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Hero to Hindu Chronology

Articles in This Slice

HERO (Gr. ἥρως), a term specially applied to warriors of extraordinary strength and courage, and generally to all who were distinguished from their fellows by superior moral, physical or intellectual qualities. No satisfactory derivation of the word has been suggested.

Ancient Greek Heroes.

In ancient Greece, the heroes were the object of a special cult, and as such were intimately connected with its religious life. Various theories have been put forward as to the nature of these heroes. According to some authorities, they were idealized historical personages; according to others, symbolical representations of the forces of nature. The view most commonly held is that they were degraded or “depotentiated” gods, occupying a position intermediate between gods and men. According to E. Rohde (in *Psyche*) they are souls of the dead, which after separation from the body enter upon a higher, eternal existence. But it is only a select minority who attain to the rank of heroes after death, only the distinguished men of the past. The worship of these heroes is in reality

an ancestor worship, which existed in pre-Homeric times, and was preserved in local cults. Instances no doubt occur of gods being degraded to the ranks of heroes, but these are not the real heroes, the heroes who are the object of a cult. The cult-heroes were all persons who had lived the life of man on earth, and it was necessary for the degraded gods to pass through this stage. They did not at once become cult-heroes, but only after they had undergone death like other mortals. Only one who has been a man can become a hero. The heroes are spirits of the dead, not demi-gods; their position is not intermediate between gods and men, but by the side of these they exist as a separate class.

In Homer the term is applied especially to warrior princes, to kings and kings' sons, even to distinguished persons of lower rank, and free men generally. In Hesiod it is chiefly confined to those who fought before Troy and Thebes; in view of their supposed divine origin, he calls them demi-gods (ἡμίθεοι). This name is also given them in an interpolated passage in the *Iliad* (xii. 23), which is quite at variance with the general Homeric idea of the heroes, who are no more than men, even if of divine origin and of superior strength and prowess. But neither in Homer nor in Hesiod is there any trace of the idea that the heroes after death had any power for good or evil over the lives of those who survived them; and consequently, no cult. Nevertheless, traces of an earlier ancestor worship appear, *e.g.* in funeral games in honour of Patroclus and other heroes, while the Hesiodic account of the five ages of man is a reminiscence of the belief in the continued existence of souls in a higher life. This pre-historic worship and belief, for a time obscured, were subsequently revived. According to Porphyry (*De abstinentia*, iv. 22), Draco ordered the inhabitants of Attica to honour the gods and heroes of their country "in accordance with the usage of their fathers" with offerings of first fruits and sacrificial cakes every year, thereby clearly pointing to a custom of high antiquity. Solon also ordered that the tombs of the heroes should be treated with the greatest respect, and Cleisthenes (*q.v.*) sought to create a pan-Athenian enthusiasm by calling his new tribes after Attic heroes and setting up their statues in the Agora. Heroic honours were at first bestowed upon the founders of a colony or city, and the ancestors of families; if their name was not known, one was adopted from legend. In many cases these heroes were purely fictitious; such were the supposed ancestors of the noble and priestly families of Attica and elsewhere (Butadae at Athens, Branchidae at Miletus Ceryces at Eleusis), of the eponymi of the tribes and demes. Again, side by side with gods of superior rank, certain heroes were worshipped as protecting spirits of the country or state; such were the Aeacidae amongst the Aeginetans, Ajax son of Oïleus amongst the Epizephyrian Locrians and Hector at Thebes. Neglect of the worship of these heroes was held to be responsible for pestilence, bad crops and other misfortunes, while, on the other hand, if duly honoured, their influence was equally beneficent. This belief was supported by the Delphic oracle, which was largely instrumental in promoting hero-worship and keeping alive its due observance. Special importance was attached to the grave of the hero and to his bodily remains, with which the spirit of the departed was inseparably connected. The grave was regarded as his place of abode, from which he could only be absent for a brief period; hence his bones were fetched from abroad (*e.g.* Cimon brought those of Theseus from Scyros), or if they could not be procured, at least a cenotaph was erected in his honour. Their relics also were carefully preserved: the house of Cadmus at Thebes, the hut of Orestes at Tegea, the stone on which Telamon had sat at Salamis (in Cyprus). Special shrines (ἡρῷα) were also erected in their honour, usually over their graves. In these shrines a complete set of armour was kept, in accordance with the idea that the hero was essentially a warrior, who on occasion came forth from his grave and fought at the head of his countrymen, putting the enemy to flight as during his lifetime. Like the gods, the cult heroes were supposed to exercise an influence on human affairs, though not to the same extent, their sphere of action being confined to their own localities. Amongst the earliest known historical examples of the elevation of the dead to the rank of heroes are Timesius the founder of Abdera, Miltiades, son of Cypselus, Harmodius and Aristogiton and Brasidas, the victor of Amphipolis, who ousted the local Athenian hero Hagnon. In course of time admission to the rank of a hero became far more common, and was even accorded to the living, such as Lysimachus in Samothrace and the tyrant Nicias of Cos. Antiochus of Commagene instituted an order of priests to celebrate the anniversary of his birth and coronation in a special sanctuary, and the kings of Pergamum claimed divine honours for themselves and their wives during their lifetime. The birthday of Eumenes was regularly kept, and every month sacrifice was offered to him and games held in his honour. In addition to persons of high rank, poets, legendary and others (Linus, Orpheus, Homer, Aeschylus and Sophocles), legislators and physicians (Lycurgus, Hippocrates), the patrons of various trades or handicrafts (artists, cooks, bakers, potters), the heads of philosophical schools (Plato, Democritus, Epicurus) received the honours of a cult. At Teos incense was offered before the statue of a flute-player during his lifetime. In some countries the honour became so general that every man after death was described as a hero in his epitaph—in Thessaly even slaves.

The cult of the heroes exhibits points of resemblance with that of the chthonian divinities and of the dead, but differs from that of the ordinary gods, a further indication that they were not "depotentiated" gods. Thus, sacrifice was offered to them at night or in the evening; not on a high, but on a low altar (ἐσχάρα), surrounded by a trench to receive the blood of the victim, which was supposed to make its way through the ground to the occupant of the grave; the victims were black male animals, whose heads were turned downwards, not upwards; their blood was allowed to trickle on the ground to appease the departed (αἱμακουρία); the body was entirely consumed by fire and no mortal was allowed to eat of it; the technical expression for the sacrifice was not θύειν but ἐναγίζειν

(less commonly ἐντέμνειν). The chthonian aspect of the hero is further shown by his attribute the snake, and in many cases he appears under that form himself. On special occasions a sacrificial meal of cooked food was set out for the heroes, of which they were solemnly invited to partake. The fullest description of such a festival is the account given by Plutarch (*Aristides*, 21) of the festival celebrated by the Plataeans in honour of their countrymen who had fallen at the battle of Plataea. On the 16th of the month Maimacterion, a long procession, headed by a trumpeter playing a warlike air, set out for the graves; wagons decked with myrtle and garlands of flowers followed, young men (who must be of free birth) carried jars of wine, milk, oil and perfumes; next came the black bull destined for the sacrifice, the rear being brought up by the archon, who wore the purple robe of the general, a naked sword in one hand, in the other an urn. When he came near the tombs, he drew some water with which he washed the gravestones, afterwards anointing them with perfume; he then sacrificed the bull on the altar calling upon Zeus Chthonios and Hermes Psychopompos, and inviting them in company with the heroes to the festival of blood. Finally, he poured a libation of wine with the words: "I drink to those who died for the freedom of the Hellenes."

See especially E. Rohde, *Psyche* (1905) and in *Rheinisches Museum*, li. (1895), 28; P. Stengel, *Die griechischen Kultusaltertümer* (Munich, 1898), p. 124; G. F. Schömann, *Griechische Altertümer*, ii. (1897), 159; J. Wassner, *De heroum apud Graecos cultu* (Kiel, 1883); article by F. Deneken in Roscher's *Lexikon der Mythologie*, in which a large amount of material is accumulated; J. A. Hild, *Étude sur les démons* (1881) and article in Daremberg and Saglio's *Dictionnaire des antiquités*.

Teutonic Legend.

Many of the chief characteristics of the ancient Greek heroes are reproduced in those of the Teutonic North, the parallel being in some cases very striking; Siegfried, for instance, like Achilles, is vulnerable only in one spot, and Wayland Smith, like Hephaestus, is lame. Superhuman qualities and powers, too, are commonly ascribed to both, an important difference, however, being that whatever worship may have been paid to the Teutonic heroes never crystallized into a cult. This applies equally to those who have a recognized historical origin and to those who are regarded as purely mythical. Of the latter the number has tended to diminish in the light of modern scholarship. The fashion during the 19th century set strongly in the other direction, and the "degraded gods" theory was applied not only to such conspicuous heroes as Siegfried, Dietrich and Beowulf, but to a host of minor characters, such as the good marquis Rüdeger of the Nibelungenlied and our own Robin Hood (both identified with Woden Hruodperaht). The reaction from one extreme has, indeed, tended to lead to another, until not only the heroes, but the very gods themselves, are being traced to very human, not to say commonplace, origins. Thus M. Henri de Tourville, in his *Histoire de la formation particulariste* (1903), basing his argument on the *Ynglinga Saga*, interpreted in the light of "Social Science," reveals Odin, "the traveller," as a great "caravan-leader" and warrior, who, driven from Asgard—a trading city on the borders of the steppes east of the Don—by "the blows that Pompey aimed at Mithridates," brought to the north the arts and industries of the East. The argument is developed with convincing ingenuity, but it may be doubted whether it has permanently "rescued Odin from the misty dreamland of mythology and restored him to history." It is now, however, admitted that, whatever influence the one may have from time to time exercised on the other, Teutonic myth and Teutonic heroic legend were developed on independent lines. The Teutonic heroes are, in the main, historical personages, never gods; though, like the Greek heroes, they are sometimes endowed with semi-divine attributes or interpreted as symbolical representations of natural forces.

The origin of Teutonic heroic saga, which may be regarded as including that of the Germans, Goths, Anglo-Saxons and Scandinavians, is to be looked for in the period of the so-called migration of nations (A.D. 350-650). It consequently rests upon a distinct basis of fact, the saga (in the older and wider sense of any story said or sung) being indeed the oldest form of historical tradition; though this of course does not exclude the probability of the accretion of mythical elements round persons and episodes from the very first. As to the origin of the heroic sagas as we now have them, Tacitus tells us that the deeds of Arminius were still celebrated in song a hundred years after his death (*Annals*, ii. 88) and in the *Germania* he speaks of "old songs" as the only kind of "annals" which the ancient Germans possessed; but, whatever relics of the old songs may be embedded in the Teutonic sagas, they have left no recognizable mark on the heroic poetry of the German peoples. The attempt to identify Arminius with Siegfried is now generally abandoned. Teutonic heroic saga, properly so-called, consists of the traditions connected with the migration period, the earliest traces of which are found in the works of historical writers such as Ammianus Marcellinus and Cassiodorus. According to Jordanes (the epitomator of Cassiodorus's *History of the Goths*) at the funeral of Attila his vassals, as they rode round the corpse, sang of his glorious deeds. The next step in the development of epic narrative was the single lay of an episodic character, sung by a single individual, who was frequently a member of a distinguished family, not merely a professional minstrel. Then, as different stories grew up round the person of a particular hero, they formed a connected cycle of legend, the centre of which was the person of the hero (*e.g.* Dietrich of Bern). The most important figures of these cycles are the following.

(1) Beowulf, king of the Geatas (Jutland), whose story in its present form was probably brought from the continent by the Angles. It is an amalgamation of the myth of Beowa, the slayer of the

water-demon and the dragon, with the historical legend of Beowulf, nephew and successor of Hygelac (Chochilaicus), king of the Geatas, who was defeated and slain (*c.* 520) while ravaging the Frisian coast. The water-demon Grendel and the dragon (probably), by whom Beowulf is mortally wounded, have been supposed to represent the powers of autumn and darkness, the floods which at certain seasons overflow the low-lying countries on the coast of the North Sea and sweep away all human habitations; Beowulf is the hero of spring and light who, after overcoming the spirit of the raging waters, finally succumbs to the dragon of approaching winter. Others regard him as a wind-hero, who disperses the pestilential vapours of the fens. Beowulf is also a culture-hero. His father Sceaf-Scyld (*i.e.* Scyld Scefing, "the protector with the sheaf") lands on the Anglian or Scandinavian coast when a child, in a rudderless ship, asleep on a sheaf of grain, symbolical of the means whereby his kingdom shall become great; the son indicates the blessings of a fixed habitation, secured against the attacks of the sea. (2) Hildebrand, the hero of the oldest German epic. A loyal supporter of Theodoric, he follows his master, when threatened by Odoacer, to the court of Attila. After thirty years' absence, he returns to his home In Italy; his son Hadubrand, believing his father to be dead, suspects treachery and refuses to accept presents offered by the father in token of good-will. A fight takes place, in which the son is slain by the father. In a later version, recognition and reconciliation take place. Well-known parallels are Odysseus and Telegonis, Rustem and Sohrab. (3) Ermanaric, the king of the East Goths, who according to Ammianus Marcellinus slew himself (*c.* 375) in terror at the invasion of the Huns. With him is connected the old German Dioscuri myth of the Harlungen. (4) Dietrich of Bern (Verona), the legendary name of Theodoric the Great. Contrary to historical tradition, Italy is supposed to have been his ancestral inheritance, of which he has been deprived by Odoacer, or by Ermanaric, who in his altered character of a typical tyrant appears as his uncle and contemporary. He takes refuge in Hungary with Etzel (Attila), by whose aid he finally recovers his kingdom. In the later middle ages he is represented as fighting with giants, dragons and dwarfs, and finally disappears on a black horse. Some attempts have been made to identify him as a kind of Donar or god of thunder. (5) Siegfried (M.H. Ger. Sîvrit), the hero of the *Niebelungenlied*, the Sigurd of the related northern sagas, is usually regarded as a purely mythical figure, a hero of light who is ultimately overcome by the powers of darkness, the mist-people (Niebelungen). He is, however, closely associated with historical characters and events, *e.g.* with the Burgundian king Gundahari (Gunther, Gunnar) and the overthrow of his house and nation by the Huns; the scholars have exercised considerable ingenuity in attempting to identify him with various historical figures. Theodor Abeling (*Das Nibelungenlied*, Leipzig, 1907) traces the Nibelung sagas to three groups of Burgundian legends, each based on fact: the Frankish-Burgundian tradition of the murder of Segeric, son of the Burgundian king Sigimund, who was slain by his father at the instigation of his stepmother; the Frankish-Burgundian story, as told by Gregory of Tours (iii. 11), of the defeat of the Burgundian kings Sigimund and Godomar, and the captivity and murder of Sigimund, by the sons of Clovis, at the instigation of their mother Chrothildis, in revenge for the murder of her father Chilperich and of her mother, by Godomar; the Rhenish-Burgundian story of the ruin of Gundahari's kingdom by Attila's Huns. Herr Abeling identifies Siegfried (Sigurd) with Segeric, while—according to him—the heroine of the Nibelung sagas, Kriemhild (Gudrun), represents a confusion of two historical persons: Chrothildis, the wife of Clovis, and Ildico (Hilde), the wife of Attila. (See also the articles KRIEMHILD, NIBELUNGENLIED).

(6) Hugdietrich, Wolfdietrich and Ortnit, whose legend, like that of Siegfried, is of Frankish origin. It is preserved in four versions, the best of which is the oldest, and has an historical foundation. Hugdietrich is the "Frankish Dietrich" (= Hugo Theodoric), king of Austrasia (d. 534), who like his son and successor Theodebert, was illegitimate; both had to fight for their inheritance with relatives. The transference of the scene to Constantinople is a reminiscence of the events of the Crusades and Theodebert's projected campaign against that city. The version in which Hugdietrich gains access to his future wife by disguising himself as a woman has also a foundation in fact. As the myth of the Harlungen is connected with Ermanaric, so another Dioscuri myth (of the Hartungen) is combined with the Ortnit-Wolfdietrich legend. The Hartungen are probably identical with the divine youths (mentioned in Tacitus as worshipped by the Vandal Naharvali or Nahanarvali), from whom the Vandal royal family, the Asdingi, claimed descent. Asdingi (Ἀστιγγοι) would be represented in Gothic by Hazdiggos, "men with women's hair" (cf. *muliebri ornatu* in Tacitus), and in middle high German by Hartungen. (7) Rother, king of Lombardy. Desiring to wed the daughter of Constantine, king of Constantinople, he sends twelve envoys to ask her in marriage. They are arrested and thrown into prison by the king. Rother, who appears under the name of Dietrich, sets out with an army, liberates the envoys and carries off the princess. One version places the scene in the land of the Huns. The character of Constantine in many respects resembles that of Alexius Comnenus; the slaying of a tame lion by one of the gigantic followers of Rother is founded on an incident which actually took place at the court of Alexius during the crusade of 1101 under duke Welf of Bavaria, when *King Rother* was composed about 1160 by a Rhenish minstrel. Rother may be the Lombard king Rothari (636-650), transferred to the period of the Crusades. (8) Walther of Aquitaine, chiefly known from the Latin poem *Waltharius*, written by Ekkehard of St Gall at the beginning of the 10th century, and fragments of an 8th-century Anglo-Saxon Epic *Waldere*. Walther is not an historical figure, although the legend undoubtedly represents typical occurrences of the migration period, such as the detention and flight of hostages of noble family from the court of the Huns, and the rescue of captive maidens by abduction. (9) Wieland (Volundr), Wayland the Smith, the only Teutonic hero (his original home was lower Saxony) who firmly established himself in England.

There is absolutely no historical background for his legend. He is a fire-spirit, who is pressed into man's service, and typifies the advance from the stone age to a higher stage of civilization (working in metals). As the lame smith he reminds us of Hephaestus, and in his flight with wings of Daedalus escaping from Minos. (10) Högni (Hagen) and Hedin (Hetel), whose personalities are overshadowed by the heroines Hilde and Gudrun (Kudrun, Kutrun). In one version occurs the incident of the never-ending battle between the forces of Hagen and Hedin. Every night Hilde revives the fallen, and "so will it continue till the twilight of the gods." The battle represents the eternal conflict between light and darkness, the alternation of day and night. Hilde here figures as a typical Valkyr delighting in battle and bloodshed, who frustrates a reconciliation. Hedin had sent a necklace as a peace-offering to Hagen, but Hilde persuades her father that it is only a ruse. This necklace occurs in the story of the goddess Freya (Frigg), who is said to have caused the battle to conciliate the wrath of Odin at her infidelity, the price paid by her for the possession of the necklace Brisnigamen; again, the light god Heimdal is said to have fought with Loki for the necklace (the sun) stolen by the latter. Hence the battle has been explained as the necklace myth in epic form. The historical background is the raids of the Teutonic maritime tribes on the coasts of England and Ireland.

Famous heroes who are specially connected with England are Alfred the Great, Richard Cœur-de-Lion, King Horn, Havelok the Dane, Guy of Warwick, Sir Bevis of Hampton (or Southampton), Robin Hood and his companions.

Celtic Heroes.

The Celtic heroic saga in the British islands may be divided into the two principal groups of Gaelic (Irish) and Brython (Welsh), the first, excluding the purely mythological, into the Ultonian (connected with Ulster) and the Ossianic. The Ultonianis grouped round the names of King Conchobar and the hero Cuchulainn, "the Irish Achilles," the defender of Ulster against all Ireland, regarded by some as a solar hero. The second cycle contains the epics of Finn (Fionn, Fingal) mac Cumhail, and his son Oisin (Ossian), the bard and warrior, chiefly known from the supposed Ossianic poems of Macpherson. (See Celt, sec. *Celtic Literature*.)

Of Brython origin is the cycle of King Arthur (Artus), the adopted national hero of the mixed nationalities of whom the "English" people was composed. Here he appears as a chiefly mythical personality, who slays monsters, such as the giant of St Michel, the boar Troit, the demon cat, and goes down to the underworld. The original Welsh legend was spread by British refugees in Brittany, and was thus celebrated by both English and French Celts. From a literary point of view, however, it is chiefly French and forms "the matter of Brittany." Arthur, the leader (*comes Britanniae, dux bellorum*) of the Siluri or Dumnonii against the Saxons, flourished at the beginning of the 6th century. He is first spoken of in Nennius's *History of the Britons* (9th century), and at greater length in Geoffrey of Monmouth's *History of the Kings of Britain* (12th century), at the end of which the French Breton cycle attained its fullest development in the poems of Chrétien de Troyes and others.

Speaking generally, the Celtic heroes are differentiated from the Teutonic by the extreme exaggeration of their superhuman, or rather extra-human, qualities. Teutonic legend does not lightly exaggerate, and what to us seems incredible in it may be easily conceived as credible to those by whom and for whom the tales were told; that Sigmund and his son Sinfiotli turned themselves into wolves would be but a sign of exceptional powers to those who believed in werewolves; Fafnir assuming the form of a serpent would be no more incredible to the barbarous Teuton than the similar transformation of Proteus to the Greek. But in the characterization of their heroes the Celtic imagination runs riot, and the quality of their persons and their acts becomes exaggerated beyond the bounds of any conceivable probability. Take, for instance, the description of some of Arthur's knights in the Welsh tale of *Kilhwch and Olwen* (in the *Mabinogion*). Along with Kai and Bedwyr (Bedivere), Peredur (Perceval), Gwalchmai (Gawain), and many others, we have such figures as Sgilti Yscandroed, whose way through the wood lay along the tops of the trees, and whose tread was so light that no blade of grass bent beneath his weight; Sol, who could stand all day upon one leg; Sugyn the son of Sugnedydd, who was "broad-chested" to such a degree that he could suck up the sea on which were three hundred ships and leave nothing but dry land; Gweyyl, the son of Gwestad, who when he was sad would let one of his lips drop beneath his waist and turn up the other like a cap over his head; and Uchtry Varyf Draws, who spread his red untrimmed beard over the eight-and-forty rafters of Arthur's hall. Such figures as these make no human impression, and criticism has busied itself in tracing them to one or other of the shadowy divinities of the Celtic pantheon. However this may be, remnants of their primitive superhuman qualities cling to the Celtic heroes long after they have been transfigured, under the influence of Christianity and chivalry, into the heroes of the medieval Arthurian romance, types—for the most part—of the knightly virtues as these were conceived by the middle ages; while shadowy memories of early myths live on, strangely disguised, in certain of the episodes repeated uncritically by the medieval poets. So Merlin preserves his diabolic origin; Arthur his mystic coming and his mystic passing; while Gawain, and after him Lancelot, journey across the river, as the Irish hero Bran had done before them to the island of fair women—the Celtic vision of the realm of death.

The chief heroes of the medieval Arthurian romances are the following. Arthur himself, who tends however to become completely overshadowed by his knights, who make his court the starting-point

of their adventures. Merlin (Myrddin), the famous wizard, bard and warrior, perhaps an historical figure, first introduced by Geoffrey of Monmouth, originally called Ambrose from the British leader Ambrosius Aurelianus, under whom he is said to have first served. Perceval (Parzival, Parsifal), the Welsh Peredur, "the seeker of the basin," the most intimately connected with the quest of the Grail (*q.v.*). Tristan (Tristram), the ideal lover of the middle ages, whose name is inseparably associated with that of Iseult. Lancelot, son of Ban king of Brittany, a creation of chivalrous romance, who only appears in Arthurian literature under French influence, known chiefly from his amour with Guinevere, perhaps in imitation of the story of Tristan and Iseult. Gawain (Welwain, Welsh Gwalchmai), Arthur's nephew, who in medieval romance remains the type of knightly courage and chivalry, until his character is degraded in order to exalt that of Lancelot. Among less important, but still conspicuous, figures may be mentioned Kay (the Kai of the *Mabinogion*), Arthur's foster-brother and seneschal, the type of the bluff and boastful warrior, and Bedivere (Bedwyr), the type of brave knight and faithful retainer, who alone is with Arthur at his passing, and afterwards becomes "a hermit and a holy man." (See Arthur, Merlin, Perceval, Tristan, Lancelot, Gawain.)

Heroes of Romance.

Another series of heroes, forming the central figures of stories variously derived but developed in Europe by the Latin-speaking peoples, may be conveniently grouped under the heading of "romance." Of these the most important are Alexander of Macedon and Charlemagne, while alongside of them Priam and other heroes of the Trojan war appear during the middle ages in strangely altered guise. Of all heroes of romance Alexander has been the most widely celebrated. His name, in the form of Iskander, is familiar in legend and story all over the East to this day; to the West he was introduced through a Latin translation of the original Greek romance (by the pseudo-Callisthenes) to which the innumerable Oriental versions are likewise traceable (see Alexander III., King of Macedon; sec. *The Romance of Alexander*). More important in the West, however, was the cycle of legends gathering round the figure of Charlemagne, forming what was known as "the matter of France." The romances of this cycle, of Germanic (Frankish) origin and developed probably in the north of France by the French (probably in the north of France) contain reminiscences of the heroes of the Merovingian period, and in their later development were influenced by the Arthurian cycle. Just as Arthur was eclipsed by his companions, so Charlemagne's vassal nobles, except in the *Chanson de Roland*, are exalted at the expense of the emperor, probably the result of the changed relations between the later emperors and their barons. The character of Charlemagne himself undergoes a change; in the *Chanson de Roland* he is a venerable figure, mild and dignified, while later he appears as a cruel and typical tyrant (as is also the case with Ermanaric). The basis of his legend is mainly historical, although the story of his journey to Constantinople and the East is mythical, and incidents have been transferred from the reign of Charles Martel to his. Charlemagne is chiefly venerated as the champion of Christianity against the heathen and the Saracens. (See Charlemagne, *ad fin.* "The Charlemagne Legends.")

The most famous heroes who are associated with him are Roland, praefect of the marches of Brittany, the Orlando of Ariosto, slain at Roncevaux (Roncevalles) in the Pyrenees, and his friend and rival Oliver (Olivier); Ogier the Dane, the Holger Danske of Hans Andersen, and Huon of Bordeaux, probably both introduced from the Arthurian cycle; Renaud (Rinaldo) of Montauban, one of the four sons of Aymon, to whom the wonderful horse Bayard was presented by Charlemagne; the traitor Doon of Mayence; Ganelon, responsible for the treachery that led to the death of Roland; Archbishop Turpin, a typical specimen of muscular Christianity; William Fierabras, William au court nez, William of Toulouse, and William of Orange (all probably identical), and Vivien, the nephew of the latter and the hero of Aliscans. The late Charlemagne romances originated the legends, in English form, of *Sowdone of Babylone*, *Sir Otnel*, *Sir Firumbras* and *Huon of Bordeaux* (in which Oberon, the king of the fairies, the son of Julius Caesar and Morgan the Fay, was first made known to England).

The chief remains of the Spanish heroic epic are some poems on the Cid, on the seven Infantes of Lara, and on Fernán Gonzalez, count of Castile. The legend of Charlemagne as told in the *Crónica general* of Alfonso X. created the desire for a national hero distinguished for his exploits against the Moors, and Roland was thus supplanted by Bernardo del Carpio. Another famous hero and centre of a 14th-century cycle of romance was Amadis of Gaul; its earliest form is Spanish, although the Portuguese have claimed it as a translation from their own language. There is no trace of a French original.

Slavonic Heroes.—The Slavonic heroic saga of Russia centres round Vladimir of Kiev (980-1015), the first Christian ruler of that country, whose personality is eclipsed by that of Ilya (Elias) of Mourom, the son of a peasant, who was said to have saved the empire from the Tatars at the urgent request of his emperor. It is not known whether he was an historical personage; many of the achievements attributed to him border on the miraculous. A much-discussed work is the *Tale of Igor*, the oldest of the Russian medieval epics. Igor was the leader of a raid against the heathen Polovtsi in 1185; at first successful, he was afterwards defeated and taken prisoner, but finally managed to escape. Although the Finns are not Slavs, on topographical grounds mention may here be made of Wainamoinen, the great magician and hero of the Finnish epic *Kalevala* ("land of heroes"). The popular hero of the Servians and Bulgarians is Marko Kralyevich (*q.v.*), son of

Vukashin, characterized by Goethe as a counterpart of the Greek Heracles and the Persian Rustem. For the Persian, Indian, &c., heroes see the articles on the literature and religions of the various countries.

AUTHORITIES.—On the subject generally, see J. G. T. Grässe, *Die grossen Sagenkreise des Mittelalters* (Dresden, 1842), forming part of his *Lehrbuch einer Literärgeschichte der berühmtesten Völker des Mittelalters*; W. P. Ker, *Epic and Romance* (2nd ed., 1908). TEUTONIC.—B. Symons, "Germanische Heldensage" in H. Paul's *Grundris der germanischen Philologie*, iii. (Strassburg, 1900), 2nd revised edition, separately printed (*ib.*, 1905); W. Grimm, *Die deutsche Heldensage* (1829, 3rd ed., 1889), still one of the most important works; W. Müller, *Mythologie der deutschen Heldensage* (Heilbronn, 1886) and supplement, *Zur Mythologie der griechischen und deutschen Heldensage* (*ib.*, 1889); O. L. Jiriczek, *Deutsche Heldensagen*, i. (Strassburg, 1898) and *Die deutsche Heldensage* (3rd revised edition, Leipzig, 1906); Chantepie de la Saussaye, *The Religion of the Teutons* (Eng. tr., Boston, U.S.A., 1902); J. G. Robertson, *History of German Literature* (1902). See also HELDENBUCH.

CELTIC.—M. H. d'Arbois de Jubainville, *Cours de littérature celtique* (12 vols., 1883-1902), one vol. trans. into English by R. I. Best, *The Irish Mythological Cycle and Celtic Mythology* (1903); L. Petit de Julleville, *Hist. de la langue et de la litt. française*, i. *Moyen âge* (1896); C. Squire, *The Mythology of the British Isles: an Introduction to Celtic Myth and Romance* (1905); J. Rhys, *Celtic Britain* (3rd ed., 1904). SLAVONIC.—A. N. Rambaud, *La Russie épique* (1876); W. Wollner, *Untersuchungen über die Volksepik der Grossrussen* (1879); W. R. Morfill, *Slavonic Literature* (1883).

HERO AND LEANDER, two lovers celebrated in antiquity. Hero, the beautiful priestess of Aphrodite at Sestos, was seen by Leander, a youth of Abydos, at the celebration of the festival of Aphrodite and Adonis. He became deeply enamoured of her; but, as her position as priestess and the opposition of her parents rendered their marriage impossible they agreed to carry on a clandestine intercourse. Every night Hero placed a lamp in the top of the tower where she dwelt by the sea, and Leander, guided by it, swam across the dangerous Hellespont. One stormy night the lamp was blown out and Leander perished. On finding his body next morning on the shore, Hero flung herself into the waves. The story is referred to by Virgil (*Georg.* iii. 258), Statius (*Theb.* vi. 535) and Ovid (*Her.* xviii. and xix.). The beautiful little epic of Musaeus has been frequently translated, and is expanded in the *Hero and Leander* of C. Marlowe and G. Chapman. It is also the subject of a ballad by Schiller and a drama by F. Grillparzer.

See M. H. Jellinek, *Die Sage von Hero und Leander in der Dichtung* (1890), and G. Knaack "Hero und Leander" in *Festgabe für Franz Susemihl* (1898). A careful collection of materials will be found in F. Köppner, *Die Sage von Hero und Leander in der Literatur und Kunst des Altertums* (1894).

HERO OF ALEXANDRIA, Greek geometer and writer on mechanical and physical subjects, probably flourished in the second half of the 1st century. This is the more modern view, in contrast to the earlier theory most generally accepted, according to which he flourished about 100 B.C. The earlier theory started from the superscription of one of his works, Ἥρωνος Κτησιβίου βελοποιϊκά, from which it was inferred that Hero was a pupil of Ctesibius. Martin, Hultsch and Cantor took this Ctesibius to be a barber of that name who lived in the reign of Ptolemy Euergetes II. (d. 117 B.C.) and is credited with having invented an improved water-organ. But this identification is far from certain, as a Ctesibius *mechanicus* is mentioned by Athenaeus as having lived under Ptolemy II. Philadelphus (285-247 B.C.). Nor can the relation of master and pupil be certainly inferred from the superscription quoted (observe the omission of any article), which really asserts no more than that Hero re-edited an earlier treatise by Ctesibius, and implies nothing about his being an *immediate* predecessor. Further, it is certain that Hero used physical and mathematical writings by Posidonius, the Stoic, of Apamea, Cicero's teacher, who lived until about the middle of the 1st century B.C. The positive arguments for the more modern view of Hero's date are (1) the use by him of Latinisms from which Diels concluded that the 1st century A.D. was the earliest possible date, (2) the description in Hero's *Mechanics* iii. of a small olive-press with one screw which is alluded to by Pliny (*Nat. Hist.* viii.) as having been introduced since A.D. 55, (3) an allusion by Plutarch (who died A.D. 120) to the proposition that light is reflected from a surface at an angle equal to the angle of incidence, which Hero proved in his *Catoptrica*, the words used by Plutarch fitting well with the corresponding passage of that work (as to which see below). Thus we arrive at the latter half of the 1st century A.D. as the approximate date of Hero's activity.

The geometrical treatises which have survived (though not interpolated) in Greek are entitled

respectively *Definitiones*, *Geometria*, *Geodaesia*, *Stereometrica* (i. and ii.), *Mensurae*, *Liber Geoponicus*, to which must now be added the *Metrica* recently discovered by R. Schöne in a MS. at Constantinople. These books, except the *Definitiones*, mostly consist of directions for obtaining, from given parts, the areas or volumes, and other parts, of plane or solid figures. A remarkable feature is the bare statement of a number of very close approximations to the square roots of numbers which are not complete squares. Others occur in the *Metrica* where also a method of finding such approximate square, and even approximate cube, roots is shown. Hero's expressions for the areas of regular polygons of from 5 to 12 sides in terms of the squares of the sides show interesting approximations to the values of trigonometrical ratios. Akin to the geometrical works is that *On the Dioptra*, a remarkable book on land-surveying, so called from the instrument described in it, which was used for the same purposes as the modern theodolite. It is in this book that Hero proves the expression for the area of a triangle in terms of its sides. The *Pneumatica* in two books is also extant in Greek as is also the *Automatopoietica*. In the former will be found such things as siphons, "Hero's fountain," "penny-in-the-slot" machines, a fire-engine, a water-organ, and arrangements employing the force of steam. Pappus quotes from three books of *Mechanics* and from a work called *Barulcus*, both by Hero. The three books on *Mechanics* survive in an Arabic translation which, however, bears a title "On the lifting of heavy objects." This corresponds exactly to *Barulcus*, and it is probable that *Barulcus* and *Mechanics* were only alternative titles for one and the same work. It is indeed not credible that Hero wrote two separate treatises on the subject of the mechanical powers, which are fully discussed in the *Mechanics*, ii., iii. The *Belopoiica* (on engines of war) is extant in Greek, and both this and the *Mechanics* contain Hero's solution of the problem of the two mean proportionals. Hero also wrote *Catoptrica* (on reflecting surfaces), and it seems certain that we possess this in a Latin work, probably translated from the Greek by Wilhelm van Moerbeek, which was long thought to be a fragment of Ptolemy's *Optics*, because it bore the title *Ptolemaei de speculis* in the MS. But the attribution to Ptolemy was shown to be wrong as soon as it was made clear (especially by Martin) that another translation by an Admiral Eugenius Siculus (12th century) of an optical work from the Arabic was Ptolemy's *Optics*. Of other treatises by Hero only fragments remain. One was four books on *Water Clocks* (Περὶ ὑδρίων ὡροσκοπείων), of which Proclus (*Hypotyp. astron.*, ed. Halma) has preserved a fragment, and to which Pappus also refers. Another work was a commentary on Euclid (referred to by the Arabs as "the book of the resolution of doubts in Euclid") from which quotations have survived in an-Nairīzī's commentary.

The *Pneumatica*, *Automatopoietica*, *Belopoiica* and *Cheiroballistra* of Hero were published in Greek and Latin in Thévenot's *Veterum mathematicorum opera graece et latine pleraque nunc primum edita* (Paris, 1693); the first important critical researches on Hero were G. B. Venturi's *Commentari sopra la storia e la teoria dell'ottica* (Bologna, 1814) and H. Martin's "Recherches sur la vie et les ouvrages d'Héron d'Alexandrie disciple de Ctésibius et sur tous les ouvrages mathématiques grecs conservés ou perdus, publiés ou inédits, qui ont été attribués à un auteur nommé Héron" (*Mém. presentés à l'Académie des Inscriptions et Belles-Lettres*, i. série, iv., 1854). The geometrical works (except of course the *Metrica*) were edited (Greek only) by F. Hultsch (*Heronis Alexandrini geometricorum et stereometricorum reliquiae*, 1864), the *Dioptra* by Vincent (*Extraits des manuscrits relatifs à la géométrie pratique des Grecs, Notices et extraits des manuscrits de la Bibliothèque Impériale*, xix. 2, 1858), the treatises on *Engines of War* by C. Wescher (*Poliorcétique des Grecs*, Paris, 1867). The *Mechanics* was first published by Carra de Vaux in the *Journal asiatique* (ix. série, ii., 1893). In 1899 began the publication in Teubner's series of *Heronis Alexandrini opera quae supersunt omnia*. Vol. i. and Supplement (by W. Schmidt) contains the *Pneumatica* and *Automata*, the fragment on *Water Clocks*, the *De ingeniis spiritualibus* of Philon of Byzantium and extracts on Pneumatics by Vitruvius. Vol. ii. pt. i., by L. Nix and W. Schmidt, contains the *Mechanics* in Arabic, Greek fragments of the same, the *Catoptrica* in Latin with appendices of extracts from Olympiodorus, Vitruvius, Pliny, &c. Vol. iii. (by Hermann Schöne) contains the *Metrica* (in three books) and the *Dioptra*. A German translation is added throughout. The approximation to square roots in Hero has been the subject of papers too numerous to mention. But reference should be made to the exhaustive studies on Hero's arithmetic by Paul Tannery, "L'Arithmétique des Grecs dans Héron d'Alexandrie" (*Mém. de la Soc. des sciences phys. et math. de Bordeaux*, ii. série, iv., 1882), "La Stéréométrie d'Héron d'Alexandrie" and "Études Héroniennes" (*ibid.* v., 1883), "Questions Héroniennes" (*Bulletin des sciences math.*, ii. série, viii., 1884), "Un Fragment des Métriques d'Héron" (*Zeitschrift für Math. und Physik*, xxxix., 1894; *Bulletin des sciences math.*, ii. série, xviii., 1894). A good account of Hero's works will be found in M. Cantor's *Geschichte der Mathematik*, i.² (1894), chapters 18 and 19, and in G. Loria's studies, *Le Scienze esatte nell' antica Grecia*, especially libro iii. (Modena, 1900), pp. 103-128.

(T. L. H.)

HERO, THE YOUNGER, the name given without any sufficient reason to a Byzantine land-surveyor who wrote (about A.D. 938) a treatise on land-surveying modelled on the works of Hero of Alexandria, especially the *Dioptra*.

See "Géodésie de Héron de Byzance," published by Vincent in *Notices et extraits des manuscrits*

de la Bibliothéque Impériale, xix. 2 (Paris, 1858), and T. H. Martin in *Mémoires présentés à l' Académie des Inscriptions*, 1st series, iv. (Paris, 1854).

HEROD, the name borne by the princes of a dynasty which reigned in Judaea from 40 B.C.

HEROD (surnamed THE GREAT), the son of Antipater, who supported Hyrcanus II. against Aristobulus II. with the aid first of the Nabataean Arabs and then of Rome. The family seems to have been of Idumaean origin, so that its members were liable to the reproach of being half-Jews or even foreigners. Justin Martyr has a tradition that they were originally Philistines of Ascalon (*Dial.* c. 52), and on the other hand Nicolaus of Damascus (*apud* Jos. *Ant.* xiv. 1. 3) asserted that Herod, his royal patron, was descended from the Jews who first returned from the Babylonian Captivity. The tradition and the assertion are in all probability equally fictitious and proceed respectively from the foes and the friends of the Herodian dynasty.

Antipas (or Antipater), the father of Antipater, had been governor of Idumaea under Alexander Jannaeus. His son allied himself by marriage with the Arabian nobility and became the real ruler of Palestine under Hyrcanus II. When Rome intervened in Asia in the person of Pompey, the younger Antipater realized her inevitable predominance and secured the friendship of her representative. After the capture of Jerusalem in 63 B.C. Pompey installed Hyrcanus, who was little better than a figurehead, in the high-priesthood; and when in 55 B.C. the son of Aristobulus renewed the civil war in Palestine, the Roman governor of Syria in the exercise of his jurisdiction arranged a settlement "in accordance with the wishes of Antipater" (Jos. *Ant.* xiv. 6. 4). To this policy of dependence upon Rome Antipater adhered, and he succeeded in commending himself to Mark Antony and Caesar in turn. After the battle of Pharsalia Caesar made him procurator and a Roman citizen.

At this point Herod appears on the scene as ruler of Galilee (Jos. *Ant.* xiv. 9. 2) appointed by his father at the age of fifteen or, since he died at seventy, twenty-five. In spite of his youth he soon found an opportunity of displaying his mettle; for he arrested Hezekiah the arch-brigand, who had overrun the Syrian border, and put him to death. The Jewish nobility at Jerusalem seized upon this high-handed action as a pretext for satisfying their jealousy of their Idumaean rulers. Herod was cited in the name of Hyrcanus to appear before the Sanhedrin, whose prerogative he had usurped in executing Hezekiah. He appeared with a bodyguard, and the Sanhedrin was overawed. Only Sameas, a Pharisee, dared to insist upon the legal verdict of condemnation. But the governor of Syria had sent a demand for Herod's acquittal, and so Hyrcanus adjourned the trial and persuaded the accused to abscond. Herod returned with an army, but his father prevailed upon him to depart to Galilee without wreaking his vengeance upon his enemies. About this time (47-46 B.C.) he was created *strategus* of Coelesyria by the provincial governor. The episode is important for the light which it throws upon Herod's relations with Rome and with the Jews.

In 44 B.C. Cassius arrived in Syria for the purpose of filling his war-chest: Antipater and Herod collected the sum of money at which the Jews of Palestine had been assessed. In 43 B.C. Antipater was poisoned at the instigation of one Malichus, who was perhaps a Jewish patriot animated by hatred of the Herods and their Roman patrons.

With the connivance of Cassius Herod had Malichus assassinated; but the country was in a state of anarchy, thanks to the extortions of Cassius and the encroachments of neighbouring powers. Antony, who became master of the East after Philippi, was ready to support the sons of his friend Antipater; but he was absent in Egypt when the Parthians invaded Palestine to restore Antigonus to the throne of his father Aristobulus (40 B.C.). Herod escaped to Rome: the Arabians, his mother's people, had repudiated him. Antony had made him tetrarch, and now with the assent of Octavian persuaded the Senate to declare him king of Judaea.

In 39 B.C. Herod returned to Palestine and, when the presence of Antony put the reluctant Roman troops entirely at his disposal, he was able to lay siege to Jerusalem two years later. Secure of the support of Rome he was concerned also to legitimize his position in the eyes of the Jews by taking, for love as well as policy, the Hasmonaean princess Mariamne to be his second wife. Jerusalem was taken by storm; the Roman troops withdrew to behead Antigonus the usurper at Antioch. In 37 B.C. Herod was king of Judaea, being the client of Antony and the husband of Mariamne.

The Pharisees, who dominated the bulk of the Jews, were content to accept Herod's rule as a judgment of God. Hyrcanus returned from his prison: mutilated, he could no longer hold office as high-priest; but his mutilation probably gave him the prestige of a martyr, and his influence—whatever it was worth—seems to have been favourable to the new dynasty. On the other hand Herod's marriage with Mariamne brought some of his enemies into his own household. He had scotched the faction of Hasmonaean sympathizers by killing forty-five members of the Sanhedrin and confiscating their possessions. But so long as there were representatives of the family alive, there was always a possible pretender to the throne which he occupied; and the people had not lost their affection for their former deliverers. Mariamne's mother used her position to further her plots

for the overthrow of her son-in-law; and she found an ally in Cleopatra of Egypt, who was unwilling to be spurned by him, even if she was not weary of his patron, Antony.

The events of Herod's reign indicate the temporary triumphs of his different adversaries. His high-priest, a Babylonian, was deposed in order that Aristobulus III., Mariamne's brother, might hold the place to which he had some ancestral right. But the enthusiasm with which the people received him at the Feast of Tabernacles convinced Herod of the danger; and the youth was drowned by order of the king at Jericho. Cleopatra had obtained from Antony a grant of territory adjacent to Herod's domain and even part of it. She required Herod to collect arrears of tribute. So it fell out that, when Octavian and the Senate declared war against Antony and Cleopatra, Herod was preoccupied in obedience to her commands and was thus prevented from fighting against the future emperor of Rome.

After the battle of Actium (31 B.C.) Herod executed Hyrcanus and proceeded to wait upon the victorious Octavian at Rhodes. His position was confirmed and his territories were restored. On his return he took in hand to heal with the Hasmonaeans, and in 25 B.C. the old intriguers, their victims like Mariamne, and all pretenders were dead. From this time onwards Herod was free to govern Palestine, as a client-prince of the Roman Empire should govern his kingdom. In order to put down the brigands who still infested the country and to check the raids of the Arabs on the frontier, he built or rebuilt fortresses, which were of material assistance to the Jews in the great revolt against Rome. Within and without Judaea he erected magnificent buildings and founded cities. He established games in honour of the emperor after the ancient Greek model in Caesarea and Jerusalem and revived the splendour of the Olympic games. At Athens and elsewhere he was commemorated as a benefactor; and as Jew and king of the Jews he restored the temple at Jerusalem. The emperor recognized his successful government by putting the districts of Ulatha and Panias under him in 20 B.C.

But Herod found new enemies among the members of his household. His brother Pheroras and sister Salome plotted for their own advantage and against the two sons of Mariamne. The people still cherished a loyalty to the Hasmonaean lineage, although the young princes were also the sons of Herod. The enthusiasm with which they were received fed the suspicion, which their uncle instilled into their father's mind, and they were strangled at Sebaste. On his deathbed Herod discovered that his eldest son, Antipater, whom Josephus calls a "monster of iniquity," had been plotting against him. He proceeded to accuse him before the governor of Syria and obtained leave from Augustus to put him to death. The father died five days after his son in 4 B.C. He had done much for the Jews, thanks to the favour he had won and kept in spite of all from the successive heads of the Roman state; he had observed the Law publicly—in fact, as the traditional epigram of Augustus says, "it was better to be Herod's *swine* than a *son* of Herod."

Josephus, *Ant.* xv., xvi., xvii. 1-8, *B.J.* i. 18-33; Schürer, *Gesch. d. jüd. Völk.*, 4th ed., i. pp. 360-418.

HEROD ANTIPAS, son of Herod the Great by the Samaritan Malthace, and full brother of Archelaus, received as his share of his father's dominions the provinces of Galilee and Peraea, with the title of tetrarch. Like his father, Antipas had a turn for architecture: he rebuilt and fortified the town of Sepphoris in Galilee; he also fortified Betharamptha in Peraea, and called it Julias after the wife of the emperor. Above all he founded the important town of Tiberias on the west shore of the Sea of Galilee, with institutions of a distinctly Greek character. He reigned 4 B.C.-A.D. 39. In the gospels he is mentioned as Herod. He it was who was called a "fox" by Christ (Luke xiii. 32). He is erroneously spoken of as a king in Mark vi. 14. It was to him that Jesus was sent by Pilate to be tried. But it is in connexion with his wife Herodias that he is best known, and it was through her that his misfortunes arose. He was married first of all to a daughter of Aretas, the Arabian king; but, making the acquaintance of Herodias, the wife of his brother Philip (not the tetrarch), during a visit to Rome, he was fascinated by her and arranged to marry her. Meantime his Arabian wife discovered the plan and escaped to her father, who made war on Herod, and completely defeated his army. John the Baptist condemned his marriage with Herodias, and in consequence was put to death in the way described in the gospels and in Josephus. When Herodias's brother Agrippa was appointed king by Caligula, she was determined to see her husband attain to an equal eminence, and persuaded him, though naturally of a quiet and unambitious temperament, to make the journey to Rome to crave a crown from the emperor. Agrippa, however, managed to influence Caligula against him. Antipas was deprived of his dominions and banished to Lyons, Herodias voluntarily sharing his exile.

HEROD PHILIP, son of Herod the Great by Cleopatra of Jerusalem, received the tetrarchate of Ituraea and other districts to E. and N.E. of the Lake of Galilee, the poorest part of his father's kingdom. His subjects were mainly Greeks or Syrians, and his coins bear the image of Augustus or Tiberius. He is described as an excellent ruler, who loved peace and was careful to maintain justice, and spent his time in his own territories. He was also a builder of cities, one of which was Caesarea Philippi, and another was Bethsaida, which he called Julias. He died after a reign of thirty-seven years (4 B.C.-A.D. 34); and his dominions were incorporated in the province of Syria.

(J. H. A. H.)

HERODAS (Gr. Ἡρώδας), or Herondas (the name is spelt differently in the few places where he is mentioned), Greek poet, the author of short humorous dramatic scenes in verse, written under the Alexandrian empire in the 3rd century B.C. Apart from the intrinsic merit of these pieces, they are interesting in the history of Greek literature as being a new species, illustrating Alexandrian methods. They are called Μιμίαμβοι, "Mimeiambics." Mimes were the Dorian product of South Italy and Sicily, and the most famous of them—from which Plato is said to have studied the drawing of character—were the work of Sophron. These were scenes in popular life, written in the language of the people, vigorous with racy proverbs such as we get in other reflections of that region—in Petronius and the *Pentamerone*. Two of the best known and the most vital among the *Idylls* of Theocritus, the 2nd and the 15th, we know to have been derived from mimes of Sophron. What Theocritus is doing there, Herodas, his younger contemporary, is doing in another manner—casting old material into novel form, upon a small scale, under strict conditions of technique. The method is entirely Alexandrian: Sophron had written in a peculiar kind of rhythmical prose; Theocritus uses the hexameter and Doric, Herodas the *scazon* or "lame" iambic (with a dragging spondee at the end) and the old Ionic dialect with which that curious metre was associated. That, however, hardly goes beyond the choice and form of words; the structure of the sentences is close-knit Attic. But the grumbling metre and quaint language suit the tone of common life which Herodas aims at realizing; for, as Theocritus may be called idealist, Herodas is a realist unflinching. His persons talk in vehement exclamations and emphatic turns of speech, with proverbs and fixed phrases; and occasionally, where it is designed as proper to the part, with the most naked coarseness of expression.

The scene of the second and the fourth is laid at Cos, and the speaking characters in each are never more than three. In Mime I. the old nurse, now the professional go-between or bawd, calls on Metriche, whose husband has been long away in Egypt, and endeavours to excite her interest in a most desirable young man, fallen deeply in love with her at first sight. After hearing all the arguments Metriche declines with dignity, but consoles the old woman with an ample glass of wine, this kind being always represented with the taste of Mrs Gamp. II. is a monologue by the 381
Πορνοβοσκός ("Whoremonger") prosecuting a merchant-trader for breaking into his establishment at night and attempting to carry off one of the inmates, who is produced in court. The vulgar blackguard, who is a stranger to any sort of shame, remarking that he has no evidence to call, proceeds to a peroration in the regular oratorical style, appealing to the Coan judges not to be unworthy of their traditional glories. In fact, the whole oration is also a burlesque in every detail of an Attic speech at law; and in this case we have the material from which to estimate the excellence of the parody. In III. a desperate mother brings to the schoolmaster a truant urchin, with whom neither she nor his incapable old father can do anything. In a voluble stream of interminable sentences she narrates his misdeeds and implores the schoolmaster to flog him. The boy accordingly is hoisted on another's back and flogged; but his spirit does not appear to be subdued, and the mother resorts to the old man after all. IV. is a visit of two poor women with an offering to the temple of Asclepius at Cos. While the humble cock is being sacrificed, they turn, like the women in the *Ion* of Euripides, to admire the works of art; among them a small boy strangling a vulpanser—doubtless the work of Boëthus that we know—and a sacrificial procession by Apelles, "the Ephesian," of whom we have an interesting piece of contemporary eulogy. The oily sacristan is admirably painted in a few slight strokes. V. brings us very close to some unpleasant facts of ancient life. The jealous woman accuses one of her slaves, whom she has made her favourite, of infidelity; has him bound and sent degraded through the town to receive 2000 lashes; no sooner is he out of sight than she recalls him to be branded "at one job." The only pleasing person in the piece is the little maidservant—permitted liberties as a *verna* brought up in the house—whose ready tact suggests to her mistress an excuse for postponing execution of a threat made in ungovernable fury. VI. is a friendly chat or a private conversation. The subject is an ugly one, but the dialogue is as clever and amusing as the rest, with some delicious touches. Our interest is engaged here in a certain Kerdon, the artistic shoemaker, to whom we are introduced in VII. (the name had already become generic for the shoemaker as the typical representative of retail trade), a little bald man with a fluent tongue, complaining of hard times, who bluffs and wheedles by turns. VII. opens with a mistress waking up her maids to listen to her dream; but we have only the beginning, and the other fragments are very short.

Within the limits of 100 lines or less Herodas presents us with a highly entertaining scene and with characters definitely drawn. Some of these had been perfected no doubt upon the Attic stage, where the tendency in the 4th century had been gradually to evolve accepted types—not individuals, but generalizations from a class, an art in which Menander's was esteemed the master-hand. The Πορνοβοσκός and the Μαστροπός we can piece together from succeeding literature, and see how skilfully the established traits are indicated here. This is achieved by true dramatic means, with touches never wasted and the more delightful often because they do not clamour for attention. The execution has the qualities of first-rate Alexandrian work in miniature, such as the epigrams of Asclepiades possess, the finish and firm outlines; and these little pictures bear the test of all artistic work—they do not lose their freshness with familiarity, and gain in interest as one learns to appreciate their subtle points.

The papyrus MS., obtained from the Fayum, is in the possession of the British Museum, and was first printed by F. G. Kenyon in 1891. Editions by O. Crusius (1905, text only, in Teubner series) and

J. A. Nairn (1904), with introduction, notes and bibliography. There is an English verse translation of the mimes by H. Sharpley (1906) under the title *A Realist of the Aegean*.

(W. G. H.)

HERODIANS (Ἡρωδιανοί), a sect or party mentioned in Scripture as having on two occasions—once in Galilee, and again in Jerusalem—manifested an unfriendly disposition towards Jesus (Mark iii. 6, xii. 13; Matt. xxii. 6; cf. also Mark viii. 15). In each of these cases their name is coupled with that of the Pharisees. According to many interpreters the courtiers or soldiers of Herod Antipas ("Milites Herodis," Jerome) are intended; but more probably the Herodians were a public political party, who distinguished themselves from the two great historical parties of post-exilian Judaism by the fact that they were and had been sincerely friendly to Herod the Great and to his dynasty (cf. such formations as "Caesariani," "Pompeiani"). It is possible that, to gain adherents, the Herodian party may have been in the habit of representing that the establishment of a Herodian dynasty would be favourable to the realization of the theocracy; and this in turn may account for Tertullian's (*De praescr.*) allegation that the Herodians regarded Herod himself as the Messiah. The sect was called by the Rabbis Boethusians as being friendly to the family of Boethus, whose daughter Mariamne was one of Herod the Great's wives.

(J. H. A. H.)

HERODIANUS, Greek historian, flourished during the third century A.D. He is supposed to have been a Syrian Greek. In 203 he was in Rome, where he held some minor posts. He does not appear to have attained high official rank; the statement that he was imperial procurator and legate of the Sicilian provinces rests upon conjecture only. His historical work (Ἡρωδιανοῦ τῆς μετὰ Μάρκον βασιλείας ἱστοριῶν βιβλία ὀκτώ) narrates the events of the fifty-eight years between the death of Marcus Aurelius and the proclamation of Gordianus III. (180-238). The narrative is of special value as supplementing Dion Cassius, whose history ends with Alexander Severus. His work has the value that attaches to a record written by one chronicling the events of his own times, gifted with ordinary powers of observation, indubitable candour and independence of view. But while he gives a lively account of external events—such as the death of Commodus and the assassination of Pertinax—the barbarian invasions, the spread of Christianity, the extension of the franchise by Caracalla are unnoticed. The dates are often wrong, and little attention is paid to geographical details, which makes the narrative of military expeditions beyond the borders of the empire difficult to understand. Herodian has been accused of prejudice against Alexander Severus. His style, modelled on that of Thucydides and unreservedly praised by Photius, is on the whole pure, though somewhat rhetorical and showing a fondness for Latinisms.

Extensive use has been made of Herodianus by later chroniclers, especially the "Scriptores historiae Augustae" and John of Antioch. His history was first translated into Latin at the end of the 15th century by Politian. The most complete edition is by G. W. Irmisch (1789-1805), with elaborate indices, but the notes are very diffuse; critical editions by I. Bekker (1855), L. Mendelssohn (1883); see also C. Dändliker.

HERODIANUS, AELIUS, called ὁ τεχνικός, Alexandrian grammarian, flourished in the 2nd century A.D. He early took up his residence at Rome, where he enjoyed the patronage of Marcus Aurelius (161-180), to whom he dedicated his great treatise on prosody. This work in twenty-one books (Καθολικὴ προσῳδία) included also an account of the etymological part of grammar. The work itself is lost, but several epitomes of it have been preserved. His Ἐπιμερισμοί dealt with difficult words and peculiar forms in Homer. Herodianus also wrote numerous grammatical treatises, of which only one has come down to us in a complete form (Περὶ μονήρους λέξεως, on peculiar style), articles on exceptional or anomalous words. Numerous quotations and fragments still exist, chiefly in the Homeric scholiasts and Stephanus of Byzantium. Herodianus enjoyed a great reputation as a grammarian, and Priscian styles him "maximus auctor artis grammaticae."

The best edition is by A. Lentz, *Herodiani. Technici reliquiae* (1867-1870); a supplementary volume is included in Uhling's *Corpus grammaticorum Graecorum*; for further bibliographical information see W. Christ, *Geschichte der griechischen Literatur* (1898).

HERODOTUS (*c.* 484-425 B.C.), Greek historian, called the Father of History, was born at Halicarnassus in Asia Minor, then dependent upon the Persians, in or about the year 484 B.C. Herodotus was thus born a Persian subject, and such he continued until he was thirty or five-and-thirty years of age. At the time of his birth Halicarnassus was under the rule of a queen Artemisia (*q.v.*). The year of her death is unknown; but she left her crown to her son Pisindelis (born about 498 B.C.), who was succeeded upon the throne by his son Lygdamis about the time that Herodotus grew to manhood. The family of Herodotus belonged to the upper rank of the citizens. His father was named Lyxes, and his mother Rhaeo, or Dryo. He had a brother Theodore, and an uncle or cousin Panyasis (*q.v.*), the epic poet, a personage of so much importance that the tyrant Lygdamis, suspecting him of treasonable projects, put him to death. It is probable that Herodotus shared his relative's political opinions, and either was exiled from Halicarnassus or quitted it voluntarily at the time of his execution.

Of the education of Herodotus no more can be said than that it was thoroughly Greek, and embraced no doubt the three subjects essential to a Greek liberal education—grammar, gymnastic training and music. His studies would be regarded as completed when he attained the age of eighteen, and took rank among the *ephebi* or *eirenes* of his native city. In a free Greek state he would at once have begun his duties as a citizen, and found therein sufficient employment for his growing energies. But in a city ruled by a tyrant this outlet was wanting; no political life worthy of the name existed. Herodotus may thus have had his thoughts turned to literature as furnishing a not unsatisfactory career, and may well have been encouraged in his choice by the example of Panyasis, who had already gained a reputation by his writings when Herodotus was still an infant. At any rate it is clear from the extant work of Herodotus that he must have devoted himself early to the literary life, and commenced that extensive course of reading which renders him one of the most instructive as well as one of the most charming of ancient writers. The poetical literature of Greece was already large; the prose literature was more extensive than is generally supposed; yet Herodotus shows an intimate acquaintance with the whole of it. The *Iliad* and the *Odyssey* are as familiar to him as Shakespeare to the educated Englishman. He is acquainted with the poems of the epic cycle, the *Cypria*, the *Epigoni*, &c. He quotes or otherwise shows familiarity with the writings of Hesiod, Olen, Musaeus, Bacis, Lysistratus, Archilochus of Paros, Alcaeus, Sappho, Solon, Aesop, Aristeas of Proconnesus, Simonides of Ceos, Phrynichus, Aeschylus and Pindar. He quotes and criticizes Hecataeus, the best of the prose writers who had preceded him, and makes numerous allusions to other authors of the same class.

