistry* (1896), and *Arbeitsmethoden für organisch-chemische Laboratorien* (1901); Hans Meyer, *Analyse und Konstitutionermittlung organischer Verbindungen* (1909). The theory of distillation finds a place in all treatises on physical chemistry. Of especial importance is Sidney Young, *Fractional Distillation* (1903). The history of distillation is to be

studied in E. Gildemeister and F. Hoffmann, *Die ätherischen Öle* (Berlin, 1899; Eng. tr. by E. Kremers, Milwaukee Press, 1900). The technology of distillation is best studied in relation to the several industries in which it is employed; reference should be made to the articles COAL-TAR, GAS, PETROLEUM, SPIRITS, NITRIC ACID, &c. (C. E.*)

DISTRACTION (from Lat. *distrahere*, to pull asunder), a drawing away or apart; a word now used generally of a state of mind, to mean a diversion of attention, or a violent emotion amounting almost to madness.

DISTRESS (from the O. Fr. *destrece*, *destresse*, from the past participle of the Lat. *distringere*, to pull apart, used in Late Lat. in the sense of to punish, hence to distrain), pressure, especially of sorrow, pain or ill-fortune. As a legal term, the action of distraining or distraint, the right which a landlord has of seizing the personal chattels of his tenant for non-payment of rent. Cattle *damage feasant* (doing damage or trespassing upon a neighbour's land) may also be *distrained*, *i.e.* may be detained until satisfaction be rendered for injury they have done. The cattle or other animals thus distrained are a mere pledge in the hands of the injured person, who has only power to retain them until the owner appear to make

satisfaction for the mischief they have done. “Distress damage feasant” is also applicable to inanimate things on the land if doing damage thereto or to its produce; things in actual use, however, are exempt. Such distress must be made during the actual trespass, and by whoever is aggrieved by the damage. Distress for rent was also at one time regarded as a mere pledge or security; but the remedy, having been found to be speedy and efficacious, was rendered more perfect by enactments allowing the thing taken to be sold. Blackstone notes that the law of distresses in this respect “has been greatly altered within a few years last past.” The legislature, in fact, converted an ancient right of personal redress into a powerful remedy for the exclusive benefit of a single class of creditors, viz. landlords. Now that the relation of landlord and tenant in England has come to be regarded as purely a matter of contract, the language of the law-books seems to be singularly inappropriate. The defaulting tenant is a “wrong-doer,” the landlord is the “injured party,”; any attempt to defeat the landlord’s remedy by carrying off distrainable goods is denounced as “fraudulent and knavish.” The operation of the law has, as we shall point out, been mitigated in some important respects, but it still remains an almost unique specimen of one-sided legislation.

At common law distress was said to be incident to *rent service*, and by particular reservation to rent charges; but by 4 Geo. II. c. 28 it was extended to *rent seck*, *rents of assize* and chief rents (see RENT). It is therefore a general remedy for rent certain in arrear. All personal chattels are distrainable with the following exceptions:—(1) things in which there can be no property, as animals *ferae naturae*; (2) ledgers, daybooks, title-deeds, &c.; (3) things delivered to a person following a public trade, as a horse sent to be shod, &c.; (4) things already in the custody of the law; (5) things which cannot be restored in as good a plight as when distrained, that is, perishable articles; (6) fixtures; (7) beasts of the plough and instruments of husbandry while there is other sufficient distress to be found; (8)

instruments of a man's trade or profession in actual use at the time the distress is made. If not in actual use they are only privileged in case there is other sufficient distress upon the premises. These exceptions, it will be seen, imply that the thing distrained is to be held as a pledge merely—not to be sold. They also imply that in general any chattels found on the land in question are to be available for the benefit of the landlord, whether they belong to the tenant or not. This principle worked with peculiar harshness in the case of lodgers, whose goods might be seized and sold for the payment of the rent due by their landlord to his superior landlord. By the Lodgers' Goods Protection Act 1871, however, where a lodger's goods have been seized by the superior landlord the lodger may serve him with a notice stating that the intermediate landlord has no interest in the property seized, but that it is the property or in the lawful possession of the lodger, and setting forth the amount of the rent due by the lodger to his immediate landlord. On payment or tender of such rent the landlord cannot proceed with the distress against the goods in question. By the Law of Distress Amendment Act 1908 this protection was extended to under tenants liable to pay rent by equal quarterly instalments, as well as to any person whatsoever who is not a tenant of the premises or any part thereof nor has any beneficial interest therein. The act, however, excludes certain goods, particularly goods belonging to the husband or wife of the tenant whose rent is in arrear, goods comprised in any bill of sale, hire purchase agreement or settlement made by the tenant, goods in the possession or disposition of a tenant by the consent and permission of the true owner under such circumstances as to make the tenant reputed owner, goods of the partner of an immediate tenant, and goods (not being goods of a lodger) upon premises where any trade or business is carried on in which both the immediate tenant and the under tenant have an interest. The act does not apply where an under tenancy has been created in breach of a covenant or agreement between the landlord and his immediate tenant. The Law of

Distress Amendment Act 1888 also absolutely exempted from distress the tools and implements of trade and wearing apparel and bedding of a tenant and his family to the value of five pounds, and the Law of Distress Amendment Act 1895 gave power to a court of summary jurisdiction to direct that such goods, when distrained upon, should be restored if not sold, or, if sold, to order their value to be paid by the persons who levied the distress or directed it to be levied. Originally the landlord could only seize things actually on the premises, so that the remedy might be defeated by the things being taken away. But by an act of 1710, and by the Distress for Rent Act 1737, he may follow things fraudulently or clandestinely removed off the premises within thirty days after their removal, unless they have been in the meantime bona fide sold for a valuable consideration. The sixth exception mentioned above was held to extend to sheaves of corn; but by an act of 1690 corn, when reaped, as well as hay, was made subject to distress. That act was modified by the Landlord and Tenant Act 1851, under which growing crops seized by the sheriff and sold under an execution are liable to distress for rent which becomes due after the seizure and sale, if there is no other sufficient distress on the premises.

Excessive or disproportionate distress exposes the distrainer to an action, and any irregularity formerly made the proceedings void *ab initio*, so that the remedy was attended with considerable risk. The Distress for Rent Act 1737, before alluded to, in the interests of landlords, protected distresses for *rent* from the consequences of irregularity. In all cases of distress for rent, if the owner do not within five days (by the Law of Distress Amendment Act 1888, fifteen days, if the tenant make a request in writing to the person levying the distress and also give security for any additional cost that may be occasioned by such extension of time) replevy the same with sufficient security, the thing distrained may be sold towards satisfaction of the rent and charges, and the surplus, if any, must be returned to the owner. To "replevy" is when the person distrained upon applies to the proper authority

(the registrar of the county court) to have the thing returned to his own possession, on giving security to try the right of taking it in an action of replevin.

Duties and penalties imposed by act of parliament (*e.g.* payment of rates and taxes) are sometimes enforced by distress.

DISTRIBUTION (Lat, *distribuere*, to deal out), a term used in various connexions with the general meaning of spreading out. In law, the word is used for the division of the personal estate of an intestate among the next-of-kin (see INTESTACY). The important scientific question as to the distribution of plants and animals on the earth is treated under PLANTS: *Distribution*, and ZOOLOGICAL DISTRIBUTION. In economics the word is used generally for the transference of commodities from person to person or from place to place, or the dividing up of large quantities of commodities into smaller quantities; and in a more technical sense, for the division of the product of industry amongst the various members or classes of the community. The theory of economic distribution, *i.e.* the causes which determine rent, wages, profits and interest, forms an important subject-matter in all text-books. Among recent works, see E. Cannan's *History of Theories of Production and Distribution, 1776-1848* (1893), J. R. Common's *Distribution of Wealth* (1893), and H. J. Davenport's *Value and Distribution* (Chicago, 1908).

DISTRICT, a word denoting in its more general sense, a tract or extent of a country, town, &c., marked off for administrative or other purposes, or having some special and distinguishing characteristics. The medieval Latin *districtus* (from *distringere*, to distrain) is defined by Du Cange as *Territorium feudi, seu tractus, in quo Dominus vassallos et tenentes suos distringere potest*; and as *justitiae exercendae in eo tractu facultas*. It was also used of the territory over which the feudal lord exercised his jurisdiction generally. It may be noted that *distringere* had a wider significance than "to distrain" in the English legal sense (see DISTRESS). It is defined by Du Cange as *compellere ad aliquid faciendum per mulctam, poenam, vel capto pignore*. In English usage, apart from its general application in such forms as postal district, registration district and the like, "district" has specific usages for ecclesiastical and local government purposes. It is thus applied to a division of a parish under the Church Building Acts, originally called a "perpetual curacy," and the church serving such a division is properly a "district chapel." Under the Local Government Act of 1894 counties are divided for the purposes of the act into urban and rural districts. In British India the word is used to represent the *zillah*, an administrative subdivision of a province or presidency. In the United States of America the word has many administrative, judicial and other applications. In South Carolina it was used instead of "county" for the chief division of the state other than in the coast region. In the Virginias, Tennessee, Georgia, Kentucky and Maryland it answers to "township" or precinct, elsewhere the principal subdivision of a county. It is used for an electoral "division," each state being divided into Congressional and senatorial districts; and also for a political subdivision ranking between an unorganized and an organized Territory—*e.g.*, the District of Columbia and Alaska.

DISTYLE (from Gr. δι, two, and στῦλος, column), the architectural term given to a portico which has two columns between antae, known as *distyle-in-antis* (see TEMPLE).

DITHMARSCHEN, or DITMARSH (in the oldest form of the name *Thiatmaresgaho*, Dietmar's Gau), a territory between the Eider, the Elbe and the North Sea, forming the western part of the old duchy of Holstein, and now included in the Prussian province of Schleswig-Holstein. It contains about 550 sq. m. with 90,000 inhabitants. The territory consists to the extent of one half of good pasture land, which is preserved from inroads of the sea by banks and dams, the other half being mostly waste. It was originally colonized mainly from Friesland and Saxony. The district was subjugated and Christianized by Charlemagne in 804, and ranked as a separate *Gau*, included perhaps in the countship of Stade, or *Comitalus utriusque ripae*. From the same century, according to one opinion, or from the year 1182, when the countship was incorporated with their see, according to another, the archbishops of Bremen claimed supremacy over the land; but the inhabitants, who had developed and consolidated a systematic organism for self-government, made obstinate resistance, and rather attached themselves to the bishop of Schleswig. Ditmarsken, to use the Scandinavian form of the name, continued part of the Danish dominions till the disastrous battle of Bornhöved in 1227, when its former independence was regained. The claims of the archbishop of Bremen were now so far recognized that he exercised the royal rights of *Heerbann* and *Blutbann*,[1] enjoyed the consequent emoluments, and was represented first

by a single *advocatus*, or *Vogt*, and afterwards by one for each of the five Döffts, or marks, into which the land was divided after the establishment of Meldorf. The community was governed by a *Landrath* of forty-eight elective consuls, or twelve from each of the four marks; and even in the 14th century the power of the episcopal *advocati* was so slight that a chronicler quoted by Conrad von Maurer says, *De Ditmarschen leven sunder Heren und Hovedt unde dohn wadt se willen*, "the Ditmarschen live without lord and head, and do what they will." In 1319 and in 1404 they succeeded in defeating the invasions of the Holstein nobles; and though in 1474 the land was nominally incorporated with the duchy by the emperor Frederick III., the attempt of the Danish king Hans and the duke of Gottorp to enforce the decree in 1500 resulted only in their complete rout in the marshes of the Dussend-Düwels-Warf. During the early part of the century which began with such prestige for Ditmarsh, it was the scene of violent internal conflict in regard to the religious questions of the time; and, thus weakened, it was obliged in 1559 to submit to partition among its three conquerors—King Frederick II. of Denmark and Dukes John and Adolphus. A new division took place on Duke John's death in 1581, by which Frederick obtained South Ditmarsh, with its chief town of Meldorf, and Adolphus obtained North Ditmarsh, with its chief town of Heide; and this arrangement continued till 1773, when all the Gottorp possessions were incorporated with the Danish crown.

See Dahlmann's edition of Neocorus, *Chronik von Dithmarschen* (Kiel, 1827), and *Geschichte Dänemarks* (1840-1844); Michelsen, *Urkundenbuch zur Geschichte des Landes Dithmarschen* (1834), *Sammlung altdithmarscher Rechtsquellen* (1842), and *Dithmarschen im Verhältniss zum bremischen Erzstift*; Kolster, *Geschichte Dithmarschens, nach F. R. Dahlmanns Vorlesungen* (1873).

1 That is, the right of claiming military service, and the right of bringing capital offenders to justice.

DITHYRAMBIC POETRY, the description of poetry in which the character of the dithyramb is preserved. It remains quite uncertain what the derivation or even the primitive meaning of the Greek word διθύραμβος is, although many conjectures have been attempted. It was, however, connected from earliest times with the choral worship of Dionysus. A dithyramb is defined by Grote as a round choric dance and song in honour of the wine-god. The earliest dithyrambic poetry was probably improvised by priests of Bacchus at solemn feasts, and expressed, in disordered numbers, the excitement and frenzy felt by the worshippers. This element of unrestrained and intoxicated vehemence is prominent in all poetry of this class. The dithyramb was traditionally first practised in Naxos; it spread to other islands, to Boeotia and finally to Athens. Arion is said to have introduced it at Corinth, and to have allied it to the worship of Pan. It was thus "merged," as Professor G. G. Murray says, "into the Satyr-choir of wild mountain-goats" out of which sprang the earliest form of tragedy. But when tragic drama had so far developed as to be quite independent, the dithyramb did not, on that account, disappear. It flourished in Athens until after the age of Aristotle. So far as we can distinguish the form of the ancient Greek dithyramb, it must have been a kind of irregular wild poetry, not divided into strophes or constructed with any evolution of the theme, but imitative of the enthusiasm created by the use of wine, by what passed as the Dionysiac delirium. It was accompanied on some occasions by flutes, on others by the lyre, but we do not know enough to conjecture the reasons

of the choice of instrument. Pindar, in whose hands the ode took such magnificent completeness, is said to have been trained in the elements of dithyrambic poetry by a certain Lasus of Hermione. Ion, having carried off the prize in a dithyrambic contest, distributed to every Athenian citizen a cup of Chian wine. In the opinion of antiquity, pure dithyrambic poetry reached its climax in a lost poem. *The Cyclops*, by Philoxenus of Cythera, a poet of the 4th century B.C. After this time, the composition of dithyrambs, although not abandoned, rapidly declined in merit. It was essentially a Greek form, and was little cultivated, and always without success, by the Latins. The dithyramb had a spectacular character, combining verse with music. In modern literature, although the adjective "dithyrambic" is often used to describe an enthusiastic movement in lyric language, and particularly in the ode, pure dithyrambs have been extremely rare. There are, however, some very notable examples. The *Baccho in Toscana* of Francesco Redi (1626-1698), which was translated from the Italian, with admirable skill, by Leigh Hunt, is a piece of genuine dithyrambic poetry. *Alexander's Feast* (1698), by Dryden, is the best example in English. But perhaps more remarkable, and more genuinely dithyrambic than either, are the astonishing improvisations of Karl Mikael Bellman (1740-1795), whose Bacchic songs were collected in 1791 and form one of the most remarkable bodies of lyrical poetry in the literature of Sweden.

(E. G.)

DITTERSBACH, a town of Germany, in the Prussian province of Silesia, 3 m. by rail S.E. from Waldenburg and 50 m. S. W. from Breslau. It has coal-mines, bleach-fields and match factories. Population (1905) 9371.

DITTERSDORF, KARL DITTERS VON (1739-1799), Austrian composer and violinist, was born in Vienna on the 2nd of November 1739, his father's name being Ditters. Having shown as a child marked talent for the violin, he was allowed to play in the orchestras of St Stephen's and the *Schottenkirche*, where he attracted the attention of a notable patron of music, Prince Joseph Frederick of Hildburghausen (1702-1787), who is also remembered as a soldier for his disastrous leading of the forces of the Empire at Rossbach. The prince gave the boy, now eleven years old, a place in his private orchestra—the first of the kind established in Vienna,—and also saw to it that he received an excellent general education. The Seven Years' War proved disastrous to both music and morals; and young Ditters, who had fallen into evil ways, fled from Hildburghausen, whither he had gone with the prince, to avoid the payment of his gambling debts. His patron generously forgave and recalled him, but soon afterwards gave up his orchestra at Vienna. Ditters now obtained a place in the Vienna opera; but he was not satisfied, and in 1761 eagerly accepted an invitation to accompany Gluck, whose acquaintance, as well as that of Haydn, he had made while in the service of the prince, on a professional journey to Italy. His success as a violinist on this occasion was equal to that of Gluck as composer; and on his return to Vienna he was recognized as the superior of Antonio Lolli, who as virtuoso had hitherto held the palm. In 1764 he was again associated with Gluck in the musical part of the ceremonies at Frankfort, attending the coronation of the archduke Joseph as King of the Romans. His next appointment was that of conductor of the orchestra of the bishop of Grosswardein, a Hungarian magnate, at Pressburg. He set up a private stage in the episcopal palace, and wrote for it his first "opera buffa,"

Amore in musica. His first oratorio, *Isacco figura del Redentore*, was also written during this time; but the scandal of performances of light opera by the bishop's company, even on fast days and during Advent, outweighed this pious effort; the empress Maria Theresa sharply called the worldly prelate to order; and he, in a huff, dismissed his orchestra (1769). After a short interlude, Ditters was again in the service of an ecclesiastical patron, count von Schafgotsch, prince bishop of Breslau, at his estate of Johannesberg in Silesia. Here he displayed so much skill as a sportsman, that the bishop procured for him the office of forester (*Forstmeister*) of the principality of Neisse. He had already, by the same influence, been made knight of the Golden Spur (1770). At Johannesberg Ditters also produced a comic opera, *Il Viaggiatore americano*, and an oratorio, *Davide*. The title rôle of the latter was taken by a pretty Italian singer, Signora Nicolini, whom Ditters married. In 1773 he was ennobled as Karl von Dittersdorf, and at the same time was appointed administrator (*Amtshauptmann*) of Freyenwaldau, an office which he performed by deputy. In the same year his oratorio *Ester* was produced in Vienna. During the War of Bavarian Succession the prince bishop's orchestra was dissolved, and Dittersdorf employed himself in his office at Freyenwaldau; but after the peace of Tetschen (1779) he again became conductor of the reconstituted orchestra. From this time forward his output was enormous. In 1780 ten months sufficed for the production of his *Giobbe* (Job) and four operas, three of which were successful; and besides these he wrote a large number of "characterized symphonies," founded on the *Metamorphoses* of Ovid. He was now at the height of his fame, and spent the fortune which it brought him in much luxury. But after a time his patron fell on evil days, the famous orchestra had to be reduced, and when the bishop died in 1795 his successor dismissed the composer with a small money gift. Poor and broken in health, he accepted the asylum offered to him by Ignaz Freiherr von Stillfried, on his estate near Neuhaus in Bohemia, where he spent what strength was left

him in a feverish effort to make money by the composition of operas, symphonies and pianoforte pieces. He died on the 1st of October 1799, praying "God's reward" for whoever should save his family from starvation. On his death-bed he dictated to his son his *Lebensbeschreibung* (autobiography).

Dittersdorf's chief talent was for comic opera and instrumental music in the sonata forms. In both of these branches his work still shows signs of life, and it is of great historical interest, since he was not only an excellent musician and a friend of Haydn but also a thoroughly popular writer, with a lively enough musical wit and sense of effect to embody in an amusing and fairly artistic form exactly what the best popular intelligence of the times saw in the new artistic developments of Haydn. Thus, while in the amiable monotony and diffuseness of Boccherini we may trace Haydn as a force tending to disintegrate the polyphonic suite-forms of instrumental music, in Dittersdorf on the other hand we see the popular conception of the modern sonata and dramatic style. Yet, with all his popularity, the reality of his progressive outlook may be gauged from the fact that, though he was at least as famous a violinist as Boccherini was a violoncellist, there is in his string quartets no trace of that tendency to sacrifice the ensemble to an exhibition of his own playing which in Boccherini's chamber music puts the violoncello into the same position as the first violin in the chamber music of Spohr. In Dittersdorf's quartets (at least six of which are worthy of their survival at the present day) the first violin leads indeed, but not more than is inevitable in such unsophisticated music where the normal place for melody is at the top. The appearance of greater vitality in the texture of Boccherini's quintets is produced merely by the fact that, his special instrument being the violoncello, his displays of brilliance inevitably occur in the inner parts. Six of Dittersdorf's symphonies on the *Metamorphoses* of Ovid were republished in 1899, the centenary of his death. In them we have an amusing and sometimes charming illustration of the way in which at

transitional periods music, as at the present day, is ready to make crutches of literature. The end of the representation of the conversion of the Lycian peasants into frogs is prophetically and ridiculously Wagnerian in its ingenious expansion of rhythm and eminently expert orchestration. Every external feature of Dittersdorf's style seems admirably apt for success in German comic opera on a small scale; and an occasional experimental performance at the present day of his *Doktor und Apotheker* is not less his due than the survival of his best quartets.

See his *Lebensbeschreibung*, published at Leipzig, 1801 (English translation by A. D. Coleridge, 1896); an article in the *Rivista musicale*, vi. 727; and the article "Dittersdorf" in Grove's *Dictionary of Music and Musicians*.

DITTO (from the Lat. *dictum*, something said, Ital. *detto*, aforesaid), that which has been said before, the same thing. The word is frequently abbreviated into "do." In accounts, "ditto" is indicated by two dots or a dash under the word or figure that would otherwise be repeated. A "suit of dittos," a trade or slang phrase, is a suit in which coat, trousers and waistcoat are all of the same material.

DITTON, HUMPHRY (1675-1715), English mathematician, was born at Salisbury on the 29th of May 1675. He studied theology, and was for some years a dissenting minister at Tonbridge, but on the death of his father he devoted himself to the congenial study of mathematics. Through the influence of Sir Isaac Newton he was elected mathematical master in Christ's hospital. He was author of the following memoirs and treatises: —"Of the Tangents of Curves, &c.," *Phil. Trans.* vol. xxiii.; "A Treatise on Spherical Catoptrics," published in the *Phil. Trans.* vol. xxiv., from which it was copied and reprinted in the *Acta Eruditorum* (1707), and also in the Memoirs of the Academy of Sciences at Paris; *General Laws of Nature and Motion* (1705), a work which is commended by Wolfius as illustrating and rendering easy the writings of Galileo and Huygens, and the *Principia* of Newton; *An Institution of Fluxions, containing the First Principles, Operations, and Applications of that admirable Method, as invented by Sir Isaac Newton* (1706). In 1709 he published the *Synopsis Algebraica* of John Alexander, with many additions and corrections. In his *Treatise on Perspective* (1712) he explained the mathematical principles of that art; and anticipated the method afterwards elaborated by Brook Taylor. In 1714 Ditton published his *Discourse on the Resurrection of Jesus Christ;* and *The New Law of Fluids, or a Discourse concerning the Ascent of Liquids in exact Geometrical Figures, between two nearly contiguous Surfaces*. To this was annexed a tract ("Matter not a Cogitative Substance") to demonstrate the impossibility of thinking or perception being the result of any combination of the parts of matter and motion. There was also added an advertisement from him and William Whiston concerning a method for discovering the longitude, which it seems they had published about half a year before. Although the method had been approved by Sir Isaac Newton before being presented to the Board of Longitude, and successfully practised in finding the longitude between Paris and Vienna, the board determined against it. This disappointment, aggravated as it was by certain

lines written by Dean Swift, affected Ditton's health to such a degree that he died in the following year, on the 15th of October 1715.

DIU, an island and town of India, belonging to Portugal, and situated at the southern extremity of the peninsula of Kathiawar. Area of district, 20 sq. m. Pop. (1900) 14,614. The anchorage is fairly protected from the sea, but the depth of water is only 3 to 4 fathoms. The channel between the island on Diu and the mainland is navigable only by fishing boats and small craft. The town is well fortified on the old system, being surrounded by a wall with towers at regular intervals. Many of the inhabitants are the well-known Banyan merchants of the east coast of Africa and Arabia. Native spirits are distilled from the palm, salt is made and fish caught. The trade of the town, however, is decayed. There are remains of several fine ancient buildings. The cathedral or Sé Matriz, dating from 1601, was formerly a Jesuit college. The mint, the arsenal and several convents (now ruined or converted to other uses) are also noteworthy. The Portuguese, under treaty with Bahadur Shah of Gujarat, built a fort here in 1535, but soon quarrelled with the natives and were besieged in 1538 and 1545. The second siege is one of the most famous in Indo-Portuguese history, and is the subject of an epic by Jeronymo Corte Real (*q.v.*).

See R. S. Whiteway, *Rise of the Portuguese Power in India* (1898).

DIURETICS (from Gr. διά, through, and οὐρεῖν, pass urine), the name given to remedies which, under certain conditions, stimulate an increased flow of urine. Their mode of action is various. Some are absorbed into the blood, carried to the secretory organs (the kidneys), and stimulate them directly, causing an increased flow of blood; others act as stimulants through the nervous system. A second class act in congested conditions of the kidneys by diminishing the congestion. Another class, such as the saline diuretics, are effectual by virtue of their osmotic action. A fourth class are diuretic by increasing the blood pressure within the vessels in general, and the Malpighian tufts in particular,—some, as digitalis, by increasing the strength of the heart's contractions, and others, as water, by increasing the amount of fluid circulating in the vessels. Some remedies, as mercury, although not diuretic themselves, when prescribed along with those which have this action, increase their effect. The same remedy may act in more than one way, *e.g.* alcohol, besides stimulating the secretory organs directly, is a stimulant to the circulation, and thus increases the pressure within the vessels. Diuretics are prescribed when the quantity of urine is much diminished, or when, although the quantity may be normal, it is wished to relieve some other organ or set of organs of part of their ordinary work, or to aid in carrying off some morbid product circulating in the blood, or to hasten the removal of inflammatory serous exudations, or of dropsical collections of fluid. Caffeine, which is far the best true diuretic, acts in nearly every way mentioned above. Together with digitalis it is the most efficient remedy for cardiac dropsy. A famous diuretic pill, known as Guy's pill, consists of a grain each of mercurial pill, digitalis leaves and squill, made up with extract of henbane. Digitalis, producing its diuretic effect by its combined action on heart, vessels and kidneys, is much used in the oedema of mitral disease, but must be avoided in chronic Bright's disease, as it increases the tension of the pulse, already often dangerously high.

Turpentine and cantharides are not now recommended as diuretics, as they are too irritating to the kidneys.

DIURNAL MOTION, the relative motion of the earth and the heavens, which results from the rotation of our globe on its axis in a direction from west toward east. The actual motion consists in this rotation. But the term is commonly applied to the resultant apparent revolution of the heavens from east to west, the axis of which passes through the celestial poles, and is coincident in direction with the axis of the earth.

DIVAN (Arabic *dīwān*), a Persian word, derived probably from Aramaic, meaning a "counting-house, office, bureau, tribunal"; thence, on one side, the "account-books and registers" of such an office, and, on another, the "room where the office or tribunal sits"; thence, again, from "account-book, register," a "book containing the poems of an author," arranged in a definite order (alphabetical according to the rhyme-words), perhaps because of the saying, "Poetry is the register (*dīwān*) of the Arabs," and from "bureau, tribunal," "a long seat, formed of a mattress laid against the side of the room, upon the floor or upon a raised structure or frame, with cushions to lean against" (Lane, *Lexicon*, 930 f.). All these meanings existed and exist, especially "bureau, tribunal," "book of poems" and "seat"[1]; but the order of

derivation may have been slightly different. The word first appears under the caliphate of Omar (A.D. 634-644). Great wealth, gained from the Moslem conquests, was pouring into Medina, and a system of business management and administration became necessary. This was copied from the Persians and given the Persian name, “divan.” Later, as the state became more complicated, the term was extended over all the government bureaus. The divan of the Sublime Porte was for long the council of the empire, presided over by the grand vizier.

See Von Kremer, *Culturgeschichte des Orients*, i. 64, 198.

(D. B. MA.)

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1 The divan in this sense has been known in Europe certainly since about the middle of the 18th century. It was fashionable, roughly speaking, from 1820 to 1850, wherever the romantic movement in literature penetrated. All the boudoirs of that generation were garnished with divans; they even spread to coffee-houses, which were sometimes known as “divans” or “Turkish divans”; and a “cigar divan” remains a familiar expression.

DIVER, a name that when applied to a bird is commonly used in a sense even more vague than that of loom, several of the sea ducks or *Fuligulinae* and mergansers being frequently so called, to say nothing of certain of the auks or *Alcidae* and grebes; but in English ornithological works the term diver is generally restricted to the Family known as *Colymbidae*, a very well-marked group of aquatic birds, possessing great, though not exceptional, powers of submergence, and consisting of a single genus *Colymbus* which is composed of three, or at most four, species, all confined to the northern hemisphere. This Family belongs to the *Cecomorphae* of T.

H. Huxley, and is usually supposed to occupy a place between the *Alcidae* and *Podicipedidae*; but to which of these groups it is most closely related is undecided. Professor Brandt in 1837 (*Beitr. Naturgesch. Vögel*, pp. 124-132) pointed out the osteological differences of the grebes and the divers, urging the affinity of the latter to the auks; while, thirty years later, Professor Alph. Milne-Edwards (*Ois. foss. France*, i. pp. 279-283) inclined to the opposite view, chiefly relying on the similarity of a peculiar formation of the tibia in the grebes and divers,[1] which indeed is very remarkable, and, in the latter group, attracted the attention of Willughby more than 230 years ago. On the other hand Professor Brandt, and Rudolph Wagner shortly after (Naumann's *Vögel Deutschlands*, ix. p. 683, xii. p. 395), had already shown that the structure of the knee-joint in the grebes and divers differs in that the former have a distinct and singularly formed *patella* (which is undeveloped in the latter) in addition to the prolonged, pyramidally formed, procnemial process—which last may, from its exaggeration, be regarded as a character almost peculiar to these two groups.[2] The evidence furnished by oology and the newly-hatched young seems to favour Brandt's views. The abortion of the *rectrices* in the gerbes, while these feathers are fairly developed in the divers, is another point that helps to separate the two Families.

The commonest species of *Colymbus* is *C. septentrionalis*, known as the red-throated diver from an elongated patch of dark bay which distinguishes the throat of the adult in summer dress. Immature birds want the bay patch, and have the back so much more spotted that they are commonly known as "speckled divers." Next in size is the black-throated diver, *C. arcticus*, having a light grey head and a gular patch of purplish-black, above which is a semicollar of white striped vertically with black. Still bigger is the great northern diver, *C. glacialis* or *torquatus*, with a glossy black head and neck, two semicollars of white and black vertical stripes, and nearly the whole of the black back and upper surface of the wings beautifully marked with

white spots, varying in size and arranged in belts.[3] Closely resembling this bird, so as to be most easily distinguished from it by its yellow bill, is *C. adamsi*. The divers live chiefly on fish, and are of eminently marine habit, though invariably resorting for the purpose of breeding to freshwater lakes, where they lay two dark brown eggs on the very brink; but they are not unfrequently found far from the sea, being either driven inland by stress of weather, or exhausted in their migrations. Like most birds of their build, they chiefly trust to swimming, whether submerged or on the surface, as a means of progress, but once on the wing their flight is strong and they can mount to a great height. In winter their range is too extensive and varied to be here defined, though it is believed never to pass, and in few directions to approach, the northern tropic; but the geographical distribution of the several forms in summer requires mention. While *C. septentrionalis* inhabits the north temperate zone of both hemispheres, *C. arcticus* breeds in suitable places from the Hebrides to Scandinavia, and across the Russian empire, it would seem, to Japan, reappearing in the north-west of North America,[4] though its eastern limit on that continent cannot be definitely laid down; but it is not found in Greenland, Iceland, Shetland or Orkney. *C. glacialis*, on the contrary, breeds throughout the north-eastern part of Canada, in Greenland and in Iceland. It has been said to do so in Scotland as well as in Norway, but the assertion seems to lack positive proof, and it may be doubted whether, with the exception of Iceland, it is indigenous to the Old World,[5] since the form observed in North-eastern Asia is evidently that which has been called *C. adamsi*, and is also found in North-western America; but it may be remarked that one example of this form has been taken in England (*Proc. Zool. Society*, 1859, p. 206) and at least one in Norway (*Nyt Mag. for Naturvidenskaberne*, 1877, p. 134).

(A. N.)

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1 The remains of *Colymboides minutus*, from the Miocene of Langy, described by this naturalist in the work just cited, seem to show it to have been a generalized form.

Unfortunately its tibia is unknown.

2 A. H. Garrod, in his tentative and chiefly myological arrangement of Birds (*Proc Zool. Society*, 1874, p. 117), placed the *Colymbidae* and *Podicipedidae* in one order (*Anseriformes*) and the *Alcidae* in another (*Charadriiformes*); but the artificial nature of this assignment may be realized by the fact of his considering the other families of the former order to be *Anatidae* and *Spheniscidae*.

3 The osteology and myology of this species are described by Dr Coues (*Mem. Boston Soc. Nat. History*, i. pp. 131-172, pl. 5).

4 Lawrence's *C. pacificus* seems hardly to deserve specific recognition.

5 In this connexion should be mentioned the remarkable occurrence in Europe of two birds of this species which had been previously wounded by a weapon presumably of transatlantic origin. One had "an arrow headed with copper sticking through its neck," and was shot on the Irish coast, as recorded by J. Vaughan Thompson (*Nat. Hist. Ireland*, iii. p. 201); the other, says Herr H. C. Müller (*Vid. Medd. nat. Forening*, 1862, p. 35), was found dead in Kalbaksfjord in the Faeroes with an iron-tipped bone dart fast under its wing.

DIVERS and **DIVING APPARATUS.** To "dive" (Old Eng. *dúfan*, *dŷfan*; cf. "dip") is to plunge under water, and in the ordinary procedure of swimmers is distinguished from simple plunging in that it involves remaining under the water for an interval of more or less duration before coming to the surface. In the article SWIMMING the sport of diving in this sense is considered. Here we are only concerned with diving as the function of a "diver," whose business it is to go under water (in modern times, assisted by specially devised apparatus) in order to work.

Unassisted or Natural Diving.—The earliest reference to the practice of the art of diving for a purpose of utility occurs in the *Iliad*, 16, 745-750, where Patroclus compares the fall of Hector's charioteer to the action of a

diver diving for oysters. Thus it would seem that the art was known about 1000 years before the Christian era. Thucydides is the first to mention the employment of divers for mechanical work under water. He relates that divers were employed during the siege of Syracuse to saw down the barriers which had been constructed below the surface of the water with the object of obstructing and damaging any Grecian war vessels which might attempt to enter the harbour. At the siege of Tyre, divers were ordered by Alexander the Great to impede or destroy the submarine defences of the besieged as they were erected. The purpose of these obstructions was analogous to that of the submarine mine of to-day.

The employment of divers for the salvage of sunken property is first mentioned by Livy, who records that in the reign of Perseus considerable treasure was recovered from the sea. By a law of the Rhodians, their divers were allowed a proportion of the value recovered, varying with the risk incurred, or the depth from which the treasure was salved. For instance, if the diver raised it from a depth of eight cubits (12 ft.) he received one-third for himself; if from sixteen cubits (24 ft.) one half; but upon goods lost near the shore, and recovered from a depth of two cubits (36 in.), his share was only one tenth.

These are examples of unassisted diving as practised by the Ancients. Their primitive method, however, is still in vogue in some parts of the world—notably in the Ceylon pearl fisheries and in the Mediterranean sponge fisheries, and it may, therefore, be as well to mention the system adopted by the natural, or naked, diver of to-day.

The volume and power of respiration of the lungs vary in different individuals, some persons being able to hold their breath longer than others, so that it naturally follows that one man may be able to stay longer under water than another. The longest time that a natural diver has been known to remain beneath the surface is about two minutes. Some pearl and sponge

divers rub their bodies with oil, and put wool, saturated with oil, in their ears. Others hold in their mouth a piece of sponge soaked in oil, which they renew every time they descend. It is doubtful, however, whether these expedients are beneficial. The men who dive in this primitive fashion take with them a flat stone with a hole in the centre; to this is attached a rope, which is secured to the diving boat and serves to guide them to particular spots below. When the diver reaches the sea bottom he tears off as much sponge within reach as possible, or picks up pearl shells, as the case may be, and then pulls the rope to indicate to the man in the boat that he wishes to be hauled up. But so exhausting is the work, and so severe the strain on the system, that, after a number of dives in deep water, the men often become insensible, and blood sometimes bursts from nose, ears and mouth.

Early Diving Appliances.—The earliest mention of any appliance for assisting divers is by Aristotle, who says that divers are sometimes provided with instruments for respiration through which they can draw air from above the water and which thus enable them to remain a long time under the sea (*De Part. Anim.* 2, 16), and also that divers breathe by letting down a metallic vessel which does not get filled with water but retains the air within it (*Problem.* 32, 5). It is also recorded that Alexander the Great made a descent into the sea in a machine called a *colimpha*, which had the power of keeping a man dry, and at the same time of admitting light. Pliny also speaks of divers engaged in the strategy of ancient warfare, who drew air through a tube, one end of which they carried in their mouths, whilst the other end was made to float on the surface of the water. Roger Bacon in 1240, too, is supposed to have invented a contrivance for enabling men to work under water; and in Vegetius's *De Re Militari* (editions of 1511 and 1532, the latter in the British Museum) is an engraving representing a diver wearing a tight-fitting helmet to which is attached a long leathern pipe leading to the surface, where its open end is kept afloat by means of a bladder. This method of obtaining air during subaqueous operations was

probably suggested by the action of the elephant when swimming; the animal instinctively elevates its trunk so that the end is above the surface of the water, and thus is enabled to take in fresh air at every inspiration.

A certain Repton invented “water armour” in the year 1617, but when tried it was found to be useless. G. A. Borelli in the year 1679 invented an apparatus which enabled persons to go to a certain depth under water, and he is credited with being the first to introduce means of forcing air down to the diver. For this purpose he used a large pair of bellows. John Lethbridge, a Devonshire man, in the year 1715 contrived “a watertight leather case for enclosing the person.” This leather case held about half a hogshead of air, and was so adapted as to give free play to arms and legs, so that the wearer could walk on the sea bottom, examine a sunken vessel and salve her cargo, returning to the surface when his supply of air was getting exhausted. It is said that Lethbridge made a considerable fortune by his invention. The next contrivance worthy of mention, and most nearly resembling the modern diving-dress, was an apparatus invented by Kleingert, of Breslau, in 1798. This consisted of an egg-ended metallic cylinder enveloping the head and the body to the hips. The diver was encased first of all in a leather jacket having tight-fitting arms, and in leather drawers with tight-fitting legs. To these the cylinder was fastened in such a way as to render the whole equipment airtight. The air supply was drawn through a pipe which was connected with the mouth of the diver by an ivory mouthpiece, the surface end being held above water after the manner mentioned in Vegetius, viz. by means of a floating bladder attached to it. The foul air escaped through another pipe held in a similar manner above the surface of the water, inhalation being performed by the mouth and exhalation by the nose, the act of inhalation causing the chest to expand and so to expel the vitiated air through the escape pipe. The diver was weighted when going under water, and when he wished to ascend he released one of his weights, and attached it to a rope which he held, and it was afterwards hauled up.

Modern Apparatus.—This, or equally cumbersome apparatus, was the only diving gear in use up till 1819, in which year Augustus Siebe (the founder of the firm of Siebe, Gorman & Co.), invented his "open" dress, worked in conjunction with an air force pump. This dress consisted of a metal helmet and shoulder-plate attached to a watertight jacket, under which, fitting more closely to the body, were worn trousers, or rather a combination suit reaching to the armpits. The helmet was fitted with an air inlet valve, to which one end of a flexible tube was attached, the other end being connected at the surface with a pump which supplied the diver with a constant stream of fresh air. The air, which kept the water well down, forced its way between the jacket and the under-garment, and escaped to the surface on exactly the same principle as that of the diving bell; hence the term "open" as applied to this dress.

Although most excellent work was accomplished with this dress—work which could not be attempted before its introduction—it was still far from perfect. It was absolutely necessary for the diver to maintain an upright, or but very slightly stooping, position whilst under water; if he stumbled and fell, the water filled his dress, and, unless quickly brought to the surface, he was in danger of being drowned. To overcome this and other defects, Siebe carried out a large number of experiments extending over several years, which culminated, in the year 1830, in the introduction of his "close" dress in combination with a helmet fitted with air inlet and regulating outlet valves.

Though, of course, vast improvements have been introduced since Siebe's death, in 1872, the fact remains that his principle is in universal use to this day. The submarine work which it has been instrumental in accomplishing is incalculable. But some idea of the importance of the invention may be gathered from the fact that diving apparatus on Siebe's principle is universally used to-day in harbour, dock, pier and breakwater

construction, in the pearl and sponge fisheries, in recovering sunken ships, cargo and treasure, and that every ship in the British navy and in most foreign navies carries one set or more of diving apparatus.

A modern set of diving apparatus consists essentially of six parts:—(1) an air pump, (2) a helmet with breastplate, (3) a diving dress, (4) a pair of heavily weighted boots, (5) a pair of back and chest weights, (6) a flexible non-collapsible air tube.

Air Pumps.—The type of air pump varies with the depth of water to which the diver has to descend; it will be readily understood that the greater the depth the greater the quantity of air required by the diver. The pattern most generally in favour amongst divers of all classes is a three-cylinder single-acting pump, which is suitable for almost every description of

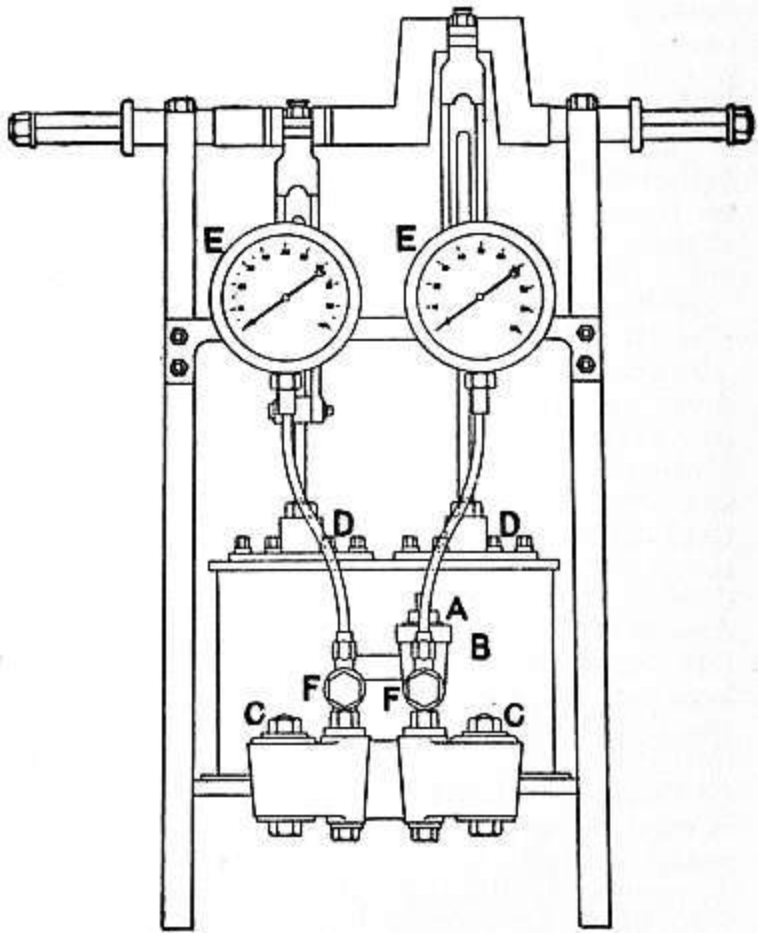


FIG. 1.—Pump out of chest.
Two-cylinder, Double-action Air Pump for Two Divers.

A, Air-distributing arrangement, for one diver or two divers.
B, Water jacket.
D, Cylinders.
E, Pressure gauges.
F, Nozzles to which divers' air pipes

work which the diver may be called upon to perform, either in deep or shallow water. Another most useful type is a two-cylinder double-acting pump (figs. 1 and 2), which is designed to supply two divers working simultaneously in moderate depths of water, or one diver only in deep water. An air-distributing arrangement is fitted, whereby, when it is desired to send two men down together, each cylinder supplies air independently of the other; and when it is required to send one diver into deep water, the two cylinders are connected and the full volume of air from both is delivered to the one man. The same duty is also performed by a four-cylinder single-acting pump. Smaller pumps, having one double-acting or two single-acting cylinders, are also used for shallow water work.

C, Suction and discharge valves. are attached.

In most cases these air pumps are worked by manual power; this method of working is rendered necessary by the fact that the machines are usually placed in small boats from which the divers work and on which other motive power is not available. In cases, however, where steam or electric power is available the pumps are sometimes worked by their means—more particularly on harbour and dock works. In such instances the air is not delivered direct from the pump to the diver, but is delivered into an intermediate steel receiver to which the diver's air pipe is connected, the object being to ensure a reserve supply of air in case of a breakdown of the pump. Some of these combinations of pumps and motors are so arranged that, in the event of an accident to the motor, the pump can be thrown out of gear with it, and be immediately worked by hand power. Each pump is fitted with a gauge (or gauges), indicating not only the pressure of air which the pump is supplying, but also the depth of water at which the diver is working. The cylinders are water-jacketed to ensure the air delivered to the diver

being cool, the water being drawn in and circulated round the cylinders by means of a small metal pump worked from an eccentric on the main crank-shaft. Filters are sometimes attached to the suction and delivery sides of the pumps to ensure the inlet of air being free from dirt, and the discharge of air free from dirt and oil.

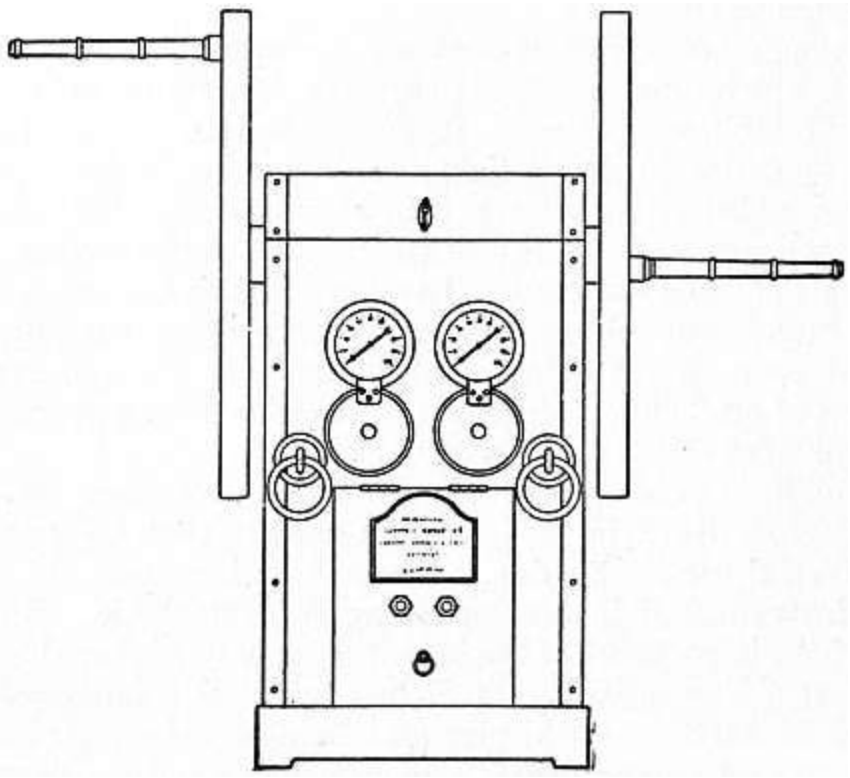


FIG. 2.—Pump in chest, ready for work.

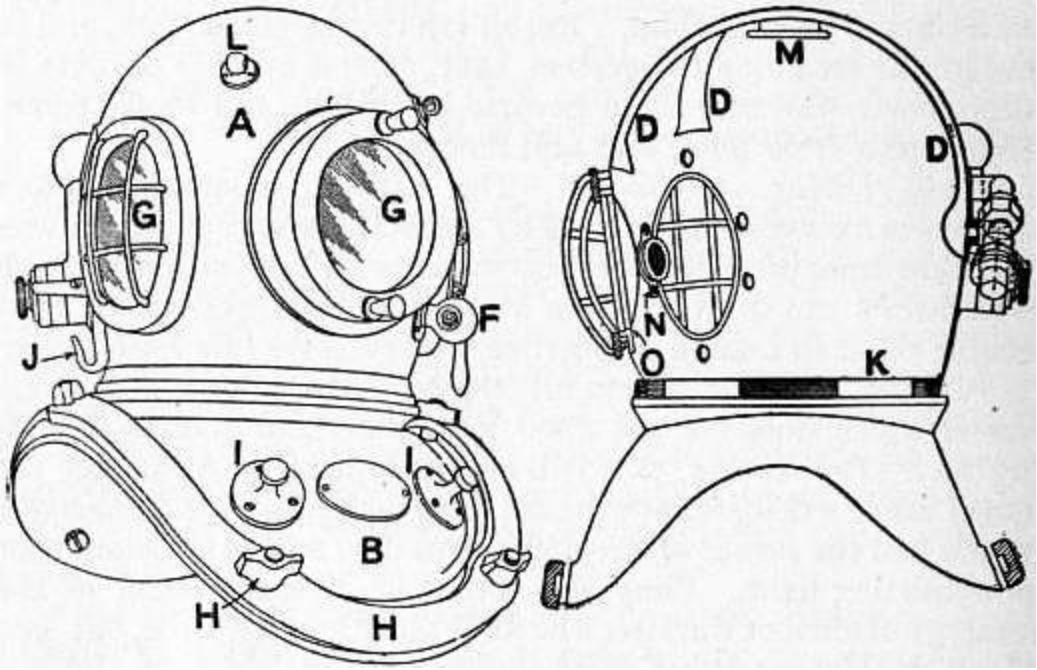
Helmet.—The helmet and breastplate (fig. 3) are made from highly planished tinned copper, with gun-metal valves and other fittings. The helmet is provided with a non-return air inlet valve to which the diver's air pipe is connected; the air when it lifts the inlet valve passes through three conduits—one having its outlet over the front glass, the others their outlets over the side glasses. In this way the diver gets the air fresh as it enters the helmet, and at the same time it prevents condensation of his breath on the glasses and keeps them clear. There is

a regulating air outlet valve by which the diver adjusts his supply of air according to his requirements in different depths of water; the valve is usually made to be adjusted by hand, but sometimes it is so constructed as to be operated by the diver knocking his head against it, the spindle being extended through to the inside of the helmet and fitted at its inner extremity with a button or disk. By unscrewing the valve, the diver allows air to escape, and thus the dress is deflated; by screwing it up the air is retained and the dress inflated. Thus the diver can control his specific gravity and rise or sink at will. In case by any chance the diver should inflate the dress inadvertently, and wish to get rid of the superfluous air quickly, he can do so by opening an emergency cock, which is fitted on the helmet. Plate glasses in gun-metal frames are also fitted to the helmet, two, one on each side, being permanently fixed, while one in front is made either to screw in and out, or to work on a hinged joint like a ship's scuttle; the side glasses are usually protected by metal cross-bars, as is also sometimes the front glass. Some divers prefer unprotected glasses at the side of the helmet, instead of protected oval ones.

The breastplate is fitted on its outer edge with metal screws and bands. The disposition of the screws corresponds with that of the holes in the india-rubber collar of the diving dress described below. There are other methods of making a watertight joint between the diver's breastplate and the diving dress, but, as these are only mechanical differences, it will suffice to describe the Siebe-Gorman apparatus, as exclusively adopted by the British government. Whatever the shape or design of the helmet or dress, Siebe's principle is the one in universal use to-day.

The metal tabs are for carrying the diver's lead weights, which are fitted with suitable clips; the hooks—one on each side of the helmet—

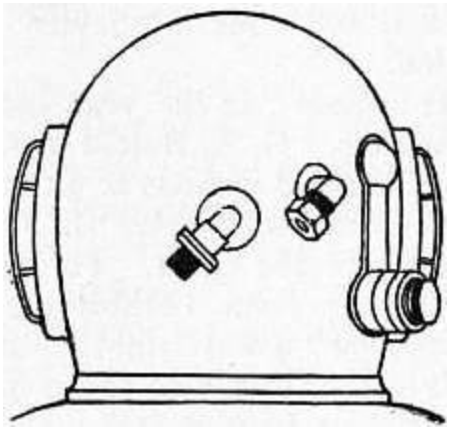
are for keeping the ropes attached to the back weight in position. The helmet and breastplate are fitted at their lower and upper parts respectively with gun-metal segmental neck rings, which make it possible to connect these two main parts together by one-eighth of a turn, a catch at the back of the helmet preventing any chance of unscrewing. The small eyes at the top of the helmet are for securing the diver's air pipe and life line in position and preventing them from swaying.