It must not, however, be supposed that he was at any time a mere student. It is probable that from an early age his inquiring disposition led him to engage in travels, both in Greece and in foreign countries. He traversed Asia Minor and European Greece probably more than once; he visited all the most important islands of the Archipelago—Rhodes, Cyprus, Delos, Paros, Thasos, Samothrace, Crete, Samos, Cythera and Aegina. He undertook the long and perilous journey from Sardis to the Persian capital Susa, visited Babylon, Colchis, and the western shores of the Black Sea as far as the estuary of the Dnieper; he travelled in Scythia and in Thrace, visited Zante and Magna Graecia, explored the antiquities of Tyre, coasted along the shores of Palestine, saw Gaza, and made a long stay in Egypt. At the most moderate estimate, his travels covered a space of thirty-one degrees of longitude, or 1700 miles, and twenty-four of latitude, or nearly the same distance. At all the more interesting sites he took up his abode for a time; he examined, he inquired, he made measurements, he accumulated materials. Having in his mind the scheme of his great work, he gave ample time to the elaboration of all its parts, and took care to obtain by personal observation a full knowledge of the various countries.

The travels of Herodotus seem to have been chiefly accomplished between his twentieth and his thirty-seventh year (464-447 B.C.).[1] It was probably in his early manhood that as a Persian subject he visited Susa and Babylon, taking advantage of the Persian system of posts which he describes in his fifth book. His residence in Egypt must, on the other hand, have been subsequent to 460 B.C., since he saw the skulls of the Persians slain by Inarus in that year. Skulls are rarely visible on a battlefield for more than two or three seasons after the fight, and we may therefore presume that it was during the reign of Inarus (460-454 B.C.),[2] when the Athenians had great authority in Egypt, that he visited the country, making himself known as a learned Greek, and therefore receiving favour and attention on the part of the Egyptians, who were so much beholden to his countrymen (see Athens, Cimon, Pericles). On his return from Egypt, as he proceeded along the Syrian shore, he seems to have landed at Tyre, and from thence to have gone to Thasos. His Scythian travels are thought to have taken place prior to 450 B.C.

It is a question of some interest from what centre or centres these various expeditions were made. Up to the time of the execution of Panyasis, which is placed by chronologists in or about the year 457 B.C., there is every reason to believe that Herodotus lived at Halicarnassus. His travels in Asia Minor, in European Greece, and among the islands of the Aegean, probably belong to this period, as also his journey to Susa and Babylon. We are told that when he quitted Halicarnassus on account of

the tyranny of Lygdamis, in or about the year 457 B.C., he took up his abode in Samos. That island was an important member of the Athenian confederacy, and in making it his home Herodotus would have put himself under the protection of Athens. The fact that Egypt was then largely under Athenian influence (see CIMON, PERICLES) may have induced him to proceed, in 457 or 456 B.C., to that country. The stories that he had heard in Egypt of Sesostris may then have stimulated him to make voyages from Samos to Colchis, Scythia and Thrace. He was thus acquainted with almost all the regions which were to be the scene of his projected history.

After Herodotus had resided for some seven or eight years in Samos, events occurred in his native city which induced him to return thither. The tyranny of Lygdamis had gone from bad to worse, and at last he was expelled. According to Suidas, Herodotus was himself an actor, and indeed the chief actor, in the rebellion against him; but no other author confirms this statement, which is intrinsically improbable. It is certain, however, that Halicarnassus became henceforward a voluntary member of the Athenian confederacy. Herodotus would now naturally return to his native city, and enter upon the enjoyment of those rights of free citizenship on which every Greek set a high value. He would also, if he had by this time composed his history, or any considerable portion of it, begin to make it known by recitation among his friends. There is reason to believe that these first attempts were not received with much favour, and that it was in chagrin at his failure that he precipitately withdrew from his native town, and sought a refuge in Greece proper (about 447 B.C.).[3] We learn that Athens was the place to which he went, and that he appealed from the verdict of his countrymen to Athenian taste and judgment. His work won such approval that in the year 445 B.C., on the proposition of a certain Anytus, he was voted a sum of ten talents (£2400) by decree of the people. At one of the recitations, it was said, the future historian Thucydides was present with his father, Olorus, and was so moved that he burst into tears, whereupon Herodotus remarked to the father —"Olorus, your son has a natural enthusiasm for letters."[4]

Athens was at this time the centre of intellectual life, and could boast an almost unique galaxy of talent—Pericles, Thucydides the son of Melesias, Aspasia, Antiphon, the musician Damon, Pheidias, Protagoras, Zeno, Cratinus, Crates, Euripides and Sophocles. Accepted into this brilliant society, on familiar terms with all probably, as he certainly was with Olorus, Thucydides and Sophocles, he must have been tempted, like many another foreigner, to make Athens his permanent home. It is to his credit that he did not yield to this temptation. At Athens he must have been a dilettante, an idler, without political rights or duties. As such he would have soon ceased to be respected in a society where literature was not recognized as a separate profession, where a Socrates served in the infantry, a Sophocles commanded fleets, a Thucydides was general of an army, and an Antiphon was for a time at the head of the state. Men were not men according to Greek notions unless they were citizens; and Herodotus, aware of this, probably sharing in the feeling, was anxious, having lost his political status at Halicarnassus, to obtain such status elsewhere. At Athens the franchise, jealously guarded at this period, was not to be attained without great expense and difficulty. Accordingly, in the spring of the following year he sailed from Athens with the colonists who went out to found the colony of Thurii (see PERICLES), and became a citizen of the new town.

From this point of his career, when he had reached the age of forty, we lose sight of him almost wholly. He seems to have made but few journeys, one to Crotona, one to Metapontum, and one to Athens (about 430 B.C.) being all that his work indicates.[5] No doubt he was employed mainly, as Pliny testifies, in retouching and elaborating his general history. He may also have composed at Thurii that special work on the history of Assyria to which he twice refers in his first book, and which is quoted by Aristotle. It has been supposed by many that he lived to a great age, and argued that "the never-to-be-mistaken fundamental tone of his performance is the quiet talkativeness of a highly cultivated, tolerant, intelligent, *old* man" (Dahlmann). But the indications derived from the later touches added to his work, which form the sole evidence on the subject, would rather lead to the conclusion that his life was not very prolonged. There is nothing in the nine books which may not have been written as early as 430 B.C.; there is no touch which, even probably, points to a later date than 424 B.C. As the author was evidently engaged in polishing his work to the last, and even promises touches which he does not give, we may assume that he did not much outlive the date last mentioned, or in other words, that he died at about the age of sixty. The predominant voice of antiquity tells us that he died at Thurii, where his tomb was shown in later ages.

The History.—In estimating the great work of Herodotus, and his genius as its author, it is above all things necessary to conceive aright what that work was intended to be. It has been called "a universal history," "a history of the wars between the Greeks and the barbarians," and "a history of the struggle between Greece and Persia." But these titles are all of them too comprehensive. Herodotus, who omits wholly the histories of Phoenicia, Carthage and Etruria, three of the most important among the states existing in his day, cannot have intended to compose a "universal history," the very idea of which belongs to a later age. He speaks in places as if his object was to record the wars between the Greeks and the barbarians; but as he omits the Trojan war, in which he fully believes, the expedition of the Teucrians and Mysians against Thrace and Thessaly, the wars connected with the Ionian colonization of Asia Minor and others, it is evident that he does not really aim at embracing in his narrative all the wars between Greeks and barbarians with which he was acquainted. Nor does it even seem to have been his object to give an account of the entire struggle between Greece and Persia. That struggle was not terminated by the battle of Mycale and the

capture of Sestos in 479 B.C. It continued for thirty years longer, to the peace of Callias (but see Callias and Cimon). The fact that Herodotus ends his history where he does shows distinctly that his intention was, not to give an account of the entire long contest between the two countries, but to write the history of a particular war—the great Persian war of invasion. His aim was as definite as that of Thucydides, or Schiller, or Napier or any other writer who has made his subject a particular war; only he determined to treat it in a certain way. Every partial history requires an "introduction"; Herodotus, untrammelled by examples, resolved to give his history a magnificent introduction. Thucydides is content with a single introductory book, forming little more than one-eighth of his work; Herodotus has six such books, forming two-thirds of the entire composition.

By this arrangement he is enabled to treat his subject in the *grand* way, which is so characteristic of him. Making it his main object in his "introduction" to set before his readers the previous history of the two nations who were the actors in the great war, he is able in tracing their history to bring into his narrative some account of almost all the nations of the known world, and has room to expatiate freely upon their geography, antiquities, manners and customs and the like, thus giving his work a "universal" character, and securing for it, without trenching upon unity, that variety, richness and fulness which are a principal charm of the best histories, and of none more than his. In tracing the growth of Persia from a petty subject kingdom to a vast dominant empire, he has occasion to set out the histories of Lydia, Media, Assyria, Babylon, Egypt, Scythia, Thrace, and to describe the countries and the peoples inhabiting them, their natural productions, climate, geographical position, monuments, &c.; while, in noting the contemporaneous changes in Greece, he is led to tell of the various migrations of the Greek race, their colonies, commerce, progress in the arts, revolutions, internal struggles, wars with one another, legislation, religious tenets and the like. The greatest variety of episodical matter is thus introduced; but the propriety of the occasion and the mode of introduction are such that no complaint can be made; the episodes never entangle, encumber or even unpleasantly interrupt the main narrative.

It has been questioned, both in ancient and in modern times, whether the history of Herodotus possesses the essential requisite of trustworthiness. Several ancient writers accuse him of intentional untruthfulness. Moderns generally acquit him of this charge; but his severer critics still urge that, from the inherent defects of his character, his credulity, his love of effect and his loose and inaccurate habits of thought, he was unfitted for the historian's office, and has produced a work of but small historical value. Perhaps it may be sufficient to remark that the defects in question certainly exist, and detract to some extent from the authority of the work, more especially of those parts of it which deal with remoter periods, and were taken by Herodotus on trust from his informants, but that they only slightly affect the portions which treat of later times and form the special subject of his history. In confirmation of this view, it may be noted that the authority of Herodotus for the circumstances of the great Persian war, and for all local and other details which come under his immediate notice, is accepted by even the most sceptical of modern historians, and forms the basis of their narratives.

Among the merits of Herodotus as an historian, the most prominent are the diligence with which he collected his materials, the candour and impartiality with which he has placed his facts before the reader, the absence of party bias and undue national vanity, and the breadth of his conception of the historian's office. On the other hand, he has no claim to rank as a critical historian; he has no conception of the philosophy of history, no insight into the real causes that underlie political changes, no power of penetrating below the surface, or even of grasping the real interconnexion of the events which he describes. He belongs distinctly to the romantic school; his forte is vivid and picturesque description, the lively presentation of scenes and actions, characters and states of society, not the subtle analysis of motives, the power of detecting the undercurrents or the generalizing faculty.

But it is as a writer that the merits of Herodotus are most conspicuous. "O that I were in a condition," says Lucian, "to resemble Herodotus, if only in some measure! I by no means say in all his gifts, but only in some single point; as, for instance, the beauty of his language, or its harmony, or the natural and peculiar grace of the Ionic dialect, or his fulness of thought, or by whatever name those thousand beauties are called which to the despair of his imitator are united in him." Cicero calls his style "copious and polished," Quintilian, "sweet, pure and flowing"; Longinus says he was "the most Homeric of historians"; Dionysius, his countryman, prefers him to Thucydides, and regards him as combining in an extraordinary degree the excellences of sublimity, beauty and the true historical method of composition. Modern writers are almost equally complimentary. "The style of Herodotus," says one, "is universally allowed to be remarkable for its harmony and sweetness." "The charm of his style," argues another, "has so dazzled men as to make them blind to his defects." Various attempts have been made to analyse the charm which is so universally felt; but it may be doubted whether any of them are very successful. All, however, seem to agree that among the qualities for which the style of Herodotus is to be admired are simplicity, freshness, naturalness and harmony of rhythm. Master of a form of language peculiarly sweet and euphonical, and possessed of a delicate ear which instinctively suggested the most musical arrangement possible, he gives his sentences, without art or effort, the most agreeable flow, is never abrupt, never too diffuse, much less prolix or wearisome, and being himself simple, fresh, *naif* (if we may use the word), honest and somewhat quaint, he delights us by combining with this melody of sound simple, clear and fresh thoughts, perspicuously expressed, often accompanied by happy turns of phrase, and always

manifestly the spontaneous growth of his own fresh and unsophisticated mind. Reminding us in some respects of the quaint medieval writers, Froissart and Philippe de Comines, he greatly excels them, at once in the beauty of his language and the art with which he has combined his heterogeneous materials into a single perfect harmonious whole. See also GREECE, section *History*, "Authorities."

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(G. R.; E. M. W.)

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1 The date of his travels is difficult to determine. E. Meyer inclines to put all the longer journeys, except the Scythian, between 440 and 430 B.C. The journey to Susa and Babylon is put by C. F. Lehmann *c.* 450 B.C., and by H. Stein before 450.

2 Most recent critics (*e.g.* Stein, Meyer, Busolt) put the visit to Egypt after the suppression of the revolt under Inarus and Amyrtaeus (*i.e.* after 449 B.C.), on the strength of Herod. 2. 30, which implies the

restoration of Persian authority.

3 Stein, Meyer, Busolt, and other recent writers attribute his departure from Halicarnassus to political causes, *e.g.* the ascendancy of the anti-Athenian party in the state.

4 This story is on chronological grounds rejected by all recent critics.

5 Opinion is divided as to this visit to Athens after his settlement at Thurii. Stein, Meyer and Busolt hold that much of his work (especially the later books) was composed at Athens soon after 430 B.C. See further Wachsmuth, *Rheinisches Museum*, lvi. (1901) 215-218. Macan, *Herodotus* VII.-IX. (*Introduction*, pp. xlv.-lxvi.), seeks to prove that the last three books were the first part of the *Histories* to be composed. He is followed in this view by Bury.

HÉROET, ANTOINE, surnamed La Maison-neuve (d. 1568), French poet, was born in Paris of a family connected with the famous chancellor, François Olivier. His poetry belongs to his early years, for after he had taken orders he ceased to write profane poetry, no doubt because he considered it out of keeping with his calling, in which he attained the dignity of bishop of Digue. His chief work is *La Parfaicte Amye* (Lyons, 1542) in which he developed the idea of a purely spiritual love, based chiefly on the reading of the Italian Neo-Platonists. The book aroused great controversy. La Borderie replied in *L'Amye de cour* with a description of a very much more human woman, and Charles Fontaine contributed a *Contr' amye de cour* to the dispute. Héroet, in addition to some translations from the classics, wrote the *Complainte d'une dame nouvellement surprise d'amour*, an *Épistre a François I^er^*, and some pieces included in the now very rare *Opuscules d'amour par Héroet, La Borderie et autres divins poëtes* (Lyons, 1547). Héroet belongs to the Lyonnese school of which Maurice Scève may be regarded as the leader. Clément Marot praises him, and Ronsard was careful to exempt him with one or two others from the scorn he poured on his immediate predecessors.

See H. F. Cary, *The Early French Poets* (1846).

HEROIC ROMANCES, the name by which is distinguished a class of imaginative literature which flourished in the 17th century, principally in France. The beginnings of modern fiction in that country took a pseudo-bucolic form, and the celebrated *Astrée* (1610) of Honoré d'Urfé (1568-1625), which is the earliest French novel, is properly styled a pastoral. But this ingenious and diffuse production, in which all is artificial, was the source of a vast literature, which took many and diverse forms. Although its action was, in the main, languid and sentimental, there was a side of the *Astrée* which encouraged that extravagant love of glory, that spirit of "panache," which was now rising to its height in France. That spirit it was which animated Marin le Roy, sieur de Gomberville (1600-1674), who was the inventor of what have since been known as the Heroical Romances. In these there was experienced a violent recrudescence of the old medieval elements of romance, the impossible valour devoted to a pursuit of the impossible beauty, but the whole clothed in the language and feeling and atmosphere of the age in which the books were written. In order to give point to the chivalrous actions of the heroes, it was always hinted that they were well-known public characters of the day in a romantic disguise.

In the *Astrée* of Honoré d'Urfé, which was a pure pastoral, in the religious romances of Pierre Camus (1582-1653), in the comic *Francion* of Charles Sorel, piquancy had been given to the recital by this belief that real personages could be recognized under the disguises. But in the *Carithée* of Gomberville (1621) we have a pastoral which is already beginning to be a heroic romance, and a book in which, under a travesty of Roman history, an appeal is made to an extravagantly chivalrous enthusiasm. A further development was seen in the *Polyxène* (1623) of François de Molière, and the *Endymion* (1624) of Gombauld; in the latter the elderly queen, Marie de' Medici, was celebrated under the disguise of Diana, for whom a beautiful shepherd of Caria (the author himself) nourishes a hopeless passion. The earliest of the Heroic Romances, pure and simple, is, however, the celebrated *Polexandre* (1629) of Gomberville. The author began by intending his hero to represent Louis XIII., but he changed his mind, and drew a portrait of Cardinal Richelieu. In this novel, for the first time, the romantic character proper to this class of books is seen undiluted; there is no intrusion of a personage who is not celebrated for his birth, his beauty or his exploits. The story deals with the adventures of a hero who visits all the sea-coasts of the world, the most remote as well as the most fabulous, in search of an ineffable princess, Alcidiane. This absurd and pretentious, yet very original piece of invention enjoyed an immense success, and historical romances of a similar class competed for the favour of the public. There was an equal amount of geography and more of ancient history in the *Ariane* (1632) of Desmarets de Saint-Sorlin (1595-1676), a book which, long neglected, has in late years been rediscovered, and which has been greeted by M. Paul Morillot as the most readable

and the least tiresome of all the Heroic Romances. The type of that class of literature, however, has always been found in the highly elaborate writings of Gauthier de Coste de la Calprenède (1609-1663), which enjoyed for a time a prodigious celebrity, and were read and imitated all over Europe. La Calprenède was a Gascon soldier, imbued with all the extravagance of his race, and in full sympathy with the audacity and violence of the aristocratic society of France in his day. His *Cassandre*, which appeared in ten volumes between 1642 and 1645, is perhaps the most characteristic of all the Heroic Romances. It deals with a highly romantic epoch of ancient history, the decline of the empire of Alexander the Great. The wars of the Persians and of the Scythians are introduced, and among the characters are discovered such personages as Artaxerxes, Roxana and Ephestion. It must not be supposed, however, that la Calprenède makes the smallest effort to deal with the subject accurately or realistically. The figures are those of his own day; they are seigneurs and great ladies of the court of Louis XIII., masquerading in Macedonian raiment. The passion of love is dominant throughout, and it is treated in the most exalted and hyperbolical spirit. The central heroes of the story, Oroondate and Lysimachus, are dignified, eloquent and amorous; they undergo unexampled privations in the quest of incomparable ladies whose beauty and whose nobility is only equalled by their magnificent loyalty. These books were written with an aim that was partly didactic. Their object was to entertain the ladies and to gratify a taste for endlessly wire-drawn sentimentality, but it was also to teach fortitude and grandeur of soul and to inculcate lessons of practical chivalry. La Calprenède followed up the success of his *Cassandre* with a *Cléopâtre* (1647) in twelve volumes, and a *Faramond* (1661) which he did not live to finish. He became more extravagant, more rhapsodical as he proceeded, and he lost all the little hold on history which he had ever held. *Cléopâtre*, nevertheless, enjoyed a prodigious popularity, and it became the fashion to emulate as far as possible the prowess of its magnificent hero, the proud Artaban. It should be said that la Calprenède objected to his books being styled romances, and insisted that they were specimens of “history embellished with certain inventions.” He may, in opposition to his wishes, claim the doubtful praise of being, in reality, the creator of the modern historical novel. He was immediately imitated or accompanied by a large number of authors, of whom two have achieved a certain immortality, which, unhappily, must be confessed to be partly of ridicule. The vogue of the historical romance was carried to its height by a brother and a sister, Georges de Scudéry (1601-1667) and Madeleine de Scudéry (1608-1701), who represented in their own persons all the extravagant, tempestuous and absurd elements of the age, and whose elephantine romances remain as portents in the history of literature. These novels—there are five of them—were signed by Georges de Scudéry, but it is believed that all were in the main written by Madeleine. The earliest was *Ibrahim, ou l’Illustre Bassa* (1641); it was followed by *Le Grand Cyrus* (1648-1653) and the final, and most preposterous member of the series was *Clélie* (1649-1654). The romances of Mlle de Scudéry (for to her we may safely attribute them) are much inferior in style to those of la Calprenède. They are pretentious, affected and sickly. The author abuses the element of analysis, and pushes a psychology, which was beyond the age in penetration, to a wearisome and excessive extent. Nothing, it is probable, in the whole evolution of the Historical Romances has attracted so much attention as the “Carte de Tendre” which occurs in the opening book of *Clélie*. This celebrated map, drawn by the heroine in order to show the route from New Friendship to Tender, and a geographical symbol, therefore, of the progress of love, with its city of Tender-upon-Esteem, its sea of Enmity, its river of Inclination, its rock-built citadel of Pride, its cold lake of Indifference, is a miracle of elaborate and incongruous ingenuity. But, amusing as it is, it shows into what depths of puerility the amorous casuistry of these romances had fallen. These novels formed the chief topic of conversation and of correspondence in the literary society which gathered at and around the Hotel de Rambouillet, and in the personages of Mlle de Scudéry’s romances could be recognized all the famous leaders of that society. The mawkish love-making and the false heroism of these monstrous novels went rapidly out of fashion in France soon after 1660, when the epoch of the Heroic Romance came to an end. In England the Heroic Romance had a period of flourishing popularity. All the principal French examples were very promptly translated, and “he was not to be admitted into the academy of wit who had not read *Astrea* and *The Grand Cyrus*.” The great vogue of these books in England lasted from about 1645 to 1660. It led, of course, to the composition of original works in imitation of the French. The most remarkable and successful of these was *Parthenissa*, published in 1654 by Roger Boyle, Lord Broghill and afterwards Earl of Orrery (1621-1679), which was greatly admired by Dorothy Osborne and her correspondents. Addison speaks in the “Spectator” of the popularity of all these huge books, “the *Grand Cyrus*, with a pin stuck in one of the middle leaves, *Clélie*, which opened of itself in the place that describes two lovers in a bower.” When the drama, and in particular tragedy, was reinstituted in England, sentimental readers found a field for their emotions on the stage, and the heroic romances immediately began to go out of fashion. They lingered, however, for a quarter of a century more, and M. Jusserand has analysed what may be considered the very latest of the race, *Pandion and Amphigenia*, published in 1665 by the dramatist, John Crowne.

See Gordon de Percel, *De l’usage des romans* (1734); André Le Breton, *Le Roman au XVII^e siècle* (1890); Paul Morillot, *Le Roman en France depuis 1610* (1894); J. J. Jusserand, *Le Roman anglais au XVII^e siècle* (1888).

(E. G.)

HEROIC VERSE, a term exclusively used in English to Indicate the rhymed iambic line or Heroic Couplet. In ancient literature, the heroic verse, ἡρωικὸν μέτρον, was synonymous with the dactylic hexameter. It was in this measure that those typically heroic poems, the *Iliad* and *Odyssey* and the *Aeneid* were written. In English, however, it was not enough to designate a single iambic line of five beats as heroic verse, because it was necessary to distinguish blank verse from the distich, which was formed by the heroic couplet. This had escaped the notice of Dryden, when he wrote "The English Verse, which we call Heroic, consists of no more than ten syllables." If that were the case, then *Paradise Lost* would be written in heroic verse, which is not true. What Dryden should have said is "consists of two rhymed lines, each of ten syllables." In French the alexandrine has always been regarded as the heroic measure of that language. The dactylic movement of the heroic line in ancient Greek, the famous ῥυθμὸς ἡρῷος of Homer, is expressed in modern Europe by the iambic movement. The consequence is that much of the rush and energy of the antique verse, which at vigorous moments was like the charge of a battalion, is lost. It is owing to this, in part, that the heroic couplet is so often required to give, in translation, the full value of a single Homeric hexameter. It is important to insist that it is the couplet, not the single line, which constitutes heroic verse. It is interesting to note that the Latin poet Ennius, as reported by Cicero, called the heroic metre of one line *versum longum*, to distinguish it from the brevity of lyrical measures. The current form of English heroic verse appears to be the invention of Chaucer, who used it in his *Legend of Good Women* and afterwards, with still greater freedom, in the *Canterbury Tales*. Here is an example of it in its earliest development:—

"And thus the longë day in fight they spend,
Till, at the last, as everything hath end,
Anton is shent, and put him to the flight,
And all his folk to go, as best go might."

This way of writing was misunderstood and neglected by Chaucer's English disciples, but was followed nearly a century later by the Scottish poet, called Blind Harry (*c.* 1475), whose *Wallace* holds an important place in the history of versification as having passed on the tradition of the heroic couplet. Another Scottish poet, Gavin Douglas, selected heroic verse for his translation of the *Aeneid* (1513), and displayed, in such examples as the following, a skill which left little room for improvement at the hands of later poets:—

"One sang, 'The ship sails over the salt foam,
Will bring the merchants and my leman home';
Some other sings, 'I will be blithe and light,
Mine heart is leant upon so goodly wight.'"

The verse so successfully mastered was, however, not very generally used for heroic purposes in Tudor literature. The early poets of the revival, and Spenser and Shakespeare after them, greatly preferred stanzaic forms. For dramatic purposes blank verse was almost exclusively used, although the French had adopted the rhymed alexandrine for their plays. In the earlier half of the 17th century, heroic verse was often put to somewhat unheroic purposes, mainly in prologues and epilogues, or other short poems of occasion; but it was nobly redeemed by Marlowe in his *Hero and Leander* and respectably by Browne in his *Britannia's Pastorals*. It is to be noted, however, that those Elizabethans who, like Chapman, Warner and Drayton, aimed at producing a warlike and Homeric effect, did so in shambling fourteen-syllable couplets. The one heroic poem of that age written at considerable length in the appropriate national metre is the *Bosworth Field* of Sir John Beaumont (1582-1628). Since the middle of the 17th century, when heroic verse became the typical and for a while almost the solitary form in which serious English poetry was written, its history has known many vicissitudes. After having been the principal instrument of Dryden and Pope, it was almost entirely rejected by Wordsworth and Coleridge, but revised, with various modifications, by Byron, Shelley (in *Julian and Maddalo*) and Keats (in *Lamia*). In the second half of the 19th century its prestige was restored by the brilliant work of Swinburne in *Tristram* and elsewhere.

(E. G.)

HÉROLD, LOUIS JOSEPH FERDINAND (1791-1833), French musician, the son of François Joseph Hérold, an accomplished pianist, was born in Paris, on the 28th of January 1791. It was not till after his father's death that Hérold in 1806 entered the Paris conservatoire, where he studied under Catal and Méhul. In 1812 he gained the grand prix de Rome with the cantata *La Duchesse de la Vallière*, and started for Italy, where he remained till 1815 and composed a symphony, a cantata and several pieces of chamber music. During his stay in Italy also Hérold for the first time ventured on the stage with the opera *La Gioventù di Enrico V.*, first performed at Naples in 1815 with moderate success. During a short stay in Vienna he was much in the society of Salieri. Returning to Paris he was invited by Boieldieu to collaborate with him on an opera called *Charles de France*,

performed in 1816, and soon followed by Hérold's first French opera, *Les Rosières* (1817), which was received very favourably. Hérold produced numerous dramatic works for the next fifteen years in rapid succession. Only the names of some of the more important need here be mentioned:—*La Clochette* (1817), *L'Auteur mort et vivant* (1820), *Marie* (1826), and the ballets *La Fille mal gardée* (1828) and *La Belle au bois dormant* (1829). Hérold also wrote a vast quantity of pianoforte music, in spite of his time being much occupied by his duties as accompanist at the Italian opera in Paris. In 1831 he produced the romantic opera *Zampa*, and in the following year *Le Pré aux clercs* (first performance December 15, 1832), in which French *esprit* and French chivalry find their most perfect embodiment. These two operas secured immortality for the name of the composer, who died on the 18th of January 1833, of the lung disease from which he had suffered for many years, and the effects of which he had accelerated by incessant work. Hérold's incomplete opera *Ludovic* was afterwards printed by J. F. F. Halévy.

HERON (Fr. *héron*; Ital. *aghirone*, *airone*; Lat. *ardea*; Gr. ἐρωδιός: A.-S. *hragra*; Icelandic, *hegre*; Swed. *häger*; Dan. *heire*; Ger. *Heiger*, *Reiher*, *Heergans*; Dutch, *reiger*), a long-necked, long-winged and long-legged bird, the typical representative of the group *Ardeidae*. It is difficult or even impossible to estimate with any accuracy the number of species of *Ardeidae* which exist. Professor Hermann Schlegel in 1863 enumerated 61, besides 5 of what he terms "conspecies," as contained in the collection at Leyden (*Mus. des Pays-Bas*, Ardeae, 64 pp.),—on the other hand, G. R. Gray in 1871 (*Handlist*, &c. iii. 26-34) admitted above 90, while Dr Anton Reichenow (*Journ. für Ornithologie*, 1877, pp. 232-275) recognizes 67 as known, besides 15 "subspecies" and 3 varieties, arranging them in 3 genera, *Nycticorax*, *Botaurus* and *Ardea*, with 17 sub-genera. But it is difficult to separate the family, with any satisfactory result, into genera, if structural characters have to be found for these groups, for in many cases they run almost insensibly into each other—though in common language it is easy to speak of herons, egrets, bitterns, night-herons and boatbills. With the exception of the last, Professor Schlegel retains all in the genus *Ardea*, dividing it into *eight* sections, the names of which may perhaps be Englished—great herons, small herons, egrets, semi-egrets, rail-like herons, little bitterns, bitterns and night-herons.

FIG. 1.—Heron.

The common heron of Europe, *Ardea cinerea* of Linnaeus, is universally allowed to be the type of the family, and it may also be regarded as that of Professor Schlegel's first section. The species inhabits suitable localities throughout the whole of Europe, Africa and Asia, reaching Japan, many of the islands of the Indian Archipelago and even Australia. Though by no means so numerous as formerly in Britain, it is still sufficiently common,[1] and there must be few persons who have not seen it rising slowly from some river-side or marshy flat, or passing overhead in its lofty and leisurely flight on its way to or from its daily haunts; while they are many who have been entertained by watching it as it sought its food, consisting chiefly of fishes (especially eels and flounders) and amphibians—though young birds and small mammals come not amiss—wading midleg in the shallows, swimming occasionally when out of its depth, or standing motionless to strike its prey with its formidable and sure beak. When sufficiently numerous the heron breeds in societies, known as

heronries, which of old time were protected both by law and custom in nearly all European countries, on account of the sport their tenants afforded to the falconer. Of late years, partly owing to the withdrawal of the protection they had enjoyed, and still more, it would seem, from agricultural improvement, which, by draining meres, fens and marshes, has abolished the feeding-places of a great population of herons, many of the larger heronries have broken up—the birds composing them dispersing to neighbouring localities and forming smaller settlements, most of which are hardly to be dignified by the name of heronry, though commonly accounted such. Thus the number of so-called heronries in the United Kingdom, and especially in England and Wales, has become far greater than formerly, but no one can doubt that the number of herons has dwindled. The sites chosen by the heron for its nest vary greatly. It is generally built in the top of a lofty tree, but not unfrequently (and this seems to have been much more usual in former days) near or on the ground among rough vegetation, on an island in a lake, or again on a rocky cliff of the coast. It commonly consists of a huge mass of sticks, often the accumulation of years, lined with twigs, and in it are laid from four to six sea-green eggs. The young are clothed in soft flax-coloured down, and remain in the nest for a considerable time, therein differing remarkably from the “pipers” of the crane, which are able to run almost as soon as they are hatched. The first feathers assumed by young herons in a general way resemble those of the adult, but the pure white breast, the black throat-streaks and especially the long pendent plumes, which characterize only the very old birds, and are most beautiful in the cocks, are subsequently acquired. The heron measures about 3 ft. from the bill to the tail, and the expanse of its wings is sometimes not less than 6 ft., yet it weighs only between 3 and 4 lb.

Large as is the common heron of Europe, it is exceeded in size by the great blue heron of America (*Ardea herodias*), which generally resembles it in appearance and habits, and both are smaller than the *A. sumatrana* or *A. typhon* of India and the Malay Archipelago, while the *A. goliath*, of wide distribution in Africa and Asia, is the largest of all. The purple heron, *A. purpurea*, as a well-known European species having a great range over the Old World, also deserves mention here. The species included in Professor Schlegel’s second section inhabit the tropical parts of Africa, Australasia and America. The egrets, forming his third group, require more notice, distinguished as they are by their pure white plumage, and, when in breeding-dress, by the beautiful dorsal tufts of decomposed feathers that ordinarily droop over the tail, and are so highly esteemed as ornaments by Oriental magnates. The largest species is *A. occidentalis*, only known apparently from Florida and Cuba; but one not much less, the great egret (*A. alba*), belongs to the Old World, breeding regularly in south-eastern Europe, and occasionally straying to Britain. A third, *A. egretta*, represents it in America, while much the same may be said of two smaller species, *A. garzetta*, the little egret of English authors, and *A. candidissima*; and a sixth, *A. intermedia*, is common in India, China and Japan, besides occurring in Australia. The group of semi-egrets, containing some nine or ten forms, among which the buff-backed heron (*A. bubulcus*), is the only species that is known to have occurred in Europe, is hardly to be distinguished from the last section except by their plumage being at certain seasons varied in some species with slaty-blue and in others with rufous. The rail-like herons form Professor Schlegel’s next section, but it can scarcely be satisfactorily differentiated, and the epithet is misleading, for its members have no rail-like affinities, though the typical species, which inhabits the south of Europe, and occasionally finds its way to England, has long been known as *A. ralloides*.[2] Nearly all these birds are tropical or subtropical. Then there is the somewhat better defined group of little bitterns, containing about a dozen species—the smallest of the whole family. One of them, *A. minuta*, though very local in its distribution, is a native of the greater part of Europe, and has bred in England. It has a close counterpart in the *A. exilis* of North America, and is represented by three or four forms in other parts of the world, the *A. pusilla* of Australia especially differing very slightly from it. Ranged by Professor Schlegel with these birds, which are all remarkable for their skulking habits, but more resembling the true herons in their nature, are the common green bittern of America (*A. virescens*) and its very near ally the African *A. atricapilla*, from which last it is almost impossible to distinguish the *A. javanica*, of wide range throughout Asia and its islands, while other species, less closely related, occur elsewhere as *A. flavicollis*—one form of which, *A. gouldi*, inhabits Australia.

Fig. 2.—Bittern.

The true bitterns, forming the genus *Botaurus* of most authors, seem to be fairly separable, but more perhaps on account of their wholly nocturnal habits and correspondingly adapted plumage than on strictly structural grounds, though some differences of proportion are observable. The common bittern (*q.v.*) of Europe (*B. stellaris*), is widely distributed over the eastern hemisphere.[3] 388 Australia and New Zealand have a kindred species, *B. poeciloptilus*, and North America a third, *B. mugitans*[4] or *B. lentiginosus*. Nine other species from various parts of the world are admitted by Professor Schlegel, but some of them should perhaps be excluded from the genus *Botaurus*.

Of the night-herons the same author recognizes six species, all of which may be reasonably placed in the genus *Nycticorax*, characterized by a shorter beak and a few other peculiarities, among which the large eyes deserve mention. The first is *N. griseus*, a bird widely spread over the Old World, and not unfrequently visiting England, where it would undoubtedly breed if permitted. Professor Schlegel unites with it the common night-heron of America; but this, though very closely allied, is generally deemed distinct, and is the *N. naevius* or *N. gardeni* of most writers. A clearly different American species, with a more southern habitat, is the *N. violaceus* or *N. cayennensis*, while others are found in South America, Australia, some of the Asiatic Islands and in West Africa. The Galapagos have a peculiar species, *N. pauper*, and another, so far as is known, peculiar to Rodriguez, *N. megacephalus*, existed in that island at the time of its being first colonized, but is now extinct.

Fig. 3.—Boatbill.

The boatbill, of which only one species is known, seems to be merely a night-heron with an exaggerated bill,—so much widened as to suggest its English name,—but has always been allowed generic rank. This curious bird, the *Cancroma cochlearia* of most authors, is a native of tropical America, and what is known of its habits shows that they are essentially those of a *Nycticorax*.[5]

Bones of the common heron and bittern are not uncommon in the peat of the East-Anglian fens. Remains from Sansan and Langy in France have been referred by Alphonse Milne-Edwards to herons under the names of *Ardea perplexa* and *A. formosa*; a tibia from the Miocene of Steinheim am Albuch by Dr Fraas to an *A. similis*, while Sir R. Owen recognized a portion of a sternum from the London Clay as most nearly approaching this family.

It remains to say that the herons form part of Huxley's section *Pelargomorphae*, belonging to his larger group *Desmognathae*, and to draw attention to the singular development of the patches of "powder-down" which in the family *Ardeidae* attain a magnitude hardly to be found elsewhere. Their

use is utterly unknown.

(A. N.)

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1 In many parts of England it is generally called a “hernser”—being a corruption of “heronsewe,” which, as Professor Skeat states (*Etymol. Dictionary*, p. 264), is a perfectly distinct word from “heronshaw,” commonly confounded with it. The further corruption of “hernser” into “handsaw,” as in the well-known proverb, was easy in the mouth of men to whom hawking the heronsewe was unfamiliar.

2 It is the “Squacco-Heron” of modern British authors—the distinctive name, given “Sguacco” by Willughby and Ray from Aldrovandus, having been misspelt by Latham.

3 The last-recorded instance of the bittern breeding in England was in 1868, as mentioned by Stevenson (*Birds of Norfolk*, ii. 164).

4 Richardson, a most accurate observer, asserts (*Fauna Boreali-Americana*, ii. 374) that its booming (whence the epithet) exactly resembles that of its Old-World congener, but American ornithologists seem only to have heard the croaking note it makes when disturbed.

5 The very wonderful shoe-bird (*Balaeniceps*) has been regarded by many authorities as allied to *Cancroma*; but there can be little doubt that it is more nearly related to the genus *Scopus* belonging to the storks. The sun-bittern (*Eurypyga*) forms a family of itself, allied to the rails and cranes.

HERPES (from the Gr. ἕρπειν, to creep), an inflammation of the true skin resulting from a lesion of the underlying nerve or its ganglion, attended with the formation of isolated or grouped vesicles of various sizes upon a reddened base. They contain a clear fluid, and either rupture or dry up. Two well-marked varieties of herpes are frequently met with. (*a*) In *herpes labialis et nasalis* the eruption occurs about the lips and nose. It is seen in cases of certain acute febrile ailments, such as fevers, inflammation of the lungs or even in a severe cold. It soon passes off. (*b*) In the *herpes zoster, zona* or “shingles” the eruption occurs in the course of one or more cutaneous nerves, often on one side of the trunk, but it may be on the face, limbs or other parts. It may occur at any age, but is probably more frequently met with in elderly people. The appearance of the eruption is usually preceded by severe stinging neuralgic pains for several days, and, not only during the continuance of the herpetic spots, but long after they have dried up and disappeared, these pains sometimes continue and give rise to great suffering. The disease seldom recurs. The most that can be done for its relief is to protect the parts with cotton wool or some dusting powder, while the pain may be allayed by opiates or bromide of potassium. Quinine internally is often of service.

HERRERA, FERNANDO DE (*c.* 1534-1597), Spanish lyrical poet, was born at Seville. Although in minor orders, he addressed many impassioned poems to the countess of Gelves, wife of Alvaro Colon de Portugal; but it is suggested that these should be regarded as Platonic literary exercises in the manner of Petrarch. As is shown by his *Anotaciones á las obras de Garcilaso de la Vega* (1580), Herrera had a boundless admiration for the Italian poets, and continued the work of Boscán in naturalizing the Italian metrical system in Spain. His commentary on Garcilaso involved him in a series of literary polemics, and his verbal innovations laid him open to attack. But, even if his amatory sonnets are condemned as insincere in sentiment, their workmanship is admirable, while his odes on the battle of Lepanto, on Don John of Austria, and the elegy on King Sebastian of Portugal entitle him to rank as the greatest of Andalusian poets and as the most important of the followers of Garcilaso de la Vega (see VEGA). His poems were published in 1582, and reprinted with additions in 1619; they are reissued in the *Biblioteca de autores españoles*, vol. xxxii. Of Herrera’s prose works only the *Vida y muerta de Tomas Moro* (1592) survives; it is a translation of the life in Thomas Stapleton’s *Tres Thomae* (1588).

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HERRERA, FRANCISCO (1576-1656), surnamed el Viejo (the old), Spanish historical and fresco painter, studied under Luis Fernandez in Seville, his native city, where he spent most of his life.

Although so rough and coarse in manners that neither scholar nor child could remain with him, the great talents of Herrera, and the promptitude with which he used them, brought him abundant commissions. He was also a skilful worker in bronze, an accomplishment that led to his being charged with coining base money. From this accusation, whether true or false, he sought sanctuary in the Jesuit college of San Hermenegildo, which he adorned with a fine picture of its patron saint. Philip IV., on his visit to Seville in 1624, having seen this picture, and learned the position of the artist, pardoned him at once, warning him, however, that such powers as his should not be degraded. In 1650 Herrera removed to Madrid, where he lived in great honour till his death in 1656. Herrera was the first to relinquish the timid Italian manner of the old Spanish school of painting, and to initiate the free, vigorous touch and style which reached such perfection in Velazquez, who had been for a short time his pupil. His pictures are marked by an energy of design and freedom of execution quite in keeping with his bold, rough character. He is said to have used very long brushes in his painting; and it is also said that, when pupils failed, his servant used to dash the colours on the canvas with a broom under his directions, and that he worked them up into his designs before they dried. The drawing in his pictures is correct, and the colouring original and skilfully managed, so that the figures stand out in striking relief. What has been considered his best easel-work, the "Last Judgment," in the church of San Bernardo at Seville, is an original and striking composition, showing in its treatment of the nude how ill-founded the common belief was that Spanish painters, through ignorance of anatomy, understood only the draped figure. Perhaps his best fresco is that on the dome of the church of San Buenaventura; but many of his frescoes have perished, some by the effects of the weather and others by the artist's own carelessness in preparing his surfaces. He has, however, preserved several of his own designs in etchings. For his easel-works Herrera often chose such humble subjects as fairs, carnivals, ale-houses and the like.

His son Francisco Herrara (1622-1685), surnamed el Mozo (the young), was also an historical and fresco painter. Unable to endure his father's cruelty, the younger Herrera, seizing what money he could find, fled from Seville to Rome. There, instead of devoting himself to the antiquities and the works of the old Italian masters, he gave himself up to the study of architecture and perspective, with the view of becoming a fresco-painter. He did not altogether neglect easel-work, but became renowned for his pictures of still-life, flowers and fruit, and from his skill in painting fish was called by the Italians *Lo Spagnuolo degli pesci*. In later life he painted portraits with great success. He returned to Seville on hearing of his father's death, and in 1660 was appointed subdirector of the new academy there under Murillo. His vanity, however, brooked the superiority of no one; and throwing up his appointment he went to Madrid. There he was employed to paint a San Hermenegildo for the barefooted Carmelites, and to decorate in fresco the roof of the choir of San Felipe el Real. The success of this last work procured for him a commission from Philip IV. to paint in fresco the roof of the Atocha church. He chose as his subject for this the Assumption of the Virgin. Soon afterwards he was rewarded with the title of painter to the king, and was appointed superintendent of the royal buildings. He died at Madrid in 1685. Herrera el Mozo was of a somewhat similar temperament to his father, and offended many people by his inordinate vanity and suspicious jealousy. His pictures are inferior to the older Herrera's both in design and in execution; but in some of them traces of the vigour of his father, who was his first teacher, are visible. He was by no means an unskilful colourist, and was especially master of the effects of chiaroscuro. As his best picture Sir Edmund Head in his *Handbook* names his "San Francisco," in Seville Cathedral. An elder brother, known as Herrera el Rubio (the ruddy), who died very young, gave great promise as a painter.

HERRERA Y TORDESILLAS, ANTONIO DE (1549-1625), Spanish historian, was born at Cuellar, in the province of Segovia in Spain. His father, Roderigo de Tordesillas, and his mother, Agnes de Herrera, were both of good family. After studying for some time in his native country, Herrera proceeded to Italy, and there became secretary to Vespasian Gonzago, with whom, on his appointment as viceroy of Navarre, he returned to Spain. Gonzago, sensible of his secretary's abilities, commended him to Philip II. of Spain; and that monarch appointed Herrera first historiographer of the Indies, and one of the historiographers of Castile. Placed thus in the enjoyment of an ample salary, Herrera devoted the rest of his life to the pursuit of literature, retaining his offices until the reign of Philip IV., by whom he was appointed secretary of state very shortly before his death, which took place at Madrid on the 29th of March 1625. Of Herrera's writings, the most valuable is his *Historia general de los hechos de los Castellanos en las islas y tierra firme del Mar Oceano* (Madrid, 1601-1615, 4 vols.), a work which relates the history of the Spanish-American colonies from 1492 to 1554. The author's official position gave him access to the state papers and to other authentic sources not attainable by other writers, while he did not scruple to borrow largely from other MSS., especially from that of Bartolomé de Las Casas. He used his facilities carefully and judiciously; and the result is a work on the whole accurate and unprejudiced, and quite indispensable to the student either of the history of the early colonies, or of the institutions and customs of the aboriginal American peoples. Although it is written in the form of

annals, mistakes are not wanting, and several glaring anachronisms have been pointed out by M. J. Quintana. “If,” to quote Dr Robertson, “by attempting to relate the various occurrences in the New World in a strict chronological order, the arrangement of events in his work had not been rendered so perplexed, disconnected and obscure that it is an unpleasant task to collect from different parts of his book and piece together the detached shreds of a story, he might justly have been ranked among the most eminent historians of his country.” This work was republished in 1730, and has been translated into English by J. Stevens (London, 1740), and into other European languages.

Herrera’s other works are the following: *Historia de lo sucedido en Escocia é Inglaterra en quarenta y quatro años que vivió la reyna Maria Estuarda* (Madrid, 1589); *Cinco libros de la historia de Portugal, y conquista de las islas de los Açores, 1582-1583* (Madrid, 1591); *Historia de lo sucedido en Francia, 1585-1594* (Madrid, 1598); *Historia general del mundo del tiempo del rey Felipe II, desde 1559 hasta su muerte* (Madrid, 1601-1612, 3 vols.); *Tratado, relacion, y discurso historico de los movimientos de Aragon* (Madrid, 1612); *Comentarios de los hechos de los Españoles, Franceses, y Venecianos en Italia, &c., 1281-1559* (Madrid, 1624, seq.). See W. H. Prescott, *History of the Conquest of Mexico*, vol. ii.

HERRICK, ROBERT (1591-1674), English poet, was born at Cheapside, London, and baptized on the 24th of August 1591. He belonged to an old Leicestershire family which had settled in London. He was the seventh child of Nicholas Herrick, goldsmith, of the city of London, who died in 1592, under suspicion of suicide. The children were brought up by their uncle, Sir William Herrick, one of the richest goldsmiths of the day, to whom in 1607 Robert was bound apprentice. He had probably been educated at Westminster school, and in 1614 he proceeded to Cambridge; and it was no doubt during his apprenticeship that the young poet was introduced to that circle of wits which he was afterwards to adorn. He seems to have been present at the first performance of *The Alchemist* in 1610, and it was probably about this time that Ben Jonson adopted him as his poetical “son.” He entered the university as fellow-commoner of St John’s College, and he remained there until, in 1616, upon taking his degree, he removed to Trinity Hall. A lively series of fourteen letters to his uncle, mainly begging for money, exists at Beaumanoir, and shows that Herrick suffered much from poverty at the university. He took his B.A. in 1617, and in 1620 he became master of arts. From this date until 1627 we entirely lose sight of him; it has been variously conjectured that he spent these years preparing for the ministry at Cambridge, or in much looser pursuits in London. In 1629 (September 30) he was presented by the king to the vicarage of Dean Prior, not far from Totnes in Devonshire. At Dean Prior he resided quietly until 1648, when he was ejected by the Puritans. The solitude there oppressed him at first; the village was dull and remote, and he felt very bitterly that he was cut off from all literary and social associations; but soon the quiet existence in Devonshire soothed and delighted him. He was pleased with the rural and semi-pagan customs that survived in the village, and in some of his most charming verses he has immortalized the morris-dances, wakes and quintains, the Christmas mummers and the Twelfth Night revellings, that diversified the quiet of Dean Prior. Herrick never married, but lived at the vicarage surrounded by a happy family of pets, and tended by an excellent old servant named Prudence Baldwin. His first appearance in print was in some verses he contributed to *A Description of the King and Queen of Fairies*, in 1635. In 1650 a volume of *Wit’s Recreations* contained sixty-two small poems afterwards acknowledged by Herrick in the *Hesperides*, and one not reprinted until our own day. These partial appearances make it probable that he visited London from time to time. We have few hints of his life as a clergyman. Anthony Wood says that Herricks’s sermons were florid and witty, and that he was “beloved by the neighbouring gentry.” A very aged woman, one Dorothy King, stated that the poet once threw his sermon at his congregation, cursing them for their inattention. The same old woman recollected his favourite pig, which he taught to drink out of a tankard. He was a devotedly loyal supporter of the king during the Civil War, and immediately upon his ejection in 1648 he published his celebrated collection of lyrical poems, entitled *Hesperides; or the Works both Human and Divine of Robert Herrick*. The “divine works” bore the title of *Noble Numbers* and the date 1647. That he was reduced to great poverty in London has been stated, but there is no evidence of the fact. In August 1662 Herrick returned to Dean Prior, supplanting his own supplanter, Dr John Syms. He died in his eighty-fourth year, and was buried at Dean Prior, October 15, 1674. A monument was erected to his memory in the parish church in 1857, by Mr Perry Herrick, a descendant of a collateral branch of the family. The *Hesperides* (and *Noble Numbers*) is the only volume which Herrick published, but he contributed poems to *Lachrymae Musarum* (1649) and to *Wit’s Recreations*.

As a pastoral lyrist Herrick stands first among English poets. His genius is limited in scope, and comparatively unambitious, but in its own field it is unrivalled. His tiny poems—and of the thirteen hundred that he has left behind him not one is long—are like jewels of various value, heaped together in a casket. Some are of the purest water, radiant with light and colour, some were originally set in false metal that has tarnished, some were rude and repulsive from the first. Out of the unarranged, heterogeneous mass the student has to select what is not worth reading, but, after he has cast aside all the rubbish, he is astonished at the amount of excellent and exquisite work that

remains. Herrick has himself summed up, very correctly, the themes of his sylvan muse when he says:—

> "I sing of brooks, of blossoms, birds and bowers,
> Of April, May, of June and July flowers,
> I sing of May-poles, hock-carts, wassails, wakes,
> Of bridegrooms, brides and of their bridal-cakes."

He saw the picturesqueness of English homely life as no one before him had seen it, and he described it in his verse with a certain purple glow of Arcadian romance over it, in tones of immortal vigour and freshness. His love poems are still more beautiful; the best of them have an ardour and tender sweetness which give them a place in the forefront of modern lyrical poetry, and remind us of what was best in Horace and in the poets of the Greek anthology.

After suffering complete extinction for more than a century, the fame of Herrick was revived by John Nichols, who introduced his poems to the readers of the *Gentleman's Magazine* of 1796 and 1797. Dr Drake followed in 1798 with considerable enthusiasm. By 1810 interest had so far revived in the forgotten poet that Dr Nott ventured to print a selection from his poems, which attracted the favourable notice of the *Quarterly Review*. In 1823 the *Hesperides* and the *Noble Numbers* were for the first time edited by Mr T. Maitland, afterwards Lord Dundrennan. Since then the reprints of Herrick's have been too numerous to be mentioned here; there are few English poets of the 17th century whose writings are now more accessible. See F. W. Moorman, *Robert Herrick* (1910).

(E. G.)

HERRIES, JOHN CHARLES (1778-1855), English politician, son of a London merchant, began his career as a junior clerk in the treasury, and became known for his financial abilities as private secretary to successive ministers. He was appointed commissary-in-chief (1811), and, on the abolition of that office (1816), auditor of the civil list. In 1823 he entered parliament as secretary to the treasury, and in 1827 became chancellor of the exchequer under Lord Goderich; but in consequence of internal differences, arising partly out of a slight put upon Herries, the ministry was broken up, and in 1828 he was appointed master of the mint. In 1830 he became president of the board of trade, and for the earlier months of 1835 he was secretary at war. From 1841 to 1847 he was out of parliament, but during 1852 he was president of the board of control under Lord Derby. He was a consistent and upright Tory of the old school, who carried weight as an authority on financial subjects. His eldest son, Sir Charles John Herries (1815-1882), was chairman of the board of inland revenue.

See the *Life* by his younger son, Edward Herries (1880).

HERRIES, JOHN MAXWELL, 4th Lord (*c.* 1512-1583), Scottish politician, was the second son of Robert Maxwell, 4th Lord Maxwell (d. 1546). In 1547 he married Agnes (d. 1594), daughter of William Herries, 3rd Lord Herries (d. 1543), a grandson of Herbert Herries (d. *c.* 1500) of Terregles, Kirkcudbrightshire, who was created a lord of the Scottish parliament about 1490, and in 1567 he obtained the title of Lord Herries. But before this event Maxwell had become prominent among the men who rallied round Mary queen of Scots, although during the earlier part of his public life he had been associated with the religious reformers and had been imprisoned by the regent, Mary of Lorraine. He was, moreover—at least until 1563—very friendly with John Knox, who calls him "a man zealous and stout in God's cause." But the transition from one party to the other was gradually accomplished, and from March 1566, when Maxwell joined Mary at Dunbar after the murder of David Rizzio and her escape from Holyrood, he remained one of her staunchest friends, although he disliked her marriage with Bothwell. He led her cavalry at Langside, and after this battle she committed herself to his care. Herries rode with the queen into England in May 1568, and he and John Lesley, bishop of Ross, were her chief commissioners at the conferences at York. He continued to labour in Mary's cause after returning to Scotland, and was imprisoned by the regent Murray; he also incurred Elizabeth's displeasure by harbouring the rebel Leonard Dacres, but he soon made his peace with the English queen. He showed himself in general hostile to the regent Morton, but he was among the supporters of the regent Lennox until his death on the 20th of January 1583. His son William, 5th Lord Herries (d. 1604), was, like his father, warden of the west marches.

William's grandson John, 7th Lord Herries (d. 1677), became 3rd earl of Nithsdale in succession to his cousin Robert Maxwell, the 2nd earl, in 1667. John's grandson was William, 5th earl of Nithsdale, the Jacobite (see Nithsdale). William was deprived of his honours in 1716, but in 1858 the

House of Lords decided that his descendant William Constable-Maxwell (1804-1876) was rightly Lord Herries of Terregles. In 1876 William's son Marmaduke Constable-Maxwell (b. 1837) became 12th Lord Herries, and in 1884 he was created a baron of the United Kingdom.

HERRING (*Clupea harengus*, *Häring* in German, *le hareng* in French, *sill* in Swedish), a fish belonging to the genus *Clupea*, of which more than sixty different species are known in various parts of the globe. The sprat, pilchard or sardine and shad are species of the same genus. Of all sea-fishes *Clupeae* are the most abundant; for although other genera may comprise a greater variety of species, they are far surpassed by *Clupea* with regard to the number of individuals. The majority of the species of *Clupea* are of greater or less utility to man; it is only a few tropical species that acquire, probably from their food, highly poisonous properties, so as to be dangerous to persons eating them. But no other species equals the common herring in importance as an article of food or commerce. It inhabits in incredible numbers the North Sea, the northern parts of the Atlantic and the seas north of Asia. The herring inhabiting the corresponding latitudes of the North Pacific is another species, but most closely allied to that of the eastern hemisphere. Formerly it was the general belief that the herring inhabits the open ocean close to the Arctic Circle, and that it migrates at certain seasons towards the northern coasts of Europe and America. This view has been proved to be erroneous, and we know now that this fish lives throughout the year in the vicinity of our shores, but at a greater depth, and at a greater distance from the coast, than at the time when it approaches land for the purpose of spawning.

Herrings are readily recognized and distinguished from the other species of *Clupea* by having an ovate patch of very small teeth on the vomer (that is, the centre of the palate). In the dorsal fin they have from 17 to 20 rays, and in the anal fin from 16 to 18; there are from 53 to 59 scales in the lateral line and 54 to 56 vertebrae in the vertebral column. They have a smooth gill-cover, without those radiating ridges of bone which are so conspicuous in the pilchard and other *Clupeae*. The sprat cannot be confounded with the herring, as it has no teeth on the vomer and only 47 or 48 scales in the lateral line.

The spawn of the herring is adhesive, and is deposited on rough gravelly ground at varying 391
distances from the coast and always in comparatively shallow water. The season of spawning is different in different places, and even in the same district, *e.g.* the east coast of Scotland, there are herrings spawning in spring and others in autumn. These are not the same fish but different races. Those which breed in winter or spring deposit their spawn near the coast at the mouths of estuaries, and ascend the estuaries to a considerable distance at certain times, as in the Firths of Forth and Clyde, while those which spawn in summer or autumn belong more to the open sea, *e.g.* the great shoals that visit the North Sea annually.

Herrings grow very rapidly; according to H. A. Meyer's observations, they attain a length of from 17 to 18 mm. during the first month after hatching, 34 to 36 mm. during the second, 45 to 50 mm. during the third, 55 to 61 mm. during the fourth, and 65 to 72 mm. during the fifth. The size which they finally attain and their general condition depend chiefly on the abundance of food (which consists of crustaceans and other small marine animals), on the temperature of the water, on the season at which they have been hatched, &c. Their usual size is about 12 in., but in some particularly suitable localities they grow to a length of 15 in., and instances of specimens measuring 17 in. are on record. In the Baltic, where the water is gradually losing its saline constituents, thus becoming less adapted for the development of marine species, the herring continues to exist in large numbers, but as a dwarfed form, not growing either to the size or to the condition of the North-Sea herring. The herring of the American side of the Atlantic is specifically identical with that of Europe. A second species (*Clupea leachii*) has been supposed to exist on the British coast; but it comprises only individuals of a smaller size, the produce of an early or late spawn. Also the so-called "white-bait" is not a distinct species, but consists chiefly of the fry or the young of herrings and sprats, and is obtained "in perfection" at localities where these small fishes find an abundance of food, as in the estuary of the Thames.

Several excellent accounts of the herring have been published, as by Valenciennes in the 20th vol. of the *Histoire naturelle des poissons*, and more especially by Mr J. M. Mitchell, *The Herring, its Natural History and National Importance* (Edinburgh, 1864). Recent investigations are described in the Reports of the Fishery *Board for Scotland*, and in the reports of the German *Kommission zur Untersuchung der Deutschen Meere* (published at Kiel).

(J. T. C.)

HERRING-BONE, a term in architecture applied to alternate courses of bricks or stone, which are laid diagonally with binding courses above and below: this is said to give a better bond to the wall, especially when the stone employed is stratified, such as Stonefield stone, and too thin to be laid in horizontal courses. Although it is only occasionally found in modern buildings, it was a type of construction constantly employed in Roman, Byzantine and Romanesque work, and in the latter is regarded as a test of very early date. It is frequently found in the Byzantine walls in Asia Minor, and in Byzantine churches was employed decoratively to give variety to the wall surface. Sometimes the diagonal courses are reversed one above the other. Examples in France exist in the churches at Querqueville in Normandy and St Christophe at Suèvres (Loir et Cher), both dating from the 10th century, and in England herring-bone masonry is found in the walls of castles, such as at Guildford, Colchester and Tamworth. The term is also applied to the paving of stable yards with bricks laid flat diagonally and alternating so that the head of one brick butts against the side of another; and the effect is more pleasing than when laid in parallel courses.

HERRINGS, BATTLE OF THE, the name applied to the action of Rouvray, fought in 1429 between the French (and Scots) and the English, who, under Sir John Falstolfe (or Falstaff), were convoying Lenten provisions, chiefly herrings, to the besiegers of Orleans. (See Orleans and Hundred Years' War.)

HERRNHUT, a town of Germany, in the kingdom of Saxony, 18 m. S.E. of Bautzen, and situated on the Löbau-Zittau railway. Pop. 1200. It is chiefly known as the principal seat of the Moravian or Bohemian brotherhood, the members of which are called *Herrnhuter*. A colony of these people, fleeing from persecution in Moravia, settled at Herrnhut in 1722 on a site presented by Count Zinzendorf. The buildings of the society include a church, a school and houses for the brethren, the sisters and the widowed of both sexes, while it possesses an ethnographical museum and other collections of interest. The town is remarkable for its ordered, regular life and its scrupulous cleanliness. Linen, paper (to varieties of which Herrnhut gives its name), tobacco and various minor articles are manufactured. The Hutberg, at the foot of which the town lies, commands a pleasant view. Berthelsdorf, a village about a mile distant, has been the seat of the directorate of the community since about 1789.

HERSCHEL, CAROLINE LUCRETIA (1750-1848), English astronomer, sister of Sir William Herschel, the eighth child and fourth daughter of her parents, was born at Hanover on the 16th of March 1750. On account of the prejudices of her mother, who did not desire her to know more than was necessary for being useful in the family, she received, in youth only the first elements of education. After the death of her father in 1767 she obtained permission to learn millinery and dressmaking with a view to earning her bread, but continued to assist her mother in the management of the household until the autumn of 1772, when she joined her brother William, who had established himself as a teacher of music at Bath. At once she became a valuable co-operator with him both in his professional duties and in the astronomical researches to which he had already begun to devote all his spare time. She was the principal singer at his oratorio concerts, and acquired such a reputation as a vocalist that she was offered an engagement for the Birmingham festival, which, however, she declined. When her brother accepted the office of astronomer to George III., she became his constant assistant in his observations, and also executed the laborious calculations which were connected with them. For these services she received from the king in 1787 a salary of £50 a year. Her chief amusement during her leisure hours was sweeping the heavens with a small Newtonian telescope. By this means she detected in 1783 three remarkable nebulae, and during the eleven years 1786-1797 eight comets, five of them with unquestioned priority. In 1797 she presented to the Royal Society an Index to Flamsteed's observations, together with a catalogue of 561 stars accidentally omitted from the "British Catalogue," and a list of the errata in that publication. Though she returned to Hanover in 1822 she did not abandon her astronomical studies, and in 1828 she completed the reduction, to January 1800, of 2500 nebulae discovered by her brother. In 1828 the Astronomical Society, to mark their sense of the benefits conferred on science by such a series of laborious exertions, unanimously resolved to present her with their gold

medal, and in 1835 elected her an honorary member of the society. In 1846 she received a gold medal from the king of Prussia. She died on the 9th of January 1848.

See *The Memoir and Correspondence of Caroline Herschel*, by Mrs John Herschel (1876).

HERSCHEL, SIR FREDERICK WILLIAM (1738-1822), generally known as Sir William Herschel, English astronomer, was born at Hanover on the 15th of November 1738. His father was a musician employed as hautboy player in the Hanoverian guard. The family had quitted Moravia for Saxony in the early part of the 17th century on account of religious troubles, they themselves being Protestants. Herschel's earlier education was necessarily of a very limited character, chiefly owing to the warlike commotions of his country; but being at all times an indomitable student, he, by his own exertions, more than repaired this deficiency. He became a very skilful musician, both theoretical and practical; while his attainments as a self-taught mathematician were fully adequate to the prosecution of those branches of astronomy which he so eminently advanced and adorned. Whatever he did he did methodically and thoroughly; and in this methodical thoroughness lay the secret of what Arago very properly termed his astonishing scientific success.

In 1752, at the age of fourteen, he joined the band of the Hanoverian guard, and with his 392
detachment visited England in 1755, accompanied by his father and eldest brother; in the following year he returned to his native country; but the hardships of campaigning during the Seven Years' War imperilling his health, his parents privately removed him from the regiment, and on the 26th of July 1757 despatched him to England. There, as might have been expected, the earlier part of his career was attended with formidable difficulties and much privation. We find him engaged in several towns in the north of England as organist and teacher of music, which were not lucrative occupations. But the tide of his fortunes began to flow when he obtained in 1766 the appointment of organist to the Octagon chapel in Bath, at that time the resort of the wealth and fashion of the city.

During the next five or six years he became the leading musical authority, and the director of all the chief public musical entertainments at Bath. His circumstances having thus become easier, he revisited Hanover for the purpose of bringing back with him his sister Caroline, whose services he much needed in his multifarious undertakings. She arrived in Bath in August 1772, being at that time in her twenty-third year. She thus describes her brother's life soon after her arrival: "He used to retire to bed with a bason of milk or a glass of water, with Smith's *Harmonics* and Ferguson's *Astronomy*, &c., and so went to sleep buried under his favourite authors; and his first thoughts on waking were how to obtain instruments for viewing those objects himself of which he had been reading." It is not without significance that we find him thus reading Smith's *Harmonics*; to that study loyalty to his profession would impel him; as a reward for his thoroughness this led him to Smith's *Optics*; and this, by a natural sequence, again led him to astronomy, for the purposes of which the chief optical instruments were devised. It was in this way that he was introduced to the writings of Ferguson and Keill, and subsequently to those of Lalande, whereby he educated himself to become an astronomer of undying fame. In those days telescopes were very rare, very expensive and not very efficient, for the Dollonds had not as yet perfected even their beautiful little achromatics of 2¾ in. aperture. So Herschel was obliged to content himself with hiring a small Gregorian reflector of about 2 in. aperture, which he had seen exposed for loan in a tradesman's shop. Not satisfied with this implement, he procured a small lens of about 18 ft. focal length, and set his sister to work on a pasteboard tube to match it, so as to make him a telescope. This unsatisfactory material was soon replaced by tin, and thus a sorry sort of vision was obtained of Jupiter, Saturn and the moon. He then sought in London for a reflector of much larger dimensions; but no such instrument was on sale; and the terms demanded for the construction of a reflecting telescope of 5 or 6 ft. focal length he regarded as too exorbitant even for the gratification of such desires as his own. So he was driven to the only alternative that remained; he must himself build a large telescope. His first step in this direction was to purchase the débris of an amateur's implements for grinding and polishing small mirrors; and thus, by slow degrees, and by indomitable perseverance, he in 1774 had, as he says, the satisfaction of viewing the heavens with a Newtonian telescope of 6 ft. focal length made by his own hands. But he was not contented to be a mere star-gazer; on the contrary, he had from the very first conceived the gigantic project of surveying the entire heavens, and, if possible, of ascertaining the plan of their general structure by a settled mode of procedure, if only he could provide himself with adequate instrumental means. For this purpose he, his brother and his sister toiled for many years at the grinding and polishing of hundreds of specula, always retaining the best and recasting the others, until the most perfect of the earlier products had been surpassed. This was the work of the daylight in those seasons of the year when the fashionable visitors of Bath had quitted the place, and had thus freed the family from professional duties. After 1774 every available hour of the night was devoted to the long-hoped-for scrutiny of the skies. In those days no machinery had been invented for the construction of telescopic mirrors; the man who had the hardihood to undertake polishing them doomed himself to walk leisurely and uniformly round an upright post for many hours, without removing his hands

from the mirror, until his work was done. On these occasions Herschel received his food from the hands of his faithful sister. But his reward was nigh.

In May 1780 his first two papers containing some results of his observations on the variable star “Mira” and the mountains of the moon were communicated to the Royal Society through the influential introduction of Dr William Watson. Herschel had made his acquaintance in a characteristic manner. In order to obtain a sight of the moon the astronomer had taken his telescope into the street opposite his house; the celebrated physician happening to pass at the time, and seeing his eye removed for a moment from the instrument, requested permission to take his place. The mutual courtesies and intelligent conversation which ensued soon ripened this casual acquaintance into a solid and enduring regard.

The phenomena of variable stars were examined by Herschel as a guide to what might be occurring in our own sun. The sun, he knew, rotated on its axis, and he knew that dark spots often exist on its photosphere; the questions that he put to himself were—Are there dark spots also on variable stars? Do the stars also rotate on their axes? or are they sometimes partially eclipsed by the intervention of opaque bodies? And he went on to enquire, What are these singular spots upon the sun? and have they any practical relation to the inhabitants of this planet? To these questions he applied his telescopes and his thoughts; and he communicated the results to the Royal Society in no less than six memoirs, occupying very many pages in the *Philosophical Transactions*, and extending in date from 1780 to 1801. It was in the latter year that these remarkable papers culminated in the inquiry whether any relation could be traced in the recurrence of sun-spots, regarded as evidences of solar activity, and the varying seasons of our planet, as exhibited by the varying price of corn. Herschel’s reply was inconclusive; nor has a final solution of the related problems yet been obtained.

In 1781 he communicated to the Royal Society the first of a series of papers on the rotation of the planets and of their several satellites. The object which he had in view was not so much to ascertain the times of their rotation as to discover whether those rotations are strictly uniform. From the result he expected to gather, by analogy, the probability of an alteration in the length of our own day. These inquiries occupy the greater part of seven memoirs extending from 1781 to 1797. While engaged on them he noticed the curious appearance of a white spot near to each of the poles of the planet Mars. On investigating the inclination of its axis to the plane of its orbit, and finding that it differed little from that of the earth, he concluded that its changes of climate also would resemble our own, and that these white patches were probably polar snow. Modern researches have confirmed his conclusion. He also discovered that, as far as his observations extended, the times of the rotations of the various satellites round their axes conform to the analogy of our moon by equalling the times of their revolution round their primaries. Here again we perceive that his discoveries arose out of the systematic and comprehensive nature of his investigation. Nothing with such a man is accidental.

In the same year (1781) Herschel made a discovery which completely altered the character of his professional life. In the course of a methodical review of the heavens he lighted on an object which at first he supposed to be a comet, but which, by its subsequent motions and appearance, averred itself to be a new planet, moving outside the orbit of Saturn. The name of Georgium Sidus was by him assigned to it, but has by general consent been laid aside in favour of Uranus. The object was detected with a 7-ft. reflector having an aperture of 6½ in.; subsequently, when he had provided himself with a much more powerful telescope, of 20 ft. focal length, he discovered, as he believed, no less than six Uranian satellites. Modern observations, while abolishing four of these supposed attendants, have added two others apparently not observed by Herschel. Seven memoirs on the subject were communicated by him to the Royal Society, extending from the date of the discovery in 1781 to 1815. A noteworthy peculiarity in Herschel’s mode of observation led to the discovery of this planet. He had observed that the spurious diameters of stars are not much affected by increasing the magnifying powers, but that the case is different with other celestial objects; hence if anything in his telescopic field struck him as unusual in aspect, he immediately varied the magnifying power in order to decide its nature. Thus Uranus was discovered; and had a similar method been applied to Neptune, that planet would have been found at Cambridge some months before it was recognized at Berlin.

We now come to the beginning of Herschel’s most important series of observations, culminating in what ought probably to be regarded as his capital discovery. A material part of the task which he had set himself embraced the determination of the relative distances of the stars from our sun and from each other. Now, in the course of his scrutiny of the heavens, he had observed many stars in apparently very close contiguity, but often differing greatly in relative brightness. He concluded that, on the average, the brighter star would be the nearer to us, the smaller enormously more distant; and considering that an astronomer on the earth, in consequence of its immense orbital displacement of some 180 millions of miles every six months, would see such a pair of stars under different perspective aspects, he perceived that the measurement of these changes should lead to an approximate determination of the stars’ relative distances. He therefore mapped down the places and aspects of all the double stars that he met with, and communicated in 1782 and 1785 very extensive catalogues of the results. Indeed, his very last scientific memoir, sent to the Royal Astronomical Society in the year 1822, when he was its first president and already in the eighty-

fourth year of his age, related to these investigations. In the memoir of 1782 he threw out the hint that these apparently contiguous stars might be genuine pairs in mutual revolution; but he significantly added that the time had not yet arrived for settling the question. Eleven years afterwards (1793), he remeasured the relative positions of many such couples, and we may conceive what his feelings must have been at finding his prediction verified. For he ascertained that some of these stars circulated round each other, after the manner required by the laws of gravitation, and thus demonstrated the action among the distant members of the starry firmament of the same mechanical laws which bind together the harmonious motions of our solar system. This sublime discovery, announced in 1802, would of itself suffice to immortalize his memory. If only he had lived long enough to learn the approximate distances of some of these binary combinations, he would at once have been able to calculate their masses relative to that of our own sun; and the quantities being, as we now know, strictly comparable, he would have found another of his analogical conjectures realized.

In the year 1782 Herschel was invited to Windsor by George III., and accepted the king's offer to become his private astronomer, and henceforth devote himself wholly to a scientific career. His salary was fixed at £200 per annum, to which an addition of £50 per annum was subsequently made for the astronomical assistance of his sister. Dr Watson, to whom alone the amount was mentioned, made the natural remark, "Never before was honour purchased by a monarch at so cheap a rate." In this way the great astronomer removed from Bath, first to Datchet and soon afterwards permanently to Slough, within easy access of his royal patron at Windsor.

The old pursuits at Bath were soon resumed at Slough, but with renewed vigour and without the former professional interruptions. The greater part, in fact, of the papers already referred to are dated from Datchet and Slough; for the magnificent astronomical speculations in which he was engaged, though for the most part conceived in the earlier portion of his philosophical career, required years of patient observation before they could be fully examined and realized.

It was at Slough in 1783 that he wrote his first memorable paper on the "Motion of the Solar System in Space,"—a sublime speculation, yet through his genius realized by considerations of the utmost simplicity. He returned to the same subject with fuller details in 1805. It was also after his removal to Slough that he published his first memoir on the construction of the heavens, which from the first had been the inspiring idea of his varied toils. In a long series of remarkable papers, addressed as usual to the Royal Society, and extending from the year 1784 to 1818, when he was eighty years of age, he demonstrated the fact that our sun is a star situated not far from the bifurcation of the Milky Way, and that all the stars visible to us lie more or less in clusters scattered throughout a comparatively thin, but immensely extended stratum. At one time he imagined that his powerful instruments had pierced through this stellar stratum, and that he had approximately determined the form of some of its boundaries. In the last of his memoirs, having convinced himself of his error, he admitted that to his telescopes the Milky Way was "fathomless." On either side of this assemblage of stars, presumably in ceaseless motion round their common centre of gravity, Herschel discovered a canopy of discrete nebulous masses, such as those from the condensation of which he supposed the whole stellar universe to have been formed,—a magnificent conception, pursued with a force of genius and put to the practical test of observation with an industry almost incredible.

Hitherto we have said nothing about the great reflecting telescope, of 40 ft. focal length and 4 ft. aperture, the construction of which is often, though mistakenly, regarded as his chief performance. The full description of this celebrated instrument will be found in the 85th volume of the *Transactions* of the Royal Society. On the day that it was finished (August 28, 1789) Herschel saw at the first view, in a grandeur not witnessed before, the Saturnian system with six satellites, five of which had been discovered long before by C. Huygens and G. D. Cassini, while the sixth, subsequently named Enceladus, he had, two years before, sighted by glimpses in his exquisite little telescope of 6½ in. aperture, but now saw in unmistakable brightness with the towering giant he had just completed. On the 17th of September he discovered a seventh, which proved to be the nearest to the globe of Saturn. It has since received the name of Mimas. It is somewhat remarkable that, notwithstanding his long and repeated scrutinies of this planet, the eighth satellite, Hyperion, and the crape ring should have escaped him.

Herschel married, on the 8th of May 1788, the widow of Mr John Pitt, a wealthy London merchant, by whom he had an only son, John Frederick William. The prince regent conferred a Hanoverian knighthood upon him in 1816. But a far more valued and less tardy distinction was the Copley medal assigned to him by his associates in the Royal Society in 1781.

He died at Slough on the 25th of August 1822, in the eighty-fourth year of his age, and was buried under the tower of St Laurence's Church, Upton, within a few hundred yards of the old site of the 40-ft. telescope. A mural tablet on the wall of the church bears a Latin inscription from the pen of the late Dr Goodall, provost of Eton College.

See Mrs John Herschel, *Memoir of Caroline Herschel* (1876); E. S. Holden, *Herschel, his Life and Works* (1881); A. M. Clerke, *The Herschels and Modern Astronomy* (1895); E. S. Holden and C. S. Hastings, *Synopsis of the Scientific Writings of Sir William Herschel* (Washington, 1881); Baron Laurier, *Éloge historique*, Paris Memoirs (1823), p. lxi.; F. Arago, *Analyse historique, Annuaire du*

Bureau des Longitudes (1842), p. 249; Arago, *Biographies of Scientific Men*, p. 167; Madame d'Arblay's *Diary, passim; Public Characters* (1798-1799), p. 384 (with portrait); J. Sime, *William Herschel and his Work* (1900). Herschel's photometric Star Catalogues were discussed and reduced by E. C. Pickering in *Harvard Annals*, vols. xiv. p. 345, xxiii. p. 185, and xxiv.

(C. P.; A. M. C.)

HERSCHEL, SIR JOHN FREDERICK WILLIAM, Bart. (1792-1871), English astronomer, the only son of Sir William Herschel, was born at Slough, Bucks, on the 7th of March 1792. His scholastic education commenced at Eton, but maternal fears or prejudices soon removed him to the house of a private tutor. Thence, at the early age of seventeen, he was sent to St John's College, Cambridge, and the form and method of the mathematical instruction he there received exercised a material influence on the whole complexion of his scientific career. In due time the young student won the highest academical distinction of his year, graduating as senior wrangler in 1813. It was during his undergraduateship that he and two of his fellow-students who subsequently attained to very high eminence, Dean Peacock and Charles Babbage, entered into a compact that they would "do their best to leave the world wiser than they found it,"—a compact loyally and successfully carried out by all three to the end. As a commencement of this laudable attempt we find Herschel associated with these two friends in the production of a work on the differential calculus, and on cognate branches of mathematical science, which changed the style and aspect of mathematical learning in England, and brought it up to the level of the Continental methods. Two or three memoirs communicated to the Royal Society on new applications of mathematical analysis at once placed him in the front rank of the cultivators of this branch of knowledge. Of these his father had the gratification of introducing the first, but the others were presented in his own right as a fellow.

With the intention of being called to the bar, he entered his name at Lincoln's Inn on the 24th of January 1814, and placed himself under the guidance of an eminent special pleader. Probably this temporary choice of a profession was inspired by the extraordinary success in legal pursuits which had attended the efforts of some noted Cambridge mathematicians. Be that as it may, an early acquaintance with Dr Wollaston in London soon changed the direction of his studies. He experimented in physical optics; took up astronomy in 1816; and in 1820, assisted by his father, he completed for a reflecting telescope a mirror of 18 in. diameter and 20 ft. focal length. This, subsequently improved by his own hands, became the instrument which enabled him to effect the astronomical observations forming the chief basis of his fame. In 1821-1823 we find him associated with Sir James South in the re-examination of his father's double stars, by the aid of two excellent refractors, of 7 and 5 ft. focal length respectively. For this work he was presented in 1826 with the Astronomical Society's gold medal; and with the Lalande medal of the French Institute in 1825; while the Royal Society had in 1821 bestowed upon him the Copley medal for his mathematical contributions to their *Transactions*. From 1824 to 1827 he held the responsible post of secretary to that society; and was in 1827 elected to the chair of the Astronomical Society, which office he also filled on two subsequent occasions. In the discharge of his duties to the last-named society he delivered presidential addresses and wrote obituary notices of deceased fellows, memorable for their combination of eloquence and wisdom. In 1831 the honour of knighthood was conferred on him by William IV., and two years later he again received the recognition of the Royal Society by the award of one of their medals for his memoir "On the Investigation of the Orbits of Revolving Double Stars." The award significantly commemorated his completion of his father's discovery of gravitational stellar systems by the invention of a graphical method whereby the eye could as it were see the two component stars of the binary system revolving under the prescription of the Newtonian law.

Before the end of the year 1833, being then about forty years of age, Sir John Herschel had re-examined all his father's double stars and nebulae, and had added many similar bodies to his own lists; thus accomplishing, under the conditions then prevailing, the full work of a lifetime. For it should be remembered that astronomers were not as yet provided with those valuable automatic contrivances which at present materially abridge the labour and increase the accuracy of their determinations. Equatorially mounted instruments actuated by clockwork, electrical chronographs for recording the times of the phenomena observed, were not available to Sir John Herschel; and he had no assistant.

His scientific life now entered upon another and very characteristic phase. The bias of his mind, as he subsequently was wont to declare, was towards chemistry and the phenomena of light, rather than towards astronomy. Indeed, very shortly after taking his degree at Cambridge, he proposed himself as a candidate for the vacant chair of chemistry in that university; but, as he said with some humour, the result of the election was to leave him in a glorious minority of one. In fact Herschel had become an astronomer from a sense of duty, and it was by filial loyalty to his father's memory that he was now impelled to undertake the completion of the work nobly begun at Slough. William Herschel had searched the northern heavens; John Herschel determined to explore the southern, besides re-exploring northern skies. "I resolved," he said, "to attempt the completion of a survey of

the whole surface of the heavens; and for this purpose to transport into the other hemisphere the same instrument which had been employed in this, so as to give a unity to the results of both portions of the survey, and to render them comparable with each other." In accordance with this resolution, he and his family embarked for the Cape on the 13th November 1833; they arrived in Table Bay on the 15th January 1834; and proceedings, he says, "were pushed forward with such effect that on the 22nd of February I was enabled to gratify my curiosity by a view of κ Crucis, the nebula about η Argûs, and some other remarkable objects in the 20-ft. reflector, and on the night of the 4th of March to commence a regular course of sweeping."

> To give an adequate description of the vast mass of labour completed during the next four busy years of his life at Feldhausen would require the transcription of a considerable portion of the *Cape Observations*, a volume of unsurpassed interest and importance; although it might perhaps be equalled by a judicious selection from Sir William's "Memoirs," now scattered through some thirty volumes of the *Philosophical Transactions*. It was published, at the sole expense of the late duke of Northumberland, but not till 1847, nine years after the author's return to England, for the cogent reason, that as he said, "The whole of the observations, as well as the entire work of reducing, arranging and preparing them for the press, have been executed by myself." There are 164 pages of catalogues of southern nebulae and clusters of stars. There are then careful and elaborate drawings of the great nebula in Orion, and of the region surrounding the remarkable star in Argo. The labour and the thought bestowed upon some of these objects are almost incredible; several months were spent upon a minute spot in the heavens containing 1216 stars, but which an ordinary spangle, held at a distance of an arm's length, would eclipse. These catalogues and charts being completed, he proceeded to discuss their significance. He confirmed his father's hypothesis that these wonderful masses of glowing vapours are not irregularly scattered over the visible heavens, but are collected in a sort of canopy, whose vertex is at the pole of that vast stratum of stars in which our solar system finds itself buried, as Herschel supposed, at a depth not greater than that of the average distance from us of an eleventh magnitude star. Then follows his catalogue of the relative positions and magnitudes of the southern double stars, to one of which, γ Virginis, he applied the beautiful method of orbital determination invented by himself, and he had the satisfaction of witnessing the fulfilment of his prediction that the components would, in the course of their revolution, appear to close up into a single star, inseparable by any telescopic power. In the next chapter he proceeded to describe his observations on the varying and relative brightness of the stars. It has been already detailed how his father began his scientific career by similar observations on stellar light-fluctuations, and how his remarks culminated years afterwards in the question whether the radiative changes of our sun, due to the presence or absence of sun-spots, affected our harvests and the price of corn. Sir John carried speculation still farther, pointing out that variations to the extent of half a magnitude in the sun's brightness would account for those strange alternations of semi-arctic and semi-tropical climates which geological researches show to have occurred in various regions of our globe.

Herschel returned to his English home in the spring of 1838. As was natural and right, he was welcomed with an enthusiastic greeting. By the queen at her coronation he was created a baronet; and, what to him was better than all such rewards, other men caught the contagion of his example, and laboured in fields similar to his own, with an adequate portion of his success.

Herschel was a highly accomplished chemist. His discovery in 1819 of the solvent power of hyposulphite of soda on the otherwise insoluble salts of silver was the prelude to its use as a fixing agent in photography; and he invented in 1839, independently of Fox Talbot, the process of photography on sensitized paper. He was the first person to apply the now well-known terms *positive* and *negative* to photographic images, and to imprint them upon glass prepared by the deposit of a sensitive film. He also paved the way for Sir George Stokes's discovery of fluorescence, by his addition of the lavender rays to the spectrum, and by his announcement in 1845 of "epipolic dispersion," as exhibited by sulphate of quinine. Several other important researches connected with the undulatory theory of light are embodied in his treatise on "Light" published in the *Encyclopaedia metropolitana*.

Perhaps no man can become a truly great mathematician or philosopher if devoid of imaginative power. John Herschel possessed this endowment to a large extent; and he solaced his declining years with the translation of the *Iliad* into verse, having earlier executed a similar version of Schiller's *Walk*. But the main work of his later life was the collection of all his father's catalogues of nebulae and double stars combined with his own observations and those of other astronomers each into a single volume. He lived to complete the former, to present it to the Royal Society, and to see it published in a separate form in the *Philosophical Transactions*, vol. cliv. The latter work he left unfinished, bequeathing it, in its imperfect form, to the Astronomical Society. That society printed a portion of it, which serves as an index to the observations of various astronomers on double stars up to the year 1866.

A complete list of his contributions to learned societies will be found in the Royal Society's great catalogue, and from them may be gathered most of the records of his busy scientific life. Sir John Herschel met with an amount of public recognition which was unusual in the time of his illustrious father. Naturally he was a member of almost every important learned society in both hemispheres. For five years he held the same office of master of the mint, which more than a century before had belonged to Sir Isaac Newton; his friends also offered to propose him as president of the Royal Society and again as member of parliament for the university of Cambridge, but neither position

was desired by him.

In private life Sir John Herschel was a firm and most active friend; he had no jealousies; he avoided all scientific feuds; he gladly lent a helping hand to those who consulted him in scientific difficulties; he never discouraged, and still less disparaged, men younger than or inferior to himself; he was pleased by appreciation of his work without being solicitous for applause; it was said of him by a discriminating critic, and without extravagance, that "his was a life full of serenity of the sage and the docile innocence of a child."

He died at Collingwood, his residence near Hawkhurst in Kent, on the 11th of May 1871, in the seventy-ninth year of his age, and his remains are interred in Westminster Abbey close to the grave of Sir Isaac Newton.

Besides the laborious *Cape Observations*, Sir John Herschel was the author of several books, one of which at least, *On the Study of Natural Philosophy* (1830), possesses an interest which no future advances of the subjects on which he wrote can obliterate. In 1849 came the *Outlines of Astronomy*, a volume still replete with charm and instruction. His articles, "Meteorology," "Physical Geography," and "Telescope," contributed to the 8th edition of the *Encyclopaedia Britannica*, were afterwards published separately. When he was at the Cape he was more than once assisted in the attempts there made to diffuse a love of knowledge among men not engaged in literary pursuits; and with the same purpose he, on his return to England, published, in *Good Words* and elsewhere, a series of papers on interesting points of natural philosophy, subsequently collected in a volume called *Familiar Lectures on Scientific Subjects*. Another less widely known volume is his *Collected Addresses*, in which he is seen in his happiest and most instructive mood.

See also Mrs John Herschel, "Memoir of Caroline Herschel," *Month. Notices Roy. Astr. Society*, xxxii. 122 (C. Pritchard); *Proceedings Roy. Society*, xx. p. xvii. (T. Romney Robinson); *Proceedings Roy. Society of Edinburgh* vii. 543 (P. G. Tait); *Nature* iv. 69; E. Dunkin, *Obituary Notices*, p. 47; *Report Brit. Association* (1871), p. lxxxv. (Lord Kelvin); *The Times*. (May 13, 1871); R. Grant, *History of Phys. Astronomy*; A. M. Clerke, *Popular Hist. of Astronomy*; A. M. Clerke, *The Herschels and Modern Astronomy*; J. H. Mädler, *Geschichte der Himmelskunde*, Bd. ii.; *Mémoires de la Société Physique de Genève*, xxi. 586 (E. Gautier). Reductions, based on standard magnitudes of 919 southern stars, observed by Herschel in sequences of relative brightness, were published by W. Doberck in the *Astrophysical Journal*, xi. 192, 270, and in *Harvard Annals*, vol. xli., No. viii.

(C. P.; A. M. C.)

HERSCHELL, FARRER HERSCHELL, 1ST BARON (1837-1899), lord chancellor of England, was born on the 2nd of November 1837. His father was the Rev. Ridley Haim Herschell, a native of Strzelno, in Prussian Poland, who, when a young man, exchanged the Jewish faith for Christianity, took a leading part in founding the British Society for the Propagation of the Gospel among the Jews, and, after many journeyings, settled down to the charge of a Nonconformist chapel near the Edgware Road, in London, where he ministered to a large congregation. His mother was a daughter of William Mowbray, a merchant of Leith. He was educated at a private school and at University College, London. In 1857 he took his B.A. degree at the University of London. He was reckoned the best speaker in the school debating society, and he displayed there the same command of language and lucidity of thought which were his characteristics during his official life. The reputation which Herschell enjoyed during his school days was maintained after he became a law-student at Lincoln's Inn. In 1858 he entered the chambers of Thomas Chitty, the famous common law pleader, father of the late Lord Justice Chitty. His fellow pupils, amongst whom were A. L. Smith, afterwards master of the rolls, and Arthur Charles, afterwards judge of the queen's bench division, gave him the sobriquet of "the chief baron" in recognition of his superiority. He subsequently read with James Hannen, afterwards Lord Hannen. In 1860 he was called to the bar and joined the northern circuit, then in its palmy days of undividedness. For four or five years he did not obtain much work. Fortunately, he was never a poor man, and so was not forced into journalism, or other paths of literature, in order to earn a living. Two of his contemporaries, each of whom achieved great eminence, found themselves in like case. One of these, Charles Russell, became lord chief justice of England; the other, William Court Gully, speaker of the House of Commons. It is said that these three friends, dining together during a Liverpool assize some years after they had been called, agreed that their prospects were anything but cheerful. Certain it is that about this time Herschell meditated quitting England for Shanghai and practising in the consular courts there. Herschell, however, soon made himself useful to Edward James, the then leader of the northern circuit, and to John Richard Quain, the leading stuff-gownsman. For the latter he was content to note briefs and draft opinions, and when, in 1866, Quain donned "silk," it was on Herschell that a large portion of his mantle descended.

In 1872 Herschell was made a queen's counsel. He had all the necessary qualifications for a leader—a clear, though not resonant voice; a calm, logical mind; a sound knowledge of legal principles; and (greatest gift of all) an abundance of common sense. He never wearied the judges by

arguing at undue length, and he knew how to retire with dignity from a hopeless cause. His only weak point was cross-examination. In handling a hostile witness he had neither the insidious persuasiveness of a Hawkins nor the compelling, dominating power of a Russell. But he made up for all by his speech to the jury, marshalling such facts as told in his client's favour with the most consummate skill. He very seldom made use of notes, but trusted to his memory, which he had carefully trained. By this means he was able to conceal his art, and to appear less as a paid advocate than as an outsider interested in the case anxious to assist the jury in arriving at the truth. By 1874 Herschell's business had become so good that he turned his thoughts to parliament. In February of that year there was a general election, with the result that the Conservative party came into power with a majority of fifty. The usual crop of petitions followed. The two Radicals (Thompson and Henderson) who had been returned for Durham city were unseated, and an attack was then made on the seats of two other Radicals (Bell and Palmer) who had been returned for Durham county. For one of these last Herschell was briefed. He made so excellent an impression on the local Radical leaders that they asked him to stand for Durham city; and after a fortnight's electioneering, he was elected as junior member. Between 1874 and 1880 Herschell was most assiduous in his attendance in the House of Commons. He was not a frequent speaker, but a few great efforts sufficed in his case to gain for him a reputation as a debater. The best examples of his style as a private member will be found in *Hansard* under the dates 18th February 1876, 23rd May 1878, 6th May 1879. On the last occasion he carried a resolution in favour of abolishing actions for breach of promise of marriage except when actual pecuniary loss had ensued, the damages in such cases to be measured by the amount of such loss. The grace of manner and solid reasoning with which he acquitted himself during these displays obtained for him the notice of Gladstone, who in 1880 appointed Herschell solicitor-general.

Herschell's public services from 1880 to 1885 were of great value, particularly in dealing with the "cases for opinion" submitted by the Foreign Office and other departments. He was also very helpful in speeding government measures through the House, notably the Irish Land Act 1881, the Corrupt Practices and Bankruptcy Acts 1883, the County Franchise Act 1884 and the Redistribution of Seats Act 1885. This last was a bitter pill for Herschell, since it halved the representation of Durham city, and so gave him statutory notice to quit. Reckoning on the local support of the Cavendish family, he contested the North Lonsdale division of Lancashire; but in spite of the powerful influence of Lord Hartington, he was badly beaten at the poll, though Mr Gladstone again obtained a majority in the country. Herschell now thought he saw the solicitor-generalship slipping away from him, and along with it all prospect of high promotion. Lord Selborne and Sir Henry James, however, successively declined Gladstone's offer of the Woolsack, and in 1886 Herschell, by a sudden turn of fortune's wheel, found himself in his forty-ninth year lord chancellor.

Herschell's chancellorship lasted barely six months, for in August 1886 Gladstone's Home Rule Bill was rejected in the Commons and his administration fell. In August 1892, when Gladstone returned to power, Herschell again became lord chancellor. In September 1893, when the second Home Rule Bill came on for second reading in the House of Lords, Herschell took advantage of the opportunity to justify the "sudden conversion" to Home Rule of himself and his colleagues in 1885 by comparing it to the duke of Wellington's conversion to Catholic Emancipation in 1829 and to that of Sir Robert Peel to Free Trade in 1846. In 1895, however, his second chancellorship came to an end with the defeat of the Rosebery ministry.

Whether sitting at the royal courts in the Strand, on the judicial committee of the privy council, or in the House of Lords, Lord Herschell's judgments were distinguished for their acute and subtle reasoning, for their grasp of legal principles, and, whenever the occasion arose, for their broad treatment of constitutional and social questions. He was not a profound lawyer, but his quickness of apprehension was such that it was an excellent substitute for great learning. In construing a real property will or any other document, his first impulse was to read it by the light of nature, and to decline to be influenced by the construction put by the judges on similar phrases occurring elsewhere. But when he discovered that certain expressions had acquired a technical meaning which could not be disturbed without fluttering the dovecotes of the conveyancers, he would yield to the established rule, even though he did not agree with it. He was perhaps seen at his judicial best in *Vagliano* v. *Bank of England* (1891) and *Allen* v. *Flood* (1898). Latterly he showed a tendency, which seems to grow on some judges, to interrupt counsel overmuch. The case last mentioned furnishes an example of this. The question involved was what constituted a molestation of a man in the pursuit of his lawful calling. At the close of the argument of counsel, whom he had frequently interrupted, one of their lordships, noted for his pretty wit, observed that although there might be a doubt as to what amounted to such molestation in point of law, the House could well understand, after that day's proceedings, what it was in actual practice. In addition to his political and judicial work, Herschell rendered many public services. In 1888 he presided over an inquiry directed by the House of Commons with regard to the Metropolitan Board of Works. He acted as chairman of two royal commissions, one on Indian currency, the other on vaccination. He took a great interest in the National Society for the Prevention of Cruelty to Children, not only promoting the acts of 1889 and 1894, but also bestowing a good deal of time in sifting the truth of certain allegations which had been brought against the management of that society. In June 1893 he was appointed chancellor of the university of London in succession to the earl of Derby, and he entered on his new duties with the usual thoroughness. "His views of reform," according to Victor Dickins, the accomplished

registrar of the university, “were always most liberal and most frankly stated, though at first they were not altogether popular with an important section of university opinion. He disarmed opposition by his intellectual power, rather than conciliated it by compromise, and sometimes was perhaps a little masterful, after a fashion of his own, in his treatment of the various burning questions that agitated the university during his tenure of office. His characteristic power of detachment was well illustrated by his treatment of the proposal to remove the university to the site of the Imperial Institute at South Kensington. Although he was at that time chairman of the Institute, the most irreconcilable opponent of the removal never questioned his absolute impartiality.” With the Imperial Institute Herschell had been officially connected from its inception. He was chairman of the provisional committee appointed by the prince of Wales to formulate a scheme for its organization, and he took an active part in the preparation of its charter and constitution in conjunction with Lord Thring, Lord James, Sir Frederick Abel and Mr John Hollams. He was the first chairman of its council, and, except during his tour in India in 1888, when he brought the Institute under the notice of the Indian authorities, he was hardly absent from a single meeting. For his special services in this connexion he was made G.C.B. in 1893, this being the only instance of a lord chancellor being decorated with an order.

In 1897 he was appointed, jointly with Lord Justice Collins, to represent Great Britain on the Venezuela Boundary Commission, which assembled in Paris in the spring of 1899. So complicated a business involved a great deal of preparation and a careful study of maps and historic documents. Not content with this, he accepted in 1898 a seat on the joint high commission appointed to adjust certain boundary and other important questions pending between Great Britain and Canada on the one hand and the United States on the other hand. He started for America in July of that year, and was received most cordially at Washington. His fellow commissioners elected him their president. In February 1899, while the commission was in full swing, he had the misfortune to slip in the street and in falling to fracture a hip bone. His constitution, which at one time was a robust one, had been undermined by constant hard work, and proved unequal to sustaining the shock. On the 1st of March, only a fortnight after the accident, he died at the Shoreham Hotel, Washington, a *post-mortem* examination revealing disease of the heart. Mr Hay, secretary of state, at once telegraphed to Mr Choate, the United States ambassador in London, the “deep sorrow” felt by President McKinley; and Sir Wilfred Laurier said the next day, in the parliament chamber at Ottawa, that he regarded Herschell’s death “as a misfortune to Canada and to the British Empire.” A funeral service held in St John’s Episcopal Church, Washington, was attended by the president and vice-president of the United States, by the cabinet ministers, the judges of the Supreme Court, the members of the joint high commission, and a large number of senators and other representative men. The body was brought to London in a British man-of-war, and a second funeral service was held in Westminster Abbey before it was conveyed to its final resting-place at Tincleton, Dorset, in the parish church of which he had been married. Herschell left a widow, granddaughter of Vice-Chancellor Kindersley; a son, Richard Farrer (b. 1878), who succeeded him as second baron; and two daughters.

A “reminiscence” of Herschell by Mr Speaker Gully (Lord Selby) will be found in *The Law Quarterly Review* for April 1899. *The Journal of the Society of Comparative Legislation* (of which he had been president from its formation in 1893) contains, in its part for July of the same year, notices of him by Lord James of Hereford, Lord Davey, Mr Victor Williamson (his executor and intimate friend), and also by Mr Justice D. J. Brewer and Senator C. W. Fairbanks (both of the United States).

(M. H. C.)

HERSENT, LOUIS (1777-1860), French painter, was born at Paris on the 10th of March 1777, and becoming a pupil of David, obtained the Prix de Rome in 1797; in the Salon of 1802 appeared his “Metamorphosis of Narcissus,” and he continued to exhibit with rare interruptions up to 1831. His most considerable works under the empire were “Achilles parting from Briseis,” and “Atala dying in the arms of Chactas” (both engraved in Landon’s *Annales du Musée*); an “Incident of the life of Fénelon,” painted in 1810, found a place at Malmaison, and “Passage of the Bridge at Landshut,” which belongs to the same date, is now at Versailles. Hersent’s typical works, however, belong to the period of the Restoration; “Louis XVI. relieving the Afflicted” (Versailles) and “Daphnis and Chloë” (engraved by Langier and by Gelée) were both in the Salon of 1817; at that of 1819 the “Abdication of Gustavus Vasa” brought to Hersent a medal of honour, but the picture, purchased by the duke of Orleans, was destroyed at the Palais Royal in 1848, and the engraving by Henriquel-Dupont is now its sole record. “Ruth,” produced in 1822, became the property of Louis XVIII., who from the moment that Hersent rallied to the Restoration jealously patronized him, made him officer of the legion of honour, and pressed his claims at the Institute, where he replaced van Spaendonck. He continued in favour under Charles X., for whom was executed “Monks of Mount St Gotthard,” exhibited in 1824. In 1831 Hersent made his last appearance at the Salon with portraits of Louis Philippe, Marie-Amélie and the duke of Montpensier; that of the king though good, is not equal to the portrait of Spontini (Berlin), which is probably Hersent’s *chef-d’œuvre*. After this date Hersent ceased to exhibit at the yearly salons. Although in 1846 he sent an excellent likeness of Delphine

Gay and one or two other works to the rooms of the Société d'Artistes, he could not be tempted from his usual reserve even by the international contest of 1855. He died on the 2nd of October 1860.

HERSFELD, a town of Germany, in the Prussian province of Hesse-Nassau, is pleasantly situated at the confluence of the Geis and Haun with the Fulda, on the railway from Frankfort-on-Main to Bebra, 24 m. N.N.E. of Fulda. Pop. (1905) 8688. Some of the old fortifications of the town remain, but the ramparts and ditches have been laid out as promenades. The principal buildings are the Stadt Kirche, a beautiful Gothic building, erected about 1320 and restored in 1899, with a fine tower and a large bell; the old and interesting town hall (Rathaus) and the ruins of the abbey church. This church was erected on the site of the cathedral in the beginning of the 12th century; it was built in the Byzantine style and was burnt down by the French in 1761. Outside the town are the Frauenberg and the Johannesberg, on both of which are monastic ruins. Among the public institutions are a gymnasium and a military school. The town has important manufactures of cloth, leather and machinery; it has also dye-works, worsted mills and soap-boiling works.

Hersfeld owes its existence to the Benedictine abbey (see below). It became a town in the 12th century and in 1370 the burghers, having meanwhile shaken off the authority of the abbots, placed themselves under the protection of the landgraves of Hesse. It was taken and retaken during the Thirty Years' War and later it suffered from the attacks of the French.

The Benedictine abbey of Hersfeld was founded by Lullus, afterwards archbishop of Mainz, about 769. It was richly endowed by Charlemagne and became an ecclesiastical principality in the 12th century, passing under the protection of the landgraves of Hesse in 1423. It was secularized in 1648, having been previously administered for some years by a member of the ruling family of Hesse. As a secular principality Hersfeld passed to Hesse, and with electoral Hesse was united with Prussia in 1866. In the middle ages the abbey was famous for its library.

See Vigelius, *Denkwürdigkeiten von Hersfeld* (Hersfeld, 1888); Demme, *Nachrichten und Urkunden zur Chronik von Hersfeld* (Hersfeld, 1891-1901), and P. Hafner, *Die Reichsabtei Hersfeld bis zur Mitte des 13ten Jahrhunderts* (Hersfeld, 1889).

HERSTAL, or Heristal, a town of Belgium, less than 2 m. N. of Liége and practically one of its suburbs. The name is supposed to be derived from *Heerstelle*, *i.e.* "Permanent Camp." The second Pippin was born here, and this mayor of the palace acquired the control of the kingdom of the Franks. His grandson, Pippin the Short, died at Herstal in A.D. 768, and it disputes with Aix la Chapelle the honour of being the birthplace of Charlemagne. It is now a very active centre of iron and steel manufactures. The Belgian national small arms factory and cannon foundry are fixed here. Pop. (1904) 20,114.

HERTFORD, EARLS AND MARQUESSES OF. The English earldom of Hertford was held by members of the powerful family of Clare from about 1138, when Gilbert de Clare was created earl of Hertford, to 1314 when another earl Gilbert was killed at Bannockburn. In 1537 Edward Seymour, viscount Beauchamp, a brother of Henry VIII.'s queen, Jane Seymour, was created earl of Hertford, being advanced ten years later to the dignity of duke of Somerset and becoming protector of England. His son Edward (*c.* 1540-1621) was styled earl of Hertford from 1547 until the protector's attainder and death in January 1552, when the title was forfeited; in 1559, however, he was created earl of Hertford. In 1560 he was secretly married to Lady Catherine Grey (*c.* 1538-1568), daughter of Henry Grey, duke of Suffolk, and a descendant of Henry VII. Queen Elizabeth greatly disliked this union, and both husband and wife were imprisoned, while the validity of their marriage was questioned. Catherine died on the 27th of January 1568 and Hertford on the 6th of April 1621. Their son Edward, Lord Beauchamp (1561-1612), who inherited his mother's title to the English throne, predeceased his father; and the latter was succeeded in the earldom by his grandson William Seymour (1588-1660), who was created marquess of Hertford in 1640 and was restored to his ancestor's dukedom of Somerset in 1660. The title of marquess of Hertford became extinct when John, 4th duke of Somerset, died in 1675, and the earldom when Algernon, the 7th duke, died in February 1750.

In August 1750 Francis Seymour Conway, 2nd Baron Conway (1718-1794), who was a direct descendant of the protector Somerset, was created earl of Hertford; this nobleman was the son of Francis Seymour Conway (1679-1732), who had taken the name of Conway in addition to that of Seymour, and was the brother of Field-marshal Henry Seymour Conway. Hertford was ambassador to France from 1763 to 1765; was lord-lieutenant of Ireland in 1765 and 1766; and lord chamberlain of the household from 1766 to 1782. Horace Walpole speaks of his “decorum and piety” and refers to him as a “perfect courtier,” but says that he had “too great propensity to heap emoluments on his children.” In 1793 he became earl of Yarmouth and marquess of Hertford, and he died on the 14th of June 1794. His son, Francis Ingram Seymour Conway (1743-1822), who was known during his father’s lifetime as Lord Beauchamp, took a prominent part in the debates of the House of Commons from 1766 until he succeeded to the marquessate in 1794. He was sent as ambassador to Berlin and Vienna in 1793 and from 1812 to 1821 he was lord chamberlain. His son Francis Charles, the 3rd marquess (1777-1842), was an intimate friend of the prince regent, afterwards George IV., and is the original of the “Marquis of Steyne” in Thackeray’s *Vanity Fair* and of “Lord Monmouth” in Disraeli’s *Coningsby*. The 4th marquess was his son, Richard (1800-1870), whose mother was the great heiress, Maria Emily Fagniani, and whose brother was Lord Henry Seymour (1805-1859), the founder of the Jockey Club at Paris. When Richard died unmarried in Paris in August 1870 his title passed to his kinsman, Francis Hugh George Seymour (1812-1884), a descendant of the 1st marquess, whose son, Hugh de Grey (b. 1843) became 6th marquess in 1884. The 4th marquess left his great wealth and his priceless collection of art treasures to Sir Richard Wallace (1818-1890), his reputed half-brother, and Wallace’s widow, who died in 1897, bequeathed the collection to the British nation. It is now in Hertford House, formerly the London residence of the marquesses of Hertford.

HERTFORD, a market-town and municipal borough, and the county town of Hertfordshire, England, in the Hertford parliamentary division of the county, 24 m. N. from London, the terminus of branch lines of the Great Eastern and Great Northern railways. Pop. (1901) 9322. It is pleasantly situated in the valley of the river Lea. The chief buildings are the modern churches of St Andrew and of All Saints, on the sites of old ones, a town hall, corn exchange, public library, school of art and the old castle, which retains the wall and part of a tower dating from the Norman period, and is represented by a picturesque Jacobean building of brick, largely modernized. There are several educational establishments, including the preparatory school for Christ’s Hospital, a picturesque building (in great part, however, rebuilt) at the east end of the town, Hale’s grammar school, the Cowper Testimonial school, and a Green-coat school for boys and girls. Two miles S.E. is Haileybury College, one of the principal public schools of England, founded in 1805 by the East India Company for their civil service students, who were then temporarily housed in Hertford Castle. The school lies high above the Lea valley, towards Hoddesdon, in the midst of a stretch of finely-wooded country. Hertford has a considerable agricultural trade, and there are maltings, breweries, iron foundries, and oriental printing works. The town is governed by a mayor, 5 aldermen and 15 councillors. Area, 1134 acres.

Hertford (*Herutford*, *Heorotford*, *Hurtford*) was the scene of a synod in 673. Its communication with London by way of the Lea and the Thames gave it strategic importance during the Danish occupation of East Anglia. In 1066 and later it was a royal garrison and burgh. It made separate payments for aids to the Norman and Angevin kings; and in 1331 was governed by a bailiff annually elected by the commonalty. A charter incorporated the bailiffs and burgesses in 1555, and was confirmed under Elizabeth and in 1606. A charter of 1680 to the mayor, aldermen and commonalty was effective until the Municipal Corporation Act. Hertford returned two burgesses to the parliament of 1298, and to others until, after 1375/6, such right became abeyant, to be restored by order of parliament in 1623/4. One representative was lost by the Representation Act in 1868, and separate representation by the Redistribution Act in 1885. A grant of fairs in 1226 probably originated or confirmed those held in 1331 on the feasts of the Assumption and of St Simon and St Jude, their vigils and morrows, which fairs were confirmed by Elizabeth and Charles II. Another on the vigil, morrow and feast of the Nativity of the Virgin was granted by Elizabeth: its date was changed to May-day under James I. Modern fairs are on the third Saturday before Easter, the 12th of May, the 5th of July and the 8th of November. Markets were held in 1331 on Wednesday and Saturday; after 1368 on Thursday and Saturday; and they returned to Wednesdays and Saturdays in 1680.

HERTFORDSHIRE [Herts], a county of England, bounded N. by Cambridgeshire, N.W. by Bedfordshire, E. by Essex, S. by Middlesex, and S.W. by Buckinghamshire. The area is 634.6 sq. m.,

the county being the sixth smallest in England. Its aspect is always pleasant, the surface generally undulating, while in some parts, where these undulations form a quick succession of hills and valleys, the woodland scenery becomes very beautiful, as in the upper Lea valley, in the neighbourhood of Tewin near Hertford, and elsewhere. To the north-west and north considerable elevations are reached, a line of hills, facing north-westward with a sharp descent, crossing this portion of the county, and overlooking the flat lands of Bedfordshire and Cambridgeshire. They continue the line of the Chiltern Hills under the name of the East Anglian Ridge. They exceed 800 ft. near Dunstable, sinking gradually north-eastward. These uplands are generally bare, and in parts remarkably sparsely populated as compared with the home counties at large. In the greater part of the county, however, rich arable lands are intermingled with the parks and woodlands of numerous fine country seats, which impart to the county a peculiar luxuriance. Of the principal rivers, the Lea, rising beyond Luton in Bedfordshire, enters Hertfordshire near East Hyde, flows S.E. to near Hatfield, then E. by N. to Hertford and Ware, whence it bends S. and passing along the eastern boundary of the county falls into the Thames below London. It receives in its course the Maran, or Mimram, the Beane, the Rib and the Stort, all joining on the north side; the Stort for some distance forming the county boundary with Essex. The Colne flows through the south-western part of the county, to fall into the Thames at Staines. It receives the Ver, the Bulborne and the Chess. The Ivel, rising in the N.W. soon passes into Bedfordshire to join the Great Ouse. To the south of Hatfield, near North Mimms, two streams of moderate size are lost in pot-holes, except in the highest floods. The New River, one of the water supplies of London, has its source near Ware, and runs roughly parallel with the Lea. Most of the rivers are full of fish, including trout in the upper parts (of the Lea and Colne especially), which are carefully preserved.

Geology.—The rocks of Hertfordshire belong to the shallow syncline known as the London basin, the beds dipping in a south-easterly direction. The two most important formations are the Chalk, which forms the high ground in the north and west; and the Eocene Reading beds and London Clay which occupy the remaining southern part of the county. On the northern boundary, at the foot of the chalk hills, a small strip of Gault Clay and the Upper Greensand above it falls just within the county. The lowest subdivision of the chalk is the Chalk Marl, which with the Totternhoe Stone above it, lies at the base of the Chalk escarpment, by Ashwell, Pirton and Miswell to Tring. Above these beds, the Lower Chalk, without flints, rises up sharply to form the downs which are the easterly continuation of the Chiltern Hills. Next comes the Chalk Rock, which being a hard bed, lies near the hilltops by Boxmoor, Apsley End and near Baldock. The Upper Chalk slopes southward towards the Eocene boundary previously mentioned. The Reading beds consist of mottled and yellow clays and sands, the latter are frequently hardened into masses made up of pebbles in a siliceous cement, known locally as Hertfordshire puddingstone. The London Clay, a stiff blue clay which weathers brown, rests nearly everywhere upon the Reading beds. Outliers of Eocene rocks rest on the chalk at Micklefield Green, Sarrat, Bedmont, &c. The Chalk is often covered by the Clay-with-flints, a detrital deposit, formed of the remnants of Tertiary rocks and Chalk. Glacial gravels, clays and loams cover a great deal of the whole area, and the Upper Chalk itself has been disturbed at Reed and Barley by the same agency. Chalk was formerly used for building purposes; it is now burned for lime. Reading beds and London clay are dug for brick-making at Watford, Hertford and Hatfield. Phosphatic nodules have been excavated from the base of the Chalk Marl at several places along the outcrop; the Marl is worked for cement.

Climate and Agriculture.—The climate is mild, dry and generally healthy. On this account London physicians were formerly accustomed to recommend the county to persons in weak health, and it was so much coveted by the noble and wealthy as a place of residence that it was a common saying that “he who buys a home in Hertfordshire pays two years’ purchase for the air.” Of the total area about four-fifths is under cultivation, and of this more than one-third is in permanent pasture. The principal grain crop is wheat, occupying about two-fifths of the area under corn, but gradually decreasing. The varieties mostly grown are white, and they are unsurpassed by those of any English county. Wheathampstead on the upper Lea receives its name from the fine quality of the wheat grown in that district. Barley is largely used in the county for malting purposes. Vetches are grown for the London stables, and the greater part of the permanent grass is used for hay. There are some very rich pastures on the banks of the Stort, and also near Rickmansworth on the Colne. Some two-thirds of the area occupied by green crops is under turnips, swedes and mangolds, many cows being kept for the supply of milk and butter to London. The quantity of stock is generally small, but increasing except in the case of sheep, of which the numbers have greatly decreased. Of cows the most common breed is the Suffolk variety; of sheep, Southdowns, Wiltshires and a cross between Cotteswolds and Leicesters. In the south-west large quantities of cherries, apples and strawberries are grown for the London market; and on the best soils near London vegetables are forced by the aid of manure, and more than one crop is sometimes obtained in a year. A considerable industry lies in the growth of watercresses in the pure water of the upper parts of the rivers and the smaller streams. There are a number of rose-gardens and nurseries.

Other Industries.—The manufacturing industries are slight; though the great brewing establishments at Watford may be mentioned, and straw-plaiting, paper-making, coach-building, tanning and brick-making are carried on in various towns.

Communications.—Owing to its proximity to the metropolis, Hertfordshire is particularly well served by railways. On the eastern border there is the Great Eastern (Cambridge line) with branches to Hertford and to Buntingford. The main line of the Great Northern passes through the

centre by Hatfield, Stevenage and Hitchin, with branches from Hatfield to Hertford, to St Albans and to Luton and Dunstable, and from Hitchin to Baldock, Royston and so to Cambridge. The Midland passes through St Albans and Harpenden, with a branch to Hemel Hempstead. The London & North-Western traverses the south-west by Watford, Berkhampstead and Tring, with branches to Rickmansworth and to St Albans. The Metropolitan & Great Central joint line serves Rickmansworth, and suburban lines of the Great Northern the Barnet district. The existence of these communications has combined with the natural attractions of the county to cause many villages to become large residential centres. Water communications are supplied from Hertford, Ware and Bishop Stortford, southward to the Thames by the Lea and Stort Navigation; and the Grand Junction canal from London to the north-west traverses the south-western corner of the county by Rickmansworth and Berkhampstead. Three great highways from London to the north traverse the county. The Holyhead Road passes Chipping Barnet, South Mimms and St Albans, quitting the county near Dunstable. The Great North Road branches from the Holyhead Road at Barnet, and passes Potter's Bar, Hatfield, Stevenage and Baldock, with a branch from Welwyn to Hitchin and beyond. Another road follows the Lea valley to Ware, whence it runs to Royston, being here coincident with the Roman Ermine Street and known as the Old North Road.

Population and Administration.—The area of the ancient county is 406,157 acres with a population in 1891 of 220,162, and in 1901 of 250,152. The area of the administrative county is 404,518 acres. The county comprises eight hundreds. The municipal boroughs are: Hemel Hempstead (11,264), Hertford (9322), St Albans, a city (16,019). The other urban districts are: Baldock (2057), Barnet (7876), Berkhampstead (Great Berkhampstead, 5140), Bishop Stortford (7143), Bushey (4564), Cheshunt (12,292), East Barnet Valley (10,094), Harpenden (4725), Hitchin (10,072), Hoddesdon (4711), Rickmansworth (5627), Royston (3517), Sawbridgeworth (2085), Stevenage (3957), Tring (4349), Ware (5573) and Watford (29,327). The county is in the home circuit, and assizes are held at Hertford. It has two courts of quarter-sessions, and is divided into 15 petty-sessional divisions. The boroughs of Hertford and St Albans have separate commissions of the peace. The total number of civil parishes is 158. All the civil parishes within 12 m. of, or in which no portion is more than 15 m. from, Charing Cross, London, are included in the metropolitan police district. The county contains 170 ecclesiastical parishes or districts, wholly or in part; it is nearly all in the diocese of St Albans, but small parts are in the dioceses of Ely, Oxford and London. It is divided into four parliamentary divisions—Northern or Hitchin, Eastern or Hertford, Mid or St Albans, Western or Watford, each returning one member. There is no parliamentary borough within the county.

History.—Relics of Saxon occupation have been found in Hertfordshire for the most part near St Albans and Hitchin. The diocesan limits show that part of the shire was included in the West Saxon kingdom. The East Saxons, as early as the 6th century, were settled about Hertford, which in 673 was sufficiently important to be the meeting-place of a synod convened by Theodore, archbishop of Canterbury, while in 675 the Witenagemot assembled at a place which has been identified with Hatfield. In the 9th century the district was frequently visited by the Danes; and after the peace of Wedmore the country east of the Lea was included in the Danelaw; in 911 Edward the Elder erected forts on both sides of the river at Hertford.

After the battle of Hastings William advanced on Hertfordshire and ravaged as far as Berkhampstead, where the Conquest received its formal ratification. In the sweeping confiscation of estates which followed, the church was generously endowed, the abbey of St Albans alone holding 172 hides, while Count Eustace of Boulogne, the chief lay tenant, held a vast fief in the north-east of the county. Large estates were held by Geoffrey de Mandeville, and the barony of Peter de Valognes, sheriff of the county in 1086, though extending over six counties in the east of England, was returned in 1166 as a Hertfordshire barony. Berkhampstead was the head of an honour carved from the fief of Robert of Mortain. The Hertfordshire estates, however, for the most part changed hands very frequently and the county is noticeably lacking in historic families. Edmund Langley, fifth son of Edward III., was born at King's Langley in this county.

During the war between John and his barons, William, earl of Salisbury and Falkes de Breauté had the king's orders to ravage Hertfordshire, and in 1216 Hertford Castle was captured and Berkhampstead Castle besieged by Louis of France, who had come over by invitation of the barons. At the time of the rising of 1381 the abbot's tenants broke into the abbey of St Albans and forced the abbot to grant them a charter. During the Wars of the Roses, Henry VI. was defeated at St Albans in 1455; at the second battle of St Albans the earl of Warwick was defeated by Queen Margaret; and in 1471 Edward IV. again defeated the earl at Barnet. On the outbreak of the Civil War of the 17th century, Hertfordshire joined with Bedfordshire and Essex in petitioning for peace, and St Albans again played an important part in the struggle, being at different times the headquarters of Essex and Fairfax.

As a shire Hertfordshire is of purely military origin, being the district assigned to the fortress which Edward the Elder erected at Hertford. It is first mentioned in the Saxon Chronicle in 1011. At the time of the Domesday Survey the boundaries were approximately those of the present day, but part of Meppershall in Bedfordshire formed a detached portion of the shire and is still assessed for land and income tax in Hertfordshire. Of the nine Domesday hundreds, those of Danais and Tring were consolidated about 1200 under the name of Dacorum; the modern hundred of Cashio, from being held by the abbots of St Albans, was known as Albaneston, while the remaining six hundreds

correspond approximately both in name and extent with those of the present day.

Hertfordshire was originally divided between the dioceses of London and Lincoln. In 1291 that part included in the Lincoln diocese formed part of the archdeaconry of Huntingdom and comprised the deaneries of Berkhampstead, Hitchin, Hertford and Baldock, and the archdeaconry and deanery of St Albans; while that part within the London diocese formed the deanery of Braughing within the archdeaconry of Middlesex. In 1535 the jurisdiction of St Albans had been transferred to the London diocese, the division being otherwise unchanged. In 1846 the whole county was placed within the diocese of Rochester and archdeaconry of St Albans, and in the next year the deaneries of Welwyn, Bennington, Buntingford, Bishop Stortford and Ware were created, and that of Braughing abolished. In 1864 the archdeaconries of Rochester and St Albans were united under the name of the archdeaconry of Rochester and St Albans. In 1878 the county was placed in the newly created diocese of St Albans, and formed the archdeaconry of St Albans, the deaneries being unchanged.