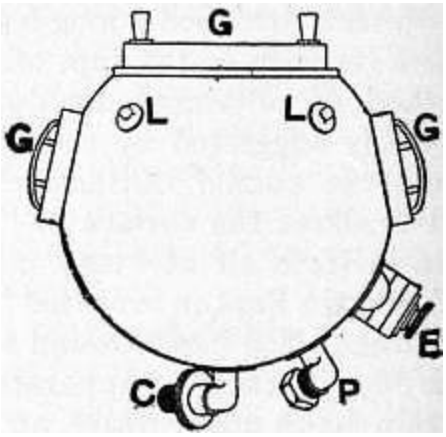
Front view of Helmet.

Side sectional view of Helmet.

A, Helmet.
B, Breastplate.
F, Emergency cock.
G, Glasses in frames.
H, Metal screws and bands.
I, Metal tabs.
J, Hooks for keeping weight ropes in position.
L, Eyes to which air pipe and life line are secured.
K, Segmental neck rings.
D, Air conduits.
M, Telephone receiver.
N, Transmitter.
O, Contact piece to ring bell.



Back view of Helmet.



Plan of Helmet.

C, Air inlet valve.
E, Regulating outlet valve.
G, Glasses in frames.
L, Eyes to which air pipe and life line are secured.
P, Connexion for telephone cable.

FIG. 3.

The *Diving Dress* is a combination suit which envelops the whole body from feet to neck. It is made of two layers of tanned twill with pure rubber between, and is fitted at the neck with a vulcanized india-rubber collar, or band, with holes punched in it corresponding to the screws in the breastplate. This collar, when clamped tightly between the bands and the breastplate by means of the nuts, ensures a watertight joint. The sleeves of the dress are fitted with vulcanized india-rubber cuffs, which, fitting tightly round the diver's wrists, prevent the ingress of water at these parts also.

Boots.—These are generally made with leather uppers, beechwood inner soles and leaden outer soles, the latter being secured to the others by copper rivets. Heavy leather straps with brass buckles secure the

boot to the foot. Each boot weighs about 16 lb. Sometimes the main part of the boot-golosh, toe and heel, are in one brass casting, with leather upper part, heavy straps and brass buckles.

Lead Weights.—These weigh 40 lb each, and the diver wears one on his back, another on his chest. These weights and the heavy boots ensure the diver's equilibrium when under water.

Belt and Knife and Small Tools.—Every diver wears a heavy waist-belt in which he carries a strong knife in metal case, and sometimes other small tools.

Air Pipe.—The diver's air pipe is of a flexible, non-collapsible description, being made of alternate layers of strong canvas and vulcanized india-rubber, with steel or hard drawn metal wire embedded. At the ends are fitted gun-metal couplings, for connecting the pipe with the diver's pump and helmet.

Signal Line.—The diver's signal line (sometimes called life line) consists of a length of reverse laid Manila rope. In cases where the telephone apparatus is not used, the diver gives his signals by means of a series of pulls on the signal line in accordance with a prearranged code.

Telephonic Apparatus.—Without doubt one of the most useful adjuncts to the modern diving apparatus is the loud-sounding telephone (fig. 4), introduced by Siebe, Gorman & Co., which enables the diver to communicate viva voce with his attendant, and vice versa. In the British navy the type of submarine telephonic apparatus used is the Graham-Davis system. This is made on two plans, (1) a single set of instruments, for communication between one diver and his attendant direct, (2) an intercommunication set which is used where two divers are employed. With this type the attendant can speak to No. 1 or No. 2

diver separately, or with both at the same time, and vice versa; and No. 1 can be put in communication with No. 2 whilst they are under water, the attendant at the surface being able to hear what the men are saying. The advantages of such a system are obvious. It is more particularly useful where two divers are working one either side of a ship, or where the divers may be engaged upon the same piece of work, but out of sight of one another, or out of touch. It would prove its utility in a marked degree in cases where a diver got into difficulties; a second diver sent down to his assistance could receive and give verbal directions and thus greatly expedite the work of rescue.

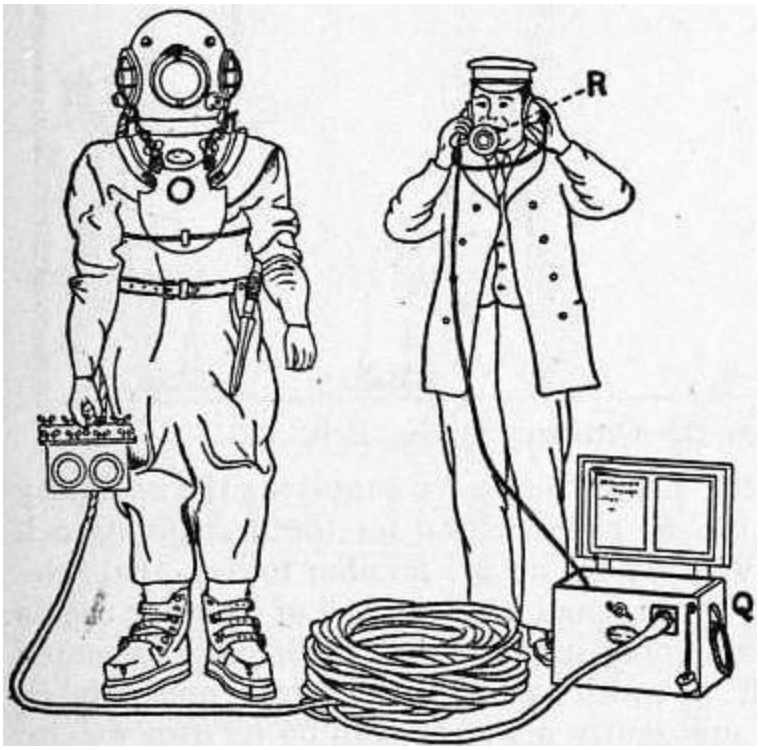


FIG. 4.—Diver's Telephone Communication with the Surface.

Q, Battery, with switch and bell in case.

R, Attendant's receiver and transmitter.

The telephone instruments in the helmet consist of one or more loud-sounding receivers placed either in the crown of the helmet, or one on each side in close proximity to the diver's ears. A transmitter of a special watertight pattern is placed between the front glass and

one of the side glasses, and a contact piece, which, when the diver presses his chin against it, rings a bell at the surface, is fitted immediately below the front glass. A buzzer is sometimes fixed in the helmet to call the diver's attention when the attendant wishes to speak, but as a rule the voice is transmitted so loudly that this device is unnecessary. A connexion, through which the insulated wires connecting the instruments pass, terminates in contact pieces, and the telephone cable, embedded in the diver's signal line, is connected with it. The other end of the signal line is connected to a battery box at the surface. This box contains, besides the cells, a receiver and transmitter for the attendant, an electric bell, a terminal box, and a special switch, by means of which various communications between diver, or divers, and attendant are made. If, as is sometimes the case, the diver happens to be somewhat deaf, he can, whilst he is taking a message, stop the vibration of the outlet valve and the noise made by the escaping air, by merely pressing his finger on a spindle which passes through the disk of the valve, and thus momentarily ensure absolute silence.

Speaking Tube.—The rubber speaking tube which was the forerunner of the telephonic apparatus is now practically obsolete, though it is still used in isolated cases.

Submarine Electric Lamps.—Various forms of submarine lamps are used, from a powerful arc light to a self-contained hand lamp, the former giving about 2000 or 3000 candle-power, and requiring a steam-driven dynamo to supply the necessary current, the latter (fig. 5) giving a light of about 10 candle-power and having its own batteries, so that the diver carries both the light and its source in his hand. These submarine lamps are all constructed on the same principle, having the incandescent lamps, or carbons as the case may be, enclosed in a strong

glass globe, the mechanism and connexions being fitted in a metal case above the globe, which is flanged and secured watertightly to the case.

Self-contained Diving Dress.—The object of the self-contained diving dress is to make the diver independent of air supply from the surface. The dress, helmet, boots and weights are of the ordinary pattern already described, but instead of obtaining his air supply by means of pumps and pipes, the diver is equipped with a knapsack consisting of a steel cylinder containing oxygen compressed to a pressure of 120 atmospheres (= about 1800 ℔) to the square inch, and chambers containing caustic soda or caustic potash. The helmet is connected to the chambers by tubes, and the oxygen cylinder is similarly connected to the chambers. The breath exhaled by the diver passes through a valve into the caustic soda, which absorbs the carbonic acid, and it is then again inhaled through another valve. This process of regeneration goes on automatically, the requisite amount of oxygen being restored to the breathed air in its passage through the chambers. This type of apparatus has been used for shallow water work, but the great majority of divers prefer the apparatus using pumps as the source of the air supply.

An emergency dress, using this self-contained system for breathing, has been designed by Messrs Fleuss and Davis, of the firm of Siebe, Gorman & Co., primarily as a life-saving apparatus, for enabling men to escape from disabled submarine boats.

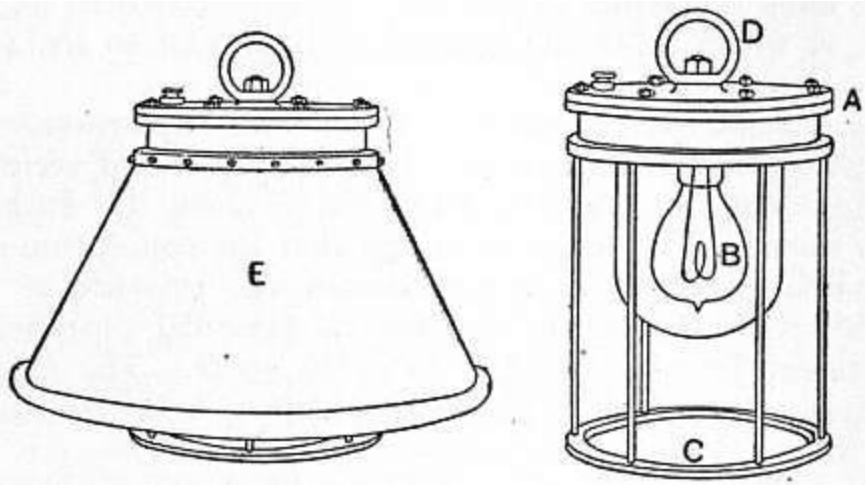


FIG. 5.—Submarine Electric Lamp, with and without Reflector.

A, Metal case containing electrical fittings.
B, Glass globe and incandescent lamp.
C, Stand, which also protects the globe.
D, Ring for suspending lamp.
E, Reflector.

The helmet diver is indispensable in connexion with harbour and dock construction, bridge-building, pearl and sponge fishing, wreck raising and the recovery of sunken cargo and treasure. Every ship in the British navy carries one set or more of diving apparatus, for use in ease of emergency, for clearing fouled propellers, cleaning valves or ship's hull below the water line, repairing hulls if necessary, and recovering lost anchors, chains, torpedoes, &c.

Greatest Depths attained.—The greatest depth at which useful work has been performed by a diver is 182 ft. From this depth a Spanish diver, Angel Erostarbe, recovered £9000 in silver bars from the wreck of the steamer "Skyro," sunk off Cape Finisterre; Alexander Lambert succeeded in salving £70,000 from the Spanish mail steamer "Alphonso XII," sunk in 162 ft. of water off Las Palmas, Grand Canary; W. Ridyard recovered £50,000 in silver dollars from the "Hamilton Mitchell," sunk off Leuconna Reef,

China, in 150 ft. There are individual cases where much larger sums have been recovered, but those mentioned are particularly notable by reason of the great depth involved and stand out as the greatest depths at which good work has been done. The sponge fishers of the Mediterranean work at a maximum depth of about 150 ft., and the pearl divers of Australia at 120 ft. But submarine operations on the great majority of the harbour and dock works of the world are conducted at a depth of from 30 to 60 ft.

The weighted tools employed by divers differ very little from those used by the workmen on *terra firma*. Pneumatic tools, worked by compressed air conveyed from the surface through flexible tubes, are great aids, particularly in rock removal work. With the rock drill the diver bores a number of holes to a given depth, inserts in these the charges of dynamite or other explosive used, attaches one end of a wire to a detonator which is inserted in the charge, and then comes to the surface. The boat from which he works is then moved away from the scene of operations, paying out the wire attached to the detonators, and when at a safe distance the free end of the wire is connected to a magneto exploding machine, which is then set in motion.

A complete set of diving apparatus costs from £75 to £200, varying with the depth of water for which it is required.

The pay of a diver depends upon the nature of the work upon which he is engaged, and also upon the depth of the water. On harbour and dock work the average wage is 2s. to 2s. 6d. per hour; on wreck work from 3s. to 5s. an hour, according to depth; on treasure and cargo recovery so much per day, with a percentage on the value recovered, generally about 5%. The pearl fishers of Australia get so much per ton of shell, and the sponge fishers are also paid by results.

A problem which has been exercising the minds of those engaged in submarine work is the greatest depth at which it is possible to work, for, as is well known, many a fine vessel with valuable cargo and treasure is lying out of reach of the diver owing to the pressure which he would have to sustain were he to attempt to reach her. Mr Leonard Hill, and Drs Greenwood and J. J. R. Macleod conducted experiments in conjunction with Messrs Siebe, Gorman & Co., with a view to solving this problem, and their efforts have been attended with some considerable success. Dr J. S. Haldane has also carried out practical experiments for the British Admiralty, and under his supervision two naval officers have succeeded in reaching the unprecedented depth of 210 ft., at which depth the pressure is about 90 lb to the square inch.

Diving Bells.—Every one is familiar with the experiment of placing an inverted tumbler in a bowl of water, and seeing the water excluded from the tumbler by the air inside it. Perhaps it was to some such experiment as this that the conception of the diving bell was due. As is well known, the pressure of water increases with the depth, and for all practical purposes this pressure can be taken at 4¼ lb to every 10 ft. The following table shows the pressure at different depths below the surface of the water:—

Depth.	Pressure.
20 ft.	8½ lb to the sq. in.
40 ”	17¼ ” ”
80 ”	34¾ ” ”
120 ”	52½ ” ”
160 ”	69¾ ” ”
200 ”	87 ” ”

If a diving bell be sunk to a depth of, say, 33 ft., the air inside it will be compressed to about half its original volume, and the bell itself will be about half filled with water. But if a supply of air be maintained at a pressure equal to the depth of water at which the bell is submerged, not only

will the water be kept down to the cutting edge, but the bell will be ventilated and it will be possible for its occupants to work for hours at a stretch.

Tradition gives Roger Bacon, in 1250, the credit for being the originator of the diving bell, but actual records are lost in antiquity. Of the records preserved to us, probably one of the most trustworthy is an account given in Kaspar Schott's work, *Technica curiosa*, published in the year 1664, which quoted from one John Taisnier, who was in the service of Charles V. This account describes an experiment which took place at Toledo, Spain, in the year 1538, before the emperor and some thousands of spectators, when two Greeks descended into the water in a large "kettle," suspended by ropes, with its mouth downwards. The "kettle" was equipoised by lead fixed round its mouth. The men came up dry, and a lighted candle, which they had taken down with them, was still burning.

Francis Bacon, in the *Novum Organum*, lib. ii., makes the following reference to a machine, or reservoir, of air to which labourers upon wrecks might resort whenever they required to take breath:—

> "A hollow vessel, made of metal, was let down equally to the surface of the water, and thus carried with it to the bottom of the sea the whole of the air which it contained. It stood upon three feet—like a tripod—which were in length something less than the height of a man, so that the diver, when he was no longer able to contain his breath, could put his head into the vessel, and having filled his lungs again, return to his work."

But it was to Dr Edmund Halley, secretary of the Royal Society, that undoubtedly the honour is due of having invented the first really practical diving bell. This is described in the *Philosophical Transactions*, 1717, in a paper on "The Art of Living Under Water by means of furnishing air at the

bottom of the sea in any ordinary depth." Halley's bell was constructed of wood, and was covered with lead, which gave it the necessary sinking weight, and was so distributed as to ensure that it kept a perpendicular position when in the water. It was in the form of a truncated cone, 3 ft. in diameter at the top, 5 ft. at the bottom and 8 ft. high. In the roof a lens was introduced for admitting light, and also a tap to let out the vitiated air. Fresh air was supplied to the bell by means of two lead-lined barrels, each having a bung-hole in the top and bottom. To the hole in the top was fixed a leathern tube, weighted in such a manner that it always fell below the level of the bottom of the barrel so that no air could escape. When, however, the tube was turned up by the attendant in the bell, the pressure of the water rising through the hole in the bottom of the barrel, forced the air through the tube at the top and into the diving bell. These barrels were raised and lowered alternately, with such success that Halley says that he, with four others, remained at the bottom of the sea, at a depth of 9 to 10 fathoms, for an hour and a half at a time without inconvenience of any sort.

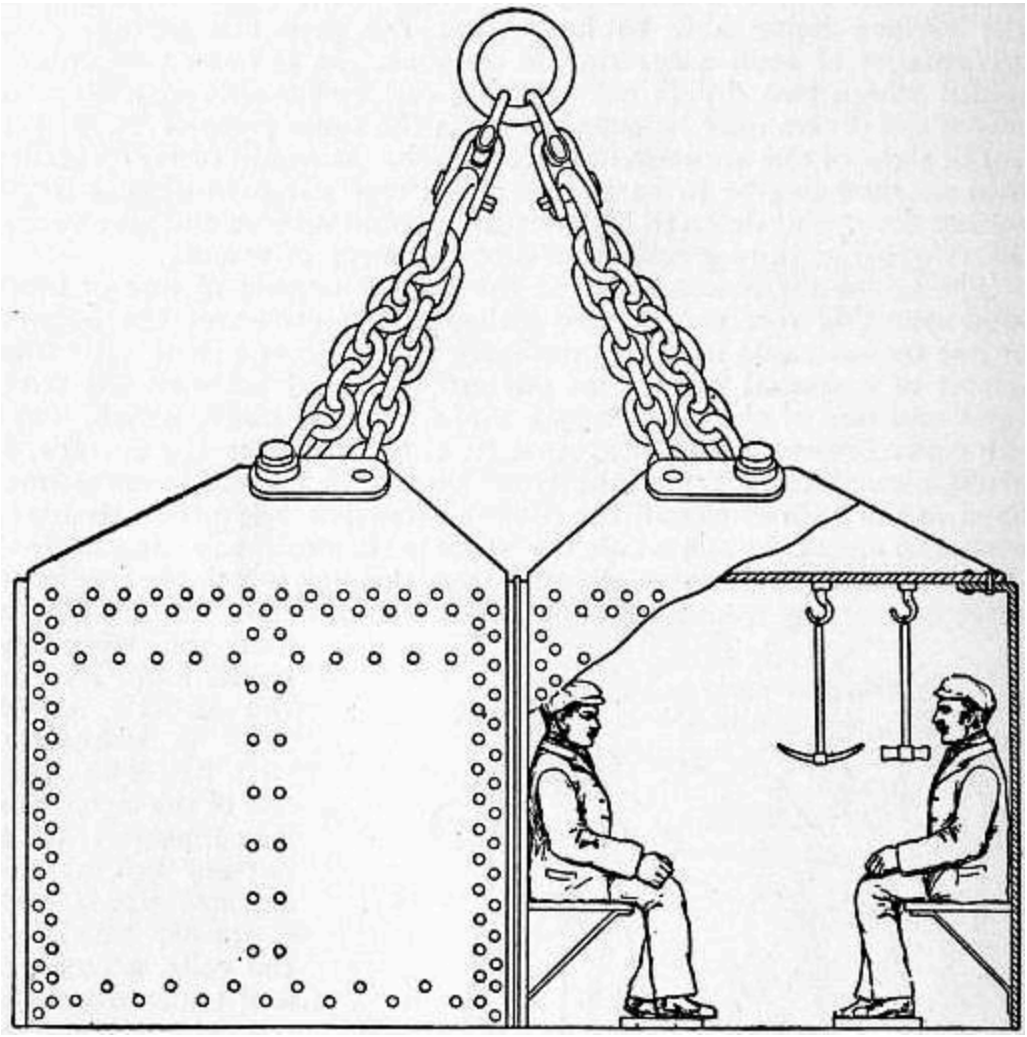


FIG. 6.—Ordinary Diving Bell.

This type of bell was used by John Smeaton in repairing the foundations of Hexham Bridge in 1778, but instead of weighted barrels, he introduced a force pump for supplying the necessary air. To Smeaton too we are indebted for the first diving bell plant in the form with which we are familiar to-day, that celebrated engineer having designed a square bell of iron, for use on the Ramsgate harbour works, in 1788. This bell, which measured 4½ ft. in length, 3 ft. in width and 4½ ft. in height, and weighed 2½ tons, was made sufficiently heavy to sink by its own weight. It afforded room enough for

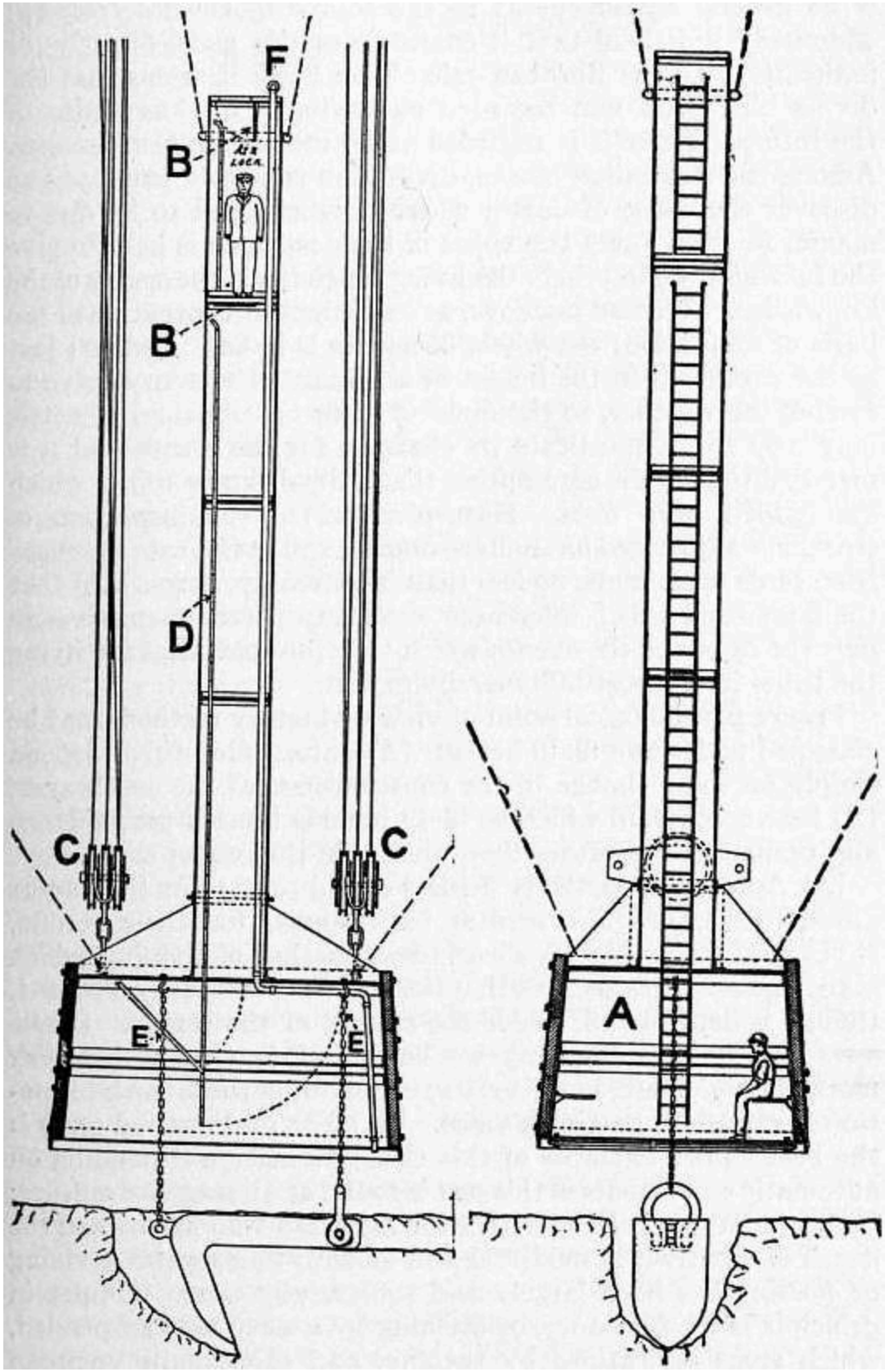
two men to work, and was supplied with air by a force pump worked from a boat at the surface.

Though the diving bell has been largely superseded by the modern diving apparatus, it is still used on certain classes of work the magnitude of which justifies the expense entailed, for it is not only a question of the cost of the bell, but of the powerful steam-driven crane which is needed to lower and raise it, and also of the gantry on which the crane travels. Sometimes a barge or other vessel is used for working the bell.

At the present day, two types of diving bell are employed—the ordinary bell, and the air-lock bell, which, however, is not so largely used.

On the new national harbour works at Dover, four large diving bells of the ordinary type (fig. 6) were employed. These bells, in each of which from four to six men descended at a time, consisted of steel chambers, open at the bottom, measuring 17 ft. long by 10½ ft. wide by 7 ft. high, and each weighed 35 tons. The ballast, which at once gives the necessary sinking weight to the bell and maintains its equilibrium, consisted of slabs of cast iron bolted to the walls of the bell, inside. Each bell was fitted with loud-sounding telephonic apparatus, by means of which the occupants could communicate either with the men attending the crane or the men looking after the air compressors at the surface. Electric lamps, supplied with current by a dynamo in the compressor room, gave the necessary light inside the bell. Seats and foot rails were provided for the men, and there were racks and hooks for the various tools. Suspended from the roof was an iron skip into which the men threw the excavated material, which was emptied out when the bell was brought to the surface. Air was supplied to the bells by means of steam-driven compressors worked in a house erected on the gantry. The air was delivered into a steel air receiver, and thence it passed through a flexible tube connected to a gun-metal inlet valve in

the roof of the diving bell; the pressure of air was regulated according to the depth at which the bell happened to be working. The maximum depth on the Dover works was between 60 and 70 ft., = about 25-30 lb to the square inch. A bell was lowered by means of powerful steam-driven cranes, travelling on a gantry, to within a few feet of the water, and the men entered it from a boat. The bell then continued its descent to the bottom, where the men, with pick and shovel, levelled the sea bed ready to receive the large concrete blocks, weighing from 30 to 42 tons apiece. Having completed one section, the bell was moved along to another. The concrete blocks were then lowered and placed in position by helmet divers. The bell divers, clad in thick woollen suits and watertight thigh boots, worked in shifts of about three hours each, and were paid at the rate of from 1s. to 15d. per hour.


F
B
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C
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E
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A

FIG. 7.—Air-lock Diving Bell.

A, Working chamber.
B, Air-lock.
C, Pulleys and wire ropes for lowering and raising bell.
D, Iron ladder.
E, Tackles suspended from roof for raising and lowering objects.
F, Air supply pipe.

The cost of an ordinary diving bell, including air compressor, telephonic apparatus and electric light, is from £600 to £1500, according to size.

The *Air-lock Diving Bell* (fig. 7) comprises an iron or steel working chamber similar to the ordinary diving bell, but with the addition of a shaft attached to its roof. At the upper end of the shaft is an airtight door, and about 8 ft. below this is another similar door. When the bell divers wish to enter the bell, they pass through the first door and close it after them, and then open a cock or valve and gradually let into the space between the two doors compressed air from the working chamber in order to equalize the pressure; they then open the second door and pass down into the working chamber, closing the door after them. When returning to the surface they reverse the operation. It can readily be imagined that, owing to its unwieldy character, the employment of the air-lock bell is resorted to only in those cases where the nature of the sea bed necessitates its remaining on a given spot for some considerable time, as for instance in the excavation of hard rock to a given depth.

An air-lock bell supplied to the British Admiralty, for use in connexion with the laying of moorings at Gibraltar, has a working chamber measuring 15 ft. long by 10½ ft. wide, by 7½ ft. high, and a shaft 37½ ft. high by 3 ft. in diameter. It is built of steel plates, with

cast-iron ballast, and its total weight is about 46 tons. The bell is electrically lighted, and is fitted with telephonic apparatus communicating with the air-compressor room and lifting-winch room. It is worked through a well in the centre of a specially constructed steel barge 85 ft. long by 40 ft. beam, having a draught of 7 ft. 6 in. The wire ropes, for lowering and raising the bell, work over pulleys which are carried on a superstructure erected over the well. Two sets of air compressors are fitted on the barge—one set for supplying air to the bell, the other set for working a pneumatic rock drill inside the bell. The greatest depth at which this particular bell will work is 40 ft. The cost of the whole plant, including barge, was about £14,000.

The diving dress has, however, to a great extent supplanted the diving bell. This is due not only to the heavier cost of the latter, but more particularly to the greater mobility of the helmet diver. Bell divers are naturally limited to the area which their bell for the time being covers, whereas helmet divers can be distributed over different parts of a contract and work entirely independently of one another. The use of the diving bell is, therefore, practically limited to the work of levelling the sea bed, and the removal of rock.

See also the article CAISSON DISEASE as regards the physiological effects of compressed air.

(R. H. D.*)

DIVES-SUR-MER, a small port and seaside resort of north-western France on the coast of the department of Calvados, on the Dives, 15 m. N.E.

of Caen by road. Pop. (1906) 3286. Dives is celebrated as the harbour whence William the Conqueror sailed to England in 1066. In the porch of its church (14th and 15th centuries) a tablet records the names of some of his companions. The town has a picturesque inn, adapted from a building dating partly from the 16th century, and market buildings dating from the 14th to the 16th centuries. The coast in the vicinity of Dives is fringed with small watering-places, those of Cabourg (to the west) and of Beuzeval and Houlgate (to the east) being practically united with it. There are large metallurgical works with electric motive power close to the town.

DIVIDE, a word used technically as a noun in America and the British colonies for any high ridge between two valleys, forming a water-parting; a dividing range. For special senses of the verb "to divide" (Lat. *di-videre*, the latter part of the word coming from a root seen in Lat. *vidua*, Eng. "widow"), meaning generally to split up in two or more parts, see DIVISION. In a parliamentary sense, to divide (involving a separation into two sides, Aye and No) is to take the sense of the House by voting on the subject before it.

DIVIDEND (Lat. *dividendum*, a thing to be divided), the net profit periodically divisible among the proprietors of a joint-stock company in

proportion to their respective holdings of its capital. Dividend is not interest, although the word dividend is frequently applied to payments of interest; and a failure to pay dividends to shareholders does not, like a failure to pay interest on borrowed money, lay a company open to being declared bankrupt. In bankruptcy a dividend is the proportionate share of the proceeds of the debtor's estate received by a creditor. In England, the Companies Act 1862 provided that no dividend should be payable except out of the profits arising from the business of the company, but, in the case of companies incorporated by special act of parliament for the construction of railways and other public works which cannot be completed for a considerable time, it is sometimes provided that interest may during construction be paid to the subscribers for shares out of capital. Dividends (excluding occasional distributions in the form of shares) are ordinarily payable in cash. Most companies divide their capital into at least two classes, called "preference" shares and "ordinary" shares, of which the former are entitled out of the profits of the company to a preferential dividend at a fixed rate, and the latter to whatever remains after payment of the preferential dividend and any fixed charges. Before, however, a dividend is paid, a part of the profits is often carried to a "reserve fund." The dividend on preference shares is either "cumulative" or contingent on the profits of each separate year or half year. When cumulative, if the profits of any one year are insufficient to pay it in full, the deficiency has to be made good out of subsequent profits. A cumulative preferential dividend is sometimes said to be "guaranteed," and preferential dividends payable by all English companies registered under the Companies Acts 1862 to 1908 are cumulative unless stipulated to be otherwise. Certain public companies are forbidden by parliament to pay dividends in excess of a prescribed maximum rate, but this restriction has been happily modified in some instances, notably in the case of gas companies, by the institution of a sliding scale, under which a gas company may so regulate the price of gas

to be charged to consumers that any reduction of an authorized standard price entitles the company to make a proportionate increase of the authorized dividend, and any increase above the standard price involves a proportionate decrease of dividend. Dividends are usually declared yearly or half-yearly; and before any dividend can be paid it is, as a rule, necessary for the directors to submit to the shareholders, at a general meeting called for the purpose, the accounts of the company, with a report by the directors on its position and their recommendation as to the rate of the proposed dividend. The articles of association of a company usually provide that the shareholders may accept the director's recommendation as to dividend or may declare a lower one, but may not declare a higher one than the directors recommend. Directors frequently have power to pay on account of the dividend for the year, without consulting the shareholders, an "interim dividend," which on ordinary shares is generally at a much lower rate than the final or regular dividend. An exceptionally high dividend is often distributed in the shape of a dividend at the usual rate supplemented by an additional dividend or "bonus." Payment of dividends is made by means of cheques sent by post, called "dividend warrants." All dividends are subject to income-tax, and by most companies dividends are paid "less income-tax," in which case the tax is deducted from the amount of dividend payable to each proprietor. When paid without such deduction a dividend is said to be "free of income-tax." In the latter case, however, the company has to make provision for payment of the tax before declaring the dividend, and the amount of its divisible profits and the rate of dividend which it is able to declare are consequently to that extent reduced. In respect of consols and certain other securities, holders of amounts of less than £1000 may instruct the Bank of England or Bank of Ireland to receive and invest their dividends. With few exceptions, the prices of securities dealt in on the London Stock Exchange include any accruing dividend not paid up to the date of purchase. At a certain day, after the dividend is declared, the stock

or share is dealt in on the Stock Exchange, as *ex dividend* (or “x. d.”), which means that the current dividend is paid not to the buyer but to the previous holder, and the price of the stock is lower to that extent. The expression “cum dividend” is used to signify that the price of the security dealt in includes a dividend which, in the absence of any stipulation, might be supposed to belong to the seller of the security. On the New York Stock Exchange the invariable practice is to sell stock with the “dividend on” until the company’s books are closed, after which it is usually sold “ex dividend.”

DIVIDIVI, the native and commercial name for the astringent pods of *Caesalpinia coriaria*, a leguminous shrub of the suborder *Caesalpinieae*, which grows in low marshy tracts in the West Indies and the north of South America. The plant is between 20 and 30 ft. in height, and bears white flowers. The pods are flattened, and curl up in drying; they are about ¾ in. broad, from 2 to 3 in. long and of a rich brown colour. Dividivi was first brought to Europe from Caracas in 1768. It contains about 30% of ellagitannic acid, whence its value in leather manufacture.

DIVINATION, the process of obtaining knowledge of secret or future things by means of oracles, omens or astrology. The root of the word, *deus* (god) or *divus*, indicates the supposed source of the soothsayer's information, just as the equivalent Greek term, μαντική, indicates the spiritual source of the utterances of the seer, μάντις. In classical times the view was, in fact, general, as may be seen by Cicero's *De divinatione*, that not only oracles but also omens were signs sent by the gods; even the astrologer held that he gained his information, in the last resort, from the same source. On the side of the Stoics it was argued that if divination was a real art, there must be gods who gave it to mankind; against this it was argued that signs of future events may be given without any god.

Divination is practised in all grades of culture; its votaries range from the Australian black to the American medium. There is no general agreement as to the source of the information; commonly it is held that it comes from the gods directly or indirectly. In the Bornean cult of the hawk it seems that the divine bird itself was

regarded as having a foreknowledge of the future. Later it is regarded as no more than a messenger. Among the Australian blacks, divination is largely employed to discover the cause of death, where it is assumed to be due to magic; in some cases the spirit of the dead man is held to give the information, in others the living magician is the source of the knowledge. We find moreover a semi-scientific conception of the basis of divination; the whole of nature is linked together; just as the variations in the height of a column of mercury serve to foretell the weather, so the flight of birds or behaviour of cattle may help to prognosticate its changes; for the uncultured it is merely a step to the assumption that animals know things which are hidden from man. Haruspication, or the inspection of entrails, was justified on similar grounds, and in the case of omens from birds or animals, no less than in astrology, it was held that the facts from which inferences were drawn were themselves in part the causes of the events which they foretold, thus fortifying the belief in the possibility of divination.

From a psychological point of view divinatory methods may be classified under two main heads: (A) autoscopic, which depend simply on some change in the consciousness of the soothsayer; (B) heteroscopic, in which he looks outside himself for guidance and perhaps infers rather than divines in the proper sense.

(A) Autoscopic methods depend on (i.) sensory or (ii.) motor automatisms, or (iii.) mental impressions, for their results. (i.) Crystal-gazing (*q.v.*) is a world-wide method of divining, which is analogous to dreams, save that the vision is voluntarily initiated, though little, if at all, under the control of the scryer. Corresponding to crystal-gazing we have *shell-hearing* and similar methods, which are, however, less common; in these the information is gained by hearing a voice. (ii.) The divining rod (*q.v.*) is the best-known example of this class; divination depending on automatic movements of this sort is found at all stages of culture; in Australia it is used to detect the magician who has caused the death of a native; in medieval and modern times water-divining or *dowsing* has been largely and successfully used. Similar in principle is *coscinomancy*, or divining by a sieve held suspended, which gives indications by turning; and the equally common divination by a suspended ring, both of which are found from Europe in the west to China and Japan in the east. The ordeal by the Bible and key is equally popular; the book is suspended by a key tied in with its wards between the leaves and supported on two persons' fingers,

and the whole turns round when the name of the guilty person is mentioned. Confined to higher cultures on the other hand, for obvious reasons, is divination by automatic writing, which is practised in China more especially. The sand divination so widely spread in Africa seems to be of a different nature. *Trance speaking*, on the other hand, may be found in any stage of culture and there is no doubt that in many cases the procedure of the magician or shaman induces a state of auto-hypnotism; at a higher stage these utterances are termed oracles and are believed to be the result of inspiration (*q.v.*). (iii.) Another method of divination is by the aid of mental impressions; observation seems to show that by some process of this sort, akin to clairvoyance (*q.v.*), fortunes are told successfully by means of palmistry or by laying the cards; for the same "lie" of the cards may be diversely interpreted to meet different cases. In other cases the impression is involuntary or less consciously sought, as in dreams (*q.v.*), which, however, are sometimes induced, for purposes of divination, by the process known as incubation or temple sleep. Dreams are sometimes regarded as visits to or from gods or the souls of the dead, sometimes as signs to be interpreted symbolically by means of dream-books, which are found not only in Europe but in less cultured countries like Siam.

(B) In heteroscopic divination the process is rather one of inference from external facts. The methods are very various. (i.) The casting of lots, *sortilege*, was common in classical antiquity; the Homeric heroes prayed to the gods when they cast lots in Agamemnon's leather cap, and Mopsus divined with sacred lots when the Argonauts embarked. Similarly dice are thrown for purposes of sortilege; the *astragali* or knucklebones, used in children's games at the present day, were implements of divination in the first instance. In Polynesia the coco-nut is spun like a teetotum to discover a thief. Somewhat different are the omens drawn from books; in ancient times the poets were often consulted, more especially Virgil, whence the name *sortes virgilianae*, just as the Bible is used for drawing texts in our own day, especially in Germany. (ii.) In *haruspication*, or the inspection of entrails, in *scapulomancy* or divination by the speal-bone or shoulder-blade, in divination by footprints in ashes, found in Australia, Peru and Scotland, the voluntary element is prominent, for the diviner must take active steps to secure the conditions necessary to divination. (iii.) In the case of *augury* and *omens*, on the other hand, that is not necessary. The behaviour and cries of birds, and *angang* or meeting with ominous

animals, &c., may be voluntarily observed, and opportunities for observation made; but this is not necessary for success. (iv.) In *astrology* we have a method which still finds believers among people of good education. The stars are held, not only to prognosticate the future but also to influence it; the child born when Mars is in the ascendant will be war-like; Venus has to do with love; the sign of the Lion presides over places where wild beasts are found. (v.) In other cases the tie that binds the subject of divination with the omen-giving object is sympathy. The name of the life-index is given to a tree, animal or other object believed to be so closely united by sympathetic ties to a human being that the fate of the latter is reflected in the condition of the former. The Polynesians set up sticks to see if the warriors they stood for were to fall in battle; on Hallowe'en in our own country the behaviour of nuts and other objects thrown into the fire is held to prognosticate the lot of the person to whom they have been assigned. Where, as in the last two cases, the sympathetic bond is less strong, we find symbolical interpretation playing an important part.

Sympathy and symbolism, association of ideas and analogy, together with a certain amount of observation, are the explanation of the great mass of heteroscopic divinatory formulae. But where autoscopic phenomena play the chief part the question of the origin of divination is less simple. The investigations of the Society for Psychical Research show that premonitions, though rare in our own day, are not absolutely unknown. Pseudo-premonitions, due to hallucinatory memory, are not unknown; there is also some ground for holding that crystal-gazers are able to perceive incidents which are happening at a distance from them. Divination of this sort, therefore, may be due to observation and experiment of a rude sort, rather than to the unchecked play of fancy which resulted in heteroscopic divination.

See also the articles AUGURS, ORACLE, ASTROLOGY, OMEN, &c.

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Divination, et la science de présages chez les Chaldéens; Skeat, *Malay Magic*; J. Johnson, *Yoruba Heathenism* (1899). (N. W. T.)

DIVINING-ROD. As indicated in the article MAGIC, *Rhabdomancy*, or the art of using a divining-rod for discovering something hidden, is apparently of immemorial antiquity, and the Roman *virgula divina*, as used in taking auguries by means of casting bits of stick, is described by Cicero and Tacitus (see also DIVINATION); but the special form of *virgula furcata*, or forked twig of hazel or willow (see also HAZEL), described by G. Agricola (*De re metallica*, 1546), and in Sebastian Munster's *Cosmography* in the early part of the 16th century, used specially for discovering metallic lodes or water beneath the earth, must be distinguished from the general superstition. The "dowsing" or divining-rod, in this sense, has a modern interest, dating from its use by prospectors for minerals in the German (Harz Mountains) mining districts; the French chemist M.E. Chevreul[1] assigns its first mention to Basil Valentine, the alchemist of the late 15th century. On account of its supposed magical powers, it may be taken perhaps as an historical analogue to such fairy wands as the *caduceus* of Mercury, the golden arrow of Herodotus's "Abaris the Hyperborean," or the medieval witch's broomstick. But the existence of the modern water-finder or dowser makes the divining-rod a matter of more than mythological or superstitious interest. The *Schlagruthe* (striking-rod), or forked twig of the German miners, was brought to England by those engaged in the Cornish mines by the merchant venturers of Queen Elizabeth's day. Professor W. F. Barrett, F.R.S., the chief modern investigator of this subject, regards its employment, dating as it does from the revival of learning, as based on the medieval doctrine of "sympathy," the drooping of trees and character of the vegetation being considered to give indications of mineral lodes beneath the earth's surface, by means of a sort of attraction; and such critical works as Robert Boyle's (1663), or the *Mineralogia Cornubiensis* of Pryce (1778), admitted its value in discovering metals. But as mining declined in Cornwall, the use of the dowser for searching for

lodes almost disappeared, and was transferred to water-finding. The divining-rod has, however, also been used for searching for any buried objects. In the south of France, in the 17th century, it was employed in tracking criminals and heretics. Its abuse led to a decree of the Inquisition in 1701, forbidding its employment for purposes of justice.

In modern times the professional dowser is a "water-finder," and there has been a good deal of investigation into the possibility of a scientific explanation of his claims to be able to locate underground water, where it is not known to exist, by the use of a forked hazel-twig which, twisting in his hands, leads him by its directing-power to the place where a boring should be made. Whether justified or not, a widespread faith exists, based no doubt on frequent success, in the dowser's power; and Professor Barrett (*The Times*, January 21, 1905) states that "making a liberal allowance for failures of which I have not heard, I have no hesitation in saying that where fissure water exists and the discovery of underground water sufficient for a domestic supply is a matter of the utmost difficulty, the chances of success with a good dowser far exceed mere lucky hits, or the success obtained by the most skilful observer, even with full knowledge of the local geology." Is this due to any special faculty in the dowser, or has the twig itself anything to do with it? Held in balanced equilibrium, the forked twig, in the dowser's hands, moves with a sudden and often violent motion, and the appearance of actual life in the twig itself, though regarded as mere stage-play by some, is popularly associated with the cause of the water-finder's success. The theory that there is any direct connexion ("sympathy" or electrical influence) between the divining-rod and the water or metal, is however repudiated by modern science. Professor Barrett, who with Professor Janet and others is satisfied that the rod twists without any intention or voluntary deception on the part of the dowser, ascribes the phenomenon to "motor-automatism" on the part of the dowser (see AUTOMATISM), a reflex action excited by some stimulus upon his mind, which may be either a subconscious suggestion or an actual impression (obscure in its nature) from an external object or an external mind; both sorts of stimulus are possible, so that the dowser himself may make false inferences (and fail) by supposing that the stimulus is an external object (like water). The divining-rod being thus "an indicator of any sub-conscious suggestion or impression," its indications, no doubt, may be fallacious; but Professor Barrett, basing his

conclusions upon observed successes and their greater proportion to failures than anything that chance could produce, advances the hypothesis that some persons (like the professional dowsers) possess "a genuine super-normal perceptive faculty," and that the mind of a good dowser, possessing the idiosyncrasy of motor-automatism, becomes a blank or *tabula rasa*, so that "the faintest impression made by the object searched for creates an involuntary or automatic motion of the indicator, whatever it may be." Like the "homing instinct" of certain birds and animals, the dowser's power lies beneath the level of any conscious perception; and the function of the forked twig is to act as an index of some material or other mental disturbance within him, which otherwise he could not interpret.

It should be added that dowsers do not always use any rod. Some again use a willow rod, or withy, others a hazel-twig (the traditional material), others a beech or holly twig, or one from any other tree; others even a piece of wire or watch-spring. The best dowsers are said to have been generally more or less illiterate men, usually engaged in some humble vocation.

Sir W. H. Preece (*The Times*, January 16, 1905), repudiating as an electrician the theory that any electric force is involved, has recorded his opinion that water-finding by a dowser is due to "mechanical vibration, set up by the friction of moving water, acting upon the sensitive ventral diaphragm of certain exceptionally delicately framed persons." Another theory is that water-finders are "exceptionally sensitive to hygrometric influences." In any case, modern science approaches the problem as one concerning which the facts have to be accepted, and explained by some natural, though obscure, cause.

See for further details Professor Barrett's longer discussion in parts 32 (1897) and 38 (1900) of the *Proceedings of the Society for Psychical Research*.

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1 *La Baguette divinatoire* (Paris, 1845).

DIVISION (from Lat. *dividere*, to break up into parts, separate), a general term for the action of breaking up a whole into parts. Thus, in political economy, the phrase "division of labour" implies the assignment to particular workmen of the various portions of a whole piece of work; in mathematics division is the process of finding how many times one number or quantity, the "divisor," is contained in another, the "dividend" (see ARITHMETIC and ALGEBRA); in the musical terminology of the 17th and 18th centuries, the term was used for rapid passages consisting of a few slow notes amplified into a florid passage, *i.e.* into a larger number of quick ones. The word is used also in concrete senses for the parts into which a thing is divided, *e.g.* a division of an army, an administrative or electoral division; similarly, a "division" is taken in a legislative body when votes are recorded for and against a proposed measure.

In logic, division is a technical term for the process by which a *genus* is broken up into its *species*. Thus the genus "animal" may be divided, according to the habitat of the various kinds, into animals which live on land, those which live in water, those which live in the air. Each of these may be subdivided according to whether their constituent members do or do not possess certain other qualities. The basis of each of these divisions is called the *fundamentum divisionis*. It is clear that there can be no division in respect of those qualities which make the genus what it is. The various species are all alike in the possession of the generic attributes, but differ in other respects; they are "variations on the same theme" (Joseph, *Introduction to Logic*, 1906); each one has the generic, and also certain peculiar, qualities (*differentiae*), which latter distinguish them from other species of the same genus. The process of division is thus the obverse of classification (*q.v.*); it proceeds from genus to species, whereas classification begins with the particulars and rises through species to genus. In the exact sciences, and indeed in all argument both practical and theoretical, accurate division is of great importance. It is governed by the following rules. (1) *Division must be exhaustive*; all the members of the genus must find a place in one or other of the species; a captain who selects for his team skilful batsmen and bowlers only is guilty of an incomplete division of the whole function of a cricket team by omitting to provide himself with good fielders. Rectilinear figures cannot be divided into triangles and quadrilaterals because there are rectilinear figures which have more than four sides. On the other hand, triangles

can be divided into equilateral, isosceles and scalene, since no other kind of triangle can exist. (2) Division *must be exclusive*, that is, each species must be complete in itself and not contain members of another species. No member of a genus must be included in more than one of the species. (3) In every division *there must be but one principle (fundamentum divisionis)*. The members of a genus may differ from one another in many respects, *e.g.* books may be divided according to external form into quarto, octavo, &c., or according to binding into calf, cloth, paper-backed and so on. They cannot, however, be divided logically into quarto, paper-backed, novels and remainders. When more than one principle is used in a division it is called "cross division." (4) *Division must proceed gradually* ("Divisio non facit saltum"), *i.e.* the genus must be resolved into the next highest ("proximate") species. To go straight from a *summum genus* to very small species is of no scientific value.

It is to be observed that logical division is concerned exclusively with universals or concepts; division is of genus and species, not of particulars. Two other kinds of division are recognized:—*metaphysical division*, the separation in thought of the various qualities possessed by an individual thing (a piece of lead has weight, colour, &c), and *physical division* or *partition*, the breaking up of an object into its parts (a watch is thought of as being composed of case, dial, works, &c.). Logical division is closely allied with logical definition (*q.v.*).

DIVORCE (Lat. *divortium*, derived from dis-, apart, and vertere, to turn), the dissolution, in whole or in part, of the tie of marriage. It includes both the complete abrogation of the marriage relation known as a divorce *a vinculo matrimonii*, which carries with it a power on the part of both parties to the marriage to remarry other persons or each other, and also that incomplete severance not involving powers to remarry, which was formerly known as divorce a *mensa et thoro*, and has in England been termed "judicial separation." Less strictly, divorce is commonly understood to include judicial declarations of nullity of marriage, which, while

practically terminating the marriage relation, proceed in law on the basis of the marriage never having been legally established.

The conditions under which, in different communities, divorce has at different times been permitted, vary with the aspects in which the relation of marriage (*q.v.*) has been regarded. When marriage has been deemed to be the acquisition by the husband of property in the wife, or when it has been regarded as a mere agreement between persons capable both to form and to dissolve that contract, we find that marriage has been dissoluble at the will of the husband, or by agreement of the husband and wife. Yet even in these cases the interest of the whole community in the purity of marriage relations, in the pecuniary bearings of this particular contract, and the condition of children, has led to the imposition of restrictions on, and the attachment of conditions to, the termination of the obligations consequent on a marriage legally contracted. But the main restrictions on liberty of divorce have arisen from the conception of marriage entertained by religions, and especially by one religion. Christianity has had no greater practical effect on the life of mankind than in its belief that marriage is no mere civil contract, but a vow in the sight of God binding the parties by obligations of conscience above and beyond those of civil law. Translating this conception into practice, Christianity not only profoundly modified the legal conditions of divorce as formulated in the Roman civil law, but in its own canon law defined its own rule of divorce, going so far as in the Western (at least in its unreformed condition), though not the Eastern, branch of Christendom to forbid all complete divorces, that is to say, all dissolutions of marriage carrying with them the right to remarry.