Hertfordshire was closely associated with Essex from the time of its first settlement, and the counties paid a joint fee-farm and were united under one sheriff until 1565, the shire-court being held at Hertford. The hundred of St Albans was at an early date constituted a separate liberty, with independent courts and coroners under the control of the abbot; it preserved a separate commission of the peace until 1874, when by act of parliament the county was arranged in two divisions, the eastern division being named Hertford, and the western the liberty of St Albans. These divisions have since been abolished.

Hertfordshire has always been an agricultural county, with few manufactures, and at the time of the Domesday Survey its wealth was derived almost entirely from its rural manors, with their water meadows, woodlands, fisheries paying rent in eels, and water-mills, the shire on its eastern side being noticeably free from waste land. In Norman times the woollen trade was considerable, and the great corn market at Royston has been famous since the reign of Elizabeth. At the time of the Civil War the malting industry was largely carried on, and saltpetre was produced in the county. In the 17th century Hertfordshire was famous for its horses, and the 18th century saw the introduction of several minor industries, such as straw-plaiting, paper-making and silk weaving.

In 1290 Hertfordshire returned two members to parliament, and in 1298 the borough of Hertford was represented. St Albans, Bishop Stortford and Berkhampstead acquired representation in the 14th century, but from 1375 to 1553 no returns were made for the boroughs. St Albans regained representation in 1553 and Hertford in 1623. Under the Reform Act of 1832 the county returned three members. St Albans was disfranchised on account of bribery in 1852. Hertford lost one member in 1868, and was disfranchised by the act of 1885.

Antiquities.—Among the objects of antiquarian interest may be mentioned the cave of Royston, doubtless once used as a hermitage; Waltham Cross, erected to mark the spot where rested the body of Eleanor, queen of Edward I., on its way to Westminster for interment; and the Great Bed of Ware referred to in Shakespeare's *Twelfth Night* and preserved at Rye House. The principal monastic buildings are the noble pile of St Albans abbey; the remains of Sopwell Benedictine nunnery near St Albans, founded in 1140; the remains of the priory of Ware, dedicated to St Francis, and originally a cell to the monastery of St Ebrulf at Utica in Normandy; and the remains of the priory at Hitchin built by Edward II. for the Carmelites. Among the more interesting churches may be mentioned those of Abbots Langley and Hemel Hempstead, both of Late Norman architecture; Baldock, a handsome mixed Gothic building supposed to have been erected by the Knights Templars in the reign of Stephen; Royston, formerly connected with the priory of canons regular; Hitchin of the 15th century; Hatfield, dating from the 13th century but in the main later; Berkhampstead, chiefly in the Perpendicular style, with a tower of the 16th century. Sandridge church shows good Norman work with the use of Roman bricks; Wheathampstead church, mainly very fine Decorated, has pre-Norman remains. The remains of secular buildings of importance are those of Berkhampstead castle, Hertford castle, Hatfield palace of the bishops of Ely, the slight traces at Bishop Stortford, and the earthworks at Anstey. Among the numerous mansions of interest, Rye House, erected in the reign of Henry VI., was tenanted by Rumbold, one of the principal agents in the plot to assassinate Charles II. Moor Park, Rickmansworth, once the property of St Albans abbey, was granted by Henry VII. to John de Vere, earl of Oxford, and was afterwards the property of the duke of Monmouth, who built the present mansion, which, however, was subsequently cased with Portland stone and received various other additions. Knebworth, the seat of the Lyttons, was originally a Norman fortress, rebuilt in the time of Elizabeth in the Tudor style and restored in the 19th century. Hatfield House is the seat of the marquis of Salisbury; but its earlier history is of great interest, as is that of Theobalds near Cheshunt. Panshanger House, until recently the principal seat of the Cowpers, is a splendid mansion in Gothic style erected at the beginning of the 19th century. The manor of Cashiobury House, the seat of the earls of Essex, was formerly held by the abbot of St Albans, but the mansion was rebuilt in the beginning of the 19th century from designs by Wyatt. Gorhambury House, near St Albans, the seat of the earl of Verulam, formerly the seat of the Bacons, and the residence of the great chancellor, was rebuilt at the close of the 18th century. At Kings Langley and Hunsdon were also former royal residences.

See Sir H. Chauncy, *Historical Antiquities of Hertfordshire* (London, 1700, 2nd ed., Bishop Stortford, 1826); N. Salmon, *History of Hertfordshire* (London, 1728); R. Clutterbuck, *History and Antiquities of the County of Hertford* (London, 1815-1827); W. Berry, *Pedigrees of the Hertfordshire*

Families (London, 1844); J. E. Cussans, *History of Hertfordshire* (London, 1870-1881); *Victoria County History, Hertfordshire* (London, 1902, &c.); see also "Visitation of Hertfordshire, 1572-1634," in *Harleian Society's Publ.* vol. xvii., and various papers in *Middlesex and Hertfordshire Notes and Queries* (1895-1898), which in January 1899 was incorporated in the *Home Counties* Magazine.

HERTHA, or NERTHUS, in Teutonic mythology, the goddess of fertility, "Mother Earth." Tacitus states that many Teutonic tribes worshipped her with orgies and mysterious rites celebrated at night. The chief seat of her cult was an island which has not been identified. A single priest performed the service. Her veiled statue was moved from place to place by sacred cows on which none but the priest might lay hands. At the conclusion of the rites the image, its vestments and its vehicle were bathed in a lake.

HERTZ, HEINRICH RUDOLF (1857-1894), German physicist, was born at Hamburg on the 22nd of February 1857. On leaving school he determined to adopt the profession of engineering, and in the pursuance of this decision went to study in Munich in 1877. But soon coming to the conclusion that engineering was not his vocation he abandoned it in favour of physical science, and in October 1878 began to attend the lectures of G. R. Kirchhoff and H. von Helmholtz at Berlin. In preparation for these he spent the winter of 1877-1878 in reading up original treatises like those of Laplace and Lagrange on mathematics and mechanics, and in attending courses on practical physics under P. G. von Jolly and J. F. W. von Bezold; the consequence was that within a few days of his arrival in Berlin in October 1878 he was able to plunge into original research on a problem of electric inertia. For the best solution a prize was offered by the philosophical faculty of the University, and this he succeeded in winning with the paper which was published in 1880 on the "Kinetic Energy of Electricity in Motion." His next investigation, on "Induction in Rotating Spheres," he offered in 1880 as his dissertation for his doctor's degree, which he obtained with the rare distinction of *summa cum laude*. Later in the same year he became assistant to Helmholtz in the physical laboratory of the Berlin Institute. During the three years he held this position he carried out researches on the contact of elastic solids, hardness, evaporation and the electric discharge in gases, the last earning him the special commendation of Helmholtz. In 1883 he went to Kiel, becoming *Privatdozent*, and there he began the studies in Maxwell's electromagnetic theory which a few years later resulted in the discoveries that rendered his name famous. These were actually made between 1885 and 1889, when he was professor of physics in the Carlsruhe Polytechnic. He himself recorded that their origin is to be sought in a prize problem proposed by the Berlin Academy of Sciences in 1879, having reference to the experimental establishment of some relation between electromagnetic forces and the dielectric polarization of insulators. Imagining that this would interest Hertz and be successfully attacked by him, Helmholtz specially drew his attention to it, and promised him the assistance of the Institute if he decided to work on the subject; but Hertz did not take it up seriously at that time, because he could not think of any procedure likely to prove effective. It was of course well known, as a necessity of Maxwell's mathematical theory, that the polarization and depolarization of an insulator must give rise to the same electromagnetic effects in the neighbourhood as a voltaic current in a conductor. The experimental proof, however, was still lacking, and though several experimenters had come very near its discovery, Hertz was the first who actually succeeded in supplying it, in 1887. Continuing his inquiries for the next year or two, he was able to discover the progressive propagation of electromagnetic action through space, to measure the length and velocity of electromagnetic waves, and to show that in the transverse nature of their vibration and their susceptibility to reflection, refraction and polarization they are in complete correspondence with the waves of light and heat. The result, was in Helmholtz's words, to establish beyond doubt that ordinary light consists of electrical vibrations in an all-pervading ether which possesses the properties of an insulator and of a magnetic medium. Hertz himself gave an admirable account of the significance of his discoveries in a lecture on the relations between light and electricity, delivered before the German Society for the Advancement of Natural Science and Medicine at Heidelberg in September 1889. Since the time of these early experiments, various other modes of detecting the existence of electric waves have been found out in addition to the spark-gap which he first employed, and the results of his observations, the earliest interest of which was simply that they afforded a confirmation of an abstruse mathematical theory, have been applied to the practical purposes of signalling over considerable distances (see TELEGRAPHY, WIRELESS). In 1889 Hertz was appointed to succeed R. J. E. Clausius as ordinary professor of physics in the university of Bonn. There he continued his researches on the discharge of electricity in rarefied gases, only just missing the discovery of the X-rays described by W. C. Röntgen a few years later, and produced his treatise

on the *Principles of Mechanics*. This was his last work, for after a long illness he died at Bonn on the 1st of January 1894. By his premature death science lost one of her most promising disciples. Helmholtz thought him the one of all his pupils who had penetrated farthest into his own circle of scientific thought, and looked to him with the greatest confidence for the further extension and development of his work.

Hertz's scientific papers were translated into English by Professor D. E. Jones, and published in three volumes: *Electric Waves* (1893), *Miscellaneous Papers* (1896), and *Principles of Mechanics* (1899). The preface contributed to the first of these by Lord Kelvin, and the introductions to the second and third by Professors P. E. A. Lenard and Helmholtz, contain many biographical details, together with statements of the scope and significance of his investigations.

HERTZ, HENRIK (1797-1870), Danish poet, was born of Jewish parents in Copenhagen on the 25th of August 1798. In 1817 he was sent to the university. His father died in his infancy, and the family property was destroyed in the bombardment of 1807. The boy was brought up by his relative, M. L. Nathanson, a well-known newspaper editor. Young Hertz passed his examination in law in 1825. But his taste was all for polite literature, and in 1826-1827 two plays of his were produced, *Mr Burchardt and his Family* and *Love and Policy*; in 1828 followed the comedy of *Flyttedagen*. In 1830 he brought out what was a complete novelty in Danish literature, a comedy in rhymed verse, *Amor's Strokes of Genius*. In the same year Hertz published anonymously *Gengangerbrevene*, or Letters from a Ghost, which he pretended were written by Baggesen, who had died in 1826. The book was written in defence of J. L. Heiberg, and was full of satirical humour and fine critical insight. Its success was overwhelming; but Hertz preserved his anonymity, and the secret was not known until many years later. In 1832 he published a didactic poem, *Nature and Art*, and *Four Poetical Epistles*. *A Day on the Island of Als* was his next comedy, followed in 1835 by *The Only Fault*. Hertz passed through Germany and Switzerland into Italy in 1833; he spent the winter there, and returned the following autumn through France to Denmark. In 1836 his comedy of *The Savings Bank* enjoyed a great success. But it was not till 1837 that he gave the full measure of his genius in the romantic national drama of *Svend Dyrings Hus*, a beautiful and original piece. His historical tragedy *Valdemar Atterdag* was not so well received in 1839; but in 1845 he achieved an immense success with his lyrical drama *Kong René's Datter* (King René's Daughter), which has been translated into almost every European language. To this succeeded the tragedy of *Ninon* in 1848, the romantic comedy of *Tonietta* in 1849, *A Sacrifice* in 1853, *The Youngest* in 1854. His lyrical poems appeared in successive collections, dated 1832, 1840 and 1844. From 1858 to 1859 he edited a literary journal entitled *Weekly Leaves*. His last drama, *Three Days in Padua*, was produced in 1869, and he died on the 25th of February of the next year.

Hertz is one of the first of Danish lyrical poets. His poems are full of colour and passion, his versification has more witchcraft in it than any other poet's of his age, and his style is grace itself. He has all the sensuous fire of Keats without his proclivity to the antique. As a romantic dramatist he is scarcely less original. He has bequeathed to the Danish theatre, in *Svend Dyrings Hus* and *King René's Daughter*, two pieces which have become classic. He is a troubadour by instinct; he has little or nothing of Scandinavian local colouring, and succeeds best when he is describing the scenery or the emotions of the glowing south.

His *Dramatic Works* (18 vols.) were published at Copenhagen in 1854-1873; and his *Poems* (4 vols.) in 1851-1862.

HERTZBERG, EWALD FRIEDRICH, Count Von (1725-1795), Prussian statesman, who came of a noble family which had been settled in Pomerania since the 13th century, was born at Lottin, in that province, on the 2nd of September 1725. After 1739 he studied, chiefly classics and history at the gymnasium at Stettin, and in 1742 entered the university of Halle as a student of jurisprudence, becoming in due course a doctor of laws in 1745. In addition to this principal study, he was also interested while at the university in historical and philosophical (Christian Wolff) studies. A first thesis for his doctorate, entitled *Jus publicum Brandenburgicum*, was not printed, because it contained a criticism of the existing condition of the state. Shortly afterwards Hertzberg entered the government service, in which he was first employed in the department of the state archives (of which he became director in 1750), soon after in the foreign office, and finally in 1763 as chief minister (*Cabinetsminister*). In 1752 he married Baroness Marie von Knyphausen, a marriage which was happy, but childless.

For more than forty years Hertzberg played an active part in the Prussian foreign office. In this

capacity he had a decisive influence on Prussian policy, both under Frederick the Great and Frederick William II. At the beginning of the Seven Years' War (1756) he took part as a political writer in the Hohenzollern-Habsburg quarrel, both in his *Ursachen, die S.K.M. in Preussen bewogen haben, sich wider die Absichten des Wienerischen Hofes zu setzen und deren Ausführung zuvorzukommen* ("Motives which have induced the king of Prussia to oppose the intentions of the court of Vienna, and to prevent them from being carried into effect"), and in his *Mémoire raisonné sur la conduite des cours de Vienne et de Saxe*, based on the secret papers taken by Frederick the Great from the archives of Dresden. After the defeat at Kolin (1757) he hastened to Pomerania in order to organize the national defence there and collect the necessary troops for the protection of the fortresses of Stettin and Colberg. In the same year he conducted the peace negotiations with Sweden, and was of great service in bringing about the peace of Hubertsburg (1763), on the conclusion of which the king received him with the words, "I congratulate you. You have made peace as I made war, one against many."

In the later years, too, of Frederick the Great's reign, Hertzberg played a considerable part in foreign policy. In 1772, in a memoir based upon comprehensive historical studies, he defended the Prussian claims to certain provinces of Poland. He also took part successfully as a publicist in the negotiations concerning the question of the Bavarian succession (1778) and those of the peace of Teschen (1779). But in 1780 he failed to uphold Prussian interests at the election of the bishop of Münster. In 1784 appeared Hertzberg's memoir containing a thorough study of the *Fürstenbund*. He championed this latest creation of Frederick the Great's mainly with a view to an energetic reform of the empire, though the idea of German unity was naturally still far from his mind. In 1785 followed "An explanation of the motives which have led the king of Prussia to propose to the other high estates of the empire an association for the maintenance of the system of the empire" (*Erklärung der Ursachen, welche S.M. in Preussen bewogen haben, ihren hohen Mitständen des Reichs eine Association zur Erhaltung des Reichssystems anzutragen*). By upholding the Fürstenbund Hertzberg made many enemies, prominent among whom was the king's brother, Prince Henry. Though the *Fürstenbund* failed to effect a reform of the empire, it at any rate prevented the fulfilment of Joseph II.'s old desire for the incorporation of Bavaria with Austria. The last act of state in which Hertzberg took part under Frederick the Great was the commercial treaty concluded in 1785 between Prussia and the United States.

With Frederick, especially in his later years, Hertzberg stood in very intimate personal relations and was often the king's guest at Sans-Souci. Under Frederick William II. his influential position at the court of Berlin was at first unshaken. The king at once received him with favour, as is clearly proved by Hertzberg's elevation to the rank of count in 1786; and Mirabeau would never have attacked him with such violence in his *Secret History of the Court of Berlin*, which appeared in 1788, if he had not seen in him the most powerful man after the king. In this attack Mirabeau seems to have been influenced by Hertzberg's personal enemies at the court. Hertzberg's political system remained on the whole the same under Frederick William II. as it had been under his predecessor. It was mainly characterized by a sharp opposition to the house of Habsburg and by a desire to win for Prussia the support of England, a policy supported by him in important memoirs of the years 1786 and 1787. His diplomacy was directed also against Austria's old ally, France. Hence it was chiefly owing to Hertzberg that in 1787, in spite of the king's unwillingness at first, Prussia intervened in Holland in support of the stadtholder William V. against the democratic French party (see Holland: *History*). The success of this intervention, which was the practical realization of a plan very characteristic of Hertzberg, marks the culminating point in his career.

But the opposition between him and the new king, which had already appeared at the time of the conclusion of the triple alliance between Holland, England and Prussia, became more marked in the following years, when Hertzberg, relying upon this alliance, and in conscious imitation of Frederick II.'s policy at the time of the first partition of Poland, sought to take advantage of the entanglement of Austria with Russia in the war with Turkey to secure for Prussia an extension of territory by diplomatic intervention. According to his plan, Prussia was to offer her mediation at the proper moment, and in the territorial readjustments that the peace would bring, was to receive Danzig and Thorn as her portion. Beyond this he aimed at preventing the restoration of the hegemony of Austria in the Empire, and secretly cherished the hope of restoring Frederick the Great's Russian alliance.

With a curious obstinacy he continued to pursue these aims even when, owing to military and diplomatic events, they were already partly out of date. His personal position became increasingly difficult, as deep-rooted differences between him and the king were revealed during these diplomatic campaigns. Hertzberg wished to effect everything by peaceful means, while Frederick William II. was for a time determined on war with Austria. As regards Polish policy, too, their ideas came into conflict, Hertzberg having always been openly opposed to the total annihilation of the Polish kingdom. The same is true of the attitude of king and minister towards Great Britain. At the conferences at Reichenbach in the summer of 1790, this opposition became more and more acute, and Hertzberg was only with difficulty persuaded to come to an agreement merely on the basis of the *status* quo, as demanded by Pitt. The king's renunciation of any extension of territory was in Hertzberg's eyes impolitic, and this view of his was later endorsed by Bismarck. A letter which came to the eyes of the king, in which Hertzberg severely criticized the king's foreign policy, and especially his plans for attacking Russia, led to his dismissal on the 5th of July 1791. He afterwards made several attempts to exert an influence over foreign affairs, but in vain. The king showed

himself more and more personally hostile to the ex-minister, and in later years pursued Hertzberg, now quite embittered, with every kind of petty persecution, even ordering his letters to be opened.

Even in his literary interests Hertzberg found an adversary in the ungrateful king, for Frederick William, to give one instance, made it so difficult for him to use the archives that in the end Hertzberg entirely gave up the attempt. He found, however, some recompense for all his disillusionment and discouragement in learning, and, Wilhelm von Humboldt excepted, he was the most learned of all the Prussian ministers. As a member of the Berlin Academy especially, and, from 1786 onwards, as its curator, Hertzberg carried on a great and valuable activity in the world of learning. His yearly reports dealt with history, statistics and political science. The most interesting is that of 1784: *Sur la forme des gouvernements, et quelle est la meilleure*. This is directed exclusively against the absolute system (following Montesquieu), upholds a limited monarchy, and is in favour of extending to the peasants the right to be represented in the diet. He spoke for the last time in 1793 on Frederick the Great and the advantages of monarchy. After 1783 these discourses caused a great sensation, since Hertzberg introduced into them a review of the financial situation, which in the days of absolutism seemed an unprecedented innovation. Besides this, Hertzberg exerted himself as an academician to change the strongly French character of the Academy and make it into a truly German institution. He showed a keen interest in the old German language and literature. A special "German deputation" was set aside at the Academy and entrusted with the drawing up of a German grammar and dictionary. He also stood in very close relations with many of the German poets of the time, and especially with Daniel Schubart. Among the German historians in whom he took a great interest, he had the greatest esteem for Pufendorf. He was equally concerned in the improvement of the state of education. In 1780 he boldly took up the defence of German literature, which had been disparaged by Frederick the Great in his famous writing *De la littérature allemande*.

Hertzberg's frank and honourable nature little fitted him to be a successful diplomatist; but the course of history has justified many of his aims and ideals, and in Prussia his memory is honoured. He died at Berlin on the 22nd of May 1795.

AUTHORITIES.—(1) By Hertzberg himself: The *Mémoires de l'Académie* from 1780 on contain Hertzberg's discourses. The most noteworthy of them were printed in 1787. Here too is to be found: *Histoire de la dissertation* [*du roi*] *sur la littérature allemande*; see also *Recueil des déductions, &c., qui ont été rédigés ... pour la cour de Prusse par le ministre* (3 vols., 1789-1795); and an "Autobiographical Sketch" published by Höpke in Schmidt's *Zeitschrift für Geschichtswissenschaft*, i. (1843). (2) Works dealing specially with Hertzberg: Mirabeau, *Histoire secrète de la cour de Berlin* (1788); P. F. Weddigen, *Hertzbergs Leben* (Bremen, 1797); E. L. Posselt, *Hertzbergs Leben* (Tübingen, 1798); H. Lehmann, in *Neustettiner Programm* (1862); E. Fischer, in *Staatsanzeiger* (1873); M. Duncker, in *Historische Zeitschrift* (1877); Paul Bailleu, in *Historische Zeitschrift* (1879); and *Allgemeine deutsche Biographie* (1880); H. Petrich, *Pommersche Lebensbilder* i. (1880); G. Dressler, *Friedrich II. und Hertzberg in ihrer Stellung zu den holländischen Wirren*, Breslauer Dissertation (1882); K. Krauel, *Hertzberg als Minister Friedrich Wilhelms II.* (Berlin, 1899); F. K. Wittichen, in *Historische Vierteljahrschrift*, 9 (1906); A. Th. Preuss, *Ewald Friedrich, Graf von Hertzberg* (Berlin, 1909). (3) General works: F. K. Wittichen, *Preussen und England, 1785-1788* (Heidelberg, 1902); F. Luckwaldt, *Die englisch-preussische Allianz von 1788 in den Forschungen zur brandenburgisch-preussischen Geschichte*, Bd. 15, and in the *Delbrückfestschrift* (Berlin, 1908); L. Sevin, *System der preussischen Geheimpolitik* 1790-1791 (Heidelberger Dissertation, 1903); P. Wittichen, *Die polnische Politik Preussens 1788-1790* (Berlin, 1899); F. Andreae, *Preussische und russische Politik in Polen* 1787-1789 (Berliner Dissertation, 1905); also W. Wenck, *Deutschland vor 100 Jahren* (2 vols., 1887, 1890); A. Harnack, *Geschichte der preussischen Akademie* (4 vols., 1899); Consentius, *Preussische Jahrbücher* (1904); J. Hashagen, "Hertzbergs Verhältnis zur deutschen Literatur," in *Zeitschrift für deutsche Philologie* for 1903.

(J. HN.)

HERTZEN, ALEXANDER (1812-1870), Russian author, was born at Moscow, a very short time before the occupation of that city by the French. His father, Ivan Yakovlef, after a personal interview with Napoleon, was allowed to leave, when the invaders arrived, as the bearer of a letter from the French to the Russian emperor. His family attended him to the Russian lines. Then the mother of the infant Alexander (a young German Protestant of Jewish extraction from Stuttgart, according to A. von Wurzbach), only seventeen years old, and quite unable to speak Russian, was forced to seek shelter for some time in a peasant's hut. A year later the family returned to Moscow, where Hertzen passed his youth—remaining there, after completing his studies at the university, till 1834, when he was arrested and tried on a charge of having assisted, with some other youths, at a festival during which verses by Sokolovsky, of a nature uncomplimentary to the emperor, were sung. The special commission appointed to try the youthful culprits found him guilty, and in 1835 he was banished to Viatka. There he remained till the visit to that city of the hereditary grand-duke (afterwards Alexander II.), accompanied by the poet Joukofsky, led to his being allowed to quit Viatka for

Vladimir, where he was appointed editor of the official gazette of that city. In 1840 he obtained a post in the ministry of the interior at St Petersburg; but in consequence of having spoken too frankly about a death due to a police officer's violence, he was sent to Novgorod, where he led an official life, with the title of "state councillor," till 1842. In 1846 his father died, leaving him by his will a very large property. Early in 1847 he left Russia, never to return. From Italy, on hearing of the revolution of 1848, he hastened to Paris, whence he afterwards went to Switzerland. In 1852 he quitted Geneva for London, where he settled for some years. In 1864 he returned to Geneva, and after some time went to Paris, where he died on the 21st of January 1870.

His literary career began in 1842 with the publication of an essay, in Russian, on *Dilettantism in Science*, under the pseudonym of "Iskander," the Turkish form of his Christian name—convicts, even when pardoned, not being allowed in those days to publish under their own names. His second work, also in Russian, was his *Letters on the Study of Nature* (1845-1846). In 1847 appeared, his novel *Kto Vinovat?* (Whose Fault?), and about the same time were published in Russian periodicals the stories which were afterwards collected and printed in London in 1854, under the title of *Prervannuie Razskazui* (Interrupted Tales). In 1850 two works appeared, translated from the Russian manuscript, *Vom anderen Ufer* (From another Shore) and *Lettres de France et d'Italie*. In French appeared also his essay *Du Développement des idées révolutionnaires en Russie*, and his *Memoirs*, which, after being printed in Russian, were translated under the title of *Le Monde russe et la Révolution* (3 vols., 1860-1862), and were in part translated into English as *My Exile to Siberia* (2 vols., 1855). From a literary point of view his most important work is *Kto Vinovat?* a story describing how the domestic happiness of a young tutor, who marries the unacknowledged daughter of a Russian sensualist of the old type, dull, ignorant and genial, is troubled by a Russian sensualist of the new school, intelligent, accomplished and callous, without there being any possibility of saying who is most to be blamed for the tragic termination. But it was as a political writer that Hertzen gained the vast reputation which he at one time enjoyed. Having founded in London his "Free Russian Press," of the fortunes of which, during ten years, he gave an interesting account in a book published (in Russian) in 1863, he issued from it a great number of Russian works, all levelled against the system of government prevailing in Russia. Some of these were essays, such as his *Baptized Property*, an attack on serfdom; others were periodical publications, the *Polyarnaya Zvyezda* (or Polar Star), the *Kolokol* (or Bell), and the *Golosa iz Rossii* (or Voices from Russia). The *Kolokol* soon obtained an immense circulation, and exercised an extraordinary influence. For three years, it is true, the founders of the "Free Press" went on printing, "not only without selling a single copy, but scarcely being able to get a single copy introduced into Russia"; so that when at last a bookseller bought ten shillings' worth of *Baptized Property*, the half-sovereign was set aside by the surprised editors in a special place of honour. But the death of the emperor Nicholas in 1855 produced an entire change. Hertzen's writings, and the journals he edited, were smuggled wholesale into Russia, and their words resounded throughout that country, as well as all over Europe. Their influence became overwhelming. Evil deeds long hidden, evil-doers who had long prospered, were suddenly dragged into light and disgrace. His bold and vigorous language aptly expressed the thoughts which had long been secretly stirring Russian minds, and were now beginning to find a timid utterance at home. For some years his influence in Russia was a living force, the circulation of his writings was a vocation zealously pursued. Stories tell how on one occasion a merchant, who had bought several cases of sardines at Nijni-Novgorod, found that they contained forbidden print instead of fish, and at another time a supposititious copy of the *Kolokol* was printed for the emperor's special use, in which a telling attack upon a leading statesman, which had appeared in the genuine number, was omitted. At length the sweeping changes introduced by Alexander II. greatly diminished the need for and appreciation of Hertzen's assistance in the work of reform. The freedom he had demanded for the serfs was granted, the law-courts he had so long denounced were remodelled, trial by jury was established, liberty was to a great extent conceded to the press. It became clear that Hertzen's occupation was gone. When the Polish insurrection of 1863 broke out, and he pleaded the insurgents' cause, his reputation in Russia received its death-blow. From that time it was only with the revolutionary party that he was in full accord.

In 1873 a collection of his works in French was commenced in Paris. A volume of posthumous works, in Russian, was published at Geneva in 1870. His *Memoirs* supply the principal information about his life, a sketch of which appears also in A. von Wurzbach's *Zeitgenossen*, pt. 7 (Vienna, 1871). See also the *Revue des deux mondes* for July 15 and Sept. 1, 1854. *Kto Vinovat?* has been translated into German under the title of *Wer ist schuld?* in Wolffsohn's *Russlands Novellendichter*, vol. iii. The title of *My Exile in Siberia* is misleading; he was never in that country.

(W. R. S.-R.)

HERULI, a Teutonic tribe which figures prominently in the history of the migration period. The name does not occur in writings of the first two centuries A.D. Where the original home of the Heruli was situated is never clearly stated. Jordanes says that they had been expelled from their territories by the Danes, from which it may be inferred that they belonged either to what is now the kingdom of

Denmark, or the southern portion of the Jutish peninsula. They are mentioned first in the reign of Gallienus (260-268), when we find them together with the Goths ravaging the coasts of the Black Sea and the Aegean. Shortly afterwards, in A.D. 289, they appear in the region about the mouth of the Rhine. During the 4th century they frequently served together with the Batavi in the Roman armies. In the 5th century we again hear of piratical incursions by the Heruli in the western seas. At the same time they had a kingdom in central Europe, apparently in or round the basin of the Elbe. Together with the Thuringi and Warni they were called upon by Theodoric the Ostrogoth about the beginning of the 6th century to form an alliance with him against the Frankish king Clovis, but very shortly afterwards they were completely overthrown in war by the Langobardi. A portion of them migrated to Sweden, where they settled among the Götar, while others crossed the Danube and entered the Roman service, where they are frequently mentioned later in connexion with the Gothic wars. After the middle of the 6th century, however, their name completely disappears. It is curious that in English, Frankish and Scandinavian works they are never mentioned, and there can be little doubt that they were known, especially among the western Teutonic peoples, by some other name. Probably they are identical either with the North Suabi or with the Iuti. The name Heruli itself is identified by many with the A.S. *eorlas* (nobles), O.S. *erlos* (men), the singular of which (erilaz) frequently occurs in the earliest Northern inscriptions, apparently as a title of honour. The Heruli remained heathen until the overthrow of their kingdom, and retained many striking primitive customs. When threatened with death by disease or old age, they were required to call in an executioner, who stabbed them on the pyre. Suttee was also customary. They were entirely devoted to warfare and served not only in the Roman armies, but also in those of all the surrounding nations. They disdained the use of helmets and coats of mail, and protected themselves only with shields.

See Georgius Syncellus; Mamertinus *Paneg. Maximi*; Ammianus Marcellinus; Zosimus i. 39; Idatius, *Chronica*; Jordanes, *De origine Getarum*; Procopius, esp. *Bellum Goticum*, ii. 14 f.; *Bellum Persicum*, ii. 25; Paulus Diaconus, *Hist. Langobardorum*, i. 20; K. Zeuss, *Die Deutschen und die Nachbarstämme*, pp. 476 ff. (Munich, 1837).

(F. G. M. B.)

HERVÁS Y PANDURO, LORENZO (1735-1809), Spanish philologist, was born at Horcajo (Cuenca) on the 10th of May 1735. He joined the Jesuits on the 29th of September 1745 and in course of time became successively professor of philosophy and humanities at the seminaries of Madrid and Murcia. When the Jesuit order was banished from Spain in 1767, Hervás settled at Forli, and devoted himself to the first part of his *Idea dell' Universo* (22 vols., 1778-1792). Returning to Spain in 1798, he published his famous *Catálogo de las lenguas de las naciones conocidas* (6 vols., 1800-1805), in which he collected the philological peculiarities of three hundred languages and drew up grammars of forty languages. In 1802 he was appointed librarian of the Quirinal Palace in Rome, where he died on the 24th of August 1809. Max Müller credits him with having anticipated Humboldt, and with making "one of the most brilliant discoveries in the history of the science of language" by establishing the relation between the Malay and Polynesian family of speech.

HERVEY, JAMES (1714-1758), English divine, was born at Hardingstone, near Northampton, on the 26th of February 1714, and was educated at the grammar school of Northampton, and at Lincoln College, Oxford. Here he came under the influence of John Wesley and the Oxford methodists; ultimately, however, while retaining his regard for the men and his sympathy with their religious aims, he adopted a thoroughly Calvinistic creed, and resolved to remain in the Anglican Church. Having taken orders in 1737, he held several curacies, and in 1752 succeeded his father in the family livings of Weston Favell and Collingtree. He was never robust, but was a good parish priest and a zealous writer. His style is often bombastic, but he displays a rare appreciation of natural beauty, and his simple piety made him many friends. His earliest work, *Meditations and Contemplations*, said to have been modelled on Robert Boyle's *Occasional Reflexions on various Subjects*, within fourteen years passed through as many editions. *Theron and Aspasio, or a series of Letters upon the most important and interesting Subjects*, which appeared in 1755, and was equally well received, called forth some adverse criticism even from Calvinists, on account of tendencies which were considered to lead to antinomianism, and was strongly objected to by Wesley in his *Preservative against unsettled Notions in Religion*. Besides carrying into England the theological disputes to which the *Marrow of Modern Divinity* had given rise in Scotland, it also led to what is known as the Sandemanian controversy as to the nature of saving faith. Hervey died on the 25th of December 1758.

A "new and complete" edition of his *Works*, with a memoir, appeared in 1797. See also *Collection*

of the Letters of James Hervey, to which is prefixed an account of his Life and Death, by Dr Birch (1760).

HERVEY DE SAINT DENYS, MARIE JEAN LÉON, Marquis d' (1823-1892), French Orientalist and man of letters, was born in Paris in 1823. He devoted himself to the study of Chinese, and in 1851 published his *Recherches sur l'agriculture et l'horticulture des Chinois*, in which he dealt with the plants and animals that might be acclimatized in the West. At the Paris Exhibition of 1867 he acted as commissioner for the Chinese exhibits; in 1874 he succeeded Stanislas Julien in the chair of Chinese at the Collège de France; and in 1878 he was elected a member of the Académie des Inscriptions et de Belles-Lettres. His works include *Poésies de l'époque des T'ang* (1862), translated from the Chinese; *Ethnographie des peuples étrangers à la Chine*, translated from Ma-Touan-Lin (1876-1883); *Li-Sao* (1870), from the Chinese; *Mémoires sur les doctrines religieuse; de Confucius et de l'école des lettres* (1887); and translations of some Chinese stories not of classical interest but valuable for the light they throw on oriental custom. Hervey de Saint Denys also translated some works from the Spanish, and wrote a history of the Spanish drama. He died in Paris on the 2nd of November 1892.

HERVEY OF ICKWORTH, JOHN HERVEY, Baron (1696-1743), English statesman and writer, eldest son of John, 1st earl of Bristol, by his second marriage, was born on the 13th of October 1696. He was educated at Westminster school and at Clare Hall, Cambridge, where he took his M.A. degree in 1715. In 1716 his father sent him to Paris, and thence to Hanover to pay his court to George I. He was a frequent visitor at the court of the prince and princess of Wales at Richmond, and in 1720 he married Mary Lepell, who was one of the princess's ladies-in-waiting, and a great court beauty. In 1723 he received the courtesy title of Lord Hervey on the death of his half-brother Carr, and in 1725 he was elected M.P. for Bury St Edmunds. He had been at one time on very friendly terms with Frederick, prince of Wales, but from 1731 he quarrelled with him, apparently because they were rivals in the favour of Anne Vane. These differences probably account for the scathing picture he draws of the prince's callous conduct. Hervey had been hesitating between William Pulteney (afterwards earl of Bath) and Walpole, but in 1730 he definitely took sides with Walpole, of whom he was thenceforward a faithful adherent. He was assumed by Pulteney to be the author of *Sedition and Defamation display'd with a Dedication to the patrons of The Craftsman* (1731). Pulteney, who, up to this time, had been a firm friend of Hervey, replied with *A Proper Reply to a late Scurrilous Libel*, and the quarrel resulted in a duel from which Hervey narrowly escaped with his life. Hervey is said to have denied the authorship of both the pamphlet and its dedication, but a note on the MS. at Ickworth, apparently in his own hand, states that he wrote the latter. He was able to render valuable service to Walpole from his influence over the queen. Through him the minister governed Queen Caroline and indirectly George II. Hervey was vice-chamberlain in the royal household and a member of the privy council. In 1733 he was called to the House of Lords by writ in virtue of his father's barony. In spite of repeated requests he received no further preferment until after 1740, when he became lord privy seal. After the fall of Sir Robert Walpole he was dismissed (July 1742) from his office. An excellent political pamphlet, *Miscellaneous Thoughts on the present Posture of Foreign and Domestic Affairs*, shows that he still retained his mental vigour, but he was liable to epilepsy, and his weak appearance and rigid diet were a constant source of ridicule to his enemies. He died on the 5th of August 1743. He predeceased his father, but three of his sons became successively earls of Bristol.

Hervey wrote detailed and brutally frank memoirs of the court of George II. from 1727 to 1737. He gave a most unflattering account of the king, and of Frederick, prince of Wales, and their family squabbles. For the queen and her daughter, Princess Caroline, he had a genuine respect and attachment, and the princess's affection for him was commonly said to be the reason for the close retirement in which she lived after his death. The MS. of Hervey's memoirs was preserved by the family, but his son, Augustus John, 3rd earl of Bristol, left strict injunctions that they should not be published until after the death of George III. In 1848 they were published under the editorship of J. W. Croker, but the MS. had been subjected to a certain amount of mutilation before it came into his hands. Croker also softened in some cases the plainspokenness of the original. Hervey's bitter account of court life and intrigues resembles in many points the memoirs of Horace Walpole, and the two books corroborate one another in many statements that might otherwise have been received with suspicion.

Until the publication of the *Memoirs* Hervey was chiefly known as the object of savage satire on the part of Pope, in whose works he figured as Lord Fanny, Sporus, Adonis and Narcissus. The

quarrel is generally put down to Pope's jealousy of Hervey's friendship with Lady Mary Wortley Montagu. In the first of the *Imitations of Horace*, addressed to William Fortescue, "Lord Fanny" and "Sappho" were generally identified with Hervey and Lady Mary, although Pope denied the personal intention. Hervey had already been attacked in the *Dunciad* and the *Bathos*, and he now retaliated. There is no doubt that he had a share in the *Verses to the Imitator of Horace* (1732) and it is possible that he was the sole author. In the *Letter from a nobleman at Hampton Court to a Doctor of Divinity* (1733), he scoffed at Pope's deformity and humble birth. Pope's reply was a *Letter to a Noble Lord*, dated November 1733, and the portrait of Sporus in the *Epistle to Dr Arbuthnot* (1735), which forms the prologue to the satires. Many of the insinuations and insults contained in it are borrowed from Pulteney's libel. The malicious caricature of Sporus does Hervey great injustice, and he is not much better treated by Horace Walpole, who in reporting his death in a letter (14th of August 1743) to Horace Mann, said he had outlived his last inch of character. Nevertheless his writings prove him to have been a man of real ability, condemned by Walpole's tactics and distrust of able men to spend his life in court intrigue, the weapons of which, it must be owned, he used with the utmost adroitness. His wife Lady Hervey [Molly Lepell] (1700-1768), of whom an account is to be found in Lady Louisa Stuart's *Anecdotes*, was a warm partisan of the Stuarts. She retained her wit and charm throughout her life, and has the distinction of being the recipient of English verses by Voltaire.

See Hervey's *Memoirs of the Court of George II.*, edited by J. W. Croker (1848); and an article by G. F. Russell Barker in the *Dict. Nat. Biog.* (vol. xxvi., 1891). Besides the *Memoirs* he wrote numerous political pamphlets, and some occasional verses.

HERVIEU, PAUL (1857-), French dramatist and novelist, was born at Neuilly (Seine) on the 2nd of November 1857. He was called to the bar in 1877, and, after serving some time in the office of the president of the council, he qualified for the diplomatic service, but resigned on his nomination in 1881 to a secretaryship in the French legation in Mexico. He contributed novels, tales and essays to the chief Parisian papers and reviews, and published a series of clever novels, including *L'Inconnu* (1887), *Flirt* (1890), *L'Exorcisée* (1891), *Peints par eux-mêmes* (1893), an ironical study written in the form of letters, and *L'Armature* (1895), dramatized in 1905 by Eugène Brieux. But his most important work consists of a series of plays: *Les Paroles restent* (Vaudeville, 17th of November 1892); *Les Tenailles* (Théâtre Français, 28th of September 1895); *La Loi de l'homme* (Théâtre Français, 15th of February 1897); *La Course du flambeau* (Vaudeville, 17th of April 1901); *Point de lendemain* (Odéon, 18th of October 1901), a dramatic version of a story by Vivaut Denon; *L'Énigme* (Théâtre Français, 5th of November 1901); *Théroigne de Méricourt* (Théâtre Sarah Bernhardt, 23rd of September 1902); *Le Dédale* (Théâtre Français, 19th of December 1903), and *Le Réveil* (Théâtre Français, 18th of December 1905). These plays are built upon a severely logical method, the mechanism of which is sometimes so evident as to destroy the necessary sense of illusion. The closing words of *La Course du flambeau*—"*Pour ma fille, j'ai tué ma mère*"—are an example of his selection of a plot representing an extreme theory. The riddle in *L'Éngime* (staged at Wyndham's Theatre, London, March 1st 1902, as *Caesar's Wife*) is, however, worked out with great art, and *Le Dédale*, dealing with the obstacles to the remarriage of a divorced woman, is reckoned among the masterpieces of the modern French stage. He was elected to the French Academy in 1900.

See A. Binet, in *L'Année psychologique*, vol. x. Hervieu's *Théâtre* was published, by Lemerre (3 vols., 1900-1904).

HERWARTH VON BITTENFELD, KARL EBERHARD (1796-1884), Prussian general field-marshal, came of an aristocratic family which had supplied many distinguished officers to the Prussian army. He entered the Guard infantry in 1811, and served through the War of Liberation (1813-15), distinguishing himself at Lützen and Paris. During the years of peace he rose slowly to high command. In the Berlin revolution of 1848 he was on duty at the royal palace as colonel of the 1st Guards. Major-general in 1852, and lieutenant-general in 1856, he received the grade of general of infantry and the command of the VIIth (Westphalian) Army Corps in 1860. In the Danish War of 1864 he succeeded to the command of the Prussians when Prince Frederick Charles became commander-in-chief of the Allies, and it was under his leadership that the Prussians forced the passage into Alsen on the 29th of June. In the war of 1866 Herwarth commanded the "Army of the Elbe" which overran Saxony and invaded Bohemia by the valley of the Elbe and Iser. His troops won the actions of Hühnerwasser and Münchengrätz, and at Königgrätz formed the right wing of the Prussian army. Herwarth himself directed the battle against the Austrian left flank. In 1870 he was

not employed in the field, but was in charge of the scarcely less important business of organizing and forwarding all the reserves and material required for the armies in France. In 1871 his great services were recognized by promotion to the rank of field-marshal. The rest of his life was spent in retirement at Bonn, where he died in 1884. Since 1889 the 13th (1st Westphalian) Infantry has borne his name.

See *G. F. M. Herwarth von Bittenfeld* (Münster, 1896).

HERWEGH, GEORG (1817-1875), German political poet, was born at Stuttgart on the 31st of May 1817, the son of a restaurant keeper. He was educated at the gymnasium of his native city, and in 1835 proceeded to the university of Tübingen as a theological student, where, with a view to entering the ministry, he entered the protestant theological seminary. But the strict discipline was distasteful; he broke the rules and was expelled in 1836. He next studied law, but having gained the interest of August Lewald (1793-1871) by his literary ability, he returned to Stuttgart, where Lewald obtained for him a journalistic post. Called out for military service, he had hardly joined his regiment when he committed an act of flagrant insubordination, and fled to Switzerland to avoid punishment. Here he published his *Gedichte eines Lebendigen* (1841), a volume of political poems, which gave expression to the fervent aspirations of the German youth of the day. The work immediately rendered him famous, and although confiscated, it soon ran through several editions. The idea of the book was a refutation of the opinions of Prince Pückler-Muskau (*q.v.*) in his *Briefe eines Verstorbenen*. He next proceeded to Paris and in 1842 returned to Germany, visiting Jena, Leipzig, Dresden and Berlin—a journey which was described as being a "veritable triumphal progress." His military insubordination appears to have been forgiven and forgotten, for in Berlin King Frederick William IV. had him introduced to him and used the memorable words: "*ich liebe eine gesinnungsvolle Opposition*" ("I admire an opposition, when dictated by principle.") Herwegh next returned to Paris, where he published in 1844 the second volume of his *Gedichte eines Lebendigen*, which, like the first volume, was confiscated by the German police. At the head of a revolutionary column of German working men, recruited in Paris, Herwegh took an active part in the South German rising in 1848; but his raw troops were defeated on the 27th of April at Schopfheim in Baden and, after a very feeble display of heroism, he just managed to escape to Switzerland, where he lived for many years on the proceeds of his literary productions. He was later (1866) permitted to return to Germany, and died at Lichtenthal near Baden-Baden on the 7th of April 1875. A monument was erected to his memory there in 1904. Besides the above-mentioned works, Herwegh published *Einundzwanzig Bogen aus der Schweiz* (1843), and translations into German of A. de Lamartine's works and of seven of Shakespeare's plays. Posthumously appeared *Neue Gedichte* (1877).

Herwegh's correspondence was published by his son Marcel in 1898. See also Johannes Scherr, *Georg Herwegh; literarische und politische Blätter* (1843); and the article by Franz Muncker in the *Allgemeine deutsche Biographie*.

HERZBERG, a town of Germany, in the Prussian province of Hanover, situated under the south-western declivity of the Harz, on the Sieber, 25 m. N.W. from Nordhausen by the railway to Osterode-Hildesheim. Pop. (1905) 3896. It contains an Evangelical and a Roman Catholic church, and a botanical garden, and has manufactures of cloth and cigars, and weaving and dyeing works. The breeding of canaries is extensively carried on here and in the district. On a hill to the south-west of the town lies the castle of Herzberg, which in 1157 came into the possession of Henry the Lion, duke of Saxony, and afterwards was one of the residences of a branch of the house of Brunswick.

HERZBERG, a town of Germany, in the Prussian province of Saxony, on the Schwarze Elster, 25 m. S. from Jüterbog by the railway Berlin-Röderau-Dresden. It has a church (Evangelical) dating from the 13th century and a medieval town hall. Its industries include the founding and turning of metal, agricultural machinery and boot-making. Pop. (1905) 4043.

HERZL, THEODOR (1860-1904), founder of modern political Zionism (*q.v.*), was born in Budapest on the 2nd of May 1860, and died at Edlach on the 3rd of July 1904. The greater part of his career was associated with Vienna, where he acquired high repute as a literary journalist. He was also a dramatist, and apart from his prominence as a Jewish Nationalist would have found a niche in the temple of fame. All his other claims to renown, however, sink into insignificance when compared with his work as the reviver of Jewish hopes for a restoration to political autonomy. Herzl was stirred by sympathy for the misery of Jews under persecution, but he was even more powerfully moved by the difficulties experienced under conditions of assimilation. Modern anti-Semitism, he felt, was both like and unlike the medieval. The old physical attacks on the Jews continued in Russia, but there was added the reluctance of several national groups in Europe to admit the Jews to social equality. Herzl believed that the humanitarian hopes which inspired men at the end of the 18th and during the larger part of the 19th centuries had failed. The walls of the ghettos had been cast down, but the Jews could find no entry into the comity of nations. The new nationalism of 1848 did not deprive the Jews of political rights, but it denied them both the amenities of friendly intercourse and the opportunity of distinction in the university, the army and the professions. Many Jews questioned this diagnosis, and refused to see in the new anti-Semitism (*q.v.*) which spread over Europe in 1881 any more than a temporary reaction against the cosmopolitanism of the French Revolution. In 1896 Herzl published his famous pamphlet "Der Judenstaat." Holding that the only alternatives for the Jews were complete merging by intermarriage or self-preservation by a national re-union, he boldly advocated the second course. He did not at first insist on Palestine as the new Jewish home, nor did he attach himself to religious sentiment. The expectation of a Messianic restoration to the Holy Land has always been strong, if often latent, in the Jewish consciousness. But Herzl approached the subject entirely on its secular side, and his solution was economic and political rather than sentimental. He was a strong advocate for the complete separation of Church and State. The influence of Herzl's pamphlet, the progress of the movement he initiated, the subsequent modifications of his plans, are told at length in the article Zionism.

His proposals undoubtedly roused an extraordinary enthusiasm, and though he almost completely failed to win to his cause the classes, he rallied the masses with sensational success. He unexpectedly gained the accession of many Jews by race who were indifferent to the religious aspect of Judaism, but he quite failed to convince the leaders of Jewish thought, who from first to last remained (with such conspicuous exceptions as Nordau and Zangwill) deaf to his pleading. The orthodox were at first cool because they had always dreamed of a nationalism inspired by messianic ideals, while the liberals had long come to dissociate those universalistic ideals from all national limitations. Herzl, however, succeeded in assembling several congresses at Basel (beginning in 1897), and at these congresses were enacted remarkable scenes of enthusiasm for the cause and devotion to its leader. At all these assemblies the same ideal was formulated: "the establishing for the Jewish people a publicly and legally assured home in Palestine." Herzl's personal charm was irresistible. Among his political opponents he had some close personal friends. His sincerity, his eloquence, his tact, his devotion, his power, were recognized on all hands. He spent his whole strength in the furtherance of his ideas. Diplomatic interviews, exhausting journeys, impressive mass meetings, brilliant literary propaganda—all these methods were employed by him to the utmost limit of self-denial. In 1901 he was received by the sultan; the pope and many European statesmen gave him audiences. The British government was ready to grant land for an autonomous settlement in East Africa. This last scheme was fatal to Herzl's peace of mind. Even as a temporary measure, the choice of an extra-Palestinian site for the Jewish state was bitterly opposed by many Zionists; others (with whom Herzl appears to have sympathized) thought that as Palestine was, at all events momentarily, inaccessible, it was expedient to form a settlement elsewhere. Herzl's health had been failing and he did not long survive the initiation of the somewhat embittered "territorial" controversy. He died in the summer of 1904, amid the consternation of supporters and the deep grief of opponents of his Zionistic aims.

Herzl was beyond question the most influential Jewish personality of the 19th century. He had no profound insight into the problem of Judaism, and there was no lasting validity in his view that the problem—the thousands of years' old mystery—could be solved by a retrogression to local nationality. But he brought home to Jews the perils that confronted them; he compelled many a "semi-detached" son of Israel to rejoin the camp; he forced the "assimilationists" to realize their position and to define it; his scheme gave a new impulse to "Jewish culture," including the popularization of Hebrew as a living speech; and he effectively roused Jews all the world over to an earnest and vital interest in their present and their future. Herzl thus left an indelible mark on his time, and his renown is assured whatever be the fate in store for the political Zionism which he founded and for which he gave his life.

(I. A.)

HERZOG, HANS (1819-1894), Swiss general, was born at Aarau. He became a Swiss artillery lieutenant in 1840, and then spent six years in travelling (visiting England among other countries),

before he became a partner in his father's business in 1846. In 1847 he saw his first active service (as artillery captain) in the short Swiss *Sonderbund* war. In 1860 he abandoned mercantile pursuits for a purely military career, becoming colonel and inspector-general of the Swiss artillery. In 1870 he was commander-in-chief of the Swiss army, which guarded the Swiss frontier, in the Jura, during the Franco-German War, and in February 1871, as such, concluded the Convention of Verrières with General Clinchant for the disarming and the interning of the remains of Bourbaki's army, when it took refuge in Switzerland. In 1875 he became the commander-in-chief of the Swiss artillery, which he did much to reorganize, helping also in the re-organization of the other branches of the Swiss army. He died in 1894 at his native town of Aarau.

(W. A. B. C.)

HERZOG, JOHANN JAKOB (1805-1882), German Protestant theologian, was born at Basel on the 12th of September 1805. He studied at Basel and Berlin, and eventually (1854) settled at Erlangen as professor of church history. He died there on the 30th of September 1882, having retired in 1877. His most noteworthy achievement was the publication of the *Realencyklopädie für protestantische Theologie und Kirche* (1853-1868, 22 vols.), of which he undertook a new edition with G. L. Plitt (1836-1880) in 1877, and after Plitt's death with Albert Hauck (b. 1845). Hauck began the publication of the third edition in 1896 (completed in 22 vols., 1909).

His other works include *Joh. Calvin* (1843), *Leben Ökolampads* (1843), *Die romanischen Waldenser* (1853), *Abriss der gesamten Kirchengeschichte* (3 vols., 1876-1882, 2nd ed., G. Koffmane, Leipzig, 1890-1892).

HESEKIEL, JOHANN GEORG LUDWIG (1819-1874), German author, was born on the 12th of August 1819 in Halle, where his father, distinguished as a writer of sacred poetry, was a Lutheran pastor. Hesekiel studied history and philosophy in Halle, Jena and Berlin, and devoted himself in early life to journalism and literature. In 1848 he settled in Berlin, where he lived until his death on the 26th of February 1874, achieving a considerable reputation as a writer and as editor of the *Neue Preussische Zeitung*. He attempted many different kinds of literary work, the most ambitious being perhaps his patriotic songs *Preussenlieder*, of which he published a volume during the revolutionary excitement of 1848-1849. Another collection—*Neue Preussenlieder*—appeared in 1864 after the Danish War, and a third in 1870—*Gegen die Franzosen, Preussische Kriegs- und Königslieder*. Among his novels may be mentioned *Unter dem Eisenzahn* (1864) and *Der Schultheiss vom Zeyst* (1875). The best known of his works is his biography of Prince Bismarck (*Das Buch vom Fürsten Bismarck*) (3rd ed., 1873; English trans. by R. H. Mackenzie).

HESILRIGE (or HESELRIG), **SIR ARTHUR,** 2nd Bart. (d. 1661), English parliamentarian, was the eldest son of Sir Thomas Hesilrige, 1st baronet (*c.* 1622), of Noseley, Leicestershire, a member of a very ancient family settled in Northumberland and Leicestershire, and of Frances, daughter of Sir William Gorges, of Alderton, Northamptonshire. He early imbibed strong puritanical principles, and showed a special antagonism to Laud. He sat for Leicestershire in the Short and Long Parliaments in 1640, and took a principal part in Strafford's attainder, the Root and Branch Bill and the Militia Bill of the 7th of December 1641, and was one of the five members impeached on the 3rd of January 1642. He showed much activity in the Great Rebellion, raised a troop of horse for Essex, fought at Edgehill, commanded in the West under Waller, being nicknamed his *fidus Achates*, and distinguished himself at the head of his cuirassiers, "The Lobsters," at Lansdown on the 5th of July 1643, at Roundway Down on the 13th of July, at both of which battles he was wounded, and at Cheriton, March 29th 1644. On the occasion of the breach between the army and the parliament, Hesilrige supported the former, took Cromwell's part in his dispute with Manchester and Essex, and on the passing of the Self-denying Ordinance gave up his commission and became one of the leaders of the Independent party in parliament. On the 30th of December 1647 he was appointed governor of Newcastle, which he successfully defended, besides defeating the Royalists on the 2nd of July 1648 and regaining Tynemouth. In October he accompanied Cromwell to Scotland, and gave him valuable support in the Scottish expedition in 1650. Hesilrige, though he approved of the king's execution, had declined to act as judge on his trial. He was one of the leading men in the

Commonwealth, but Cromwell's expulsion of the Long Parliament threw him into antagonism, and he opposed the Protectorate and refused to pay taxes. He was returned for Leicester to the parliaments of 1654, 1656 and 1659, but was excluded from the two former. He refused a seat in the Lords, whither Cromwell sought to relegate him, and succeeded in again obtaining admission to the Commons in January 1658. On Cromwell's death Hesilrige refused support to Richard, and was instrumental in effecting his downfall. He was now one of the most influential men in the council and in parliament. He attempted to maintain a republican parliamentary administration, "to keep the sword subservient to the civil magistrate," and opposed Lambert's schemes. On the latter succeeding in expelling the parliament, Hesilrige turned to Monk for support, and assisted his movements by securing Portsmouth on the 3rd of December 1659. He marched to London, and was appointed one of the council of state on the 2nd of January 1660, and on the 11th of February a commissioner for the army. He was completely deceived by Monk, and trusting to his assurance of fidelity to "the good old cause" consented to the retirement of his regiment from London. At the Restoration his life was saved by Monk's intervention, but he was imprisoned in the Tower, where he died on the 7th of January 1661. Clarendon describes Hesilrige as "an absurd, bold man." He was rash, "hare-brained," devoid of tact and had little claim to the title of a statesman, but his energy in the field and in parliament was often of great value to the parliamentary cause. He exposed himself to considerable obloquy by his exactions and appropriations of confiscated landed property, though the accusation brought against him by John Lilburne was examined by a parliamentary committee and adjudged to be false. Hesilrige married (1) Frances, daughter of Thomas Elmes of Lilford, Northamptonshire, by whom he had two sons and two daughters, and (2) Dorothy, sister of Robert Greville, 2nd Lord Brooke, by whom he had three sons and five daughters. The family was represented in 1907 by his descendant Sir Arthur Grey Hazlerigg of Noseley, 13th Baronet.

AUTHORITIES.—Article on Hesilrige by C. H. Firth in the *Dict. of Nat. Biography*, and authorities there quoted; *Early History of the Family of Hesilrige*, by W. G. D. Fletcher; *Cal. of State Papers, Domestic*, 1631-1664, where there are a large number of important references, as also in *Hist. MSS.*, *Comm. Series*, *MSS. of Earl Cowper*, *Duke of Leeds* and *Duke of Portland*; *Egerton MSS.* 2618, *Harleian* 7001 f. 198, and in the *Sloane*, *Stowe* and *Additional* collections in the British Museum; also S. R. Gardiner, *Hist. of England*, *Hist. of the Great Civil War and Commonwealth*; Clarendon's *History, State Papers and Cal. of State Papers*, J. L. Sanford's *Studies of the Great Rebellion*. His life is written by Noble in the *House of Cromwell*, i. 403. For his public letters and speeches in parliament see the catalogue of the British Museum.

HESIOD, the father of Greek didactic poetry, probably flourished during the 8th century B.C. His father had migrated from the Aeolic Cyme in Asia Minor to Boeotia; and Hesiod and his brother Perses were born at Ascra, near mount Helicon (*Works and Days*, 635). Here, as he fed his father's flocks, he received his commission from the Muses to be their prophet and poet—a commission which he recognized by dedicating to them a tripod won by him in a contest of song (see below) at some funeral games at Chalcis in Euboea, still in existence at Helicon in the age of Pausanias (*Theogony*, 20-34, *W. and D.*, 656; Pausanias ix. 38. 3). After the death of his father Hesiod is said to have left his native land in disgust at the result of a law-suit with his brother and to have migrated to Naupactus. There was a tradition that he was murdered by the sons of his host in the sacred enclosure of the Nemean Zeus at Oeneon in Locris (Thucydides iii. 96; Pausanias ix. 31); his remains were removed for burial by command of the Delphic oracle to Orchomenus in Boeotia, where the Ascraeans settled after the destruction of their town by the Thespians, and where, according to Pausanias, his grave was to be seen.

Hesiod's earliest poem, the famous *Works and Days*, and according to Boeotian testimony the only genuine one, embodies the experiences of his daily life and work, and, interwoven with episodes of fable, allegory, and personal history, forms a sort of Boeotian shepherd's calendar. The first portion is an ethical enforcement of honest labour and dissuasive of strife and idleness (1-383); the second consists of hints and rules as to husbandry (384-764); and the third is a religious calendar of the months, with remarks on the days most lucky or the contrary for rural or nautical employments. The connecting link of the whole poem is the author's advice to his brother, who appears to have bribed the corrupt judges to deprive Hesiod of his already scantier inheritance, and to whom, as he wasted his substance lounging in the agora, the poet more than once returned good for evil, though he tells him there will be a limit to this unmerited kindness. In the *Works and Days* the episodes which rise above an even didactic level are the "Creation and Equipment of Pandora," the "Five Ages of the World" and the much-admired "Description of Winter" (by some critics judged post-Hesiodic). The poem also contains the earliest known fable in Greek literature, that of "The Hawk and the Nightingale." It is in the *Works and Days* especially that we glean indications of Hesiod's rank and condition in life, that of a stay-at-home farmer of the lower class, whose sole experience of the sea was a single voyage of 40 yds. across the Euripus, and an old-fashioned bachelor whose misogynic views and prejudice against matrimony have been conjecturally traced to his brother Perses having a wife as extravagant as himself.