History

The Roman Law of Divorce before Justinian.—The history of divorce, therefore, practically begins with the law of Rome. It took its earliest colour from that conception of the *patria potestas*, or the power of the head of the family over its members, which enters so deeply into the jurisprudence of ancient Rome. The wife was transferred at marriage to the authority of her husband, *in manus*, and consequently became so far subject to him that he could, at his will, renounce his rule over her, and terminate his companionship, subject at least to an adjustment of

the pecuniary rights which were disturbed by such action. So clearly was the power of the husband derived from that of the father, that for a long period a father, in the exercise of his *potestas*, could take his daughter from her husband against the wishes of both. It may be presumed that this power, anomalous as it appears, was not unexercised, as we find that a constitution of Antoninus Pius prohibited a father from disturbing a harmonious union, and Marcus Aurelius afterwards limited this prohibition by allowing the interference of a father for strong and just cause—*magna et justa causa interveniente*. Except in so far as it was restrained by special legislation, the authority of a husband in the matter of divorce was absolute. As early indeed, however, as the time of Romulus, it is said that the state asserted its interest in the permanence of marriage by forbidding the repudiation of wives unless they were guilty of adultery or of drinking wine, on pain of forfeiture of the whole of an offender's property, one-half of which went to the wife, the other to Ceres. But the law of the XII. Tables, in turn, allowed freedom of divorce. It would appear, however, that the sense of the community was so far shocked by the inhumanity of treating a wife as mere property, or the risk of regarding marriage as a mere terminable contract, that, without crystallizing into positive enactment, it operated to prevent the exercise of so harsh and dangerous a power. It is said that for 500 years no husband took advantage of his power, and it was then only by an order of a censor, however obtained, that Spurius Carvilius Ruga repudiated his wife for barrenness. We may, however, be permitted to doubt the genuineness of this censorial order, or at least to conjecture the influence under which the censor was induced to intervene, when we find that in another instance, that of L. Antonius, a censor punished an unjust divorce by expulsion from the senate, and that the exercise of their power by husbands increased to a great and alarming extent. Probably few of the admirers of the greatest of Roman orators have not regretted his summary and wholly informal repudiation of Terentia. At last the *lex Julia de adulteriis*, while recognizing a power of divorce both in the husband and in the wife, imposed on it, in the public interest, serious restrictions and consequences. It required a written bill of divorce (*libellus repudii*) to be given in the presence of seven witnesses, who must be Roman citizens of age, and the divorce must be publicly registered. The act was, however, purely an act of the party performing it, and no idea of judicial interference or contract seems to have been entertained. It was not necessary for either husband or wife giving the bill to acquaint the other

with it before its execution, though it was considered proper to deliver the bill, when made, to the other party. In this way a wife could divorce a lunatic husband, or the *paterfamilias* of a lunatic wife could divorce her from her husband. But the *lex Julia* was also the first of a series of enactments by which pecuniary consequences were imposed on divorce both by husbands and wives, whether the intention was to restrain divorce by penalties of this nature, or to readjust pecuniary relations settled on the basis of marriage and disturbed by its rupture. It was provided that if the wife was guilty of adultery, her husband in divorcing her could retain one-sixth of her *dos*, but if she had committed a less serious offence, one-eighth. If the husband was guilty of adultery, he had to make immediate restitution of her dowry, or if it consisted of land, the annual proceeds for three years; if he was guilty of a less serious offence, he had six months within which to restore the *dos*. If both parties were in fault, no penalty fell on either. The *lex Julia* was followed by a series of acts of legislation extending and modifying its provisions. The legislation of Constantine, A.D. 331, specified certain causes for which alone a divorce could take place without the imposition of pecuniary penalties. There were three causes for which a wife could divorce her husband with impunity: (1) murder, (2) preparation of poisons, (3) violation of tombs; but if she divorced him for any other cause, such as drunkenness, or gambling or immoral society, she forfeited her dowry and incurred the further penalty of deportation. There were also three causes for which a husband could divorce his wife without incurring any penalty: (1) adultery, (2) preparation of poisons, (3) acting as a procuress. If he divorced her for any other cause, he forfeited all interest in her dowry; and if he married again, the first wife could take the dowry of the second.

In A.D. 421 the emperors Honorius and Theodosius enacted a law of divorce which introduced limitations on the power of remarriage as an additional penalty in certain cases. As regards a wife: (1) if she divorced her husband for grave reasons or crime, she retained her dowry and could remarry after five years; (2) if she divorced him for criminal conduct or moderate faults, she forfeited her dowry, became incapable of remarriage, and liable to deportation, nor could the emperor's prerogative of pardon be exerted in her favour. As regards a husband: if he divorced his wife (1) for serious crime, he retained the dowry and could remarry immediately; (2) for criminal conduct, he did not retain the dowry, but could

remarry; (3) for mere dislike, he forfeited the property brought into the marriage and could not remarry.

In A.D. 449 the law of divorce was rendered simpler and certainly more facile by Theodosius and Valentinian. It was provided that a wife could divorce her husband without incurring any penalty if he was convicted of any one of twelve offences: (1) treason, (2) adultery, (3) homicide, (4) poisoning, (5) forgery, (6) violating tombs, (7) stealing from a church, (8) robbery, (9) cattle-stealing, (10) attempting his wife's life, (11) beating his wife, (12) introducing immoral women to his house. If the wife divorced her husband for any other cause, she forfeited her dowry, and could not marry again for five years. A husband could divorce his wife without incurring a penalty for any of these reasons except the last, and also for the following reasons: (1) going to dine with men other than her relations without the knowledge or against the wish of her husband; (2) going from home at night against his wish without reasonable cause; (3) frequenting the circus, theatre or amphitheatre after being forbidden by her husband. If a husband divorced his wife for any other reason, he forfeited all interest in his wife's dowry, and also any property he brought into the marriage.

The above sketch of the legislation prior to the time of Justinian, while it indicates a desire to place the husband and wife on something like terms of equality as regards divorce, indicates also, by its forbidding remarriage and by its pecuniary provisions in certain cases, a sense in the community of the importance in the public interest of restraining the violation of the contract of marriage. But to the Roman marriage was primarily a contract, and therefore side by side with this legislation there always existed a power of divorce by mutual consent. We must now turn to those principles of the Christian religion which, in combination with the legislation above described, produced the law formulated by Justinian.

The Christian View of Divorce.—The Christian law of divorce as enunciated by its Founder was expressed in a few words, but these, unfortunately, by no means of agreed interpretation. To appreciate them it is necessary to consider the enactment of the Mosaic law, which also was expressed in few words, but of a meaning involved in much doubt. The phrase in Deut. xxiv. 1-4, which is translated in the Authorized Version "some uncleanness," but in the Revised Version, "some

unseemly thing," and which is the only cause stated to justify the giving of a "bill of divorcement," was limited by the school of Shanmai to moral delinquency, but was extended by the rival school of Hillel to causes of trifling importance or even to motives of caprice. The wider interpretation would seem to be supported by the words of Christ (Matt. v. 31), who, in indicating His own doctrine in contradistinction to the law of Moses, said, "Whosoever shall put away his wife, saving for the cause of fornication (πορνείας), causeth her to commit adultery; and whosoever shall marry her that is divorced committeth adultery." The meaning of these words of Christ Himself has been involved in controversy, which perhaps was nowhere carried on with greater acuteness or under more critical conditions than within the walls of the British parliament during the passage of the Divorce Act of 1857. That they justify divorce of a complete kind for moral delinquency of some nature is supported by the opinion probably of every competent scholar. But scholars of eminence have sought to restrict the meaning of the λόγος πορνείας to antenuptial incontinence concealed from the husband, and to exclude adultery. The effect of this view commends itself to the adherents of the Church of Rome, because it places the right to separation between husband and wife, not on a cause supervening after a marriage, which that Church seeks to regard as absolutely indissoluble, but on invalidity in the contract of marriage itself, and which may therefore render the marriage liable to be declared void without impugning its indissoluble character when rightly contracted. The narrower view of the meaning of πορνείας has been maintained by, among others, Dr Döllinger (*First Ages of the Church*, ii. 226); but those who will consider the arguments of Professor Conington in reply to Dr Döllinger (*Contemp. Review*, May 1869) will probably assign the palm to the English scholar. A more general view points in the same direction. It is quite true that under the Mosaic law antenuptial incontinence was, as was also adultery, punishable with death. But when we consider the effect of adultery not only as a moral fault, but as violating the solemn contract of marriage and vitiating its objects, it is inconceivable that Christ, in employing a term of general import, intended to limit it to one kind, and that the less serious, of incontinence.

Effect of Christianity on the Law of Rome.—The modification in the civil law of Rome effected by Justinian under the joint influence of the previous law of Rome and that of Christianity was remarkable. Gibbon has summed up the change effected

in the law of Rome with characteristic accuracy: “The Christian princes were the first who specified the just causes of a private divorce; their institutions from Constantine to Justinian appear to fluctuate between the customs of the empire and the wishes of the Church; and the author of the Novels too frequently reforms the jurisprudence of the Code and Pandects.” Divorce by mutual consent, hitherto, as we have seen, absolutely free, was prohibited (Nov. 117) except in three cases: (1) when the husband was impotent; (2) when either husband or wife desired to enter a monastery; and (3) when either of them was in captivity for a certain length of time. It is obvious that the two first of these exceptions might well commend themselves to the mind of the Church, the former as being rather a matter of nullity of marriage than of divorce, the latter as admitting the paramount claims of the Church on its adherents, and not inconsistent with the spirit of the words of St Paul himself, who clearly contemplated a separation between husband and wife as allowable in case either of them did not hold the Christian faith (1 Cor. vii. 12). At a later period Justinian placed a further restriction or even prohibition on divorce by consent by enacting that spouses dissolving a marriage by mutual consent should forfeit all their property, and be confined for life in a monastery, which was to receive one-third of the forfeited property, the remaining two-thirds going to the children of the marriage. The cause stated for this remarkable alteration of the law, and the abandonment of the conception of marriage as a civil contract *ut non Dei judicium contemnatur* (Nov. 134), indicates the influence of the Christian idea of marriage. That influence, however, did not long continue in its full force. The prohibitions of Justinian on divorce by consent were repealed by Justin (Nov. 140), his successor. “He yielded,” says Gibbon, “to the prayers of his unhappy subjects, and restored the liberty of divorce by mutual consent; the civilians were unanimous, the theologians were divided, and the ambiguous word which contains the precept of Christ is flexible to any interpretation that the wisdom of a legislature can demand.” It was difficult, the enactment stated, “to reconcile those who once came to hate each other, and who, if compelled to live together, frequently attempted each other’s lives.”

Justinian further re-enacted, with some modifications, the power of divorce by a husband or wife against the will of the other. Divorce by a wife was allowed in five cases (Nov. 117): (1) the husband being party or privy to conspiracy against the

state; (2) attempting his wife's life, or failing to disclose to her plots against it; (3) attempting to induce his wife to commit adultery; (4) accusing his wife falsely of adultery; (5) taking a woman to live in the house with his wife, or, after warning, frequenting a house in the same town with any woman other than his wife. If a wife divorced her husband for one of these reasons, she recovered her dowry and any property brought into the marriage by her husband for life with reversion to her children, or if there were no children, absolutely. But if she divorced him for any other reason, the provisions of the enactment of Theodosius and Valentinian were to apply. A husband was allowed to divorce his wife for any one of seven reasons: (1) failure to disclose to her husband plots against the state; (2) adultery; (3) attempting or failing to disclose plots against her husband's life; (4) frequenting dinners or balls with other men against her husband's wishes; (5) remaining from home against the wishes of her husband except with her parents; (6) going to the circus, theatre or amphitheatre without the knowledge or contrary to the prohibition of her husband; (7) procuring abortion. If the husband divorced his wife for any one of these reasons he retained the dowry absolutely, or if there were children, with reversion to them. If he divorced her for any other reason, the enactments of Theodosius and Valentinian applied. In any case of a divorce, if the father or mother of either spouse had advanced the dowry and it would be forfeited by an unreasonable divorce, the consent of the father or mother was necessary to render the divorce valid.

Effect of Divorce on Children in the Law of Rome.—The custody of the children of divorced parents was dealt with by the Roman law in a liberal manner. A constitution of Diocletian and Maximian left it to the judge to determine in his discretion to which of the parents the children should go. Justinian enacted that divorce should not impair the rights of children either as to inheritance or maintenance. If a wife divorced her husband for good cause, and she remained unmarried, the children were to be in her custody, but to be maintained by the father; but if the mother was in fault, the father obtained the custody. If he was unable, from want of means, to support them, but she was able to do so, she was obliged to take them and support them. It is interesting to compare these provisions as to children with the practice at present under English law, which in this respect reflects so closely the spirit of the law of Rome.

The Canon Law of Divorce.—The canon law of Rome was based on two main principles: (1) That there could be no divorce a *vinculo matrimonii*, but only *a mensa et thoro*. The rule was stated in the most absolute terms: *"Quamdiu vivit vir licet adulter sit, licet sodomita, licet flagitiis omnibus coopertus, et ab uxore propter haec scelera derelictus, maritus ejus reputatur, cui alterum vivum accipere non licet"* (Caus. 32, Quaest. 7, c. 7). (2) That no divorce could be had at the will of the parties, but only by the sentence of a competent, that is to say, an ecclesiastical, court. In this negation of a right to divorce a *vinculo matrimonii* lies the broad difference between the doctrines of the Eastern and Western Churches of Christendom. The Greek Church, understanding the words of Christ in the broader sense above mentioned, has always allowed complete divorce with a right to remarry for the cause of adultery. And it is said that the form at least of an anathema of the council of Trent was modified out of respect to difference on the part of the Greek Church (see Pothier 5. 6. 21). The papal canon law allowed a divorce a *mensa et thoro* for six causes: (1) adultery or unnatural offences; (2) impotency; (3) cruelty; (4) infidelity; (5) entering into religion; (6) consanguinity. The Church, however, always assumed to itself the right to grant licences for an absolute divorce; and further, by claiming the power to declare marriages null and void, though professedly this could be done only in cases where the original contract could be said to be void, it was, and is to this day, undoubtedly extended in practice to cases in which it is impossible to suppose the original contract really void, but in which a complete divorce is on other grounds desirable.

Divorce in England

In England the law of divorce, originally based on the canon law of Rome, underwent some, though little, permanent change at the Reformation, but was profoundly modified by the exercise of the power of the state through legislation. From the canon law was derived the principle that divorce could legally take place only by sentence of the court, and never at the will of the parties. Complete divorce has never been governed by any other principle than this; and in so far as an incomplete divorce has become practicable at the will of the parties, it has been by the intervention of civil tribunals and contrary to the law of the ecclesiastical courts.

Those courts adopted as ground for divorce *a mensa et thoro* the main grounds allowed by Roman canon law, adultery and cruelty (Ayliffe, 22; Co. Lit. 102; 1 Salk. 162; Godolphin Abridg. 495). The causes of heresy and of entering into religion, if ever they were recognized in England, ceased to exist at the Reformation.

The principles upon which the English ecclesiastical courts proceeded in divorce *a mensa et thoro* are those which are still in force, and which (with some modification by statutory enactment) have been administered by judicial tribunals down to the present day. The courts by which the ecclesiastical law, and therefore the law of divorce, was administered were, until 1857, the courts of the various dioceses, including that of the archbishop of Canterbury, known as the Court of Arches, and that of the archbishop of York, known as the Consistory Court of York; but by statute a suitor was prevented from taking proceedings in any court except that determined by the residence of the person against whom proceedings were taken (23 Hen. VIII. c. 9). From these courts an appeal lay to delegates appointed in each case by the crown, until the establishment of the judicial committee of the privy council in 1836, when the appeal was given to the crown as advised by that body.

The proof of adultery (to which Isidore in his *Book of Etymologies* gives the fanciful derivation of "*ad alterius thorum*") was not by the canon law as received in England restricted by the operation of arbitrary rules. It was never, for example, required, as by the law of Mahomet, that the act should have been actually seen by competent witnesses, nor even that the case should be based on any particular kind of proof. It was recognized that the nature of the offence almost inevitably precluded direct evidence. One rule, however, appears to have commended itself to the framers of the canon law as too general in its application not to be regarded as a principle. The mere confession of the parties was not regarded as a safe ground of conviction; and this rule was formulated by a decretal epistle of Pope Celestine III., and, following it, by the 105th of the Canons of 1604. This rule has now been abrogated; and no doubt it is wiser not to fetter the discretion of the tribunal charged with the responsibility of deciding particular cases, but experience of divorce proceedings tends to confirm the belief that this rule of the canon law was founded on an accurate appreciation of human nature.

Although, therefore, with the above exception, no strict rules of the evidence necessary to establish adultery have ever been established in the English courts, experience has indicated, and in former days judges of the ecclesiastical courts often expressed, the lines upon which such proof may be expected to proceed. It is necessary and sufficient, in general, to prove two things—first the guilty affection towards each other of the persons accused, and, secondly, an opportunity or opportunities of which, if so minded, their passion may have been gratified. It is obvious that any strong proof on either of these points renders strict proof on the other less needful; but when proof on both is afforded, the common sense of a tribunal, acting with a knowledge of human nature, may be trusted to draw the inevitable conclusion.

The definition of cruelty accepted by the ecclesiastical courts as that of the canon law is the same as that which prevails at the present time; and the view of the law taken by the House of Lords in *Russell* v. *Russell* (1897 App. Cas. 395) was expressly based on the view of cruelty taken by the authorities of the ecclesiastical law. The best definition by older English writers is probably to be found in Clarke's *Praxis* (p. 144): "Si maritus fuerit erga uxorem crudelis et ferax ac mortem comminatus et machinatus fuerit, vel eam inhumaniter verbis et verberibus tractaverit, et aliquando venenum loco potus paraverit vel aliquod simile commiserit, propter quod sine periculo vitae cum marito cohabitare aut obsequia conjugalia impendere non audeat ... consimili etiam causa competit viro contra mulierem." Lord Stowell, probably the greatest master of the civil and canon law who ever sat in an English court of justice, has in one of his most famous judgments (*Evans* v. *Evans*, 1790, 1 Hagg. *Consist.* 35) echoed the above language in words often quoted, which have constituted the standard exposition of the law to the present day. "In the older cases," he said, "of this sort which I have had the opportunity of looking into, I have observed that the danger of life, limb or health is usually insisted as the ground upon which the court has proceeded to a separation. This doctrine has been repeatedly applied by the court in the cases which have been cited. The court has never been driven off this ground. It has always been jealous of the inconvenience of departing from it, and I have heard no one case cited in which the court has granted a divorce without proof given of a reasonable apprehension of bodily hurt. I say an apprehension, because assuredly the court is not to wait till the

hurt is actually done; but the apprehension must be reasonable: it must not be an apprehension arising from an exquisite and diseased sensibility of mind. Petty vexations applied to such a constitution of mind may certainly in time wear out the animal machine, but still they are not cases of legal relief; people must relieve themselves as well as they can by prudent resistance, by calling in the succours of religion and the consolation of friends; but the aid of courts is not to be resorted to in such cases with any effect." The risk of personal danger in cohabitation constituted, therefore, the foundation of legal cruelty. But this does not exclude such conduct as a course of persistent ill-treatment, though not amounting to personal violence, especially if such ill-treatment has in fact caused injury to health. But the person complaining must not be the author of his or her own wrong. If, accordingly, one of the spouses by his or her conduct is really the cause of the conduct complained of, recourse to the court would be had in vain, the true remedy lying in a reformation of the real cause of the disagreement.

In addition to a denial of the charge or charges, the canon law allowed three grounds of answer: (1) *Compensatio criminis*, a setoff of equal guilt or recrimination. This principle is no doubt derived from the Roman law and it had the effect of refusing to one guilty spouse the remedy of divorce against the other although equally guilty. It was always accepted in England, although not in other countries, such as France and Scotland, which also followed the canon or civil law. In strictness, recrimination applied to a similar offence having been committed by the party charging that offence. But a decision (1888) of the English courts shows that a wife who had committed adultery could not bring a suit against her husband for cruelty (*Otway* v. *Otway* 13 P. D. 141). (2) *Condonation.* If the complaining spouse has, in fact, forgiven the offence complained of, that constitutes a conditional bar to any proceedings. The main and usual evidence of such forgiveness is constituted by a renewal of marital intercourse, and it is difficult-perhaps impossible-to imagine any case in which such intercourse would not be held to establish condonation. But condonation may be proved by other acts, or by words, having regard to the circumstances of each case. Condonation is, however, always presumed to be conditional on future good behaviour, and misconduct even of a different kind revives the former offence. (3) *Connivance* constitutes a complete answer to any charge. Nor need the husband be the active agent of the

misconduct of the wife. Indifference or neglect imputable to a corrupt intention are sufficient. It will be seen presently that modern statute law has gone further in this direction. It is to be added that the connivance need not be of the very act complained of, but may be of an act of a similar kind. A learned judge, recalling the classical anecdote of Maecenas and Galba, said, "A husband is not permitted to say *non omnibus dormio*." The ecclesiastical courts also considered themselves bound to refuse relief if there was shown to be *collusion* between the parties. In its primary and most general sense collusion was understood to be an agreement between the parties for the purpose of deceiving the court by false or fictitious evidence; for example, an agreement to commit, or appear to commit, an act of adultery. Collusion, however, is not limited to the imposing of other than genuine evidence on the court. It extends to an agreement to withhold any material evidence; and indeed is carried further, and held to extend to any agreement which may have the effect of concealing the real and complete truth from the court (see *Churchward* v. *Churchward*, 1894, p. 161). This doctrine was of considerable importance even in the days when only divorces *a mensa et thoro* were granted, because at that time the parties were not permitted to separate by consent. At the present day it has become, with regard to divorce a *vinculo matrimonii*, a rule of greater and of more far-reaching importance.

The canon law as accepted in England, while allowing divorces of the nature and for the causes above mentioned, actively interfered to prevent separation between husband and wife in any other manner. A suit known as a suit for restitution of conjugal rights could be brought to compel cohabitation; and on evidence of the desertion of either spouse, the court ordered a return to the matrimonial home, though it carried no further its authority as to the matrimonial relations within the home. To this suit an agreement between the parties constituted no answer. But an answer was afforded by any conduct which would have supported a decree of divorce *a mensa et thoro*. It is a question whether, indeed, the ecclesiastical courts would not have gone further, and refused a decree of restitution of conjugal rights on grounds which might appear adequate to justify such refusal, though not sufficient on which to ground a decree of divorce. The view of the court of appeal and the House of Lords has given some colour to this opinion, and certainly the court of appeal has held, although perhaps somewhat hastily, that the effect of a

modern statute has been to allow the court to refuse restitution of conjugal rights for causes falling short of what would constitute ground for divorce (*Russell* v. *Russell*, 1895, p. 315).

The ecclesiastical courts provided for the pecuniary rights of the wife by granting to her alimony during the progress of the suit, and a proper allowance after its termination in cases in which she was successful. Such payments were dependent on the pecuniary means, or *faculties*, as they were termed, of the husband, and were subject to subsequent increase or diminution in proper cases. But the ecclesiastical courts did not deal with the custody of the children of the marriage, it being probably considered that that matter could be determined by the common law rights of the father, or by the intervention of the court of chancery.

The canon law fixed no period of limitation, either in respect of a suit for divorce or for restitution of conjugal rights; but, as regards at least suits for divorce, any substantial delay might lead to the imputation of acquiescence or even condonation. To that extent, at least, the maxim *vigilantibus non dormientibus jura subveniunt* applied.

It is remarkable that desertion by either party to a marriage, except as giving rise to a suit for restitution, was not treated as an offence by canon law in England. It formed no ground for a suit for divorce, and constituted no answer to such a suit by way of recrimination. It might indeed deprive a husband of his remedy if it amounted to connivance, or perhaps even if it amounted only to culpable neglect.

The canon law, as administered in England, has kept clear the logical distinction which exists between dissolving a marriage and declaring it null and void. The result has been that, in England at least, the two proceedings have never been allowed to pass into one another, and a complete divorce has not been granted on pretence of a cause really one for declaring the marriage void *ab initio*. But for certain causes the courts were prepared to declare a marriage null and void on the suit of either party. There is, indeed, a distinction to be drawn between a marriage void or only voidable, though in both cases it became the subject of a similar declaration. It was void in the cases of incapacity of the parties to contract it, arising from want of proper age, or consanguinity, or from a previous marriage, or from

absence of consent, a state of things which would arise if the marriage were compelled by force or induced by fraud as to the nature of the contract entered into or the personality of the parties. It is to be remarked that, in England at least, the idea of fraud as connected with the solemnization of marriage has been kept within these narrow limits. Fraud of a different kind, such as deception as to the property or position of the husband or wife, or antecedent impurity of the wife, even if resulting in a concealed pregnancy, has not in England (though the last-mentioned cause has in other countries) been held a ground for the vitiation of a marriage contract. A marriage was voidable, and could be declared void, on the ground of physical incapacity of either spouse, the absence of intercourse between the parties after a sufficient period of opportunity being almost, if not quite, conclusive on this subject.

With regard to one cause of nullity the legislation interfered from consideration, it is said, of a case of special hardship. Before the Marriage Act of 1835 marriages within the prohibited degrees of consanguinity and affinity were only voidable by a decree of the court, and remained valid unless challenged during the lifetime of both the parties. But this act, while providing that no previous marriage between persons within the prohibited degrees should be annulled by a decree of the ecclesiastical court pronounced in a suit depending at the time of the passing of the act, went on to render all such marriages thereafter contracted in England "absolutely null and void to all intents and purposes whatever."

Another suit was allowed by the ecclesiastical courts which should be mentioned, although its bearing on divorce is indirect. This was the suit for *jactitation of marriage*, which in the case of any person falsely asserting his or her marriage to another, allowed such person to be put to perpetual silence by an order of the court. This suit, which has been of rare occurrence (though there was an instance, *Thompson* v. *Rourke*, in 1892), does not appear to have been used for the purpose of determining the validity of a marriage. The legislature, has, however, in the Legitimacy Declaration Act of 1858, provided a ready means by which the validity of marriages and the legitimacy of children can be determined, and the procedure provided has repeatedly been utilised.

It should be added, as a matter closely akin to the proceedings in the ecclesiastical courts, that the common law took cognizance of one phase of matrimonial relations by allowing an action by the husband against a paramour, known as an action for criminal conversation. In such an action a husband could recover damages estimated according to the loss he was supposed to have sustained by the seduction and loss of his wife, the punishment of the seducer not being altogether excluded from consideration. Although this action was not unfrequently (and indeed, for the purposes of a divorce, necessarily) brought, it was one which naturally was regarded with disfavour.

Effect of the Reformation.—Great as was the indirect effect of the Reformation upon the law of divorce in England, the direct effect was small. It might, indeed, have been supposed that the disappearance of the sacramental idea of marriage entertained by the Roman Church would have ushered in the greater freedom of divorce which had been associated with marriage regarded as a civil contract. And to some extent this was the case. It was for some time supposed that the sentences of divorce pronounced by the ecclesiastical courts acquired the effect of allowing remarriage, and such divorces were in some cases granted. In *Lord Northampton's* case in the reign of Edward VI. the delegates pronounced in favour of a second marriage after a divorce *a mensa et thoro*. It was, however, finally decided in *Foljambe's* case, in the 44th year of Elizabeth, that a marriage validly contracted could not be dissolved for any cause. But the growing sense of the right to a complete divorce for adequate cause, when no longer any religious law to the contrary could be validly asserted, in time compelled the discovery of a remedy. The commission appointed by Henry VIII. and Edward VI. to reform the ecclesiastical law drew up the elaborate report known as the *Reformatio Legum*, and in this they recommended that divorces *a mensa et thoro* should be abolished, and in their place complete divorce allowed for the causes of adultery, desertion and cruelty. These proposals, however, never became law. In 1669 a private act of parliament was granted in the case of Lord de Roos, and this was followed by another in the case of the duke of Norfolk in 1692. Such acts were, however, rare until the accession of the House of Hanover, only five acts passing before that period. Afterwards their number considerably increased. Between 1715 and 1775 there were sixty such acts,

in the next twenty-five years there were seventy-four, and between 1800 and 1850 there were ninety. In 1829 alone there were seven, and in 1830 nine.

The jurisdiction thus assumed by parliament to grant absolute divorces was exercised with great care. The case was fully investigated before a committee of the House of Lords, and not only was the substance of justice so secured, but the House of Lords further required that application to parliament should be preceded by a successful suit in the ecclesiastical courts resulting in a decree of divorce *a mensa et thoro*, and in the case of a husband being the applicant, a successful action at common law and the recovery of damages against the paramour. In this way, and also, if needful, on its own initiative, the House of Lords provided that there should be no connivance or collusion. Care was also taken that a proper allowance was secured to the wife in cases in which she was not the offending party. This procedure is still pursued in the case of Irish divorces.

It is obvious, however, that the necessity for costly proceedings before the Houses of Parliament imposed great hardship on the mass of the population, and there can be little doubt that this hardship was deeply felt. Repeated proposals were made to parliament with a view to reform of the law, and more than one commission reported on the subject. It is said that the final impetus was given by an address to a prisoner by Mr Justice Maule. The prisoner's wife had deserted him with her paramour, and he married again during her lifetime. He was indicted for bigamy, and convicted, and Mr Justice Maule sentenced him in the following words: —"Prisoner at the bar: You have been convicted of the offence of bigamy, that is to say, of marrying a woman while you had a wife still alive, though it is true she has deserted you and is living in adultery with another man. You have, therefore, committed a crime against the laws of your country, and you have also acted under a very serious misapprehension of the course which you ought to have pursued. You should have gone to the ecclesiastical court and there obtained against your wife a decree *a mensa et thoro*. You should then have brought an action in the courts of common law and recovered, as no doubt you would have recovered, damages against your wife's paramour. Armed with these decrees, you should have approached the legislature and obtained an act of parliament which would have rendered you free and legally competent to marry the person whom you have taken on yourself to marry with no such sanction. It is quite true that these proceedings

would have cost you many hundreds of pounds, whereas you probably have not as many pence. But the law knows no distinction between rich and poor. The sentence of the court upon you, therefore, is that you be imprisoned for one day, which period has already been exceeded, as you have been in custody since the commencement of the assizes." The grave irony of the learned judge was felt to represent truly a state of things well-nigh intolerable, and a reform in the law of divorce was felt to be inevitable. The hour and the man came in 1857, the man in the person of Sir Richard Bethell (afterwards Lord Westbury), then attorney-general.

The Act of 1857.—Probably few measures have been conceived with such consummate skill and knowledge, and few conducted through parliament with such dexterity and determination. The leading opponent of the measure was Mr Gladstone, backed by the zeal of the High Church party and inspired by his own matchless subtlety and resource. But the contest proved to be unequal, and after debates in which every line, almost every word, of the measure was hotly contested, especially in the House of Commons, the measure emerged substantially as it had been introduced. Not the least part of the merit and success of the act of 1857 is due to the skill which, while effecting a great social change, did so with the smallest possible amount of innovation. The act (which came into operation on the 1st of January 1858) embodied two main principles: 1. The constitution of a lay court for the administration of all matters connected with divorce. 2. The transfer to that court, with as little change as possible, of the powers exercised in matrimonial matters by (a) the House of Lords, (b) the ecclesiastical courts, (c) the courts of common law.

The Constitution of the Court.—The new court, termed "The Court for Divorce and Matrimonial Causes," was constituted by the lord chancellor, the chiefs and the senior puisne judges of the three courts of common law, and the judge of the court of probate (which was also established in 1857), but the functions of the court were practically entrusted to the judge of the court of probate, termed the "Judge Ordinary," who thus in matters of probate and divorce became the representative of the former ecclesiastical jurisdiction. The judge ordinary was empowered either to sit alone or with one or more of the other judges to constitute a full court. The parties to a suit obtained the right of trial by jury of all disputed questions of fact; and the rules of evidence of the common law courts were made to apply. An appeal

to the full court was given in all matters, which the judge ordinary was enabled to hear sitting alone.

1. To this court were transferred all the powers of the ecclesiastical courts with regard to suits for divorce *a mensa et thoro*, to which the name was given of suits for "judicial separation," nullity, restitution of conjugal rights, and jactitation of marriage, and in all such proceedings it was expressly enacted (sec. 22) that the court should act on principles and rules as nearly as possible conformable to the principles and rules of the ecclesiastical courts. Judicial separation could be obtained by either husband or wife for adultery, or cruelty, or desertion continued for two or more years.

2. There were also transferred to the court powers equivalent to those exercised by the legislature in granting absolute divorce. The husband could obtain a divorce for adultery, the wife could obtain a divorce for adultery coupled with cruelty or desertion for two or more years, and also for incestuous or bigamous adultery, or rape, or unnatural offences. The same conditions as had been required by the legislature were insisted on. A petition for dissolution (sec. 30) was to be dismissed in case of connivance, condonation or collusion; and further, the court had power, though it was not compelled, to dismiss such petition if the petitioner had been guilty of adultery, or if there had been unreasonable delay in presenting or prosecuting the petition, or if the petitioner had been guilty of cruelty or desertion without reasonable excuse, or of wilful neglect or misconduct conducing to the adultery. The exercise of these discretionary powers of the court, just and valuable as they undoubtedly are, has been attended with some difficulty. But the view of the legislature has on the whole been understood to be that the adultery of a petitioner should not constitute a bar to his or her proceeding, if it has been caused by the misconduct of the respondent, and that cruelty should not constitute such a bar unless it has caused or contributed to the misconduct of the respondent. But the court, while regarding its powers as those of a judicial and not an arbitrary discretion, has declined to fetter itself by any fixed rule of interpretation or practice.

It is to be observed that this act assigned a new force to desertion. The ecclesiastical law regarded it only as suggestive of connivance or culpable neglect. But the act of 1857 made it (1) a ground of judicial separation if continued for two

years, (2) a ground in part of dissolution of marriage if continued for the same period, (3) a bar, in the discretion of the court, to a petition for dissolution, though it was not made in a similar way any bar to a suit for judicial separation. It is also to be observed that the act was confined to causes of divorce recognized by the ecclesiastical law as administered in England. It did not either extend the causes of a suit for nullity by adding such grounds as antenuptial incontinence, even if accompanied with pregnancy, nor did it borrow from the civil law of Rome either lunacy or crime as grounds for divorce.

Much comment has been made on the different grounds on which divorce is allowed to a husband and to a wife,—it being necessary to prove infidelity in both cases, but a wife being compelled to show either an aggravation of that offence or an addition to it. Opinions probably will always differ whether the two sexes should be placed on an equality in this respect, abstract justice being invoked, and the idea of marriage as a mere contract pointing in one direction, and social considerations in the other. But the reason of the legislature for making the distinction is clear. It is that the wife is entitled to an absolute divorce only if her reconciliation with her husband is neither to be expected nor desired. This was no doubt the view taken by the House of Lords. In 1801 a Mrs Addison claimed an absolute divorce on the ground of her husband's incest with her sister. The matter was long debated, but Lord Thurlow, who appeared in the House of Lords for the last time in order to support the bill, turned the scale by arguing that it was improper that the wife should under such circumstances return to her husband (see Campbell, *Lives of the Chancellors*, vii. 145). "Why do you," he said, "grant to the husband a divorce for the adultery of the wife? Because he ought not to forgive her, and separation is inevitable. Where the wife cannot forgive, and separation is inevitable by reason of the crime of the husband, the wife is entitled to the like remedy."

The act (sec. 32) provided, in case of dissolution, for maintenance of the wife by the husband on principles similar to those recognized by the ecclesiastical courts, and (sec. 45) for the settlement of the property of a guilty wife on her husband or children; but this enactment was imperfect, as provision was made only for a settlement and not for payment of an allowance, and none was made for altering settlements made in view or in consequence of a marriage. The act (sec. 35) provides also in all divorce proceedings, and also in those of nullity, for provision

for the custody, maintenance and education of children by the court: provisions of great value, which were unfortunately for some time limited by an erroneous view of the court that the age of the children to which such provisions applied should be considered limited to sixteen. The act of 1857 also transferred to the new court the powers exercised by the common law courts in the action for criminal conversation. It was made obligatory to join an alleged adulterer in the suit, and damages (sec. 33) might be claimed against him, and he might be ordered to pay the cost of the proceedings (sec. 34), the extent depending upon the circumstances of each case.[1]

The act of 1857 in one respect went beyond a transfer of the powers exercised by the ecclesiastical courts or the legislature. It provided (sec. 21) that a wife deserted by her husband might apply to a magistrate in petty sessions and obtain an order which had the effect of protecting her earnings and property, and during the currency of such order of protection a wife was to be in the same position as if she had obtained an order for judicial separation. The effect of this section appears to have been small; but the Summary Jurisdiction (Married Women) Act 1895 has afforded a cheap and speedy remedy to all classes.

The framers of the act of 1857 were careful to avoid offending the scruples of clergymen who disapproved of the complete dissolution of marriage by a lay court. It was provided (secs. 57 and 58) that no clergyman should be compelled to solemnize the marriage of any person whose former marriage had been dissolved on the ground of his or her adultery, but should permit any other clergyman to solemnize the marriage in any church or chapel in which the parties were entitled to be married. It is to be feared that this concession, ample as it appears, has not allayed conscientious objections, which are perhaps from their nature insuperable. The act made no provision as to the name to be borne by a wife after a divorce; and this omission led to litigation in the case of a peer's wife, in *Cowley* v. *Cowley*, in which Lady Cowley was allowed to retain her status.

Modifications of the Act of 1857.—Subsequent legislation has made good many of the defects of the act of 1857. In 1859 power was given to the court, after a decree of dissolution or of nullity of marriage, to inquire into the existence of ante- and post-nuptial settlements, and to make orders with respect to the property settled either for the benefit of children of the marriage or their parents; and a subsequent

act (41 & 42 Vict. c. 19, s. 3) removed a doubt which was entertained whether these powers could be exercised if there were no children of the marriage. In 1860 a very important change was made, having for its object a practical mode of preventing divorces in cases of connivance and collusion or of misconduct of the petitioner. It was provided that a claim of dissolution (a provision afterwards extended to decrees of nullity) should in the first instance be a decree nisi, which should not be made absolute until the expiration of a period then fixed at not less than three, but by subsequent legislation enlarged to not less than six, months. During the interval which elapsed between the decree nisi and such decree being made absolute, power was given to any person to intervene in the suit and show cause why the decree should not be made absolute, by reason of the same having been obtained by collusion, or by reason of material facts not brought before the court; and it was also provided that, at any time before the decree was made absolute, the queen's proctor, if led to suspect that the parties were acting in collusion for the purpose of obtaining a divorce contrary to the justice of the case, might under the direction of the attorney-general intervene and allege such case of collusion. This enactment (extended in the year 1873 to suits for nullity) was ill drawn and unskilfully conceived. The power given to any person whomsoever to intervene is no doubt too wide, and practically has had little or no useful effect as employed by friends or enemies of parties to a suit. The limitation in terms of the express power of the queen's proctor to intervene in cases of collusion was undoubtedly too narrow. But the queen's proctor, or the official by whom that officer was afterwards represented, has in practice availed himself of the general authority given to any person to show cause why a decree *nisi* should not be made absolute, and has thus been enabled to render such important service to the administration of justice that it is difficult to imagine the due execution of the law of divorce by a court without such assistance. By the Matrimonial Causes Act 1866 power was given to the court to order an allowance to be paid by a guilty husband to a wife on a dissolution of marriage. This act also can hardly be considered to have been drawn with sufficient care, inasmuch as while it provides that if the husband's means diminish, the allowance may be diminished or suspended, it makes no corresponding provision for increase of the allowance if the husband's means increase; nor, apparently, does it permit of an allowance in addition to, but only in substitution for, a settlement. The act makes no provision for allowance to a guilty wife, and it certainly is a serious defect that the

power to grant an allowance does not extend to cases of nullity. In 1868 an appeal to the House of Lords was given in cases of decree for dissolution or nullity of marriage.

The great changes effected by the Judicature Acts included the court for divorce and matrimonial causes. Under their operation a division of the high court of justice was constituted, under the designation of the probate division and admiralty division, to which was assigned that class of legal administration governed mainly by the principles and practice of the canon and civil law. The division consists of a president, and a justice of the high court, with registrars representing each branch of the jurisdiction. Appeals lie to the court of appeal, and thence to the House of Lords.

In 1884 the legislature interfered to prevent imprisonment being the result of disobedience to an order for restitution of conjugal rights. That mode of enforcing the order of the court was abolished, and the matter was left to a proper adjustment of the pecuniary relations of the husband and wife; and a respondent disobeying such an order was held to be guilty of desertion without reasonable cause, such desertion having further given to it a similar effect to that assigned to desertion for two years or upwards. The effect of this provision has been that the suit for restitution of conjugal rights is most frequently brought for the purpose of shortening the time within which a wife can obtain a decree for dissolution of marriage.

Proceedings in the divorce court have shown the improvement in the law of evidence which has been effected with regard to other legal proceedings. The act of 1857 made an inroad on the former law, which prohibited evidence being given by parties interested in the proceedings, by allowing a petitioner (sec. 43) to be called and examined by order of the court, absolving such petitioner, however, from the necessity of answering any question tending to show that he or she had been guilty of adultery. In the next year power was given to the court to dismiss any person, with whom a party to the suit was alleged to have committed adultery, from the suit if there should not appear to be sufficient evidence against him or her, the object being to allow such person to give evidence; and in 1859 it was provided that, on a petition by a wife for a divorce on the grounds of cruelty or desertion with adultery, the husband and wife could be competent and compellable witnesses as to the

cruelty or desertion. A few years later, however, in 1869, the subject was finally dealt with by repealing all previous rules which limited the powers to give evidence on questions of adultery with the safeguard that no witness in any proceeding can be asked or bound to answer any question tending to show that he or she has been guilty of adultery, unless in the same proceeding such witness shall have given evidence in disproof of his or her alleged adultery. It has been held that the principles of these enactments apply to interrogatories as well as to evidence given in court.

It is a most remarkable omission in the act of 1857, especially when we remember the high legal authority from whom it proceeded, that the act nowhere defines the class of persons with regard to whom the jurisdiction of the court should be exercised. This omission has given rise to a misapprehension of the law which, though now set at rest, prevailed for a considerable period, and has undoubtedly led to the granting of divorce in several cases in which it could not legally be given. It was supposed that the court could grant a dissolution of marriage to all persons who had anything more than a casual and fleeting residence within the jurisdiction of the court; and this view, although its correctness was doubted by Lord Penzance, the judge of the divorce court, was upheld by a majority of the judges of the court of appeal in the case of *Niboyet* v. *Niboyet* (4 P. D. 1). It was supposed that such residence gave what was termed a matrimonial domicile. But this view was undoubtedly erroneous as regards dissolution of marriage, although probably correct as regards judicial separation, and the true view is no doubt that indicated with great learning and ability by Lord Watson in a judgment given by him in the privy council in the case of *Le Mesurier* v. *Le Mesurier* (1895, App. Cas. 517), that the only true test of jurisdiction for a decree of divorce altering the status of the parties to a marriage is to be found in the domicile of the spouses—that is to say, of the husband, as the domicile of a wife follows that of her husband—at the time of the divorce. Domicile means a person's permanent home, the place at which he resides with no intention of making his home elsewhere, and, if he leaves it, with the intention of returning to it.

It is now also clearly recognized as the law of England that the English courts will not recognize a divorce purporting to be made by a foreign tribunal with regard to persons domiciled in England. For a considerable time doubt appears to have

clouded the law on this subject. In a famous case known as *Lolley's* case, decided in 1812, the judges of England (the point arose in connexion with a criminal charge) unanimously held "that no sentence or act of any foreign country or any state could dissolve an English marriage *a vinculo matrimonii* for grounds on which it was not liable to be dissolved *a vinculo matrimonii* in England." This case has been frequently understood as deciding that a marriage celebrated in England cannot be dissolved elsewhere, and on this point the courts of Scotland differ from the view supposed to be taken by the English judges. But the matter has been fully explained in one of the most masterly of Lord Hannen's judgments (*Harvey* v. *Fairnie*, 5. P. D. 154), afterwards upheld by the House of Lords in 1882 (8 App. Cas. 43); and it is now clear that while the parties are domiciled in this country no decree of any foreign court dissolving their marriage will be recognized here, unless it proceed on the grounds on which a divorce may be obtained in this country, and even the exception just mentioned appears to rest rather on reasoning and principle than on the authority of any decided case. This principle received the highest sanction in the prosecution of Earl Russell for bigamy before the House of Lords (1901), in which it was held that, where a divorce had been refused him in England, an American divorce would not relieve a man from the guilt of marrying again.

Summary Proceedings for Separation.—The legislature has sought to extend the relief afforded by the courts in matrimonial causes by a procedure fairly to be considered within the reach of all classes. In 1895 an act was passed which re-enacted in an improved form the provisions of an act of 1878 of similar effect. By the act of 1895 power was given to a married woman whose husband (1) has been guilty of an aggravated assault upon her within the Offences against the Person Act 1861, or (2) convicted on indictment of an assault on her and sentenced to pay a fine of more than £5 or to imprisonment for more than two months, or (3) shall have deserted her, or (4) been guilty of persistent cruelty to her or wilful neglect to maintain her or her infant children, and by such cruelty or neglect shall have caused her to leave and live apart from him, to apply to a court of summary jurisdiction and to obtain an order containing all or any of the following provisions:—(1) that the applicant be not forced to cohabit with her husband, (2) that the applicant have the custody of any children under sixteen years of age, (3) that the husband pay to her an allowance not exceeding £2 a week. The act provides that no married woman

guilty of adultery should be granted relief, but with the very important proviso, altering as it does the rule of the common law, that the husband has not conduced or connived at, or by wilful neglect or misconduct conduced to, such adultery. The provisions of this act[2] have been largely put in force, and no doubt to the great advantage of the poorer classes of the community. It will be observed that the act is unilateral, and affords no relief to a husband against a wife; and the complaint is often heard that no misconduct of the wife, except adultery, relieves the husband from the necessity of maintaining her and allowing her to share his home, unless he can obtain access to the high court.[3]

Separation Deeds.—Although nothing in the development of the law of divorce has tended to give to married persons the right absolutely to dissolve their marriage by consent, and, on the contrary, any such agreement would be held to be strong evidence of collusion, the view of the Church expressed in the ecclesiastical law has been entirely departed from as regards agreements for separation. Such agreements were embodied in deeds, and usually contained mutual covenants not to sue in the ecclesiastical courts for restitution of conjugal rights. The ecclesiastical courts, however, wholly disregarded such agreements, and considered them as affording no answer to a suit for restitution of conjugal rights. For a considerable period the court of chancery refused to enforce the covenant in such deeds by restraining the parties from proceeding to the ecclesiastical courts. But at last a memorable judgment of Lord Westbury (1861) asserted the right (*Hunt* v. *Hunt*, 4 De G. F. & J. 221; see also *Marshall* v. *Marshall*, 5 P. D. 19) of the court of chancery to maintain the claim of good faith in this as in other cases, and restrained a petitioner from suing in the ecclesiastical court contrary to his covenant. Thereafter these deeds became common, and no doubt often afford a solution of matrimonial difficulties of very great value. When the courts of the country became united under the Judicature Acts, it became practicable to set up in the divorce division a separation deed in answer to a suit for restitution of conjugal rights without the necessity of recourse to any other tribunal.

Statistics.—The statistics of divorce in England have for some years been regularly published in the volumes of judicial statistics published annually by the Home Office.

The number of petitions for divorce (including in the term both divorce *a mensa et thoro* and divorce *a vinculo*) for the years from 1858 to 1905 inclusive are as follows:—

1858	326	1874	469	1890	644
1859	291	1875	451	1891	632
1860	272	1876	536	1892	629
1861	236	1877	551	1893	645
1862	248	1878	632	1894	652
1863	298	1879	555	1895	683
1864	297	1880	615	1896	772
1865	284	1881	589	1897	781
1866	279	1882	481	1898	750
1867	294	1883	561	1899	727
1868	303	1884	647	1900	698
1869	351	1885	541	1901	848
1870	351	1886	708	1902	987
1871	384	1887	662	1903	914
1872	374	1888	680	1904	822
1873	416	1889	654	1905	844

It is probably impossible to account for the variations which the above table discloses. It was no doubt natural that the year immediately succeeding the passing of the act which originated facilities for divorces *a vinculo* should exhibit a larger number of divorces than its successors for a considerable period. But there does not appear to be any adequate cause for the comparative increase which seems to have prevailed in the decade between 1878 and 1888, unless it be found in the increase of marriages which culminated in 1873 and 1883, falling after each of those years. The number of marriages again rose high in 1891 and 1892, and this may account for the increased number of divorces in 1896 and the following years. But it may certainly be said with confidence that as compared with the growth of population the number of divorces in England has shown no alarming increase.

The total number of petitions in matrimonial causes presented by husbands exceed those presented by wives, but in no marked degree. This excess would seem to be due to the fact that the larger number of petitions for dissolution presented by husbands, owing no doubt to the difference in the law affecting the two sexes, is not entirely counterbalanced by the much larger number of petitions for judicial separation presented by wives. The following figures for various years may be taken as typical:—

	1895	1896	1897	1898	1899	1905
Petitions for Dissolution—						
Presented by husbands	353	393	414	401	383	429
Presented by wives	220	280	269	243	262	23
Petitions for Judicial Separation—						
Presented by husbands	4	3	2	4	4	5
Presented by wives	106	96	96	102	78	87
Totals—						
Presented by husbands	357	396	416	405	387	434
Presented by wives	326	376	365	345	340	410

Speaking generally, it may be said that about 70% of the petitions presented are successful and result in decrees. This percentage has a tendency, however, to rise.

Attempts have been made to ascertain the classes which supply the petitioners for divorce, but this cannot be done with such certainty as to warrant any but the most general conclusions. It may, however, safely be said that while all classes, professions and occupations are represented, it is certainly not those highest in the scale that are the largest contributors. The principles of the act of 1857 have beyond question been justified by the relief required by and afforded to the general community.

Other European Countries

We may now turn to the law of divorce as administered in the other countries of the modern world. On the main question whether marriage is to be considered indissoluble they will be found to range themselves on one side or the other according to the influence upon them of the Church of Rome and its canon law.

In *Scotland* it has long been the law that marriage can be dissolved at the instance of either party by judicial sentence on the grounds of adultery or of desertion, termed non-adherence, and the spouses could in such case remarry, except with the paramour,—at all events if the paramour was named in the decree (and the name is sometimes omitted for that reason). A divorce *a mensa et thoro* could also be granted for cruelty. By the Court of Session Act 1830, the jurisdiction in divorce was transferred from a body of commissaries to the court of session.

By the law of *Holland* complete divorce could be granted by judicial sentence on the grounds of adultery or of wilful and malicious desertion, to which were added unnatural offences and imprisonment for life, and such divorce gave the power of remarriage, except with the person with whom adultery was proved to have been committed, but there would seem to be a doubt whether this power extended to the guilty party (Voet, *De divortiis*, lit. 24, tit. 2). Divorce *a mensa et thoro* could be granted on the grounds allowed by the canon law.

The Code of *Prussia* of 1794 contained elaborate provisions which gave great facility of divorce. A complete divorce could be obtained by judicial sentence for the following causes:—(1) Adultery or unnatural offences; and adultery by a husband formed no bar to his obtaining a divorce against his wife for adultery; and even an illicit intimacy, from which a presumption of adultery might arise, was held sufficient for a divorce. (2) Wilful desertion. (3) Obstinate refusal of the rights of marriage, which was considered as equivalent to desertion. (4) Incapacity to perform the duties of marriage, even if arising subsequent to the marriage; and the same effect was assigned to other incurable bodily defects that excited disgust and horror. (5) Lunacy, if after a year there was no reasonable hope of recovery. (6) An attempt on the life of one spouse by the other, or gross and unlawful attack on the honour or personal liberty. (7) Incompatibility of temper and quarrelsome disposition, if rising to the height of endangering life or health. (8) Opprobrious crime for which either spouse has suffered imprisonment, or a knowingly false

accusation of such crime by one spouse of the other. (9) If either spouse by unlawful transactions endangers the life, honour, office or trade of the other, or commences an ignominious employment. (10) Change of religion. In addition to these causes, marriages, when there were no children, could be dissolved by mutual consent if there be no reason to suspect levity, precipitation or compulsion; and a judge had also power to dissolve a marriage in cases in which a strongly rooted dislike appeared to him to exist. In all cases of divorce, but sometimes subject to the necessity of obtaining a licence, remarriage was permissible (see Burge, *Commentaries on Colonial and Foreign Law*, vol. i. 649).

Before 1876 only a divorce *a vinculo* could be obtained in some of the German states, especially if the petitioner were a Roman Catholic. The only relief afforded was a "perpetual separation." By the Personal Status Act 1875 perpetual separation orders were abolished and divorce decrees allowed in cases where the petitioners would, under the former law, have been entitled to a perpetual separation order. However, two Drafting Commissions under the act declined to alter the new rule, but under pressure from the Roman Catholic party the Reichstag passed a law introducing a modified separation order, termed "dissolution of the conjugal community" (*Aufhebung der ehelichen Gemeinschaft*). This order can be converted into a dissolution of the marriage at the option of either party. Under the Civil Code of 1900 a petitioner can obtain a divorce or judicial separation on "absolute" or "relative" grounds. In the former case if the facts are established the petitioner is entitled to the relief prayed for; in the latter case, it is left to judicial discretion. The absolute grounds are adultery, bigamy, sodomy, an attempt against the petitioner's life or wilful desertion. The relative grounds are (a) such grave breach of marital duty or dishonourable or immoral conduct as would disturb the marital relation to such an extent that the marriage could not reasonably be expected to continue; (b) insanity, continued for more than three years during the marriage, and of so severe a nature that intellectual community between the parties has ceased and is not likely to be re-established. A divorced wife, if not exclusively the guilty party, may retain her husband's name; but if exclusively guilty, her former husband may compel her to resume her maiden name.

By the law of *Denmark*, according to the Code of King Christian the Fifth, complete divorce could be obtained for incest; for leprosy, whether contracted

before or after marriage; for transportation for crime or flight from justice, after three years, though not for crime itself; and for exile not arising from crime, after seven years.

In *Sweden* complete divorce is granted by judicial sentence for adultery, and in *Russia* for that cause and also for incompatibility of temper (Ayliffe, Par. 49). On the other hand, in *Spain* marriage is indissoluble, and the ecclesiastical courts have retained their exclusive cognizance of matrimonial causes. In *Italy* certain articles of the Civil Code deal with separation, voluntary and judicial, but divorce is not allowed in any form.

In *France* the law of divorce has had a chequered history. Before the Revolution the Roman canon law prevailed, marriage was considered indissoluble, and only divorce *a mensa et thoro*, known as *la séparation d'habitation*, was permitted; though it would appear that in the earliest age of the monarchy divorce *a vinculo matrimonii* was allowed. *La séparation d'habitation* was granted at the instance of a wife for cruelty by her husband or false accusation of a capital crime, or for habitual treatment with contempt before the inmates of the house; but a wife could not obtain a separation for adultery by her husband, although he had his remedy in case of adultery by his wife. In every case the sentence of a judicial tribunal, which took precautions against collusion, was necessary. But the Revolution may be said to have swept away marriage among the institutions which it overwhelmed, and by the law of the 20th of September 1792 so great facility was given for divorce *a vinculo matrimonii* as practically to terminate the obligations of marriage. A reaction came with the Code Napoléon, yet even under that system of law divorce remained comparatively easy. Mutual consent, expressed in the manner and continued for a period specified by the law, was cause for a divorce (the principle of the Roman law being adopted on this point), but such consent could not take place unless the husband was twenty-five years of age and the wife twenty-one, unless they had been married for two years, nor after twenty years of marriage, nor after the wife had completed her forty-fifth year; and further, the approval of the parents of both parties was required. In case of divorce by consent, the law required that a proper agreement should be made for the maintenance of the wife and the custody of the children. A husband could obtain a divorce *a vinculo matrimonii* for adultery, but the wife had no such power unless the husband had brought his mistress to the

home. Both husband and wife could claim divorce on the ground of outrage, or grievous bodily injury, or condemnation for an infamous crime. If the divorce was for adultery, the erring party could not marry the partner of his or her guilt. A divorce *a mensa et thoro* could be obtained on the same grounds as a divorce *a vinculo*, but not by mutual consent; and if the divorce *a mensa et thoro* continued in force for three years, the defendant party could claim a divorce *a vinculo*. On the restoration of royalty in 1816 divorce *a vinculo* was abolished, and pending suits for divorce *a vinculo* were converted into suits for separation only.

Divorce in France, after the repeal of the provisions respecting it in the Code Napoléon in 1816, was re-enacted by a law of the 27th of July 1884, the provisions of which were simplified by laws of 1886 and 1907. But a wide departure was made by these laws from the terms of the Code Napoléon. Divorce by consent disappeared, and the following became the causes for which divorce was allowed: (1) Adultery by either party to the marriage at the suit of the other, without, in the case of adultery by the husband, the aggravation of introduction of the concubine into the home required by the Code; (2) violence (*excès*) or cruelty (*sévices*); (3) *injures graves*; and (4) *peine afflictive et infamante*. *Excès* is defined by Locié as "a generic expression comprising all acts tending to compromise the safety of the person, without distinction as to their object or motive, premeditation as well as furious anger, attempts upon life as well as serious woundings." *Sévices* are acts of ill-treatment less grave in character, which, while not endangering life, render existence in common intolerable (Kelly's *French Law of Marriage*, p. 122). *Injures graves*, as to which the courts have considered themselves entitled to exercise a wide discretion, have been defined as acts, writings or words which reflect upon the honour or the reputation of the party against whom they are directed. The courts have held that retraction at the trial does not relieve the party from the consequences of an *injure grave*, and that publicity is an aggravating but not a necessary element. A letter from one spouse to the other may constitute an *injure* and the courts have further held themselves at liberty to consider letters written after divorce proceedings have been commenced. *Injures graves* have also been considered to include material injuries, and among these have been classed habitual and groundless refusal of matrimonial rights, communication of disease and refusal to consent to a religious ceremony of marriage. Habitual but not occasional

drunkenness has also been held to fall within the definition of an *injure grave*. *Peine afflictive et infamante* signifies a legal punishment involving corporal confinement and moral degradation.[4]

In addition to its recognition of full divorce, the French law recognizes separation of two kinds, one *séparation de biens* and the other *séparation de corps*. The effect of *séparation de biens* is merely to put an end to the community of goods between the spouses. It necessarily follows, but may be decreed independently of *séparation de corps*. The grounds of *séparation de corps* are the same as those for a divorce; and if a *séparation de corps* has existed for three years, it may be turned into a divorce upon the application of either party to the court.

Until 1893 a wife *séparée de corps* obtained only the capacity attaching to a concomitant *séparation de biens*; that is to say, she recovered the enjoyment and management of her separate property, but could not deal with real property, nor take legal proceedings, without the sanction of her husband or of the court. But by a law of the 6th of February 1893 a wife *séparée de corps* obtains "the full exercise of her civil capacity, so that she shall not need to resort to the authority of her husband or of the court." In case of reconciliation, the wife returns to the limited capacity of a wife *séparée de biens*, and after the prescribed notification of such change of status it becomes binding on third persons.

The provisions of French law with regard to the custody of the children of a dissolved marriage, and with regard to property, do not differ materially from those prescribed by the English acts. The custody of children is given to the party who has obtained the divorce, unless the court, on the application of the family, or the *ministère public*, consider it better, in the interests of the children, that custody should be given to the other party or a third person; but in every case the right of both father and mother to supervise the maintenance and education of the children, and their liability to contribute to their support, are continued.

The law in France as to property on a divorce has been accurately stated as follows:—

> "Divorce in France effects a dissolution of the matrimonial régime of property as well as of the marriage itself. The decree appoints a notary, who is

charged with the settlement of the pecuniary interests of the parties. By a stereotyped form of procedure the appointment is made invariably for the purpose of liquidating *la communauté ayant existé entre les époux*, irrespective of whether the régime really was that of community or another. In the case of aliens, therefore, married under the rule of separate property, it is necessary carefully to set this out in the notarial deed of liquidation, in order to defeat the presumption which might be raised by the wording of the decree that a community really did exist. The party against whom the divorce has been pronounced loses the benefit of all settlements made upon him or her by the other party, either by the marriage contract or since the marriage. On the other hand, the party in whose favour the divorce has been pronounced preserves the benefit of all settlements made in his or her favour by the unsuccessful party. If no such settlements were made, or if those made appear inadequate to ensure the subsistence of the successful party, the court may grant him or her permanent alimony out of the property of the other party, not to exceed one-third of the income, and revocable in case it ceases to be necessary" (Kelly, p. 130).

On a divorce both parties are at liberty to remarry. The husband could remarry at once; but the wife (art. 296 of the Code) was only allowed to remarry after an interval of ten months. By the act of 1907, this article was abolished, and the wife allowed to remarry as soon as the judgment or decree granting the divorce has been entered, providing 300 days have elapsed since the first judgment was pronounced. A divorced husband may remarry his divorced wife, but if he does so, he cannot be again divorced, except on the ground of a sentence to a *peine afflictive et infamante* passed on one of them since their remarriage. There is, however, this limitation on the power of remarriage of divorced persons, that the party to the marriage against whom the decree has been pronounced is not allowed to marry the person with whom his or her guilt has been established. Such person, however, has no such rights as are recognized in him or her according to English law, and cannot take any part in the proceedings. But his or her name is referred to in the proceedings only by an initial; and French law goes even further in the avoidance of publicity, inasmuch as the publication of divorce proceedings in the press is forbidden, under heavy penalties.

By a law of the 6th of February 1893 French jurisprudence, more complete at least, and perhaps wiser, than English, dealt with a matter previously in controversy, and decided that after a divorce the wife shall resume her maiden name, and may not continue to use the name of her divorced husband; nor may the husband, for business or other purposes, continue to use the name of his wife.

By the law of 1886 the special procedure in divorce previously in force under the Code and under the law of 1884 was abolished, and it was provided that matrimonial causes should be tried according to the ordinary rules of procedure. The action therefore, when brought, follows the methods of procedure common to other civil proceedings. But there still remain certain necessary preliminaries to an action of divorce. A petition must be presented by a petitioner in person to the president of the court sitting in chambers, with the object of a reconciliation being effected. This is known as the *première comparation*. If the petitioner still determines to proceed, there follows the *seconde comparation*, on which occasion both parties appear before the president. If the president fails to effect a reconciliation, he makes an order permitting the petitioner to proceed, and deals with the matters necessary to be dealt with *pendente lite*, such matters being (1) separate residence, (2) alimony, (3) possession of personal effects, (4) custody of children. As regards residence, the wife is compelled to adhere during the proceedings to the residence assigned to her, but no similar restriction is placed on the husband. Alimony *pendente lite* is in the discretion of the court, having regard to the means of the parties, and includes a proper provision for costs. As regards the custody of children, the Code and the law of 1884 gave it to the husband, unless the court otherwise orders, but the law of 1886 leaves the matter wholly in the discretion of the court.

There are certain technical rules of evidence on the trial of a divorce action. It is a general principle of the French law of evidence that documentary evidence is the best evidence, and oral testimony only secondary. In divorce cases adultery *flagrante delicto* can be proved by the official certificate of the commissary of police. Letters between the husband and wife are admissible in evidence. As to letters between the parties and third persons, the law, which has been doubtful, now appears to be that the wife may produce only such letters from third parties to her husband as have come into her possession accidentally, and without any ruse or artifice on her part; but the husband may put in evidence any letters written to or by

his wife which he has obtained by any, short of criminal, means. If the documents put in evidence are not sufficient to satisfy the court, there follows an investigation by means of witnesses, termed an *enquête*. A schedule of allegations is drawn up, and a judge, termed a *juge-commissaire*, is specially appointed to conduct the inquiry. Relatives and servants, though not competent witnesses in ordinary civil actions, are so in divorce proceedings. Cross petitions may be entered; the substantiation of a cross petition, however, does not have the effect, in some cases given to it by English law, of barring a divorce, but a divorce may be, and often is, granted in favour of and against both parties *pour torts réciproques*. When a case comes on for trial, it is in the power of the court to order an adjournment for a period not exceeding six months, which is termed a *temps d'épreuve*, in order to afford an opportunity for reconciliation. It is said, however, that this power is seldom exercised. An appeal may be brought against a decree of divorce within two months; and a decree made on appeal is subject to revision by the court of cassation within two months. Both references to the court of appeal and the court of cassation operate as a stay of execution. A decree must, by the law of 1886, be transcribed on the register of marriages within two months from its date, and failing this transcription, the decree is void. The transcription must be made at the place of celebration of the marriage, or, if the parties are married abroad, at the place where the parties were last domiciled in France. If the parties, after having married abroad, return to France, it has been provided, by a circular of the *Procureur de la République* in 1887, that the transcription may be made at the place of their actual domicile at the time of action brought, a rule which has been held to apply to the divorce of aliens in France. The effect of transcription does not relate back to the date of the decree.

Opinions may differ as to the relative merits of the English and French law relating to divorce. But it cannot be denied that the French law presents a singularly complete and well-considered system, and one which, obviously with the English system in view, has endeavoured to graft on it provisions supplementing its omissions, and modifying certain of its terms in accordance with the light afforded by experience and the changed feelings of the modern world. The effect of the laws of 1884 and 1886 in France has been great. The act of 1907 dealing with divorce, coupled with that of the 21st of July of the

same year dealing with marriage, may also be said to mark an epoch in the laws relating to women. During the five years from 1884 to 1888 the courts granted divorces in 21,064 cases, rejecting applications for divorce in 1524. In addition, there were 12,242 applications for judicial separation, of which 10,739 were granted. A distinguished French writer, the author of a work of singular completeness and accuracy on the judicial system of Great Britain has compared these figures with the corresponding result of the English act of 1857. His conclusion is expressed in these words: "On voit qu'en cinq années nos tribunaux out prononcé trois fois plus de divorces que la haute cour d'Angleterre n'en a prononcé en trente ans. Je n'insiste pas sur les conclusions morales à tirer de ce rapprochement" (Comte de Franqueville, *Le Système judiciaire de la Grande-Bretagne*, ii. p. 171). It is, however, practically impossible to compare the number of divorces in France and in England with exact justice, because, as will have been seen above, the causes of divorce in France materially exceed those recognized by English law; and the absence in France of any official performing the functions assigned to the king's proctor in England cannot but have great influence on the number of applications for divorce, as well as on their results.

(ST H.)

UNITED STATES

According to American practice, divorce is the termination by proper legal authority, sometimes legislatively but usually judicially, of a marriage which up to the time of the decree was legal and binding. It is to be distinguished from a decree of nullity of marriage, which is simply a legal determination that no legal marriage has ever existed between the two parties. It is also to be distinguished from a decree of separation, which permits or commands the parties to live apart, but does not completely and for all purposes sever the marriage tie. The matrimonial law of England, as at the time of the declaration of independence, forms part of the common law of the United States. But as no ecclesiastical courts have ever existed there, the law must be considered to have been inoperative. There is no Federal jurisdiction in divorce, and it is a question for the law of each separate state; and though it is competent to Congress to authorize divorces in the Territories, still it

appears that this subject like others is usually left to the territorial legislature. In the different states, and in England, divorces were at first granted by the legislatures, whether directly or by granting special authority to the tribunals to deal with particular cases. This practice fell into general disrepute, and by the constitution of some states such divorces are expressly prohibited.

Upon the subject of divorce in the United States, and, to some extent, in foreign countries, a careful investigation was made by the American Bureau of Labour, and its report covered the years 1867 to 1886; a further report for the period 1887 to 1906 has also been published by the Federal Census Bureau. The number of divorces was in 1886 over 25,000, and in 1906 was over 72,000, about double the number reported for that year from all the rest of the Christian world. As divorce presupposes a legal marriage, the amount of divorce, or the divorce-rate, is best stated as the ratio between the number of divorces decreed during a year and the number of subsisting marriages or married couples. The usual basis is 100,000 married couples. In 1898-1902 the divorce-rate was 200 divorces (400 people) to 100,000 married couples. This is equivalent to more than one divorce annually to each 1400 people. The several states differ in divorce-rate, from South Carolina, with no provision for legal divorce, to Montana and Washington, where the rate is two and a half times the average for the country. In general the rate is about the same in the North as in the South, but greater in the Central states than in the East, and in the Western than in the Central states; but to this rule the New England states, Louisiana, New Mexico and Arizona are exceptions. The New England states have a higher rate than their geographical position would lead one to expect, and the other three, owing doubtless, in part at least, to the influence of the Roman Catholic Church, have a lower rate than the states about them. The several state groups had in 1900 the following divorce-rates per 100,000: South Atlantic, 196; North Atlantic, 200; South Central, 558; North Central, 510; Western, 712. The divorce-rate in the United States increased rapidly and steadily in forty years from 27 in 1867 to 86 in 1906. But distinct tendencies are traceable in different regions. In the North Atlantic group the rate rose by 58%, in the North Central by 158%, in the Western by 223%, in the South Atlantic by 437%, and in the South Central by 685%. The great increase in the South was mainly due to the spread of divorce among the

emancipated negroes. Each state determines for itself the causes for which divorce may be granted, and no general statement is therefore possible.

The ground pleaded for a divorce is seldom an index to the motives which caused the suit to be brought. This is determined by the character of the law rather than by the state of mind of the parties; and so far as the individuals are concerned, the ground alleged is thus a cloak rather than a clue or revelation. Still those causes which have been enacted into law by the various state legislatures do indicate the pleas which have been endorsed by the social judgment of the respective communities. In the United States exclusive of Alaska and the recent insular accessions there are forty-nine different jurisdictions in the matter of divorce. Six out of every seven allow divorce for desertion, adultery or cruelty; and of the 945,625 divorces reported with their causes during the twenty years 1887-1906 nearly 78% were granted for some one of these three causes, viz. 39% for desertion, 22% for adultery, and 16% for cruelty. Probably nearly 9% more were for some combination of these causes. Three other grounds for divorce are admitted as legal in many or most American states, viz. imprisonment in 39, habitual drunkenness in 38, and neglect to provide in 22. About 98% of American divorces are granted on some one or more of these six grounds. In general the legislation on the subject of the causes allowed for divorce is most restrictive in the states on the Atlantic coast, from New York to South Carolina inclusive, and is least so in the Western states. The slight expense of obtaining a divorce in many of the states, and the lack of publicity which is given to the suit, are also important reasons for the great number of decrees issued. The importance of the former consideration is reflected in the fact that the divorce-rate for the United States as a whole shows clearly, in its fluctuations, the influences of good and bad times. When times are good and the income of the working and industrial classes likely to be assured, the divorce-rate rises. In periods of industrial depression it falls, fluctuating thus in the same way and probably for the same reason that the marriage-rate in industrial communities fluctuates. In two-thirds of the divorce suits the wife is the plaintiff, and the proportion slightly increased in the forty years. In the Northern states the percentage issued to wives (1887-1906) was 71, while in the Southern states it was only 56. But where both parties desire a decree, and each has a legal ground to urge, a jury will usually listen more favourably to a woman’s suit.

Divorce is probably especially frequent among the native population of the United States, and among these probably more common in the city than in the country. This statement cannot be established absolutely, since statistics afford no means of distinguishing the native from the foreign-born applicants. It is, however, the most obvious reason for explaining the fact that, while in Europe the city divorce-rate is from three to five times as great as that of the surrounding country, the difference in the United States between the two regions is very much less. In other words, the great number of foreigners in American cities probably tends to obscure by a low divorce-rate the high rate of the native population. Divorce is certainly more common in the New England states than in any others on the Atlantic coast north of Florida, and it is not unlikely that wherever the New England families have gone divorce is more frequent than elsewhere. For example, it is much more common in the northern counties of Ohio settled largely from New England than in the southern counties settled largely from the Middle Atlantic states.

There are two statements frequently made regarding divorce in the United States which do not find warrant in the statistics on the subject. The first is, that the real motive for divorce with one or both parties is the desire for marriage to a third person. The second is, that a very large proportion of divorces are granted to persons who move from one jurisdiction to another in order to avail themselves of lax divorce laws. On the first point the American statistics are practically silent, since, in issuing a marriage licence to parties one or both of whom have been previously divorced, no record is generally made of the fact. In Connecticut, however, for a number of years this information was required; and, if the statements were trustworthy, the number of persons remarrying each year was about one-third the total number of persons divorcing, which is probably a rate not widely different from that of widows and widowers of the same age. Foreign figures for Switzerland, Holland and Berlin indicate that in those regions the proportion of the divorced who remarry speedily is about the same as that of widows and widowers. What statistical evidence there is on the subject therefore tends to discredit this popular opinion. The evidence on the second point is more conclusive, and has gone far towards decreasing the demand for a constitutional amendment allowing a federal marriage and divorce law. About four-fifths of all the divorces granted in the United States were issued to parties who were married in the state in which the decree of divorce

was later made; and when from the remaining one-fifth are deducted those in which the parties migrated for other reasons than a desire to obtain an easy divorce, the remainder would constitute a very small, almost a negligible, fraction of the total number.

It is difficult, perhaps impossible, to say how far the frequency of divorce in the United States has been or is a social injury; how far it has weakened or undermined the ideal of marriage as a lifelong union between man and woman. In this respect the question is very like that of illegitimacy; and as the most careful students of the latter subject agree that almost no trustworthy inference regarding the moral condition of a community can be derived from the proportion of illegitimate children born, so one may say regarding the prevalence of divorce that from this fact almost no inferences are warranted regarding the moral or social condition of the population. It is by no means impossible, for example, that the spread of divorce among the negro population in the South marks a step in advance from the condition of largely unregulated and illegal unions characteristic of the race immediately after the war. The prevalence of divorce in the United States among the native population, in urban communities, among the New England element, in the middle classes of society, and among those of the Protestant faith, indicates how closely this social phenomenon is interlaced with much that is characteristic and valuable in American civilization. In this respect, too, the United States perhaps represent the outcome of a tendency which has been at work in Europe at least since the Reformation. Certainly the divorce-rate is increasing in nearly every civilized country. Decrees of nullity of marriage and decrees of separation not absolutely terminating the marriage relation are relatively far less prevalent than they were in the medieval and early modern period, and many persons who under former conditions would have obtained relief from unsatisfactory unions through one or the other of these avenues now resort to divorce. The increasing proportion of the community who have an income sufficient to pay the requisite legal fees is also a factor of great importance. The belief in the family as an institution ordained of God, decreed to continue “till death us do part,” and in its relations typifying and perpetuating many holy religious ideas, probably became weakened in the United States during the 19th century, along with a weakening of other religious conceptions; and it is yet to be determined whether a substitute for these ideas can

be developed under the guidance of the motive of social utility or individual desire. In this respect the United States is, as Mr Gladstone once wrote, a *tribus praerogativa*, but one who knows anything of the family and home life of America will not readily despond of the outcome.

The great source of American statistical information is the governmental report of over 1000 pages, *A Report on Marriage and Divorce in the United States 1867 to 1886, including an Appendix relating to Marriage and Divorce in Certain Countries of Europe*, by Carroll D. Wright, Commissioner of Labour; together with the further report for 1887 to 1906. The statistics contained in the former volume have been analysed and interpreted in W. F. Willcox's *The Divorce Problem: A Study in Statistics* (Columbia University, New York, 1891, 1897). Further interpretations are contained in an article in the *Political Science Quarterly* for March 1893, entitled "A Study in Vital Statistics." The best legal treatise is probably Bishop on *Marriage, Divorce, and Judicial Separation*. See also J. P. Lichtenberger, *Divorce: A Study in Social Causation* (New York, 1909).

(W. F. W.)

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1 In *Constantinidi* v. *Constantinidi and Lance* (1903), in which both parties were guilty of misconduct, it was held by Sir Francis Jeune (Lord St Helier) that where a wife has by her misconduct broken up the home (the husband's misconduct not having conduced to the wife's adultery) the court would exercise its discretion in favour of the husband petitioner, and, further, the wife being a rich woman, it was justifiable to give her husband a portion of her income, in order to preserve to him the position he would have occupied as her husband, the broad principle being that a guilty respondent should not be allowed to profit by divorce. But further litigation concerning this case occurred as to the variation of the marriage settlements in favour of the husband, and the decision of the court of appeal in July 1905 considerably modified the decision of Sir Francis Jeune.—Ed. *E. B.*

2 It is to be noted that by a decision of the court of appeal in *Harriman* v. *Harriman* in 1909, where a wife has been deserted by her husband and has obtained a separation order within two years from the time when the desertion commenced, she loses her right to plead desertion under the Matrimonial Causes Act 1857, and is therefore not entitled to a divorce after two years' desertion, upon proof of adultery. See also *Dodd* v. *Dodd*, 1906, 22 T. L. R. 484.

3 In 1909 a Royal Commission was appointed to inquire into the law of divorce, with special reference to the position of the poorer classes.

4 It is interesting to observe how, according to the latest decisions of the House of Lords, cruelty, according to English law, includes some but not others of the forms of injury for which, under the term of *injures graves*, the French law affords a remedy. It may well be doubted whether the view

taken by the minority of the peers in *Russell* v. *Russell*, which would have included in the definition of cruelty all, or nearly all, of that which the French law deems either *sévices* or *injures graves*, would not have better satisfied both the principles of English jurisprudence and the feelings of modern life.

DIWANIEH, a small town in Turkish Asia, about 40 m. below Hillah, on both banks of the Euphrates (31° 58′ 47″ N., 44° 58′ 18″ E.), which is here spanned by a floating bridge. Formerly a military post for the control of the Affech territory, and a telegraph station, it was in 1893 made the capital of the sanjak, instead of Hillah, on account of its more strategical position. This transfer of the seat of government represented a step in the development of Turkish control over the central regions of Irak.

DIX, DOROTHEA LYNDE (1802-1887), American philanthropist, was born at Hampden, Maine, on the 4th of April 1802. Her parents were poor and shiftless, and at an early age she was taken into the home in Boston of her grandmother, Dorothea Lynde, wife of Dr Elijah Dix. Here she was reared in a distinctly Puritanical atmosphere. About 1821 she opened a school in Boston, which was patronized by the well-to-do families; and soon afterwards she also began teaching poor and neglected children at home. But her health broke down, and from 1824 to 1830 she was chiefly occupied with the writing of books of devotion and stories for children. Her *Conversations on Common Things* (1824) had reached its sixtieth edition by 1869. In 1831 she established in Boston a model school for girls, and conducted this successfully until 1836, when her health again failed. In 1841 she became interested in the condition of gaols and almshouses, and spent two years in visiting every such institution in Massachusetts, investigating especially the treatment of the pauper

insane. Her memorial to the state legislature dealing with the abuses she discovered resulted in more adequate provision being made for the care and treatment of the insane, and she then extended her work into many other states. By 1847 she had travelled from Nova Scotia to the Gulf of Mexico, and had visited 18 state penitentiaries, 300 county gaols and houses of correction, and over 500 almshouses. Her labours resulted in the establishment of insane asylums in twenty states and in Nova Scotia and Newfoundland, and in the founding of many additional gaols and almshouses conducted on a reformed plan. In 1853 she secured more adequate equipment for the life-saving service on Sable Island, then rightly called "the graveyard of ships." In 1854 she secured the passage by Congress of a bill granting to the states 12,250,000 acres of public lands, to be utilized for the benefit of the insane, deaf, dumb and blind; but the measure was vetoed by President Pierce. After this disappointment she went to England for rest, but at once became interested in the condition of the insane in Scotland, and her report to the home secretary opened the way for sweeping reforms. She extended her work into the Channel Islands, and then to France, Italy, Austria, Greece, Turkey, Russia, Sweden, Norway, Denmark, Holland, Belgium and a part of Germany. Her influence over Arinori Mori, the Japanese *chargé d'affaires* at Washington, led eventually to the establishment of two asylums for the insane in Japan. At the outbreak of the Civil War she offered her services to the Federal government and was appointed superintendent of women nurses. In this capacity she served throughout the war, without a day's furlough; and her labours on behalf of defectives were continued after the war. After a lingering illness of six years she died at Trenton, New Jersey, on the 17th of July 1887.

See Francis Tiffany, *Life of Dorothea Lynde Dix* (Boston, 1892).

DIX, JOHN ADAMS (1798-1879), American soldier and political leader, was born at Boscawen, New Hampshire, on the 24th of July 1798. He studied at Phillips Exeter Academy in 1810-1811 and at the College of Montreal in 1811-1812, and as

a boy took part in the War of 1812, becoming a second lieutenant in March 1814. In July 1828, having attained the rank of captain, he resigned from the army, and for two years practised law at Cooperstown, New York. In 1830-1833 he was adjutant-general of New York. He soon became prominent as one of the leaders of the Democratic party in the state, and for many years was a member of the so-called "Albany Regency," a group of Democrats who between about 1820 and 1850 exercised a virtual control over their party in New York, dictating nominations and appointments and distributing patronage. From 1833 to 1839 he was secretary of state and superintendent of schools in New York, and in this capacity made valuable reports concerning the public schools of the state, and a report (1836) which led to the publication of the *Natural History of the State of New York* (1842-1866). In 1842 he was a member of the New York assembly. In 1841-1843 he was editor of *The Northern Light*, a literary and scientific journal published in Albany. From 1845 to 1849 he was a United States senator from New York; and as chairman of the committee on commerce was author of the warehouse bill passed by Congress in 1846 to relieve merchants from immediate payment of duties on imported goods. In 1848 he was nominated for governor of New York by the Free Soil party, but was defeated by Hamilton Fish. His acceptance of the nomination, however, earned him the enmity of the southern Democrats, who prevented his appointment by Pierce as secretary of state and as minister to France in 1853. In this year Dix was for a few weeks assistant U.S. treasurer in New York city. In May 1860 he became postmaster of New York city, and from January until March 1861 he was secretary of the treasury of the United States, in which capacity he issued (January 29, 1861) to a revenue officer at New Orleans a famous order containing the words, "if any one attempts to haul down the American flag, shoot him on the spot." He rendered important services in hurrying forward troops in 1861, was appointed major-general of volunteers in June 1861, and during the Civil War commanded successively the department of Maryland (July 1861-May 1862), Fortress Monroe (May 1862-July 1863), and the department of the East (July 1863-July 1865). He was minister to France from 1866 to 1869, and in 1872 was elected by the Republicans governor of New York, but was defeated two years later. He had great energy and administrative ability, was for a time president of the Chicago & Rock Island and of the Mississippi & Missouri railways, first president of the Union Pacific in 1863-1868, and for a short time in 1872 president of the Erie. He died in New York city on the

21st of April 1879. Among his publications are *A Winter in Madeira and a Summer in Spain and Florence* (1850), and *Speeches and Occasional Addresses* (1864). He wrote excellent English versions of the *Dies irae* and the *Stabat mater*.

His son, MORGAN DIX (1827-1908), graduated at Columbia in 1848 and at the General Theological Seminary in 1852, and was ordained deacon (1852) and priest (1853) in the Protestant Episcopalian church. In 1855-1859 he was assistant minister, and in 1859-1862 assistant rector, of Trinity Church, New York city, of which he was rector from 1862 until his death. He published sermons and lectures; *A History of the Parish of Trinity Church, New York City* (4 vols., 1898-1905); and a biography of his father. *Memoirs of John Adams Dix* (2 vols., New York, 1883).

DIXON, GEORGE (1755?-1800), English navigator. He served under Captain Cook in his third expedition, during which he had an opportunity of learning the commercial capabilities of the north-west coast of North America. After his return from Cook's expedition he became a captain in the royal navy. In the autumn of 1785 he sailed in the "Queen Charlotte," in the service of the King George's Sound Company of London, to explore the shores of the present British Columbia, with the special object of developing the fur trade. His chief discoveries were those of Queen Charlotte's Islands and Sound (the latter only partial), Port Mulgrave, Norfolk Bay, and Dixon's Entrance and Archipelago. After visiting China, where he disposed of his cargo, he returned to England (1788), and published (1799) *A Voyage round the World, but more particularly to the North-West Coast of America*, the bulk of which consists of descriptive letters by William Beresford, his supercargo. His own contribution to the work included valuable charts and appendices. He is usually, though not with absolute certainty, identified with the George Dixon who was author of *The Navigator's Assistant* (1791) and teacher of navigation at Gosport.

DIXON, HENRY HALL (1822-1870), English sporting writer over the *nom de plume* "The Druid," was born at Warwick Bridge, Cumberland, on the 16th of May 1822, and was educated at Rugby and at Trinity College, Cambridge, where he graduated in 1846. He took up the profession of the law, but, though called to the bar in 1853, soon returned to sporting journalism, in which he had already made a name for himself, and began to write regularly for the *Sporting Magazine*, in the pages of which appeared three of his novels, *Post and Paddock* (1856), *Silk and Scarlet* (1859), and *Scott and Sebright* (1862). He also published a legal compendium entitled *The Law of the Farm* (1858), which ran through several editions. His other more important works were *Field and Fern* (1865), giving an account of the herds and flocks of Scotland, and *Saddle and Sirloin* (1870), treating in the same manner those of England. He died at Kensington on the 16th of March 1870.

See Hon. Francis Lawley, *Life and Times of "The Druid"* (London, 1895).

DIXON, RICHARD WATSON (1833-1900), English poet and divine, son of Dr James Dixon, a Wesleyan minister, was born on the 5th of May 1833. He was educated at King Edward's school, Birmingham, and on proceeding to Pembroke College, Oxford, became one of the famous "Birmingham group" there who shared with William Morris and Burne-Jones in the Pre-Raphaelite movement. He took only a second class in moderations in 1854, and a third in *Literae Humaniores* in 1856; but in 1858 he won the Arnold prize for an historical essay, and in 1863 the English Sacred Poem prize. He was ordained in 1858, was second master of Carlisle high school, 1863-1868, and successively vicar of Hayton, Cumberland, and Warkworth, Northumberland. He became minor canon and honorary librarian of Carlisle in 1868, and honorary canon in 1874, he was proctor in convocation (1890-1894), and received the honorary degree of D.D. from Oxford in 1899. He died at Warkworth on the 23rd of January 1900. Canon Dixon's first two volumes of verse,

Christ's Company and *Historical Odes*, were published in 1861 and 1863 respectively; but it was not until 1883 that he attracted conspicuous notice with *Mano*, an historical poem in *terza rima*, which was enthusiastically praised by Mr Swinburne. This success he followed up by three privately printed volumes. *Odes and Eclogues* (1884), *Lyrical Poems* (1886), and *The Story of Eudocia* (1888). Dixon's poems were during the last fifteen years of his life recognized as scholarly and refined exercises, touched with both dignity and a certain severe beauty, but he never attained any general popularity as a poet, the appeal of his poetry being directly to the scholar. A great student of history, his studies in that direction colour much of his poetry. The romantic atmosphere is remarkably preserved in *Mano*, a successful metrical exercise in the difficult *terza rima*. His typical poems have charm and melody, without introducing any new note or variety of rhythm. He is contemplative, sober and finished in literary workmanship, a typical example of the Oxford school. Pleasant as his poetry is, however, he will probably be longest remembered by the work to which he gave the best years of his life, his *History of the Church of England from the Abolition of the Roman Jurisdiction* (1878-1902). At the time of his death he had completed six volumes, two of which were published posthumously. This fine work, covering the period from 1529 to 1570, is built upon elaborate research, and presents a trustworthy and unprejudiced survey of its subject.

Dixon's *Selected Poems* were published in 1909 with a memoir of the author by Robert Bridges.

DIXON, WILLIAM HEPWORTH (1821-1879), English author and traveller, was born at Great Ancoats, Manchester, on the 30th of June 1821, a member of an old Lancashire family. Beginning life as a clerk at Manchester, he decided, in 1846, to take up literature as a career. After gaining some journalistic experience at Cheltenham he settled in London, on the recommendation of Douglas Jerrold, and contributed to the *Athenaeum* and *Daily News*. His series of papers—"The Literature of the Lower Orders"—in the last-named journal, and a further series, "London Prisons," were widely noticed. In 1849 appeared his *John Howard and the Prison World of Europe*, which proved a great popular success. These were followed by a *Life of William Penn* (1851), in which he replied to Macaulay's attack on Penn; *Life of Blake* (1852); and *Personal History of Lord Bacon* (1861), supplemented by *The Story of Lord Bacon's Life* (1862). From 1853 to 1869 he was editor of the *Athenaeum*. In 1863 he visited the East, and on his return helped to found the Palestine Exploration Fund, and published (1865) *The Holy Land*. In 1866 he travelled through the United States, publishing, in 1867, *New America*, and, the following year, *Spiritual Wives*, two supplementary volumes. In the autumn of 1867 he journeyed through the Baltic Provinces, publishing an account of his trip in *Free Russia* (1870). In 1871 he was in Switzerland, and in 1872 in Spain, where he wrote the greater part of his *History of Two Queens*. In 1874 he revisited the United States, giving the impressions of his tour in *The White Conquest* (1875). His other works, besides some fiction, were *British Cyprus* (1879) and *Royal Windsor*. He died on the 26th of December 1879. His daughter, Ella N. Hepworth Dixon, became known as a journalist and novelist.

DIXON, a city and the county seat of Lee county, Illinois, U.S.A., on the Rock river, in the N.W. part of the state. Pop. (1890) 5161; (1900) 7917 (879 foreign-born); (1910) 7216. It is served by the Chicago & North-Western and the Illinois Central railways, and is connected with Sterling by an electric line; freight is shipped over the Hennepin Canal. The city has two parks of 159 and 6 acres respectively, and there is a Chautauqua Park, where an annual Chautauqua Assembly is held. Dixon is the seat of the Northern Illinois normal school (incorporated in 1884), and of the Rock River military academy. The river furnishes water power for the street railways, electric lighting and a number of manufacturing establishments. Among the manufactures are condensed milk, boxes, wire screens and wire cloth, lawn mowers, gas engines, cement, agricultural implements, shoes and wagons. The place was laid out in 1835 by John Dixon (1784-1876), the first white settler of Lee county. A bronze tablet in the Howells Building, at the intersection of First and Peoria Streets, marks the site of his cabin, and in the city cemetery a granite shaft has been erected to his memory. Dixon was chartered as a city in 1859.

DIZFUL, or DIZ-PUL ("fort-bridge"), a town of Persia, in the province of Arabistan, 36 m. N.W. of Shushter, in 32° 25′ N., 48° 28′ E. Pop. about 25,000. It has post and telegraph offices. It is situated on the left bank of the Dizful river, a tributary of the Karun, crossed by a fine bridge of twenty-two arches, 430 yds. in length, constructed on ancient foundations. Dizful is the chief place of a small district of the same name and the residence of the governor of Arabistan during

the winter months. The district has twelve villages and a population of about 35,000 (5000 Arabs of the Ali i Kethīr tribe), and pays a yearly tribute of about £6000. The city was formerly known as Andamish, and in its vicinity are many remains of ancient canals and buildings which afford conclusive proof of former importance. 16 m. S.W. are the ruins of Susa, and east of them and half-way between Dizful and Shushter stood the old city of Junday Shapur.

DJAKOVO (sometimes written *Djakovar*, Hungarian *Diakovár*), a city of Croatia-Slavonia, Hungary; in the county of Virovitica, 100 m. E. by S. of Agram. Pop. (1900) 6824. Djakovo is a Roman Catholic episcopal see, whose occupant bears the title "Bishop of Bosnia, Slavonia and Sirmium." During the life of Bishop Strossmayer (1815-1905) it was one of the chief centres of religious and political activity among the Croats. The cathedral, a vast basilica built of brick and white stone, with a central dome and two lofty spires above the north entrance, was founded in 1866 and consecrated in 1882. Its style is Romanesque, chosen by Strossmayer as symbolical of the position of his country midway between east and west. The interior is magnificently decorated with mosaics, mural paintings and statuary, chiefly the work of local artists. Other noteworthy buildings are the nunnery, ecclesiastical seminary and episcopal palace. Djakovo has a thriving trade in agricultural produce. Many Roman remains have been discovered in the neighbourhood, but the earliest mention of the city is in 1244, when Béla IV. of Hungary confirmed the title-deeds of its owners, the bishops of Bosnia.

For a full description of the cathedral, in Serbo-Croatian and French, see the finely illustrated folio *Stolna Crkva u Djakovu*, published by the South Slavonic Academy (Agram, 1900).

DLUGOSZ, JAN [JOHANNES LONGINUS] (1415-1480), Polish statesman and historian, was the son of Jan Dlugosz, burgrave of Bozeznica. Born in 1415, he graduated at the university of Cracow and in 1431 entered the service of Bishop Zbygniew Olesnicki (1389-1455), the statesman and diplomatist. He speedily won the favour of his master, who induced him to take orders and made him his secretary. His preferment was rapid. In 1436 we find him one of the canons of Cracow and the administrator of Olesnicki's vast estates. In 1440, on returning from Hungary, whither his master had escorted King Wladislaus II., Dlugosz saved the life of Olesnicki from robbers. The prelate now employed Dlugosz on the most delicate and important political missions. Dlugosz brought Olesnicki the red hat from Rome in 1449, and shortly afterwards was despatched to Hungary to mediate between Hunyadi and the Bohemian condottiere Giszkra, a difficult mission which he most successfully accomplished. Both these embassies were undertaken contrary to the wishes of King Casimir IV., who was altogether opposed to Olesnicki's ecclesiastical policy. But though he thus sacrificed his own prospects to the cardinal's good pleasure, Dlugosz was far too sagacious to approve of the provocative attitude of Olesnicki, and frequently and fearlessly remonstrated with him on his conduct. In his account, however, of the quarrel between Casimir and Olesnicki concerning the question of priority between the cardinal and the primate of Poland he warmly embraced the cause of the former, and even pronounced Casimir worthy of dethronement. Such outbursts against Casimir IV. are not infrequent in Dlugosz's *Historia Polonica*, and his strong personal bias must certainly be taken into consideration in any critical estimate of that famous work. Yet as a high-minded patriot Dlugosz had no sympathy whatever with Olesnicki's opposition to Casimir's Prussian policy, and steadily supported the king during the whole course of the war with the Teutonic knights. When Olesnicki died in 1455 he left Dlugosz his principal executor. The office of administering the cardinal's estate was a very ungrateful

one, for the family resented the liberal benefactions of their kinsman to the Church and the university, and accused Dlugosz of exercising undue influence, from which charge he triumphantly vindicated himself. It was in the year of his patron's death that he began to write his *Historia Polonica*. This great book, the first and still one of the best historical works on Poland in the modern sense of the word, was only undertaken after mature consideration and an exhaustive study of all the original sources then available, some of which are now lost. The principal archives of Poland and Hungary were ransacked for the purpose, and in his account of his own times Dlugosz's intimate acquaintance with the leading scholars and statesmen of his day stood him in good stead. The style is modelled on that of Livy, of whom Dlugosz was a warm admirer. As a proof of the thoroughness and conscientiousness of Dlugosz it may be mentioned that he learned the Cyrillic alphabet and took up the study of Ruthenian, "in order that this our history may be as plain and perfect as possible." The first of the numerous imprints of the *Historia Polonica* appeared in 1614, the first complete edition in 1711.

Dlugosz's literary labours did not interfere with his political activity. In 1467 the generous and discerning Casimir IV. entrusted Dlugosz with the education of his sons, the eldest of whom, Wladislaus, at the urgent request of the king, he accompanied to Prague when in 1471 the young prince was elected king of Bohemia. Dlugosz refused the archbishopric of Prague because of his strong dislike of the land of the Hussites; but seven years later he accepted the archbishopric of Lemberg. His last years were devoted to his history, which he completed in 1479. He died on the 19th of May 1480, at Piatek.

See Aleksander Semkowicz, *Critical Considerations of the Polish Works of Dlugosz* (Pol.; Cracow, 1874); Michael Bobrzynski and Stanislaw Smolka, *Life of Dlugosz and his Position in Literature* (Pol.; Cracow, 1893).

(R. N. B.)

DMITRIEV, IVAN IVANOVICH (1760-1837), Russian statesman and poet, was born at his father's estate in the government of Simbirsk. In consequence of the revolt of Pugachev the family had to flee to St Petersburg, and there Ivan was entered at the school of the Semenov Guards, and afterwards obtained a post in the military service. On the accession of Paul to the imperial throne he quitted the army with the title of colonel; and his appointment as procurator for the senate was soon after renounced for the position of privy councillor. During the four years from 1810 to 1814 he served as minister of justice under the emperor Alexander; but at the close of this period he retired into private life, and though he lived more than twenty years, he never again took office, but occupied himself with his literary labours and the collection of books and works of art. In the matter of language he sided with Karamsin, and did good service by his own pen against the Old Slavonic party. His poems include songs, odes, satires, tales, epistles, &c., as well as the fables—partly original and partly translated from Fontaine, Florian and Arnault—on which his fame chiefly rests. Several of his lyrics have become thoroughly popular from the readiness with which they can be sung; and a short dramatico-epic poem on Yermak, the Cossack conqueror of Siberia, is well known.

His writings occupy three volumes in the first five editions; in the 6th (St Petersburg, 1823) there are only two. His memoirs, to which he devoted the last years of his life, were published at Moscow in 1866.

DNIEPER, one of the most important rivers of Europe (the *Borysthenes* of the Greeks, *Danapris* of the Romans, *Uzi* or *Uzu* of the Turks, Eksi of the Tatars, *Elice* of Visconti's map (1381), *Lerene* of Contarini (1437), *Luosen* of Baptista of Genoa (1514), and *Lussem* in the same century). It belongs entirely to Russia, and rises in the government of Smolensk, in a swampy district (alt. 930 ft.) at the

foot of the Valdai Hills, not far from the sources of the Volga and the Dvina, in 55° 52’ N. and 33° 41’ E. Its length is about 1410 m. and it drains an area of 202,140 sq. m. In the first part of its course, which may be said to end at Dorogobuzh, it flows through an undulating country of Carboniferous formation; in the second it passes west to Orsha, south through the fertile plain of Chernigov and Kiev, and then south-east across the rocky steppe of the Ukraine to Ekaterinoslav. About 45 m. S. of this town it has to force its way across the same granitic offshoot of the Carpathian mountains which interrupts the course of the Dniester and the Bug, and for a distance of about 25 m. rapid succeeds rapid. The fall of the river in that distance is 155 ft. The Dnieper, having got clear of the rocks, continues south-west through the grassy plains of Kherson and Taurida, and enters the Black Sea, or rather a *liman* or bay of the Black Sea, by a considerable estuary in 46° 30′ N. and 32° 20′ E. On this ramifying *liman*, into which the Bug also pours its waters, stand Nikolaiev and the fortified town of Ochakov. Navigation extends as far up as Dorogobuzh, where the depth is about 12 ft., and rafts are floated down from the higher reaches. The banks are generally high, more particularly the left bank. About the town of Smolensk the breadth is 455 ft., at the confluence of the Pripet 1400, and in some parts of the Ekaterinoslav district more than 1¼ m. In the course above the rapids the channel varies very greatly in nature and depth, and it is not infrequently interrupted by shallows. The rapids, or *porogs*, form a serious obstacle to navigation; it is only for a few weeks when the river is in flood that they are passable, and even then the venture is not without risk and can only be undertaken with the assistance of special pilots. It is from these falls that the Cossacks of the Ukraine came to be known as Zaporogian Cossacks. As early as 1732 an attempt was made to improve the channel. A canal, which ultimately proved too small for use, was constructed at Nenasitets in 1780 at private expense; blastings were carried out in 1798 and 1799 at various parts; in 1805 a canal was formed at Kaindatski, and the channel straightened at Sursk; by 1807 a new canal was completed at Nenasitets; in 1833 a passage was cleared through the Staro-kaindatski porog; and in the period 1843 to 1853 numerous ameliorations were effected. The result has been not only to diminish greatly the

dangers of the natural channel, but also to furnish a series of artificial canals by which vessels can make their way when the river is low. Of the tributaries of the Dnieper the following are navigable,—the Berezina and the Pripet from the right, and the Sozh and the Desna from the left. By means of the Dnieper-Bug (King's) canal, and the Berezina and Oginski canals, this river has a sort of water connexion with the Baltic Sea. In the estuary the fisheries give employment to large numbers of people. At Kiev the river is free from ice on an average of 234 days in the year, at Ekaterinoslav 270 and at Kherson 277.

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

DNIESTER (*Tyras* and *Danaster* or *Danastris* of classical authors, *Nistrul* of the Rumanians, and *Turla* of the Turks), a river of south-eastern Europe belonging to the basin of the Black Sea. It rises on the northern slope of the Carpathian mountains in Austrian Galicia, and belongs for the first 350 m. of its course to Austrian, for the remaining 515 m. to Russian, territory. It drains an area of 29,670 sq. m., of which 16,500 sq. m. belong to Russia. It is excessively meandering, and the current in most parts even during low water is decidedly rapid as compared with Russian rivers generally, the mean rate being calculated at 1⁷⁄₁₁ m. per hour. The average width of the channel is from 500 to 750 ft., but in some places it attains as much as 1400 ft.; the depth is various and changeable. The principal interruption in the navigable portion of the river, besides a sprinkling of rocks in the bed and the somewhat extensive shallows, is occasioned by a granitic spur from the Carpathians, which gives rise to the Yampol Rapids. For ordinary river craft the passage of these rapids is rendered possible, but not free from danger, by a natural channel on the left side, and by a larger and deeper artificial channel on the right; for steamboats they form an insuperable barrier. The river falls into the sea by several arms, passing through a shallow *liman* or lagoon, a few miles S.W. of Odessa. There are two periodical

floods,—the earlier and larger caused by the breaking up of the ice, and occurring in the latter part of February or in March; and the later due to the melting of the snows in the Carpathians, and taking place about June. The spring flood raises the level of the water 20 ft., and towards the mouth of the river submerges the gardens and vineyards of the adjacent country. In some years the general state of the water is so low that navigation is possible only for three or four weeks, while in other years it is so high that navigation continues without interruption; but in recent years considerable improvements have been effected at government expense. In consequence the traffic has increased, the Dniester tapping regions of great productiveness, especially in cereals and timber, namely, Galicia, Podolia and Bessarabia. Steamboat traffic was introduced in the lower reaches in 1840. The fisheries of the lower course and of the estuary are of considerable importance; and these, together with those of the lakes which are formed by the inundations, furnish a valuable addition to the diet of the people in the shape of carp, pike, tench, salmon, sturgeon and eels. Its tributaries are numerous, but not of individual importance, except perhaps the Sereth in Galicia.

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

DOAB, Duab or Dooab, a name, like the Greek Mesopotamia, applied in India, according to its derivation (*do*, two, and *ab*, river), to the stretch of country lying between any two rivers, as the Bari Doab between the Sutlej and the Ravi, the Rechna Doab between the Ravi and the Chenab, the Jech Doab between the Chenab and Jhelum, and the Sind Sagar Doab between the Jhelum and the Indus, but frequently employed, without any distinctive adjunct, as the proper name for the region between the Ganges and its great tributary the Jumna. In like manner the designation of Doab canal is given to the artificial

channel which breaks off from the Jumna near Fyzabad, and flows almost parallel with the river till it reunites with it at Delhi.

DOANE, GEORGE WASHINGTON (1799-1859), American churchman, Protestant Episcopal bishop of New Jersey, was born in Trenton, New Jersey, on the 27th of May 1799. He graduated at Union College, Schenectady, New York, in 1818, studied theology and, in 1821, was ordained deacon and in 1823 priest by Bishop Hobart, whom he assisted in Trinity church, New York. With George Upfold (1796-1872), bishop of Indiana from 1849 to 1872, Doane founded St Luke's in New York City. In 1824-1828 he was professor of belles-lettres in Washington (now Trinity) College, Hartford, Connecticut, and at this time he was one of the editors of the *Episcopal Watchman*. He was assistant in 1828-1830 and rector in 1830-1832 of Christ church, Boston, and was bishop of New Jersey from October 1832 to his death at Burlington, New Jersey, on the 27th of April 1859. The diocese of New Jersey was an unpromising field, but he took up his work there with characteristic vigour, especially in the foundation of St Mary's Hall (1837, for girls) and Burlington College (1846) as demonstrations of his theory of education under church control. His business management of these schools got him heavily into debt, and in the autumn of 1852 a charge of lax administration came before a court of bishops, who dismissed it. The schools showed him an able and wise disciplinarian, and his patriotic orations and sermons prove him a speaker of great power. He belonged to the High Church party and was a brilliant controversialist. He published *Songs by the Way* (1824), a volume of poems; and his hymns beginning "Softly now the light of day" and "Thou art the Way" are well known.

See *Life and Writings of George Washington Doane* (4 vols., New York, 1860-1861), edited by his son, William Croswell Doane (b. 1832), first

bishop of Albany.

DOBBS FERRY, a village of Westchester county, New York, on the E. bank of the Hudson river 2 m. N. of Yonkers. Pop. (1890) 2083; (1900) 2888; (1910 U. S. census) 3455. Dobbs Ferry is served by the Hudson River division of the New York Central railway. There are many fine country places, two private schools—the Mackenzie school for boys and the Misses Masters' school for girls—and the children's village (with about thirty cottages) of the New York juvenile asylum. The name of the village was derived from a Swede, Jeremiah Dobbs, whose family probably moved hither from Delaware, and who at the beginning of the last quarter of the 18th century had a skiff ferry, which was kept up by his family for a century afterwards. Because Dobbs Ferry had been a part of Philipse Manor all lands in it were declared forfeit at the time of the War of American Independence (see YONKERS), and new titles were derived from the commissioners of forfeitures. The position of the village opposite the northernmost end of the Palisades gave it importance during the war. The region was repeatedly raided by camp followers of each army; earthworks and a fort, commanding the Hudson ferry and the ferry to Paramus, New Jersey, were built; the British army made Dobbs Ferry a rendezvous, after the battle of White Plains, in November 1776, and the continental division under General Benjamin Lincoln was here at the end of January 1777. The American army under Washington encamped near Dobbs Ferry on the 4th of July 1781, and started thence for Yorktown in the following month. In the Van Brugh Livingston house on the 6th of May 1783, Washington and Governor George Clinton met General Sir Guy Carleton, afterwards Lord Dorchester, to negotiate for the evacuation by the British troops of the posts they still held in the United States. In 1873 the village was incorporated as Greenburgh, from the township of the same name

which in 1788 had been set apart from the manor of Phillipsburgh; but the name Dobbs Ferry was soon resumed.