The other poem attributed to Hesiod or his school which has come down in great part to modern times is *The Theogony*, a work of grander scope, inspired alike by older traditions and abundant local associations. It is an attempt to work into system, as none had essayed to do before, the floating legends of the gods and goddesses and their offspring. This task Herodotus (ii. 53) attributes to Hesiod, and he is quoted by Plato in the *Symposium* (178 B) as the author of the *Theogony*. The first to question his claim to this distinction was Pausanias, the geographer (A.D. 200). The Alexandrian grammarians had no doubt on the subject; and indications of the hand that wrote the *Works and Days* may be found in the severe strictures on women, in the high esteem for the wealth-giver Plutus and in coincidences of verbal expression. Although, no doubt, of Hesiodic origin, in its present form it is composed of different recensions and numerous later additions and interpolations. The *Theogony* consists of three divisions—(1) a cosmogony, or creation; (2) a theogony proper, recounting the history of the dynasties of Zeus and Cronus; and (3) a brief and abruptly terminated heroögony, the starting-point not improbably of the supplementary poem, the κατάλογος, or "Lists of Women" who wedded immortals, of which all but a few fragments are lost.[1] 408
The proem (1-116) addressed to the Heliconian and Pierian muses, is considered to have been variously enlarged, altered and arranged by successive rhapsodists. The poet has interwoven several episodes of rare merit, such as the contest of Zeus and the Olympian gods with the Titans, and the description of the prison-house in which the vanquished Titans are confined, with the Giants for keepers and Day and Night for janitors (735 seq.).

The only other poem which has come down to us under Hesiod's name is the *Shield of Heracles*, the opening verses of which are attributed by a nameless grammarian to the fourth book of *Eoiai*. The theme of the piece is the expedition of Heracles and Iolaus against the robber Cycnus; but its main object apparently is to describe the shield of Heracles (141-317). It is clearly an imitation of the Homeric account of the shield of Achilles (*Iliad*, xviii. 479) and is now generally considered spurious. Titles and fragments of other lost poems of Hesiod have come down to us: didactic, as the *Maxims of Cheiron*; genealogical, as the *Aegimius*, describing the contest of that mythical ancestor of the Dorians with the Lapithae; and mythical, as the *Marriage of Ceyx* and the *Descent of Theseus to Hades*.

Recent editions of Hesiod include the Ἀγὼν Ὁμήρου καὶ Ἡσιόδου, the contest of song between Homer and Hesiod at the funeral games held in honour of King Amphidamas at Chalcis. This little tract belongs to the time of Hadrian, who is actually mentioned as having been present during its recitation, but is founded on an earlier account by the sophist Alcidamas (*q.v.*). Quotations (old and new) are made from the works of both poets, and, in spite of the sympathies of the audience, the judge decides in favour of Hesiod. Certain biographical details of Homer and Hesiod are also given.

A strong characteristic of Hesiod's style is his sententious and proverbial philosophy (as in *Works and Days*, 24-25, 40, 218, 345, 371). There is naturally less of this in the *Theogony*, yet there too not a few sentiments take the form of the saw or adage. He has undying fame as the first of didactic poets (see Didactic Poetry), the accredited systematizer of Greek mythology and the rough but not unpoetical sketcher of the lines on which Virgil wrought out his exquisitely finished Georgics.

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On the subject generally, consult G. F. Schömann, *Opuscula*, ii. (1857); H. Flach, *Die Hesiodischen Gedichte* (1874); A. Rzach, *Der Dialekt des Hesiodos* (1876); P. O. Gruppe, *Die griechischen Kulte und Mythen*, i. (1887); O. Friedel, *Die Sage vom Tode Hesiods* (1879), from *Jahrbücher für classische Philologie* (10th suppl. Band, 1879); J. Adam, *Religious Teachers of Greece* (1908). There is a full bibliography of the publications relating to Hesiod (1884-1898) by A. Rzach in Bursian's *Jahresbericht über die Fortschritte der klassischen Altertumswissenschaft*, xxvii. (1900).

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(J. Da.; J. H. F.)

1 Part of the poem was called Eoiai, because the description of each heroine began with ἢ οἵη, "or like as." (See Bibliography.)

HESPERIDES, in Greek mythology, maidens who guarded the golden apples which Earth gave Hera on her marriage to Zeus. According to Hesiod (*Theogony*, 215) they were the daughters of Erebus and Night; in later accounts, of Atlas and Hesperis, or of Phorcys and Ceto (schol. on Apoll. Rhod. iv. 1399; Diod. Sic. iv. 27). They were usually supposed to be three in number—Aegle, Erytheia, Hesperis (or Hesperethusa); according to some, four, or even seven. They lived far away in the west at the borders of Ocean, where the sun sets. Hence the sun (according to Mimnermus *ap.* Athenaeum xi. p. 470) sails in the golden bowl made by Hephaestus from the abode of the Hesperides to the land where he rises again. According to other accounts their home was among the Hyperboreans. The golden apples grew on a tree guarded by Ladon, the ever-watchful dragon. The sun is often in German and Lithuanian legends described as the apple that hangs on the tree of the nightly heaven, while the dragon, the envious power, keeps the light back from men till some beneficent power takes it from him. Heracles is the hero who brings back the golden apples to mankind again. Like Perseus, he first applies to the Nymphs, who help him to learn where the garden is. Arrived there he slays the dragon and carries the apples to Argos; and finally, like Perseus, he gives them to Athena. The Hesperides are, like the Sirens, possessed of the gift of delightful song. The apples appear to have been the symbol of love and fruitfulness, and are introduced at the marriages of Cadmus and Harmonia and Peleus and Thetis. The golden apples, the gift of Aphrodite to Hippomenes before his race with Atalanta, were also plucked from the garden of the Hesperides.

HESPERUS (Gr. Ἕσπερος, Lat. Vesper), the evening star, son or brother of Atlas. According to Diodorus Siculus (iii. 60, iv. 27), he ascended Mount Atlas to observe the motions of the stars, and was suddenly swept away by a whirlwind. Ever afterwards he was honoured as a god, and the most brilliant star in the heavens was called by his name. Although as a mythological personality he is regarded as distinct from Phosphoros or Heosphoros (Lat. Lucifer), the morning star or bringer of light, the son of Astraeus (or Cephalus) and Eos, the two stars were early identified by the Greeks.

Diog. Laërt. viii. 1. 14; Cicero, *De nat. deorum*, ii. 20; Pliny, *Nat. Hist.* ii. 6 [8].

HESS, the name of a family of German artists.

Heinrich Maria Hess (1798-1863)—von Hess, after he received a patent of personal nobility—was born at Düsseldorf and brought up to the profession of art by his father, the engraver Karl Ernst Christoph Hess (1755-1828). Karl Hess had already acquired a name when in 1806 the elector of Bavaria, having been raised to a kingship by Napoleon, transferred the Düsseldorf academy and gallery to Munich. Karl Hess accompanied the academy to its new home, and there continued the education of his children. In time Heinrich Hess became sufficiently master of his art to attract the attention of King Maximilian. He was sent with a stipend to Rome, where a copy which he made of Raphael's Parnassus, and the study of great examples of monumental design, probably caused him to become a painter of ecclesiastical subjects on a large scale. In 1828 he was made professor of painting and director of all the art collections at Munich. He decorated the Aukirche, the Glyptothek and the Allerheiligencapelle at Munich with frescoes; and his cartoons were selected for glass windows in the cathedrals of Cologne and Regensburg. Then came the great cycle of frescoes in the basilica of St Boniface at Munich, and the monumental picture of the Virgin and Child enthroned between the four doctors, and receiving the homage of the four patrons of the Munich churches (now in the Pinakothek). His last work, the "Lord's Supper," was found unfinished in his atelier after his death in 1863. Before testing his strength as a composer Heinrich Hess tried genre, an example of which is the Pilgrims entering Rome, now in the Munich gallery. He also executed portraits, and twice had sittings from Thorwaldsen (Pinakothek and Schack collections). But his fame rests on the frescoes representing scenes from the Old and New Testaments in the Allerheiligencapelle, and the episodes from the life of St Boniface and other German apostles in the basilica of Munich. Here he holds rank second to none but Overbeck in monumental painting, being always true to nature though mindful of the traditions of Christian art, earnest and simple in feeling, yet lifelike and

powerful in expression. Through him and his pupils the sentiment of religious art was preserved and extended in the Munich school.

Peter Hess (1792-1871)—afterwards von Hess—was born at Düsseldorf and accompanied his younger brother Heinrich Maria to Munich in 1806. Being of an age to receive vivid impressions, he felt the stirring impulses of the time and became a painter of skirmishes and battles. In 1813-1815 he was allowed to join the staff of General Wrede, who commanded the Bavarians in the military operations which led to the abdication of Napoleon; and there he gained novel experiences of war and a taste for extensive travel. In the course of years he successively visited Austria, Switzerland and Italy. On Prince Otho's election to the Greek throne King Louis sent Peter Hess to Athens to gather materials for pictures of the war of liberation. The sketches which he then made were placed, forty in number, in the Pinakothek, after being copied in wax on a large scale (and little to the edification of German feeling) by Nilsen, in the northern arcades of the Hofgarten at Munich. King Otho's entrance into Nauplia was the subject of a large and crowded canvas now in the Pinakothek, which Hess executed in person. From these, and from battlepieces on a scale of great size in the Royal Palace, as well as from military episodes executed for the czar Nicholas, and the battle of Waterloo now in the Munich Gallery, we gather that Hess was a clever painter of horses. His conception of subject was lifelike, and his drawing invariably correct, but his style is not so congenial to modern taste as that of the painters of touch. He finished almost too carefully with thin medium and pointed tools; and on that account he lacked to a certain extent the boldness of Horace Vernet, to whom he was not unaptly compared. He died suddenly, full of honours, at Munich, in April 1871. Several of his genre pictures, horse hunts, and brigand scenes may be found in the gallery of Munich.

Karl Hess (1801-1874), the third son of Karl Christoph Hess, born at Düsseldorf, was also taught by his father, who hoped that he would obtain distinction as an engraver. Karl, however, after engraving one plate after Adrian Ostade, turned to painting under the guidance of Wagenbauer of Munich, and then studied under his elder brother Peter. But historical composition proved to be as contrary to his taste as engraving, and he gave himself exclusively at last to illustrations of peasant life in the hill country of Bavaria. He became clever alike in representing the people, the animals and the landscape of the Alps, and with constant means of reference to nature in the neighbourhood of Reichenhall, where he at last resided, he never produced anything that was not impressed with the true stamp of a kindly realism. Some of his pictures in the museum of Munich will serve as examples of his manner. He died at Reichenhall on the 16th of November 1874.

HESS, HEINRICH HERMANN JOSEF, Freiherr von (1788-1870), Austrian soldier, entered the army in 1805 and was soon employed as a staff officer on survey work. He distinguished himself as a subaltern at Aspern and Wagram, and in 1813, as a captain, again served on the staff. In 1815 he was with Schwarzenberg. He had in the interval between the two wars been employed as a military commissioner in Piedmont, and at the peace resumed this post, gaining knowledge which later proved invaluable to the Austrian army. In 1831, when Radetzky became commander-in-chief in Austrian Italy, he took Hess as his chief-of-staff, and thus began the connexion between two famous soldiers which, like that of Blücher and Gneisenau, is a classical example of harmonious co-operation of commander and chief-of-staff. Hess put into shape Radetzky's military ideas, in the form of new drill for each arm, and, under their guidance, the Austrian army in North Italy, always on a war footing, became the best in Europe. From 1834 to 1848 Hess was employed in Moravia, at Vienna, &c., but, on the outbreak of revolution and war in the latter year, was at once sent out to Radetzky as chief-of-staff. In the two campaigns against King Charles Albert which followed, culminating in the victory of Novara, Hess's assistance to his chief was made still more valuable by his knowledge of the enemy, and the old field-marshal acknowledged his services in general orders. Lieut.-Fieldmarshal Hess was at once promoted *Feldzeugmeister*, made a member of the emperor's council, and *Freiherr*, assuming at the same time the duties of the quartermaster-general. Next year he became chief of the staff to the emperor. He was often employed in missions to various capitals, and he appeared in the field in 1854 at the head of the Austrian army which intervened so effectually in the Crimean war. In 1859 he was sent to Italy after the early defeats. He became field-marshal in 1860, and a year later, on resigning his position as chief-of-staff, he was made captain of the Trabant guard. He died in Vienna in 1870.

See "General Hess" in *Lebensgeschichtlichen Hinrissen* (Vienna, 1855).

HESSE (Lat. *Hessia*, Ger. *Hessen*), a grand duchy forming a state of the German empire. It was

known until 1866 as Hesse-Darmstadt, the history of which is given under a separate heading below. It consists of two main parts, separated from each other by a narrow strip of Prussian territory. The northern part is the province of Oberhessen; the southern consists of the contiguous provinces of Starkenburg and Rheinhessen. There are also eleven very small exclaves, mostly grouped about Homburg to the south-west of Oberhessen; but the largest is Wimpfen on the north-west frontier of Württemberg. Oberhessen is hilly; though of no great elevation it extends over the water-parting between the basins of the Rhine and the Weser, and in the Vogelsberg it has as its culminating point the Taufstein (2533 ft.). In the north-west it includes spurs of the Taunus. Between these two systems of hills lies the fertile undulating tract known as the Wetterau, watered by the Wetter, a tributary of the Main. Starkenburg occupies the angle between the Main and the Rhine, and in its south-eastern part includes some of the ranges of the Odenwald, the highest part being the Seidenbucher Höhe (1965 ft.). Rheinhessen is separated from Starkenburg by the Rhine, and has that river as its northern as well as its eastern frontier, though it extends across it at the north-east corner, where the Rhine, on receiving the Main, changes its course abruptly from south to west. The territory consists of a fertile tract of low hills, rising towards the south-west into the northern extremity of the Hardt range, but at no point reaching a height of more than 1050 ft.

The area and population of the three provinces of Hesse are as follow:

	Area.	Population.	
	sq. m.	1895.	1905.
Oberhessen	1267	271,524	296,755
Starkenburg	1169	444,562	542,996
Rheinhessen	530	322,934	369,424
Total	2966	1,039,020	1,209,175

The chief towns of the grand duchy are Darmstadt (the capital) and Offenbach in Starkenburg, Mainz and Worms in Rheinhessen and Giessen in Oberhessen. More than two-thirds of the inhabitants are Protestants; the majority of the remainder are Roman Catholics, and there are about 25,000 Jews. The grand duke is head of the Protestant church. Education is compulsory, the elementary schools being communal, assisted by state grants. There are a university at Giessen and a technical high school at Darmstadt. Agriculture is important, more than three-fifths of the total area being under cultivation. The largest grain crops are rye and barley, and nearly 40,000 acres are under vines. Minerals, in which Oberhessen is much richer than the two other provinces, include iron, manganese, salt and some coal.

The constitution dates from 1820, but was modified in 1856, 1862, 1872 and 1900. There are two legislative chambers. The upper consists of princes of the grand-ducal family, heads of mediatized houses, the head of the Roman Catholic and the superintendent of the Protestant church, the chancellor of the university, two elected representatives of the land-owning nobility, and twelve members nominated by the grand duke. The lower chamber consists of ten deputies from large towns and forty from small towns and rural districts. They are indirectly elected, by deputy electors (*Wahlmänner*) nominated by the electors, who must be Hessians over twenty-five years old, paying direct taxes. The executive ministry of state is divided into the departments of the interior, justice and finance. The three provinces are divided for local administration into 18 circles and 989 communes. The ordinary revenue and expenditure amount each to about £4,000,000 annually, the chief taxes being an income-tax, succession duties and stamp tax. The public debt, practically the whole of which is on railways, amounted to £19,097,468 in 1907.

History.—The name of Hesse, now used principally for the grand duchy formerly known as Hesse-Darmstadt, refers to a country which has had different boundaries and areas at different times. The name is derived from that of a Frankish tribe, the Hessi. The earliest known inhabitants of the country were the Chatti, who lived here during the 1st century A.D. (Tacitus, *Germania*, c. 30), and whose capital, Mattium on the Eder, was burned by the Romans about A.D. 15. “Alike both in race and language,” says Walther Schultze, “the Chatti and the Hessi are identical.” During the period of the *Völkerwanderung* many of these people moved westward, but some remained behind to give their name to the country, although it was not until the 8th century that the word Hesse came into use. Early Hesse was the district around the Fulda, the Werra, the Eder and the Lahn, and was part of the Frankish kingdom both during Merovingian and during Carolingian times. Soon *Hessegau* is mentioned, and this district was the headquarters of Charlemagne during his campaigns against the Saxons. By the treaty of Verdun in 843 it fell to Louis the German, and later it seems to have been partly in the duchy of Saxony and partly in that of Franconia. The Hessians were converted to Christianity mainly through the efforts of St Boniface; their land was included in the archbishopric of Mainz; and religion and culture were kept alive among them largely owing to the foundation of the Benedictine abbeys of Fulda and Hersfeld. Like other parts of Germany during the 9th century Hesse felt the absence of a strong central power, and, before the time of the emperor Otto the Great, several counts, among whom were Giso and Werner, had made themselves practically independent; but after the accession of Otto in 936 the land quietly accepted the yoke of the medieval emperors. About 1120 another Giso, count of Gudensberg, secured possession of the lands of the Werners; on his death in 1137 his daughter and heiress, Hedwig, married Louis, landgrave of

Thuringia; and from this date until 1247, when the Thuringian ruling family became extinct, Hesse formed part of Thuringia. The death of Henry Raspe, the last landgrave of Thuringia, in 1247, caused a long war over the disposal of his lands, and this dispute was not settled until 1264 when Hesse, separated again from Thuringia, was secured by his niece Sophia (d. 1284), widow of Henry II., duke of Brabant. In the following year Sophia handed over Hesse to her son Henry (1244-1308), who, remembering the connexion of Hesse and Thuringia, took the title of landgrave, and is the ancestor of all the subsequent rulers of the country. In 1292 Henry was made a prince of the Empire, and with him the history of Hesse properly begins.

For nearly 300 years the history of Hesse is comparatively uneventful. The land, which fell into two main portions, upper Hesse round Marburg, and lower Hesse round Cassel, was twice divided between two members of the ruling family, but no permanent partition took place before the Reformation. A *Landtag* was first called together in 1387, and the landgraves were constantly at variance with the electors of Mainz, who had large temporal possessions in the country. They found time, however, to increase the area of Hesse. Giessen, part of Schmalkalden, Ziegenhain, Nidda and, after a long struggle, Katzenelnbogen were acquired, while in 1432 the abbey of Hersfeld placed itself under the protection of Hesse. The most noteworthy of the landgraves were perhaps Louis I. (d. 1458), a candidate for the German throne in 1440, and William II. (d. 1509), a comrade of the German king, Maximilian I. In 1509 William's young son, Philip (*q.v.*), became landgrave, and by his vigorous personality brought his country into prominence during the religious troubles of the 16th century. Following the example of his ancestors Philip cared for education and the general welfare of his land, and the Protestant university of Marburg, founded in 1527, owes to him its origin. When he died in 1567 Hesse was divided between his four sons into Hesse-Cassel, Hesse-Darmstadt, Hesse-Marburg and Hesse-Rheinfels. The lines ruling in Hesse-Rheinfels and Hesse-Marburg, or upper Hesse, became extinct in 1583 and 1604 respectively, and these lands passed to the two remaining branches of the family. The small landgraviate of Hesse-Homburg was formed in 1622 from Hesse-Darmstadt. After the annexation of Hesse-Cassel and Hesse-Homburg by Prussia in 1866 Hesse-Darmstadt remained the only independent part of Hesse, and it generally receives the common name.

Hesse-Philippsthal is an offshoot of Hesse-Cassel, and was founded in 1685 by Philip (d. 1721), son of the Landgrave William VI. In 1909 the representative of this family was the Landgrave Ernest (b. 1846). Hesse-Barchfeld was founded in 1721 by Philip's son, William (d. 1761), and in 1909 its representative was the Landgrave Clovis (b. 1876). The lands of both these princes are now mediatized. Hesse-Nassau is a province of Prussia formed in 1866 from part of Hesse-Cassel and part of the duchy of Nassau.

See H. B. Wenck, *Hessische Landesgeschichte* (Frankfort, 1783-1803); C. von Rommel, *Geschichte von Hesse* (Cassel, 1820-1858); F. Münscher, *Geschichte von Hesse* (Marburg, 1894); F. Gundlach, *Hesse und die Mainzer Stiftsfehde* (Marburg, 1899); Walther, *Literarisches Handbuch für Geschichte und Landeskunde von Hesse* (Darmstadt, 1841; Supplement, 1850-1869); K. Ackermann, *Bibliotheca Hessiaca* (Cassel, 1884-1899); Hoffmeister, *Historischgenealogisches Handbuch über alle Linien des Regentenhauses Hesse* (Marburg, 1874), and the *Zeitschrift des Vereins für hessische Geschichte* (1837-1904).

HESSE-CASSEL (in German *Kurhessen*, *i.e.* Electoral Hesse), now the government district of Cassel in the Prussian province of Hesse-Nassau. It was till 1866 a landgraviate and electorate of Germany, consisting of several detached masses of territory, to the N.E. of Frankfort-on-the-Main. It contained a superficial area of 3699 sq. m., and its population in 1864 was 745,063.

History.—The line of Hesse-Cassel was founded by William IV., surnamed the Wise, eldest son of Philip the Magnanimous. On his father's death in 1567 he received one half of Hesse, with Cassel as his capital; and this formed the landgraviate of Hesse-Cassel. Additions were made to it by inheritance from his brother's possessions. His son, Maurice the Learned (1592-1627), turned Protestant in 1605, became involved later in the Thirty Years' War, and, after being forced to cede some of his territories to the Darmstadt line, abdicated in favour of his son William V. (1627-1637), his younger sons receiving apanages which created several cadet lines of the house, of which that of Hesse-Rheinfels-Rotenburg survived till 1834. On the death of William V., whose territories had been conquered by the Imperialists, his widow Amalie Elizabeth, as regent for her son William VI. (1637-1663), reconquered the country and, with the aid of the French and Swedes, held it, together with part of Westphalia. At the peace of Westphalia (1648), accordingly, Hesse-Cassel was augmented by the larger part of the countship of Schaumburg and by the abbey of Hersfeld, secularized as a principality of the Empire. The Landgravine Amalie Elizabeth introduced the rule of primogeniture. William VI., who came of age in 1650, was an enlightened patron of learning and the arts. He was succeeded by his son William VII., an infant, who died in 1670, and was succeeded by his brother Charles (1670-1730). Charles's chief claim to remembrance is that he was the first ruler to adopt the system of hiring his soldiers out to foreign powers as mercenaries, as a means of

improving the national finances. Frederick I., the next landgrave (1730-1751), had become by marriage king of Sweden, and on his death was succeeded in the landgraviate by his brother William VIII. (1751-1760), who fought as an ally of England during the Seven Years' War. From his successor Frederick II. (1760-1785), who had become a Roman Catholic, 22,000 Hessian troops were hired by England for about £3,191,000, to assist in the war against the North American colonies. This action, often bitterly criticized, has of late years found apologists (cf. v. Werthern, *Die hessischen Hilfstruppen im nordamerikanischen Unabhängigkeitskriege*, Cassel, 1895). It is argued that the troops were in any case mercenaries, and that the practice was quite common. Whatever opinion may be held as to this, it is certain that Frederick spent the money well: he did much for the development of the economic and intellectual improvement of the country. The reign of the next landgrave, William IX. (1785-1821), was an important epoch in the history of Hesse-Cassel. Ascending the throne in 1785, he took part in the war against France a few years later, but in 1795 peace was arranged by the treaty of Basel. For the loss in 1801 of his possessions on the left bank of the Rhine he was in 1803 compensated by some of the former French territory round Mainz, and at the same time was raised to the dignity of Elector (*Kurfürst*) as William I. In 1806 he made a treaty of neutrality with Napoleon, but after the battle of Jena the latter, suspecting William's designs, occupied his country, and expelled him. Hesse-Cassel was then added to Jerome Bonaparte's new kingdom of Westphalia; but after the battle of Leipzig in 1813 the French were driven out and on the 21st of November the elector returned in triumph to his capital. A treaty concluded by him with the Allies (Dec. 2) stipulated that he was to receive back all his former territories, or their equivalent, and at the same time to restore the ancient constitution of his country. This treaty, so far as the territories were concerned, was carried out by the powers at the congress of Vienna. They refused, however, the elector's request to be recognized as "King of the Chatti" (*König der Katten*), a request which was again rejected at the conference of Aix-la-Chapelle (1818). He therefore retained the now meaningless title of elector, with the predicate of "royal highness."

The elector had signalized his restoration by abolishing with a stroke of the pen all the reforms introduced under the French régime, repudiating the Westphalian debt and declaring null and void the sale of the crown domains. Everything was set back to its condition on the 1st of November 1806; even the officials had to descend to their former rank, and the army to revert to the old uniforms and powdered pigtails. The estates, indeed, were summoned in March 1815, but the attempt to devise a constitution broke down; their appeal to the federal diet at Frankfort to call the elector to order in the matter of the debt and the domains came to nothing owing to the intervention of Metternich; and in May 1816 they were dissolved, never to meet again. William I. died on the 27th of February 1821, and was succeeded by his son, William II. Under him the constitutional crisis in Hesse-Cassel came to a head. He was arbitrary and avaricious like his father, and moreover shocked public sentiment by his treatment of his wife, a popular Prussian princess, and his relations with his mistress, one Emilie Ortlöpp, created countess of Reichenbach, whom he loaded with wealth. The July revolution in Paris gave the signal for disturbances; the elector was forced to summon the estates; and on the 5th of January 1831 a constitution on the ordinary Liberal basis was signed. The elector now retired to Hanau, appointed his son Frederick William regent, and took no further part in public affairs.

The regent, without his father's coarseness, had a full share of his arbitrary and avaricious temper. Constitutional restrictions were intolerable to him; and the consequent friction with the diet was aggravated when, in 1832, Hassenpflug (*q.v.*) was placed at the head of the administration. The whole efforts of the elector and his minister were directed to nullifying the constitutional control vested in the diet; and the Opposition was fought by manipulating the elections, packing the judicial bench, and a vexatious and petty persecution of political "suspects," and this policy continued after the retirement of Hassenpflug in 1837. The situation that resulted issued in the revolutionary year 1848 in a general manifestation of public discontent; and Frederick William, who had become elector on his father's death (November 20, 1847), was forced to dismiss his reactionary ministry and to agree to a comprehensive programme of democratic reform. This, however, was but short-lived. After the breakdown of the Frankfort National Parliament, Frederick William joined the Prussian Northern Union, and deputies from Hesse-Cassel were sent to the Erfurt parliament. But as Austria recovered strength, the elector's policy changed. On the 23rd of February 1850 Hassenpflug was again placed at the head of the administration and threw himself with renewed zeal into the struggle against the constitution and into opposition to Prussia. On the 2nd of September the diet was dissolved; the taxes were continued by electoral ordinance; and the country was placed under martial law. It was at once clear, however, that the elector could not depend on his officers or troops, who remained faithful to their oath to the constitution. Hassenpflug persuaded the elector to leave Cassel secretly with him, and on the 15th of October appealed for aid to the reconstituted federal diet, which willingly passed a decree of "intervention." On the 1st of November an Austrian and Bavarian force marched into the electorate.

This was a direct challenge to Prussia, which under conventions with the elector had the right to the use of the military roads through Hesse that were her sole means of communication with her Rhine provinces. War seemed imminent; Prussian troops also entered the country, and shots were actually exchanged between the outposts. But Prussia was in no condition to take up the challenge; and the diplomatic contest that followed issued in the Austrian triumph at Olmütz (1851). Hesse was surrendered to the federal diet; the taxes were collected by the federal forces, and all officials who

refused to recognize the new order were dismissed. In March 1852 the federal diet abolished the constitution of 1831, together with the reforms of 1848, and in April issued a new provisional constitution. The new diet had, under this, very narrow powers; and the elector was free to carry out his policy of amassing money, forbidding the construction of railways and manufactories, and imposing strict orthodoxy on churches and schools. In 1855, however, Hassenpflug—who had returned with the elector—was dismissed; and five years later, after a period of growing agitation, a new constitution was granted with the consent of the federal diet (May 30, 1860). The new chambers, however, demanded the constitution of 1831; and, after several dissolutions which always resulted in the return of the same members, the federal diet decided to restore the constitution of 1831 (May 24, 1862). This had been due to a threat of Prussian occupation; and it needed another such threat to persuade the elector to reassemble the chambers, which he had dismissed at the first sign of opposition; and he revenged himself by refusing to transact any public business. In 1866 the end came. The elector, full of grievances against Prussia, threw in his lot with Austria; the electorate was at once overrun with Prussian troops; Cassel was occupied (June 20); and the elector was carried a prisoner to Stettin. By the treaty of Prague Hesse-Cassel was annexed to Prussia. The elector Frederick William (d. 1875) had been, by the terms of the treaty of cession, guaranteed the entailed property of his house. This was, however, sequestered in 1868 owing to his intrigues against Prussia; part of the income was paid, however, to the eldest agnate, the landgrave Frederick (d. 1884), and part, together with certain castles and palaces, was assigned to the cadet lines of Philippsthal and Philippsthal-Barchfeld.

See K. W. Wippermann, *Kurhessen seit den Freiheitskriegen* (Cassel, 1850); Röth, *Geschichte von Hessen-Kassel* (Cassel, 1856; 2nd ed. continued by Stamford, 1883-1885); H. Gräfe, *Der Verfassungskampf in Kurhessen* (Leipzig, 1851) and works under Hesse.

HESSE-DARMSTADT, a grand-duchy in Germany, the history of which begins with the partition of Hesse in 1567. George I. (1547-1597), the youngest son of the landgrave Philip, received the upper county of Katzenelnbogen, and, selecting Darmstadt as his residence, became the founder of the Hesse-Darmstadt line. Additions to the landgraviate were made both in the reigns of George and of his son and successor, Louis V. (1577-1626), but in 1622 Hesse-Homburg was cut off to form an apanage for George's youngest son, Frederick (d. 1638). Although Louis V., who founded the university of Giessen in 1607, was a Lutheran, he and his son, George II. (1605-1661), sided with the imperialists in the Thirty Years' War, during which Hesse-Darmstadt suffered very severely from the ravages of the Swedes. In this struggle Hesse-Cassel took the other side, and the rivalry between the two landgraviates was increased by a dispute over Hesse-Marburg, the ruling family of which had become extinct in 1604. This quarrel was interwoven with the general thread of the Thirty Years' War, and was not finally settled until 1648, when the disputed territory was divided between the two claimants. Louis VI. (d. 1678), a careful and patriotic prince, followed the policy of the three previous landgraves, but the anxiety of his son, Ernest Louis (d. 1739), to emulate the French court under Louis XIV. led his country into debt. Under Ernest Louis and his son and successor, Louis VIII. (d. 1768), another dispute occurred between Darmstadt and Cassel; this time it was over the succession to the county of Hanau, which was eventually divided, Hesse-Darmstadt receiving Lichtenberg. During the 18th century the War of the Austrian Succession and the Seven Years' War dealt heavy blows at the prosperity of the landgraviate, which was always loyal to the house of Austria. Louis IX. (1719-1790), who served in the Prussian army under Frederick the Great, is chiefly famous as the husband of Caroline (1721-1774), "the great landgravine," who counted Goethe, Herder and Grimm among her friends and was described by Frederick the Great as *femina sexu, ingenio vir*. In April 1790, just after the outbreak of the French Revolution, Louis X. (1753-1830), an educated prince who shared the tastes and friendships of his mother, Caroline, became landgrave. In 1792 he joined the allies against France, but in 1799 he was compelled to sign a treaty of neutrality. In 1803, having formally surrendered the part of Hesse on the left bank of the Rhine which had been taken from him in the early days of the Revolution, Louis received in return a much larger district which had formerly belonged to the duchy of Westphalia, the electorate of Mainz and the bishopric of Worms. In 1806, being a member of the confederation of the Rhine, he took the title of Louis I., grand-duke of Hesse; he supported Napoleon with troops from 1805 to 1813, but after the battle of Leipzig he joined the allies. In 1815 the congress of Vienna made another change in the area and boundaries of Hesse-Darmstadt. Louis secured again a district on the left bank of the Rhine, including the cities of Mainz and Worms, but he made cessions of territory to Prussia and to Bavaria and he recognized the independence of Hesse-Homburg, which had recently been incorporated with his lands. However, his title of grand-duke was confirmed, and as grand-duke of Hesse and of the Rhine he entered the Germanic confederation. Soon the growing desire for liberty made itself felt in Hesse, and in 1820 Louis gave a constitution to the land; various forms were carried through; the system of government was reorganized, and in 1828 Hesse-Darmstadt joined the Prussian *Zollverein*. Louis I., who did a great deal for the welfare of his country, died on the 6th of April 1830, and was followed on the throne by his son, Louis II. (1777-1848). This grand-duke had

some trouble with his *Landtag*, but, dying on the 16th of June 1848, he left his son, Louis III. (1806-1877), to meet the fury of the revolutionary year 1848. Many concessions were made to the popular will, but during the subsequent reaction these were withdrawn, and the period between 1850 and 1871, when Karl Friedrich Reinhard, Freiherr von Dalwigk (1802-1880), was chiefly responsible for the government of Hesse-Darmstadt, was one of repression, although some benefits were conferred upon the people. Dalwigk was one of Prussia's enemies, and during the war of 1866 the grand-duke fought on the Austrian side, the result being that he was compelled to pay a heavy indemnity and to cede certain districts, including Hesse-Homburg, which he had only just acquired, to Prussia. In 1867 Louis entered the North German Confederation, but only for his lands north of the Main, and in 1871 Hesse-Darmstadt became one of the states of the new German empire. After the withdrawal of Dalwigk from public life at this time a more liberal policy was adopted in Hesse. Many reforms in ecclesiastical, educational, financial and administrative matters were introduced, and in general the grand-duchy may be said to have passed largely under the influence of Prussia, which, by an arrangement made in 1896, controls the Hessian railway system. The constitution of 1820, subject to four subsequent modifications, is still the law of the land, the legislative power being vested in two chambers and the executive power being exercised by the three departments of the ministry of state. Since the annexation of Hesse-Cassel by Prussia in 1866 the grand-duchy has been known simply as Hesse. Louis III. died on the 13th of June 1877, and was succeeded by his nephew, Louis IV. (1837-1892), a son-in-law of Queen Victoria; he died on the 13th of March 1892, and was succeeded by his son, Ernest Louis (b. 1868). This grand-duke's marriage with Victoria (b. 1876), daughter of Alfred, duke of Saxe-Coburg and Gotha, was dissolved in 1901. The union was childless, and consequently in 1902 a law regulating the succession was passed. By this the landgrave Alexander Frederick (b. 1863), the representative of the family which ruled Hesse-Cassel until 1866, was declared the heir to Hesse in case the grand-duke died without sons. However, in 1905 Ernest Louis married Elenore, princess of Solms-Hohensolms-Lich (b. 1871), by whom he had a son George (b. 1906).

See L. Baur, *Urkunden zur hessischen Landes-, Orts- und Familiengeschichte* (Darmstadt, 1846-1873); Steiner, *Geschichte des Grossherzogtums Hesse*n (Darmstadt, 1833-1834); Klein, *Das Grossherzogtum Hessen* (Mainz, 1861); Ewald, *Historische Übersicht der Territorialveränderungen der Landgrafschaft Hessen und des Grossherzogtums Hessen* (Darmstadt, 1872); F. Soldan, *Geschichte des Grossherzogtums Hessen* (Giessen, 1896); H. Heppe, *Kirchengeschichte beider Hessen* (Marburg, 1876-1878); C. Hessler, *Geschichte von Hessen* (Cassel, 1891), and *Hessische Landes- und Volkskunde* (Marburg, 1904-1906); F. Küchler, A. E. Braun and A. K. Weber, *Verfassungs- und Verwaltungsrecht des Grossherzogtums Hessen* (Darmstadt, 1894-1897); H. Künzel, *Grossherzogtum Hessen* (Giessen, 1893); and W. Zeller, *Handbuch der Verfassung und Verwaltung im Grossherzogtum Hessen* (Darmstadt, 1885-1893). See also *Archiv für hessische Geschichte und Altertumskunde* (Darmstadt, 1894 fol.) and *Hessisches Urkundenbuch* (Leipzig, 1879 fol.).

HESSE-HOMBURG, formerly a small landgraviate in Germany. It consisted of two parts, the district of Homburg on the right side of the Rhine, and the district of Meisenheim, which was added in 1815, on the left side of the same river. Its area was about 100 sq. m., and its population in 1864 was 27,374. Homburg now forms part of the Prussian province of Hesse-Nassau, and Meisenheim of the province of the Rhine. Hesse-Homburg was formed into a separate landgraviate in 1622 by Frederick I. (d. 1638), son of George I., landgrave of Hesse-Darmstadt, although it did not become independent of Hesse-Darmstadt until 1768. By two of Frederick's sons it was divided into Hesse-Homburg and Hesse-Homburg-Bingenheim; but these parts were again united in 1681 under the rule of Frederick's third son, Frederick II. (d. 1708). In 1806, during the long reign of the landgrave Frederick V., which extended from 1751 to 1820, Hesse-Homburg was mediatized, and incorporated with Hesse-Darmstadt; but in 1815 by the congress of Vienna the latter state was compelled to recognize the independence of Hesse-Homburg, which was increased by the addition of Meisenheim. Frederick V. joined the German confederation as a sovereign prince in 1817, and after his death his five sons in succession filled the throne. The last of these, Ferdinand, who succeeded in 1848, granted a liberal constitution to his people, but cancelled it during the reaction of 1852. When he died on the 24th of March 1866, Hesse-Homburg was inherited by Louis III., grand-duke of Hesse-Darmstadt, while Meisenheim fell to Prussia. In the following September, however, Louis was forced to cede his new possession to Prussia, as he had supported Austria during the war between these two powers.

See R. Schwartz, *Landgraf Friedrich V. von Hessen-Homburg und seine Familie* (1878); and von Herget, *Das landgräfliche Haus Homburg* (Homburg, 1903).

HESSE-NASSAU (Ger. *Hessen-Nassau*), a province of Prussia, bounded, from N. to E., S. and W., successively by Westphalia, Waldeck, Hanover, the province of Saxony, the Thuringian States, Bavaria, Hesse and the Rhine Province. There are small detached portions in Waldeck, Thuringia, &c.; on the other hand the province enclaves the province of Oberhessen belonging to the grand-duchy of Hesse, and the circle of Wetzlar belonging to the Rhine Province. Hesse-Nassau was formed in 1867-1868 out of the territories which accrued to Prussia after the war of 1866, namely, the landgraviate of Hesse-Cassel and the duchy of Nassau, in addition to the greater part of the territory of Frankfort-on-Main, parts of the grand-duchy of Hesse, the territory of Homburg and the countship of Hesse-Homburg, together with certain small districts which belonged to Bavaria. It is now divided into the governments of Cassel and Wiesbaden, the second of which consists mainly of the former territory of Nassau (*q.v.*).

The province has an area of 6062 sq. m., and had a population in 1905 of 2,070,052, being the fourth most densely populated province in Prussia, after Berlin, the Rhine Province and Westphalia. The east and north parts lie in the basin of the river Fulda, which near the north-eastern boundary joins with the Werra to form the Weser. The Main forms part of the southern boundary, and the Rhine the south-western; the western part of the province lies mostly in the basin of the Lahn, a tributary of the Rhine. The province is generally hilly, the highest hills occurring in the east and west. The Fulda rises in the Wasserkuppe (3117 ft.), an eminence of the Rhöngebirge, the highest in the province. In the south-west are the Taunus, bordering the Main, and the Westerwald, west of the Lahn, in which the highest points respectively are the Grosser Feldberg (2887 ft.) and the Fuchskauten (2155 ft.). The congeries of small groups of lower hills in the north are known as the Hessische Bergland.

The province is not notably well suited to agriculture, but in forests it is the richest in Prussia, and the timber trade is large. The chief trees are beech, oak and conifers. Cattle-breeding is extensively practised. The vine is cultivated chiefly on the slopes of the Taunus, in the south-west, where the names of several towns are well known for their wines—Schierstein, Erbach (Marcobrunner), Johannisberg, Geisenheim, Rüdesheim, Assmannshausen. Iron, coal, copper and manganese are mined. The mineral springs are important, including those at Wiesbaden, Homburg, Langenschwalbach, Nenndorf, Schlangenbad and Soden. The chief manufacturing centres are Cassel, Diez, Eschwege, Frankfort, Fulda, Gross Almerode, Hanau and Hersfeld. The province is divided for administration into 42 circles (*Kreise*), 24 in the government of Cassel and 18 in that of Wiesbaden. It returns 14 representatives to the Reichstag. Marburg is the seat of a university.

HESSE-ROTENBURG, a German landgraviate which was broken up in 1834. In 1627 Ernest (1623-1693), a younger son of Maurice, landgrave of Hesse-Cassel (d. 1632), received Rheinsfels and lower Katzenelnbogen as his inheritance, and some years later, on the deaths of two of his brothers, he added Eschwege, Rotenburg, Wanfried and other districts to his possessions. Ernest, who was a convert to the Roman Catholic Church, was a great traveller and a voluminous writer. About 1700 his two sons, William (d. 1725) and Charles (d. 1711), divided their territories, and founded the families of Hesse-Rotenburg and Hesse-Wanfried. The latter family died out in 1755, when William's grandson, Constantine (d. 1778), reunited the lands except Rheinfels, which had been acquired by Hesse-Cassel in 1735, and ruled them as landgrave of Hesse-Rotenburg. At the peace of Lunéville in 1801 the part of the landgraviate on the left bank of the Rhine was surrendered to France, and in 1815 other parts were ceded to Prussia, the landgrave Victor Amadeus being compensated by the abbey of Corvey and the Silesian duchy of Ratibor. Victor was the last male member of his family, so, with the consent of Prussia, he bequeathed his allodial estates to his nephews the princes Victor and Chlodwig of Hohenlohe-Waldenburg-Schillingsfürst (see Hohenlohe). When the landgrave died on the 12th of November 1834 the remaining parts of Hesse-Rotenburg were united with Hesse-Cassel according to the arrangement of 1627. It may be noted that Hesse-Rotenburg was never completely independent of Hesse-Cassel. Perhaps the most celebrated member of this family was Charles Constantine (1752-1821), a younger son of the landgrave Constantine, who was called "citoyen Hesse," and who took part in the French Revolution.

HESSIAN, the name of a jute fabric made as a plain cloth, in various degrees of fineness, width and quality. The common, or standard, hessian is 40 in. wide, weighs 10½ oz. per yd., and in the finished state contains about 12 threads and 12½ picks per in. The name is probably of German origin, and the fabric was originally made from flax and tow. Small quantities of cloth are still made

from yarns of these fibres, but the jute fibre, owing to its comparative cheapness, has now almost supplanted all others.

This useful cloth is employed in countless ways, especially for packing all kinds of dry goods, while large quantities, of different qualities, are made up into bags for sugar, flour, coffee, grain, ore, manure, sand, potatoes, onions, &c. Indeed, bags made from one or other quality of this cloth, or from sacking, bagging or tarpaulin, form the most convenient, and at the same time the cheapest covering for any kind of goods which are not damaged by being crushed.

Certain types are specially treated, dyed black, tan or other colour, or left in their natural colour, stiffened and used for paddings and linings for cheap clothing, boots, shoes, bags and other articles. When dyed in art shades the cloth forms an attractive decoration for stages and platforms, and generally for any temporary erection, and in many cases it is stencilled and then used for wall decoration.

The great linoleum industry depends upon certain types of this fabric for the foundation of its products, while large quantities are used for the backs of fringe rugs, spring mattresses and the upholstery of furniture.

The great centres for the manufacture of this fabric are Dundee and Calcutta, and every variety of the cloth, and all kinds of hand- and machine-sewn, as well as seamless bags, are made in the former city. The American name for hessian is burlap; this particular kind is 40 in. wide, and is now largely made in Calcutta as well as in Dundee and other places.

HESSUS, HELIUS EOBANUS (1488-1540), German Latin poet, was born at Halgehausen in Hesse-Cassel, on the 6th of January 1488. His family name is said to have been Koch; Eoban was the name of a local saint; Hessus indicates the land of his birth, Helius the fact that he was born on Sunday. In 1504 he entered the university of Erfurt, and soon after his graduation was appointed rector of the school of St Severus. This post he soon lost, and spent the years 1509-1513 at the court of the bishop of Riesenburg. Returning to Erfurt, he was reduced to great straits owing to his drunken and irregular habits. At length (in 1517) he was appointed professor of Latin in the university. He was prominently associated with the distinguished men of the time (Johann Reuchlin, Conrad Peutinger, Ulrich von Hutten, Conrad Mutianus), and took part in the political, religious and literary quarrels of the period, finally declaring in favour of Luther and the Reformation, although his subsequent conduct showed that he was actuated by selfish motives. The university was seriously weakened by the growing popularity of the new university of Wittenberg, and Hessus endeavoured (but without success) to gain a living by the practice of medicine. Through the influence of Camerarius and Melanchthon, he obtained a post at Nuremberg (1526), but, finding a regular life distasteful, he again went back to Erfurt (1533). But It was not the Erfurt he had known; his old friends were dead or had left the place; the university was deserted. A lengthy poem gained him the favour of the landgrave of Hesse, by whom he was summoned in 1536 as professor of poetry and history to Marburg, where he died on the 5th of October 1540. Hessus, who was considered the foremost Latin poet of his age, was a facile verse-maker, but not a true poet. He wrote what he thought was likely to pay or secure him the favour of some important person. He wrote local, historical and military poems, idylls, epigrams and occasional pieces, collected under the title of *Sylvae*. His most popular works were translations of the Psalms into Latin distichs (which reached forty editions) and of the *Iliad* into hexameters. His most original poem was the *Heroïdes* in imitation of Ovid, consisting of letters from holy women, from the Virgin Mary down to Kunigunde, wife of the emperor Henry II.

His *Epistolae* were edited by his friend Camerarius, who also wrote his life (1553). There are later accounts of him by M. Hertz (1860), G. Schwertzell (1874) and C. Krause (1879); see also D. F. Strauss, *Ulrich von Hutten* (Eng. trans., 1874). His poems on Nuremberg and other towns have been edited with commentaries and 16th-century illustrations by J. Neff and V. von Loga in M. Herrmann and S. Szamatolski's *Lateinische Literaturdenkmäler des XV. u. XVI. Jahrhunderts* (Berlin, 1896).

HESTIA, in Greek mythology, the "fire-goddess," daughter of Cronus and Rhea, the goddess of hearth and home. She is not mentioned in Homer, although the hearth is recognized as a place of refuge for suppliants; this seems to show that her worship was not universally acknowledged at the time of the Homeric poems. In post-Homeric religion she is one of the twelve Olympian deities, but, as the abiding goddess of the household, she never leaves Olympus. When Apollo and Poseidon became suitors for her hand, she swore to remain a maiden for ever; whereupon Zeus bestowed

upon her the honour of presiding over all sacrifices. To her the opening sacrifice was offered; to her at the sacrificial meal the first and last libations were poured. The fire of Hestia was always kept burning, and, if by any accident it became extinct, only sacred fire produced by friction, or by burning glasses drawing fire from the sun, might be used to rekindle it. Hestia is the goddess of the family union, the personification of the idea of home; and as the city union is only the family union on a large scale, she was regarded as the goddess of the state. In this character her special sanctuary was in the prytaneum, where the common hearth-fire round which the magistrates meet is ever burning, and where the sacred rites that sanctify the concord of city life are performed. From this fire, as the representative of the life of the city, intending colonists took the fire which was to be kindled on the hearth of the new colony. Hestia was closely connected with Zeus, the god of the family both in its external relation of hospitality and its internal unity round its own hearth; in the *Odyssey* a form of oath is by Zeus, the table and the hearth. Again, Hestia is often associated with Hermes, the two representing home and domestic life on the one hand, and business and outdoor life on the other; or, according to others, the association is local—that of the god of boundaries with the goddess of the house. In later philosophy Hestia became the hearth of the universe—the personification of the earth as the centre of the universe, identified with Cybele and Demeter. As Hestia had her home in the prytaneum, special temples dedicated to her are of rare occurrence. She is seldom represented in works of art, and plays no important part in legend. It is not certain that any really Greek statues of Hestia are in existence, although the Giustiniani Vesta in the Torlonia Museum is usually accepted as such. In this she is represented standing upright, simply robed, a hood over her head, the left hand raised and pointing upwards. The Roman deity corresponding to the Greek Hestia is Vesta (*q.v.*).

See A. Preuner, *Hestia-Vesta* (1864), the standard treatise on the subject, and his article in Roscher's *Lexikon der Mythologie*; J. G. Frazer, "The Prytaneum," &c., in *Journal of Philology*, xiv. (1885); G. Hagemann, *De Graecorum prytaneis* (1881), with bibliography and notes; *Homeric Hymns*, xxix., ed. T. W. Allen and E. E. Sikes (1904); Farnell, *Cults, the Greek States*, v. (1909).

HESYCHASTS (ἡσυχασταί or ἡσυχάζοντες, from ἥσυχος, quiet, also called ὀμφαλόψυχοι, Umbilicanimi, and sometimes referred to as Euchites, Massalians or Palamites), a quietistic sect which arose, during the later period of the Byzantine empire, among the monks of the Greek church, especially at Mount Athos, then at the height of its fame and influence under the reign of Andronicus the younger and the abbacy of Symeon. Owing to various adventitious circumstances the sect came into great prominence politically and ecclesiastically for a few years about the middle of the 14th century. Their opinion and practice will be best represented in the words of one of their early teachers (quoted by Gibbon, *Decline and Fall*, c. 63): "When thou art alone in thy cell shut thy door, and seat thyself in a corner; raise thy mind above all things vain and transitory; recline thy beard and chin on thy breast; turn thine eyes and thy thought towards the middle of thy belly, the region of the navel (ὀμφαλός); and search the place of the heart, the seat of the soul. At first all will be dark and comfortless; but if thou persevere day and night, thou wilt feel an ineffable joy; and no sooner has the soul discovered the place of the heart than it is involved in a mystic and ethereal light." About the year 1337 this hesychasm, which is obviously related to certain well-known forms of Oriental mysticism, attracted the attention of the learned and versatile Barlaam, a Calabrian monk, who at that time held the office of abbot in the Basilian monastery of St Saviour's in Constantinople, and who had visited the fraternities of Mount Athos on a tour of inspection. Amid much that he disapproved, what he specially took exception to as heretical and blasphemous was the doctrine entertained as to the nature of this divine light, the fruition of which was the supposed reward of hesychastic contemplation. It was maintained to be the pure and perfect essence of God Himself, that eternal light which had been manifested to the disciples on Mount Tabor at the transfiguration. This Barlaam held to be polytheistic, inasmuch as it postulated two eternal substances, a visible and an invisible God. On the hesychastic side the controversy was taken up by Gregory Palamas, afterwards archbishop of Thessalonica, who laboured to establish a distinction between eternal οὐσία and eternal ἐνέργεια. In 1341 the dispute came before a synod held at Constantinople and presided over by the emperor Andronicus; the assembly, influenced by the veneration in which the writings of the pseudo-Dionysius were held in the Eastern Church, overawed Barlaam, who recanted and returned to Calabria, afterwards becoming bishop of Hierace in the Latin communion. One of his friends, Gregory Acindynus, continued the controversy, and three other synods on the subject were held, at the second of which the Barlaamites gained a brief victory. But in 1351 under the presidency of the emperor John Cantacuzenus, the uncreated light of Mount Tabor was established as an article of faith for the Greeks, who ever since have been ready to recognize it as an additional ground of separation from the Roman Church. The contemporary historians Cantacuzenus and Nicephorus Gregoras deal very copiously with this subject, taking the Hesychast and Barlaamite sides respectively. It may be mentioned that in the time of Justinian the word hesychast was applied to monks in general simply as descriptive of the quiet and contemplative character of their pursuits.

See article “Hesychasten” in Herzog-Hauck, *Realencyklopädie* (3rd ed., 1900), where further references are given.

HESYCHIUS, grammarian of Alexandria, probably flourished in the 5th century A.D. He was probably a pagan; and the explanations of words from Gregory of Nazianzus and other Christian writers (*glossae sacrae*) are interpolations of a later time. He has left a Greek dictionary, containing a copious list of peculiar words, forms and phrases, with an explanation of their meaning, and often with a reference to the author who used them or to the district of Greece where they were current. Hence the book is of great value to the student of the Greek dialects; while in the restoration of the text of the classical authors generally, and particularly of such writers as Aeschylus and Theocritus, who used many unusual words, its value can hardly be exaggerated. The explanations of many epithets and phrases reveal many important facts about the religion and social life of the ancients. In a prefatory letter Hesychius mentions that his lexicon is based on that of Diogenianus (itself extracted from an earlier work by Pamphilus), but that he has also used similar works by Aristarchus, Apion, Heliodorus and others.

The text is very corrupt, and the order of the words has often been disturbed. There is no doubt that many interpolations, besides the Christian glosses, have been made. The work has come down to us from a single MS., now in the library at Venice, from which the editio princeps was published. The best edition is by M. Schmidt (1858-1868); in a smaller edition (1867) he attempts to distinguish the additions made by Hesychius to the work of Diogenianus.

HESYCHIUS OF MILETUS, Greek chronicler and biographer, surnamed *Illustrius*, son of an advocate, flourished at Constantinople in the 5th century A.D. during the reign of Justinian. According to Photius (cod. 69) he was the author of three important works, (1) *A Compendium of Universal History* in six books, from Belus, the reputed founder of the Assyrian empire, to Anastasius I. (d. 518). A considerable fragment has been preserved from the sixth book, entitled Πάτρια Κωνσταντινουπόλεως, a history of Byzantium from its earliest beginnings till the time of Constantine the Great. (2) *A Biographical Dictionary* (Ὀνοματολόγος or Πίναξ) *of Learned Men*, arranged according to classes (poets, philosophers), the chief sources of which were the Μουσικὴ ἱστορία of Aelius Dionysius and the works of Herennius Philo. Much of it has been incorporated in the lexicon of Suidas, as we learn from that author. It is disputed, however, whether the words in Suidas (“of which this book is an epitome”) mean that Suidas himself epitomized the work of Hesychius, or whether they are part of the title of an already epitomized Hesychius used by Suidas. The second view is more generally held. The epitome referred to, in which alphabetical order was substituted for arrangement in classes and some articles on Christian writers added as a concession to the times, is assigned from internal indications to the years 829-837. Both it and the original work are lost, with the exception of the excerpts in Photius and Suidas. A smaller compilation, chiefly from Diogenes Laërtius and Suidas, with a similar title, is the work of an unknown author of the 11th or 12th century. (3) A *History* of the Reign of Justin I. (518-527) and the early years of Justinian, completely lost. Photius praises the style of Hesychius, and credits him with being a veracious historian.

Editions: J. C. Orelli (1820) and J. Flach (1882); fragments in C. W. Müller, *Frag. hist. Graec.* iv. 143 and in T. Preger’s *Scriptores originis Constantinopolitanae*, i. (1901); *Pseudo-Hesychius*, by J. Flach (1880); see generally C. Krumbacher, *Geschichte der byzantinischen Literatur* (1897).

HETAERISM (Gr. ἕταιρα mistress), the term employed by anthropologists to express the primitive condition of man in his sexual relations. The earliest social organization of the human race was characterized by the absence of the institution of marriage in any form. Women were the common property of their tribe, and the children never knew their fathers.

HETEROKARYOTA, a zoological name proposed by S. J. Hickson for the Infusoria (*q.v.*) on the ground of the differentiation of their nuclear apparatus into meganucleus and micronucleus (or nuclei).

See Lankester's *Treatise of Zoology*, vol. i. fasc. 1 (1903).

HETERONOMY (from Gr. ἕτερος and νόμος, the rule of another), the state of being under the rule of another person. In ethics the term is specially used as the antithesis of "autonomy," which, especially in Kantian terminology, treats of the true self as will, determining itself by its own law, the moral law. "Heteronomy" is therefore applied by Kant to all other ethical systems, inasmuch as they place the individual in subjection to external laws of conduct.

HETMAN (a Polish word, probably derived from the Ger. *Hauptmann*, head-man or captain; the Russian form is *ataman*), a military title formerly in use in Poland; the *Hetman Wielki*, or Great Hetman, was the chief of the armed forces of the nation, and commanded in the field, except when the king was present in person. The office was abolished in 1792. From Poland the word was introduced into Russia, in the form *ataman*, and was adopted by the Cossacks, as a title for their head, who was practically an independent prince, when under the suzerainty of Poland. After the acceptance of Russian rule by the Cossacks in 1654, the post was shorn of its power. The title of "ataman" or "hetman of all the Cossacks" is held by the Cesarevitch. "Ataman" or "hetman" is also the name of the elected elder of the *stanitsa*, the unit of Cossack administration. (See Cossacks.)

HETTNER, HERMANN THEODOR (1821-1882), German literary historian and writer on the history of art, was born at Leisersdorf, near Goldberg, in Silesia, on the 12th of March 1821. At the universities of Berlin, Halle and Heidelberg he devoted himself chiefly to the study of philosophy, but in 1843 turned his attention to aesthetics, art and literature. With a view to furthering these studies, he spent three years in Italy, and, on his return, published a *Vorschule zur bildenden Kunst der Alten* (1848) and an essay on *Die neapolitanischen Malerschulen*. He became *Privatdozent* for aesthetics and the history of art at Heidelberg and, after the publication of his suggestive volume on *Die romantische Schule in ihrem Zusammenhang mit Goethe und Schiller* (1850), accepted a call as professor to Jena where he lectured on the history of both art and literature. In 1855 he was appointed director of the royal collections of antiquities and the museum of plaster casts at Dresden, to which posts were subsequently added that of director of the historical museum and a professorship at the royal *Polytechnikum*. He died in Dresden on the 29th of May 1882. Hettner's chief work is his *Literaturgeschichte des 18ten Jahrhunderts*, which appeared in three parts, devoted respectively to English, French and German literature, between 1856 and 1870 (5th ed. of I. and II., revised by A. Brandl and H. Morf, 1894; 4th of III., revised by O. Harnack, 1894). Although to some extent influenced by the political and literary theories of the Hegelian school, which, since Hettner's day have fallen into discredit, and at times losing sight of the main issues of literary development over questions of social evolution, this work belongs to the best histories that the 19th century produced. Hettner's judgment is sound and his point of view always original and stimulating. His other works include *Griechische Reiseskizzen* (1853), *Das moderne Drama* (1852)—a book that arose from a correspondence with Gottfried Keller—*Italienische Studien* (1879), and several works descriptive of the Dresden art collections. His *Kleine Schriften* were collected and published in 1884.

See A. Stern, *Hermann Hettner, ein Lebensbild* (1885); H. Spitzer, *H. Hettners kunstphilosophische Anfänge und Literaturästhetik* (1903).

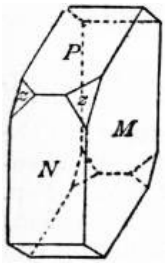
HETTSTEDT, a town of Germany, in Prussian Saxony, on the Wipper, and at the junction of the

railways Berlin-Blankenheim and Hettstedt-Halle, 23 m. N.W. of the last town. Pop. (1905), 9230. It has a Roman Catholic and four Evangelical churches, and has manufactures of machinery, pianofortes and artificial manure. In the neighbourhood are mines of argentiferous copper, and the surrounding district and villages are occupied with smelting and similar works. Silver and sulphuric acid are the other chief products; nickel and gold are also found in small quantities. In the Kaiser Friedrich mine close by, the first steam-engine in Germany was erected on the 23rd of August 1785. Hettstedt is mentioned as early as 1046; in 1220 it possessed a castle; and in 1380 it received civic privileges. When the countship of Mansfeld was sequestrated, Hettstedt came into the possession of Saxony, passing to Prussia in 1815.

HEUGLIN, THEODOR VON (1824-1876), German traveller in north-east Africa, was born on the 20th of March 1824 at Hirschlanden near Leonberg in Württemberg. His father was a Protestant pastor, and he was trained to be a mining engineer. He was ambitious, however, to become a scientific investigator of unknown regions, and with that object studied the natural sciences, especially zoology. In 1850 he went to Egypt where he learnt Arabic, afterwards visiting Arabia Petraea. In 1852 he accompanied Dr Reitz, Austrian consul at Khartum, on a journey to Abyssinia, and in the next year was appointed Dr Reitz's successor in the consulate. While he held this post he travelled in Abyssinia and Kordofan, making a valuable collection of natural history specimens. In 1857 he journeyed through the coast lands of the African side of the Red Sea, and along the Somali coast. In 1860 he was chosen leader of an expedition to search for Eduard Vogel, his companions including Werner Munzinger, Gottlob Kinzelbach, and Dr Hermann Steudner. In June 1861 the party landed at Massawa, having instructions to go direct to Khartum and thence to Wadai, where Vogel was thought to be detained. Heuglin, accompanied by Dr Steudner, turned aside and made a wide detour through Abyssinia and the Galla country, and in consequence the leadership of the expedition was taken from him. He and Steudner reached Khartum in 1862 and there joined the party organized by Miss Tinné. With her or on their own account, they travelled up the White Nile to Gondokoro and explored a great part of the Bahr-el-Ghazal, where Steudner died of fever on the 10th of April 1863. Heuglin returned to Europe at the end of 1864. In 1870 and 1871 he made a valuable series of explorations in Spitsbergen and Novaya Zemlya; but 1875 found him again in north-east Africa, in the country of the Beni Amer and northern Abyssinia. He was preparing for an exploration of the island of Sokotra, when he died, at Stuttgart, on the 5th of November 1876. It is principally by his zoological, and more especially his ornithological, labours that Heuglin has taken rank as an independent authority.

His chief works are *Systematische Übersicht der Vögel Nordost-Afrikas* (1855); *Reisen in Nordost-Afrika, 1852-1853* (Gotha, 1857); *Syst. Übersicht der Säugetiere Nordost-Afrikas* (Vienna, 1867); *Reise nach Abessinien, den Gala-Ländern*, &c., *1861-1862* (Jena, 1868); *Reise in das Gebiet des Weissen Nil*, &c. *1862-1864* (Leipzig, 1869); *Reisen nach dem Nordpolarmeer, 1870-1871* (Brunswick, 1872-1874); *Ornithologie von Nordost-Afrika* (Cassel, 1869-1875); *Reise in Nordost-Afrika* (Brunswick, 1877, 2 vols.) A list of the more important of his numerous contributions to *Petermann's Mitteilungen* will be found in that serial for 1877 at the close of the necrological notice.

HEULANDITE, a mineral of the zeolite group, consisting of hydrous calcium and aluminium silicate, $H_4CaAl_2(SiO_3)_6 + 3H_20$. Small amounts of sodium and potassium are usually present replacing part of the calcium. Crystals are monoclinic, and have a characteristic coffin-shaped habit. They have a perfect cleavage parallel to the plane of symmetry (*M* in the figure), on which the lustre is markedly pearly; on other faces the lustre is of the vitreous type. The mineral is usually colourless or white, sometimes brick-red, and varies from transparent to translucent. The hardness is 3½-4, and the specific gravity 2.2.



Heulandite closely resembles stilbite (*q.v.*) in appearance, and differs from it chemically only in containing rather less water of crystallization. The two minerals may, however, be readily distinguished by the fact that in heulandite the acute positive bisectrix of the optic axes emerges perpendicular to the cleavage. Heulandite was first separated from stilbite by A. Breithaupt in 1818, and named by him euzeolite (meaning beautiful zeolite); independently, in 1822, H. J. Brooke arrived at the same result, giving the name heulandite, after the mineral collector, Henry Heuland.

Heulandite occurs with stilbite and other zeolites in the amygdaloidal cavities of basaltic volcanic rocks, and occasionally in gneiss and metalliferous veins. The best specimens are from the basalts of

Berufjord, near Djupivogr, in Iceland and the Faroe Islands, and the Deccan traps of the Sahyadri mountains near Bombay. Crystals of a brick-red colour are from Campsie Fells in Stirlingshire and the Fassathal in Tirol. A variety known as beaumontite occurs as small yellow crystals on syenitic schist near Baltimore in Maryland.

Isomorphous with heulandite is the strontium and barium zeolite brewsterite, named after Sir David Brewster. The greyish monoclinic crystals have the composition $H_4(Sr, Ba, Ca)Al_2(SiO_3)_6 + 3H_2O$, and are found in the basalt of the Giant's Causeway in Co. Antrim, and with harmotome in the lead mines at Strontian in Argyllshire.

(L. J. S.)

HEUSCH, WILLEM, or GUILLIAM DE, a Dutch landscape painter in the 17th century at Utrecht. The dates of this artist's birth and death are unknown. Nothing certain is recorded of him except that he presided over the gild of Utrecht, whilst Cornelis Poelemburg, Jan Both and Jan Weenix formed the council of that body, in 1649. According to the majority of historians, Heusch was born in 1638, and was taught by Jan Both. But each of these statements seems open to doubt; and although it is obvious that the style of Heusch is identical with that of Both, it may be that the two masters during their travels in Italy fell under the influence of Claude Lorraine, whose "Arcadian" art they imitated. Heusch certainly painted the same effects of evening in wide expanses of country varied by rock formations and lofty thin-leaved arborescence as Both. There is little to distinguish one master from the other, except that of the two Both is perhaps the more delicate colourist. The gild of Utrecht in the middle of the 17th century was composed of artists who clung faithfully to each other. Poelemburg, who painted figures for Jan Both, did the same duty for Heusch. Sometimes Heusch sketched landscapes for the battlepieces of Molenaer. The most important examples of Heusch are in the galleries of the Hague and Rotterdam, in the Belvedere at Vienna, the Städel at Frankfort and the Louvre. His pictures are signed with the full name, beginning with a monogram combining a G (for Guilliam), D and H. Heusch's etchings, of which thirteen are known, are also in the character of those of Both.

After Guilliam there also flourished at Utrecht his nephew, Jacob de Heusch, who signs like his uncle, substituting an initial J for the initial G. He was born at Utrecht in 1657, learnt drawing from his uncle, and travelled early to Rome, where he acquired friends and patrons for whom he executed pictures after his return. He settled for a time at Berlin, but finally retired to Utrecht, where he died in 1701. Jacob was an "Arcadian," like his relative, and an imitator of Both, and he chiefly painted Italian harbour views. But his pictures are now scarce. Two of his canvases, the "Ponte Rotto" at Rome, in the Brunswick Gallery, and a lake harbour with shipping in the Lichtenstein collection at Vienna, are dated 1696. A harbour with a tower and distant mountains, in the Belvedere at Vienna, was executed in 1699. Other examples may be found in English private galleries, in the Hermitage of St Petersburg and the museums of Rouen and Montpellier.

HEVELIUS [HEVEL or HÖWELCKE], **JOHANN** (1611-1687), German astronomer, was born at Danzig on the 28th of January 1611. He studied jurisprudence at Leiden in 1630; travelled in England and France; and in 1634 settled in his native town as a brewer and town councillor. From 1639 his chief interest became centred in astronomy, though he took, throughout his life, a leading part in municipal affairs. In 1641 he built an observatory in his house, provided with a splendid instrumental outfit, including ultimately a tubeless telescope of 150 ft. focal length, constructed by himself. It was visited, on the 29th of January 1660, by John II. and Maria Gonzaga, king and queen of Poland. Hevelius made observations of sun-spots, 1642-1645, devoted four years to charting the lunar surface, discovered the moon's libration in longitude, and published his results in *Selenographia* (1647), a work which entitles him to be called the founder of lunar topography. He discovered four comets in the several years 1652, 1661, 1672 and 1677, and suggested the revolution of such bodies in parabolic tracks round the sun. On the 26th of September 1679, his observatory, instruments and books were maliciously destroyed by fire, the catastrophe being described in the preface to his *Annus climactericus* (1685). He promptly repaired the damage, so far as to enable him to observe the great comet of December 1680; but his health suffered from the shock, and he died on the 28th of January 1687. Among his works were: *Prodromus cometicus* (1665); *Cometographia* (1668); *Machina coelestis* (first part, 1673), containing a description of his instruments; the second part (1679) is extremely rare, nearly the whole issue having perished in the conflagration of 1679. The observations made by Hevelius on the variable star named by him "Mira" are included in *Annus climactericus*. His catalogue of 1564 stars appeared posthumously in *Prodromus astronomiae* (1690). Its value was much impaired by his preference of the antique

"pinnules" to telescopic sights on quadrants. This led to an acrimonious controversy with Robert Hooke. In an *Atlas* of 56 sheets, corresponding to his catalogue, and entitled *Firmamentum Sobiescianum* (1690), he delineated seven new constellations, still in use. Hevelius had his book printed in his own house, at lavish expense, and himself not only designed but engraved many of the plates.

See J. H. Westphal, *Leben, Studien, und Schriften des Astronomen Johann Hevelius* (1820); C. B. Lengnich, *Anekdoten und Nachrichten* (1780); *Allgemeine deutsche Biographie* (C. Bruhns); J. B. J. Delambre, *Histoire de l'astronomie moderne*, ii. 471; J. F. Weidler, *Historia astronomiae*, p. 486; F. Baily's edition of the Catalogue of Hevelius, *Memoirs Roy. Astr. Society*, xiii. (1843); R. Wolf, *Geschichte der Astronomie*, p. 396; J. C. Poggendorff, *Biog.-lit. Handwörterbuch*. For an account of the epistolary remains of Hevelius, see C. G. Hecker, *Monatl. Correspondenz*, viii. 30; also *Astr. Nachrichten*, vols. xxiii., xxiv.

(A. M. C.)

HEWETT, SIR PRESCOTT GARDNER, Bart. (1812-1891), British surgeon, was born on the 3rd of July 1812, being the son of a Yorkshire country gentleman. He lived for some years in early life in Paris, and started on a career as an artist, but abandoned it for surgery. He entered St George's Hospital, London (where his half-brother, Dr Cornwallis Hewett, was physician from 1825 to 1833) becoming demonstrator of anatomy and curator of the museum. He was the pupil and intimate friend of Sir B. C. Brodie, and helped him in much of his work. Eventually he rose to be anatomical lecturer, assistant-surgeon and surgeon to the hospital. In 1876 he was president of the College of Surgeons; in 1877 he was made serjeant-surgeon extraordinary to Queen Victoria, in 1884 serjeant-surgeon, and in 1883 he was created a baronet. He was a very good lecturer, but shrank from authorship; his lectures on *Surgical Affections of the Head* were, however, embodied in his treatise on the subject in Holmes's *System of Surgery*. As a surgeon he was always extremely conservative, but hesitated at no operation, however severe, when convinced of its expediency. He was a perfect operator, and one of the most trustworthy of counsellors. He died on the 19th of June 1891.

HEWITT, ABRAM STEVENS (1822-1903), American manufacturer and political leader, was born in Haverstraw, New York, on the 31st of July 1822. His father, John, a Staffordshire man, was one of a party of four mechanics who were sent by Boulton and Watt to Philadelphia about 1790 to set up a steam engine for the city water-works and who in 1793-1794 built at Belleville, N.J., the first steam engine constructed wholly in America; he made a fortune in the manufacture of furniture, but lost it by the burning of his factories. The boy's mother was of Huguenot descent. He graduated with high rank from Columbia College in 1842, having supported himself through his course. He taught mathematics at Columbia, and in 1845 was admitted to the bar, but, owing to defective eyesight, never practised. With Edward Cooper (son of Peter Cooper, whom Hewitt greatly assisted in organizing Cooper Union, and whose daughter he married) he went into the manufacture of iron girders and beams under the firm name of Cooper, Hewitt & Co. His study of the making of gun-barrel iron in England enabled him to be of great assistance to the United States government during the Civil War, when he refused any profit on such orders. The men in his works never struck—indeed in 1873-1878 his plant was run at an annual loss of $100,000. In politics he was a Democrat. In 1871 he was prominent in the re-organization of Tammany after the fall of the "Tweed Ring"; from 1875 until the end of 1886 (except in 1879-1881) he was a representative in Congress; in 1876 he left Tammany for the County Democracy; in the Hayes-Tilden campaign of that year he was chairman of the Democratic National Committee, and in Congress he was one of the House members of the joint committee which drew up the famous Electoral Count Act providing for the Electoral Commission. In 1886 he was elected mayor of New York City, his nomination having been forced upon the Democratic Party by the strength of the other nominees, Henry George and Theodore Roosevelt; his administration (1887-1888) was thoroughly efficient and creditable, but he broke with Tammany, was not renominated, ran independently for re-election, and was defeated. In 1896 and 1900 he voted the Republican ticket, but did not ally himself with the organization. He died in New York City on the 18th of January 1903. In Congress he was a consistent defender of sound money and civil service reform; in municipal politics he was in favour of business administrations and opposed to partisan nominations. He was a leader of those who contended for reform in municipal government, was conspicuous for his public spirit, and exerted a great influence for good not only in New York City but in the state and nation. His most famous speech was that made at the opening of the Brooklyn Bridge in 1883. He was a terse, able and lucid speaker, master of wit and sarcasm, and a fearless critic. He gave liberally to Cooper Union, of which he was trustee and secretary, and which owes much of its success to him; was a trustee of Columbia University

from 1901 until his death, chairman of the board of trustees of Barnard College, and was one of the original trustees, first chairman of the board of trustees, and a member of the executive committee of the Carnegie Institution.

HEWLETT, MAURICE HENRY (1861-), English novelist, was born on the 22nd of January 1861, the eldest son of Henry Gay Hewlett, of Shaw Hall, Addington, Kent. He was educated at the London International College, Spring Grove, Isleworth, and was called to the bar in 1891. From 1896 to 1900 he was keeper of the land revenue records and enrolments. He published in 1895 two books on Italy, *Earthwork out of Tuscany*, and (in verse) *The Masque of Dead Florentines*. *Songs and Meditations* followed in 1897, and in 1898 he won an immediate reputation by his *Forest Lovers*, a romance of medieval England, full of rapid movement and passion. In the same year he printed the pastoral and pagan drama of *Pan and the Young Shepherd*, shortened for purposes of representation and produced at the Court Theatre in March 1905, when it was followed by the *Youngest of the Angels*, dramatized from a chapter in his *Fool Errant*. In *Little Novels of Italy* (1899), a collection of brilliant short stories, he showed again his power of literary expression together with a close knowledge of medieval Italy. The new and vivid portraits of Richard Cœur de Lion in his *Richard Yea-and-Nay* (1900), and of Mary, queen of Scots, in *The Queen's Quair* (1904) showed the combination of fiction with real history at its best. *The New Canterbury Tales* (1901) was another volume of stories of English life, but he returned to Italian subjects with *The Road in Tuscany* (1904); in *Fond Adventures, Tales of the Youth of the World* (1905), two are Italian tales, and *The Fool Errant* (1905) purports to be the memoirs of Francis Antony Stretley, citizen of Lucca. Later works were the novel *The Stooping Lady* (1907), and a volume of poems, *Artemision* (1909).

HEXAMETER, the name of the earliest and most important form of classical verse in dactylic rhythm. The word is due to each line containing six feet or measures (μέτρα), the last of which must be a spondee and the penultimate a dactyl, though occasionally, for some special effect, a spondee may be allowed in the fifth foot, when the line is said to be spondaic. The four other feet may be either spondees or dactyls. All the great heroic and epic verse of the Greek and Roman poets is in this metre, of which the finest examples are to be found in Homer and in Virgil. Varied cadences and varied caesura are essential to this form of verse, otherwise the monotony is wearying to the ear. The most usual places for the caesura are at the middle of the third, or the middle of the fourth foot: the former is known as the penthemimeral and the latter as hepthemimeral caesura. There are several more or less successful examples of English poems in this metre, for example Longfellow's *Evangeline*, Kingsley's *Andromeda* and Clough's *Bothie of Tober-na-Vuoilich*, but it does not really suit the genius of the English language. In English the lack of true spondees is severely felt, even though the English metre depends, not, as in Greek and Latin, on the distinction between long and short syllables, but on that between accented and unaccented syllables. The accent must always (or it sounds very ugly) fall on the first syllable, whatever may have been the case in Greek and Latin— Voss, Klopstock and Goethe have written hexameter poems of varying merit and the metre suits the German language distinctly better than the English. The customary form of hexameter in English verse is exemplified by Coleridge's descriptive line:—

"In the hex | ameter | rises the | fountain's | silvery | column."

Several modern poets, and in particular Robert Browning, and Lord Bowen (1835-1894) have used with effect a truncated hexameter consisting of the usual verse deprived of its last syllable. Thus Browning:—

"Well, it is I gone at | last, the | palace of | music I | reared."

It is not sufficiently observed that even the classic Greek poets introduced considerable variations into their treatment of the hexameter. These have been treated with erudition in G. Hermann's *De aetate scriptoris Argonauticorum*. The differences in the hexameters of the Latin poets were not so remarkable, but even these varied, in various epochs, their treatment of the separate feet, and the position of the caesura. The satirists in particular allowed themselves an extraordinary licence: these hexameters, from Persius, are as far removed from the rhythm of Homer, or even of Virgil, as possible, if they are to remain hexameters:—

"Mane piger stertis. 'Surge!' inquit Avaritia, 'heia
Surge!' negas; instat 'Surge!' inquit 'Non queo.' 'Surge!'
'Et quid agam?' 'Rogitas? en saperdam advehe Ponto.'"

It is also to be noted that various prosodical liberties, due originally to the extreme antiquity of the hexameter, and long reformed and repressed by the culture of poets, were apt to be revived in later ages, by writers who slavishly copied the most antique examples of the art of verse.

See Wilhelm Christ, *Metrik der Griechen und Römer*, 2te Aufl. (1879).

HEXAPLA (Gr. for "sixfold"), the term for an edition of the Bible in six versions, and especially the edition of the Old Testament compiled by Origen, which placed side by side (1) Hebrew, (2) Hebrew in Greek character, (3) Aquila, (4) Symmachus, (5) Septuagint, (6) Theodotion. See BIBLE: *Old Testament, Texts and Versions*.

HEXAPODA (Gr. ἕξ, six, and πούς, foot), a term used in systematic zoology for that class of the ARTHROPODA, popularly known as insects. Linnaeus in his *Systema naturae* (1735) grouped under the class Insecta all segmented animals with firm exoskeleton and jointed limbs—that is to say, the insects, centipedes, millipedes, crustaceans, spiders, scorpions and their allies. This assemblage is now generally regarded as a great division (phylum or sub-phylum) of the animal kingdom and known by K. T. E. von Siebold's (1848) name of Arthropoda. For the class of the true insects included in this phylum, Linnaeus's old term Insecta, first used in a restricted sense by M. J. Brisson (1756), is still adopted by many zoologists, while others prefer the name Hexapoda, first used systematically in its modern sense by P. A. Latreille in 1825 (*Familles naturelles du règne animal*), since it has the advantage of expressing, in a single word, an important characteristic of the group. The terms "Hexapoda" and "hexapod" had already been used by F. Willughby, J. Ray and others in the late 17th century to include the active larvae of beetles, as well as bugs, lice, fleas and other insects with undeveloped wings.

Characters.

A true insect, or member of the class Hexapoda, may be known by the grouping of its body-segments in three distinct regions—a head, a thorax and an abdomen—each of which consists of a definite number of segments. In the terminology proposed by E. R. Lankester the arrangement is "nomomeristic" and "nomotagmic." The head of an insect carries usually four pairs of conspicuous appendages—feelers, mandibles and two pairs of maxillae, so that the presence of four primitive somites is immediately evident. The compound eyes of insects resemble so closely the similar organs in Crustaceans that there can hardly be reasonable doubt of their homology, and the primitively appendicular nature of the eyes in the latter class suggests that in the Hexapoda also they represent the appendages of an anterior (protocerebral) segment. Behind the antennal (or deutocerebral) segment an "intercalary" or tritocerebral segment has been demonstrated by W. M. Wheeler (1893) and others in various insect embryos, while in the lowest insect order—the Aptera—a pair of minute jaws—the maxillulae—in close association with the tongue are present, as has been shown by H. J. Hansen (1893) and J. W. Folsom (1900). Distinct vestiges of the maxillulae exist also in the earwigs and booklice, according to G. Enderlein and C. Börner (1904), and they are very evident in larval may-flies. The number of limb-bearing somites in the insectan head is thus seen to be seven. All of these are to be regarded as primitively post-oral, but in the course of development the mouth moves back to the mandibular segment, so that the first three somites—ocular, antennal and intercalary—lie in front of it. In Lankester's terminology, therefore, the head of an insect is "triprosthomerous." The maxillae of the hinder pair become more or less fused together to form a "lower lip" or labium, and the segment of these appendages is, in some insects, only imperfectly united with the head-capsule.

The thorax is composed of three segments; each bears a pair of jointed legs, and in the vast majority of insects the two hindmost bear each a pair of wings. From these three pairs of thoracic legs comes the name—Hexapoda—which distinguishes the class. And the wings, though not always present, are highly characteristic of the Hexapoda, since no other group of the Arthropoda has acquired the power of flight. In the more generalized insects the abdomen evidently consists of ten segments, the hindmost of which often carries a pair of tail-feelers, (cerci or cercopods) and a terminal anal segment. In some cases, however, it can be shown that the cerci really belong to an eleventh abdominal segment which usually becomes fused with the tenth. With very few exceptions the abdomen is without locomotor limbs. Paired processes on the eighth and ninth abdominal segments may be specialized as external organs of reproduction, but these are probably not appendages. The female genital opening usually lies in front of the eighth abdominal segment, the

male duct opens on the ninth.

In all main points of their internal structure the Hexapoda agree with other Arthropoda. Specially characteristic of the class, however, is the presence of a complex system of air-tubes (tracheae) for respiration, usually opening to the exterior by a series of paired spiracles on certain of the body segments. The possession of a variable number of excretory tubes (Malpighian tubes), which are developed as outgrowths of the hind-gut and pour their excretion into the intestine, is also a distinctive character of the Hexapoda.

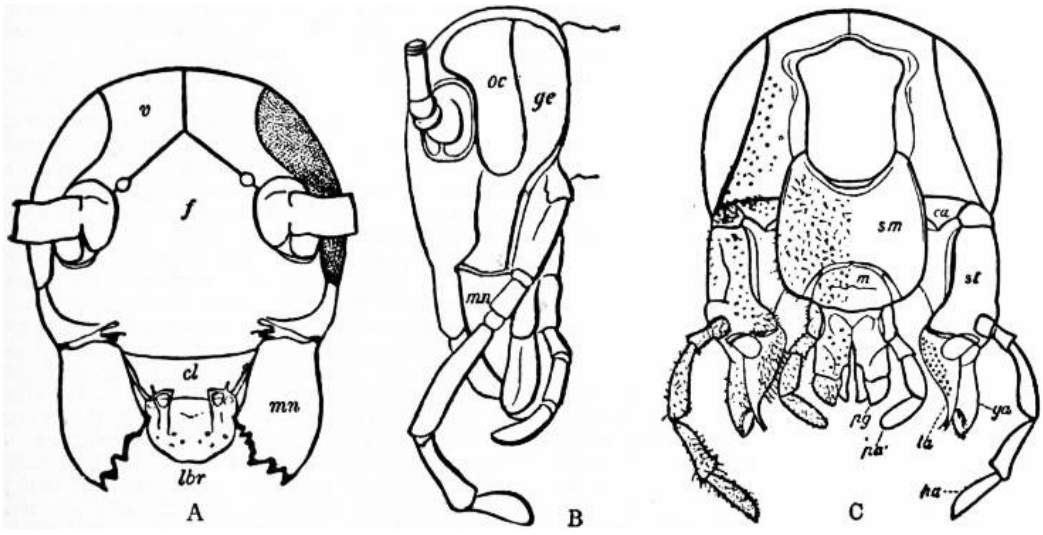
The wings of insects are, in all cases, developed after hatching, the younger stages being wingless, and often unlike the parent in other respects. In such cases the development of wings and the attainment of the adult form depend upon a more or less profound transformation or metamorphosis.

With this brief summary of the essential characters of the Hexapoda, we may pass to a more detailed account of their structure.

Exoskeleton

The outer cellular layer (ectoderm or "hypodermis") of insects as of other Arthropods, secretes a chitinous cuticle which has to be periodically shed and renewed during the growth of the animal. The regions of this cuticle have a markedly segmental arrangement, and the definite hardened pieces (sclerites) of the exoskeleton are in close contact with one another along linear sutures, or are united by regions of the cuticle which are less chitinous and more membranous, so as to permit freedom of movement.

Head.—The head-capsule of an insect (figs. 1, 2) is composed of a number of sclerites firmly sutured together, so that the primitive segmentation is masked. Above is the crown (*vertex* or *epicranium*), on which or on the "front" may be seated three simple eyes (ocelli). Below this comes the front, and then the face or clypeus, to which a very distinct upper lip (*labrum*) is usually jointed. Behind the labrum arises a process—the *epipharynx*—which in some blood-sucking insects becomes a formidable piercing-organ. On either side a variable amount of convex area is occupied by the compound eye; in many insects of acute sense and accurate flight these eyes are very large and sub-globular, almost meeting on the middle line of the head. Below each eye is a cheek area (*gena*), often divided into an anterior and a posterior part, while a distinct chin-sclerite (*gula*) is often developed behind the mouth.



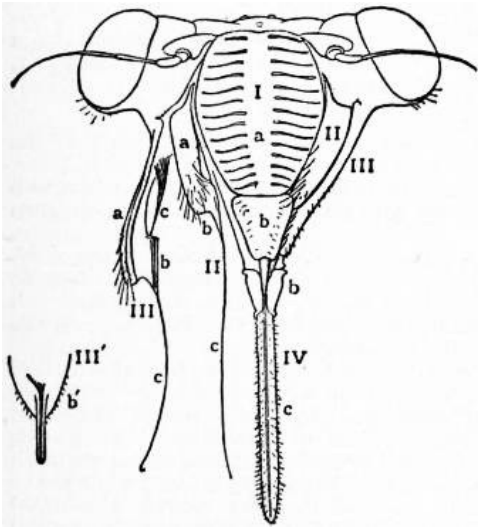
From Miall and Denny, *The Cockroach*, Lovell Reeve & Co.

Fig. 1.—Head and Jaws of Cockroach (*Blatta*). Magnified 10 times. A, Front; B, side; C, back; *v*, vertex; *f*, frons; *cl*, clypeus; *lbr*, labrum; *oc*, compound eye; *ge*, gena; *mn*, mandible; *ca*, *st*, *pa*, *ga*, *la*, cardo, stipes, palp, galea, lacinia of first maxilla; *sm*, *m*, *pa″*, *pg*, sub-mentum, mentum, palp, galea of 2nd maxilla.

Feelers.—Most conspicuous among the appendages of the head are the feelers or antennae, which correspond to the anterior feelers (antennules) of Crustacea. In their simpler condition they are long and many-jointed, the segments bearing numerous olfactory and tactile nerve-endings. Elaboration in the form of the feelers, often a secondary sexual character in male insects, may result from a distal broadening of the segments, so that the appendage becomes serrate, or from the development of processes bearing sensory organs, so that the structure is pinnate or feather-like. On the other hand, the number of segments may be reduced, certain of them often becoming highly modified in form.

Jaws.—The mandibles of the Hexapoda are usually strong jaws with one or more teeth at the apex (fig. 1, A, B, *mn*), articulating at their bases with the head-capsule by sub-globular condyles,

and provided with abductor and adductor muscles by means of which they can be separated or drawn together so as to bite solid food, or seize objects which have to be carried about. They never bear segmented limbs (palps) and only exceptionally (as in the chafers) is the skeleton composed of more than one sclerite. The mandibles often furnish a good example of "secondary sexual characters," being more strongly developed in the male than in the female of the same species. In most insects that feed by suction the mandibles are modified. In bugs (Heteroptera) and many flies, for example, they are changed into needle-like piercers (fig. 2, II), while in moths and caddis-flies they are reduced to mere vestiges or altogether suppressed.



After Marlatt, *Entom. Bull.* 14, n. s. (U.S. Dept. Agric.).

FIG. 2.—Head of Cicad, front view. I*a*, frons; *b*, clypeus (the pointed labrum beneath it); II, mandible; III, first maxilla; (*a*, base; *b*, sheath; *c*, piercer), III′, inner view of sheath; IV, second maxillae forming rostrum (*b*, mentum; *c*, ligula).

As previously mentioned, a pair of minute jaws —the *maxillulae*—are present in the lowest order of insects, between the mandibles and the first maxillae. They usually consist of an inner and an outer lobe arising from a basal piece, which bears also in some genera a small palp (see APTERA).

In their typical state of development, the *first maxillae* offer a striking contrast to the mandibles, being composed of a two-segmented basal piece (*cardo* and *stipes*, fig. 1, C, *ca*, *st*) bearing a distinct inner and outer lobe (*lacinia* and *galea*, fig. 1, C, *la*, *ga*) and externally a jointed limb or palp (fig. 1, C, *pa*). Such maxillae are found in most biting insects. In insects whose mouths are adapted for sucking and piercing, remarkable modifications may occur. In many blood-sucking flies, for example, the galea is absent, while the lacinia becomes a strong knife-like piercer and the palp is well developed. In bugs and aphids the lacinia is a slender needle-like piercer (fig. 2, III), while the palp is wanting. In butterflies and moths the lacinia is absent while the galea becomes a flexible process, grooved on its inner face, so as to make with its fellow a hollow sucking-trunk, and the palp is usually very small.

The *second pair of maxillae* are more or less completely fused together to form what is known as the *labium* or "lower lip." In generalized biting insects, such as cockroaches and locusts (Orthoptera), the parts of a typical maxilla can be easily recognized in the labium. The fused cardines form a broad basal plate (*sub-mentum*) and the stipites a smaller plate (*mentum*)—see fig. 1, C, *sm*, *m*—jointed on to the sub-mentum, while the galeae, laciniae and palps remain distinct. In specialized biting insects, such as beetles (Coleoptera), the labium tends to become a hard transverse plate bearing the pair of palps, a median structure—known as the *ligula*—formed of the conjoined laciniae, and a pair of small rounded processes—the reduced galeae—often called the "paraglossae," a term better avoided since it has been applied also to the maxillulae of Aptera, entirely different structures. The long sucking "tongue" of bees is probably a modification of the ligula. In bugs and aphids (Hemiptera), the fused second maxillae form a jointed grooved beak or rostrum (fig. 2, IV) in which the slender piercers (mandibles and first maxillae) work to and fro.

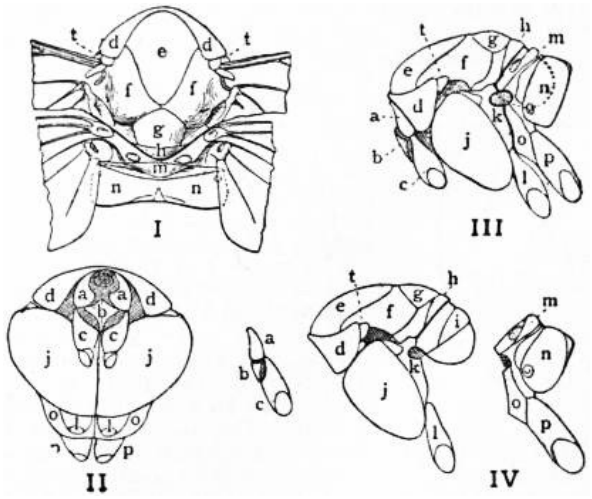
This second pair of maxillae (or labium) form then the hinder or lower boundary of the mouth. In front or above the mouth is bounded by the labrum, while the mandibles and first maxillae lie on either side of it. A median process, known as the *hypopharynx* or tongue, arises from the floor of the mouth in front of the labium, and becomes most variously developed or specialized in different insects. The salivary duct opens on its hinder surface. It does not appear to represent a pair of appendages, but the maxillulae of the Aptera become closely associated with it. According to the view of R. Heymons, the hypopharynx represents the sterna of all the jaw-bearing somites, but other students consider that it belongs to the mandibular and first maxillary segments, or entirely to the segment of the first maxillae.

Neck.—The head is usually connected with the thorax by a distinct membranous neck, strengthened in the more generalized orders with small chitinous plates (*cervical sclerites*). These have been interpreted as indicating one or more primitive segments between the head and thorax. Probably, however, as suggested by T. H. Huxley (*Anat. Invert. Animals*, 1877), they really belong to the labial segment which has not become completely fused with the head-capsule. It has been shown by C. Janet (1889), from careful studies of the musculature, that the greater part of the head-capsule is built up of the four anterior head-segments, the hindmost of which has the mandibles for its appendages, and this conclusion is in the main supported by the recent work on the head skeleton of J. H. Comstock and C. Kochi (1902) and W. A. Riley (1904).

Thorax.—The three segments which make up the thorax or fore-trunk are known as the *prothorax*, *mesothorax* and *metathorax* (see fig. 3). The dorsal area of the prothorax is occupied by a single sclerite, the *pronotum* (fig. 3, *d*), which is large and conspicuous in those insects, such as cockroaches, bugs (Heteroptera) and beetles, which have the prothorax free—*i.e.* readily movable on the segment (mesothorax) immediately behind—smaller and of less importance where the prothorax is fixed to the mesothorax, as in bees and flies. The dorsal area of the mesothorax, and also of the

metathorax, may be made up of a series of sclerites arranged one behind the other—*prescutum*, *scutum*, *scutellum* and *post-scutellum* (fig. 3, *e*, *f*, *g*, *h*), the scutellum of the mesothorax being often especially conspicuous. Ventrally, each segment of the thorax has a *sternum* with which a median *pre-sternum* and paired *episterna* and *epimera* are often associated (see figs. 3, 4). The recent suggestion of K. W. Verhoeff (1904) that the hexapodan thorax in reality contains six primitive segments is entirely without embryological support.

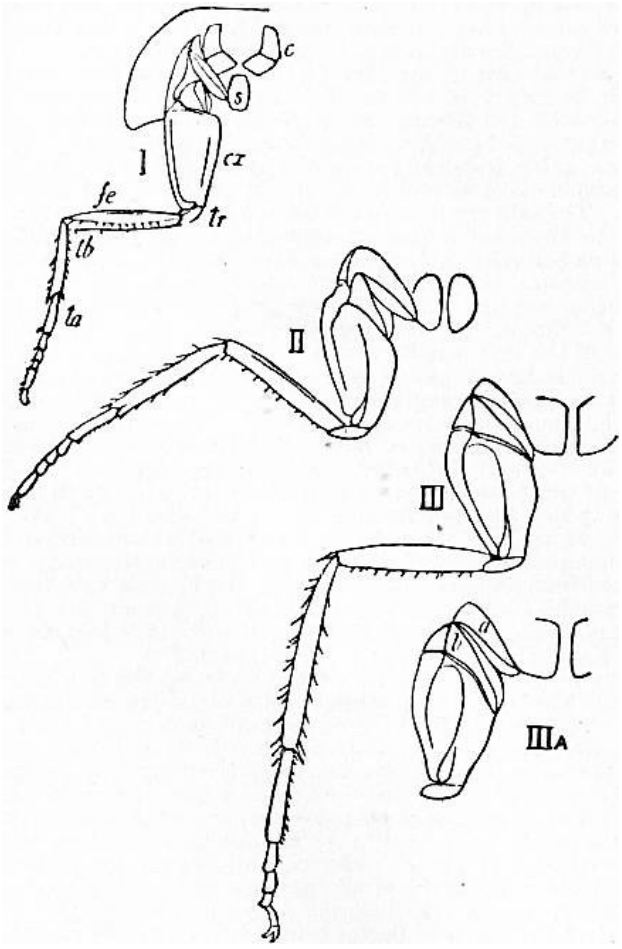
Legs.—Each segment of the thorax carries a pair of legs. In most insects the leg is built up of nine segments: (1) a broad triangular, sub-globular, conical or cylindrical haunch (*coxa*); (2) a small *trochanter*; (3) an elongate stout thigh (*femur*); (4) a more slender shin (*tibia*); and (5-9) a foot consisting of five *tarsal segments*. The fifth (distal) tarsal segment carries a median adhesive pad—the *pulvillus*—on either side of which is a claw. The pulvillus is probably to be regarded as a true terminal (tenth) segment of the leg, while the claws are highly modified bristles. Numerous bristles are usually present on the thighs, shins and feet of insects, some of them so delicate as to be termed "hairs," others so stout and hard that they are named "spines" or "spurs." In the relative development and shape of the various segments of the leg there is almost endless variety, dependent on the order to which the insect belongs, and the special function—walking, running, climbing, digging or swimming—for which the limb is adapted. The walking of insects has been carefully studied by V. Graber (1877) and J. Demoor (1890), who find that the legs are usually moved in two sets of three, the first and third legs of one side moving with the second leg of the other. One tripod thus affords a firm base of support while the legs of the other tripod are brought forward to their new positions.



After Marlat, *Ent. Bull.* 3, n.s. (U.S. Dept. Agr.).

FIG. 3.—Thorax of Saw-Fly (*Pachynematus*).

I, Dorsal view.
II, Ventral view.
III, Lateral view.
IV, Lateral view with segments separated.
Prothorax:
a, Episternum.
b, Sternum.
c, Coxa of fore-leg.
d, Pronotum.
Mesothorax:
e, Prescutum.
f, Scutum.
g, Scutellum.
h, Post-scutellum.
i, Mesophragma.
j, *Epimeron*.
k, *Episternum*.
l, Coxa of middle leg.
Metathorax:
m, Scutum.
o, Epimeron.
p, Coxa of hind leg.
n, *First Abdominal Segment*.
t, Tegula at base of fore-wing.



After Miall and Denny, *The Cockroach*, Lovell Reeve & Co.

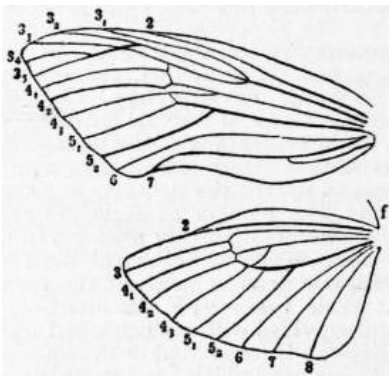
FIG. 4.—Legs and Ventral Thoracic Sclerites of Female Cockroach (*Blatta*).

I, Fore-leg and pro-sternum (S) in front of which are the ventral cervical sclerites (*c*).
cx, Coxa. *tr*, Trochanter.
fe, Thigh. *tb*, Shin.
ta, Tarsal segments.

II, Middle leg and mesosternum.
III, Hind-leg and metasternum.
In IIIA, the episternum (*a*) and epimeron (*b*) are slightly separated.

Wings.—Two pairs of wings are present in the vast majority of insects, borne respectively on the mesothorax and metathorax. At the base of the wing, *i.e.* its attachment to the trunk, we find a highly complex series of small sclerites adapted for the varied movements necessary for flight. Those of the dragon-flies (Odonata) have been described in detail by R. von Lendenfeld (1881). The long axis of the wings, when at rest, lies parallel to the body axis. In this position the outer margin of the wing is the *costa*, the inner the *dorsum*, and the hind-margin the *termen*. The angle between the costa and termen is the *apex*. When the wing is spread, its long axis is more or less at a right angle to the body axis. A wing is an outgrowth from the dorsal and pleural regions of the thoracic segment that bears it, and microscopic examination shows it to consist of a double layer of cuticularized skin, the two layers being in contact except where they are thickened and folded to form the firm tubular nervures, which serve as a supporting framework for the wing membrane, enclose air-tubes, and convey blood. These nervures consist of a series of trunks radiating from the wing-base and usually branching as they approach the wing-margins, the branches being often connected by short transverse nervures, so that the wing-area is marked off into a number of “cells” or areolets.

The details of the nervuration vary greatly in the different orders, but J. H. Comstock and J. G. Needham have lately (1898-1899) shown that a common arrangement underlies all, six series of longitudinal or radiating nervures being present in the typical wing (see fig. 5). Along the costa runs a costal nervure. This is followed by a sub-costal which sometimes shows two main branches. Then comes the radial—usually the most important nervure of the wing—typically with five branches, and the median with four. These sets arise from a main trunk towards the front region of the wing-base. From another hinder trunk arise the two-branched cubital nervure and three separate anal nervures. In the hind-



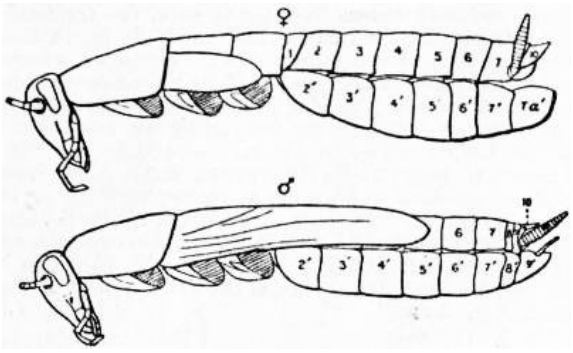
wing of many insects the number of radial branches becomes reduced, while the anal area is especially well developed and undergoes a fan-like folding when the wings are closed. Great diversity exists in the texture and functions of fore and hind-wings in different insects; these differences are discussed in the descriptions of the various orders. The wings often afford secondary sexual characters, being not infrequently absent or reduced in the female when well developed in the male (see fig. 6). Rarely the male is the wingless sex.

After Quail, *Natural Science*, vol. xiii., J. M. Dent & Co.

FIG. 5.—Wing-Neuration in a Cossid Moth. 2, sub-costal; 3, radial; 4, median; 5, cubital; 6, 7, 8, anal nervures.

In addition to the wings there are smaller dorsal outgrowths of the thorax in many insects. Paired erectile plates (patagia) are borne on the prothorax in moths, while in moths, sawflies, wasps, bees and other insects there are small plates (tegulae)—see Fig. 3, *t*—on the mesothorax at the base of the fore-wings.

Abdomen.—In the abdominal exoskeleton the segmental structure is very clearly marked, a series of sclerites—dorsal terga and abdominal sterna—being connected by pale, feebly chitinized cuticle, so that considerable freedom of movement between the segments is possible. The first and second abdominal sterna are often suppressed or reduced, on account of the strong development of the hind-legs. In many insects ten, and in a few eleven, abdominal segments can be clearly distinguished in addition to a small terminal anal segment. The female genital opening usually lies between the seventh and eighth segments, the male on the ninth. Prominent paired limbs are often borne on the tenth segment, the elongate tail-feelers (cerci) of bristle-tails and may-flies, or the forceps of earwigs, for example. In the Embiidae, a family of Isoptera, it has been shown by G. Enderlein (1901) that these cerci clearly belong to a partially suppressed eleventh segment, and R. Heymons (1895-1896) has proved by embryological study that in all cases they really belong to this eleventh segment, which in the course of development becomes fused with the tenth. Smaller appendages (such as the stylets of male cockroaches) may be carried on the ninth segment. Pairs of processes carried on the eighth and ninth segments often become specialized to form the ovipositor of the female (see fig. 14) and the genital armature of the male. A marked modification of the hinder abdominal segments may be noticed in most insects, the sclerites of the eighth and ninth being frequently hidden by those of the seventh. In the higher orders several of the hinder segments may be altogether suppressed.



From Miall and Denny, *The Cockroach*, Lovell Reeve & Co.

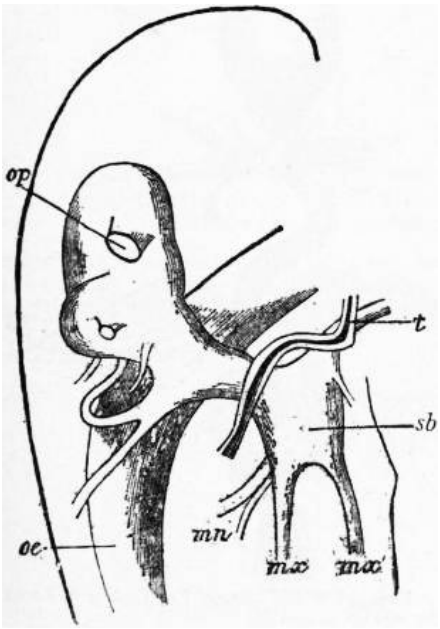
FIG. 6.—Outline of Male (♂) and Female (♀) Cockroaches (*Blatta*) from the side, showing Abdominal Segments (numbered 1-10).

INTERNAL ORGANS

Nervous System.—The nervous system in the Hexapoda is built up on the typical arthropodan plan of a double ventral nerve-cord with a pair of ganglia in each segment, the cords passing on either side of the gullet and connecting with an anterior nerve-centre or brain (fig. 7) in the head. The brain innervates the eyes and feelers, and must be regarded as a "syncerebrum" representing the ganglia of the three foremost limb-bearing somites united with the primitive cephalic lobes. Behind the gullet lies the sub-oesophageal nerve-centre (fig. 7, *sb*), composed of the ganglia of the four hinder head-somites and sending nerves to the jaws. A pair of ganglia in each thoracic segment is usual (fig. 8), and as many as eight distinct pairs of abdominal ganglia may often be distinguished, the hindmost of which represents the fused ganglia of the last four segments. But in many highly organized insects a remarkable concentration of the trunk-ganglia takes place, all the nerve-centres of the thorax and abdomen in the chafers and in the Hemiptera, for

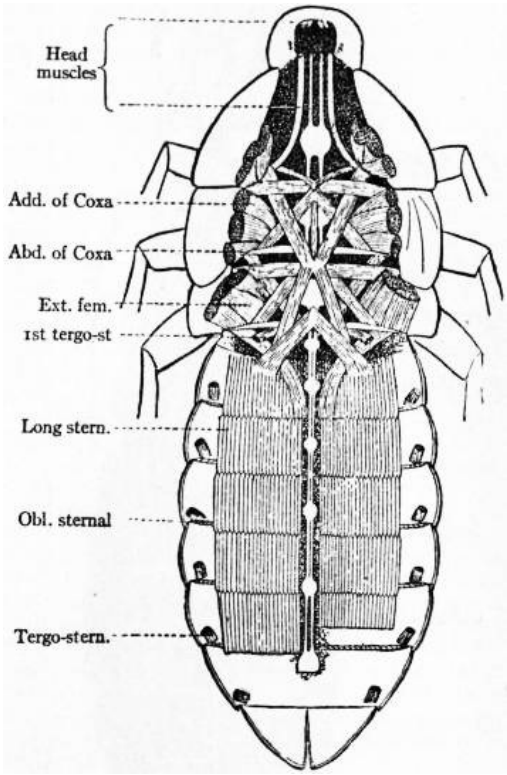
instance, being represented by a single mass situated in the thorax. The legs, wings and other organs of the trunk receive their nerves from the thoracic and abdominal ganglia, and the fusion of several pairs of these ganglia may be regarded as corresponding to a centralization of individuality. A special "sympathetic" system arises by paired nerves from the oesophageal connectives; these nerves unite, and send back a median recurrent nerve associated with ganglia on the gullet and crop, whence proceed cords to various parts of the digestive system.

In connexion with the central nervous system there are usually numerous organs of special sense. Most insects possess a pair of compound eyes, and many have, in addition, three simple eyes or ocelli on the vertex. The nature of these organs is described in the article ARTHROPODA. The surface of a compound eye is seen to be covered with a large number of hexagonal corneal facets, each of which overlies an ommatidium or series of cell elements (fig. 9, A, B). There are over 25,000 ommatidia in the eye of a hawk moth.



From Miall and Denny (after Newton), *The Cockroach*, Lovell Reeve & Co.

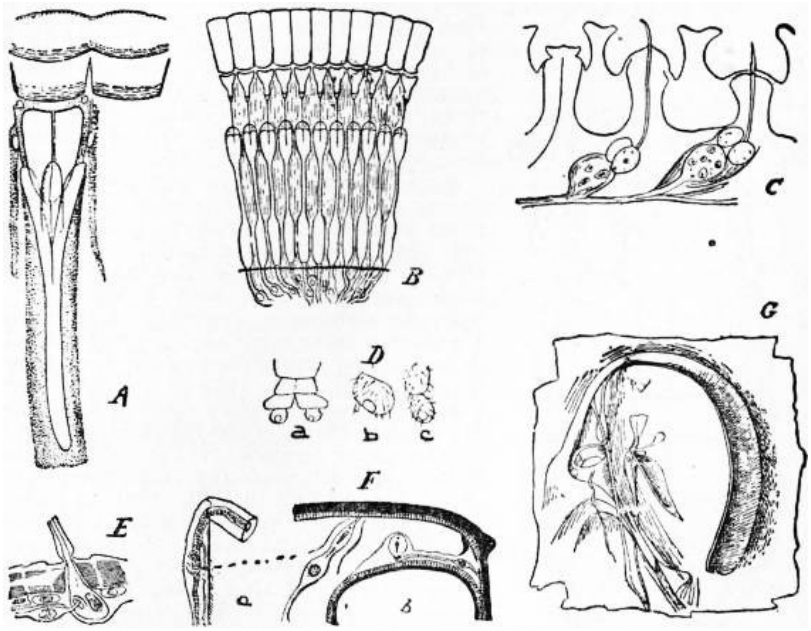
FIG. 7.—Brain of Cockroach from side. *oe*, Gullet; *op*, optic nerve; *sb*, sub-oesophageal ganglion; *mn*, *mx*, *mx'*, nerves to jaws; *t*, tentorium.



After Miall and Denny, *The Cockroach*, Lovell Reeve & Co.

FIG. 8.—Ventral Muscles and Nerve Cord of Cockroach.

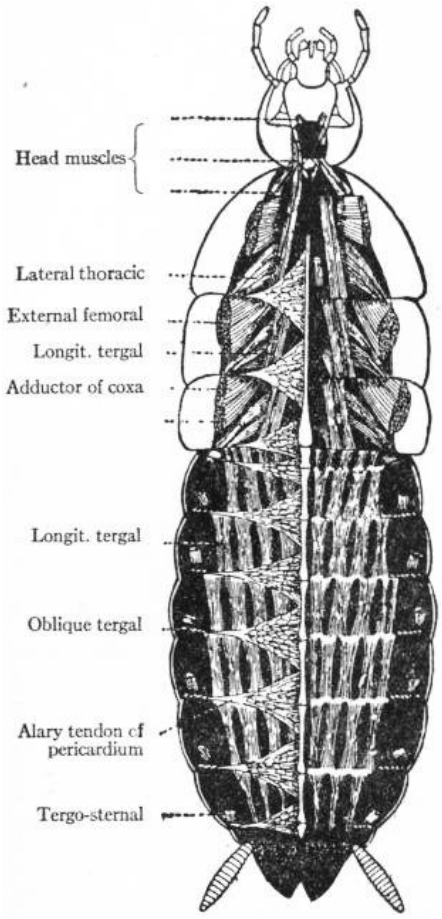
Auditory organs of a simple type are present in most insects. These consist of fine rods suspended between two points of the cuticle, and connected with nerve-fibres; they are known as chordotonal organs. In many cases a more complex ear is developed, which may be situated in strangely diverse regions of the insect's body. In locusts (*Acridiidae*) a large ovate, tympanic membrane (fig. 9, G) is conspicuous on either side of the first abdominal segment; on the inner surface of this membrane are two horn-like processes in contact with a delicate sac containing fluid, connected with which are the actual nerve-endings. In the nearly-related crickets and long-horned grasshoppers (*Locustidae*) the ears are situated in the shins of the fore-legs (see fig. 9, F). Just below the knee-joint there is a swelling, along which two narrow slits run lengthwise. They lead into chambers, formed by inpushing of the cuticle, whose delicate inner walls are in contact with air-tubes; on the outer surface of these latter are ridges, along which the special nerve-endings are arranged. An ear of another type is found in the swollen second segment of the feeler in many male gnats and midges, the cuticle between this segment and the third forming an annular drum which is connected with numerous nerve-endings, while the fine bristles on the more distal segments vibrate in response to the note produced by the humming of the female.



From Ridley, *Insect Life*, vol. 7 (U.S. Dept. Agr.).

FIG. 9.—Single Ommatidium of Cockroach's Eye (after Grenacher). B, Section through compound eye (after Miall and Denny); C, organs of smell in cockchafer (after Kraepelin); D, *a*, *b*, sensory pits on cercopods of golden-eye fly; *c*, sensory pit on palp of stone-fly (after Packard); E, sensory hair (after Miall and Denny); F, ear of long-horned grasshopper; *a*, Front shin showing outer opening and air-tube; *b*, section (after Graber); G, ear of locust from within (after Graber). All highly magnified.

Many of the numerous hairs (fig. 9, E) that cover the body of an insect have a tactile function. The sense of smell resides chiefly in the feelers, on whose segments occur tiny pits, often guarded by peg-like or tooth-like structures and containing rod-like cells (fig. 9, C) in connexion with large nerve-cells. It is said that 13,000 such olfactory organs are present on the feeler of a wasp, and 40,000 on the complex antennae of a male cockchafer. Organs of similar type on the maxillae and epipharynx appear to exercise the function of taste.



After Miall and Denny, *The Cockroach*, Lovell Reeve & Co.

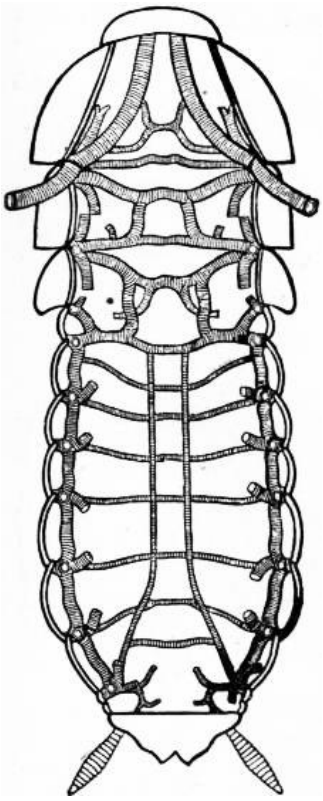
FIG. 10.—Dorsal Muscles, Heart and Pericardial Tendons of Cockroach.

Muscular System.—The muscles in the Hexapoda are striated, as in Arthropods generally, the

large fibres being associated in bundles which are attached from point to point of the cuticle, so as to move adjacent sclerites with respect to one another (see figs. 8, 10). For example, the contraction of the tergo-sternal muscles, connecting the dorsal with the ventral sclerites of the abdomen, lessens the capacity of the abdominal region, while the contraction of the powerful muscles arising from the thoracic walls, and inserted into the proximal ends of the thighs, flexes or extends the legs.

Circulatory System.—Insects afford an excellent illustration of the remarkable type of blood-system characterizing the Arthropoda. The dorsal vessel is an elongate tube, whose abdominal portion is usually chambered, forming a contractile heart (fig. 10). At the constrictions between the chambers are paired slits, through which the blood passes from the surrounding pericardial sinus. The dorsal vessel is prolonged anteriorly into an aorta, through which the blood is propelled into the great body-cavity or haemocoel. After bathing the various tissues and organs, the blood returns dorsalwards into the pericardial sinus through fine perforations of its floor, and so makes its way into the heart again. Some water-bugs, *e.g.* of the families *Belostomatidae*, *Nepidae*, *Corixidae* and *Hydrometridae* have a pulsating sac at each knee-joint to assist the flow of blood through the legs, while in dragon-flies and locusts (*Acridiidae*) there is a ventral pulsating diaphragm, which forms the roof of a sinus enclosing the nerve-cords.

Respiratory System.—As mentioned above, respiration by means of air-tubes (tracheae) is a most characteristic feature of the Hexapoda. An air-tube consists of an epithelium of large polygonal cells with a thin basement-membrane externally and a chitinous layer internally, the last-named being continuous with the outer cuticle. The chitinous layer is usually strengthened by thread-like thickenings which, in the region close to the outer opening of the tube, form a network enclosing polygonal areas, but which, through most of the tracheal system, are arranged spirally, the strengthening thread not forming a continuous spiral, but being interrupted after a few turns around the tube. The tracheal system in Hexapods is very complex, forming a series of longitudinal trunks with transverse anastomosing connexions (fig. 11), and extending by the finest sub-division and by repeated branching into all parts of the body. In insects of active flight the tubes swell out into numerous air-sacs, by which the breathing capacity is much increased.



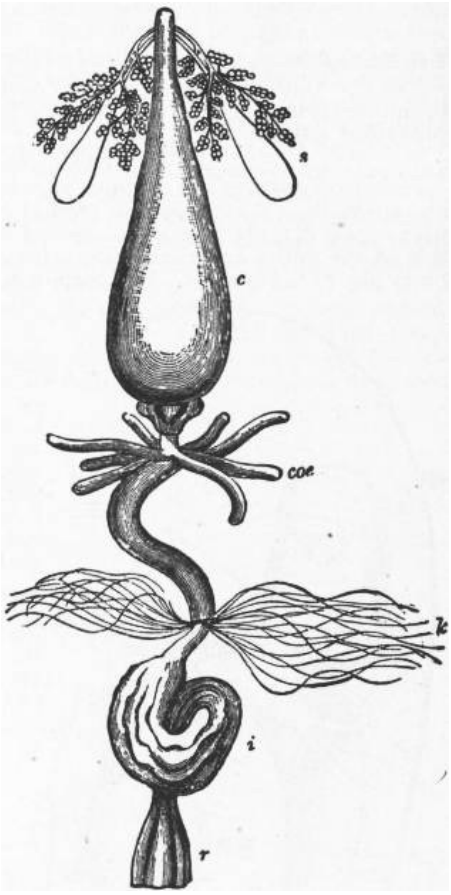
After Miall and Denny, *The Cockroach*, Lovell Reeve & Co.

FIG. 11.—Ventral Portion of Air-Tubes in Cockroach.

Atmospheric air gains access to the air-tubes through paired *spiracles* or *stigmata*, which usually occur laterally on most of the body-segments. These spiracles have firm chitinous edges, and can be closed by valves moved by special muscles. When the spiracles are open and the body contracts, air is expired. The subsequent expansion of the body causes fresh air to enter the tracheal system, and if the spiracles be then closed and the body again contracted, this air is driven to the finest branches of the air-tubes, where a direct oxygenation of the tissues takes place. The physiology of respiration has been carefully studied by F. Plateau (1884). In aquatic insects various devices for obtaining or entangling air are found; these modifications are described in the special articles on the various orders of insects (COLEOPTERA, HEMIPTERA, &c.). Many insects have aquatic larvae, some of which take in atmospheric air at intervals, while others breathe dissolved air by means of tracheal gills. These modifications are mentioned below in the section on metamorphosis.

Digestive System.—A striking feature in the food-canal of the Hexapoda, as in other Arthropods, is the great extent of the "fore-gut" and "hind-gut," lined with a chitinous cuticle, continuous with the exoskeleton. The fore-gut is composed of a tubular gullet, a large sac-like crop (fig. 12, *c*) and a proventriculus or "gizzard," whose function is to strain the food-substances before they pass on into the tubular stomach, which has no chitinous lining. This organ, usually regarded as a "mid-gut," gives off a number of secretory caecal tubes (fig. 12, *coe*). At its hinder end it is continuous with the hind-gut, which is usually differentiated into a tubular coiled intestine (fig. 12, *i*) and a swollen rectum (fig. 12, *r*). From the fore-end of the hind-gut arise the slender Malpighian tubes (fig. 12, *k*), which have a renal function.

On either side of the gullet are from one to ten pairs of salivary glands (fig. 12, *s*) whose ducts open



From Miall and Denny, *The Cockroach*, Lovell Reeve & Co.

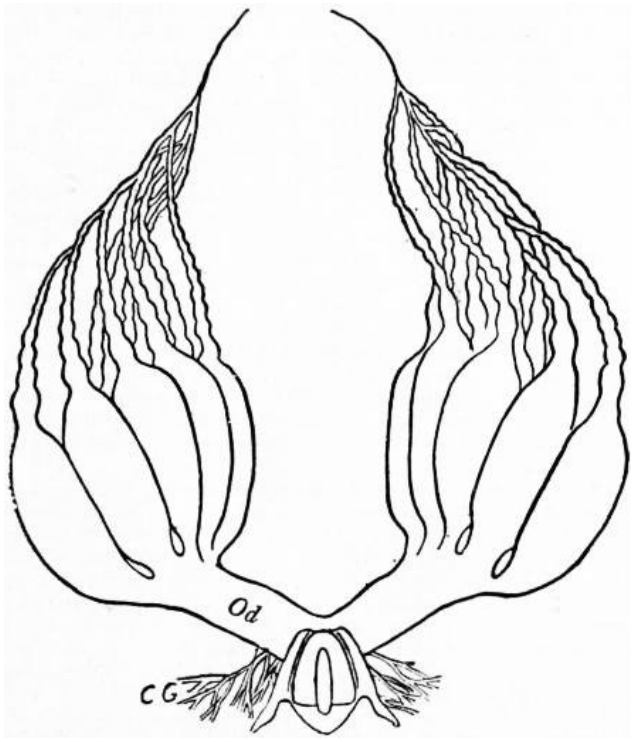
FIG. 12.—Food Canal of Cockroach.

s, Salivary glands and reservoir.
c, Crop (the gizzard below it).
coe, Caecal tubes (below them the stomach).
k, Kidney tubes.
i, Intestine.
r, Rectum.

into the mouth. Some of these glands may be modified for special purposes—as silk-producing glands in caterpillars or as poison-glands in blood-sucking flies and bugs. The food passing into the crop is there acted on by the saliva and also by an acid gastric juice which passes forwards from the stomach through the proventriculus. As the various portions of the food undergo digestion, they are allowed to pass through the proventriculus into the stomach, where the nutrient substances are absorbed.