DOBELL, SYDNEY THOMPSON (1824-1874), English poet and critic, was born on the 5th of April 1824 at Cranbrook, Kent. His father was a wine merchant, his mother a daughter of Samuel Thompson (1766-1837), a London political reformer. The family moved to Cheltenham when Dobell was twelve years old. He was educated privately, and never attended either school or university. He refers to this in some lines on Cheltenham College in imitation of Chaucer, written in his eighteenth year. After a five years' engagement he married, in 1844, Emily Fordham, a lady of good family. An acquaintance with Mr (subsequently Sir James) Stansfeld and with the Birmingham preacher-politician, George Dawson (1821-1876), which afterwards led to the foundation of the Society of the Friends of Italy, fed the young enthusiast's ardour for the liberalism of the day. Meanwhile, Dobell wrote a number of minor poems, instinct with a passionate desire for political reform. *The Roman* appeared in 1850, under the *nom de plume* of "Sydney Yendys." Next year he travelled through Switzerland with his wife; and after his return he formed friendships with Robert Browning, Philip Bailey, George MacDonald, Emanuel Deutsch, Lord Houghton, Ruskin, Holman Hunt, Mazzini, Tennyson and Carlyle. His second long poem, *Balder*, appeared in 1854. The three following years were spent in Scotland. Perhaps his closest friend at this time was Alexander Smith, in company with whom he published, in 1855, a number of sonnets on the Crimean War, which were followed by a volume on *England in Time of War*. Although by no means a rich man he was always ready to help needy men of letters, and it was through his exertions that David Gray's poems were published. In 1869 a horse, which he was riding, fell and rolled over with him. His health, which had

for several years necessitated his wintering abroad, was seriously affected by this accident, and he was from this time more or less of an invalid, until his death on the 22nd of August 1874.

As a poet Dobell belongs to the "spasmodic school," as it was named by Professor Aytoun, who parodied its style in *Firmilian*. The epithet, however, was first applied by Carlyle to Byron. The school includes George Gilfillan, Philip James Bailey, John Stanyan Bigg (1826-1865), Dobell, Alexander Smith, and, according to some critics, Gerald Massey. It was characterized by an under-current of discontent with the mystery of existence, by vain effort, unrewarded struggle, sceptical unrest, and an uneasy straining after the unattainable. It thus faithfully reflected a certain phase of 19th century thought. The productions of the school are marked by an excess of metaphor and a general extravagance of language. On the other hand, they exhibit freshness and originality often lacking in more conventional writings. Dobell's poem, *The Roman*, dedicated to the interests of political liberty in Italy, is marked by pathos, energy and passionate love of freedom, but it is overlaid with monologue, which is carried to a dreary excess in *Balder*, relieved though the latter is by fine descriptive passages, and by some touching songs. Dobell's suggestive, but too ornate prose writings were collected and edited with an introductory note by Professor J. Nichol (*Thoughts on Art, Philosophy and Religion*) in 1876. In his religious views Dobell was a Christian of the Broad Church type; and socially he was one of the most amiable and true-hearted of men. His early interest in the cause of oppressed nationalities, shown in his friendship with Kossuth, Emanuel Deutsch and others, never lessened, although his views of home politics underwent some change from the radical opinions of his youth. In Gloucestershire Dobell was well known as an advocate of social reform, and he was a pioneer in the application of the co-operative system to private enterprise.

The standard edition of his poems (1875) by Professor Nichol includes a memoir.

DÖBELN, a town of Germany, in the kingdom of Saxony, on the (Freiberg) Mulde, two arms of which embrace the town as an island, 35 m. S.E. from Leipzig by rail, and at the junction of lines to Dresden, Chemnitz, Riesa and Oschatz. Pop. (1905) including the garrison, 18,907. It has two Evangelical churches, of which the Nikolai-kirche, dating in its present form from 1485, is a handsome edifice; a medieval town hall, a former Benedictine nunnery and a monument to Luther. There are an agricultural and a commercial school. The industries include wool-spinning, iron-founding, carriage, agricultural implement, and metal-printing and stamping works.

DOBERAN, or DOBBERAN, a town of Germany, in the grand-duchy of Mecklenburg-Schwerin, about 2 m. from the shores of the Baltic and 7 W. of Rostock by rail. Pop. 5000. Besides the ruins of a Cistercian abbey founded by Pribislaus, prince of Mecklenburg, in 1173, and secularized in 1552, it possesses an Evangelical Gothic church of the 14th century, one of the finest in north Germany, a grand-ducal palace, a theatre, an exchange and a concert hall. Owing to its delightful situation amid beech forests and to its chalybeate waters, Doberan has become a favourite summer resort. Numerous villa residences have been erected and promenades and groves laid out. In 1793 Duke Frederick Francis caused the first seaside watering-place in Germany to be established on the neighbouring coast, 4 m. distant, at the spot where the Heiligen-Damm, a great bank of rocks about 1000 ft. broad and 15 ft. high, stretches out into the sea and forms an excellent bathing ground. Though no longer so popular as in the early part of the 19th century, it is still frequented, and is connected with Doberan by a tramway.

DÖBEREINER, JOHANN WOLFGANG (1780-1849), German chemist, was born near Hof in Bavaria on the 15th of December 1780. After studying pharmacy at Münchberg, he started a chemical manufactory in 1803, and in 1810 was appointed professor of chemistry, pharmacy and technology at Jena, where he died on the 24th of March 1849. The Royal Society's *Catalogue* enumerates 171 papers by him on various chemical topics, but his name is best known for his experiments on platinum in a minute state of division and on the oxidation products of alcohol. In 1822 he showed that when a mass of platinum black, supplied with alcohol by a wick is enclosed in a jar to which the air has limited access, acetic acid and water are produced; this experiment formed the basis of the Schützenbach Quick Vinegar Process. A year later he noticed that spongy platinum in presence of oxygen can bring about the ignition of hydrogen, and utilized this fact to construct his "hydrogen lamp," the prototype of numerous devices for the self-ignition of coal-gas burners. He studied the formation of aldehyde from alcohol by various methods, also obtaining its crystalline compound with ammonia, and he was the discoverer of furfurol. An early observation of the diffusion of gases was recorded by him in 1823 when he noticed the escape of hydrogen from a cracked jar, attributing it to the capillary action of fissures. His works included treatises on pneumatic chemistry (1821-1825) and the chemistry of fermentation (1822).

A correspondence which he carried on with Goethe and Charles August, grand-duke of Saxe-Weimar, was collected and published at Weimar by Schade in 1856.

DOBREE, PETER PAUL (1782-1825), English classical scholar and critic, was born in Guernsey. He was educated at Reading school under Richard Valpy and at Trinity College, Cambridge, where he was elected fellow. He was

appointed regius professor of Greek in 1823, and died in Cambridge on the 24th of September 1825. He was an intimate friend of Porson, whom he took as his model in textual criticism, although he showed less caution in conjectural emendation. After Porson's death (1808) Dobree was commissioned with Monk and Blomfield to edit his literary remains, which had been bequeathed to Trinity College. Illness and a subsequent journey to Spain delayed the work until 1820, when Dobree brought out the *Plutus* of Aristophanes (with his own and Porson's notes) and all Porson's *Aristophanica*. Two years later he published the *Lexicon* of Photius from Porson's transcript of the Gale MS. in Trinity College library, to which he appended a *Lexicon rhetoricum* from the margin of a Cambridge MS. of Harpocration. James Scholefield, his successor in the Greek professorship, brought out selections from his notes (*Adversaria*, 1831-1833) on Greek and Latin authors (especially the orators), and a reprint of the *Lexicon rhetoricum*, together with notes on inscriptions (1834-1835). The latest edition of the *Adversaria* is by William Wagner (in Bohn's *Collegiate Series*, 1883).

An appreciative estimate of Dobree as a scholar will be found in J. Bake's *Scholica hypomnemata*, ii. (1839) and in the *Philological Museum*, i. (1832) by J. C. Hare.

DÖBRENTEI, GABOR [GABRIEL] (1786-1851), Hungarian philologist and antiquary, was born at Nagyszöllös in 1786. He completed his studies at the universities of Wittenberg and Leipzig, and was afterwards engaged as a tutor in Transylvania. At this period he originated and edited the *Erdélyi Muzeum*, which, notwithstanding its important influence on the development of the Magyar language and literature, soon failed for want of support. In 1820 Döbrentei settled at Pest, and there he spent the rest of his life. He held various official posts, but continued zealously to pursue the studies for which he had

early shown a strong preference. His great work is the *Ancient Monuments of the Magyar Language* (*Régi Magyar Nyelvemlékek*), the editing of which was entrusted to him by the Hungarian Academy. The first volume was published in 1838 and the fifth was in course of preparation at the time of his death. Döbrentei was one of the twenty-two scholars appointed in 1825 to plan and organize, under the presidency of Count Teleki, the Hungarian Academy. In addition to his great work he wrote many valuable papers on historical and philological subjects, and many biographical notices of eminent Hungarians. These appeared in the Hungarian translation of Brockhaus's *Conversations-Lexikon*. He translated into Hungarian *Macbeth* and other plays of Shakespeare, Sterne's letters from Yorick to Eliza (1828), several of Schiller's tragedies, and Molière's *Avare*, and wrote several original poems. Döbrentei does not appear to have taken any part in the revolutionary movement of 1848. He died at his country house, near Pest, on the 28th of March 1851.

DOBRITCH, or HAJIOLUPAZARJIK, the principal town in the Bulgarian Dobrudja. Pop. (1901) 13,436. The town is noted for its *panaïr* or great fair, chiefly for horses and cattle, held annually in the summer, which formerly attracted a large concourse from all parts of eastern Europe, but has declined in importance.

DOBRIZHOFFER, MARTIN (1717-1791), Austrian Roman Catholic missionary, was born at Gratz, in Styria. He joined the Society of Jesus in 1736, and in 1749 proceeded to Paraguay, where for eighteen years he worked devotedly first among the Guaranis, and then among the Abipones. Returning to Europe on the expulsion of the Jesuits from South America, he settled at Vienna, obtained the friendship of Maria Theresa, survived the extinction of his order, composed the history of his mission, and died on the 17th of July 1791. The lively if rather garrulous book on which his title to remembrance rests, appeared at Vienna in 1784, in the author's own Latin, and in a German translation by Professor Krail of the university of Pest. Of its contents some idea may be obtained from its extended title:—*Historia de Abiponibus, Equestri Bellicosaque Paraguariae Natione, locupletata Copiosis Barbararum Gentium, Urbium, Fluminum, Ferarum, Amphibiorum, Insectorum, Serpentium praecipuorum, Piscium, Avium, Arborum, Plantarum aliarumque ejusdem Provinciae Proprietatum Observationibus*. In 1822 there appeared in London an anonymous translation sometimes ascribed to Southey, but really the work of Sara Coleridge, who had undertaken the task to defray the college expenses of one of her brothers. A delicate compliment was paid to the translator by Southey in the third canto of his *Tale of Paraguay*, the story of which was derived from the pages of Dobrizhoffer's narrative:—

> "And if he could in Merlin's glass have seen
> By whom his tomes to speak our tongue were taught,
> The old man would have felt as pleased, I ween,
> As when he won the ear of that great Empress Queen."

DOBROWSKY, JOSEPH (1753-1829), Hungarian philologist, was born of Bohemian parentage at Gjermet, near Raab, in Hungary. He received his first education in the German school at Bischofteinitz, made his first acquaintance with Bohemian at the Deutschbrod gymnasium, studied for some time under the Jesuits at Klattau, and then proceeded to the university of Prague. In 1772 he was admitted among the Jesuits at Brünn; but on the dissolution of the order in 1773 he returned to Prague to study theology. After holding for some time the office of tutor in the family of Count Nostitz, he obtained an appointment first as vice-rector, and then as rector, in the general seminary at Hradisch; but in 1790 he lost his post through the abolition of the seminaries throughout Austria, and returned as a guest to the house of the count. In 1792 he was commissioned by the Bohemian Academy of Sciences to visit Stockholm, Abo, Petersburg and Moscow in search of the manuscripts which had been scattered by the Thirty Years' War; and on his return he accompanied Count Nostitz to Switzerland and Italy. His reason began to give way in 1795, and in 1801 he had to be confined in a lunatic asylum; but by 1803 he had completely recovered. The rest of his life was mainly spent either in Prague or at the country seats of his friends Counts Nostitz and Czernin; but his death took place at Brünn, whither he had gone in 1828 to make investigations in the library. While his fame rests chiefly on his labours in Slavonic philology his botanical studies are not without value in the history of the science.

The following is a list of his more important works, *Fragmentum Pragense evangelii S. Marci, vulgo autographi* (1778); a periodical for Bohemian and Moravian Literature (1780-1787); *Scriptores rerum Bohemicarum* (2 vols., 1783); *Geschichte der böhm. Sprache und ältern Literatur* (1792); *Die Bildsamkeit der slaw. Sprache* (1799); a *Deutsch-böhm. Wörterbuch* compiled in collaboration with Leschka-Puchmayer and Hanka (1802-1821); *Entwurf eines Pflanzensystems nach Zahlen und Verhältnissen* (1802); *Glagolitica* (1807); *Lehrgebäude der böhm. Sprache* (1809); *Institutiones linguae slavicae dialecti veteris* (1822); *Entwurf zu einem allgemeinen Etymologikon der slaw. Sprachen* (1813); *Slowanka zur Kenntniss der slaw. Literatur* (1814); and a critical edition of Jordanes, *De*

rebus Geticis, for Pertz's *Monumenta Germaniae historica*. See Palacky, *J. Dobrowskys Leben und gelehrtes Wirken* (1833).

DOBRUDJA (Bulgarian *Dobritch*, Rumanian *Dobrogea*), also written DOBRUDSCHA, and DOBRUJA, a region of south-eastern Europe, bounded on the north and west by the Danube, on the east by the Black Sea, and on the south by Bulgaria. Pop. (1900) 267,808; area, 6000 sq. m. The strategic importance of this territory was recognized by the Romans, who defended it on the south by "Trajan's Wall," a double rampart, drawn from Constantza, on the Black Sea, to the Danube. In later times it was utilized by Russians and Turks, as in the wars of 1828, 1854 and 1878, when it was finally wrested from Turkey. By the treaty of Berlin, in 1878, the Russians rewarded their Rumanian allies with this land of mountains, fens and barren steppes, peopled by Turks, Bulgarians, Tatars, Jews and other aliens; while, to add to the indignation of Rumania, they annexed instead the fertile country of Bessarabia, largely inhabited by Rumans. After 1880, however, the steady decrease of aliens, and the development of the Black Sea ports, rendered the Dobrudja a source of prosperity to Rumania.

DOBSINA (Ger. *Dobschau*), a town of Hungary, 165 m. N.E. of Budapest by rail. Pop. (1900) 5109. It is situated in the county of Gömör, at the foot of the Radzim (3200 ft. high) in the central Carpathians, and lies to the south of the beautiful Straczena valley, watered by the river Göllnitz, and enclosed on all

sides by mountains. In the vicinity are mines of iron, cobalt, copper and mercury, some of them being very ancient. But the most remarkable feature is a large cavern some 3¾ m. N.W., in which is an icefield nearly 2 acres in extent, containing formations which are at once most curious and strikingly beautiful. This cavern, which lies in the above-mentioned Straczena valley, was discovered in 1870. The place was founded in the first half of the 14th century by German miners.

DOBSON, HENRY AUSTIN (1840-), English poet and man of letters, was born at Plymouth on the 18th of January 1840, being the eldest son of George Clarisse Dobson, a civil engineer, and on his grandmother's side of French descent. When he was about eight years old the family moved to Holyhead, and his first school was at Beaumaris, in the Isle of Anglesea. He was afterwards educated at Coventry, and the Gymnase, Strassburg, whence he returned at the age of sixteen with the intention of becoming a civil engineer. He had a taste for art, and in his earlier years at the office continued to study it at South Kensington, at his leisure, but without definite ambition. In December 1856 he entered the Board of Trade, gradually rising to a principalship in the harbour department, from which he withdrew in the autumn of 1901. He married in 1868 Frances Mary, daughter of Nathaniel Beardmore of Broxbourne, Herts, and settled at Ealing. His official career was industrious though uneventful, but as poet and biographer he stands among the most distinguished of his time. The student of Mr Austin Dobson's work will be struck at once by the fact that it contains nothing immature: there are no *juvenilia* to criticize or excuse. It was about 1864 that Mr Dobson first turned his attention to composition in prose and verse, and some of his earliest known pieces remain among his best. It was not until 1868 that the appearance of *St Paul's*, a magazine edited by Anthony

Trollope, afforded Mr Dobson an opportunity and an audience; and during the next six years he contributed to its pages some of his favourite poems, including "Tu Quoque," "A Gentleman of the Old School," "A Dialogue from Plato," and "Une Marquise." Many of his poems in their original form were illustrated—some, indeed, actually written to support illustrations. By the autumn of 1873 Mr Dobson had produced sufficient verse for a volume, and put forth his *Vignettes in Rhyme*, which quickly passed through three editions. During the period of their appearance in the magazine the poems had received unusual attention, George Eliot, among others, extending generous encouragement to the anonymous author. The little book at once introduced him to a larger public. The period was an interesting one for a first appearance, since the air was full of metrical experiment. Swinburne's bold and dithyrambic excursions into classical metre had given the clue for an enlargement of the borders of English prosody; and, since it was hopeless to follow him in his own line without necessary loss of vigour, the poets of the day were looking about for fresh forms and variations. It was early in 1876 that a small body of English poets lit upon the French forms of Theodore de Banville, Marot and Villon, and determined to introduce them into English verse. Mr Austin Dobson, who had already made successful use of the triolet, was at the head of this movement, and in May 1876 he published in *The Prodigals* the first original ballade written in English. This he followed by English versions of the rondel, rondeau and villanelle. An article in the *Cornhill Magazine* by Mr Edmund Gosse, "A Plea for Certain Exotic Forms of Verse," appearing in July 1877, simultaneously with Mr Dobson's second volume, *Proverbs in Porcelain*, drew the general eye to the possibilities and achievements of the movement. The experiment was extremely fortunate in its introduction. Mr Dobson is above all things natural, spontaneous and unaffected in poetic method; and in his hands a sheaf of metrical forms, essentially artificial and laborious, was made to assume the colour and bright profusion of a natural product. An air of pensive charm, of delicate sensibility, pervades the whole of these fresh revivals; and it is perhaps this personal touch of humanity which has given something like stability to one side of a movement otherwise transitory in

influence. The fashion has faded, but the flowers of Mr Dobson's French garden remain bright and scented.

In 1883 Mr Dobson published *Old-World Idylls*, a volume which contains some of his most characteristic work. By this time his taste was gradually settling upon the period with which it has since become almost exclusively associated; and the spirit of the 18th century is revived in "The Ballad of Beau Brocade" and in "The Story of Rosina," as nowhere else in modern English poetry. In "Beau Brocade," indeed, the pictorial quality of his work, the dainty economy of eloquent touches, is at its very best: every couplet has its picture, and every picture is true and vivacious. The touch has often been likened to that of Randolph Caldecott, with which it has much in common; but Mr Dobson's humour is not so "rollicking," his portraiture not so broad, as that of the illustrator of "John Gilpin." The appeal is rather to the intellect, and the touches of subdued pathos in the "Gentleman" and "Gentlewoman of the Old School" are addressed directly to the heart. We are in the 18th century, but see it through the glasses of to-day; and the soft intercepting sense of change which hangs like a haze between ourselves and the subject is altogether due to the poet's sympathy and sensibility. *At the Sign of the Lyre* (1885) was the next of Mr Dobson's separate volumes of verse, although he has added to the body of his work in a volume of *Collected Poems* (1897). *At the Sign of the Lyre* contains examples of all his various moods. The admirably fresh and breezy "Ladies of St James's" has precisely the qualities we have traced in his other 18th-century poems; there are ballades and rondeaus, with all the earlier charm; and in "A Revolutionary Relic," as in "The Child Musician" of the *Old-World Idylls*, the poet reaches a depth of true pathos which he does not often attempt, but in which, when he seeks it, he never fails. At the pole opposite to these are the light occasional verses, not untouched by the influence of Praed, but also quite individual, buoyant and happy. But the chief novelty in *At the Sign of the Lyre* was the series of "Fables of Literature and Art," founded in manner upon Gay, and exquisitely finished in scholarship, taste and criticism. It is in these perhaps, more than in any other of his poems, that we see how with much felicity Mr Dobson interpenetrates the literature of fancy with the literature of judgment.

After 1885 Mr Dobson was engaged principally upon critical and biographical prose, by which he has added very greatly to the general knowledge of his favourite 18th century. His biographies of *Fielding* (1883), *Bewick* (1884), *Steele* (1886), *Goldsmith* (1888), *Walpole* (1890) and *Hogarth* (1879-1898) are studies marked alike by assiduous research, sympathetic presentation and sound criticism. It is particularly noticeable that Mr Dobson in his prose has always added something, and often a great deal, to our positive knowledge of the subject in question, his work as a critic never being solely aesthetic. In *Four Frenchwomen* (1890), in the three series of *Eighteenth-Century Vignettes* (1892-1894-1896), and in *The Paladin of Philanthropy* (1899), which contain unquestionably his most delicate prose work, the accurate detail of each study is relieved by a charm of expression which could only be attained by a poet. In 1901 he collected his hitherto unpublished poems in a volume entitled *Carmina Votiva*. Possessing an exquisite talent of defined range, Mr Austin Dobson may be said in his own words to have "held his pen in trust for Art" with a service sincere and distinguished.

DOBSON, WILLIAM (1610-1646), English portrait and historical painter, was born in London. His father was master of the alienation office, but by improvidence had fallen into reduced circumstances. The son was accordingly bound an apprentice to a stationer and picture dealer in Holborn Bridge; and while in his employment he began to copy the pictures of Titian and Van Dyck. He also took portraits from life under the advice and instruction of Francis Cleyn, a German artist of considerable repute. Van Dyck, happening to pass a shop in Snow Hill where one of Dobson's pictures was exposed, sought out the artist, and presented him to Charles I., who took Dobson under his protection, and not only sat to him several times for his own portrait, but caused the prince

of Wales, Prince Rupert and many others to do the same. The king had a high opinion of his artistic ability, styled him the English Tintoretto, and appointed him serjeant-painter on the death of Van Dyck. After the fall of Charles, Dobson was reduced to great poverty, and fell into dissolute habits. He died at the early age of thirty-six. Excellent examples of Dobson's portraits are to be seen at Blenheim, Chatsworth and several other country seats throughout England. The head in the "Decollation of St John the Baptist" at Wilton is said to be a portrait of Prince Rupert.

DOCETAE, a name applied to those thinkers in the early Christian Church who held that Christ, during his life, had not a real or natural, but only an apparent (δοκεῖν, to appear) or phantom body. Other explanations of the δόκησις or appearance have, however, been suggested, and, in the absence of any statement by those who first used the word of the grounds on which they did so, it is impossible to determine between them with certainty. The name Docetae is first used by Theodoret (*Ep.* 82) as a general description, and by Clement of Alexandria as the designation of a distinct sect,[1] of which he says that Julius Cassianus was the founder. Docetism, however, undoubtedly existed before the time of Cassianus. The origin of the heresy is to be sought in the Greek, Alexandrine and Oriental philosophizing about the imperfection or rather the essential impurity of matter. Traces of a Jewish Docetism are to be found in Philo; and in the Christian form it is generally supposed to be combated in the writings of John,[2] and more formally in the epistles of Ignatius.[3] It differed much in its complexion according to the points of view adopted by the different authors. Among the Gnostics and Manichaeans it existed in its most developed type, and in a milder form it is to be found even in the writings of the orthodox teachers. The more thoroughgoing Docetae assumed the position that Christ was

born without any participation of matter; and that all the acts and sufferings of his human life, including the crucifixion, were only apparent. They denied accordingly, the resurrection and the ascent into heaven. To this class belonged Dositheus, Saturninus, Cerdo, Marcion and their followers, the Ophites, Manichaeans and others. Marcion, for example, regarded the body of Christ merely as an "umbra," a "phantasma." His denial (due to his abhorrence of the world) that Jesus was born or subjected to human development, is in striking contrast to the value which he sets on Christ's death on the cross. The other, or milder school of Docetae, attributed to Christ an ethereal and heavenly instead of a truly human body. Amongst these were Valentinus, Bardesanes, Basilides, Tatian and their followers. They varied considerably in their estimation of the share which this body had in the real actions and sufferings of Christ. Clement and Origen, at the head of the Alexandrian school, took a somewhat subtle view of the Incarnation, and Docetism pervades their controversies with the Monarchians. Hilary especially illustrates the prevalence of naive Docetic views as regards the details of the Incarnation. Docetic tendencies have also been developed in later periods of ecclesiastical history, as for example by the Priscillianists and the Bogomils, and also since the Reformation by Jacob Boehme, Menno Simons and a small fraction of the Anabaptists. Docetism springs from the same roots as Gnosticism, and the Gnostics generally held Docetic views (see GNOSTICISM).

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1 Not a distinct sect, but a continuous type of Christology. Hippolytus, however (*Philosophumena*, viii. 8-11), speaks of a definite party who called themselves Docetae.

2 1 *Ep.* iv. 2, ii. 22, v. 6, 20; 2 *Ep.* 7, cf. Jerome (*Dial. adv. Lucifer*. § 23 "Apostolis adhuc in saeculo superstitibus, adhuc apud Judaeam Christi sanguine recenti, phantasma Domini corpus asserebatur").

3 *Ad Trall.* 9 f., *Ad Smyrn.* 2, 4, *Ad Ephes.* 7. Cf. Polycarp, *Ad Phil.* 7.

DOCHMIAC (from Gr. δοχμή, a hand's breadth), a form of verse, consisting of *dochmii* or pentasyllabic feet (usually o _ _ o -).

DOCK, a word applied to (1) a plant (see below), (2) an artificial basin for ships (see below), (3) the fleshy solid part of an animal's tail, and (4) the railed-in enclosure in which a prisoner is placed in court at his trial. Dock (1) in O.E. is *docce*, represented by Ger. *Dockea-blatter*, O.Fr. *docque*, Gael. *dogha*; Skeat compares Gr. δαῦκος, a kind of parsnip. Dock (2) appears in Dutch (*dok*) and English in the 16th century; thence it was adopted into other languages. It has been connected with Med. Lat. *doga*, cap, Gr. δοχή, receptacle, from δέχεσθαι, to receive. Dock (3), especially used of a horse or dog, appears in English in the 14th century; a parallel is found in Icel. *docke*, stumpy tail, and Ger. *Docke*, bundle, skein, is also connected with it. This word has given the verb "to dock," to cut short, curtail, especially used of the shortening of an animal's tail by severing one or more of the vertebrae. The English Kennel Club (Rules, 1905, revised 1907) disqualifies from prize-winning dogs whose tails have been docked; several breeds are, however, excepted, *e.g.* varieties of terriers and spaniels, poodles, &c., and such foreign dogs as may from time to time be determined by the club. The prisoners' dock (4) is apparently to be referred to Flem. *dok*, pen or hutch. It was probably first used in thieves' slang; according to the *New English Dictionary* it was known after 1610 in "bail-dock," a room at the corner of the Old Bailey left open at the top, "in which during the trials are put some of the malefactors" (*Scots. Mag.*, 1753).

DOCK, in botany, the name applied to the plants constituting the section *Lapathum* of the genus *Rumex*, natural order Polygonaceae. They are biennial or perennial herbs with a stout root-stock, and glabrous linear-lanceolate or oblong-lanceolate leaves with a rounded, obtuse or hollowed base and a more or less wavy or crisped margin. The flowers are arranged in more or less crowded whorls, the whole forming a denser or looser panicle; they are generally perfect, with six sepals, six stamens and a three-sided ovary bearing three styles with much-divided stigmas. The fruit is a triangular nut enveloped in the three enlarged leathery inner sepals, one or all of which bear a tubercle. In the common or broad-leaved dock, *Rumex obtusifolius*, the flower-stem is erect, branching, and 18 in. to 3 ft. high, with large radical leaves, heart-shaped at the base, and more or less blunt; the other leaves are more pointed, and have shorter stalks. The whorls are many-flowered, close to the stem and mostly leafless. The root is many-headed, black externally and yellow within. The flowers appear from June to August. In autumn the whole plant may become of a bright red colour. It is a troublesome weed, common by roadsides and in fields, pastures and waste places throughout Europe. The great water dock, *R. hydrolapathum*, believed to be the *herba britannica* of Pliny (*Nat. Hist.* xxv. 6), is a tall-growing species; its root is used as an antiscorbutic. Other British species are *R. crispus*; *R. conglomeratus*, the root of which has been employed in dyeing; *R. sanguineus* (bloody dock, or bloodwort); *R. palustris*; *R. pulcher* (fiddle dock), with fiddle-shaped leaves; *R. maritimus*; *R. aquaticus*; *R. pratensis*. The naturalized species, *R. alpinus*, or “monk’s rhubarb,” was early cultivated in Great Britain, and was accounted an excellent remedy for ague, but, like many other such drugs, is now discarded.

DOCK, in marine and river engineering. Vessels require to lie afloat alongside quays provided with suitable appliances in sheltered sites in order to discharge and take in cargoes conveniently and expeditiously; and a basin constructed for this purpose, surrounded by quay walls, is known as a dock. The term is specially applied to basins adjoining tidal rivers, or close to the sea-coast, in which the water is maintained at a fairly uniform level by gates, which are closed when the tide begins to fall, as exemplified by the Liverpool and Havre docks (figs. 1 and 2). Sometimes, however, at ports situated on tidal rivers near their tidal limit, as at Glasgow (fig. 3), Hamburg and Rouen, and at some ports near the sea-coast, such as Southampton (fig. 4) and New York, the tidal range is sufficiently moderate for dock gates to be dispensed with, and for open basins and river quays to serve for the accommodation of vessels. For ports established on the sea-coast of tideless seas, such as the Mediterranean, on account of the rivers being barred by deltas at their outlets, like the Rhone and the Tiber, and thus rendered inaccessible, open basins, provided with quays and protected by breakwaters, furnish the necessary commercial requirements for sea-going vessels, as for example at Marseilles (fig. 5), Genoa, Naples and Trieste. These open basins, however, are precisely the same as closed docks, except for the absence of dock gates, and the accommodation for shipping at the quays round basins in river ports is so frequently supplemented by river quays, that closed docks, open basins and river quays are all naturally included in the general consideration of dock works.

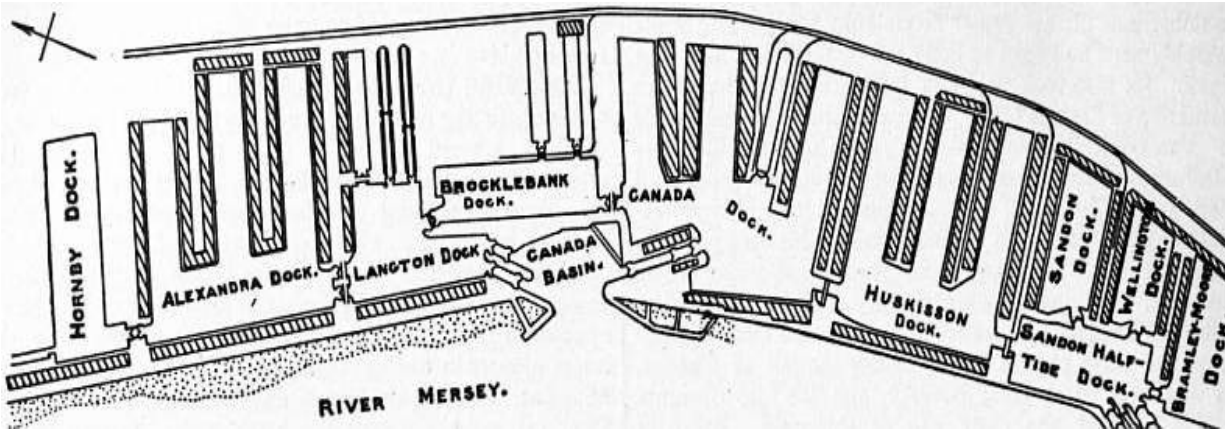


FIG. 1.—Liverpool Docks, North End. Scale 1/20,000.

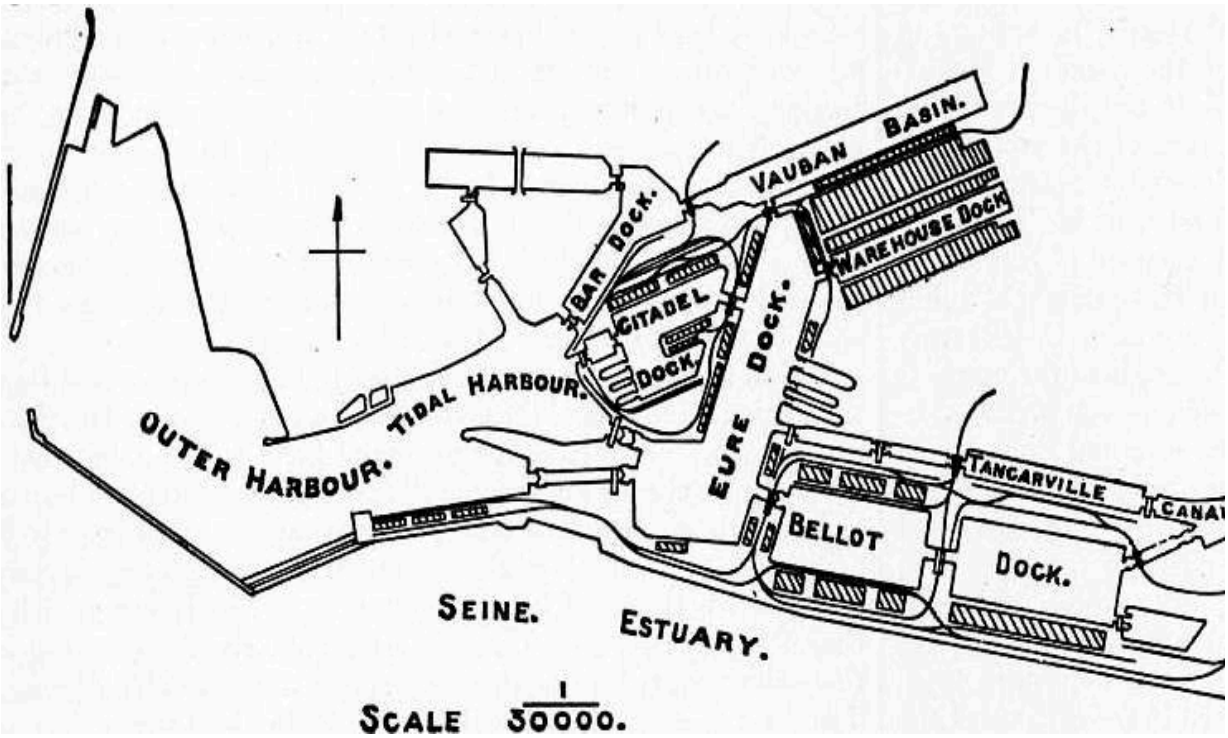


FIG. 2.—Havre Docks and Outer Harbour.

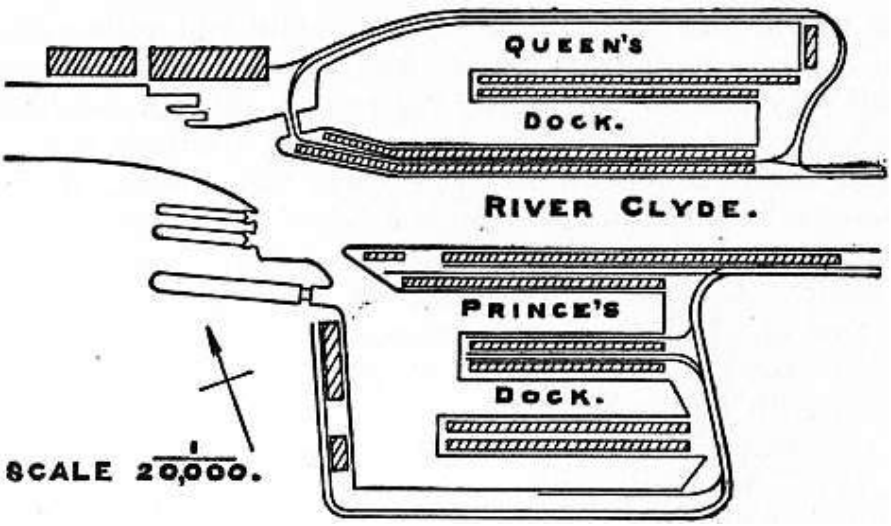


FIG. 3.—Glasgow Docks.

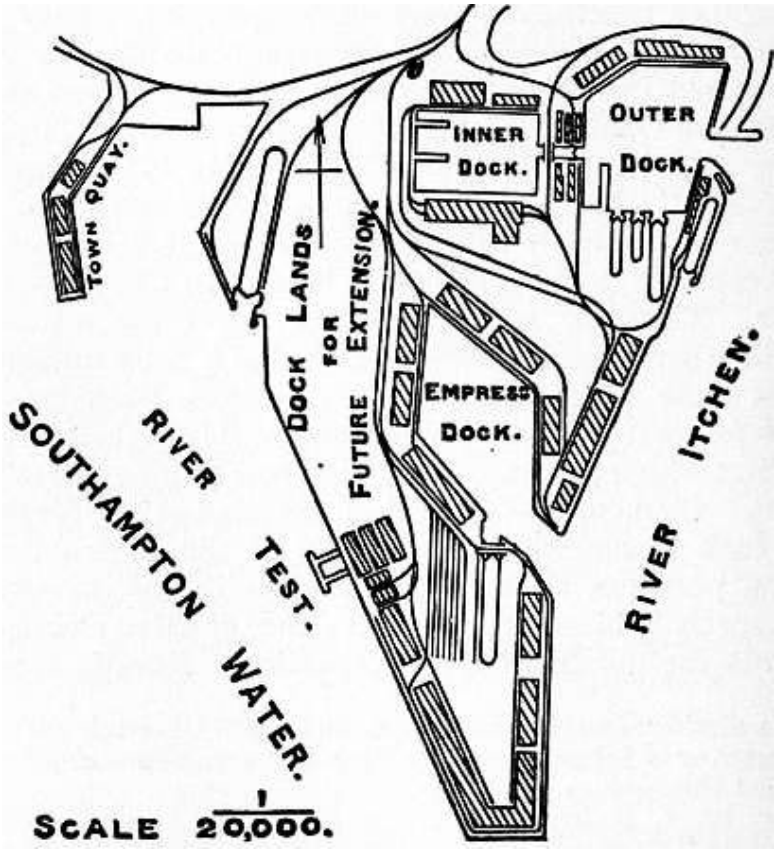


FIG. 4.—Southampton Docks and River Quays.

Sites for Docks.

Low-lying land adjoining a tidal river or estuary frequently provides suitable sites for docks; for the position, being more or less inland, is sheltered; the low level reduces the excavation required for forming the docks, and enables the excavated materials to be utilized in raising the ground at the sides for quays, and the river furnishes a sheltered approach channel. Notable instances of these are the docks of the ports of London, Liverpool, South Wales, Southampton, Hull, Belfast, St Nazaire, Rotterdam, Antwerp and Hamburg. Sometimes docks are partially formed on foreshores reclaimed from estuaries, as at Hull, Grimsby, Cardiff, Liverpool, Leith and Havre; whilst at Bristol, a curved portion of the river Avon was appropriated for a dock, and a straight cut made for the river. By carrying docks across sharp bends of tidal rivers, upper and lower entrances can be provided, thereby conveniently separating the inland and sea-going traffic; and of this the

London, Surrey Commercial, West India, and Victoria and Albert docks are examples on the Thames and Chatham dockyard on the Medway. Occasionally, when a small tidal river has a shallow entrance, or an estuary exhibits signs of silting up, docks alongside, formed on foreshores adjoining the sea-coast, are provided with a sheltered entrance direct from the sea, as exemplified by the Sunderland docks adjacent to the mouth of the river Wear, and the Havre docks at the outlet of the Seine estuary (fig. 2). Some old ports, originally established on sandy coasts where a creek, maintained by the influx and efflux of the tide from low-lying spaces near the shore, afforded some shelter and an outlet to the sea across the beach, have had their access improved by parallel jetties and dredging; and docks have been readily formed in the low-lying land only separated by sand dunes from the sea, as at Calais, Dunkirk (fig. 6) and Ostend (see HARBOUR). In sheltered places on the sea-coast, docks have sometimes been constructed on low-lying land bordering the shore, with direct access to the sea, as at Barrow and Hartlepool; whilst at Mediterranean ports open basins have been formed in the sea, by establishing quays along the foreshore, from which wide, solid jetties, lined with quay walls, are carried into the sea at intervals at right angles to the shore, being sheltered by an outlying breakwater parallel to the coast, and reached at each end through the openings left between the projecting jetties and the breakwater, as at Marseilles (fig. 5) and Trieste, and at the extensions at Genoa (see HARBOUR) and Naples. Where, however, the basins are formed within the partial protection of a bay, as in the old ports of Genoa and Naples, the requisite additional shelter has been provided by converging breakwaters across the opening of the bay; and an entrance to the port is left between the breakwaters. The two deep arms of the sea at New York, known as the Hudson and East rivers, are so protected by Staten Island and Long Island that it has been only necessary to form open basins by projecting wide jetties or quays into them from the west and east shores of Manhattan Island, and from the New Jersey and Brooklyn shores, at intervals, to provide adequate accommodation for Atlantic liners and the sea-going trade of New York.

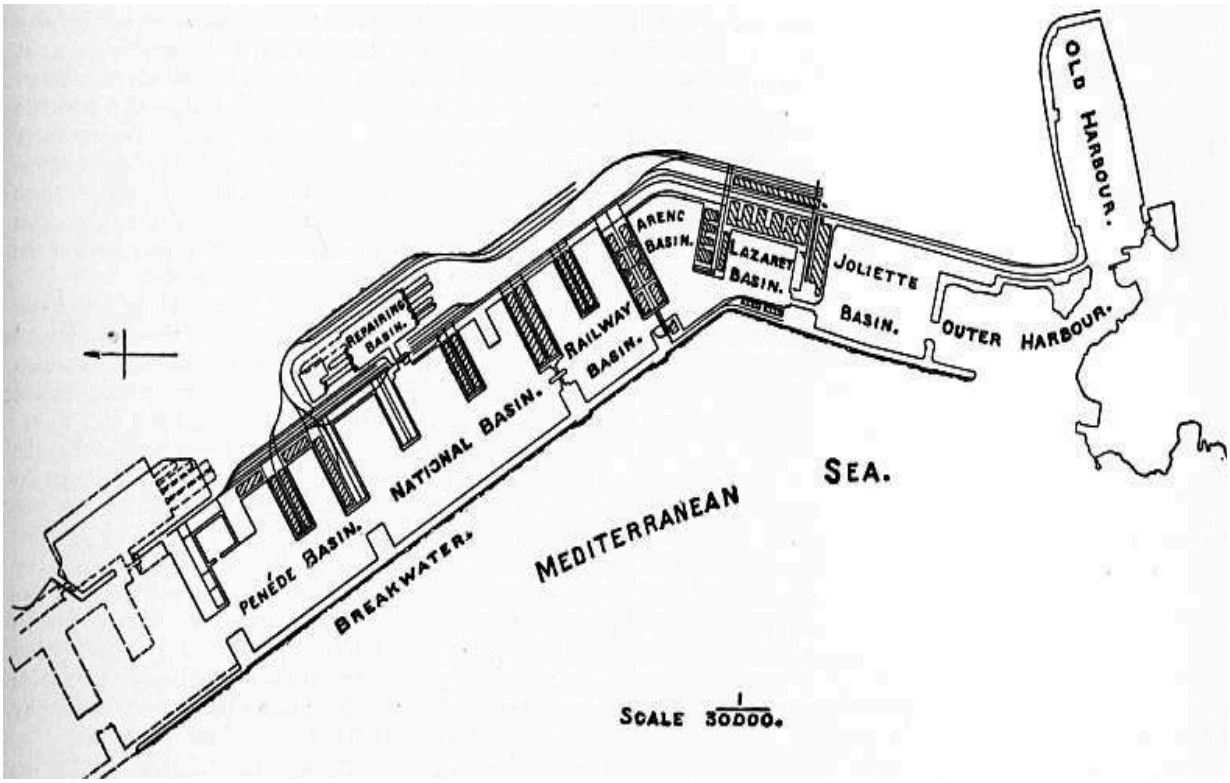


FIG. 5.—Port of Marseilles. Basins and Extensions.

The accessibility of a port depends upon the depth of its approach channel, which also determines the depth of the docks or basins to which it leads; for it is useless to give a depth to a dock much in excess of the depth down to which there is a prospect of carrying the channel by which it is reached. The great augmentation, however, in the power and capacity for work of modern dredgers, and especially of suction dredgers in sand (see DREDGE), together with the increasing draught of vessels, has resulted in a considerable increase being made in the available depth of rivers and channels leading to docks, and has necessitated the making of due allowance for the possibility of a reasonable improvement in determining the depth to be given to a new dock. On the other hand, there is a limit to the deepening of an approach channel, depending upon its length, the local conditions as regards silting, and the resources and prospects of trade of the port, for every addition to the depth generally involves a corresponding increase in the cost of maintenance.

Approach channels.

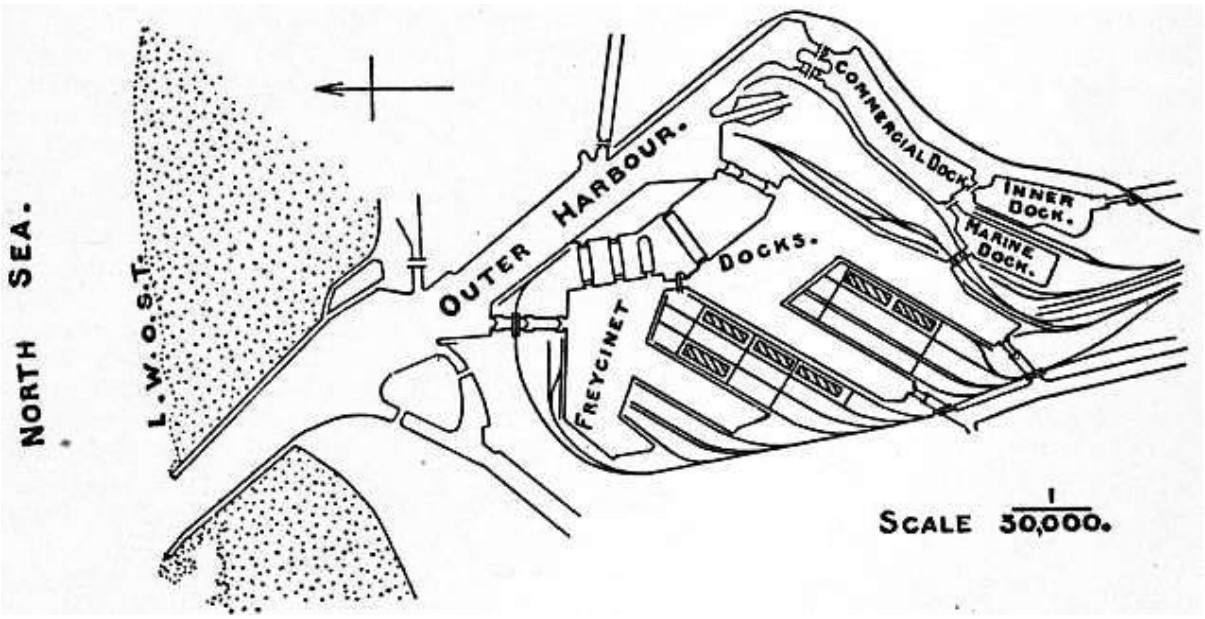
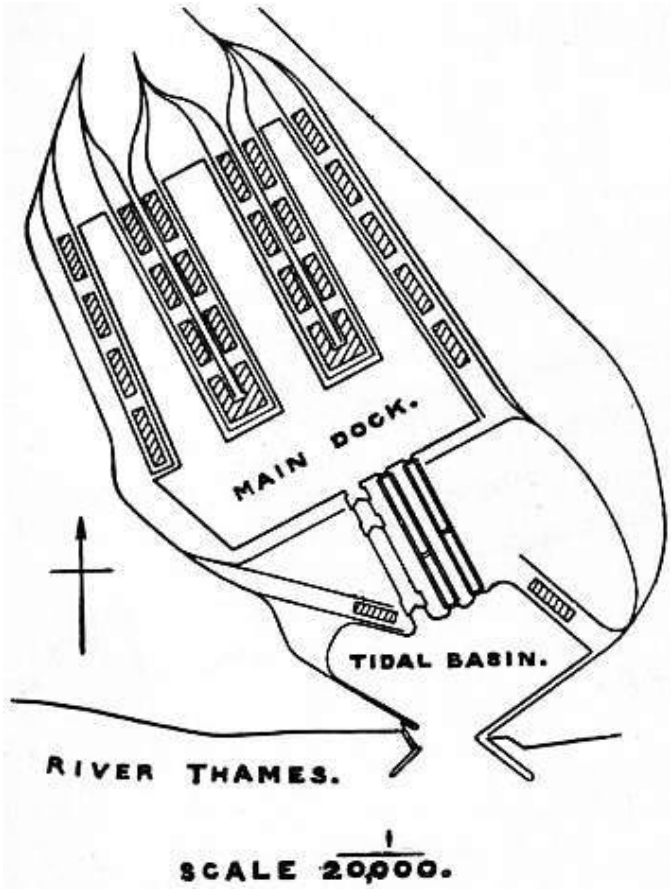


FIG. 6.—Dunkirk Docks and Jetty Channel.



At tidal ports the available depth for vessels should be reckoned from high water of the lowest neap tides, as the standard which is certain to be reached at high tide; and the period during which docks can be entered at each tide depends upon the nature of the approach channel, the extent of the tidal range and the manner in which the entrance to the docks is effected. Thus where the tidal range is very large, as in the Severn estuary, the approach channels to some of the South Wales ports are

FIG. 7.—Tilbury Docks.

nearly dry at low water of spring tides, and it would be impossible to make these ports accessible near low tide; whereas at high water, even of neap tides, vessels of large draught can enter their docks. At Liverpool, with a rise of 31 ft. at equinoctial spring tides, owing to the deep channel between Liverpool and Birkenhead and into the outer estuary of the Mersey in Liverpool Bay, maintained by the powerful tidal scour resulting from the filling and emptying of the large inner estuary, access to the river by the largest vessels has been rendered possible, at any state of the tide, by dredging a channel through the Mersey bar; but the docks cannot be entered till the water has risen above half-tide level, and the gates are closed directly after high water. A large floating landing-stage, however, about half a mile in length, in front of the centre of the docks, connected with the shore by several hinged bridges and rising and falling with the tide, enables Atlantic liners to come alongside and take on board or disembark their passengers at any time.

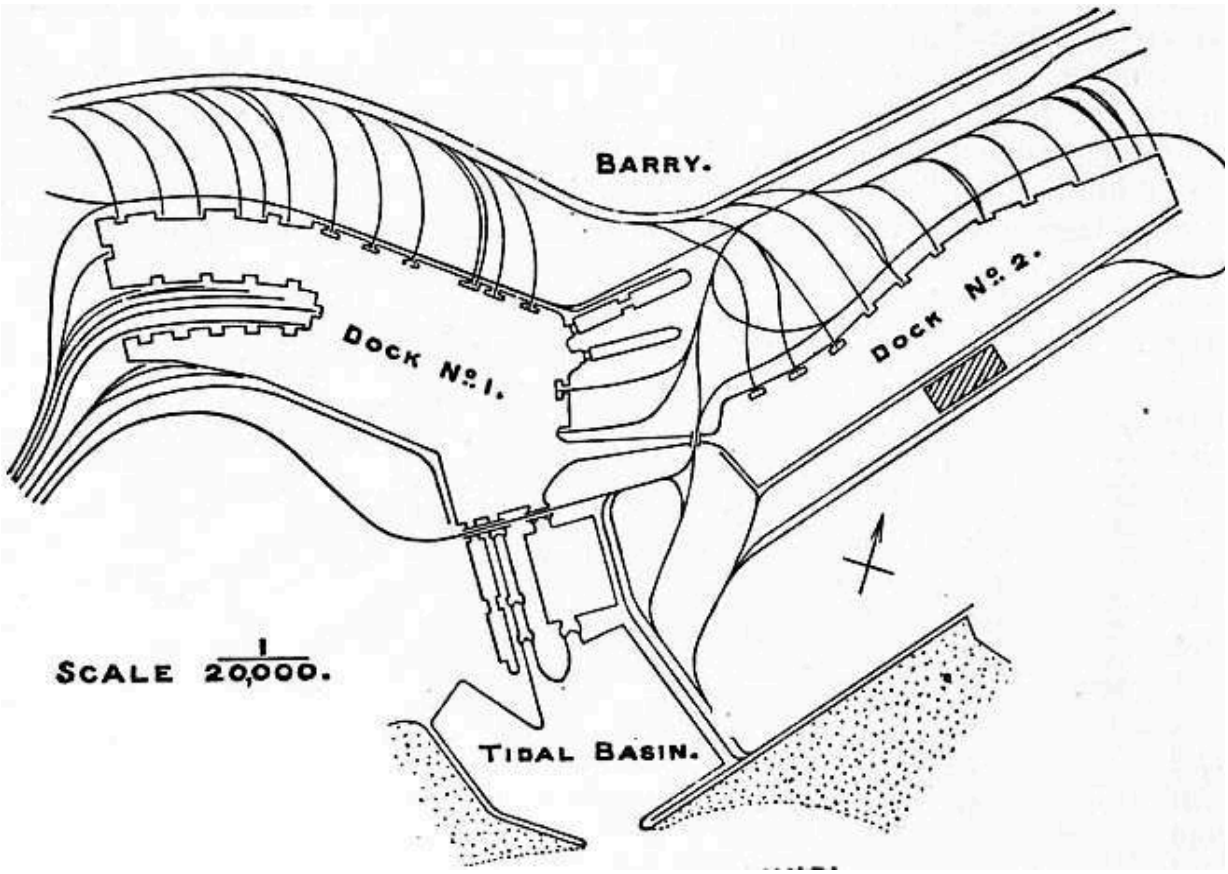


FIG. 8.—Barry Docks.

Comparatively small tidal rivers offer the best opportunity of a considerable improvement in the approach channel to a port; for they can be converted into artificially deep channels by dredging, and their necessary maintenance is somewhat aided by the increased influx and efflux of tidal water due to the lowering of the low-water line by the outflow of the ebb tide being facilitated by the deepening. Thus systematic, continuous dredging in the Tyne and the Clyde has raised the Tyne ports and Glasgow into first-class ports. In large tidal rivers and estuaries, docks should be placed alongside a concave bank which the deep navigable channel hugs, as effected at Hull and Antwerp, or close to a permanently deep channel in an estuary, such as chosen for Garston and the entrance to the Manchester ship canal at Eastham in the inner Mersey estuary, and for Grimsby and the authorized Illingham dock in the Humber estuary; for a channel carried across an estuary to deep water requires constant dredging to

maintain its depth. Occasionally, extensive draining works and dredging have to be executed to form an adequately deep channel through a shifting estuary and shallow river to a port, as for instance on the Weser to Bremerhaven and Bremen, on the Seine to Honfleur and Rouen, on the Tees to Middlesborough and Stockton, on the Ribble to Preston, on the Maas to Rotterdam and on the Nervion to Bilbao (see River Engineering). Southampton possesses the very rare combination of advantages of a well-sheltered and fairly deep estuary, a rise of only 12 ft. at spring tides, and a position at the head of Southampton Water at the confluence of two rivers (fig. 4), so that, with a moderate amount of dredging and the construction of quays along the lower ends of the river with a depth of 35 ft. in front of them at low water, it is possible for vessels of the largest draught to come alongside or leave the quays at any state of the tide. This circumstance has enabled Southampton to attract some of the Atlantic steamers formerly running to Liverpool.

Ports on tideless seas have to be placed where deep water approaches the shore, and where there is an absence of littoral drift. The basins of such ports are always accessible for vessels of the draught they provide for; but they require most efficient protection, and, unlike tidal ports, they are not able on exceptional occasions to admit a vessel of larger draught than the basins have been formed to accommodate. Occasionally, an old port whose approach channel has become inadequate for modern vessels, or from which the sea has receded, has been provided with deep access from the sea by a ship canal, as exemplified by Amsterdam and Bruges; whilst Manchester has become a seaport by similar works (see Manchester Ship Canal). In such cases, however, perfectly sheltered open basins are formed inland at the head of the ship canal, in the most convenient available site; and the size of vessels that can use the port depends wholly on the dimensions and facility of access of the ship canal.

Docks require to be so designed that they may provide the maximum length of quays in proportion to the water area consistent with easy access for vessels to the quays; but often the space available does not admit of the adoption of the best forms, and the design has to be made as suitable as

Design of Docks.

practicable under the existing conditions. On this account, and owing to the small size of vessels in former times, the docks of old ports present a great variety in size and arrangement, being for the most part narrow and small, forming a sort of string of docks communicating with one another, and provided with locks or entrances at suitable points for their common use, as noticeable in the older London and Liverpool docks. Though narrow timber jetties were introduced in some of the wider London docks for increasing the length of quays by placing vessels alongside them, no definite arrangement of docks was adopted in carrying out the large Victoria and Albert docks between 1850 and 1880; whilst the Victoria dock was made wide with solid quays, provided with warehouses, projecting from the northern quay wall, thereby affording a large accommodation for vessels lying end on to the north quay, the Albert dock subsequently constructed was given about half the width of the earlier dock, but made much longer, so that vessels lie alongside the north and south quays in a long line. This change of form, however, was probably dictated by the advantage of stretching across the remainder of the wide bend, in order to obtain a second entrance in a lower reach of the river. The Tilbury docks, the latest and lowest docks on the Thames, were constructed on the most approved modern system, consisting of a series of branch docks separated by wide, well-equipped solid quays, and opening straight into a main dock or basin communicating with the entrance lock, in which vessels can turn on entering or leaving the docks (fig. 7). The most recently constructed Liverpool docks, also, at the northern end have been given this form; and the older docks adjoining them to the south have been transformed by reconstruction into a similar series of branch docks opening into a dock alongside the river wall, leading to a half-tide basin or river entrances (fig. 1). The Manchester and Salford docks were laid out on a precisely similar system, which was also adopted for the most recent docks at Dunkirk (fig. 6) and Prince’s dock at Glasgow (fig. 3), and at some of the principal Rhine ports; whilst the Alexandra dock at Hull resembles it in principle. The basins in tideless seas have naturally been long formed in

accordance with this system (fig. 5). The Barry docks furnish an example of the special arrangements for a coal-shipping port, with numerous coal-tips served by sidings (fig. 8).

Tidal and half-tide basins.

Tidal basins, as they are termed, are generally interposed in the docks of London between the entrance locks and the docks, with the object of facilitating the passage of vessels out of and into the docks before and after high water, by lowering the water in the basin as soon as the tide has risen sufficiently, and opening the lock gates directly a level has been formed with the tide in the river. Then the vessels which have collected in the basin, when level with the dock, are readily passed successively into the river. The incoming vessels are next brought into the basin, and the gates are closed; and the water in the basin having been raised to the level in the dock, the gates shutting off the basin from the dock when the water was lowered are opened, and the vessels are admitted to the dock. In this manner, by means of an inner pair of gates, the basin can be used as a large lock without unduly altering the water-level in the dock, and saves the delay of locking most of the vessels out and in, the lock being only used for the smaller vessels leaving early or coming in late on the tide. Similar tidal basins have also been provided at Cardiff, Penarth, Barry (fig. 8), Sunderland, Antwerp and other docks.

The large half-tide docks introduced at the most modern Liverpool docks (fig. 1) serve a similar purpose as tidal basins; but being much larger, and approached by entrances instead of locks, the exit and entrance of vessels are effected by lowering their water-level on a rising tide, and opening the gates, which are then closed at high water to prevent the lowering of the water-level in the dock, and to avoid closing the gates against a strong issuing current.

The tidal basins outside the locks at Tilbury and Barry are quite open to the tide, and have been carried down to 24 ft. and 16 ft. respectively below low water of spring tides, in order to afford vessels a deep sheltered

approach to the lock in each case, available at or near low water (figs. 7 and 8). Such basins, however, open to a considerable tidal range where the water is densely charged with silt, are exposed to a large deposit in the fairly still water, and their depth has to be constantly maintained by sluicing or dredging.

River quays.

Where the range of tide is moderate, or on large inland rivers, docks or basins are usefully supplemented by river quays, which though subject to changes in the water-level, and exposed to currents in the river, are very convenient for access, and are sometimes very advantageously employed in regulating a river and keeping up its banks when deepened by dredging. Generally 10 to 12 ft. is the limit of the tidal range convenient for the adoption of open basins and river quays; but the banks of the Tyne have been utilized for quays, jetties and coal-staiths, with a somewhat larger maximum tidal range; and a long line of quays stretching along the right bank of the Scheldt in front of Antwerp, constructed so as to regulate this reach of the river, accommodates a large sea-going traffic, with a rise at spring tides of 15 ft.

Excavations for docks.

When a dock has to be formed on land, the excavation is effected by men with barrows and powerful steam navvies, loading into wagons drawn in trains by locomotives to the place of deposit, usually to raise the land at the sides for forming quays. Directly the underground water-level is reached, the water has to be removed from the excavations by pumps raising the inflowing water from sumps, lined with timber, sunk down below the lowest foundations at suitable positions, so that the lower portions of the dock walls and sills of the lock or entrance may be built out of water. A cofferdam has to be constructed extending out from the bank of the river or approach channel in front of the site of the proposed entrance or lock, so that the excavations for the entrance to the dock may be pushed forwards, and the lock or entrance built under its protection. Sometimes the lowest

portion of the excavation for the dock can be accomplished economically by dredging, after the dock walls and lock have been completed and the water admitted.

Where a dock is partially or wholly constructed on reclaimed land, the reclamation bank for enclosing the site and excluding the tide has to be undertaken first by tipping an embankment from each end with wagons, protected and consolidated along its outer toe by rubble stone or chalk. When the ends of the embankments are approaching one another, it is essential to connect them by a long low bank of selected materials brought up gradually in successive layers, and retaining the water in the enclosure to the level of this bank, so that the influx and efflux of the tide, filling and emptying the reclaimed area, may take place over a long length, and in smaller volume as the low bank is raised. In this way a reduction is effected of the tidal current in and out, which in the case of a large enclosure and a considerable tidal range, would create such a scour in the narrowing gap between two high embankments as to wash away their ends and prevent the closing of the gap. Occasionally the final closure is effected by lowering timber panels in grooves between a series of piles driven down at intervals across the gap. On the closing of the reclamation bank the water is pumped out; and the excavation is carried on in the ordinary manner. It is very important that such an embankment should be carried well above the level of the highest tide which might be raised by a high wind; and in exposed sites, the outer slope of the bank should be protected by pitching from the action of waves, for any overtopping or erosion of the bank might result in a large breach through it, and the flooding of the works inside.

Docks are generally surrounded by walls retaining the quays, alongside which vessels lie for discharging and taking in cargoes. In order to ascertain the nature of the strata upon which these walls have to be founded, borings are taken at the outset to the requisite depth at intervals near the line of the walls, but inside the dock area if the piercing of quicksand is anticipated, as in excavating for

Foundations for dock walls.

the foundations, these holes might give rise to the outflow, under pressure, of underlying quicksand into the foundations. As docks are generally formed near rivers or estuaries, these strata are commonly alluvial; but being situated at some depth below the surface, they are usually fairly hard. When they consist of gravel, clay or firm sand, the walls can be founded on the natural bottom excavated a few feet below the bottom of the dock, their weight being somewhat distributed by making them rest on a broad bed of concrete filling up the excavation at the bottom. When, however, fine sand or silt charged with water, or quicksand is met with at the required depth, the necessary pumping and excavation for the foundations might occasion the influx of sand or silt with the water into the excavations, leading to settlement and slips; or the soft stratum might be too thick to remove. The wall may then be founded on bearing piles driven down to a solid stratum, and having their tops joined together by walings and planking, or by a layer of concrete, upon which the wall is built. Or the soft stratum can be enclosed with a double row of sheet piling along the front and back of the line of wall, by which it sometimes becomes sufficiently confined and consolidated to sustain the weight of the wall on a broad foundation of concrete; or it can be excavated without any danger of sand or silt running in from outside; whilst the sheet piling at the back relieves the wall to some extent from the pressure of the earth behind it, and in front retains the wall from sliding forwards. Firmer foundations have been obtained by sinking brick, concrete or masonry wells through soft ground to a solid stratum, upon which the dock wall is built. Clusters of small concrete cylinders, in sets of three in front, and a line of double cylinders at the back, were used for the foundations of the walls of Prince's dock at Glasgow. Wells of rubble masonry were sunk in the silty foreshore of the Seine estuary for the walls of the Bellot docks at Havre; and they served as piers, connected by arches, for the foundations of a continuous dock wall above, being carried down to a considerable depth through alluvium at the St Nazaire, Bordeaux and Rochefort docks. These well foundations, derived from the old Indian system, are built up upon a curb, sometimes furnished with a cutting edge

underneath, and gradually sunk by excavating inside; and eventually the central hollow is filled up solid with concrete or masonry.

Dock walls.

The walls round a dock serve as retaining walls to keep up the quays; and though they have the support of the water in front of them when the docks are in use, they have to sustain the full pressure of the filling at the back on the completion of the dock before the water is admitted. They have, accordingly, to be increased in thickness downwards to support the pressure increasing with the depth. This pressure, with perfectly dry material, would be represented by the weight of half the prism of filling between the natural slope of the material behind and the back of the wall; but the pressure is often increased by the accumulation of water at the back, which, with fine silty backing, is liable to exert a sort of fluid pressure against the wall proportionate to the density of the mixture of silt and water. The increase of thickness towards the base used formerly to be effected by a batter on the face, as well as by steps out at the back; but the vertical form now given to the sides of large vessels necessitates a corresponding fairly vertical face for the wall, to prevent the upper part of the vessel being kept

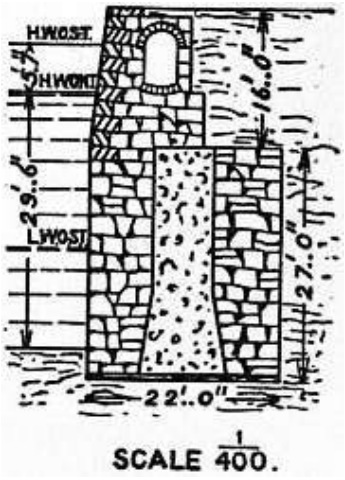


FIG. 9.—Havre Bellot Dock Wall.

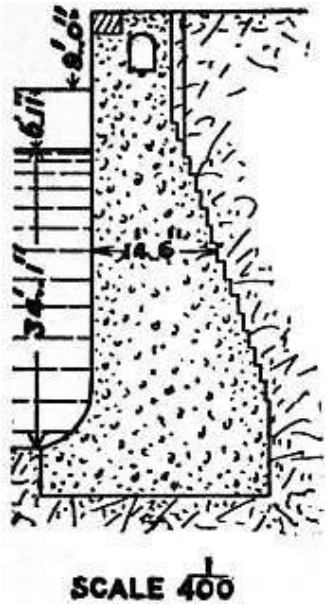


FIG. 10.—Liverpool Dock Wall.

unduly away from the quay. Examples of the most modern types of dock walls are given in figs. 9 to 12.

The height of a dock wall depends upon the depth of water always available for vessels, at tideless sea-ports and at ports removed from tidal influences, such as Manchester, Bruges and the ports on the Rhine; this depth should not be less than 28 to 30 ft. for large sea-going vessels, together with a margin of 5 to 8 ft. above the normal water-level for the quays, and the foundations below. At tidal ports, however, an addition has to be made equal to the difference in height between the high-water levels of spring and neap tides; so that at ports with a large tidal range, such as the South Wales ports on the Severn estuary and Liverpool, specially high dock walls are necessary. Under normal conditions, a dock wall should be given a width at a height half-way between dock-bottom and quay-level, equal to one-third of its height above dock-bottom, and a width of half this height at dock-bottom.

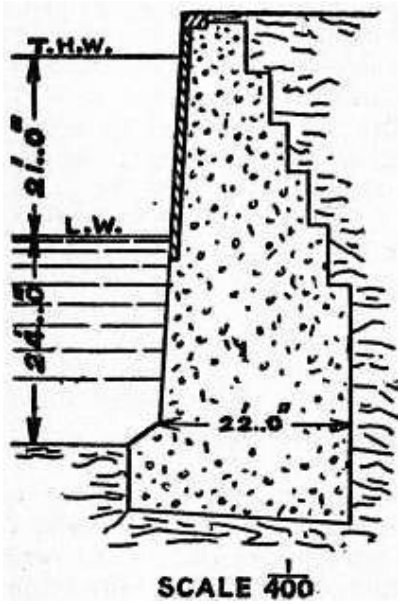


FIG. 11.—Tilbury Basin Wall.

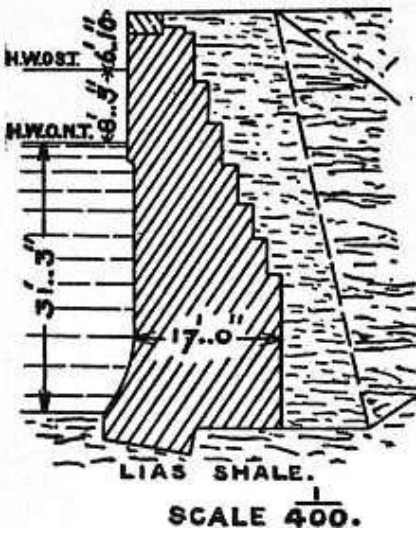


FIG. 12.—Barry Dock Wall.

Dock walls are constructed of masonry, brickwork or concrete, or of concrete with a facing of masonry or brickwork. Masonry is adopted where large stone quarries are readily accessible, in the form of rubble masonry with dressed stone on the face, as for instance at the Hull and Barry docks,

and forms a very durable wall; but strong overhead staging carrying powerful gantries is necessary for laying large blocks. Brickwork has been often used where bricks are the ordinary building material of the district or can be made on the works, and requires only ordinary scaffolding; and harder or pressed bricks are employed for the facework. Concrete is very commonly resorted to now where sand and stones are readily procured; and where clean, sharp sand and gravel are found in thick layers in the excavations for a dock, as in the alluvial strata bordering the Thames, dock walls can be constructed cheaply and economically with concrete deposited within timber framing, dispensing with regular scaffolding and skilled labour. Such walls require to be given a facing of stronger concrete, or of blue bricks, as at Tilbury, to guard against abrasion by vessels, chains and ropes; and dock walls are commonly provided at the top with granite or other hard stone coping where the wear is greatest. The foundations for dock walls are excavated in a trench below dock-bottom, only lined with timbering where the faces of the trench cannot stand for a short time without support, and with sheet piling through very unstable silt or sand; and the trench is conveniently filled up solid with concrete, carried out in short lengths in untrustworthy ground. To reduce the amount of filling behind the wall, the excavation at the back above dock-bottom, preparatory for the trench, is given as steep a slope as practicable, supported sometimes towards the base by timbering and struts; but occasionally the wall is built within a timbered trench carried down to the required depth, before the excavation for the dock in front of it has been executed, as effected at Tilbury. The filling at the back is thus reduced to a minimum, and the lower portion of the excavation can be accomplished by dredging, if expedient, after the admission of the water, the dock wall in this way being exposed to the least possible pressure behind.

The walls of open basins are often constructed out of water precisely like dock walls, as in the case of the basins forming the Manchester, Bruges and Glasgow docks; and basin walls open to the tide, as at Glasgow and in the tidal basin outside Tilbury docks (fig. 7), differ only from dock walls in

being exposed to variations in the pressure at the back resulting from the lowering of the water-level in front, which is, indeed, shared to some extent by the walls round closed docks where the difference in the high-water levels of springs and neaps is considerable. The walls, however, round basins in tideless seas, such as Marseilles, occasionally those inside harbours, and especially quay walls along rivers and round open basins alongside rivers, have to be constructed under water.

Open basin and river quay walls founded under water.

At Marseilles, the simple expedient was long ago adopted of constructing the quay walls lining the basins formed in the sea, by depositing tiers of large concrete blocks on a rubble foundation, one on top of the other, till they reached sea-level, and then building a solid masonry quay wall out of water on the top up to quay-level, faced with ashlar

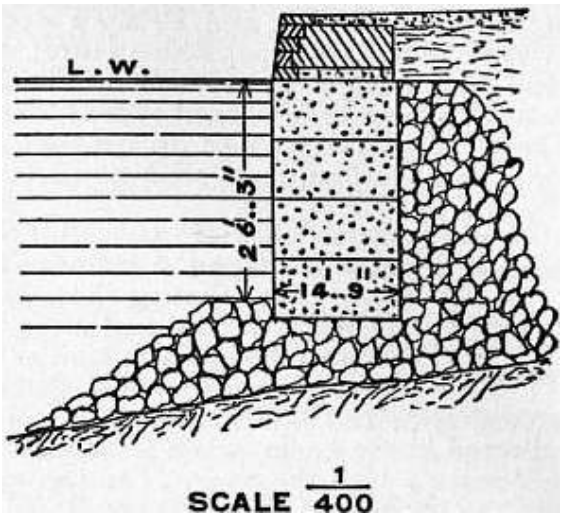


FIG. 13.—Marseilles Quay Wall.

(fig. 13), the wall being backed by rubble for some distance behind up to the water-level. The same system was employed for the quay walls at Trieste, and at Genoa and other Italian ports. A quay wall inside Marmagao harbour, on the west coast of India, was erected on a foundation layer of rubble by the sloping-block system, to provide against unequal settlement on the soft bottom (see BREAKWATER). The quay walls alongside the river Liffey, and round the adjacent basins below Dublin, were erected under water by building rubble-concrete blocks of 360 tons on staging carried out into the water, from

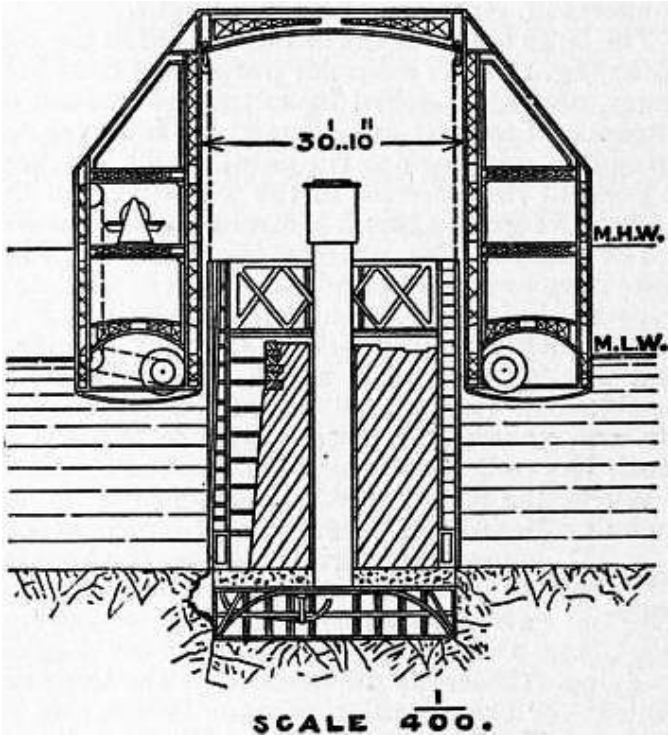


FIG. 14.—Antwerp Quay Wall, founded by compressed air.

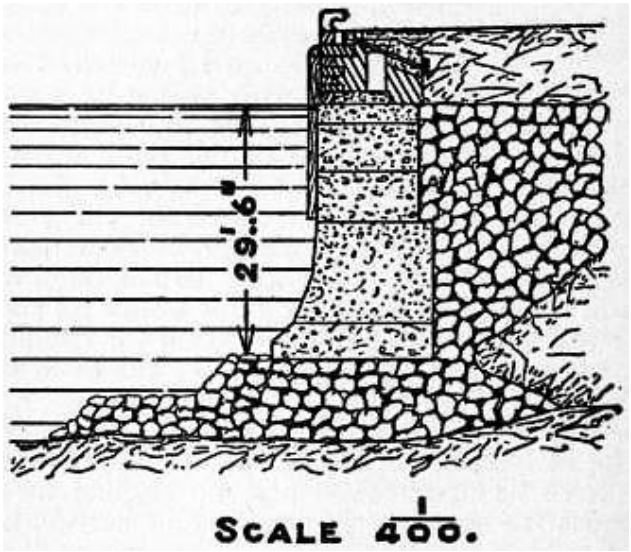


FIG. 15.—Caracciolo Jetty Quay Wall, Genoa.

which they were lifted one by one by a powerful floating derrick, which conveyed the block to the site, and deposited it on a levelled bottom at low tide in a depth of 28 ft., raising the wall a little above low water. After a row of these blocks had been laid, and connected together by filling the grooves formed at the sides and the interstices between the blocks with concrete, a continuous masonry wall faced with ashlar was built on the top out of water. A quay wall was built up to a little above low water on a similar principle at Cork, with three smaller blocks as a foundation, in lengths of 8 ft. Cylindrical well foundations have been extensively used for the foundations of the quay walls along the Clyde, formerly made of brick, but subsequently of concrete, sunk through a considerable variety of alluvial strata, but mostly sand and gravel fully charged with water.

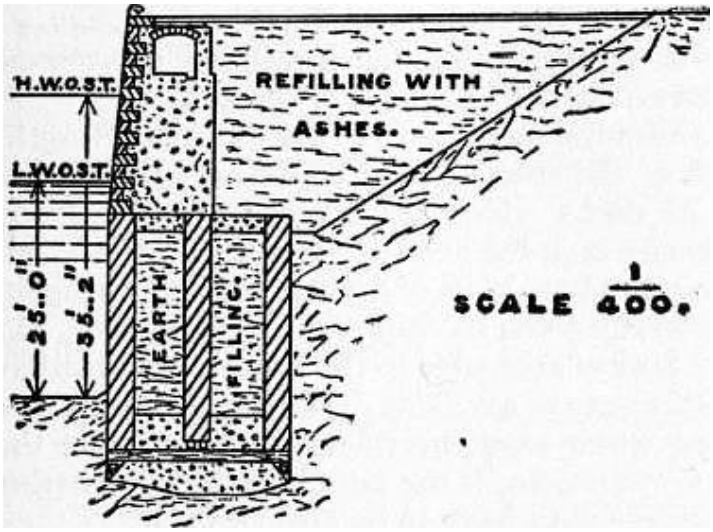


FIG. 16.—Glasgow River Quay Wall.

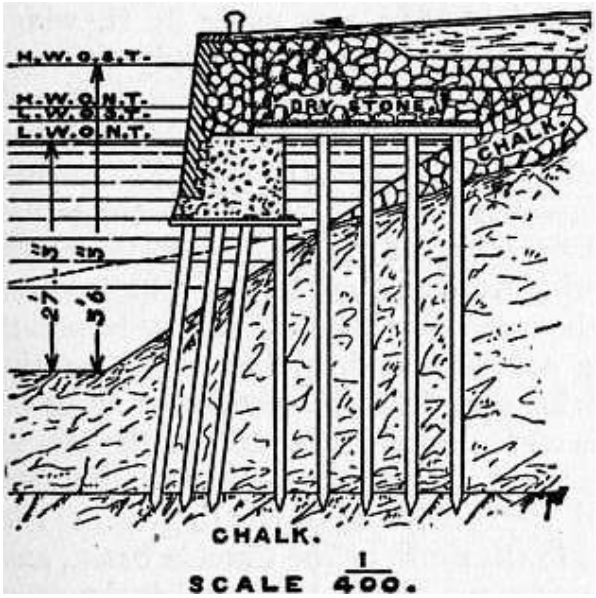


FIG. 17.—Rouen Quay Wall.

Compressed air in bottomless caissons has been increasingly employed in recent years for carrying down the subaqueous foundations of river quay walls, through alluvial deposits, to a solid stratum. About 1880, a long line of river quays was commenced in front of Antwerp, extending in the central portion a considerable distance out into the Scheldt, with the object of regulating the width of the river simultaneously with the provision of deep quays for sea-going vessels; and the quay wall was erected, out of water, on the flat tops of a series of wrought-iron caissons, 82 ft. long and 29½ ft. wide, constructed on shore, floated out one by one to their site in the river between two barges, and gradually lowered as the wall was built up inside a plate-iron enclosure round the roof of the caisson, which was eventually sunk by aid of compressed air through the bed of the river to a compact stratum (fig. 14). The weight of the wall counteracted the tendency of the caisson and the enclosure above it to float; and the caisson, furnished with seven circular wrought-iron shafts, provided with air-locks at the top for the admission of men and materials and for the removal of the excavations, was gradually carried down by excavating inside the working chamber at the bottom, 6¼ ft. high, till a good foundation was reached. The working chamber was then filled with concrete through some of the shafts, the plate-iron sides of the upper enclosure were removed to be used for another length of wall, the shafts were drawn out and the hollows left by them filled with concrete, the apertures between adjacent lengths were closed at each face with wooden panels and filled with concrete, and a continuous quay wall was completed above. The most recent quay walls constructed in the old harbour at Genoa were founded under water on a rubble mound in a similar manner by the aid of compressed air (fig. 15). Quay walls also on the Clyde have been founded on caissons, consisting of a bottomless steel structure, surmounted by a brick superstructure having hollows filled with concrete, in lengths of 80 ft. and 27 ft., and widths of 18 ft. and 21 ft. respectively, carried down by means of compressed air from 54 to 70 ft. below quay-level, on the top of which a continuous wall of concrete, faced with brickwork, and having a granite coping, was built up from near low-

water level (fig. 16). In many cases where soft strata extend to considerable depths, river quays and basin walls have been constructed by building a light quay wall upon a series of bearing and raking piles driven into, and if possible through, the soft alluvium. Thus the walls along the Seine, and round the basins at Rouen, were built upon bearing piles carried down through the alluvial bed of the river to the chalk. The lower portion of the quay wall was constructed of concrete faced with brickwork within water-tight timber caissons, resting upon the piles at a depth of 9¾ ft. below low water; and upon this a rubble wall faced with bricks was erected from low water to quay-level, backed by rubble stone laid on a timber flooring supported by piles, together with chalk, to form a quay right back to the top of the slope of the bank of the deepened river (fig. 17). The quay walls of the open basins bordering the Hudson river at New York have had, in certain parts, to be founded on bearing piles combined with raking piles, driven into a thick bed of soft silt where no firm stratum could be reached, and where, therefore, the weight could only be borne by the adherence of the long piles in the silt. Before driving the piles, however, the silt round the upper part of the piles and under the quay wall was consolidated by depositing small stones in a trench dredged to a depth of 30 ft. below low water; the piles were driven through these stones, and were further kept in place by a long toe of rubble stone in front and a backing of rubble stone behind carried nearly up to quay-level, behind which a light filling of ashes and earth was raised to quay-level. The slight quay wall resting upon the front rows of bearing piles was carried up under water by 70-ton concrete blocks deposited by means of a floating derrick; and the upper part of the wall was built of concrete faced with ashlar masonry (fig. 18). The basin and quay walls at Bremen, Bremerhaven and Hamburg were built on a series of bearing and raking piles driven down to a firm stratum, the wall being begun a few feet below low water. At Southampton, ferro-concrete piles were employed in constructing the deep quays; and a wharfing of timber pilework has been frequently used for river quays.

Where the increase of trade is moderate and the conditions of the traffic permit, and also at coal-shipping ports, economy in construction is obtained by giving sloping sides to a portion of a dock in place of dock walls, the slope being pitched where necessary with stone; and the length of the slope projecting into a dock is sometimes reduced by substituting sheet piling for the slope at the toe up to a certain height. By this arrangement jetties can be carried out across the slope as required, enabling vessels to lie against their ends; and coal-tips are very conveniently extended out across the slope at suitable intervals (fig. 8).

Failures of dock walls.

As dock walls, especially before the admission of water into the dock, constitute high retaining walls, not infrequently founded upon soft or slippery strata, and backed up with the excavated materials from alluvial beds, into which water is liable to percolate, they are naturally exposed under unfavourable conditions to the danger of failure. A dock wall erected on unsatisfactory foundations is liable, where the bottom is soft, to settle down at its toe, owing to the pressure at the back, and to fall forwards into the dock, as occurred at Belfast; or where the silty bottom slips forward under the weight of the backing, the wall may follow the slip at the bottom and settle down at the back, falling to some extent backwards, as exemplified by the failure of the Empress basin wall at Southampton. The most common form, however, of failure is the sliding forwards of a dock wall, with little or no subsidence, on a silty or slippery stratum under the pressure imposed by the backing. Thus the Kidderpur dock walls furnish an instance of sliding forwards on muddy silt, and part of the South West India dock walls on two underlying, detached, slippery seams of London clay.

To avoid these failures with untrustworthy foundations, great care has to be exercised in selecting the best hard material available, unaffected by water, for the backing, which should be brought up in thin, horizontal layers carefully consolidated; and where there is a possibility of water accumulating at the back, pipes should be introduced at intervals near the

bottom right through the wall in building it, and rubble stone deposited close to the back of the wall, so as to carry off any water from behind, these pipes being stopped up just before the water is let into the dock. These precautions, moreover, are assisted by reducing the amount of backing to a minimum in the construction of the wall, best effected by building the wall inside a timbered trench. The liability to slide forwards can be obviated by carrying down the foundations of the wall sufficiently below dock-bottom to provide an efficient buttress of earth in front of the wall, and also by making the base of the wall slope down towards the back, thereby forcing the wall in sliding forwards to mount the slope, or to push forward a larger mass of earth; whilst a row of sheet piling in front of the foundations offers a very effectual impediment to a forward movement, and, in combination with bearing piles, prevents settlement at the toe in soft ground. In very treacherous foundations it may be advisable to defer the completion of the backing till after the admission of the water; but the additional stability given to a retaining wall or reservoir dam by an ample batter in front, is precluded in dock walls by the modern requirements of vessels.

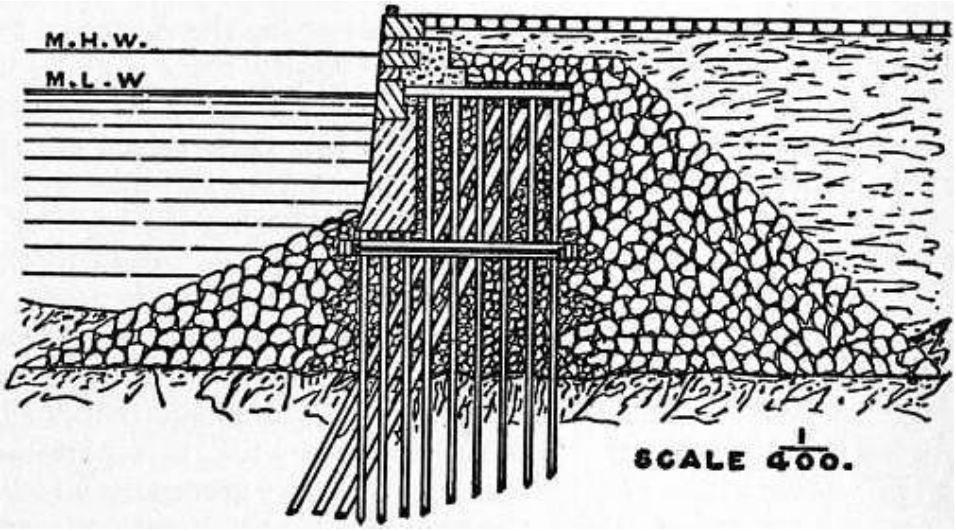


FIG. 18.—New York Quay Wall, Hudson river.

Silt accumulates in docks where the lowering of the water-level by locking, the drawing down of half-tide basins, and the raising of the water at spring tides, involve the admission of considerable volumes of tidal water heavily charged with silt, which is deposited in still water and has to be periodically removed by dredging. To avoid this, the water is sometimes replenished from some clear inland source, an arrangement adopted at some of the South Wales ports opening into the muddy Severn estuary, and at the Alexandra dock, Hull, to exclude the silty waters of the Humber. At the Kidderpur docks on the Húgli, the water from the river for replenishing the docks is conducted by a circuitous canal, in which it deposits its burden of silt before it is pumped into the docks.

Maintenance of depth.

In order to deal expeditiously with the cargoes and goods brought into and despatched from docks, numerous sidings communicating with the railways of the district are arranged along the quays, which are also provided with steam, hydraulic or electric travelling cranes at intervals alongside the docks, basins or river, for discharging or loading vessels, and with sheds and warehouses for the storage of merchandise, &c., the arrangements depending largely upon the special trade of the port. Though different sources of power are sometimes made use of at different parts of the same port, as for example at Hamburg, where the numerous cranes are worked by steam, hydraulic power or most recently by electricity, and a few by gas engines, it is generally most convenient to work the various installations by one form of power from a central station. Water-pressure has been very commonly used as the motive power at docks, being generated by a steam-engine and stored up by one or more accumulators, from which the water is transmitted under pressure through strong cast-iron pipes to the hydraulic engines which actuate the cranes, lifts, coal-tips, capstans, swing-bridges and gate machinery throughout the docks (see POWER TRANSMISSION: *Hydraulic*). The intermittent working of the machinery in docks results in a considerable variation in the power needed at different times; but economical working is secured by arranging that when the accumulators are full,

Equipment on quays.

steam is automatically shut off from the pumping engines, but is supplied again as soon as water is drawn off. Electricity affords another means for the economical transmission of power to a distance suited for intermittent working; as far back as 1902 it was being adopted at Hamburg as the source of power for the machinery of the extensive additional basins then recently opened for traffic.

Coal-tips.

At ports where the principal trade is the export of coal from neighbouring collieries, special provision has to be made for its rapid shipment. Coal-tips, accordingly, are erected at the sides of the dock in these ports, with sidings on the quays at the back for receiving the trains of coal trucks, from which two lines of way diverge to each coal-tip, one serving for the conveyance of the full wagons one by one to the tip, after passing over a weigh-bridge, and the other for the return of the empty wagons to the siding where the empty train is made up for returning to the colliery (fig. 8). Each full wagon is either run at a low level upon a cradle at the tip, then raised on the cradle within a wrought-iron lattice tower to a suitable height, and lastly, tipped up at the back for discharging the coal; or it is brought along a high-level road on to a cradle raised to this level on the tower, and tipped up at this or some slightly modified level. The coal is discharged down an adjustable iron shoot, gradually narrowed so as to check the fall; and on first discharging into the hold of a vessel, an anti-breakage box is suspended below the mouth of the shoot. When full, this is lowered to the bottom of the hold and emptied, thereby gradually forming a cone of coal upon which the coal can be discharged directly from the shoot without danger of breakage. Other contrivances are also adopted with the same object.

Dock extensions.

In designing dock works, it is expedient to make provision, as far as possible, for future extensions as the trade of the port increases. Generally this can be effected alongside tidal rivers and estuaries by utilizing sites lower down the river, as carried out on the Thames for the port of London, or reclaiming unoccupied foreshores of an estuary, as adopted for extensions of the ports of Liverpool, Hull and Havre. At ports on the sea-coast of tideless seas, it is

only necessary to extend the outlying breakwater parallel to the shore line, and form additional basins under its shelter, as at Marseilles (fig. 5) and Genoa (see HARBOUR). Quays also along rivers furnish very valuable opportunities of readily extending the accommodation of ports. Ports, however, established inland like Manchester, though extremely serviceable in converting an inland city into a seaport, are at the disadvantage of having to acquire very valuable land for any extensions that may be required; but, nevertheless, some compensation is afforded by the complete shelter in which the extensions can be carried out, when compared with Liverpool, where the additions to the docks can only be effected by troublesome reclamation works along the foreshore to the north, in increasingly exposed situations.

Dock Entrances and Locks.—The size of vessels which a port can admit depends upon the depth and width of the entrance to the docks; for, though the access of vessels is also governed by the depth of the approach channel, this channel is often capable of being further deepened to some extent by dredging; whereas the entrance, formed of solid masonry or concrete, cannot be adapted, except by troublesome and costly works sometimes amounting to reconstruction, to the increasing dimensions of vessels. Accordingly, in designing new dock works with entrances and locks, it is essential to look forward to the possible future requirements of vessels. The necessity for such forethought is illustrated by the rapid increase which has taken place in the size of the largest ocean liners. Thus the "City of Rome," launched in 1881, is 560 ft. long, and 52¼ ft. beam, and has a maximum recorded draught of 27½ ft.; the "Campania" and "Lucania," in 1893, measure 600 ft. by 65 ft.; the "Oceanic," in 1899, 685½ ft. by 68¼ ft., with a maximum draught of 31⅓ ft.; the "Baltic," in 1903, 709 ft. by 75 ft., with a maximum draught of 31¾ ft.; and the "Lusitania" and "Mauretania," launched in 1906, 787½ ft. by 88 ft.

The width and depth of access to docks are of more importance than the length of locks; for docks which are reached through entrances with a single pair of gates have to admit vessels towards high water when the water-level in the

Dimensions of entrances and locks.

dock is the same as in the approach channel, or through a half-tide basin drawn down to the level of the water outside, and are therefore accessible to vessels of any length, provided the width of the entrance and depth over the sill are adequate; whilst at docks which are entered through locks, vessels which are longer than the available length of the lock can get in at high water when both pairs of gates of the lock are open. Open basins are generally given an ample width of entrance, and river quays also are always accessible to the longest and broadest vessels; but in a tidal river the available depth has to be reckoned from the lowest low water of spring tides, instead of from the lowest high water of neap tides, if the vessels in the open basins and alongside the river quays have to be always afloat.

Many years ago the Canada lock at Liverpool, the outer North lock at Birkenhead, the Ramsden lock and entrance at Barrow-in-Furness, and the Eure entrance at Havre, were given a width of 100 ft. Probably this was done with the view of admitting paddle steamers, since subsequent entrances at Liverpool were given widths of 80 and 65 ft.; whereas none of the locks in the port of London has been made wider than 80 ft., which has been the standard maximum width since the completion of the Victoria dock in 1866. The widest locks at Cardiff are 80 ft., and the entrance to the Barry docks is the same; but the lock of the Alexandra dock, Hull, opened in 1885, was made 85 ft. wide. At Liverpool, where the access to the docks is mainly through entrances, on account of the small width between the river and the high ground rising at the back, and where ample provision has to be made for the largest Atlantic liners, though the entrances to the Langton dock, completed in 1881, leading to the latest docks at the northern end were made 65 ft. wide, with their sills 3 ft. below low water of spring tides and 20½ ft. below high water of the lowest neap tides, the two new entrances to the deepened Brunswick dock near the southern end, giving access to the adjacent reconstructed docks, completed in 1906, were made 80 and 100 ft. wide, with sills 28 ft. below high water of the lowest neap tides. Moreover, the three new entrances to the new Sandon half-tide dock, completed in 1906, communicating with the reconstructed line of docks to the

south of the Canada basin, and with the latest northern extensions of the Liverpool docks, were made 40 ft. wide with a depth over the sill of 24½ ft., and 80 and 100 ft. wide on each end of the central entrance, with sills 29 ft. below high water of the lowest neap tides, each entrance being provided with two pairs of gates, in case of any accident occurring to one pair, according to the regular custom at Liverpool. Powers were also obtained in 1906 for the construction of a half-tide dock and two branch docks to the north of the Hornby dock, which are to be reached from the river by two entrances designed to be 130 ft. wide, with sills 38½ ft. below high water of the lowest neap tides, so as to meet fully the assumed future increase in the beam and draught of the largest vessels; whilst the authorized extension of the river wall northwards will enable additional docks to be constructed in communication with these entrances when required.

Though, with the exception of Southampton and Dover, other British ports do not aim, like Liverpool, at accommodating the largest Atlantic liners at all times, the depths of the sills at the principal ports have been increased in the most recent extensions. Thus at the port of London the sills of the first lock of the Albert dock were 26½ ft. below high water of neap tides, and of the second lock adjoining, 32½ ft. deep; whilst the sills of the lock of the Tilbury docks are 40½ ft. below high water of neap tides. Moreover, in spite of the great range of tide at the South Wales ports on the Severn estuary, the available depth at high water of neap tides of 25 ft. at the Roath lock, Cardiff, was increased in the lock of the new dock to 31½ ft.; the depth at the entrance to the Barry docks, opened in 1889, was 29½ ft., but at the lock opened in 1896 was made 41⅓ ft.; whilst a depth of 34 ft. has been proposed for the new lock of the Alexandra dock extension at Newport, nearly 10 ft. deeper than the existing lock sills there. Similar improvements in depth have also been made or designed at other ports to provide for the increasing draught of vessels.

The length of locks has also been increased, from 550 ft. at the Albert dock, to 700 ft. at Tilbury in the port of London, from 300 ft. to 550 ft. at Hull, and from 350 ft. to 660 ft. at Cardiff. The lock at the Barry docks is 647 ft. long, though only 65 ft. wide. A lock constructed in connexion with the improvement works

at Havre, carried out in 1896-1907, was given an available length of 805 ft. and a width of 98½ ft., with a depth over the sills of 34¾ ft. at high water of neap tides.

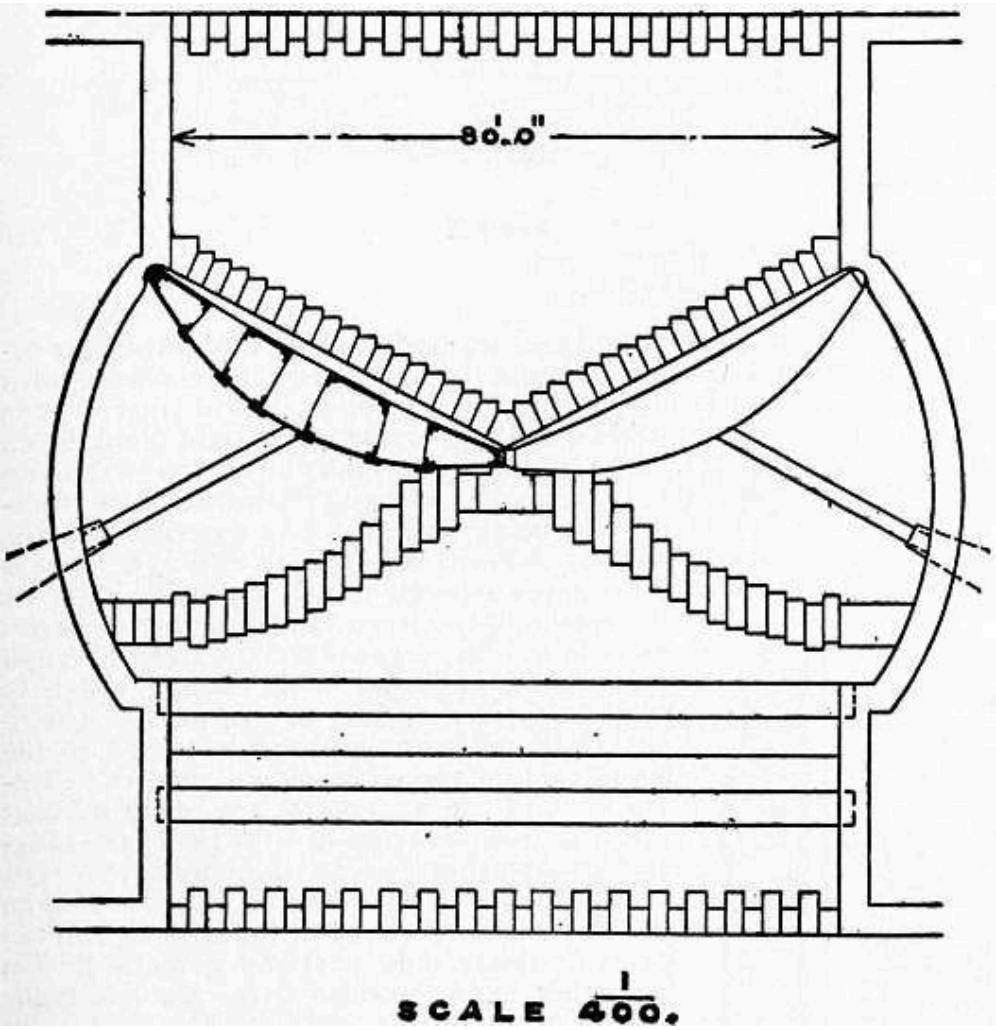


FIG. 19.—Barry Docks, Entrance.

Entrances to docks.

Entrances with a single pair of gates, closing against a raised sill at the bottom and meeting in the centre, have to be made long enough to provide a recess in each side wall at the back to receive the gates when they are opened, and to form a buttress in front on each side to bear the thrust of the gates when closed against a head of water inside. A masonry floor is laid on the bottom in

continuation of the sill, serving as an apron against erosion by water leaking between or under the gates, and by the current through the sluiceways in the gates, when opened for scouring the entrance channel or to assist in lowering the water in a half-tide dock for opening the gates (fig. 19). A sluiceway in each side wall, closed by a vertical sluice-gate, generally provided in duplicate in case of accidents and worked by a machine actuated by hydraulic pressure, enables the half-tide basin to be brought down to the level of the approach channel outside with a rising tide, so that vessels may be brought into or passed out of the basin towards high water. The advantages of these entrances are, that they occupy comparatively little room where the space is limited, and are much less costly than locks; whilst in conjunction with a half-tide basin they serve the same purpose as a lock with a rising tide. Vessels also pass more readily through the short entrances than through locks; and as entrances are only used towards high water, their sills need not be placed so low as the outer sills of locks to accommodate vessels of large draught. On the other hand, they are accessible for a more limited period at each tide than locks; and they do not allow of the exclusion of silt-bearing tidal water, and therefore necessitate a greater amount of dredging in the docks, and especially in half-tide basins, for maintenance. Entrances, however, at large ports are frequently supplemented by the addition of a lock at some convenient site, rendering the ports accessible for the smaller class of vessels for some time before and after high water, as for instance at Liverpool, Barry, Havre and St Nazaire. A small basin with an entrance at each end—an arrangement often adopted—is in reality, for all practical purposes, a lock with a very large lock-chamber. An entrance or passage with gates has also to be provided at the inner end of a large half-tide basin like the basins adopted at Liverpool, to shut off the half-tide basin from the docks to which it gives access, and maintain their water-level when the water is drawn down in the basin to admit vessels before high tide.

Reverse gates pointing outwards are sometimes added in passages to docks and at entrances, to render the water-level in one set of docks

independent of adjacent docks, to exclude silty tidal water and very high tides, and also to protect the gates of outer entrances in exposed situations from swell, which might force them open slightly and lead to a damaging shock on their closing again.

Locks at docks.

Locks differ from entrances in having a pair of gates with arrangements similar to an entrance at each end, separated from one another by a lock-chamber, which should be large enough to receive the longest and broadest vessel coming regularly to the port. These dock locks are similar in principle to locks on canals and canalized rivers, but are on a much larger scale. The lock-chamber has its water raised or lowered in proportion to the difference in level between the water-level in the dock and the water in the entrance channel, by passing water, when the gates are closed at both ends, from the dock into the lock-chamber or from the lock-chamber into the entrance channel, through large sluiceways in the side walls, controlled, as at entrances, by vertical sluice-gates. In this way the vessel is raised or lowered in the chamber, till, when a level has been reached, the intervening pair of gates is opened and the vessel is passed into the dock or out to the channel. Generally the upper and lower sills of a lock are at the same level, a foot or two higher than dock-bottom; and the depth at which they are laid is governed by the same considerations as the sill of an entrance. Vessels longer than the available length between the two pairs of gates can be admitted close to high water, when the water in the dock and outside is at the same level, and both pairs of gates can be opened. When the range of tide at a port is large, and the depth in the approach channel is sufficient to allow vessels to come up or go out some time before and after high water, and also where the water in the dock is kept up to a high level from an inland source to exclude very silty tidal water, it is expedient to reduce the cost of construction by limiting the depth of the excavations for the dock, and consequently also the height of the dock walls, to what is necessary to provide a sufficient depth of water below high water of the lowest neap tides, or below the water-level to which the water in the dock is always

maintained, for the vessels of largest draught frequenting the port, or those which may be reasonably expected in the near future. The upper sill of the lock is then determined by the level of dock-bottom; but the lower sill is taken down approximately to the depth of the bottom of the approach channel, or to the depth to which it can be carried by dredging, so as to enable the lock to admit or let out at any time all vessels which can navigate the approach channel. Thus, for instance, the outer and intermediate sills of the lock at the Barry docks are 9 ft. lower then the upper sill.