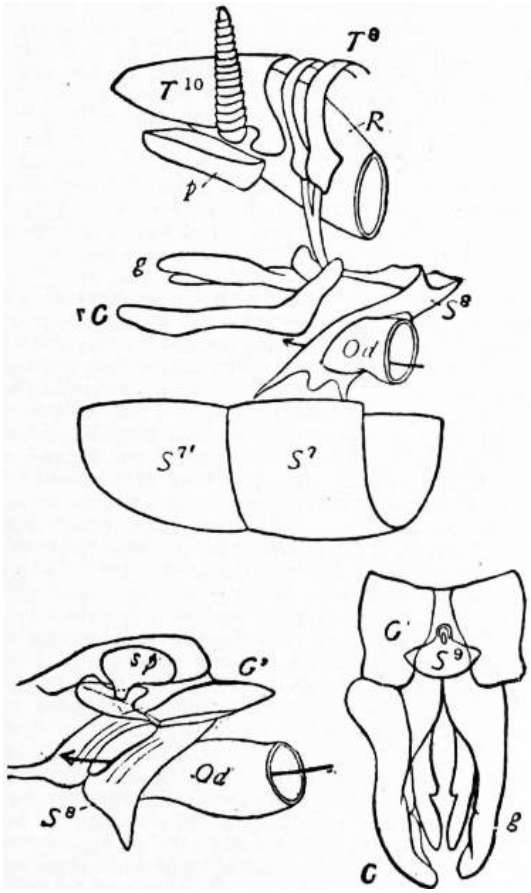
Excretory System.—Nitrogenous waste-matter is removed from the body by the Malpighian tubes which open into the food-canal, usually where the hind-gut joins the stomach. These tubes vary in number from four to over a hundred in different orders of insects. The cells which line them and also the cavities of the tubes contain urates, which are excreted from the blood in the surrounding body-cavity. This cavity contains an irregular mass of whitish tissue, the fat-body, consisting of fat-cells which undergo degradation and become more or less filled with urates. When the worn-out cells are broken down, the urates are carried dissolved in the blood to the Malpighian tubes for excretion. The fat-body is therefore the seat of important metabolic processes in the hexapod body.

Reproductive System.—All the Hexapoda are of separate sexes. The ovaries (fig. 13) in the female are paired, each ovary consisting of a variable number of tubes (one in the bristle-tail *Campodea* and fifteen hundred in a queen termite) in which the eggs are developed. From each ovary an oviduct (fig. 13, *od*) leads, and in some of the more primitive insects (bristle-tails, earwigs, may-flies) the two oviducts open separately direct to the exterior. Usually they open into a median vagina, formed by an ectodermal inpushing and lined with chitin. The vagina usually opens in front of the eighth abdominal sternite. Behind it is situated a spermatheca (fig. 14, *sp*) and the ovipositor previously mentioned, with its three pairs of processes (Fig. 14, G, *g*).



From Miall and Denny, *The Cockroach*, Lovell Reeve & Co.

FIG. 13.—Ovaries of Cockroach, with Oviducts *Od* and Colleterial Glands *CG*.



From Miall and Denny, *The Cockroach*, Lovell Reeve & Co.

FIG. 14.—Hinder Abdominal Segment and Ovipositor of Female Cockroach. Magnified.

T^8 &c. Tergites.
S^7, 7th Sternite.
S^8, Sclerite between 7th and 8th sterna.
S^9, 8th Sclerite.
Od, Vagina.
sp, Spermatheca.
G, Anterior, and *g*, posterior gonapophyses.

The paired testes of the male consist of a variable number of seminal tubes, those of each testis opening into a *vas deferens*. In some bristle-tails and may-flies, the two *vasa deferentia* open separately, but usually they lead into a sperm-reservoir, whence issues a median ejaculatory duet. The male opening is on the ninth abdominal segment, to which belong the processes that form the claspers or genital armature. Accessory glands are commonly present in connexion both with the male and the female reproductive organs. The poison-glands of the sting in wasps and bees are well-known examples of these.

EMBRYOLOGY

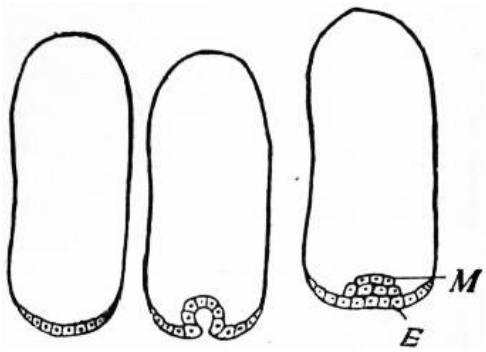
The Egg.—Among the Hexapoda, as in Arthropods generally, the egg is large, containing an accumulation of yolk for the nourishment of the growing embryo. Most insect eggs are of an elongate oval shape; some are globular, others flattened, while others again are flask-shaped, and the outer envelope (*chorion*) is often beautifully sculptured (figs. 20, *d*; 21, *a*, *b*). Various devices are adopted for the protection of the eggs from mechanical injury or from the attacks of enemies, and for fixing them in appropriate situations. For example, the egg may be raised above the surface on which it is laid by an elongate stalk; the eggs may be protected by a secretion, which in some cases forms a hard protective capsule or "purse"; or they may be covered with shed hairs of the mother, while among water-insects a gelatinous envelope, often of rope-like form, is common. In various groups of the Hexapoda—aphids and some flesh-flies (*Sarcophaga*), for example—the egg undergoes development within the body of the mother, and the young insect is born in an active state; such insects are said to be "viviparous."

Parthenogenesis.—A number of cases are known among the Hexapoda of the development of young from the eggs of virgin females. In insects so widely separated as bristle-tails and moths this occurs occasionally. In certain gall-flies (*Cynipidae*) no males are known to exist at all, and the species seems to be preserved entirely by successive parthenogenetic generations. In other gall-flies and in aphids we find that a sexual generation alternates with one or with many virgin generations. The offspring of the virgin females are in most of these instances females; but among the bees and wasps parthenogenesis occurs normally and always results in the development of males, the "queen" insect laying either a fertilized or unfertilized egg at will.

Maturation, Fertilization and Segmentation.—Polar bodies were first observed in the eggs of

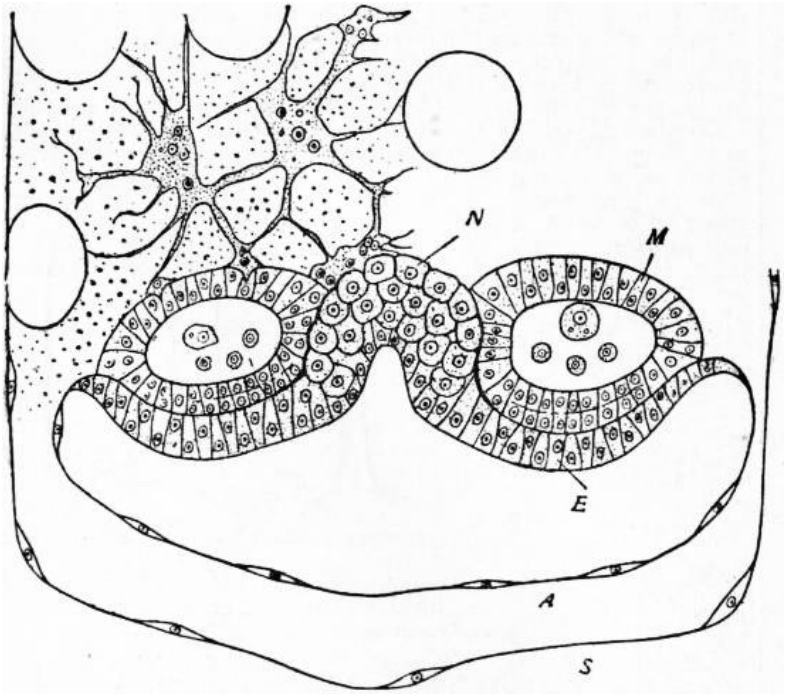
Hexapoda by F. Blochmann in 1887. The two nuclei are successively divided from the egg nucleus in the usual way, but they frequently become absorbed in the peripheral protoplasm instead of being extruded from the egg-cell altogether. It appears that in parthenogenetic eggs two polar nuclei are formed. According to A. Petrunkevich (1901-1903), the second polar nucleus uniting with one daughter-nucleus of the first polar body gives rise to the germ-cells of the parthenogenetically-produced male. There is no reunion of the second polar nucleus with the female pronucleus, but, according to the recent work of L. Doncaster (1906-1907) on the eggs of sawflies, the number of chromosomes is not reduced in parthenogenetic egg-nuclei, while, in eggs capable of fertilization, the usual reduction-divisions occur. Fertilization takes place as the egg is laid, the spermatozoa being ejected from the spermatheca of the female and making their way to the protoplasm of the egg through openings (micropyles) in its firm envelope. The segmentation of the fertilized nucleus results in the formation of a number of nuclei which arrange themselves around the periphery of the egg and, the protoplasm surrounding them becoming constricted, a blastoderm or layer of cells, enclosing the central yolk, is formed. Within the yolk the nuclei of some "yolk cells" can be distinguished.

Germinal Layers and Food-Canal.—The embryo begins to develop as an elongate, thickened, ventral region of the blastoderm which is known as the ventral plate or germ band. Along this band a median furrow appears, and a mass of cells sinks within, the one-layered germ band thus becoming transformed into a band of two cell-layers (fig. 15). In some cases the inner layer is formed not by invagination but by proliferation or by delamination. The outer of these two layers (fig. 15, E) is the ectoderm. With regard to the inner layer (*endoblast* of some authors, fig. 15, M) much difference of opinion has prevailed. It has usually been regarded as representing both endoderm and mesoderm, and the groove which usually leads to its formation has been compared to the abnormally elongated blastopore of a typical gastrula. No doubt can be entertained that the greater part of the inner layer corresponds to the mesoderm of more ordinary embryos, for the coelomic pouches, the germ-cells, the musculature and the vascular system all arise from it. Further, there is general agreement that the chitin-lined fore-gut and hind-gut, which form the greater part of the digestive tract, arise from ectodermal invaginations (stomodaeum and proctodaeum respectively) at the positions of the future mouth and anus. The origin of the mid-gut (mesenteron), that has no chitinous lining in the developed insect, is the disputed point. According to the classical researches of A. Kowalevsky (1871 and 1887) on the embryology of the water-beetle *Hydrophilus* and of the muscid flies, an anterior and a posterior endoderm-rudiment both derived from the "endoblast" become apparent at an early stage, in close association with the stomodaeum and the proctodaeum respectively. These two endoderm-rudiments ultimately grow together and give rise to the epithelium of the mid-gut. These results were confirmed by the observations of K. Heider and W. M. Wheeler (1889) on the embryos of two beetles—*Hydrophilus* and *Doryphora* respectively. V. Graber, however (1889), stated that in the *Muscidae*, while the anterior endoderm-rudiment arises as Kowalevsky had observed, the posterior part of the "mid-gut" has its origin as a direct outgrowth from the proctodaeum. The recent researches of R. Heymons (1895) on the Orthoptera, and of A. Lécaillon (1898) on various leaf beetles, tend to show that the whole of the "mid-gut" arises from the proliferation of cells at the extremity of the stomodaeum and of the proctodaeum. On this view the entire food-canal in most Hexapoda must be regarded as of ectodermal origin, the "endoblast" represents mesoderm only, and the median furrow whence it arises can be no longer compared with the blastopore. According to Heymons, the yolk-cells must be regarded as the true endoderm in the hexapod embryo, for he states (1897) that in the bristle-tail *Lepisma* and in dragon-flies they give rise to the mid-gut. These views are not, however, supported by other recent observers. J. Carrière's researches (1897) on the embryology of the mason bee (*Chalicodoma*) agree entirely with the interpretations of Kowalevsky and Heider, and so on the whole do those of F. Schwangart, who has studied (1904) the embryonic development of Lepidoptera. He finds that the endoderm arises from an anterior and a posterior rudiment derived from the "endoblast," that many of the cells of these rudiments wander into the yolk, and that the mesenteric epithelium becomes reinforced by cells that migrate from the yolk. K. Escherich (1901), after a new research on the embryology of the muscid Diptera, claims that the fore and hind endodermal rudiments arise from the blastoderm by invagination, and are from their origin distinct from the mesoderm. On the whole it seems likely that the endoderm is represented in part by the yolk, and in part by those anterior and posterior rudiments which usually form the mesenteron, but that in some Hexapoda the whole digestive tract may be ectodermal. It must be admitted that some or the later work on insect embryology has justified the growing scepticism in the universal applicability of the "germ-layer theory." Heider has suggested, however, that the apparent origin of the mid-gut from the stomodaeum and proctodaeum may be explained by the presence of a "latent endoderm-group" in those invaginations.



From Nussbaum in Miall and Denny's, *The Cockroach*, Lovell, Reeve & Co.

FIG. 15.—Diagram showing Formation of Germinal Layers. E, ectoderm; M, inner layer. Magnified.



From Nussbaum in Miall and Denny, *The Cockroach*, Lovell Reeve & Co.

FIG. 16.—Cross section of Embryo of German Cockroach (*Phyllodromia*). S, serosa; A, amnion; E, ectoderm; N, rudiment of nerve-cord; M, mesodermal pouches.

Embryonic Membranes.—A remarkable feature in the embryonic development of most Hexapoda is the formation of a protective membrane analogous to the amnion of higher Vertebrates and known by the same term. Usually there arises around the edge of the germ band a double fold in the undifferentiated blastoderm, which grows over the surface of the embryo, so that its inner and outer layers become continuous, forming respectively the *amnion* and the *serosa* (fig. 16, A, S). The embryo of a moth, a dragon-fly or a bug is invaginated into the yolk at the head end, the portion of the blastoderm necessarily pushed in with it forming the amnion. The embryo thus becomes transferred to the dorsal face of the egg, but at a later stage it undergoes reversion to its original ventral position. In some parasitic Hymenoptera there is only a single embryonic membrane formed by delamination from the blastoderm, while in a few insects, including the wingless spring-tails, the embryonic membranes are vestigial or entirely wanting. In the bristle-tails *Lepisma* and *Machilis*, an interesting transitional condition of the embryonic membranes has lately been shown by Heymons. The embryo is invaginated into the yolk, but the surface edges of the blastoderm do not close over, so that a groove or pore puts the insunken space that represents the amniotic cavity into communication with the outside. Heymons believes that the “dorsal organ” in the embryos of the lower Arthropoda corresponds with the region invaginated to form the serosa of the hexapod embryo. Wheeler, however, compares with the “dorsal organ” the peculiar extra embryonic membrane or indusium which he has observed between serosa and amnion in the embryo of the grasshopper *Xiphidium*.

Metameric Segmentation.—The segments are perceptible at a very early stage of the development as a number of transverse bands arranged in a linear sequence. The first segmentation of the ventral plate is not, however, very definite, and the segmentation does not make its appearance simultaneously throughout the whole length of the plate; the anterior parts are segmented before the posterior. In Orthoptera and Thysanura, as well as some others of the lower insects, twenty-one of these divisions—not, however, all similar—may be readily distinguished, six of which subsequently enter into the formation of the head, three going to the thorax and twelve to the abdomen. In Hemiptera only eleven and in Collembola only six abdominal segments have been detected. The first and last of these twenty-one divisions are so different from the others that they can scarcely be considered true segments.

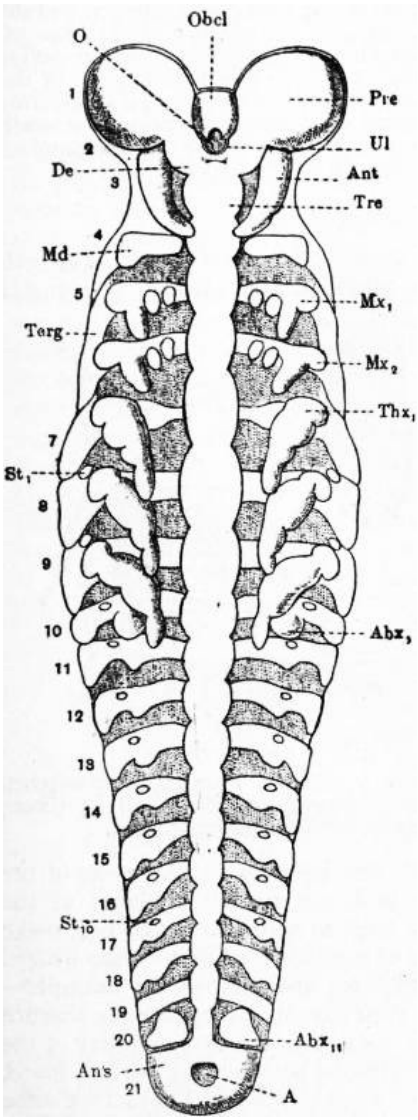
Head Segments.—In the adult insect the head is insignificant in size compared with the thorax or abdomen, but in the embryo it forms a much larger portion of the body than it does in the adult. Its composition has been the subject of prolonged difference of opinion. Formerly it was said that the head consisted of four divisions, viz. three segments and the procephalic or prae-oral lobes. It is now ascertained that the procephalic lobes consist of three divisions, so that the head must certainly be formed from at least six segments. The first of these, according to the nomenclature of Heymons (see fig. 17), is the mouth or oral piece; the second, the antennal segment; the third, the intercalary or prae-mandibular segment; while the fourth, fifth, and sixth are respectively the segments of the mandibles and of the first and second maxillae. These six divisions of the head are diverse in kind, and subsequently undergo so much change that the part each of them takes in the formation of the head-capsule is not finally determined. The labrum and clypeus are developed as a single prolongation of the oral piece, not as a pair of appendages. The antennal segment apparently entirely disappears, with the exception of a pair of appendages it bears; these become the antennae; it is possible that the original segment, or some part of it, may even become a portion of the actual antennae. The intercalary segment has no appendages, nor rudiments thereof, except, according to

H. Uzel (1897), in the thysanuran *Campodea*, and probably entirely disappears, though J. H. Comstock and C. Kochi believe that the labrum belongs to it. The appendages of the posterior three or trophal segments become the parts of the mouth. The appendages of the two maxillary segments arise as treble instead of single projections, thus differing from other appendages. From these facts it appears that the anterior three divisions of the head differ strongly from the posterior three, which greatly resemble thoracic segments; hence it has been thought possible that the anterior divisions may represent a primitive head, to which three segments and their leg-like appendages were subsequently added to form the head as it now exists. This is, however, very doubtful, and an entirely different inference is possible. Besides the five limb-bearing somites just enumerated, two others must now be recognized in the head. One of these is the ocular segment, in front of the antennal, and behind the primitive pre-oral segment. The other is the segment of the maxillulae (see above, under *Jaws*), behind the mandibular somite; the presence of this in the embryo of the collembolan *Anurida* has been lately shown (1900) by J. W. Folsom (fig. 18, v. 5), who terms the maxillulae "superlinguae" on account of their close association with the hypopharynx or lingua. In reference to the structure of the head-capsule in the imago, it appears that the clypeus and labrum represent, as already said, an unpaired median outgrowth of the oral piece. According to W. A. Riley (1904) the epicranium or "vertex," the compound eyes and the front divisions of the genae are formed by the cephalic lobes of the embryo (belonging to the ocular segment), while the mandibular and maxillary segments form the hinder parts of the genae and the hypopharynx.

Great difference of opinion exists as to the hypopharynx, which has even been thought to represent a distinct segment, or the pair of appendages of a distinct segment. Heymons considers that it represents the sternites of the three trophal segments, and that the gula is merely a secondary development. Folsom looks on the hypopharynx as a secondary development. Riley holds that the hypopharynx belongs to the mandibular and maxillary segments, while the cervical sclerites or gula represent the sternum of the labial segment. The ganglia of the nervous system offer some important evidence as to the morphology of the head, and are alluded to below.

Thoracic Segments.—These are always three in number. The three pairs of legs appear very early as rudiments. Though the thoracic segments bear the wings, no trace of these appendages exists till the close of the embryonic life, nor even, in many cases, till much later. The thoracic segments, as seen in an early stage of the ventral plate, display in a well-marked manner the essential elements of the insect segment. These elements are a central piece or sternite, and a lateral field on each side bearing the leg-rudiment. The external part of the lateral field subsequently grows up, and by coalescence with its fellow forms the tergite or dorsal part of the segment.

Abdominal Segments and Appendages.—We have already seen that in numerous lower insects the abdomen is formed from twelve divisions placed in linear fashion. Eleven of these may perhaps be considered as true segments, but the twelfth or terminal one is different, and is called by Heymons a telson; in it is placed the anal orifice, and the mass subsequently becomes the upper and lower laminae anales. In Hemiptera this telson is absent, and the anal orifice is placed quite at the termination of the eleventh segment. Moreover, in this order the abdomen shows at first a division into only nine segments and a terminal mass, which last subsequently becomes divided into two. The appendages of the abdomen are called cerci, stylets and gonapophyses. They differ much according to the kind of insect, and in the adult according to sex. Difference of opinion as to the nature of the abdominal appendages prevails. The cerci, when present, appear in the mature insect to be attached to the tenth segment, but according to Heymons they are really appendages of the eleventh segment, their connexion with the tenth being secondary and the result of considerable changes that take place in the terminal segments. It has been disputed whether any true cerci exist in the higher insects, but they are probably represented in the Diptera and in the scorpion-flies (Mecaptera). In those insects in

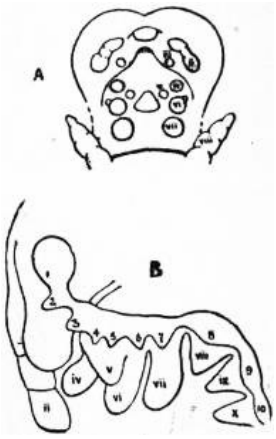


After Heymons.

FIG. 17.—Morphology of an Insect: the embryo of *Gryllotalpa*, somewhat diagrammatic. The longitudinal segmented band along the middle line represents the early segmentation of the nervous system and the subsequent median field of each sternite; the lateral transverse unshaded bands are the lateral fields of each segment; the shaded areas indicate the more internally placed mesoderm layer. The segments are numbered 1-21; 1-6 will form the head, 7-9 the thorax, 10-21 the abdomen. *A*, anus; Abx_1 Abx_{11},

which a median terminal appendage exists between the two cerci this is considered to be a prolongation of the eleventh tergite. The stylets, when present, are placed on the ninth segment, and in some Thysanura exist also on the eighth segment; their development takes place later in life than that of the cerci. The gonapophyses are the projections near the extremity of the body that surround the sexual orifices, and vary extremely according to the kind of insect. They have chiefly been studied in the female, and form the sting and ovipositor, organs peculiar to this sex. They are developed on the ventral surface of the body and are six in number, one pair arising from the eighth ventral plate and two pairs from the ninth. This has been found to be the case in insects so widely different as Orthoptera and Aculeate Hymenoptera. The genital armature of the male is formed to a considerable extent by modifications of the segments themselves. The development of the armature has been little studied, and the question whether there may be present gonapophyses homologous with those of the female is open.

appendage of 1st and of 11th abdominal segments; *Ans*, anal piece = telson or 12th abdominal segment; *Ant*, antenna; *De*, deuterencephalon; *Md*, mandible; Mx_1, first maxilla; Mx_2, second maxilla or labium; *O*, mouth; *Obcl*, rudimentary labrum and clypeus; *Pre*, protencephalon; St_1 St_{10}, stigmata 1 and 10; *Terg*, tergite; Thx_1, appendage of first thoracic segment; *Tre*, tritencephalon; *Ul*, a thickening at hinder margin of the mouth.



A. After Wheeler, *Journ. Morph.* vol. viii., and Folsom, *Bull. Mus. Harvard*, xxxvi.
B. After Folsom.

FIG. 18.—Embryos of Springtail (*Anuridamaritima*). Magnified. A, Head-region of germ band. B, Section through head and thorax. The neuromeres are shown in Arabic, the appendages in Roman numerals.

1, Ocular segment.
2, Antennal.
3, Trito-cerebral.
4, Mandibular.
5, Maxillular.
6, Maxillary.
7, Labial.
8, Prothoracic.
9, Mesothoracic.
10, Metathoracic.

In the adult state no insect possesses more than six legs, and they are always attached to the thorax; in many Thysanura there are, however, processes on the abdomen that, as to their position, are similar to legs. In the embryos of many insects there are projections from the segments of the abdomen similar, to a considerable extent, to the rudimentary thoracic legs. The question whether these projections can be considered an indication of former polypody in insects has been raised. They do not long persist in the embryo, but disappear, and the area each one occupied becomes part of the sternite. In some embryos there is but a single pair of these rudiments (or vestiges) situate on the first abdominal segment, and in some cases they become invaginations of a glandular nature. Whether cerci, stylets and gonapophyses are developed from these rudiments has been much debated. It appears that it is possible to accept cerci and stylets as modifications of the temporary pseudopods, but it is more difficult to believe that this is the case with the gonapophyses, for they apparently commence their development considerably later than cerci and stylets and only after the apparently complete disappearance of the embryonic pseudopods. The fact that there are two pairs of gonapophyses on the ninth abdominal segment would be fatal to the view that they are in any way homologous with legs, were it not that there is some evidence that the division into two pairs is secondary and incomplete. But another and apparently insuperable objection may be raised—that the appendages of the ninth segment are the stylets, and that the gonapophyses cannot therefore be appendicular. The pseudopods that exist on the abdomen of numerous caterpillars may possibly arise from the embryonic pseudopods, but this also is far from being established.

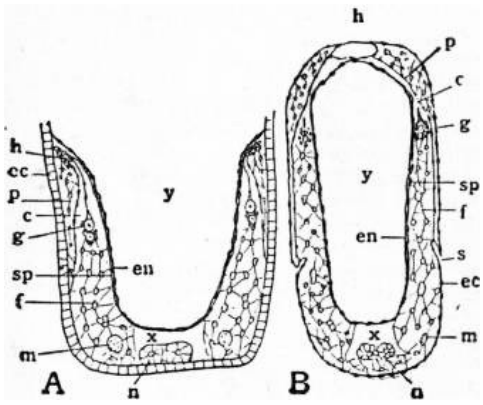
Nervous System.—The nervous system is ectodermal in origin, and is developed and segmented to a large extent in connexion with the outer part of the body, so that it affords important evidence as to the segmentation thereof. The continuous layer of cells from which the nervous system is developed undergoes a segmentation analogous with that we have described as occurring in the ventral plate; there is thus formed a pair of contiguous ganglia for each segment of the body, but there is no ganglion for the telson. The ganglia become greatly changed in position during the later life, and it is usually said that there are only ten pairs of abdominal ganglia even in the embryo. In Orthoptera, Heymons has demonstrated the existence of eleven pairs, the terminal pair becoming, however, soon united with the tenth. The nervous system of the embryonic head exhibits three ganglionic masses, anterior to the thoracic ganglionic masses; these three masses subsequently amalgamate and form the sub-oesophageal ganglion, which supplies the trophal segments. In front of the three masses that will form the sub-oesophageal ganglion the mass of cells that is to form the nervous system is very large, and projects on each side; this anterior or “brain” mass consists of three lobes (the prot-, deut-, and tritencephalon of Viallanes and others), each of which might be thought to represent a segmental ganglion. But the protocerebrum contains the ganglia of the ocular segment in addition to those of the procephalic lobes. These three divisions subsequently form the supra-oesophageal ganglion or brain proper. There are other ganglia in addition to those of the ventral chain, and Janet supposes that the ganglia of the sympathetic system indicate the existence of three anterior head-segments; the remains of the segments themselves are, in accordance with this view, to be sought in the stomodaeum. Folsom has detected in the embryo of *Anurida* a pair of ganglia (fig. 18, 5) belonging to the maxillular (or superlingual) segment, thus establishing seven sets of cephalic ganglia, and

supporting his view as to the composition of the head.

Air-tubes.—The air-tubes, like the food-canal, are formed by invaginations of the ectoderm, which arise close to the developing appendages, the rudimentary spiracles appearing soon after the budding limbs. The pits leading from these lengthen into tubes, and undergo repeated branching as development proceeds.

Dorsal Closure.—The germ band evidently marks the ventral aspect of the developing insect, whose body must be completed by the extension of the embryo so as to enclose the yolk dorsally. The method of this dorsal closure varies in different insects. In the Colorado beetle (*Doryphora*), whose development has been studied by W. M. Wheeler, the amnion is ruptured and turned back from covering the germ band, enclosing the yolk dorsally and becoming finally absorbed, as the ectoderm of the germ band itself spreads to form the dorsal wall. In some midges and in caddis-flies the serosa becomes ruptured and absorbed, while the germ band, still clothed with the amnion, grows around the yolk. In moths and certain saw-flies there is no rupture of the membranes; the Russian zoologists Tichomirov and Kovalevsky have described the growth of both amnion and embryonic ectoderm around the yolk, the embryo being thus completely enclosed until hatching time by both amnion and serosa. V. Graber has described a similar method of dorsal closure in the saw-fly *Hylotoma*.

Mesoderm, Coelom and Blood-System.—From the mesoderm most of the organs of the body—muscular, circulatory, reproductive—take their origin. The mass of cells undergoes segmentation corresponding with the outer segmentation of the embryo, and a pair of cavities—the coelomic pouches (fig. 16, M)—are formed in each segment. Each coelomic pouch—as traced by Heymons in his study on the development of the cockroach (*Phyllodromia*)—divides into three parts, of which the most dorsal contains the primitive germ-cells, the median disappears, and the ventral loses its boundaries as it becomes filled up with the growing fat body (fig. 19). This latter, as well as the heart and the walls of the blood spaces, arises by the modification of mesodermal cells, and the body cavity is formed by the enlargement and coalescence of the blood channels and by the splitting of the fat body. It is therefore a haemocoel, the coelom of the developed insect being represented only by the cavities of the genital glands and their ducts.



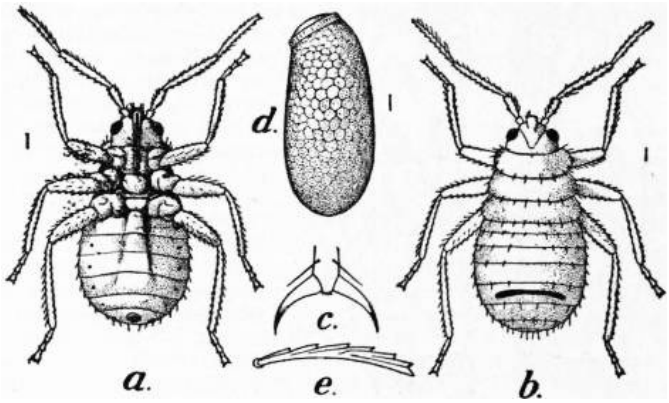
After Heymons, *Zeit. Wiss. Zoolog.* vol. 53.

FIG. 19.—Cross sections through Abdomen of German Cockroach Embryo. A (later than fig. 16) magnified. B (still more advanced, dorsal closure complete) magnified.

ec, Ectoderm.
en, Endoderm.
sp, Splanchnic layer of mesoderm.
y, Yolk.
h, Heart.
p, Pericardial septum.
c, Coelom.
g, Germ-cells surrounded by rudiment-cells of ovarian tubes.
m, Muscle-rudiment.
n, Nerve-chain.
f, Fat body.
s, Inpushing of ectoderm to form air-tubes.
x, Secondary body-cavity.

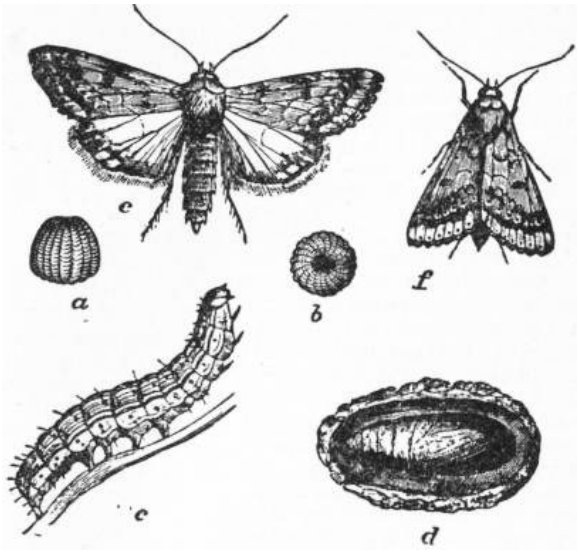
Reproductive Organs.—In the cockroach embryo, before the segmentation of the germ-band has begun, the primitive germ-cells can be recognized at the hinder end of the mesoderm, from whose ordinary cells they can be distinguished by their larger size. At a later stage further germ-cells arise from the epithelium of the coelomic pouches from the second to the seventh abdominal segments, and become surrounded by other mesoderm cells which form the ovarian or testicular tubes and ducts (fig. 19, *g*). In the male of *Phyllodromia* the rudiment of a vestigial ovary becomes separated from the developing testis, indicating perhaps an originally hermaphrodite condition. An exceedingly early differentiation of the primitive germ-cells occurs in certain Diptera. E. Metchnikoff observed (1866) in the development of the parthenogenetic eggs produced by the precocious larva of the gall-midge *Cecidomyia* that a large “polar-cell” appeared at one extremity during the primitive cell-segmentation. This by successive divisions forms a group of four to eight cells, which subsequently pass through the blastoderm, and dividing into two groups become symmetrically arranged and surrounded by the rudiments of the ovarian tubes. E. G. Balbiani and R. Ritter (1890) have since observed a similar early origin for the germ-cells in the midge *Chironomus* and in the *Aphidae*.

The paired oviducts and vasa deferentia are, as we have seen, mesodermal in origin. The median vagina, spermatheca and ejaculatory duct are, on the other hand, formed by ectodermal inpushings. The classical researches of J. A. Palmén (1884) on these ducts have shown that in may-flies and in female earwigs the paired mesodermal ducts open directly to the exterior, while in male earwigs there is a single mesodermal duct, due either to the coalescence of the two or to the suppression of one. In the absence of the external ectodermal ducts usual in winged insects, these two groups resemble therefore the primitive Aptera. The presence of rudiments of the genital ducts of both sexes in the embryo of either sex is interesting and suggestive. The ejaculatory duct which opens on the ninth abdominal sternum in the adult male arises in the tenth abdominal embryonic segment and subsequently moves forward.



After Marlatt, *Ent. Bull.* 4, n. s. (U.S. Dept. Agr.).

Fig. 20.—*a*, Bed-bug (*Cimex lectularis*, Linn.); newly hatched young from beneath; *b*, from above; *d*, egg, magnified; *c*, foot with claws; *e*, serrate spine, more highly magnified.

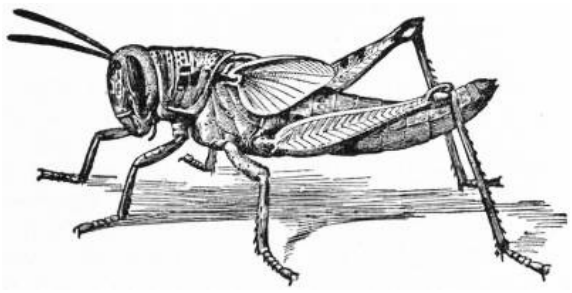


From Mally, *Ent. Bull.* 24 (U.S. Dept. Agr.).

Fig. 21.—*e*, *f*, Owl moth (*Heliothis armigera*); *a*, *b*, egg, highly magnified; *c*, larva or caterpillar; *d*, pupa in earthen cell.

After hatching or birth an insect undergoes a process of growth and change until the adult condition is reached. The varied details of this post-embryonic development furnish some of the most interesting facts and problems to the students of the Hexapoda. Wingless insects, such as spring-tails and lice, make their appearance in the form of miniature adults. Some winged insects—cockroaches, bugs (fig. 20) and earwigs, for example—when young closely resemble their parents, except for the absence of wings. On the other hand, we find in the vast majority of the Hexapoda a very marked difference between the perfect insect (imago) and the young animal when newly hatched and for some time after hatching. From the moth's egg comes a crawling caterpillar (fig. 21, *c*), from the fly's a legless maggot (fig. 25, *a*). Such a young insect is a *larva*—a term used by zoologists for young animals generally that are decidedly unlike their parents. It is obvious that the hatching of the young as a larva necessitates a more or less profound transformation or metamorphosis before the perfect state is attained. Usually this transformation comes with apparent suddenness, at the penultimate stage of the insect's life-history, when the passive pupa (fig. 21, *d*) is revealed, exhibiting the wings and other imaginal structures, which have been developed unseen beneath the cuticle of the larva. Hexapoda with this resting pupal stage in their life-history are said to undergo "a complete transformation," to be metabolic, or holometabolic, whereas those insects in which the young form resembles the parent are said to be ametabolic. Such insects as dragon-flies and may-flies, whose young, though unlike the parent, develop into the adult form without a resting pupal stage are said to undergo an "incomplete transformation" or to be hemimetabolic. The absence of the pupal stage depends upon the fact that in the ametabolic and hemimetabolic Hexapoda the wing-rudiments appear as lateral outgrowths (fig. 22) of the two hinder thoracic segments and are visible externally throughout the life-history, becoming larger after each moult or casting of the cuticle. Hence, as has been pointed out by D. Sharp (1898), the marked divergence among the Hexapoda, as regards life-history, is between insects whose wings develop outside the cuticle (Exopterygota) and those whose wings develop inside the cuticle (Endopterygota), becoming visible only when the casting of the last larval cuticle reveals the pupa. Metamorphosis among the Hexapoda depends upon the universal acquisition of wings during post-embryonic development—no insect being hatched with the smallest external rudiments of those organs—and on the necessity for

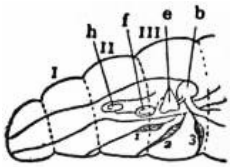
successive castings or “moults” (ecdyses) of the cuticle.



After Howard, *Insect Life*, vol. vii.
FIG. 22.—Nymph of Locust (*Schistocera americana*), showing wing-rudiments.

Ecdysis.—The embryonic ectoderm of an insect consists of a layer of cells forming a continuous structure, the orifices in it—mouth, spiracles, anus and terminal portions of the genital ducts—being invaginations of the outer wall. This cellular layer is called the hypodermis; it is protected externally by a cuticle, a layer of matter it itself excretes, or in the excretion of which it plays, at any rate, an important part. The cuticle is a dead substance, and is composed in large part of chitin. The cuticle contrasts strongly in its nature with the hypodermis it protects. It is different in its details in different insects and in different stages of the life of the same insect. The “sclerites” that make up the skeleton of the insect (which skeleton, it should be remembered, is entirely external) are composed of this chitinous excretion. The growth of an insect is usually rapid, and as the cuticle does not share therein, it is from time to time cast off by moulting or ecdysis. Before a moult actually occurs the cuticle becomes separated from its connexion with the underlying hypodermis. Concomitant with this separation there is commencement of the formation of a new cuticle within the old one, so that when the latter is cast off the insect appears with a partly completed new cuticle. The new instar—or temporary form—is often very different from the old one, and this is the essential fact of metamorphosis. Metamorphosis is, from this point of view, the sum of the changes that take place under the cuticle of an insect between the ecdyses, which changes only become externally displayed when the cuticle is cast off. The hypodermis is the immediate agent in effecting the external changes.

The study of the physiology of ecdysis in its simpler forms has unfortunately been somewhat neglected, investigators having directed their attention chiefly to the cases that are most striking, such as the transformation of a maggot into a fly, or of a caterpillar into a butterfly. The changes have been found to be made up of two sets of processes: histolysis, by which the whole or part of a structure disappears: and histogenesis, or the formation of the new structure. By histolysis certain parts of the hypodermis are destroyed, while other portions of it develop into the new structures. The hypodermis is composed of parts of two different kinds, viz. (1) the larger part of the hypodermis that exists in the maggot or caterpillar and is dissolved at the metamorphosis; (2) parts that remain comparatively quiescent previously, and that grow and develop when the other parts degenerate. These centres of renovation are called imaginal disks or folds. The adult caterpillar may be described as a creature the hypodermis of which is studded with buds that expand and form the butterfly, while the parts around them degenerate. In some insects (*e.g.* the maggots of the blowfly, *Calliphora vomitoria*) the imaginal disks are to all appearance completely separated from the hypodermis, with which they are, however, really organically connected by strings or pedicels. This connexion was not at first recognized and the true nature of imaginal disks was not at first perceived, even by Weismann, to whom their discovery in Diptera is due. In other insects the imaginal disks are less completely disconnected from the superficies of the larval hypodermis, and may indeed be merely patches thereof. The number of imaginal disks in an individual is large, upwards of sixty having been discovered to take part in the formation of the outer body of a fly. With regard to the internal organs, we need only say that transformation occurs in an essentially similar manner, by means of a development from centres distributed in the various organs. The imaginal disks for the outer wall of the body, some of them, at any rate, include mesodermal rudiments (from which the muscles are developed) as well as hypodermis. The imaginal disks make their appearance (that is, have been first detected) at very different epochs in the life; their absolute origin has been but little investigated. Pratt has traced them in the sheep-tick (*Melophagus*) to an early stage of the embryonic life.



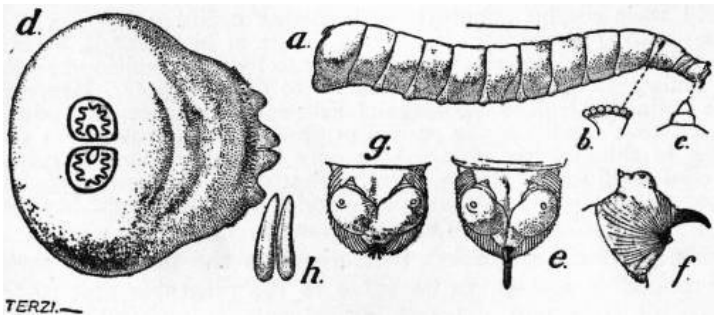
Adapted from Koerschelt and Herder and Lowne.

FIG. 23.—Diagram showing position of imaginal buds in larva of fly. I., II., III., the three thoracic segments of the larva; 1, 2, 3, buds of the legs of the imago; *h*, bud of head-lobes; *f*, of feeler; *e* of eye; *b*, brain.

Histolysis and Histogenesis.—The process of destruction of the larval tissues was first studied in the forms where metamorphosis is greatest and most abrupt, viz. in the Muscid Diptera. It was found that the tissues were attacked by phagocytic cells that became enlarged and carried away fragments of the tissue; the cells were subsequently identified as leucocytes or blood-cells. Hence the opinion arose that histolysis is a process of phagocytosis. It has, however, since been found that in other kinds of insects the tissues degenerate and break down without the intervention of phagocytes. It has, moreover, been noticed that even in cases where phagocytosis exists a greater or

less extent of degeneration of the tissue may be observed before phagocytosis occurs. This process can therefore only be looked on as a secondary one that hastens and perfects the destruction necessary to permit of the accompanying histogenesis. This view is confirmed by the fate of the phagocytic cells. These do not take a direct part in the formation of the new tissue, but it is believed merely yield their surplus acquisitions, becoming ordinary blood-cells or disappearing altogether. As to the nature of histogenesis, nothing more can be said than that it appears to be a phenomenon similar to embryonic growth, though limited to certain spots. Hence we are inclined to look on the imaginal disks as cellular areas that possess in a latent condition the powers of growth and development that exist in the embryo, powers that only become evident in certain special conditions of the organism. What the more essential of these conditions may be is a question on which very little light has been thrown, though it has been widely discussed.

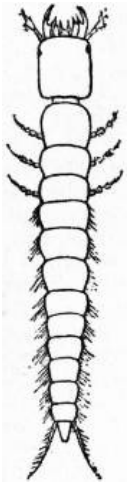
Much consideration has been given to the nature of metamorphosis in insects, to its value to the creatures and to the mode of its origin. Insect metamorphosis may be briefly described as phenomena of development characterized by abrupt changes of appearance and of structure, occurring during the period subsequent to embryonic development and antecedent to the reproductive state. It is, in short, a peculiar mode of growth and adolescence. The differences in appearance between the caterpillar and the butterfly, striking as they are to the eye, do not sufficiently represent the phenomena of metamorphosis to the intelligence. The changes that take place involve a revolution in the being, and may be summarized under three headings: (1) The food-relations of the individual are profoundly changed, an entirely different set of mouth-organs appears and the kind and quantity of the food taken is often radically different. (2) A wingless, sedentary creature is turned into a winged one with superlative powers of aerial movement. (3) An individual in which the reproductive organs and powers are functionally absent becomes one in which these structures and powers are the only reason for existence, for the great majority of insects die after a brief period of reproduction. These changes are in the higher insects so extreme that it is difficult to imagine how they could be increased. In the case of the common drone-fly, *Eristalis tenax*, the individual, from a sedentary maggot living in filth, without any relations of sex, and with only unimportant organs for the ingestion of its foul nutriment, changes to a creature of extreme alertness, with magnificent powers of flight, living on the products of the flowers it frequents, and endowed with highly complex sexual structures.



After Howard, *Ent. Bull.* 4, n. s. (*U.S. Dept. Agr.*).

FIG. 25.—Vermiform Larva (maggot) of House-fly (*Musca domestica*). Magnified. *b*, spiracle on prothorax; *c*, protruded head region; *d*, tail-end with functional spiracles; *e*, *f*, head region with mouth hooks protruded; *g*, hooks retracted; *h*, eggs. All magnified.

Forms of Larva.—The unlikeness of the young insect to its parent is one of the factors that necessitates metamorphosis. It is instructive, further, to trace among metabolic insects an increase in the degree of this dissimilarity. An adult Hexapod is provided with a firm, well-chitinized cuticle and six conspicuous jointed legs. Many larval Hexapods might be defined in similar general terms, unlike as they are to their parents in most points of detail. Examples of such are to be seen in the grubs of may-flies, dragon-flies, lacewing-flies and ground-beetles (fig. 24). This type of active, armoured larva—often bearing conspicuous feelers on the head and long jointed cercopods on the tenth abdominal segment—was styled campodeiform by F. Brauer (1869), on account of its likeness in shape to the bristle-tail *Campodea*. As an extreme contrast to this campodeiform type, we take the maggot of the house-fly (fig. 25)—a vermiform larva, with soft, white, feebly-chitinized cuticle and without either head-capsule or legs. Between these two extremes, numerous intermediate forms can be traced: the grub (wireworm) of a click-beetle, with narrow elongate well-armoured body, but with the legs very short; the grub of a chafer, with the legs fairly developed, but with the cuticle of all the trunk-segments soft and feebly chitinized; the well-known caterpillar of a moth (fig. 21, *e*) or saw-fly, with its long cylindrical body, bearing the six shortened thoracic legs and a variable number of pairs of "pro-legs" on the abdomen (this being the eruciform type of larva); the soft, white, wood-boring grub of a longhorn-beetle or of the saw-fly *Sirex*, with its stumpy vestiges of thoracic legs; the



After Westwood, *Modern Classification*.

FIG. 24.—Campodeiform Larva of a Ground-Beetle (*Aepus marinus*). Magnified.

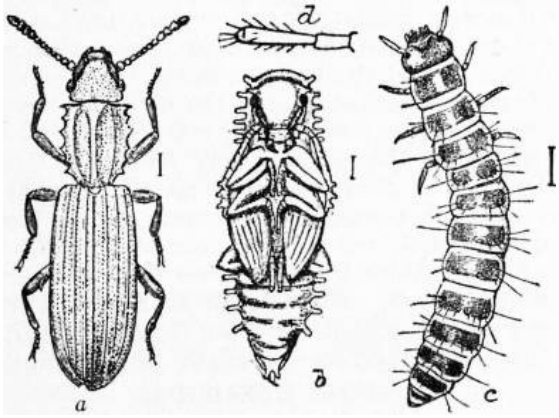
large-headed but entirely legless, fleshy grub of a weevil; and the legless larva, with greatly reduced head, of a bee. The various larvae of the above series, however, have all a distinct head-capsule, which is altogether wanting in the degraded fly maggot. These differences in larval form depend in part on the surroundings among which the larva finds itself after hatching; the active, armoured grub has to seek food for itself and to fight its own battles, while the soft, defenceless maggot is provided with abundant nourishment. But in general we find that elaboration of imaginal structure is associated with degradation in the nature of the larva, eruciform and vermiform larvae being characteristic of the highest orders of the Hexapoda, so that unlikeness between parent and offspring has increased with the evolution of the class.

Hypermetamorphosis.—Among a few of the beetles or Coleoptera (*q.v.*), and also in the neuropterous genus *Mantispa*, are found life-histories in which the earliest instar is campodeiform and the succeeding larval stages eruciform. These later stages, comprising the greater part of the larval history, are adapted for an inquiline or a parasitic life, where shelter is assured and food abundant, while the short-lived, active condition enables the newly-hatched insect to make its way to the spot favourable for its future development, clinging, for example, in the case of an oil-beetle's larva, to the hairs of a bee as she flies towards her nest. The presence of the two successive larval forms in the life-history constitutes what is called hypermetamorphosis. Most significant is the precedence of the eruciform by the campodeiform type. In conjunction with the association mentioned above of the most highly developed imaginal with the most degraded larval structure, it indicates clearly that the active, armoured grub preceded the sluggish soft-skinned caterpillar or maggot in the evolution of the Hexapoda.

Nymph.—The term nymph is applied by many writers on the Hexapoda to all young forms of insects that are not sufficiently unlike their parents to be called larvae. Other writers apply the term to a "free" pupa (see *infra*). It is in wellnigh universal use for those instars of ametabolous and hemimetabolous insects in which the external wing-rudiments have become conspicuous (fig. 27). The mature dragon-fly nymph, for example, makes its way out of the water in which the early stages have been passed and, clinging to some water-plant, undergoes the final ecdysis that the imago may emerge into the air. Like most ametabolic and hemimetabolic Hexapoda, such nymphs continue to move and feed throughout their lives. But examples are not wanting of a more or less complete resting habit during the latest nymphal instar. In some cicads the mature nymph ceases to feed and remains quiescent within a pillar-shaped earthen chamber. The nymph of a thrips-insect (Thysanoptera) is sluggish, its legs and wings being sheathed by a delicate membrane, while the nymph of the male scale-insect rests enclosed beneath a waxy covering.

Sub-imago.—Among the Hexapoda generally there is no subsequent ecdysis nor any further growth after the assumption of the winged state. The may-flies, however, offer a remarkable exception to this rule. After a prolonged aquatic larval and nymphal life-history, the winged insect appears as a sub-imago, whence, after the casting of a delicate cuticle, the true imago emerges.

Pupa.—In the metabolic Hexapoda the resting pupal instar shows externally the wings and other characteristic imaginal organs which have been gradually elaborated beneath the larval cuticle. It is usual to distinguish between the free pupae (fig. 26, *b*)—of Coleoptera and Hymenoptera, for example—in which the wings, legs and other appendages are not fixed to the trunk, and the obtect pupae (fig. 21, *d*)—such as may be noticed in the majority of the Lepidoptera—whose appendages are closely and immovably pressed to the body by a general hardening and fusion of the cuticle. In the degree of mobility there is great diversity among pupae. A gnat pupa swims through the water by powerful strokes of its abdomen, while the caddis-fly pupa, in preparation for its final ecdysis, bites its way out of its subaqueous protective case and rises through the water, so that the fly may emerge into the air. Some pupae are thus more active than some nymphs; the essential character of a pupa is not therefore its passivity, but that it is the instar in which the wings first become evident externally. The division of the winged Hexapoda into Exopteryga and Endopteryga is thus again justified.



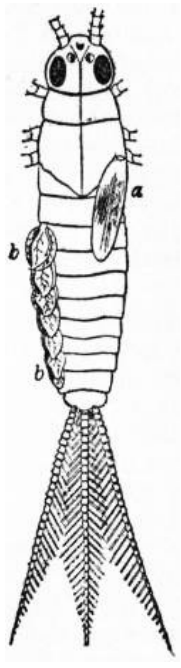
From Chittenden, *Bull.* 4 (n.s.) *Div. Ent. U.S. Dept. Agr.*

FIG. 26.—*a*, Saw-toothed Grain-Beetle (*Silvanus surinamensis*); *b*, pupa; *c*, larva, magnified—; *d*, feeler of larva.

If we admit that the larva has, in the phylogeny of insects, gradually diverged from the imago, and if we recollect that in the ontogeny the larva has always to become the imago (and of course still does so) notwithstanding the increased difficulty of the transformation, we cannot but recognize that a period of helplessness in which the transformation may take place is to be expected. It is generally considered that this is sufficient as an explanation of the existence of the pupa. This, however, is not the case, because the greater part of the transformation precedes the disclosure of the pupa, which, as L. C. Miall remarks, is structurally little other "than the fly enclosed in a temporary skin." Moreover, in many insects with imperfect metamorphosis the change from larva or (as the later stage of the larva is called in these cases) nymph to imago is about as great as the corresponding change in the Holometabola, as the student will recognize if he recalls the histories of *Ephemeridae*, Odonata and male *Coccidae*. But in none of these latter cases have the wings to be changed from a position inside the body to become external and actively functional organs. The difference between the nymph or false pupa and the true pupa is that in the latter a whole stage is devoted to the perfecting of the wings and body-wall after the wings have become external organs; the stage is one in which no food is or can be taken, however prolonged may be its existence. Amongst insects with imperfect metamorphosis the nearest approximations to the true pupa of the Holometabola are to be found in the sub-imago of *Ephemeridae* and in the quiescent or resting stages of Thysanoptera, *Aleurodidae* and *Coccidae*. A much more thorough appreciation than we yet possess of the phenomena in these cases is necessary in order completely to demonstrate the special characteristics of the holometabolous transformation. But even at present we can correctly state that the true pupa is invariably connected with the transference of the wings from the interior to the exterior of the body. It cannot but suggest itself that this transference was induced by some peculiarity as to formation of cuticle, causing the growth of the wings to be directed inwards instead of outwards. We may remark that fleas possess no wings, but are understood to possess a true pupa. This is a most remarkable case, but unfortunately very little information exists as to the details of metamorphosis in this group.

Life-Relations.—Only a brief reference can be made here to the fascinating subject of the life-relations of the larva, nymph and pupa, as compared with those of the imago. For details, the reader may consult the special articles on the various orders and groups of insects. A common result of metamorphosis is that the larva and imago differ markedly in their habitat and mode of feeding. The larva may be aquatic, or subterranean, or a burrower in wood, while the imago is aerial. It may bite and devour solid food, while the imago sucks liquids. It may eat roots or refuse, while the imago lives on leaves and flowers. The aquatic habit of many larvae is associated with endless beautiful adaptations for respiration. The series of paired spiracles on most of the trunk-segments is well displayed, as a rule, in terrestrial larvae—caterpillars and the grubs of most beetles, for example. In many aquatic larvae we find that all the spiracles are closed up, or become functionless, except a pair at the hinder end which are associated with some arrangement—such as the valvular flaps of the gnat larva or the telescopic "tail" of the drone-fly larva—for piercing the surface film and drawing periodical supplies of atmospheric air. A similar restriction of the functional spiracles to the tail-end (fig. 25, *d*) is seen in many larvae of flies (Diptera) that live and feed buried in carrion or excrement. Other aquatic larvae have the tracheal system entirely closed, and are able to breathe dissolved air by means of tubular or leaf-like gills. Such are the grubs of stone-flies, may-flies (fig. 27) and some dragon-flies and midges. An interesting feature is the difference often to be observed between an aquatic larva and pupa of the same insect in the matter of breathing. The gnat larva, for example, breathes at the tail-end, hanging head-downwards from the surface-film. But the pupa hangs from the surface by means of paired respiratory trumpets on the prothorax, the dorsal thoracic surface, where the cuticle splits to allow the emergence of the fly, being thus directed towards the upper air.

A marked disproportion between the life-term of larva and imago is common; the former often lives for months or years, while the latter only survives for weeks or days or hours. Generally the larval is the feeding, the imaginal the breeding, stage of the life-cycle. The extreme of this "division of labour" is seen in those insects whose jaws are vestigial in the winged state, when, the need for feeding all behind them, they have but to pair, to lay eggs and to die. The acquisition of wings is the sign of developed reproductive power.



Paedogenesis.—Nevertheless, the function of reproduction is occasionally exercised by larvae. In 1865 N. Wagner made his classical observations on the production of larvae from unfertilized eggs developed in the precociously-formed ovaries of a larval gall-midge (Cecidomyid), and subsequent observers have confirmed his results by studies on insects of the same family and of the related *Chironomidae*. The larvae produced by this remarkable method (paedogenesis) of virgin-reproduction are hatched within the parent larva, and in some cases escape by the rupture of its body.

Polyembryony.—Occasionally the power of reproduction is thrown still farther back in the life-history, and it is found that from a single egg a large number of embryos may be formed. P. Marchal has (1904) described this power in two small parasitic Hymenoptera—a Chalcid

(*Encyrtus*) which lays eggs in the developing eggs of the small moth *Hyponomeuta*, and a Proctotrypid (*Polygnotus*) which infests a gall-midge (Cecidomyid) larva. In the egg of these insects a small number of nuclei are formed by the division of the nucleus, and each of these nuclei originates by division the cell-layers of a separate embryo. Thus a mass or chain of embryos is produced, lying in a common cyst, and developing as their larval host develops. In this way over a hundred embryos may result from a single egg. Marchal points out the analogy of this phenomenon to the artificial polyembryony that has been induced in Echinoderm and other eggs by separating the blastomeres, and suggests that the abundant food-supply afforded by the host-larva is favourable for this multiplication of embryos, which may be, in the first instance, incited by the abnormal osmotic pressure on the egg.

From Miall and Denny (after Vayssière), *The Cockroach*, Lovell Reeve & Co.

FIG. 27.—Nymph of May-fly (*Chloeon dipterum*), with wing rudiments (*a*) and tracheal gill-plates (*b*, *b*). Magnified—. (The feelers and legs are cut short.)

Duration of Life.—The flour-moth (*Ephestia kuhniella*) sometimes passes through five or six generations in a single year. Although one of the characteristics of insects is the brevity of their adult lives, a considerable number of exceptions to the general rule have been discovered. These exceptions may be briefly summarized as follows: (1) Certain larvae, provided with food that may be adequate in quantity but deficient in nutriment, may live and go on feeding for many years; (2) certain stages of the life that are naturally "resting stages" may be in exceptional cases prolonged, and that to a very great extent; in this case no food is taken, and the activity of the individual is almost *nil*; (3) the life of certain insects in the adult state may be much prolonged if celibacy be maintained; a female of *Cybister roeselii* (a large water-beetle) has lived five and a half years in the adult state in captivity. In addition to these abnormal cases, the life of certain insects is naturally more prolonged than usual. The females of some social insects have been known to live for many years. In *Tibicen septemdecim* the life of the larva extends over from thirteen to seventeen years. The eggs of locusts may remain for years in the ground before hatching; and there may thus arise the peculiar phenomenon of some species of insect appearing in vast numbers in a locality where it has not been seen for several years.

CLASSIFICATION

Number of Species.—It is now considered that 2,000,000 is a moderate estimate of the species of insects actually existing. Some authorities consider this total to be too small, and extend the number to 10,000,000. Upwards of 300,000 species have been collected and described, and at present the number of named forms increases at the rate of about 8000 species per annum. The greater part by far of the insects existing in the world is still quite unknown to science. Many of the species are in process of extinction, owing to the extensive changes that are taking place in the natural conditions of the world by the extension of human population and of cultivation, and by the destruction of forests; hence it is probable that a considerable proportion of the species at present existing will disappear from the face of the earth before we have discovered or preserved any specimens of them. Nevertheless, the constant increase of our knowledge of insect forms renders classification increasingly difficult, for gaps in the series become filled, and while the number of genera and families increases, the distinctions between these groups become dependent on characters that must seem trivial to the naturalist who is not a specialist.