The foundations for the sill and side walls at each end of a lock, and also for the side walls and invert commonly enclosing the lock-chamber at the sides and bottom, are generally constructed simultaneously with the dock works, under shelter of a cofferdam across the entrance channel, and in the excavations kept dry by means of pumps. The foundations under the sills and adjacent side walls are carried down to a lower level than the rest, and if possible to a water-tight stratum, to prevent infiltration of water under them owing to the water-pressure on the upper side of the gates; or sometimes one or two rows of sheet piling have been driven across the lock under the sills to an impermeable stratum, to stop any flow. The foundations for the sills consist usually of concrete deposited in a trench extended out under the adjoining side walls. The sill, projecting generally about 2 ft. above the adjacent gate floor over which the gates turn, is built of granite; and the same material is also used for the hollow quoins in which the heelpost, or pivot, of the dock gates turns, and which, together with the sills, are exposed to considerable wear. The side walls of the lock-chamber are very similar in construction to the dock walls; but they are strengthened against the loss of water-pressure in front of them when the water is lowered in the chamber by an inverted arch of masonry, brickwork or concrete, termed an “invert,” laid across the bottom of the chamber along its whole length, against which the toe of each side wall abuts and effectually prevents any forward movement. The side walls also, alongside the gates at each end, abut against a thick level gate floor and apron, and,

moreover, are considerably widened to provide space for the sluiceways and gate machinery.

The new Florida lock (fig. 20), forming the main entrance through the new approach harbour and tidal harbour to the Eure dock and other docks of the port of Havre, is the largest lock hitherto constructed. It has an available length of chamber between the gates of 805 ft., a width of 98½ ft., and depths over the sills of 15¾ ft. at the lowest low water of spring tides, 23½ ft. at low water of neap tides, 35 ft. at high water of neap tides, and 40½ ft. at high water of spring tides. Owing to the alluvial stratum at the site of the lock close to the Seine estuary, of which it doubtless at one time formed part, the foundations for the sill and side walls or heads at each end of the lock were executed by aid of compressed air. The foundations for these heads were carried down to an impermeable stratum by means of two bottomless caissons, filled eventually with concrete, 213½ ft. long across the lock and 105 ft. wide in the line of the lock at the upper end, and 206¾ ft. long and 116½ ft. wide at the lower end, to a depth of 18 ft. below the sill at the upper end, and 41 ft. at the lower end, owing to the dip down seawards and southward of the water-tight stratum. These caissons were provided for their sinkage with temporary dams of masonry closing the opening of the lock at the extremities of each caisson, enabling the gates to be subsequently erected under their shelter. The junctions between the foundations of the heads and the adjacent foundations were effected by small movable caissons carried down in recesses provided in the buried caissons. The connexions with the adjacent quay walls were accomplished by two supplementary side caissons at the end of each head; and the north side wall of the lock was founded by means of seven bottomless caissons sunk by aid of compressed air, on account of the proximity of the tidal harbour on that side. The south side wall was founded for a length of about 200 ft. at its western end in an excavated trench kept dry by pumping; but the greater portion was founded in a dredged trench in which bearing piles were driven under water, on which the masonry was built in successive layers, about 3¼ ft. thick, in a movable caisson 93½ ft. long and 37¾ ft.

wide; whilst a bottomless caisson, left in the work, was employed for founding about 100 ft. of wall at the eastern end. The bed of concrete also, 10 ft. thick, forming the floor of the chamber, was carried out for 82 ft. at the western end in the open air, and the remainder in the same movable caisson as used for the south wall. Two sluiceways on each side running the whole length of the lock, differing 6½ ft. in level, communicate with the lock-chamber through openings in the side walls, 67¼ ft. apart, and provide for the filling and emptying of the chamber.

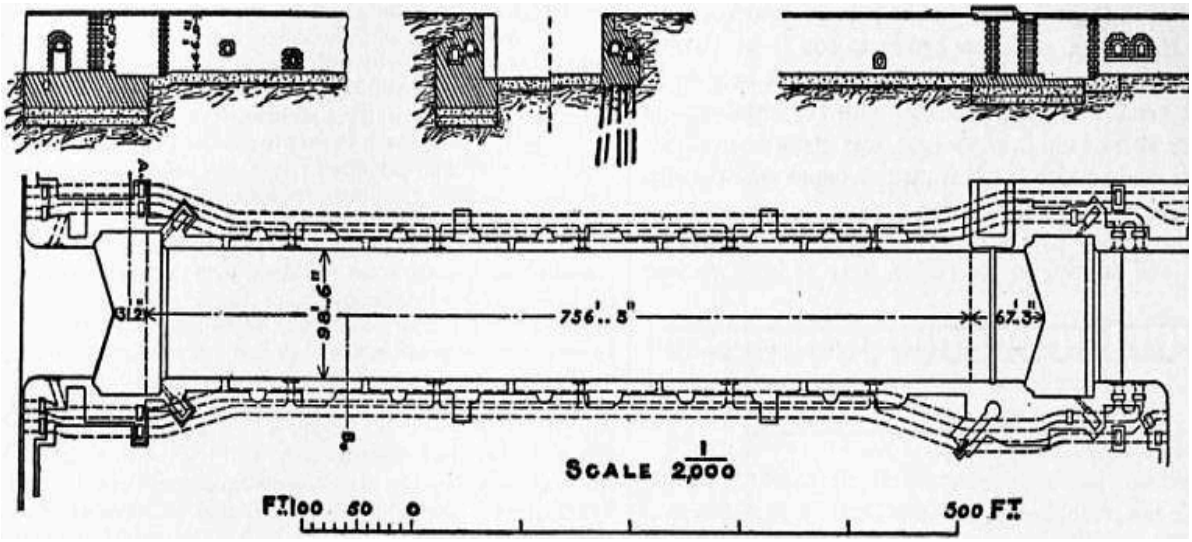


FIG. 20.—Florida Lock, Havre Docks, Sections and Plan.

Dock gates.

The gates closing the entrances and locks at docks are made of wood or of iron. In iron gates, the heelpost, or a vertical closing strip attached to the outer side of the gate close to the heelpost, the meeting-post at the end of each gate closing against each other when the gates are shut, and the sill piece fitting against the sill are generally made of wood. Wooden gates consist of a series of horizontal framed beams, made thicker and put closer together towards the bottom to resist the water-pressure increasing with the depth, fastened to the heelpost and meeting-post at the two ends and to intermediate uprights, and supporting water-tight planking on the inner face

(fig. 21). Iron gates have generally an outer as well as an inner skin of iron plates braced vertically and horizontally by plate-iron ribs, the horizontal ribs being placed nearer together and the plates made thicker towards the bottom (figs. 22 and 23). Greenheart is the wood used for gates exposed to salt water, as it resists the attack of the teredo in temperate climates. As cellular iron gates are made water-tight, and have to be ballasted with enough water to prevent their flotation, or are provided with air chambers below and are left open to the rising tide on the outer side above, the gates are light in the water and are easily moved; whereas greenheart gates with their fastenings are considerably heavier than water, so that a considerable weight has to be moved when the water is somewhat low in the dock and the gates therefore only partially immersed. On the other hand, wooden gates are less liable than iron gates to be seriously damaged if run into by a vessel.

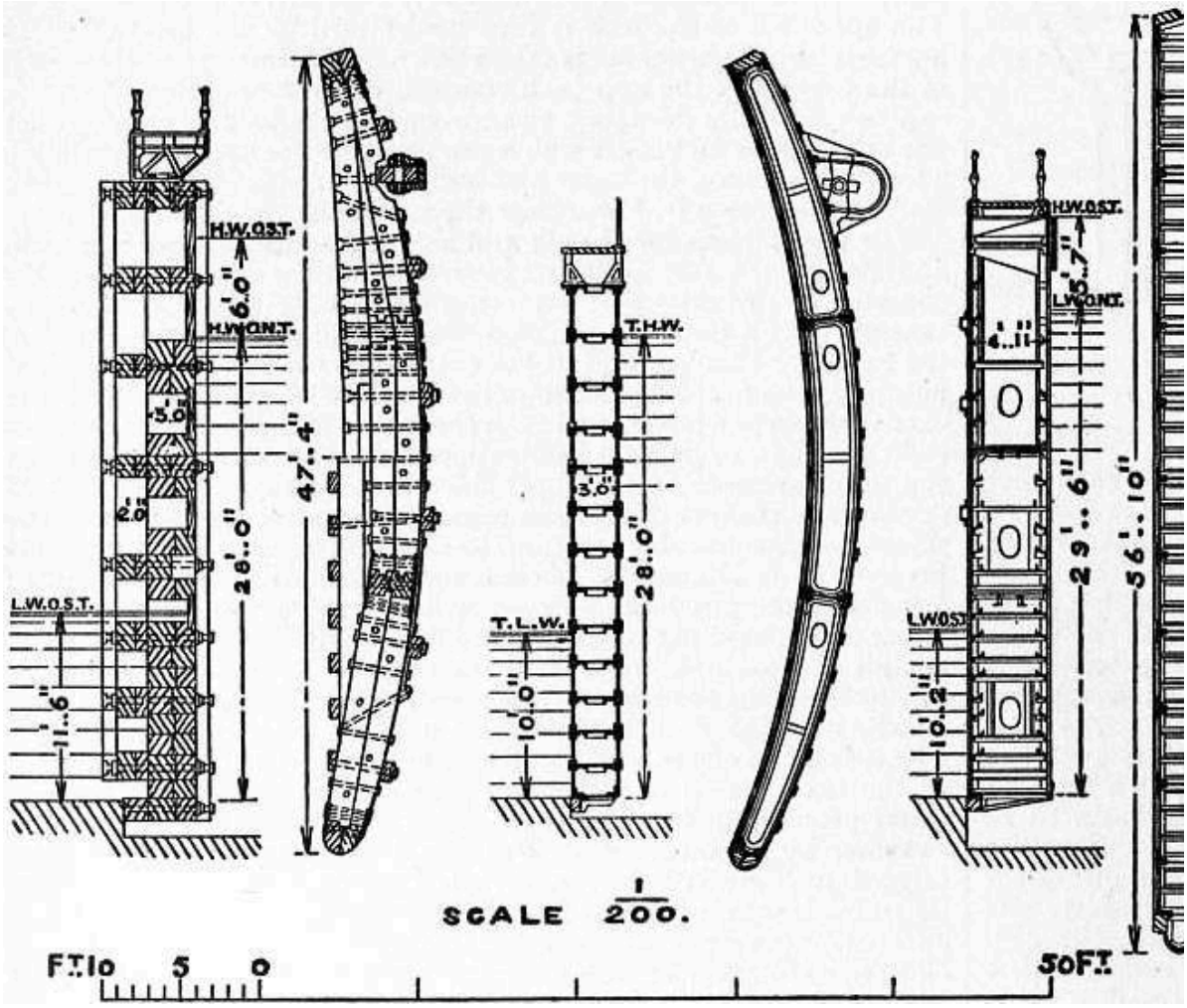


FIG. 21.—Wooden Dock Gate.

FIG. 22.—Iron Segmental Dock Gate.

FIG. 23.—Straight Iron Doc Gate.

Dock gates are sometimes made straight, closing against a straight sill (figs. 20 and 23); and occasionally they are made segmental with the inner faces forming a continuous circular arc and closing against a sill corresponding to the outer curves of the gates (fig. 22), or by means of a projecting sill piece against a straight sill (fig. 21). More frequently the gates, curved on both faces, meet at an angle forming a Gothic arch in plan, and close by aid of a projecting piece against a straight sill, which in the Barry entrance gates is modified by making the outer faces nearly straight (fig. 19), giving an unusual width to the centre of the gates. The pressures

produced by a head of water against these gates when closed depends not only on the form of the gates, but also upon the projection given to the angle of the sill in proportion to the width of the lock, which is known as the rise, and is generally placed at a distance along the centre line of the lock, from a line joining the centres of the heel-posts, of about one-fourth the width. With straight gates, the stresses consist, first of a transverse stress due to the water-pressure against the gate, which increases with the head of water and length of the gate; and secondly, of a compressive stress along the gate, resulting from the pressure of the other gate against its meeting-post, which is equal to half the water-pressure on the gate multiplied by the tangent of half the angle between the closed gates, varying inversely with the rise. Though an increase in the rise reduces this stress, it increases the length of the gate and the transverse stress, and also the length of the lock. By curving the gates suitably, the transverse stress is reduced and the longitudinal compressive stress is augmented, till at last, when the gates form a horizontal segmental arch, the stresses become wholly compressive and uniform in each horizontal section, increasing with the depth; and the total stress is equal to the pressure on a unit of surface multiplied by the radius of curvature. Though the water-pressure is most uniformly and economically borne by cylindrical gates, they are longer, and encroach more upon the lines of quay with their curved recesses than straighter gates; and, consequently, Gothic-arched gates are often preferred. Straight gates afford the greatest simplicity in construction.

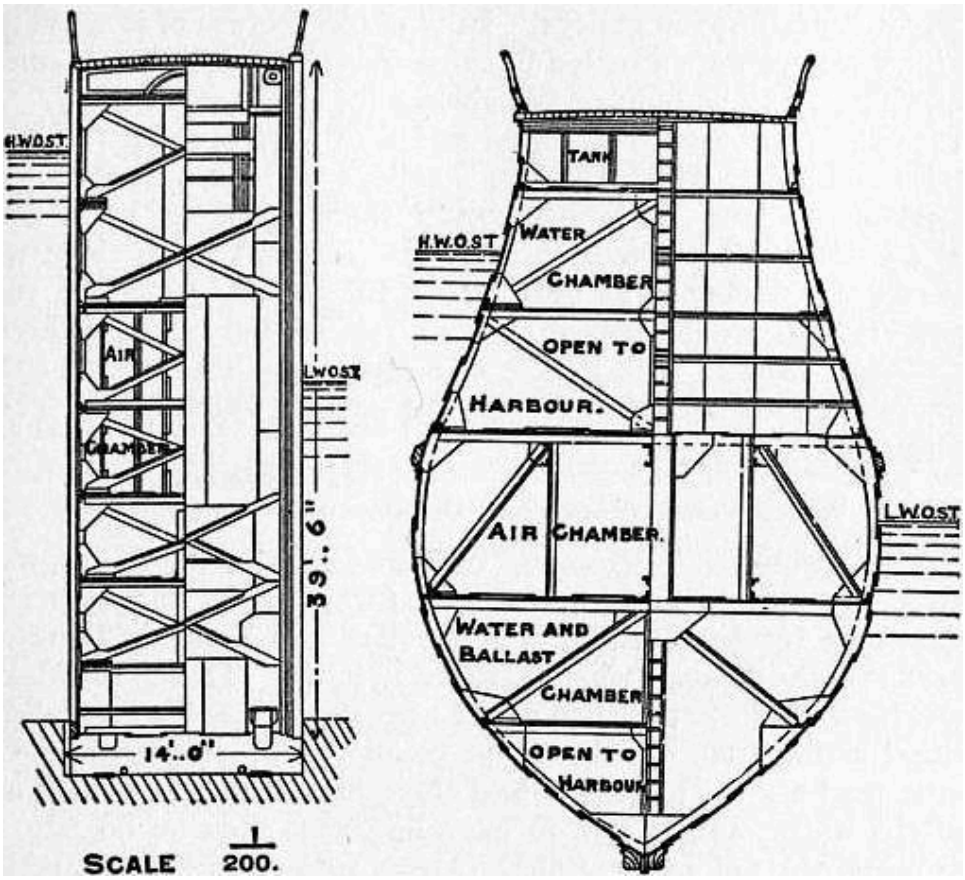


FIG. 24.—Sliding Caisson. FIG. 25.—Ship Caisson.

Gates in wide entrances or locks are generally supported towards their outer end by a roller running along a castiron roller-path on the gate floor (figs. 19, 21 and 22), as well as by the heelpost, fitted over a steel pivot at the bottom, and tied back against the hollow quoins at the top by anchor straps and bolts, on which the gate turns. In some cases, by placing the water ballast in iron gates close to the heelpost, a roller has been dispensed with, even, for instance, at the wide entrance at Havre (fig. 23). The gates are opened and closed, either by an opening and a closing chain for each gate, fastened on either side and worked from opposite side walls by hydraulic power, or by a single hydraulic piston or bar hinged to the inner side of each gate (figs. 19 and 20). The latter system has the advantages of being simpler and occupying less space in the side walls, of avoiding the

slight loss of available depth over the sill due to the two closing chains crossing on the sill when the gates are open, and especially of keeping the gates closed against a swell in exposed sites.

A sliding or rolling caisson is occasionally placed across each end of a lock in place of a pair of dock gates, being Caissons drawn back into a recess at the side for opening docks. the lock. As a caisson chamber has to be covered for over to provide a continuous quay or roadway on the top, a lowering platform is supplied to enable the caisson to pass under the small girders spanning the top of the chamber, or the caisson is sunk down sufficiently (fig. 24). The caisson is furnished with an air chamber to give it flotation, which is adjusted by ballast according to the depth of water. The advantages of a caisson, as compared with a pair of gates, are that the gate recesses, gate floor, hollow quoins and arrangements for working in the side walls are dispensed with, so that the lock can be made shorter, and the work at each head is rendered less complicated. The caisson itself also serves as a very strong movable bridge, and therefore is often preferred at dockyards to dock gates. By improvements in the hauling machinery, a caisson can open or close a lock as quickly as dock gates; the caissons at Zeebrugge lock, at the entrance to the Bruges ship canal, are drawn across the lock or into their chamber by electricity in two minutes. A caisson is specially useful in cases where there may be a head of water on either side, as then it takes the place of two pairs of gates pointing in opposite directions, or for closing an entrance against a current. A caisson, however, requires a much larger amount of material than a pair of dock gates, and a considerable width on one side for its chamber, so that under ordinary conditions gates are generally used at docks.

Caissons for docks.

A ship caisson, so called from its presenting some resemblance in section to the hull of a vessel, occupies too much time in being towed, floated into position, and sunk into grooves at the bottom and sides of an entrance for closing it, and then refloated and towed away for opening the entrance

again, to be used at entrances and locks to docks (fig. 25). Being, however, simple in construction, taking up little space, and requiring no chamber or machinery for moving it, this form of caisson is generally used for closing the entrance to a graving dock, where it remains for several days in place during the execution of repairs to a vessel in the dock. A ship caisson only requires the admission of sufficient water to sink it when in position across the entrance to a graving dock; and this water has to be pumped out before it can be floated, and removed to some vacant position in the neighbouring dock till it is again required. Like a sliding or rolling caisson, it provides a bridge for crossing over the entrance of the graving dock when in position.

Graving Docks. - Provision has to be made at ports for the repairs of vessels frequenting them. The simplest arrangement is a timber gridiron, on which a vessel settles with a falling tide, and can then be inspected and slightly cleaned and repaired till the tide floats it again. Inclined slipways are sometimes provided, up which a vessel resting in a cradle on wheels can be drawn out of the water; and they are also used for shipbuilding, the vessel when ready for launching being allowed to slide down them into the water. Graving or dry docks, however, opening out of a dock, are the usual means provided for enabling the cleaning and repairs of vessels to be carried out.

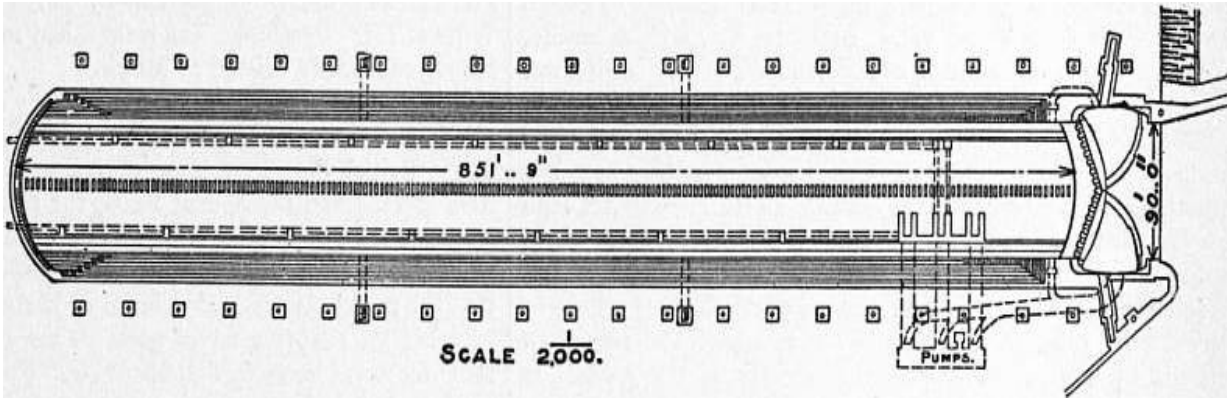


FIG. 26.—Plan of Southampton Graving Dock.

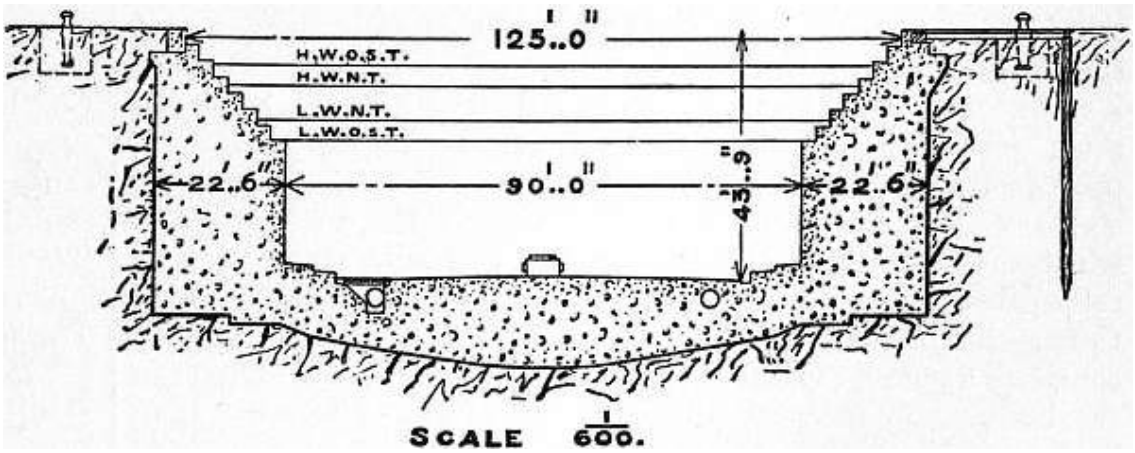


FIG. 27.—Cross Section of Southampton Graving Dock.

A graving dock consists of an enclosure, surrounded by side walls stepped on the face, and paved at the bottom with a thick floor sloping slightly down from the centre to drains along the sides, long enough to receive the longest vessel likely to come to the port. Its entrance, at the end adjoining the dock, is just wide enough to admit the vessel of greatest beam, and deep enough over the sill to receive the vessel of greatest draught, when light, at the lowest water-level of the dock (figs. 26 and 27). Graving docks are constructed of masonry, brickwork or concrete, or formerly in America of timber; they should be founded on a solid impervious stratum, or, where that is impracticable, they should be built upon bearing piles and enclosed within sheet piling, to prevent settlement and the infiltration of water under pressure below the dock. Keel blocks are laid along the centre line of the dock, for the keel of the vessel to rest on when the water is pumped out; and the vessel is further supported on each side by timber shores supported on the steps or "altars" of the side walls, which are lined with granite or other hard stone, or blue bricks, or, when constructed of concrete, with a facing of stronger concrete, to enable these altars to withstand the wear and shocks to which they are subjected. Steps and slides are provided at convenient places at the sides to give access for men and materials to the bottom of the dock; and culverts and drains lead the water to pumps for removing the water from the dock when the

entrance has been closed, and to keep it dry whilst a vessel is under repair. Culverts in the side walls of the entrance enable water to be admitted for filling the dock to let the vessel out. Graving docks are generally closed by ship caissons; but where they open direct on to a tidal river, and there is some exposure, gates are adopted, or sometimes sliding caissons.

The dimensions of graving docks vary considerably with the nature of the trade and the date of construction; and sometimes an intermediate entrance is provided to accommodate two smaller vessels. The sizes of some of the largest graving docks are as follows: Liverpool, Canada dock, 925½ ft. long, 94 ft. width of entrance, and 29 ft. depth at the ordinary water-level in the dock; Southampton, 851¾ ft. by 90 ft., and 29½ ft. depth at high-water neaps (figs. 26 and 27); Tilbury, 875 ft. by 70 ft. by 31½ ft.; and Glasgow, 880 ft. by 80 ft. by 26½ ft.

Floating Dry Docks.—Where there is no site available for a graving dock, or the ground is very treacherous, floating dry docks, built originally of wood, but more recently of iron or steel, have occasionally been resorted to. The first Bermuda dock towed across the Atlantic in 1869, and the new dock launched in 1902, 545 ft. by 100 ft., are notable examples. Water is admitted into the pontoon at the bottom to sink the dock sufficiently to admit a vessel at its open end; and then the water is pumped out of compartments in the pontoon till the vessel is raised out of water. It is only necessary to find a sheltered site, with a sufficient depth of water, for conducting the operations.

(L. F. V.-H.)

DOCKET (perhaps from “dock,” to curtail or cut short, with the diminutive suffix *et*, but the origin of the word is obscure; it has come into use since the

15th century), in law, a brief summary or digest of a case, or a memorandum of legal decisions; also the alphabetical list of cases down for trial, or of suits pending. Such cases are said to be “on the docket.” In commercial use, a docket is a warrant from the custom-house, stating that the duty on goods entered has been paid, or the label fastened to goods, showing their destination, value, contents, &c., and, generally, any indorsement on the back of a document, briefly setting out its contents.

DOCK WARRANT, in law, a document by which the owner of a marine or river dock certifies that the holder is entitled to goods imported and warehoused in the docks. In the Factors Act 1889 it is included in the phrase “document of title” and is defined as any document or writing, being evidence of the title of any person therein named ... to the property in any goods or merchandise lying in any warehouse or wharf and signed or certified by the person having the custody of the goods. It passes by indorsement and delivery and transfers the absolute right to the goods described in it. A dock warrant is liable to a stamp duty of threepence, which may be denoted by an adhesive stamp, to be cancelled by the person by whom the instrument is executed or issued.

DOCKYARDS. In the fullest meaning of the word, a “dock-yard” (or “navy yard” in America) is a government establishment where warships of every kind are built and repaired, and supplied with the men and stores required to maintain

them in a state of efficiency for war. Thus a dockyard in this extended sense would include slips for building ships, workshops for manufacturing their machinery, dry docks for repairing them, stores of arms, ammunition, coal, provisions, &c., with basins in which they may lie while being supplied with such things, and an establishment for providing the *personnel* necessary for manning them. But in practice few, if any, existing dockyards are of so complete a nature; many of them, for instance, do not undertake the building of ships at all, while others are little more than harbours where a ship may replenish her stores of coal, water and provisions and carry out minor repairs. Private firms are relied upon for the construction of many ships down to an advanced stage, the government dockyards completing and equipping them for commission.

Great Britain.—Previous to the reign of Henry VIII., the kings of England had neither naval arsenals nor dockyards, nor any regular establishment of civil or naval officers to provide ships of war, or to man them. There are, however, strong evidences of the existence of dockyards, or of something answering thereto, at very early dates, at Rye, Shoreham and Winchelsea. In November 1243 the sheriff of Sussex was ordered to enlarge the house at Rye in which the king's galleys were kept, so that it might contain seven galleys. In 1238 the keepers of some of the king's galleys were directed to cause those vessels to be breamed, and a house to be built at Winchelsea for their safe custody. In 1254 the bailiffs of Winchelsea and Rye were ordered to repair the buildings in which the king's galleys were kept at Rye. At Portsmouth and at Southampton there seem to have been at all times depôts for both ships and stores, though there was no regular dockyard at Portsmouth till the middle of the 16th century. It would appear, from a curious poem in Hakluyt's *Collection* called "The Policie of Keeping the Sea," that Littlehampton, unfit as it now is, was the port at which Henry VIII. built

"his great *Dromions*
Which passed other great shippes of the commons."

The “dromion,” “dromon,” or “dromedary” was a large warship, the prototype of which was furnished by the Saracens. Roger de Hoveden, Richard of Devizes and Peter de Longtoft celebrate the struggle which Richard I., in the “Trench the Mer,” on his way to Palestine, had with a huge dromon,—“a marvellous ship! a ship than which, except Noah’s ship, none greater was ever read of.” This vessel had three masts, was very high out of the water, and is said to have had 1500 men on board. It required the united force of the king’s galleys, and an obstinate fight, to capture the dromon.

The foundation of a regular British navy, by the establishment of dockyards, and the formation of a board, consisting of certain commissioners for the management of its affairs, was first laid by Henry VIII., and the first dockyard erected during his reign was that of Woolwich. Those of Portsmouth, Deptford, Chatham and Sheerness followed in succession. Plymouth was founded by William III. Pembroke was established in 1814, a small yard having previously existed at Milford.

The most important additions yet made at any one period to the dockyard and harbour works required to meet the necessities of the British fleet were those sanctioned by the Naval Works Acts of 1895 and subsequent years, the total estimated cost, as stated in the act of 1899, being over 23½ millions sterling. The works proposed under these acts were classified under three heads, viz. (a) the enclosure and defence of harbours against torpedo attacks; (b) adapting naval ports to the present needs of the fleet; (c) naval barracks and hospitals. Under the first heading were included the defensive harbours at Portland, Dover and Gibraltar. Under heading (b) were included the deepening of harbours and approaches, the dockyard extensions at Gibraltar, Keyham (Devonport), Simons Bay, and Hong-Kong, with sundry other items. Under heading (c) were included the naval barracks at Chatham, Portsmouth and Keyham; the naval hospitals at Chatham, Haslar and Haulbowline; the colleges at Keyham and Dartmouth; and other items.

Great Britain possesses dockyards at Portsmouth, Devonport, Chatham, Malta and Gibraltar, each in charge of an admiral-superintendent, and at Sheerness and

Pembroke in charge of a captain-superintendent, together with establishments at Ascension, Bermuda, Simons Town (Cape of Good Hope), Queenstown (Haulbowline); Hong-Kong, Portland, Sydney and Weihaiwei. The Indian Government has dockyards at Bombay and Calcutta. The medical establishments include Ascension, Bermuda, Cape of Good Hope, Chatham, Dartmouth, Deal, Gibraltar, Haslar, Haulbowline, Hong-Kong, Malta, Osborne, Plymouth, Portland, Portsmouth, Sheerness, Sydney, Yarmouth, Yokohama and Weihaiwei.

The arrangements for the administrative control of the dockyards have varied with those adopted for the regulation of the navy as a whole. (See ADMIRALTY ADMINISTRATION; and NAVY: *History*.) At the present time, whether at home or abroad, they lie within the province of the controller of the navy (the third lord of the board of admiralty); and the director of dockyards, whose office, replacing that of surveyor of dockyards was created in December 1885, is responsible to the controller for the building of ships, boats, &c., in dockyards, and for the maintenance and repair of ships and boats, and of all steam machinery in ships, boats, dockyards and factories. The director of naval construction, who is also deputy-controller, is responsible, not only for the design of ships, but for their construction, in the sense that he approves great numbers of working drawings of structural parts prepared at the dockyards. But the director of dockyards is the admiralty official under whose instructions the work goes on, involving the employment and supervision of an army of artisans and labourers. Instructions, therefore, emanate from the admiralty, but the details lie with the dockyard officials, and in practice there is a considerable decentralization of duties.

The chief function of a dockyard is the building and maintaining of ships in efficiency. The constructive work is carried out under the care of the chief constructor of the yard, in accordance with plans sent down from the admiralty. The calculations for displacement, involving the draught of water forward and aft, have already been made, and, in order to ensure accuracy in the carrying out of the design, an admirable system has been devised for weighing everything

that is built into the new ships or that goes on board; and it is astonishing how very closely the actual displacement approximates to that which was intended, particularly when the tendency of weights to increase, in perfecting a ship for commission, is considered.

The ship having been built to her launching weight, the duty of putting her into the water devolves upon the chief constructor of the yard, and failures in this matter are so extremely rare that it may almost be said they do not occur. As soon as the ship is water-borne the responsibility falls upon the king's harbour master, who has charge of her afloat and of moving her into the fitting basins. When the ship has been brought alongside the wharf, the responsibility of the chief constructor of the yard is resumed, and the ship is carried forward to completion by the affixing of armour plating (if that has not been done before launching), the mounting of guns, the instalment of engines, boilers, and electrical and hydraulic gear, and the fitting of cabins for officers, mess places for men, and storerooms, and a vast volume of other work unnecessary to be specified. In regard to the complicated details of guns and torpedoes, the captains of the gunnery and torpedo schools have a function of supervision. The captain of the fleet reserve also closely watches the work, because, when the heads of all departments have reported the ship to be ready, she has to be inspected by the commander-in-chief at the port, and then passed into the fleet reserve as ready for sea, and there the captain of the fleet reserve is responsible for her efficiency. Other important officers of a dockyard are the chief engineer; the superintendent civil engineer, who has charge of the work involved in keeping all buildings, docks, basins, caissons, roads, &c., in repair; the naval store officer, who has charge of most of the stores in the dockyard; and the cashier of the yard, whose name sufficiently expresses his duties.

The system of conducting business at the dockyards is analogous to that which prevails at the admiralty. There is personal communication between the officers responsible for the work, and facilities are afforded for coming to rapid decisions upon matters that are in hand, and the operations are conducted with an ease which contributes much to efficiency. In 1844 the custom was

introduced of all the principal officers of the dockyard meeting at the superintendent's office at 9.30 A.M. every day, to hear the orders from the admiralty and discuss the work of the day. But this system of "readings" was abolished at the beginning of 1906, the naval establishments inquiry committee considering that the assembling of the officials was unnecessary since the communications after reception are copied and sent to the departments concerned.

The police force necessary in a dockyard is in some cases supplied from the London metropolitan police, and is under the orders of the superintendent of the yard for duties connected with it, and under the commissioner of police for the discipline and disposition of the force. The charges are, of course, paid by the admiralty, and the system answers well.

United States.—The shore stations under control of the Navy Department (see also ADMIRALTY ADMINISTRATION), and collectively known as naval stations, are under different names according to their nature. Of those called *Navy Yards*, and intended for the general purpose of sources of supply and for repairs of ships, there are within the United States eight in number. Two of them are on the Pacific coast, situated on Puget Sound, at Bremerton, Washington; and at Mare Island, near San Francisco. The other six are on the Atlantic coast, and are situated at Portsmouth, N.H.; Boston, Mass.; Brooklyn, N.Y.; Philadelphia, Pa.; Washington, D.C.; and Norfolk, Va. There are also naval stations at Port Royal and Charleston, S.C.; Key West and Pensacola, Fla.; New Orleans, La.; Guantanamo, Cuba; Culebra and San Juan, Porto Rico; Honolulu, H.I.; Cavite, P.I.; Tutuila, Samoa; and Island of Guam, in the Ladrones Islands. The floating dock Dewey, having a lifting capacity of 18,500 gross tons with a free-board of 2 ft., was stationed in the Philippine Islands in 1906.

Besides these, there are important naval stations established for special purposes, which in some cases are also available for ports of supply and for repairs. These are: the U.S. Naval Academy, Annapolis, Md., for the instruction of naval cadets; the training stations at Newport, R.I., and Yerba Buena Island, Cal., for the instruction of apprentices; the proving ground at Indian Head, Md.,

on the Potomac river, where all government-built ordnance is tested; the War College at Newport, R.I., for the instruction of officers; the torpedo station at Newport, for the instruction of officers and men in torpedoes, electricity and submarine diving; the naval observatory at Washington; and the marine post at Sitka, Alaska. Coaling depôts have been established at Honolulu, Pago Pago, Samoan Islands, and at Manila, P.I. Naval hospitals are located at the Portsmouth, Boston, New York, Philadelphia, Washington, Norfolk and Mare Island yards; at Las Animas, Colo.; at Newport, R.I.; Cañacao, P.I.; Sitka, Alaska; and Yokohama, Japan.

The commandant of a navy yard and station, who is usually a rear-admiral, is its commander-in-chief. His official assistants are called heads of departments. The captain of the yard, who is next in succession to command, has general charge of the water front and the ships moored there, and of the police of the navy yard; it is his duty to keep the commandant informed as to the nature and efficiency of all work in progress. The equipment officer has charge of anchors, chains, rigging, sails and the electric generating plant. The other heads of departments are the ordnance officer, the naval constructor, the engineering officer, the general storekeeper, the paymaster of the yard, the surgeon and the civil engineer. The clerks and draughtsmen employed by these officers are appointed under civil service rules, and their employment is continuous so long as funds are available. The foremen are selected by competitive examination, and their number is fixed. In the employment of mechanics and labourers, veterans are given preference, after which follow persons previously employed who have displayed especial efficiency and good conduct. The rates of wages are determined semi-annually by a board of officers, who ascertain the wages paid by private establishments in the vicinity of the navy yard. Eight hours constitute the legal work day. When emergencies necessitate longer hours the workmen are paid at the ordinary rate plus 50%.

The nature and extent of work to be performed upon naval vessels is determined by the secretary of the navy; the commandant then issues the necessary orders. The material required is obtained by a system of requisitions,

which provide for the purchase from the lowest bidder after open competition. Heads of departments initiate the purchase of materials which are peculiar to their own work; ordinary commercial articles, however, are usually carried in a special stock called the “Naval Supply Fund,” which may be drawn upon by any head of department. All materials are inspected, both as to quantity and quality, by a board of inspectors consisting of three officers.

France.—The French coast is divided into five naval arrondissements, which have their headquarters at the five naval ports of which Cherbourg, Brest and Toulon are the most important, Lorient and Rochefort being of lesser degree. All are building and fitting-out yards. Corsica, which has naval stations at Ajaccio, Porto Vecchio, Bonifacio and other places, is a dependency of the arsenal at Toulon. On the African coast there are docking facilities in Algeria. Bizerta, the Tunisian port, has been made a naval base by the deepening and fortifying of the canal which is the approach to the inner lake. There are arsenals also at Saïgon and Hai-phong, and an establishment at Diego Suarez.

The subsidiary establishments in France are the gun foundry at Ruelle; the steel and iron works at Guérigny, where anchors, chains and armour-plate are made; and the works at Indret, on an island in the lower Loire, where machinery is constructed. There are many private shipbuilding establishments in the country, the most important being the Forges et Chantiers de la Méditerranée at La Seyne, on the lesser roadstead at Toulon where many French and foreign warships of the largest classes have been built. The same company has a building yard at Havre. Other establishments are the Ateliers et Chantiers de la Loire, at Saint Nazaire; the Normand Yard, at Havre; and the Chantiers de la Gironde, near Bordeaux.

Each of the arrondissements above mentioned is divided into sous-arrondissements, having their centres in the great commercial ports, but this arrangement is purely for the embodiment of the men of the Inscription Maritime, and has nothing to do with the dockyards as naval arsenals. In each arrondissement the vice-admiral, who is naval prefect, is the immediate representative of the minister of marine, and has full direction and command of the arsenal, which is his headquarters. He is thus commander-in-chief, as also governor-designate for time of war, but his authority does not extend to ships belonging to organized squadrons or divisions. The naval prefect is assisted by a rear-admiral as chief of the staff (except at Lorient and Rochefort, where the office is filled by a captain), and a certain number of officers, the special functions of the chief of the staff having relation principally to the efficiency and *personnel* of the fleet, while the “major-general,” who is usually a rear-

admiral, is concerned chiefly with the *matériel*. There are also directors of stores, of naval construction, of the medical service and of the submarine defences (which are concerned with torpedoes, mines and torpedo-boats), as well as of naval ordnance and works. The prefect directs the operations of the arsenal, and is responsible for its efficiency and for that of the ships which are there in reserve. In regard to the constitution and maintenance of the naval forces, the administration of the arsenals is divided into three principal departments, the first concerned with naval construction, the second with ordnance, including gun-mountings and small-arms, and the third with the so-called submarine defences, dealing with all torpedo *matériel*.

Germany.—With the expansion of the German navy considerable additions have been made to the two principal dockyards. These are Wilhelmshaven, the naval headquarters on the North Sea, and Kiel, the headquarters on the Baltic, Danzig being an establishment of lesser importance, and Kiao-chau an undeveloped base in the Shantung peninsula, China. The chief official at each home dockyard is the superintendent (*Oberwerftdirektor*), who is a rear-admiral or senior captain directly responsible to the naval secretary of state. Under the superintendent's orders are the chief of the Ausrüstung department, or captain of the fleet reserve, the directors of ordnance, torpedoes, navigation, naval construction, engineering and harbour works, with some other officers. The chiefs of the constructive and engineering departments are responsible for the building of ships and machinery, and for the maintenance of the hulls and machinery of existing vessels; while the works department has charge of all work on the quays, docks, &c., in the dockyard and port. A great advance has been made in increasing the efficiency and capabilities of the imperial dockyards by introducing a system of continuous work in the building of new ships and effecting alterations in others, and German material is exclusively used. The Schichau Works at Elbing and Danzig, the Vulkan Yard at Bredow, near Stettin, the Weser Company at Bremen, and the establishment of Blohm and Voss at Hamburg, are important establishments which have built many vessels for the German navy, as well as for foreign states.

Italy.—The principal Italian state dockyards are Spezia, Naples and Venice, the first named being by far the most important. It covers an area, including the

water spaces, of 629 acres, and there are five dry docks, three being 433 ft. long and 105 ft. wide, and two 361 ft. long and 98 ft. 6 in. wide. The dockyard is very completely equipped with machinery of the best British, German and Italian makes, and it has built several of the finest Italian ships. The number of hands employed in the yard averages 4000. There are two building slips, and for smaller vessels there are two in the neighbouring establishment of San Bartolommeo (which is the headquarters for submarine mining), and one at San Vito, where is a Government gun factory. Castellammare di Stabia is subsidiary to Naples. A large dry dock has been built at Taranto. There is a small naval establishment at Maddalena Island on the Strait of Bonifacio. The Italian Government has no gun or torpedo factories, nearly all the ordnance coming from the Armstrong factory at Pozzuoli near Naples, and the torpedoes from the Schwarzkopf factory at Venice, while armour-plates are produced at the important works at Terni. Machinery is supplied by the firms of Ansaldo, Odero, Orlando, Guppy & Hawthorn and Pattison. The three establishments first named have important shipbuilding yards, and have constructed vessels for the Italian and foreign navies. The Orlando Yard at Leghorn is Government property, but is leased by the firm, and possesses five building slips.

Austria-Hungary.—The naval arsenal is on the well-protected harbour of Pola, in Istria, which is the headquarters of the national navy, and includes establishments of all kinds for the maintenance of the fleet. There are large building and docking facilities, and a number of warships have been built there. There is a construction yard also at Trieste. A new coaling and torpedo station is at Teodo, large magazines and stores are at Vallelunga, and the mining establishment is at Ficella. The shipbuilding branch of the navy is under the direction of a chief constructor (*Oberster-Ingenieur*), assisted by seven constructors, of whom two are of the first class. The engineering and ordnance branches are similarly organized.

Spain.—The Spanish dockyards are of considerable antiquity, but of diminishing importance. There is an establishment at Ferrol, another at Cartagena, and a third at Cadiz. They are well equipped in all necessary respects, but are not provided with continuous work. A recent arrangement is

the specialization of the yards, Ferrol being designed for larger, and Carthagena for smaller, building work. The ordnance establishment is at Carraca.

Russia.—In Russia the naval ports are of two classes. The most important are Kronstadt, St Petersburg and Nikolayev. Of lesser importance are Reval, Sveaborg, Sevastopol, Batum, Baku and Vladivostok. The administration of the larger ports, except St Petersburg, which is under special regulations, is in the hands of vice-admirals, who are commanders-in-chief, while the smaller ports are under the direction of rear-admirals. All are directly under the minister of marine, except that the Black Sea ports and Astrabad, on the Caspian, are subordinate to the commander-in-chief at Nikolayev. Sevastopol has grown in importance, and become mainly a naval harbour, the commercial harbour being removed to Theodosia. The Russian government has also proposed to remodel the harbour works at St Petersburg and Kronstadt. The Emperor Alexander III. Port at Libau, on the Baltic, is in a region less liable to be icebound in the winter. There are no strictly private yards for the building of large vessels in Russia, except that of the Black Sea Company at Nikolayev. Messrs Creighton build torpedo-boats at Åbo in Finland, and the admiralty has steel works at Ijora, where some torpedo-boats have been built. Other ordnance and steel works are at Obukhov and Putilov.

Japan.—The principal Japanese dockyard, which was established by the Shogunate in 1866, is Yokosuka. French naval constructors and engineers were employed, and several wooden ships were built. The Japanese took the administration into their own hands in 1875, and built a number of vessels of small displacement in the yard. The limit of size was about 5000 tons, but the establishment has been enlarged so that vessels of the first class may be built there. There is a first-class modern dry dock which will take the largest battleship. Shipbuilding would be undertaken to a larger extent but for the fact that nearly all material has to come from abroad. Down to 1905 all the important vessels of the Japanese navy were built in Great Britain, France, Germany and the United States, but at the end of that year a first-class cruiser of 13,500 tons (the “Tsukuba”) was launched from the important yard at Kure. There are other yards at Sassebo and Maisuru.

DOCTOR (Lat. for “teacher”), the title conferred by the highest university degree. Originally there were only two degrees, those of bachelor and master, and the title doctor was given to certain masters as a merely honorary appellation. The process by which it became established as a degree superior to that of master cannot be clearly traced. At Bologna it seems to have been conferred in the faculty of law as early as the 12th century. Paris conferred the degree in the faculty of divinity, according to Antony Wood, some time after 1150. In England it was introduced in the 13th century; and both in England and on the continent it was long confined to the faculties of law and divinity. Though the word is so commonly used as synonymous with “physician,” it was not until the 14th century that the doctor’s degree began to be conferred in medicine. The tendency since has been to extend it to all faculties; thus in Germany, in the faculty of arts, it has replaced the old title of *magister*. The doctorate of music was first conferred at Oxford and Cambridge.

Doctors of the Church are certain saints whose doctrinal writings have obtained, by the universal consent of the Church or by papal decree, a special authority. In the case of the great schoolmen a characteristic qualification was added to the title doctor, *e.g.* “angelicus” (Aquinas), “mellifluus” (Bernard). The doctors of the Church are: for the East, SS. Athanasius, Gregory of Nazianzus, Basil the Great, John Chrysostom; for the West, SS. Hilary, Ambrose, Jerome, Augustine, Gregory the Great, Anselm, Bernard, Bonaventura and Thomas Aquinas. To these St Alphonso dei Liguori was added by Pope Pius IX.

DOCTORS’ COMMONS, the name formerly applied to a society of ecclesiastical lawyers in London, forming a distinct profession for the practice of the

civil and canon laws. Some members of the profession purchased in 1567 a site near St Paul's, on which at their own expense they erected houses (destroyed in the great fire, but rebuilt in 1672) for the residence of the judges and advocates, and proper buildings for holding the ecclesiastical and admiralty courts. In 1768 a royal charter was obtained by virtue of which the then members of the society and their successors were incorporated under the name and title of "The College of Doctors of Law exercent in the Ecclesiastical and Admiralty Courts." The college consisted of a president (the dean of Arches for the time being) and of those doctors of law who, having regularly taken that degree in either of the universities of Oxford or Cambridge, and having been admitted advocates in pursuance of the rescript of the archbishop of Canterbury, were elected fellows in the manner prescribed by the charter. There were also attached to the college thirty-four proctors, whose duties were analogous to those of solicitors. The judges of the archiepiscopal courts were always selected from this college. By the Court of Probate Act 1857 the college was empowered to sell its real and personal estate and to surrender its charter, and it was enacted that on such surrender the college should be dissolved and the property thereof belong to the then existing members as tenants in common for their own use and benefit. The college was accordingly dissolved, and the various ecclesiastical courts which sat at Doctors' Commons (the Court of Arches, the Prerogative Court, the Faculty Court and the Court of Delegates) are now open to the whole bar.

DOCTRINAIRES, the name given to the leaders of the moderate and constitutional Royalists in France after the second restoration of Louis XVIII. in 1815. The name, as has often been the case with party designations, was at first given in derision, and by an enemy. In 1816 the *Nain jaune réfugié*, a French paper published at Brussels by Bonapartist and Liberal exiles, began to speak of M. Royer-Collard as the "doctrinaire" and also as *le père Royer-Collard de la doctrine chrétienne*. The *pères de la doctrine chrétienne*, popularly known as the "doctrinaires," were a French religious order founded in 1592 by César de Bus. The

choice of a nickname for M. Royer-Collard does credit to the journalistic insight of the contributors to the *Nain jaune réfugié*, for he was emphatically a man who made it his business to preach a doctrine and an orthodoxy. The popularity of the name and its rapid extension to M. Royer-Collard's colleagues is the sufficient proof that it was well chosen and had more than a personal application. These colleagues came, it is true, from various quarters. The duc de Richelieu and M. de Serre had been Royalist *émigrés* during the revolutionary and imperial epoch. MM. Royer-Collard himself, Lainé, and Maine de Biran had sat in the revolutionary Assemblies. MM. Pasquier, Beugnot, de Barante, Cuvier, Mounier, Guizot and Decazes had been imperial officials. But they were closely united by political principle, and also by a certain similarity of method. Some of them, notably Guizot and Maine de Biran, were theorists and commentators on the principles of government. M. de Barante was an eminent man of letters. All were noted for the doctrinal coherence of their principles and the dialectical rigidity of their arguments. The object of the party as defined by M. (afterwards the duc) Decazes was to "nationalize the monarchy and to royalize France." The means by which they hoped to attain this end were a loyal application of the charter granted by Louis XVIII., and the steady co-operation of the king with the moderate Royalists to defeat the extreme party known as the Ultras, who aimed at the complete undoing of the political and social work of the Revolution. The Doctrinaires were ready to allow the king a large discretion in the choice of his ministers and the direction of national policy. They refused to allow that ministers should be removed in obedience to a hostile vote in the chamber. Their ideal in fact was a combination of a king who frankly accepted the results of the Revolution, and who governed in a liberal spirit, with the advice of a chamber elected by a very limited constituency, in which men of property and education formed, if not the whole, at least the very great majority of the voters. Their views were set forth by Guizot in 1816 in his treatise *Du gouvernement représentatif et de l'état actuel de la France.* The chief organs of the party in the press were the *Indépendent*, renamed the *Constitutionnel* in 1817, and the *Journal des débats*. The supporters of the Doctrinaires in the country were chiefly ex-officials of the empire,—who believed in the necessity for monarchical government but had a lively memory of Napoleon's tyranny and a no less lively hatred of the *ancien régime*—merchants, manufacturers and members of the liberal professions, particularly the lawyers. The history of the Doctrinaires as a separate political party began in 1816 and ended in 1830. In 1816

they obtained the co-operation of Louis XVIII., who had been frightened by the violence of the Ultras in the *Chambre introuvable* of 1815. In 1830 they were destroyed by Charles X. when he took the Ultra prince de Polignac as his minister and entered on the conflict with Liberalism in France which ended in his overthrow. During the revolution of 1830 the Doctrinaires became absorbed in the Orleanists, from whom they had never been separated on any ground of principle (see FRANCE: *History*).

The word "doctrinaire" has become naturalized in English terminology, as applied, in a slightly contemptuous sense, to a theorist, as distinguished from a practical man of affairs.

See Duvergier de Hauranne, *Histoire du gouvernement parlementaire en France* (Paris, 1857-1871), vol. iii.

DOCUMENT, strictly, in law, that which can serve as evidence or proof, and is written or printed, or has an inscription or any significance that can be "read"; thus a picture, authenticated photograph, seal or the like would furnish "documentary evidence." More generally the word is used for written or printed papers that provide information or evidence on a subject. The Latin *documentum*, from which the word is derived, meant, in classical times, a lesson, example or proof (*docere*, to teach), and only in medieval Latin came to be applied to an *instrumentum*, or record in writing. The classical Latin use is found in English; thus Jeremy Taylor (Works, ed. 1835, i. 815) speaks of punishment being a "single and sudden document if instantly inflicted" (see DIPLOMATIC; and EVIDENCE).

DODD, WILLIAM (1729-1777), English divine, was born at Bourne in Lincolnshire in May 1729. He was admitted a sizar of Clare Hall, Cambridge, in 1745, and took the degree of B.A. in 1750, being fifteenth wrangler. On leaving the university he married a young woman of a more than questionable reputation, whose extravagant habits helped to ruin him. In 1751 he was ordained deacon, and in 1753 priest, and he soon became a popular and celebrated preacher. His first preferment was the lectureship of West-Ham and Bow. In 1754 he was also chosen lecturer of St Olave's, Hart Street; and in 1757 he took the degree of M.A. at Cambridge, subsequently becoming LL.D. He was a strenuous supporter of the Magdalen hospital, founded in 1758, and soon afterwards became preacher at the chapel of that charity. In 1763 he obtained a prebend at Brecon, and in the same year he was appointed one of the king's chaplains,—soon after which the education of Philip Stanhope, afterwards earl of Chesterfield, was committed to his care. In 1768 he had a fashionable congregation and was held in high esteem, but indiscreet ambition led to his ruin. On the living of St George's, Hanover Square, becoming vacant in 1774, Mrs Dodd wrote an anonymous letter to the wife of the lord chancellor, offering three thousand guineas if, by her assistance, Dodd were promoted to the benefice. This letter having been traced, a complaint was immediately made to the king, and Dodd was dismissed from his office as chaplain. After residing for some time at Geneva and Paris, he returned to England in 1776. He still continued to exercise his clerical functions, but his extravagant habits soon involved him in difficulties. To meet his creditors he forged a bond on his former pupil Lord Chesterfield for £4200, and actually received the money. He was detected, committed to prison, tried at the Old Bailey, found guilty, and sentenced to death; and, in spite of numerous applications for mercy, he was executed at Tyburn on the 27th of June 1777. Samuel Johnson was very zealous in pleading for a pardon, and a petition from the city of London received 23,000 signatures. Dr Dodd was a voluminous writer and possessed considerable abilities, with but little judgment and much vanity. He wrote one or two comedies, and his *Beauties of Shakespeare*, published in 1752, was long a well-known work; while his *Thoughts in Prison*, a poem in blank verse, written between his conviction and execution, naturally attracted much attention. He published a large number of sermons and other theological works, including a *Commentary on the Bible* (1765-1770). A list of his fifty-five writings and an account of the writer is included in the *Thoughts in Prison*.

See also P. Fitzgerald, *A Famous Forgery* (1865).

DODDER (Frisian *dodd*, a bunch; Dutch *dot*, ravelled thread), the popular name of the annual, leafless, twining, parasitic plants forming the genus *Cuscuta*, formerly regarded as representing a distinct natural order Cuscutaceae, but now generally ranked as a tribe of the natural order Convolvulaceae. The genus contains nearly 100 species and is widely distributed in the temperate and warmer parts of the earth. The slender thread-like stem is white, yellow, or red in colour, bears no leaves, and attaches itself by suckers to the stem or leaves of some other plant round which it twines and from which it derives its nourishment. It bears clusters of small flowers with a four- or five-toothed calyx, a cup-shaped corolla with four or five stamens inserted on its tube, and sometimes a ring of scales below the stamens; the two-celled ovary becomes when ripe a capsule splitting by a ring just above the base. The seeds are angular and contain a thread-like spirally coiled embryo which bears no cotyledons. On coming in contact with the living stem of some other plant the seedling dodder throws out a sucker, by which it attaches itself and begins to absorb the sap of its foster-parent; it then soon ceases to have any connexion with the ground. As it grows, it throws out fresh suckers, establishing itself firmly on the host-plant (fig. 2). After making a few turns round one stem the dodder finds its way to another, and thus it continues twining and branching till it resembles “fine, closely-tangled, wet catgut.” The injury done to flax, clover, hop and bean crops by species of dodder is often very great. *C. europaea*, the greater dodder (fig. 1) is found parasitic on nettles, thistles, vetches and the hop; *C. Epilinum*, on flax; *C. Epithymum*, on furze, ling and thyme. *C. Trifolii*, the Clover Dodder, is perhaps a subspecies of the last mentioned.

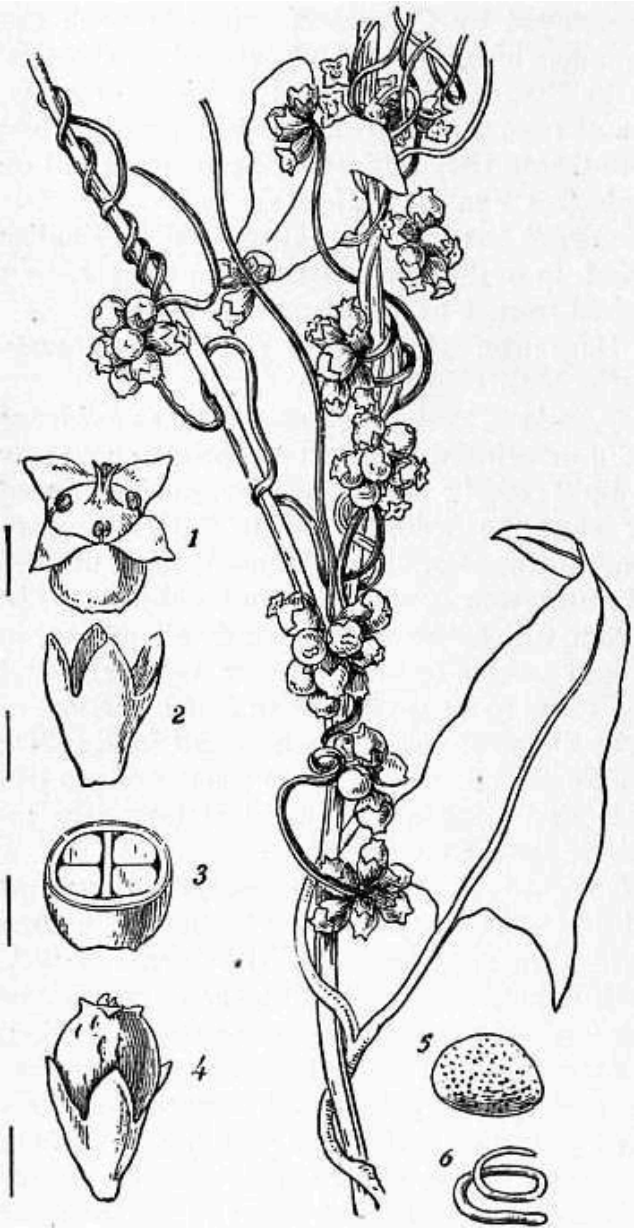


FIG. 1.—*Cuscuta europaea*, Dodder.

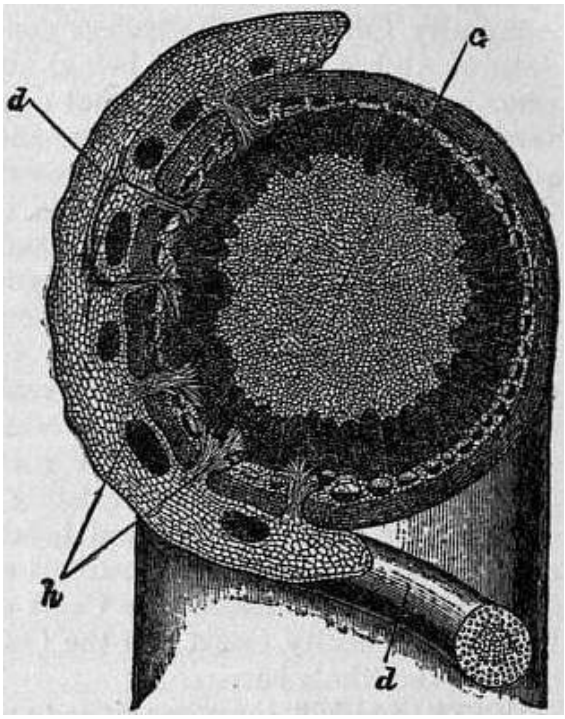


FIG. 2.—*Cuscuta glomerata*. Section through union between parasite and host.

1. Flower removed from 2, Calyx.
3. Ovary cut across.
4. Fruit enveloped by a persistent corolla.
5. Seed.
6. Embryo. 1-6 enlarged.

c, stem of host.
d, stem of *Cuscuta*.
h, haustoria.
(After Dodel-Port.)

DODDRIDGE, PHILIP (1702-1751), English Nonconformist divine, was born in London on the 26th of June 1702. His father, Daniel Doddridge, was a London merchant, and his mother the orphan daughter of the Rev. John Bauman, a Lutheran clergyman who had fled from Prague to escape religious persecution, and had held for some time the mastership of the grammar school at Kingston-upon-Thames. Before he could read, his mother taught him the history of the Old and New Testament by the assistance of some blue Dutch chimney-tiles. He afterwards went to a private school in London, and in 1712 to the grammar school at Kingston-upon-Thames. About 1715 he was removed to a private school at St Albans, where he was much influenced by the Presbyterian minister, Samuel Clarke. He declined offers which would have led him into the Anglican ministry or the bar, and in 1719 entered the very liberal academy for dissenters at Kibworth in Leicestershire, taught at that time by the Rev. John Jennings, whom Doddridge succeeded in the ministry at that place in 1723, declining overtures from Coventry, Pershore and London (Haberdashers' Hall). In 1729, at a general meeting of Nonconformist ministers, he was chosen to conduct the academy established in that year at Market Harborough. In the same year he received an invitation from the independent congregation at Northampton, which he accepted. Here he continued his multifarious labours; but the church seems to have decreased, and his many engagements and bulky correspondence interfered seriously with his pulpit work, and with the discipline of his academy, where he had some 200 students to whom he lectured on philosophy and theology in the mathematical or Spinozistic style. In 1751 his health, which had never been good, broke down, and he sailed for Lisbon on the 30th of September of that year; but the change was unavailing, and he died there on the 26th of October. His popularity as a preacher is said to have been chiefly due to his "high susceptibility, joined with physical advantages and perfect sincerity." His sermons were mostly practical in character, and his great aim was to cultivate in his hearers a spiritual and devotional frame of mind. He laboured for the attainment of a united Nonconformist body, which should retain the cultured element without alienating the uneducated. His principal works are, *The Rise and Progress of Religion in the Soul* (1745), which best illustrates his religious genius, and has been widely translated; *The Family Expositor* (6 vols., 1739-1756), *Life of Colonel Gardiner* (1747); and a *Course of Lectures on Pneumatology, Ethics and Divinity* (1763). He also published several courses of sermons on particular topics, and is the author of many well-

known and justly admired hymns, *e.g.* "O God of Bethel, by whose hand." In 1736 both the universities at Aberdeen gave him the degree of D.D.

See *Memoirs*, by Rev. Job Orton (1766); *Letters to and from Dr Doddridge*, by Rev. Thomas Stedman (1790); and *Correspondence and Diary*, in 5 vols., by his grandson, John Doddridge Humphreys (1829). The best life is Stanford's *Philip Doddridge* (1880). Doddridge's academy is now represented by New College, Hampstead, in the library of which there is a large collection of his manuscripts.

DODDS, ALFRED AMÉDÉE (1842-), French general, was born at St Louis, Senegal, on the 6th of February 1842; his father's family was of Anglo-French origin. He was educated at Carcassonne and at St Cyr, and in 1864 joined the marine infantry as a sub-lieutenant. He was promoted captain for his services during the disturbances in Réunion in 1868-69, in the course of which he was wounded. He served as a company commander in the Franco-German War, was taken prisoner at Sedan but escaped, and took part in the campaigns of the Loire and of the East. In 1872 he was sent to West Africa, and, except when on active service in Cochin China (1878) and Tong-King (1883), he remained on duty in Senegal for the next twenty years, taking a prominent part in the operations which brought the countries of the Upper Senegal and Upper Niger under French rule. He led the expeditions against the Boal and Kayor (1889), the Serreres (1890) and the Futa (1891), and from 1888 to 1891 was colonel commanding the troops in Senegal. At the close of 1891 he returned to France to command the eighth marine infantry at Toulon. In April 1892 Dodds was selected to command the expeditionary force in Dahomey; he occupied Abomey, the hostile capital, in November, and in a second campaign (1894) he completed the subjugation of the country. He was then appointed inspector-general of the marine infantry, and after a tour of the French colonies was given the command of the XX. (Colonial) Army Corps, subsequently becoming inspector-general of colonial troops and a member of the *Conseil supérieur de guerre*.

DODECAHEDRON (Gr. δώδεκα, twelve, and ἕδρα, a face or base), in geometry, a solid enclosed by twelve plane faces. The "ordinary dodecahedron" is one of the Platonic solids (see POLYHEDRON). The Greeks discovered that if a line be divided in extreme and mean proportion, then the whole line and the greater segment are the lengths of the edge of a cube and dodecahedron inscriptible in the same sphere. The "small stellated dodecahedron," the "great dodecahedron" and the "great stellated dodecahedron" are Kepler-Poinsot solids; and the "truncated" and "snub dodecahedra" are Archimedean solids (see POLYHEDRON). In crystallography, the regular or ordinary dodecahedron is an impossible form since the faces cut the axes in irrational ratios; the "pentagonal dodecahedron" of crystallographers has irregular pentagons for faces, while the geometrical solid, on the other hand, has regular ones. The "rhombic dodecahedron," one of the geometrical semiregular solids, is an important crystal form. Many other dodecahedra exist as crystal forms, for which see CRYSTALLOGRAPHY.

DODECASTYLE (Gr. δώδεκα, twelve, and στῦλος, column), the architectural term given to a temple where the portico has twelve columns in front, as in the portico added to the temple of Demeter at Eleusis, designed by Philo, the architect of the arsenal at the Peiraeus.

DÖDERLEIN, JOHANN CHRISTOPH WILHELM LUDWIG (1791-1863), German philologist, was born at Jena on the 19th of December 1791. His father, Johann Christoph Döderlein, professor of theology at Jena, was celebrated for his varied learning, for his eloquence as a preacher, and for the important influence he exerted in guiding the transition movement from strict orthodoxy to a freer theology. Ludwig Döderlein, after receiving his preliminary education at Windsheim and Schulpforta (Pforta), studied at Munich, Heidelberg, Erlangen and Berlin. He devoted his chief attention to philology under the instruction of such men as F. Thiersch, G. F. Creuzer, J. H. Voss, F. A. Wolf, August Böckh and P. K. Buttmann. In 1815, soon after completing his studies at Berlin, he accepted the appointment of ordinary professor of philology in the academy of Bern. In 1819 he was transferred to Erlangen, where he became second professor of philology in the university and rector of the gymnasium. In 1827 he became first professor of philology and rhetoric and director of the philological seminary. He died on the 9th of November 1863. Döderlein's most elaborate work as a philologist was marred by over-subtlety, and lacked method and clearness. He is best known by his *Lateinische Synonymen und Etymologien* (1826-1838), and his *Homerisches Glossarium* (1850-1858). To the same class belong his *Lateinische Wortbildung* (1838), *Handbuch der lateinischen Synonymik* (1839), and the *Handbuch der lateinischen Etymologie* (1841), besides various works of a more elementary kind intended for the use of schools and gymnasia. Most of the works named have been translated into English. To critical philology Döderlein contributed valuable editions of Tacitus (*Opera*, 1847; *Germania*, with a German translation) and Horace (*Epistolae*, with a German translation, 1856-1858; *Satirae*, 1860). His *Reden und Aufsätze* (Erlangen, 1843-1847) and *Offentliche Reden* (1860) consist chiefly of academic addresses dealing with various subjects in paedagogy and philology.

DODGE, THEODORE AYRAULT (1842-1909), American soldier and military writer, was born at Pittsfield, Massachusetts, on the 28th of May 1842. He received a

military education in Germany and subsequently studied at Heidelberg and London University, returning to the United States in 1861. At the outbreak of the Civil War he at once enlisted in the federal army, and he soon rose to commissioned rank. He served in the Army of the Potomac until Gettysburg, where he lost a leg. Incapacitated for further active service, he continued to be employed in administrative posts to the end of the war, and for several years thereafter he served at army headquarters, becoming captain in 1866 and brevet lieutenant-colonel in 1867. He retired in 1870. His works include *The Campaign of Chancellorsville* (1881), *A Bird's Eye View of our Civil War* (1882, later edition 1897), a complete, accurate and remarkably concise account of the whole war, *Patroclus and Penelope, a Chat in the Saddle* (1883), *Great Captains* (1886), a series of lectures, *Riders of Many Lands* (1893), and a series of large illustrated volumes entitled *A History of the Art of War*, being lives of "Great Captains," including *Alexander* (2 vols., 1888), *Hannibal* (2 vols., 1889), *Caesar* (2 vols., 1892), *Gustavus Adolphus* (2 vols., 1896) and *Napoleon* (4 vols., 1904-1907). He died in France, at Versailles, on the 26th of October 1909.

DODGSON, CHARLES LUTWIDGE ["LEWIS CARROLL"] (1832-1898), English mathematician and author, son of the Rev. Charles Dodgson, vicar of Daresbury, Cheshire, was born in that village on the 27th of January 1832. The literary life of "Lewis Carroll" became familiar to a wide circle of readers, but the private life of Charles Lutwidge Dodgson was retired and practically uneventful. After four years' schooling at Rugby, Dodgson matriculated at Christ Church, Oxford, in May 1850; and from 1852 till 1870 held a studentship there. He took a first class in the final mathematical school in 1854, and the following year was appointed mathematical lecturer at Christ Church, a post he continued to fill till 1881. In 1861 he was ordained deacon, but he never took priest's orders, possibly because of a stammer which prevented reading aloud. His earliest publications, beginning with *A Syllabus of Plane Algebraical Geometry* (1860) and *The Formulae of Plane Trigonometry*

(1861), were exclusively mathematical; but late in the year 1865 he published, under the pseudonym of "Lewis Carroll," *Alice's Adventures in Wonderland*, a work that was the outcome of his keen sympathy with the imagination of children and their sense of fun. Its success was immediate, and the name of "Lewis Carroll" has ever since been a household word. A dramatic version of the "Alice" books by Mr Savile Clarke was produced at Christmas, 1886, and has since enjoyed many revivals. Mr Dodgson was always very fond of children, and it was an open secret that the original of "Alice" was a daughter of Dean Liddell. *Alice* was followed (in the "Lewis Carroll" series) by *Phantasmagoria*, in 1869; *Through the Looking-Glass*, in 1871; *The Hunting of the Snark* (1876); *Rhyme and Reason* (1883); *A Tangled Tale* (1885); and *Sylvie and Bruno* (in two parts, 1889 and 1893). He wrote skits on Oxford subjects from time to time. *The Dynamics of a Particle* was written on the occasion of the contest between Gladstone and Mr Gathorne Hardy (afterwards earl of Cranbrook); and *The New Belfry* in ridicule of the erection put up at Christ Church for the bells that were removed from the Cathedral tower. While "Lewis Carroll" was delighting children of all ages, C. L. Dodgson periodically published mathematical works—*An Elementary Treatise on Determinants* (1867); *Euclid, Book V., proved Algebraically* (1874); *Euclid and his Modern Rivals* (1879), the work on which his reputation as a mathematician largely rests; and *Curiosa Mathematica* (1888). Throughout this dual existence Mr Dodgson pertinaciously refused to acquiesce in being publicly identified with "Lewis Carroll." Though the fact of his authorship of the "Alice" books was well known, he invariably stated, when occasion called for such a pronouncement, that "Mr Dodgson neither claimed nor acknowledged any connexion with the books not published under his name." He died at Guildford, on the 14th of January 1898. His memory is appropriately kept green by a cot in the Children's Hospital, Great Ormond Street, London, which was endowed perpetually by a public subscription.

See S. D. Collingwood, *Life and Letters of Lewis Carroll* (1898).

DODO (from the Portuguese *Dóudo*, a simpleton), a large bird formerly inhabiting the island of Mauritius, but now extinct—the *Didus ineptus* of Linnaeus. When, in 1507, the Portuguese discovered the island which we now know as Mauritius they named it *Ilha do Cerné*, from a notion that it must be the island of that name mentioned by Pliny; but most authors have insisted that it was known to the seamen of that nation as *Ilha do Cisne*—perhaps but a corruption of Cerne, and brought about by their finding it stocked with large fowls, which, though not aquatic, they likened to swans, the most familiar to them of bulky birds. In 1598 the Dutch, under Van Neck, took possession of the island and renamed it Mauritius. A narrative of this voyage was published, in 1601, if not earlier, and has been often reprinted. Here we have birds spoken of as big as swans or bigger, with large heads, no wings, and a tail consisting of a few curly feathers. The Dutch called them *Walgvögels* (the word is variously spelled), *i.e.* nauseous birds, either because no cooking made them palatable, or because this island-paradise afforded an abundance of fare so much superior. De Bry gives two admirably quaint prints of the doings of the Hollanders, and in one of them the *Walgvögel* appears, being the earliest published representation of its unwieldy form, with a footnote stating that the voyagers brought an example alive to Holland. Among the company there was a draughtsman, and from a sketch of his, Clusius, a few years after, gave a figure of the bird, which he vaguely called "*Gallinaceus Gallus peregrinus*," but described rather fully. Meanwhile two other Dutch fleets had visited Mauritius. One of them had rather an accomplished artist on board, and his drawings fortunately still exist (see article BIRD). Of the other a journal kept by one of the skippers was subsequently published. This in the main corroborates what has been before said of the birds, but adds the curious fact that they were now called by some *Dodaarsen* and by others *Dronten*.[1]

Henceforth Dutch narrators, though several times mentioning the bird, fail to supply any important fact in its history. Their navigators, however, were not idle, and found work for their naturalists and painters. Clusius says that in 1605 he saw at Pauw's House in Leyden a dodo's foot,[2] which he minutely describes. In a copy of Clusius's work in the high school of Utrecht is pasted an original drawing by Van de Venne superscribed "Vera effigies huius avis *Walghvögel* (quae & a nautis *Dodaers* propter foedam posterioris partis crassitiem nuncupatur), qualis viua Amsterodamum perlata est ex insula Mauritii. Anno M.DC.XXVI." Now a good many paintings of

the dodo drawn from life by Roelandt Savery (1576-1639) exist; and the paintings by him at Berlin and Vienna—dated 1626 and 1628—as well as the picture by Goiemare, belonging to the duke of Northumberland, dated 1627, may be with greater plausibility than ever considered portraits of a captive bird. It is even probable that this was not the first example painted in Europe. In the private library of the emperor Francis I. of Austria was a series of pictures of various animals, supposed to be by the Dutch artist Hoefnagel, who was born about 1545. One of these represents a dodo, and, if there be no mistake in Von Frauenfeld's ascription, it must almost certainly have been painted before 1626, while there is reason to think that the original may have been kept in the *vivarium* of the emperor Rudolf II., and that the portion of a dodo's head, which was found in the museum at Prague about 1850, belonged to this example. The other pictures by Roelandt Savery, like those in the possession of the Zoological Society of London and others, are undated, but were probably all painted about the same time—1626-1628. The large picture in the British Museum, once belonging to Sir Hans Sloane, by an unknown artist, but supposed to be by Roelandt Savery, is also undated; while the still larger one at Oxford (considered to be by the younger Savery) bears a much later date, 1651. Undated also is a picture in Holland said to be by Pieter Holsteyn.

In 1628 we have the evidence of the first English observer of the bird—one Emanuel Altham, who mentions it in two letters written on the same day from Mauritius to his brother at home (*Proc. Zool. Soc.* 1874, pp. 447-449). In one he says: "You shall receue ... a strange fowle: which I had at the Iland Mauritius called by ye portingalls a Do Do: which for the rareness thereof I hope wilbe welcome to you." The passage in the other letter is to the same effect, with the addition of the words "if it liue." In the same fleet with Altham sailed Sir Thomas Herbert, whose *Travels* ran through several editions. It is plain that he could not have reached Mauritius till 1629, though 1627 has been usually assigned as the date of his visit. The fullest account he gives of the bird is in his edition of 1638: "The Dodo comes first to a description: here, and in *Dygarrois*[3] (and no where else, that ever I could see or heare of) is generated the Dodo (a Portuguize name it is, and has reference to her simpleness,) a Bird which for shape and rareness might be call'd a Phoenix (wer't in Arabia:)" &c. Herbert was weak as an etymologist, but his positive statement, corroborated as it is by Altham, cannot be set aside, and hence we do not

hesitate to assign a Portuguese derivation for the word.[4] Herbert also gave a figure of the bird.

Proceeding chronologically we next come upon a curious bit of evidence. This is contained in a MS. diary kept between 1626 and 1640, by Thomas Crossfield of Queen's College, Oxford, where, under the year 1634, mention is casually made of one Mr Gosling "who bestowed the Dodar (a blacke Indian bird) vpon ye Anatomy school." Nothing more is known of it. About 1638, Sir Hamon Lestrange tells us, as he walked London streets he saw the picture of a strange fowl hung out on a cloth canvas, and going in to see it found a great bird kept in a chamber "somewhat bigger than the largest Turky cock, and so legged and footed, but shorter and thicker." The keeper called it a dodo and showed the visitors how his captive would swallow "large peble stones ... as bigge as nutmegs."

In 1651 Morisot published an account of a voyage made by François Cauche, who professed to have passed fifteen days in Mauritius, or "l'isle de Saincte Apollonie," as he called it, in 1638. According to De Flacourt the narrative is not very trustworthy, and indeed certain statements are obviously inaccurate. Cauche says he saw there birds bigger than swans, which he describes so as to leave no doubt of his meaning dodos; but perhaps the most important facts (if they be facts) that he relates are that they had a cry like a gosling ("il a un cry comme l'oison"), and that they laid a single white egg ("gros comme un pain d'un sol") on a mass of grass in the forests. He calls them "oiseaux de Nazaret," perhaps, as a marginal note informs us, from an island of that name which was then supposed to lie more to the northward, but is now known to have no existence.

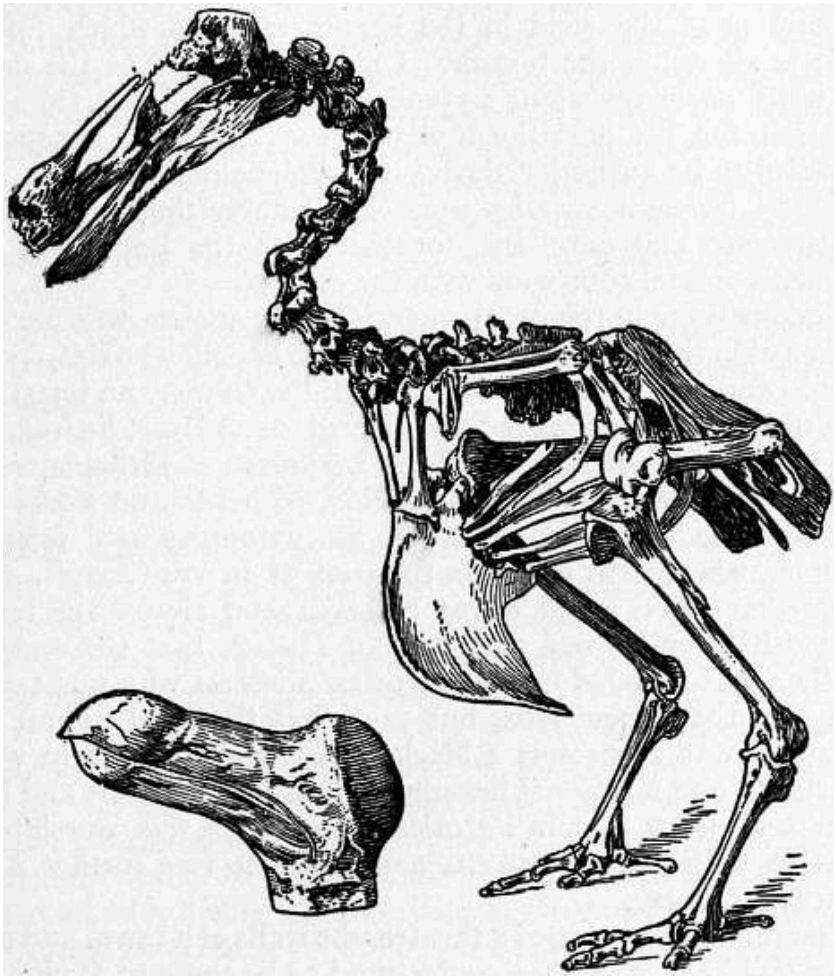


FIG. 1.—Skeleton of a Dodo, *Didus ineptus*, Museum of Zoology, Cambridge, and cast of a Head in Oxford.

In the catalogue of Tradescant's *Collection of Rarities, preserved at South Lambeth*, published in 1656, we have entered among the "Whole Birds," a "Dodar from the island *Mauritius*; it is not able to flie being so big." This specimen may well have been the skin of the bird seen by Lestrange some eighteen years before, but anyhow we are able to trace the specimen through Willughby, Edward Llwyd and Thomas Hyde, till it passed in or before 1684 to the Ashmolean collection at Oxford. In 1755 it was ordered to be destroyed, but, in accordance with the original orders of Ashmole, its head and right foot were preserved, and still ornament the museum of that university. In the second edition of a *Catalogue of many Natural Rarities*, &c., "to be seen at the place formerly called the Music House, near the West End of St Paul's Church," collected by one Hubert *alias* Forbes, and published in 1665, mention is made of a "legge of a Dodo, a great heavy bird that cannot fly; it is a Bird

of the Mauricius Island." This is supposed to have subsequently passed into the possession of the Royal Society. At all events such a specimen is included in Grew's list of their treasures which was published in 1681. This was afterwards transferred to the British Museum. It is a left foot, without the integuments, but it differs sufficiently in size from the Oxford specimen to forbid its having been part of the same individual. In 1666 Olearius brought out the *Gottorffische Kunst Kammer*, wherein he describes the head of a *Walghvögel* which some sixty years later was removed to the museum at Copenhagen, and is now preserved there, having been the means of first leading zoologists, under the guidance of Prof. J. Th. Reinhardt, to recognize the true affinities of the bird.

We have passed over all but the principal narratives of voyagers or other notices of the bird. A compendious bibliography, up to the year 1848, will be found in Strickland's classical work,[5] and the list was continued by Von Frauenfeld[6] for twenty years later. The last evidence we have of the dodo's existence is furnished by a journal kept by Benj. Harry, and now in the British Museum (*MSS. Addit. 3668.* II. D). This shows its survival till 1681, but the writer's sole remark upon it is that its "fflesh is very hard." The successive occupation of the island by different masters seems to have destroyed every tradition relating to the bird, and doubts began to arise whether such a creature had ever existed. Dr Henry Duncan, Scottish minister and journalist, in 1828, showed how ill-founded these doubts were, and some ten years later William John Broderip with much diligence collected all the available evidence into an admirable essay, which in its turn was succeeded by Strickland's monograph just mentioned. But in the meanwhile little was done towards obtaining any material advance in our knowledge, Prof. Reinhardt's determination of its affinity to the pigeons (*Columbae*) excepted; and it was hardly until George Clark's discovery in 1865 of a large number of dodos' remains in the mud of a pool (the Mare aux Songes) that zoologists generally were prepared to accept that affinity without question. The examination of bone after bone by Sir R. Owen (*Trans. Zool. Soc.* vi. p. 49) confirmed the judgment of the Danish naturalist.

In 1889 Th. Sauzier, acting for the government of Mauritius, sent a great number of bones from the same swamp to Sir Edward Newton.[7] From these the first correctly restored and properly mounted skeleton was prepared and sent to Paris, to be

forwarded to the museum of Mauritius. Good specimens are in the British Museum, at Paris and at Cambridge, England.

The huge blackish bill of the dodo terminated in a large, horny hook; the cheeks were partly bare, the stout, short legs yellow. The plumage was dark ash-coloured, with whitish breast and tail, yellowish white wings (incapable of flight). The short tail formed a curly tuft.

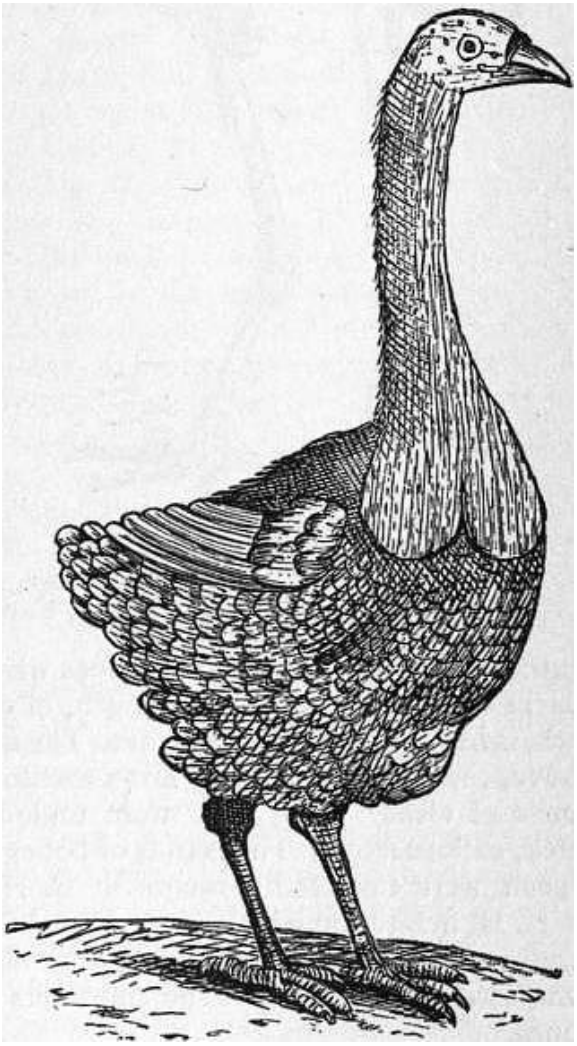


FIG. 2.—The Solitaire of Rodriguez (*Pezophaps solitarius*). From Leguat's figure.

The dodo is said to have inhabited forests and to have laid one large white egg on a mass of grass. Besides man, hogs and other imported animals seem to have exterminated it. But the dodo is not the only member of its family that has vanished. The little island which has successively borne the name of Mascaregnas, England's Forest, Bourbon and Réunion, and lies to the southward of Mauritius, had also an allied bird, now dead and gone. Of this not a relic has been handled by any naturalist. The latest description of it, by Du Bois in 1674, is very meagre, while Bontekoe (1646) gave a figure, apparently intended to represent it. It was originally called the "solitaire," but this name was also applied to *Pezophaps solitarius* of Rodriguez by the Huguenot exile Leguat, who described and figured it about 1691.

The solitaire, Didus solitarius of Gmelin, referred by Strickland to a district genus Pezophaps, is supposed to have lingered in the island of Rodriguez until about 1761. Leguat[8] has given a delightful description of its quaint habits. The male stood about

2 ft. 9 in. high; its colour was brownish grey, that of its mate more inclined to brown, with a whitish breast. The wings were rudimentary, the tail very small, almost hidden, and the thigh feathers were thick and curled “like shells.” A round mass of bone, “as big as a musket ball,” was developed on the wings of the males, and they used it as a weapon of offence while they whirled themselves about twenty or thirty times in four or five minutes, making a noise with their pinions like a rattle. The mien was fierce and the walk stately, the birds living singly or in pairs. The nest was a heap of palm leaves a foot high, and contained a single large egg which was incubated by both parents. The food consisted of seeds and leaves, and the birds aided digestion by swallowing large stones; these were used by the Dutch sailors to sharpen their knives with. One of these stones, nearly an inch and a half in length, of extremely hard volcanic rock, is in the Cambridge museum. The fighting knobs mentioned above, are very interesting, large exostoses on one of the wrist-bones of either wing; they were undoubtedly covered with a thick, callous skin. Thousands of bones of this curious flightless pigeon were collected through Sir E. Newton’s[9] exertions, and by H. H. Sclater on behalf of the Royal Society of London. The results are several almost complete skeletons of both sexes, composed however out of the enormous mass of the dissociated bones.

(A. N.; H. F. G.)

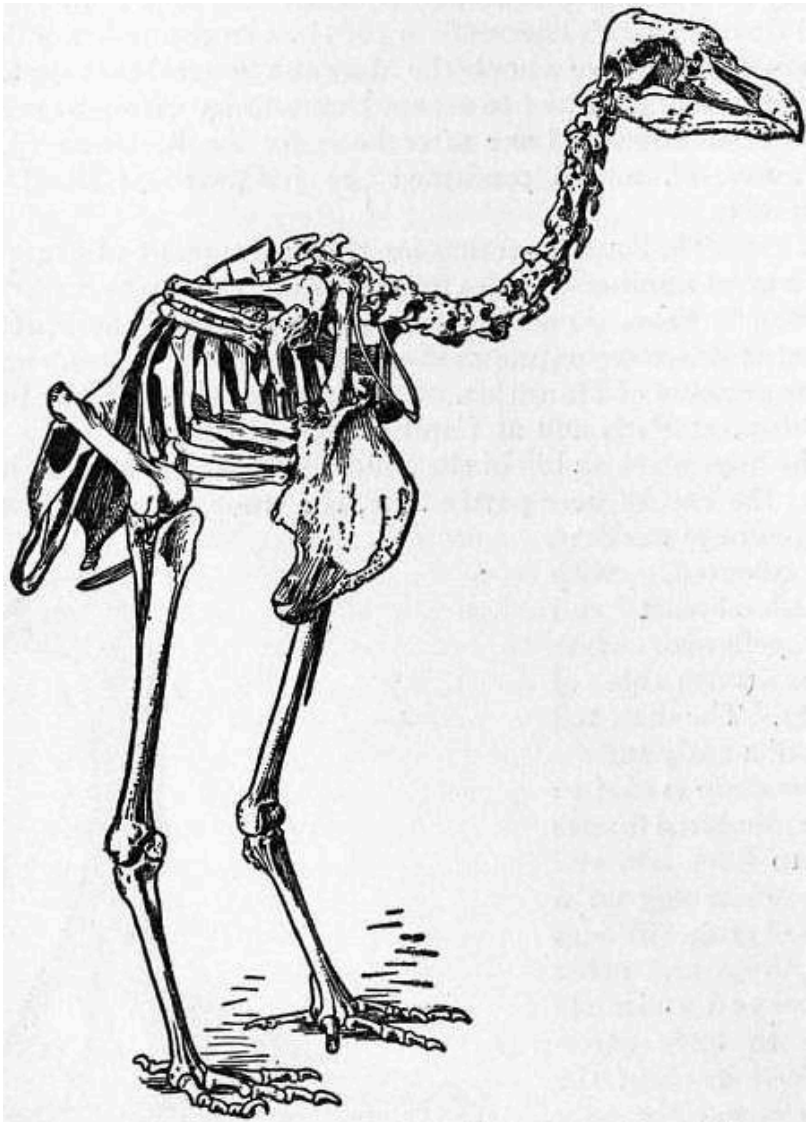


FIG. 3.—Skeleton of a male Solitaire, *Pezophaps solitarius*, Museum of Zoology, Cambridge.

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1 The etymology of these names has been much discussed. That of the latter, which has generally been adopted by German and French authorities, seems to defy investigation, but the former has been shown by Prof. Schlegel (*Versl. en Mededeel. K. Akad. Wetensch.* ii. pp. 255 et seq.) to be the homely name of the dabchick or little grebe (*Podiceps minor*), of which the Dutchmen were reminded by the round stern and tail diminished to a tuft that characterized the dodo. The same learned authority suggests that dodo is a corruption of *Dodaars*, but, as will presently be seen, we herein think him mistaken.

2 What has become of the specimen (which may have been a relic of the bird brought home by Van Neck's squadron) is not known. Broderip and Dr Gray have suggested its identity with that now in the British Museum, but on what grounds is not apparent.

3 *i.e.* Rodriguez; an error.

4 Hence we venture to dispute Prof. Schlegel's supposed origin of "Dodo." The Portuguese must have been the prior nomenclators, and if, as is most likely, some of their nation, or men acquainted with their language, were employed to pilot the Hollanders, we see at once how the first Dutch name *Walghvögel* would give way. The meaning of *Doudo* not being plain to the Dutch, they would, as is the habit of sailors, convert it into something they did understand. Then *Dodaers* would easily suggest itself.

5 *The Dodo and its Kindred*, by H. E. Strickland and A. G. Melville (London, 1848, 4to).

6 *Neu aufgefundene Abbildung des Dronte*, by Georg Ritter von Frauenfeld (Wien, 1868, fol.).

7 E. Newton and H. Gadow, *Trans. Zool. Soc.* xiii. (1893) pp. 281-302, pls.

8 *Voyage et aventures de François Leguat*, &c. (2 vols., London, 1708). An English translation, edited with many additional illustrations by Captain Oliver, has been published by the Hakluyt Society (2 vols., 1891).

9 E. Newton and J. W. Clark, *Phil. Trans.* clix. (1869), pp. 327-362; clxviii. (1879), pp. 448-451.

DODONA, in Epirus, the seat of the most ancient and venerable of all Hellenic sanctuaries. Its ruins are at Dramisos, near Tsacharovista. In later times the Greeks of the south looked on the inhabitants of Epirus as barbarians; nevertheless for Dodona they always preserved a certain reverence, and the temple there was the object of frequent missions from them. This temple was dedicated to Zeus, and connected with the temple was an oracle which enjoyed more reputation in Greece than any other save that at Delphi, and which would seem to date from earlier times than the worship of Zeus; for the normal method of gathering the responses of the oracle was by listening to the rustling of an old oak tree, which was supposed to be the seat of the deity. We seem here to have a remnant of the very ancient and widely diffused tree-worship. Sometimes, however, auguries were taken in other manners, being drawn from the moaning of doves in the branches, the murmur of a fountain which rose close by, or the resounding of the wind in the brazen caldrons which formed a circle all round the temple. Croesus proposed to the oracle his well-known question; Lysander sought to obtain from it a sanction for his ambitious views; the Athenians

frequently appealed to its authority during the Peloponnesian War. But the most frequent votaries were the neighbouring tribes of the Acarnanians and Aetolians, together with the Boeotians, who claimed a special connexion with the district.

Dodona is not unfrequently mentioned by ancient writers. It is spoken of in the *Iliad* as the stormy abode of Selli who sleep on the ground and wash not their feet, and in the *Odyssey* an imaginary visit of Odysseus to the oracle is referred to. A Hesiodic fragment gives a complete description of the Dodonaea or Hellopia, which is called a district full of corn-fields, of herds and flocks and of shepherds, where is built on an extremity (ἐπ᾽ ἐσχατίῃ) Dodona, where Zeus dwells in the stem of an oak (φηγός). The priestesses were called doves (πέλειαι) and Herodotus tells a story which he learned at Egyptian Thebes, that the oracle of Dodona was founded by an Egyptian priestess who was carried away by the Phoenicians, but says that the local legend substitutes for this priestess a black dove, a substitution in which he tries to find a rational meaning. From inscriptions and later writers we learn that in historical times there was worshipped, together with Zeus, a consort named Dione (see further ZEUS; ORACLE; DIONE).

The ruins, consisting of a theatre, the walls of a town, and some other buildings, had been conjectured to be those of Dodona by Wordsworth in 1832, but the conjecture was changed into ascertained fact by the excavations of Constantin Carapanos. In 1875 he made some preliminary investigations; soon after, an extensive discovery of antiquities was made by peasants, digging without authority; and after this M. Carapanos made a systematic excavation of the whole site to a considerable depth. The topographical and architectural results are disappointing, and show either that the site always retained its primitive simplicity, or else that whatever buildings once existed have been very completely destroyed.

To the south of the hill, on which are the walls of the town, and to the east of the theatre, is a plateau about 200 yds. long and 50 yds. wide. Towards the eastern end of this terrace are the scanty remains of a building which can hardly be anything but the temple of Zeus; it appears to have consisted of pronaos, naos or cella, and opisthodomus, and some of the lower drums of the internal columns of the cella were still resting on their foundations. No trace of any external colonnade was found. The temple was about 130 ft. by 80 ft. It had been converted into a Christian church, and

hardly anything of its architecture seems to have survived. In it and around it were found the most interesting products of excavation—statuettes and decorative bronzes, many of them bearing dedications to Zeus Naïus and Dione, and inscriptions, including many small tablets of lead which contained the questions put to the oracle. Farther to the west, on the same terrace, were two rectangular buildings, which M. Carapanos conjectures to have been connected with the oracle, but which show no distinguishing features.

Below the terrace was a precinct, surrounded by walls and flanked with porticoes and other buildings; it is over 100 yds. in length and breadth, and of irregular shape. One of the buildings on the south-western side contained a pedestal or altar, and is identified by M. Carapanos as a temple of Aphrodite, on the insufficient evidence of a single dedicated object; it does not seem to have any of the characteristics of a temple. In front of the porticoes are rows of pedestals, which once bore statues and other dedications. At the southern corner of the precinct is a kind of gate or propylaeum, flanked with two towers, between which are placed two coarse limestone drums. If these are *in situ* and belong to the original gateway, it must have been of a very rough character; it does not seem probable that they carried, as M. Carapanos suggests, the statuette and bronze bowl by which divinations were carried on.

The chief interest of the excavation centres in the smaller antiquities discovered, which have now been transferred from M. Carapanos's collection to the National Museum in Athens. Among the dedications, the most interesting historically are a set of weapons dedicated by King Pyrrhus from the spoils of the Romans, including characteristic specimens of the pilum. The leaden tablets of the oracle contain no certain example of a response, though there are many questions, varying from matters of public policy or private enterprise to inquiries after stolen goods.

The temple of Dodona was destroyed by the Aetolians in 219 B.C., but the oracle survived to the times of Pausanias and even of the emperor Julian.

See C. Wordsworth, *Greece* (1839), p. 247; Constantin Carapanos, *Dodone et ses ruines* (Paris, 1878). For the oracle inscriptions, see E. S. Roberts in *Journal of Hellenic Studies*, vol. i. p. 228. (E. GR.)

DODS, MARCUS (1834-1909), Scottish divine and biblical scholar, was born at Belford, Northumberland, the youngest son of Rev. Marcus Dods, minister of the Scottish church of that town. He was trained at Edinburgh Academy and Edinburgh University, graduating in 1854. Having studied theology for five years he was licensed in 1858, and in 1864 became minister of Renfield Free Church, Glasgow, where he worked for twenty-five years. In 1889 he was appointed professor of New Testament Exegesis in the New College, Edinburgh, of which he became principal on the death of Dr Rainy in 1907. He died in Edinburgh on the 26th of April 1909. Throughout his life, both ministerial and professorial, he devoted much time to the publication of theological books. Several of his writings, especially a sermon on Inspiration delivered in 1878, incurred the charge of unorthodoxy, and shortly before his election to the Edinburgh professorship he was summoned before the General Assembly, but the charge was dropped by a large majority, and in 1891 he received the honorary degree of D.D. from Edinburgh University. He edited Lange's *Life of Christ* in English (Edinburgh, 1864, 6 vols.), Augustine's works (1872-1876), and, with Dr Alexander Whyte, Clark's "Handbooks for Bible Classes" series. In the Expositor's Bible series he edited Genesis and 1 Corinthians, and he was also a contributor to the 9th edition of the *Encyclopaedia Britannica* and Hastings' *Dictionary of the Bible*. Among other important works are: *The Epistle to the Seven Churches* (1865); *Israel's Iron Age* (1874); *Mohammed, Buddha and Christ* (1877); *Handbook on Haggai, Zechariah and Malachi* (1879); *The Gospel according to St John* (1897), in the Expositor's Greek Testament; *The Bible, its Origin and Nature* (1904), the Bross Lectures, in which he gave an able sketch of the use of Old Testament criticism, and finally set forth his Theory of Inspiration. Apart from his great services to Biblical scholarship he takes high rank among those who have sought to bring the results of technical criticism within the reach of the ordinary reader.

DODSLEY, ROBERT (1703-1764), English bookseller and miscellaneous writer, was born in 1703 near Mansfield, Nottinghamshire, where his father was master of the free school. He is said to have been apprenticed to a stocking-weaver in Mansfield, from whom he ran away, taking service as a footman. In 1729 Dodsley published his first work, *Servitude; a Poem ... written by a Footman*, with a preface and postscript ascribed to Daniel Defoe; and a collection of short poems, *A Muse in Livery, or the Footman's Miscellany*, was published by subscription in 1732, Dodsley's patrons comprising many persons of high rank. This was followed by a satirical farce called *The Toyshop* (Covent Garden, 1735), in which the toyman indulges in moral observations on his wares, a hint which was probably taken from Thomas Randolph's *Conceited Pedlar*. The profits accruing from the sale of his works enabled Dodsley to establish himself with the help of his friends—Pope lent him £100—as a bookseller at the "Tully's Head" in Pall Mall in 1735. His enterprise soon made him one of the foremost publishers of the day. One of his first publications was Dr Johnson's *London*, for which he gave ten guineas in 1738. He published many of Johnson's works, and he suggested and helped to finance the *English Dictionary*. Pope also made over to Dodsley his interest in his letters. In 1738 the publication of Paul Whitehead's *Manners*, voted scandalous by the Lords, led to a short imprisonment. Dodsley published for Edward Young and Mark Akenside, and in 1751 brought out Thomas Gray's *Elegy*. He also founded several literary periodicals: *The Museum* (1746-1767, 3 vols.); *The Preceptor containing a general course of education* (1748, 2 vols.), with an introduction by Dr Johnson; *The World* (1753-1756, 4 vols.); and *The Annual Register*, founded in 1758 with Edmund Burke as editor. To these various works, Horace Walpole, Akenside, Soame Jenyns, Lord Lyttelton, Lord Chesterfield, Burke and others were contributors. Dodsley is, however, best known as the editor of two collections: *Select Collection of Old Plays* (12 vols., 1744; 2nd edition with notes by Isaac Reed, 12 vols., 1780; 4th edition, by W. C. Hazlitt, 1874-1876, 15 vols.); and *A collection of Poems by Several Hands* (1748, 3 vols.), which passed through many editions. In 1737 his *King and the Miller of Mansfield*, a "dramatic tale" of King Henry II., was produced at Drury Lane, and received with much applause; the sequel, *Sir John Cockle at Court*, a farce, appeared in 1738. In 1745 he published a collection of his dramatic works, and some poems which had been issued separately, in one volume under the modest title of *Trifles*. This was followed by *The Triumph of Peace, a Masque occasioned by the Treaty of*

Aix-la-Chapelle (1749); a fragment, entitled *Agriculture*, of a long tedious poem in blank verse on *Public Virtue* (1753); *The Blind Beggar of Bethnal Green* (acted at Drury Lane 1739, printed 1741); and an ode, *Melpomene* (1757). His tragedy of *Cleone* (1758) had a long run at Covent Garden, 2000 copies being sold on the day of publication, and it passed through four editions within the year. Lord Chesterfield is, however, almost certainly the author of the series of mock chronicles of which *The Chronicle of the Kings of England* by "Nathan ben Saddi" (1740) is the first, although they were included in the *Trifles* and "ben Saddi" was received as Dodsley's pseudonym. *The Economy of Human Life* (1750), a collection of moral precepts frequently reprinted, is also by Lord Chesterfield. In 1759 Dodsley retired, leaving the conduct of the business to his brother James (1724-1797), with whom he had been many years in partnership. He published two more works, *The Select Fables of Aesop translated by R. D.* (1764) and the *Works of William Shenstone* (3 vols., 1764-1769). He died at Durham while on a visit to his friend the Rev. Joseph Spence, on the 23rd of September 1764.

See also *Shadows of the Old Booksellers*, by Charles Knight (1865), pp. 189-216; "At Tully's Head" in *Eighteenth Century Vignettes*, 2nd series, by Austin Dobson (1894); E. Solly in *The Bibliographer*, v. (1884) pp. 57-61. Dodsley's poems are reprinted with a memoir in A. Chalmers's *Works of English Poets*, vol. xv. (1810).

DODSWORTH, ROGER (1585-1654), English antiquary, was born near Oswaldkirk, Yorkshire. He devoted himself early to antiquarian research, in which he was greatly assisted by the fact that his father, Matthew Dodsworth, was registrar of York cathedral, and could give him access to the records preserved there. He married the widow of Laurence Rawsthorne of Hutton Grange, where he subsequently resided till his death in August 1654. At various times in his life he was enabled to study the records in the library of Sir Robert Cotton, in Skipton Castle, and in the Tower of London. He collected a vast store of materials for a history of Yorkshire, a

Monasticon Anglicanum, and an English baronage. The second of these was published with considerable additions by Sir William Dugdale (2 vols., 1655 and 1661). The MSS. were left to Thomas, third Lord Fairfax, who by his will bequeathed them (160 volumes in all) to the Bodleian Library at Oxford. Portions have been printed by the Yorkshire Archaeological Society (*Dodsworth's Yorkshire Notes*, 1884) and the Chetham Society (copies of Lancashire postmortem inquisitions, 1875-1876).

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