Orders of Hexapoda.—In the present article it is only possible to treat of the division of the Hexapoda into orders and sub-orders and of the relations of these orders to each other. For further classificatory details, reference must be made to the special articles on the various orders. As regards the vast majority of insects, the orders proposed by Linnaeus are acknowledged by modern zoologists. His classification was founded mainly on the nature of the wings, and five of his orders—the Hymenoptera (bees, ants, wasps, &c.), Coleoptera (beetles), Diptera (two-winged flies), Lepidoptera (moths and butterflies), and Hemiptera (bugs, cicads, &c.)—are recognized to-day with nearly the same limits as he laid down. His order of wingless insects (Aptera) included Crustacea, spiders, centipedes and other creatures that now form classes of the Arthropoda distinct from the Hexapoda; it also included Hexapoda of parasitic and evidently degraded structure, that are now regarded as allied more or less closely to various winged insects. Consequently the modern order Aptera comprises only a very small proportion of Linnaeus's "Aptera"—the spring-tails and bristle-tails, wingless Hexapoda that stand evidently at a lower grade of development than the bulk of the class. The earwigs, cockroaches and locusts, which Linnaeus included among the Coleoptera, were early grouped into a distinct order, the Orthoptera. The great advance in modern zoology as regards the classification of the Hexapoda lies in the treatment of a heterogeneous assembly which formed Linnaeus's order Neuroptera. The characters of the wings are doubtless important as indications of relationship, but the nature of the jaws and the course of the life-history must be considered of greater value. Linnaeus's Neuroptera exhibit great diversity in these respects, and the insects included in it are now therefore distributed into a number of distinct orders. The many different arrangements that have been proposed can hardly be referred to in this article. Of special importance in the history of systematic entomology was the scheme of F. Brauer (1885), who separated the spring tails and bristle-tails as a sub-class Apterygogenea from all the other Hexapoda, these forming the sub-class Pterygogenea distributed into sixteen orders. Brauer in his

arrangement of these orders laid special stress on the nature of the metamorphosis, and was the first to draw attention to the number of Malpighian tubes as of importance in classification. Subsequent writers have, for the most part, increased the number of recognized orders; and during the last few years several schemes of classification have been published, in the most revolutionary of which—that of A. Handlirsch (1903-1904)—the Hexapoda are divided into four classes and thirty-four orders! Such excessive multiplication of the larger taxonomic divisions shows an imperfect sense of proportion, for if the term “class” be allowed its usual zoological value, no student can fail to recognize that the Hexapoda form a single well-defined class, from which few entomologists would wish to exclude even the Apterygogenea. In several recent attempts to group the orders into sub-classes, stress has been laid upon a few characters in the imago. C. Börner (1904), for example, considers the presence or absence of cerci of great importance, while F. Klapalek (1904) lays stress on a supposed distinction between appendicular and non-appendicular genital processes. A natural system must take into account the nature of the larva and of the metamorphosis in conjunction with the general characters of the imago. Hence the grouping of the orders of winged Hexapoda into the divisions Exopterygota and Endopterygota, as suggested by D. Sharp, is unlikely to be superseded by the result of any researches into minute imaginal structure. Sharp’s proposed association of the parasitic wingless insects in a group Anapterygota cannot, however, be defended as natural; and recent researches into the structure of these forms enables us to associate them confidently with related winged orders. The classification here adopted is based on Sharp’s scheme, with the addition of suggestions from some of the most recent authors—especially Börner and Enderlein.

Class: **HEXAPODA.**

Sub-class: APTERYGOTA.

Primitively (?) wingless Hexapods with cumacean mandibles, distinct maxillulae, and locomotor abdominal appendages. Without ectodermal genital ducts. Young closely resemble adults.

The sub-class contains a single

Order: *Aptera*,

which is divided into two sub-orders:

1. *Thysanura* (Bristle-tails): with ten abdominal segments; number of abdominal appendages variable. Cerci prominent. Developed tracheal system.

2. *Collembola* (Spring-tails): with six abdominal segments; appendages of the first forming an adherent ventral tube, those of the third a minute “catch,” those of the fourth (fused basally) a “spring.” Tracheal system reduced or absent.

Sub-class: EXOPTERYGOTA.

Hexapoda mostly with wings, the wingless forms clearly degraded. Maxillulae rarely distinct. No locomotor abdominal appendages. The wing-rudiments develop visibly outside the cuticle. Young like or unlike parents.

Order: *Dermaptera*.

Biting mandibles; minute but distinct-maxillulae; second maxillae incompletely fused. When wings are present, the fore-wings are small firm elytra, beneath which the delicate hind-wings are complexly folded. Many forms wingless. Genital ducts entirely mesodermal. Cerci always present; usually modified into unjointed forceps. Numerous (30 or more) Malpighian tubes. Young resembling parents.

Includes two families—the *Forficulidae* or *earwigs* (*q.v.*) and the *Hemimeridae*.

Order: *Orthoptera*.

Biting mandibles; vestigial maxillulae; second maxillae incompletely fused. Wings usually well developed, net-veined; the fore-wings of firmer texture than the hind-wings, whose anal area folds fanwise beneath them. Jointed cerci always present; ovipositor well developed. Malpighian tubes numerous (100-150). Young resemble parents.

Includes stick and leaf insects, cockroaches, mantids, grasshoppers, locusts and crickets (see ORTHOPTERA).

Order: *Plecoptera*.

Biting mandibles; second maxillae incompletely fused. Fore-wings similar in texture to hind-wings, whose anal area folds fanwise. Jointed, often elongate, cerci. Numerous (50-60) Malpighian tubes. Young resembling parents, but aquatic in habit, breathing dissolved air by thoracic tracheal gills.

Includes the single family of the *Perlidae* (Stone-flies), formerly grouped with the Neuroptera.

Order: *Isoptera*.

Biting mandibles; second maxillae incompletely fused. Fore-wings similar in shape and texture to hind-wings, which do not fold. In most species the majority of individuals are wingless. Short, jointed cerci. Six or eight Malpighian tubes. Young resembling adults; terrestrial throughout life.

Includes two families, formerly reckoned among the Neuroptera—the *Embiidae* and the *Termitidae* or "White Ants" (see TERMITE).

Order: *Corrodentia*.

Biting mandibles; second maxillae incompletely fused; maxillulae often distinct. Cerci absent. Four Malpighian tubes.

Includes two sub-orders, formerly regarded as Neuroptera:—

1. *Copeognatha*: Corrodentia with delicate cuticle. Wings usually developed; the fore-wings much larger than the hind-wings. One family, the *Psocidae* (Book-lice). These minute insects are found amongst old books and furniture.

2. *Mallophaga*: Parasitic wingless Corrodentia (Bird-lice).

Order: *Ephemeroptera*.

Jaws vestigial. Fore-wings much larger than hind-wings. Elongate, jointed cerci. Genital ducts paired and entirely mesodermal. Malpighian tubes numerous (40). Aquatic larvae with distinct maxillulae, breathing dissolved air by abdominal tracheal gills. Penultimate instar a flying sub-imago. [Includes the single family of the *Ephemeridae* or may-flies. See also NEUROPTERA, in which this order was formerly comprised.]

Order: *Odonata*.

Biting mandibles. Wings of both pairs closely alike; firm and glassy in texture. Prominent, unjointed cerci, male with genital armature on second abdominal segment. Malpighian tubes numerous (50-60). Aquatic larvae with caudal leaf-gills or with rectal tracheal system.

Includes the three families of dragon-flies. Formerly comprised among the Neuroptera.

Order: *Thysanoptera*.

Piercing mandibles, retracted within the head-capsule. First maxillae also modified as piercers; maxillae of both pairs with distinct palps. Both pairs of wings similar, narrow and fringed. Four Malpighian tubes. Cerci absent. Ovipositor usually present. Young resembling parents, but penultimate instar passive and enclosed in a filmy pellicle.

Includes three families of Thrips (see THYSANOPTERA).

Order: *Hemiptera*.

Mandibles and first maxillae modified as piercers; second maxillae fused to form a jointed, grooved rostrum. Wings usually present. Four Malpighian tubes. Cerci absent. Ovipositor developed.

Includes two sub-orders:—

1. *Heteroptera*: Rostrum not in contact with haunches of fore-legs. Fore-wings partly coriaceous. Young resembling adults.

Includes the bugs, terrestrial and aquatic.

2. *Homoptera*: Rostrum in contact with haunches of fore-legs. Fore-wings uniform in texture. Young often larvae. Penultimate instar passive in some cases.

Includes the cicads, aphides and scale-insects (see HEMIPTERA).

Order: *Anoplura*.

Piercing jaws modified and reduced, a tubular, protrusible sucking-trunk being developed; mouth with hooks. Wingless, parasitic forms. Cerci absent. Four Malpighian tubes. Young resembling adults.

Includes the family of the Lice (*Pediculidae*), often reckoned as Hemiptera (*q.v.*). See also LOUSE.

Sub-class: ENDOPTERYGOTA.

Hexapoda mostly with wings; the wingless forms clearly degraded or modified. Maxillulae vestigial or absent. No locomotor abdominal appendages (except in certain larvae). Young animals always unlike parents, the wing-rudiments developing beneath the larval cuticle and only appearing in a penultimate pupal instar, which takes no food and is usually passive.

Order: *Neuroptera*.

Biting mandibles; second maxillae completely fused. Prothorax large and free. Membranous, net-veined wings, those of the two pairs closely alike. Six or eight Malpighian tubes. Cerci absent. Larva campodeiform, usually feeding by suction (exceptionally hypermetamorphic with subsequent eruciform instars). Pupa free.

Includes the alder-flies, ant-lions and lacewing-flies. See NEUROPTERA.

Order: *Coleoptera*.

Biting mandibles; second maxillae very intimately fused. Prothorax large and free. Fore-wings modified into firm elytra, beneath which the membranous hind-wings (when present) can be folded. Cerci absent. Four or six Malpighian tubes. Larva campodeiform or eruciform. Pupa free.

Includes the beetles and the parasitic *Stylopidae*, often regarded as a distinct order (*Strepsiptera*). (See COLEOPTERA.)

Order: *Mecaptera*.

Biting mandibles; first maxillae elongate; second maxillae completely fused. Prothorax small. Two pairs of similar, membranous wings, with predominantly longitudinal neuration. Six Malpighian tubes. Larva eruciform. Pupa free. Cerci present.

Includes the single family of *Panorpidae* (scorpion-flies), often comprised among the Neuroptera.

Order: *Trichoptera*.

Mandibles present in pupa, vestigial in imago; maxillae suctorial without specialization; first maxillae with lacinia, galea and palp. Prothorax small. Two pairs of membranous, hair-covered wings, with predominantly longitudinal neuration. Larvae aquatic and eruciform. Pupa free. Six Malpighian tubes. Cerci absent.

Includes the caddis-flies. See NEUROPTERA, among which these insects were formerly comprised.

Order: *Lepidoptera*.

Mandibles absent in imago, very exceptionally present in pupa; first maxillae nearly always without laciniae and often without palps, or only with vestigial palps, their galeae elongated and grooved inwardly so as to form a sucking trunk. Prothorax small. Wings with predominantly longitudinal neuration, covered with flattened scales. Fore-wings larger than hind-wings. Cerci absent. Four (rarely 6 or 8) Malpighian tubes. Larvae eruciform, with rarely more than five pairs of abdominal prolegs. Pupa free in the lowest families, in most cases incompletely or completely obtect.

Includes the moths and butterflies. See LEPIDOPTERA.

Order: *Diptera*.

Mandibles rarely present, adapted for piercing; first maxillae with palps; second maxillae forming with hypopharynx a suctorial proboscis. Prothorax small, intimately united to mesothorax. Fore-wings well developed; hind-wings reduced to stalked knobs (“halteres”). Cerci present but usually reduced. Four Malpighian tubes. Larvae eruciform without thoracic legs, or vermiform without head-capsule. Pupa incompletely obtect or free, and enclosed in the hardened cuticle of the last larval instar (puparium).

Includes the two-winged flies (see DIPTERA), which may be divided into two sub-orders:—

1. *Orthorrhapha*: Larva eruciform. Cuticle of pupa or puparium splitting longitudinally down the back, to allow escape of imago.

Comprises the midges, gnats, crane-flies, gad-flies, &c.

2. *Cyclorrhapha*: Larva vermiform (no head-capsule). Puparium opening by an anterior “lid.”

Comprises the hover-flies, flesh-flies, bot-flies, &c.

Order: *Siphonaptera*.

Mandibles fused into a piercer; first maxillae developed as piercers; palps of both pairs of maxillae present; hypopharynx wanting. Prothorax large. Wings absent or vestigial. Larva eruciform, limbless.

Includes the fleas.

Order: *Hymenoptera*.

Biting mandibles; second maxillae incompletely or completely fused; often forming a suctorial proboscis. Prothorax small, and united to mesothorax. First abdominal segment united to metathorax. Wings membranous, fore-wings larger than hind-wings. Ovipositor always well

developed, and often modified into a sting. Numerous (20-150) Malpighian tubes (in rare cases, 6-12 only). Larva eruciform, with seven or eight pairs of abdominal prolegs, or entirely legless. Pupa free.

Includes two sub-orders:—

1. *Symphyta*: Abdomen not basally constricted. Larvae caterpillars with thoracic legs and abdominal prolegs.

Comprises the saw-flies.

2. *Apocrita*: Abdomen markedly constricted at second segment. Larvae legless grubs.

Comprises gall-flies, ichneumon-flies, ants, wasps, bees. See Hymenoptera.

Geological History

The classification just given has been drawn up with reference to existing insects, but the great majority of the extinct forms that have been discovered can be referred with some confidence to the same orders, and in many cases to recent families. The Hexapoda, being aerial, terrestrial and fresh-water animals, are but occasionally preserved in stratified rocks, and our knowledge of extinct members of the class is therefore fragmentary, while the description, as insects, of various obscure fossils, which are perhaps not even Arthropods, has not tended to the advancement of this branch of zoology. Nevertheless, much progress has been made. Several Silurian fossils have been identified as insects, including a Thysanuran from North America, but upon these considerable doubt has been cast.

The Devonian rocks of Canada (New Brunswick) have yielded several fossils which are undoubtedly wings of Hexapods. These have been described by S. H. Scudder, and include gigantic forms related to the Ephemeroptera.

In the Carboniferous strata (Coal measures) remains of Hexapods become numerous and quite indisputable. Many European forms of this age have been described by C. Brongniart, and American by S. H. Scudder. The latter has established, for all the Palaeozoic insects, an order Palaeodictyoptera, there being a closer similarity between the fore-wings and the hind-wings than is to be seen in most living orders of Hexapoda, while affinities are shown to several of these orders—notably the Orthoptera, Ephemeroptera, Odonata and Hemiptera. It is probable that many of these Carboniferous insects might be referred to the Isoptera, while others would fall into the existing orders to which they are allied, with some modification of our present diagnoses. Of special interest are cockroach-like forms, with two pairs of similar membranous wings and a long ovipositor, and gigantic insects allied to the Odonata, that measured 2 ft. across the outspread wings. A remarkable fossil from the Scottish Coal-measures (*Lithomantis*) had apparently small wing-like structures on the prothorax, and in allied genera small veined outgrowths—like tracheal gills—occurred on the abdominal segments. To the Permian period belongs a remarkable genus *Eugereon*, that combines hemipteroid jaws with orthopteroid wing-neuration. With the dawn of the Mesozoic epoch we reach Hexapods that can be unhesitatingly referred to existing orders. From the Trias of Colorado, Scudder has described cockroaches intermediate between their Carboniferous precursors and their present-day descendants, while the existence of endopterygotous Hexapods is shown by the remains of Coleoptera of several families. In the Jurassic rocks are found Ephemeroptera and Odonata, as well as Hemiptera, referable to existing families, some representatives of which had already appeared in the oldest of the Jurassic ages—the Lias. To the Lias also can be traced back the Neuroptera, the Trichoptera, the orthorrhaphous Diptera and, according to the determination of certain obscure fossils, also the Hymenoptera (ants). The Lithographic stone of Kimmeridgian age, at Solenhofen in Bavaria, is especially rich in insect remains, cyclorrhaphous Diptera appearing here for the first time. In Tertiary times the higher Diptera, besides Lepidoptera and Hymenoptera, referable to existing families, become fairly abundant. Numerous fossil insects preserved in the amber of the Baltic Oligocene have been described by G. L. Mayr and others, while Scudder has studied the rich Oligocene faunas of Colorado (Florissant) and Wyoming (Green River). The Oeningen beds of Baden, of Miocene age, have also yielded an extensive insect fauna, described fifty years ago by O. Heer. Further details of the geological history of the Hexapoda will be found in the special articles on the various orders. Fragmentary as the records are, they show that the Exopterygota preceded the Endopterygota in the evolution of the class, and that among the Endopterygota those orders in which the greatest difference exists between imago and larva—the Lepidoptera, Diptera and Hymenoptera—were the latest to take their rise.

Geographical Distribution

The class Hexapoda has a world-wide range, and so have most of its component orders. The Aptera have perhaps the most extensive distribution of all animals, being found in Franz Josef Land and South Victoria Land, on the snows of Alpine glaciers, and in the depths of the most extensive caves. Most of the families and a large proportion of the genera of insects are exceedingly widespread, but a study of the genera and species in any of the more important families shows that faunas can be distinguished whose headquarters agree fairly with the regions that have been

proposed to express the distribution of the higher vertebrates. Many insects, however, can readily extend their range, and a careful study of their distribution leads us to discriminate between faunas rather than definitely to map regions. A large and dominant Holoarctic fauna, with numerous subdivisions, ranges over the great northern continents, and is characterized by the abundance of certain families like the *Carabidae* and *Staphylinidae* among the Coleoptera and the *Tenthredinidae* among the Hymenoptera. The southern territory held by this fauna is invaded by genera and species distinctly tropical. Oriental types range far northwards into China and Japan. Ethiopian forms invade the Mediterranean area. Neotropical and distinctively Sonoran insects mingle with members of the Holoarctic fauna across a wide "transition zone" in North America. "Wallace's line" dividing the Indo-Malayan and Austro-Malayan sub-regions is frequently transgressed in the range of Malayan insects. The Australian fauna is rich in characteristic and peculiar genera, and New Zealand, while possessing some remarkable insects of its own, lacks entirely several families with an almost world-wide range—for example, the *Notodontidae*, *Lasiocampidae*, and other families of Lepidoptera. Interesting relationships between the Ethiopian and Oriental, the Neotropical and West African, the Patagonian and New Zealand faunas suggest great changes in the distribution of land and water, and throw doubt on the doctrine of the permanence of continental areas and oceanic basins. Holoarctic types reappear on the Andes and in South Africa, and even in New Zealand. The study of the Hexapoda of oceanic islands is full of interest. After the determination of a number of cosmopolitan insects that may well have been artificially introduced, there remains a large proportion of endemic species—sometimes referable to distinct genera—which suggest a high antiquity for the truly insular faunas.

Relationships and Phylogeny

The Hexapoda form a very clearly defined class of the Arthropoda, and many recent writers have suggested that they must have arisen independently of other Arthropods from annelid worms, and that the Arthropoda must, therefore, be regarded as an "unnatural," polyphyletic assemblage. The cogent arguments against this view are set forth in the article on Arthropoda. A near relationship between the Apterygota and the Crustacea has been ably advocated by H. J. Hansen (1893). It is admitted on all hands that the Hexapoda are akin to the Chilopoda. Verhoeff has lately (1904) put forward the view that there are really six segments in the hexapodan thorax and twenty in the abdomen—the cerci belonging to the seventeenth abdominal segment thus showing a close agreement with the centipede *Scolopendra*. On the other hand, G. H. Carpenter (1899, 1902-1904) has lately endeavoured to show an exact numerical correspondence in segmentation between the Hexapoda, the Crustacea, the Arachnida, and the most primitive of the Diplopoda. On either view it may be believed that the Hexapoda arose with the allied classes from a primitive arthropod stock, while the relationships of the class are with the Crustacea, the Chilopoda and the Diplopoda, rather than with the Arachnida.

Nature of Primitive Hexapoda.—Two divergent views have been held as to the nature of the original hexapod stock. Some of those zoologists who look to *Peripatus*, or a similar worm-like form, as representing the direct ancestors of the Hexapoda have laid stress on a larva like the caterpillar of a moth or saw-fly as representing a primitive stage. On the other hand, the view of F. Müller and F. Brauer, that the Thysanura represent more nearly than any other existing insects the ancestors of the class, has been accepted by the great majority of students. And there can be little doubt that this belief is justified. The caterpillar, or the maggot, is a specialized larval form characteristic of the most highly developed orders, while the campodeiform larva is the starting-point for the more primitive insects. The occurrence in the hypermetamorphic Coleoptera (see *supra*) of a campodeiform preceding an eruciform stage in the life-history is most suggestive. Taken in connexion with the likeness of the young among the more generalized orders to the adults, it indicates clearly a thysanuroid starting-point for the evolution of the hexapod orders. And we must infer further that the specialization of the higher orders has been accompanied by an increase in the extent of the metamorphosis—a very exceptional condition among animals generally, as has been ably pointed out by L. C. Miall (1895).

Origin of Wings.—The post-embryonic growth of Hexapods with or without metamorphosis is accompanied in most cases by the acquisition of wings. These organs, thus acquired during the lifetime of the individual, must have been in some way acquired during the evolution of the class. Many students of the group, following Brauer, have regarded the Apterygota as representing the original wingless progenitors of the Pterygota, and the many primitive characters shown by the former group lend support to this view. On the other hand, it has been argued that the presence of wings in a vast majority of the Hexapoda suggests their presence in the ancestors of the whole class. It is most unlikely that wings have been acquired independently by various orders of Hexapoda, and if we regard the Thysanura as the slightly modified representatives of a primitively wingless stock, we must postulate the acquisition of wings by some early offshoot of that stock, an offshoot whence the whole group of the Pterygota took its rise. How wings were acquired by these primitive Pterygota must remain for the present a subject for speculation. Insect wings are specialized outgrowths of certain thoracic segments, and are quite unrepresented in any other class of Arthropods. They are not, therefore, like the wings of birds, modified from some pre-existing structures (the fore-limbs) common to their phylum; they are new and peculiar structures.

Comparison of the tracheated wings with the paired tracheated outgrowths on the abdominal segments of the aquatic campodeiform larva of may-flies (see fig. 27) led C. Gegenbaur to the brilliant suggestion that wings might be regarded as specialized and transformed gills. But a survey of the Hexapoda as a whole, and especially a comparative study of the tracheal system, can hardly leave room for doubt that this system is primitively adapted for atmospheric breathing, and that the presence of tracheal gills in larvae must be regarded as a special adaptation for temporary aquatic life. The origin of insect wings remains, therefore, a mystery, deepened by the difficulty of imagining any probable use for thoracic outgrowths, comparable to the wing-rudiments of the Exopterygota, in the early stages of their evolution.

Origin of Metamorphosis.—In connexion with the question whether metamorphosis has been gradually acquired, we have to consider two aspects, viz. the bionomic nature of metamorphosis, and to what extent it existed in primitive insects. Bionomically, metamorphosis may be defined as the sum of adaptations that have gradually fitted the larva (caterpillar or maggot) for one kind of life, the fly for another. So that we may conclude that the factors of evolution would favour its development. With regard to its occurrence in primitive insects, our knowledge of the geological record is most imperfect, but so far as it goes it supports the conclusion that holometabolism (*i.e.* extreme metamorphosis) is a comparatively recent phenomenon of insect life. None of the groups of existing Endopterygota have been traced with certainty farther back than the Mesozoic epoch, and all the numerous Palaeozoic insect-fossils seem to belong to forms that possessed only imperfect metamorphosis. The only doubt arises from the existence of insect remains, referred to the order Coleoptera, in the Silesian Culm of Steinkunzendorf near Reichenbach. The oldest larva known, *Mormolucoides articulatus*, is from the New Red Sandstone of Connecticut; it belongs to the *Sialidae*, one of the lowest forms of Holometabola. It is now, in fact, generally admitted that metamorphosis has been acquired comparatively recently, and Scudder in his review of the earliest fossil insects states that “their metamorphoses were simple and incomplete, the young leaving the egg with the form of the parent, but without wings, the assumption of which required no quiescent stage before maturity.”

It has been previously remarked that the phenomena of holometabolism are connected with the development of wings inside the body (except in the case of the fleas, where there are no wings in the perfect insect). Of existing insects 90% belong to the Endopterygota. At the same time we have no evidence that any Endopterygota existed amongst Palaeozoic insects, so that the phenomena of endopterygotism are comparatively recent, and we are led to infer that the Endopterygota owe their origin to the older Exopterygota. In Endopterygota the wings commence their development as invaginations of the hypodermis, while in Exopterygota the wings begin—and always remain—as external folds or evaginations. The two modes of growth are directly opposed, and at first sight it appears that this fact negatives the view that Endopterygota have been derived from Exopterygota.

Only three hypotheses as to the origin of Endopterygota can be suggested as possible, viz.:—(1) That some of the Palaeozoic insects, though we infer them to have been exopterygotous, were really endopterygotous, and were the actual ancestors of the existing Endopterygota; (2) that Endopterygota are not descended from Exopterygota, but were derived directly from ancestors that were never winged; (3) that the predominant division—*i.e.* Endopterygota—of insects of the present epoch are descended from the predominant—if not the sole—group that existed in the Palaeozoic epoch, viz. the Exopterygota. The first hypothesis is not negatived by direct evidence, for we do not actually know the ontogeny of any of the Palaeozoic insects; it is, however, rendered highly improbable by the modern views as to the nature and origin of wings in insects, and by the fact that the Endopterygota include none of the lower existing forms of insects. The second hypothesis—to the effect that Endopterygota are the descendants of apterous insects that had never possessed wings (*i.e.* the Apterygogenea of Brauer and others, though we prefer the shorter term Apterygota)—is rendered improbable from the fact that existing Apterygota are related to Exopterygota, not to Endopterygota, and by the knowledge that has been gained as to the morphology and development of wings, which suggest that—if we may so phrase it—were an apterygotous insect gradually to develop wings, it would be on the exopterygotous system. From all points of view it appears, therefore, probable that Endopterygota are descended from Exopterygota, and we are brought to the question as to the way in which this has occurred.

It is almost impossible to believe that any species of insect that has for a long period developed the wings outside the body could change this mode of growth suddenly for an internal mode of development of the organs in question, for, as we have already explained, the two modes of growth are directly opposed. The explanation has to be sought in another direction. Now there are many forms of Exopterygota in which the creatures are almost or quite destitute of wings. This phenomenon occurs among species found at high elevations, among others found in arid or desert regions, and in some cases in the female sex only, the male being winged and the female wingless. This last state is very frequent in *Blattidae*, which were amongst the most abundant of Palaeozoic insects. The wingless forms in question are always allied to winged forms, and there is every reason to believe that they have been really derived from winged forms. There are also insects (fleas, &c.) in which metamorphosis of a “complete” character exists, though the insects never develop wings. These cases render it highly probable that insects may in some circumstances become wingless, though their ancestors were winged. Such insects have been styled anapterygotous. In these facts we have one possible clue to the change from exopterygotism to endopterygotism, namely, by an

intermediate period of anapterygotism.

Although we cannot yet define the conditions under which exopterygotous wings are suppressed or unusually developed, yet we know that such fluctuations occur. There are, in fact, existing forms of Exopterygota that are usually wingless, and that nevertheless appear in certain seasons or localities with wings. We are therefore entitled to assume that the suppressed wings of Exopterygota tend to reappear; and, speaking of the past, we may say that if after a period of suppression the wings began to reappear as hypodermal buds while a more rigid pressure was exerted by the cuticle, the growth of the buds would necessarily be inwards, and we should have incipient endopterygotism. The change that is required to transform Exopterygota into Endopterygota is merely that a cell of hypodermis should proliferate inwards instead of outwards, or that a minute hypodermal evaginated bud should be forced to the interior of the body by the pressure of a contracted cuticle.

If it should be objected that the wings so developed would be rudimentary, and that there would be nothing to encourage their development into perfect functional organs, we may remind the reader that we have already pointed out that imperfect wings of Exopterygota do, even at the present time under certain conditions, become perfect organs; and we may also add that there are, even among existing Endopterygota, species in which the wings are usually vestiges and yet sometimes become perfectly developed. In fact, almost every condition that is required for the change from exopterygotism to endopterygotism exists among the insects that surround us.

But it may perhaps be considered improbable that organs like the wings, having once been lost, should have been reacquired on the large scale suggested by the theory just put forward. If so, there is an alternative method by which the endopterygotous may have arisen from the exopterygotous condition. The sub-imago of the Ephemeroptera suggests that a moult, after the wings had become functional, was at one time general among the Hexapoda, and that the resting nymph of the Thysanoptera or the pupa of the Endopterygota represents a formerly active stage in the life-history. Further, although the wing-rudiments appear externally in an early instar of an exopterygotous insect, the earliest instars are wingless and wing-rudiments have been previously developing beneath the cuticle, growing however outwards, not inwards as in the larva of an endopterygote. The change from an exopterygote to an endopterygote development could, therefore, be brought about by the gradual postponement to a later and later instar of the appearance of the wing-rudiments outside the body, and their correlated growth inwards as imaginal disks. For in the post-embryonic development of the ancestors of the Endopterygota we may imagine two or three instars with wing-rudiments to have existed, the last represented by the sub-imago of the may-flies. As the life-conditions and feeding-habits of the larva and imago become constantly more divergent, the appearance of the wing-rudiments would be postponed to the pre-imaginal instar, and that instar would become predominantly passive.

Relationships of the Orders.—Reasons have been given for regarding the Thysanura as representing, more nearly than any other living group, the primitive stock of the Hexapoda. It is believed that insects of this group are represented among Silurian fossils. We may conclude, therefore, that they were preceded, in Cambrian times or earlier, by Arthropods possessing well developed appendages on all the trunk-segments. Of such Arthropods the living Symphyla—of which the delicate little *Scutigerella* is a fairly well-known example—give us some representation.

No indications beyond those furnished by comparative anatomy help us to unravel the phylogeny of the Collembola. In most respects, the shortened abdomen, for example, they are more specialized than the Thysanura, and most of the features in which they appear to be simple, such as the absence of a tracheal system and of compound eyes, can be explained as the result of degradation. In their insunken mouth and their jaws retracted within the head-capsule, the Collembola resemble the entotrophous division of the Thysanura (see Aptera), from which they are probably descended.

From the thysanuroid stock of the Apterygota, the Exopterygota took their rise. We have undoubted fossil evidence that winged insects lived in the Devonian and became numerous in the Carboniferous period. These ancient Exopterygota were synthetic in type, and included insects that may, with probability, be regarded as ancestral to most of the existing orders. It is hard to arrange the Exopterygota in a linear series, for some of the orders that are remarkably primitive in some respects are rather highly specialized in others. As regards wing-structure, the Isoptera with the two pairs closely similar are the most primitive of all winged insects; while in the paired mesodermal genital ducts, the elongate cerci and the conspicuous maxillulae of their larvae the Ephemeroptera retain notable ancestral characters. But the vestigial jaws, numerous Malpighian tubes, and specialized wings of may-flies forbid us to consider the order as on the whole primitive. So the Dermaptera, which retain distinct maxillulae and have no ectodermal genital ducts, have either specialized or aborted wings and a large number of Malpighian tubes. The Corrodentia retain vestigial maxillulae and two pairs of Malpighian tubes, but the wings are somewhat specialized in the Copeognatha and absent in the degraded and parasitic Mallophaga. The Plecoptera and Orthoptera agree in their numerous Malpighian tubes and in the development of a folding anal area in the hind-wing. As shown by the number and variety of species, the Orthoptera are the most dominant order of this group. Eminently terrestrial in habit, the differentiation of their fore-wings and hind-wings can be traced from Carboniferous, isopteroid ancestors through intermediate Mesozoic forms. The Plecoptera resemble the Ephemeroptera and Odonata in the aquatic habits of

their larvae, and by the occasional presence of tufted thoracic gills in the imago exhibit an aquatic character unknown in any other winged insects. The Odonata are in many imaginal and larval characters highly specialized; yet they probably arose with the Ephemeroptera as a divergent offshoot of the same primitive isopteroid stock which developed more directly into the living Isoptera, Plecoptera, Dermaptera and Orthoptera.

All these orders agree in the possession of biting mandibles, while their second maxillae have the inner and outer lobes usually distinct. The Hemiptera, with their piercing mandibles and first maxillae and with their second maxillae fused to form a jointed beak, stand far apart from them. This order can be traced with certainty back to the early Jurassic epoch, while the Permian fossil *Eugereon*, and the living order—specially modified in many respects—of the Thysanoptera indicate steps by which the aberrant suctorial and piercing mouth of the Hemiptera may have been developed from the biting mouth of primitive Isopteroids, by the elongation of some parts and the suppression of others. The Anoplura may probably be regarded as a degraded offshoot of the Hemiptera.

The importance of great cardinal features of the life-history as indicative of relationship leads us to consider the Endopterygota as a natural assemblage of orders. The occurrence of weevils—among the most specialized of the Coleoptera—in Triassic rocks shows us that this great order of metabolous insects had become differentiated into its leading families at the dawn of the Mesozoic era, and that we must go far back into the Palaeozoic for the origin of the Endopterygota. In this view we are confirmed by the impossibility of deriving the Endopterygota from any living order of Exopterygota. We conclude, therefore, that the primitive stock of the former sub-class became early differentiated from that of the latter. So widely have most of the higher orders of the Hexapoda now diverged from each other, that it is exceedingly difficult in most cases to trace their relationships with any confidence. The Neuroptera, with their similar fore- and hind-wings and their campodeiform larvae, seem to stand nearest to the presumed isopteroid ancestry, but the imago and larva are often specialized. The campodeiform larvae of many Coleoptera are indeed far more primitive than the neuropteran larvae, and suggest to us that the Coleoptera—modified as their wing-structure has become—arose very early from the primitive metabolous stock. The antiquity of the Coleoptera is further shown by the great diversity of larval form and habit that has arisen in the order, and the proof afforded by the hypermetamorphic beetles that the campodeiform preceded the eruciform larva has already been emphasized.

In all the remaining orders of the Endopterygota the larva is eruciform or vermiform. The Mecaptera, with their predominantly longitudinal wing-nervuration, serve as a link between the Neuroptera and the Trichoptera, their retention of small cerci being an archaic character which stamps them as synthetic in type, but does not necessarily remove them from orders which agree with them in most points of structure but which have lost the cerci. The standing of the Trichoptera in a position almost ancestral to the Lepidoptera is one of the assured results of recent morphological study, the mobile mandibulate pupa and the imperfectly suctorial maxillae of the Trichoptera reappearing in the lowest families of the Lepidoptera. This latter order, which is not certainly known to have existed before Tertiary times, has become the most highly specialized of all insects in the structure of the pupa. Diptera of the sub-order Orthorrhapha occur in the Lias and Cyclorrhapha in the Kimmeridgian. The order must therefore be ancient, and as no evidence is forthcoming as to the mode of reduction of the hind-wings, nor as to the stages by which the suctorial mouth-organs became specialized, it is difficult to trace the exact relationship of the group, but the presence of cerci and a degree of correspondence in the nervuration of the fore-wings suggest the Mecaptera as possible allies. There seems no doubt that the suctorial mouth-organs of the Diptera have arisen quite independently from those of the Lepidoptera, for in the former order the sucker is formed from the second maxillae, in the latter from the first. The eruciform larva of the Orthorrhapha leads on to the headless vermiform maggot of the Cyclorrhapha, and in the latter sub-order we find metamorphosis carried to its extreme point, the muscid flies being the most highly specialized of all the Hexapoda as regards structure, while their maggots are the most degraded of all insect larvae. The Siphonaptera appear by the form of the larva and the nature of the metamorphosis to be akin to the Orthorrhapha—in which division they have indeed been included by many students. They differ from the Diptera, however, in the general presence of palps to both pairs of maxillae, and in the absence of a hypopharynx, so it is possible that their relationship to the Diptera is less close than has been supposed. The affinities of the Hymenoptera afford another problem of much difficulty. They differ from other Endopterygota in the multiplication of their Malpighian tubes, and from all other Hexapoda in the union of the first abdominal segment with the thorax. Specialized as they are in form, development and habit, they retain mandibles for biting, and in their lower sub-order—the Symphyta—the maxillae are hardly more modified than those of the Orthoptera. From the evidence of fossils it seems that the higher sub-order—Apocrita—can be traced back to the Lias, so that we believe the Hymenoptera to be more ancient than the Diptera, and far more ancient than the Lepidoptera. They afford an example—paralleled in other classes of the animal kingdom—of an order which, though specialized in some respects, retains many primitive characters, and has won its way to dominance rather by perfection of behaviour, and specially by the development of family life and helpful socialism, than by excessive elaboration of structure. We would trace the Hymenoptera back therefore to the primitive endopterygote stock. The specialization of form in the constricted abdomen and in the suctorial “tongue” that characterizes

the higher families of the order is correlated with the habit of careful egg-laying and provision of food for the young. In some way it is assured among the highest of the Hexapoda—the Lepidoptera, Diptera and Hymenoptera—that the larva finds itself amid a rich food-supply. And thus perfection of structure and instinct in the imago has been accompanied by degradation in the larva, and by an increase in the extent of transformation and in the degree of reconstruction before and during the pupal stage. The fascinating difficulties presented to the student by the metamorphosis of the Hexapoda are to some extent explained, as he ponders over the evolution of the class.

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(D. S.*; G. H. C.)

HEXASTYLE (Gr. ἕξ, six, and στῦλος, column), an architectural term given to a temple in the portico of which there are six columns in front.

HEXATEUCH, the name given to the first six books of the Old Testament (the Pentateuch and Joshua), to mark the fact that these form one literary whole, describing the early traditional history of the Israelites from the creation of the world to the conquest of Palestine and the origin of their national institutions. These books are the result of an intricate literary process, on which see Bible (Old Testament: *Canon*), and the articles on the separate books (Genesis, Exodus, Leviticus, Numbers, Deuteronomy and Joshua).

HEXHAM, a market town in the Hexham parliamentary division of Northumberland, England, 21 m. W. from Newcastle by the Carlisle branch of the North-Eastern railway, served also from Scotland by a branch of the North British railway. Pop. of urban district (1901) 7107. It is pleasantly situated beneath the hills on the S. bank of the Tyne, and its market square and narrow streets bear many marks of antiquity. It is famous for its great abbey church of St Andrew. This building, as renovated in the 12th century, was to consist of nave and transepts, choir and aisles, and massive central tower. The Scots are believed to have destroyed the nave in 1296, but it may be doubted if it was ever completed. In 1536 the last prior was hanged for being concerned in the insurrection called the Pilgrimage of Grace. The church as it stands is a fine monument of Early English work, with Transitional details. Within, although it suffered much loss during a restoration *c.* 1858, there are several objects of interest. Among these are a Roman slab, carved with figures of a horseman trampling upon an enemy, several fine tombs and stones of the 13th and 14th centuries, the frith or fridstool of stone, believed to be the original bishop's throne, and the fine Perpendicular roodscreen of oak, retaining its loft. The crypt, discovered in 1726, is part of the Saxon church, and a noteworthy example of architecture of the period. Its material is Roman, some of the stones having Roman inscriptions. These were brought from the Roman settlement at Corbridge, 4 m. E. of Hexham on the N. bank of the Tyne; for Hexham itself was not a Roman station. In 1832 a vessel containing about 8000 Saxon coins was discovered in the churchyard. Fragments of the monastic buildings remain, and west of the churchyard is the monks' park, known as the Seal, and now a promenade, commanding beautiful views. In the town are two strong castellated towers of the 14th century, known as the Moot Hall and the Manor Office. Their names explain their use, but they were doubtless also intended as defensive works. In the interesting and beautiful neighbourhood of Hexham there should be noticed Aydon castle near Corbridge, a fortified house of the late 13th century; and Dilston or Dyvilston, a typical border fortress dating from Norman times, of which only a tower and small chapel remain. It is replete with memories of the last earl of Derwentwater, who was beheaded in 1716 for his part in the Stuart rising of the previous year, and was buried in the chapel. There is an Elizabethan grammar school. Hexham and Newcastle form a Roman Catholic

bishopric, with the cathedral at Newcastle. There are manufactures of leather gloves and other goods, and in the neighbourhood barytes and coal mines and extensive market gardens.

The church and monastery at Hexham (Hextoldesham) were founded about 673 by Wilfrid, archbishop of York, who is said to have received a grant of the whole of Hexhamshire from Æthelhryth, queen of Northumbria, and a grant of sanctuary in his church from the king. The church in 678 became the head of the new see of Bernicia, which was united to that of Lindisfarne about 821, when the bishop of Lindisfarne appears to have taken possession of the lordship which he and his successors held until it was restored to the archbishop of York by Henry II. The archbishops appear to have had almost royal power throughout the liberty, including the rights of trying all pleas of the crown in their court, of taking inquisitions and of taxation. In 1545 the archbishop exchanged Hexhamshire with the king for other property, and in 1572 all the separate privileges which had belonged to him were taken away, and the liberty was annexed to the county of Northumberland. Hexham was a borough by prescription, and governed by a bailiff at least as early as 1276, and the same form of government continued until 1853. In 1343 the men of Hexham were accused of pretending to be Scots and imprisoning many people of Northumberland and Cumberland, killing some and extorting ransoms for others. The Lancastrians were defeated in 1464 near Hexham, and legend says that it was in the woods round the town that Queen Margaret and her son hid until their escape to Flanders. In 1522 the bishop of Carlisle complained to Cardinal Wolsey, then archbishop of York, that the English thieves committed more thefts than “all the Scots of Scotland,” the men of Hexham being worst of all, and appearing 100 strong at the markets held in Hexham, so that the men whom they had robbed dared not complain or “say one word to them.” This state of affairs appears to have continued until the accession of James I., and in 1595 the bailiff and constables of Hexham were removed as being “infected with combination and toleration of thieves.” Hexham was at one time the market town of a large agricultural district. In 1227 a market on Monday and a fair on the vigil and day of St Luke the Evangelist were granted to the archbishop, and in 1320 Archbishop Melton obtained the right of holding two new fairs on the feasts of St James the Apostle lasting five days and of SS. Simon and Jude lasting six days. The market day was altered to Tuesday in 1662, and Sir William Fenwick, then lord of the manor, received a grant of a cattle market on the Tuesday after the feast of St Cuthbert in March and every Tuesday fortnight until the feast of St Martin. The market rights were purchased from Wentworth B. Beaumont, lord of the manor, in 1886. During the 17th and 18th centuries Hexham was noted for the leather trade, especially for the manufacture of gloves, but in the 19th century the trade began to decline. Coal mines which had belonged to the archbishop, were sold to Sir John Fenwick, Kt., in 1628. Hexham has never been represented in parliament, but gives its name to one of the four parliamentary divisions of the county.

See Edward Bateson and A. B. Hinds, *A History of Northumberland* vol. iii. (1893-1896); A. B. Wright, *An Essay towards the History of Hexham* (1823); James Hewitt, *A Handbook to Hexham and its Antiquities* (1879).

HEYDEN, JAN VAN DER (1637-1712), Dutch painter, was born at Gorcum in 1637, and died at Amsterdam on the 12th of September 1712. He was an architectural landscape painter, a contemporary of Hobbema and Jacob Ruysdael, with the advantage, which they lacked, of a certain professional versatility; for, whilst they painted admirable pictures and starved, he varied the practice of art with the study of mechanics, improved the fire engine, and died superintendent of the lighting and director of the firemen’s company at Amsterdam. Till 1672 he painted in partnership with Adrian van der Velde. After Adrian’s death, and probably because of the loss which that event entailed upon him, he accepted the offices to which allusion has just been made. At no period of artistic activity had the system of division of labour been more fully or more constantly applied to art than it was in Holland towards the close of the 17th century. Van der Heyden, who was perfect as an architectural draughtsman in so far as he painted the outside of buildings and thoroughly mastered linear perspective, seldom turned his hand to the delineation of anything but brick houses and churches in streets and squares, or rows along canals, or “moated granges,” common in his native country. He was a travelled man, had seen The Hague, Ghent and Brussels, and had ascended the Rhine past Xanten to Cologne, where he copied over and over again the tower and crane of the great cathedral. But he cared nothing for hill or vale, or stream or wood. He could reproduce the rows of bricks in a square of Dutch houses sparkling in the sun, or stunted trees and lines of dwellings varied by steeples, all in light or thrown into passing shadow by moving cloud. He had the art of painting microscopically without loss of breadth or keeping. But he could draw neither man nor beast, nor ships nor carts; and this was his disadvantage. His good genius under these circumstances was Adrian van der Velde, who enlivened his compositions with spirited figures; and the joint labour of both is a delicate, minute, transparent work, radiant with glow and atmosphere.

HEYLYN (or HEYLIN), **PETER** (1600-1662), English historian and controversialist, was born at Burford in Oxfordshire. Having made great progress in his studies, he entered Hart Hall, Oxford, in 1613, afterwards joining Magdalen College; and in 1618 he began to lecture on cosmography, being made fellow of Magdalen in the same year. His lectures, under the title of Μικρόκοσμος, were published in 1621, and many editions of this useful book, each somewhat enlarged, subsequently appeared. Having been ordained in 1624 Heylyn attracted the notice of William Laud, then bishop of Bath and Wells; and in 1628 he married Laetitia, daughter of Thomas Highgate, or Heygate, of Hayes, Middlesex; but he appears to have kept his marriage secret and did not resign his fellowship. After serving as chaplain to Danby in the Channel Islands, he became chaplain to Charles I. in 1630, and was appointed by the king to the rectory of Hemingford, Huntingdonshire. John Williams, bishop of Lincoln, however, refused to institute Heylyn to this living, owing to his friendship with Laud; and in return Charles appointed him a prebendary of Westminster, where he made himself very objectionable to Williams, who held the deanery *in commendam*. In 1633 he became rector of Alresford, soon afterwards vicar of South Warnborough, and he became treasurer of Westminster Abbey in 1637; but before this date he was widely known as one of the most prominent and able controversialists among the high-church party. Entering with great ardour into the religious controversies of the time he disputed with John Prideaux, regius professor of divinity at Oxford, replied to the arguments of Williams in his pamphlets, “A Coal from the Altar” and “Antidotum Lincolnense,” and was hostile to the Puritan element both within and without the Church of England. He assisted William Noy to prepare the case against Prynne for the publication of his *Histriomastix*, and made himself useful to the Royalist party in other ways. However, when the Long Parliament met he was allowed to retire to Alresford, where he remained until he was disturbed by Sir William Waller’s army in 1642, when he joined the king at Oxford. At Oxford Heylyn edited *Mercurius Aulicus*, a vivacious but virulent news-sheet, which greatly annoyed the Parliamentarians; and consequently his house at Alresford was plundered and his library dispersed. Subsequently he led for some years a wandering life of poverty, afterwards settling at Winchester and then at Minster Lovel in Oxfordshire; and he refers to his hardships in his pamphlet “Extraneus Vapulans,” the cleverest of his controversial writings, which was written in answer to Hamon l’Estrange. In 1653 he settled at Lacy’s Court, Abingdon, where he resided undisturbed by the government of the Commonwealth, and where he wrote several books and pamphlets, both against those of his own communion, like Thomas Fuller, whose opinions were less unyielding than his own, and against the Presbyterians and others, like Richard Baxter.

His works, all of which are marred by political or theological rancour, number over fifty. Among the most important are: a legendary and learned *History of St. George of Cappadocia*, written in 1631; *Cyprianus Anglicus, or the history of the Life and Death of William Laud*, a defence of Laud and a valuable authority for his life; *Ecclesia restaurata, or the History of the Reformation of the Church of England* (1661; ed. J. C. Robertson, Cambridge, 1849); *Ecclesia vindicata, or the Church of England justified*; *Aërius redivivus, or History of the Presbyterians*; and *Help to English History*, an edition of which, with additions by P. Wright, was published in 1773. In 1636 he wrote a *History of the Sabbath*, by order of Charles I. to answer the Puritans; and in consequence of a journey through France in 1625 he wrote *A Survey of France*, a work, frequently reprinted, which was termed by Southey “one of the liveliest books of travel in its lighter parts, and one of the wisest and most replete with information that was ever written by a young man.” Some verses of merit also came from his active pen, and his poetical memorial of William of Waynflete was published by the Caxton Society in 1851.

Heylyn was a diligent writer and investigator, a good ecclesiastical lawyer, and had always learning at his command. His principles, to which he was honestly attached, were defended with ability; but his efforts to uphold the church passed unrecognized at the Restoration, probably owing to his physical infirmities. His sight had been very bad for several years; yet he rejoiced that his “bad old eyes” had seen the king’s return, and upon this event he preached before a large audience in Westminster Abbey on the 29th of May 1661. He died on the 8th of May 1662 and was buried in Westminster Abbey, where he had been sub-dean for some years.

Lives of Heylyn were written by his son-in-law Dr John Barnard or Bernard, and by George Vernon (1682). Bernard’s work was reprinted with Robertson’s edition of Heylyn’s *History of the Reformation* in 1849.

HEYN, PIETER PIETERZOON [commonly abbreviated to PIET] (1578-1629), Dutch admiral, was born at Delfshaven in 1578, the son of Pieter Hein, who was engaged in the herring fishery. The son went early to sea. In his youth he was taken prisoner by the Spaniards, and was forced to row in the galleys during four years. Having recovered his freedom by an exchange of prisoners, he worked for several years as a merchant skipper with success. The then dangerous state of the seas at all times, and the continuous war with Spain, gave him ample opportunity to gain a reputation as a resolute fighting man. Wills which he made before 1623 show that he had been able to acquire considerable

property. When the Dutch West India Company was formed he was Director on the Rotterdam Board, and in 1624 he served as second in command of the fleet which took San Salvador in Bahia de Todos os Santos in Brazil. Till 1628 he continued to serve the Company, both on the coast of Brazil, and in the West Indies. In the month of September of that year he made himself famous, gained immense advantage for the Company, and inflicted ruinous loss on the Spaniards, by the capture of the fleet which was bringing the bullion from the American mines home to Spain. The Spanish ships were outnumbered chiefly because the convoy had become scattered by bad management and bad seamanship. The more valuable part of it, consisting of the four galleons, and eleven trading ships in which the king's share of the treasure was being carried, became separated from the rest, and on being chased by the superior force of Heyn endeavoured to take refuge at Matanzas in the island of Cuba, hoping to be able to land the bullion in the bush before the Dutchman could come up with them. But Juan de Benavides, the Spanish commander, failed to act with decision, was overtaken, and his ships captured in the harbour before the silver could be discharged. The total loss was estimated by the Spaniards at four millions of ducats. Piet Heyn now returned home, and bought himself a house at Delft with the intention of retiring from the sea. In the following year, however, he was chosen at a crisis to take command of the naval force of the Republic, with the rank of Lieutenant-Admiral of Holland, in order to clear the North Sea and Channel of the Dunkirkers, who acted for the king of Spain in his possessions in the Netherlands. In June of 1629 he brought the Dunkirkers to action, and they were severely beaten, but Piet Heyn did not live to enjoy his victory. He was struck early in the battle by a cannon shot on the shoulder and fell dead on the spot. His memory has been preserved by his capture of the Treasure Galleons, which had never been taken so far, but he is also the traditional representative of the Dutch "sea dogs" of the 17th century.

See de Jonge, *Geschiedenis van het Nederlandsche Zeewezen*; I. Duro, *Armada espanola*, iv.; der Aa, *Biograph. Woordenboek der Nederlanden*.

(D. H.)

HEYNE, CHRISTIAN GOTTLOB (1729-1812), German classical scholar and archaeologist, was born on the 25th of September 1729, at Chemnitz in Saxony. His father was a poor weaver, and the expenses of his early education were paid by one of his godfathers. In 1748 he entered the university of Leipzig, where he was frequently in want of the necessaries of life. His distress had almost amounted to despair, when he procured the situation of tutor in the family of a French merchant in Leipzig, which enabled him to continue his studies. After he had completed his university course, he was for many years in very straitened circumstances. An elegy written by him in Latin on the death of a friend attracted the attention of Count von Brühl, the prime minister, who expressed a desire to see the author. Accordingly, in April 1752, Heyne journeyed to Dresden, believing that his fortune was made. He was well received, promised a secretaryship and a good salary, but nothing came of it. Another period of want followed, and it was only by persistent solicitation that Heyne was able to obtain the post of under-clerk in the count's library, with a salary of somewhat less than twenty pounds sterling. He increased his scanty pittance by translation; in addition to some French novels, he rendered into German the *Chaereas and Callirrhoe* of Chariton, the Greek romance writer. He published his first edition of *Tibullus* in 1755, and in 1756 his *Epictetus*. In the latter year the Seven Years' War broke out, and Heyne was once more in a state of destitution. In 1757 he was offered a tutorship in the household of Frau Von Schönberg, where he met his future wife. In January 1759 he accompanied his pupil to the university of Wittenberg, from which he was driven in 1760 by the Prussian cannon. The bombardment of Dresden (to which city he had meanwhile returned) on the 18th of July 1760, destroyed all his possessions, including an almost finished edition of Lucian, based on a valuable codex of the Dresden Library. In the summer of 1761, although still without any fixed income, he married, and for some time he found it necessary to devote himself to the duties of land-steward to the Baron von Löben in Lusatia. At the end of 1762, however, he was enabled to return to Dresden, where he was commissioned by P. D. Lippert to prepare the Latin text of the third volume of his *Dactyliotheca* (an account of a collection of gems). On the death of Johann Matthias Gesner at Göttingen in 1761, the vacant chair was refused first by Ernesti and then by Ruhnken, who persuaded Münchhausen, the Hanoverian minister and principal curator of the university, to bestow it on Heyne (1763). His emoluments were gradually augmented, and his growing celebrity brought him most advantageous offers from other German governments, which he persistently refused. After a long and useful career, he died on the 14th of July 1812. Unlike Gottfried Hermann, Heyne regarded the study of grammar and language only as the means to an end, not as the chief object of philology. But, although not a critical scholar, he was the first to attempt a scientific treatment of Greek mythology, and he gave an undoubted impulse to philological studies.

Of Heyne's numerous writings, the following may be mentioned. Editions, with copious commentaries, of Tibullus (ed. E. C. Wunderlich, 1817), Virgil (ed. G. P. Wagner, 1830-1841), Pindar (3rd ed. by G. H. Schäfer, 1817), Apollodorus, *Bibliotheca Graeca* (1803), Homer, *Iliad* (1802);

Opuscula academica (1785-1812), containing more than a hundred academical dissertations, of which the most valuable are those relating to the colonies of Greece and the antiquities of Etruscan art and history. His *Antiquarische Aufsätze* (1778-1779) is a valuable collection of essays connected with the history of ancient art. His contributions to the *Göttingische gelehrte Anzeigen* are said to have been between 7000 and 8000 in number. See biography by A. H. Heeren (1813) which forms the basis of the interesting essay by Carlyle (*Misc. Essays*, ii.); H. Sauppe, *Göttinger Professoren* (1872); C. Bursian in *Allgemeine deutsche Biographie*, xii.; J. E. Sandys, *Hist. Class. Schol.* iii. 36-44.

HEYSE, PAUL JOHANN LUDWIG (1830-), German novelist, dramatist and poet, was born at Berlin on the 15th of March 1830, the son of the distinguished philologist Karl Wilhelm Ludwig Heyse (1797-1855). After attending the Friedrich Wilhelm Gymnasium in Berlin, he went, in 1849, to Bonn University as a student of the Romance languages, and in 1852 took his doctor's degree. He had already given proof of great literary ability in the production in 1850 of *Der Jungbrunnen, Märchen eines fahrenden Schülers* and of the tragedy *Francesca von Rimini*, when after a year's stay in Italy, he was summoned, early in 1854, by King Maximilian II. to Munich, where he subsequently lived. Here he turned his attention to novel-writing. He published at Munich in 1855 four short stories in one volume, one of which, at least, *L'Arrabbiata*, was a masterpiece of its kind. These were the precursors of a series of similar volumes, necessarily unequal at times, but on the whole constituting such a mass of highly complex miniature fiction as seldom before had proceeded from the pen of a single writer. Heyse works in the spirit of a sculptor; he seizes upon some picturesque incident or situation, and chisels and polishes until all the effect which it is capable of producing has been extracted from it. The success of the story usually depends upon the theme, for the artist's skill is generally much the same, and the situation usually leaves a deeper impression than the characters. Heyse is also the author of several novels on a larger scale, all of which have gained success and provoked abundant discussion. The more important are *Kinder der Welt* (1873), *Im Paradiese* (1875)—the one dealing with the religious and social problems of its time, the other with artist-life in Munich—*Der Roman der Stiftsdame* (1888), and *Merlin* (1892), a novel directed against the modern realistic movement of which Heyse had been the leading opponent in Germany. He has also been a prolific dramatist, but his plays are deficient in theatrical qualities and are rarely seen on the stage. Among the best of them are *Die Sabinerinnen* (1859); *Hans Lange* (1866), *Kolberg* (1868), *Die Weisheit Salomos* (1886), and *Maria von Magdala* (1903). There are masterly translations by him of Leopardi, Giusti, and other Italian poets (*Italienische Dichter seit der Mitte des 18ten Jahrhundert*) (4 vols., 1889-1890).

Heyse's *Gesammelte Werke* appeared in 29 vols. (1897-1899); there is also a popular edition of his *Romane* (8 vols., 1902-1904) and *Novellen* (10 vols., 1904-1906). See his autobiography, *Jugenderinnerungen und Bekenntnisse* (1901); also O. Kraus, *Paul Heyses Novellen und Romane* (1888); E. Petzet, *Paul Heyse als Dramatiker* (1904), and the essays by T. Ziegler (in *Studien und Studienköpfe*, 1877), and G. Brandes (in *Moderne Geister*, 1887).

HEYSHAM, a seaport in the Lancaster parliamentary division of Lancashire, England, on the south shore of Morecambe Bay, served by the Midland railway. Pop. (1901) 3381. Under powers obtained from parliament in 1896, the Midland Railway Company constructed, and opened in 1904, a harbour, enclosed by breakwaters, for the development of traffic with Belfast and other Irish ports, a daily passenger-service of the first class being established to Belfast. The harbour has a depth at low tide of 17 ft., and extensive accommodation for live-stock and goods of all kinds is provided. Heysham is in some favour as a watering-place. The church of St Peter is mainly Norman, and has fragments of even earlier date. Ruins of a very ancient oratory stand near it. This was dedicated to St Patrick, and is traditionally said to have been erected as a place of prayer for those at sea.

HEYWOOD, JOHN (b. 1497), English dramatist and epigrammatist, is generally said to have been a native of North Mimms, near St Albans, Hertfordshire, though Bale says he was born in London. A letter from a John Heywood, who may fairly be identified with him, is dated from Malines in 1575, when he called himself an old man of seventy-eight, which would fix his birth in 1497. He was a chorister of the Chapel Royal, and is said to have been educated at Broadgates Hall (Pembroke

College), Oxford. From 1521 onwards his name appears in the king's accounts as the recipient of an annuity of ten marks as player of the virginals, and in 1538 he received forty shillings for "playing an interlude with his children" before the Princess Mary. He is said to have owed his introduction to her to Sir Thomas More, at whose seat at Gobions near St Albans he wrote his Epigrams, according to Henry Peacham. More took a keen interest in the drama, and is represented by tradition as stepping on to the stage and taking an impromptu part in the dialogue. William Rastell, the printer of four of Heywood's plays, was the son of More's brother-in-law, John Rastell, who organized dramatic representations, and possibly wrote plays himself. Mr A. W. Pollard sees in Heywood's firm adherence to Catholicism and his free satire of legal and social abuses a reflection of the ideas of More and his friends, which counts for much in his dramatic development. His skill in music and his inexhaustible wit made him a favourite both with Henry VIII. and Mary. Under Edward VI. he was accused of denying the king's supremacy over the church, and had to make a public recantation in 1554; but with the accession of Mary his prospects brightened. He made a Latin speech to her in St Paul's Churchyard at her coronation, and wrote a poem to celebrate her marriage. Shortly before her death she granted him the lease of a manor and lands in Yorkshire. When Elizabeth succeeded to the throne he fled to Malines, and is said to have returned in 1577. In 1587 he is spoken of as "dead and gone" in Thomas Newton's epilogue to his works.

John Heywood is important in the history of English drama as the first writer to turn the abstract characters of the morality plays into real persons. His interludes link the morality plays to the modern drama, and were very popular in their day. They represent ludicrous incidents of a homely kind in a style of the broadest farce, and approximate to the French dramatic renderings of the subjects of the *fabliaux*. The fun in them still survives in spite of the long arguments between the characters and what one of their editors calls his "humour of filth." Heywood's name was actually attached to four interludes. *The Playe called the foure PP; a newe and a very mery interlude of a palmer, a pardoner, a potycary, a pedler* (not dated) is a contest in lying, easily won by Palmer, who said he had never known a woman out of patience. *The Play of the Wether, a new and a very mery interlude of all maner of Wethers* (printed 1533) describes the chaotic results of Jupiter's attempts to suit the weather to the desires of a number of different people. *The Play of Love* (printed 1533) is an extreme instance of the author's love of wire-drawn argument. It is a double dispute between "Loving not Loved" and "Loved not Loving" as to which is the more wretched, and between "Both Loved and Loving" and "Neither Loving nor Loved" to decide which is the happier. The only action in this piece is indicated by the stage direction marking the entrance of "Neither loved nor loving," who is to run about the audience with a huge copper tank on his head full of lighted squibs, and is to cry "Water, water! Fire, fire!" *The Dialogue of Wit and Folly* is more of an academic dispute than a play. But two pieces universally assigned to Heywood, although they were printed by Rastell without any author's name, combine action with dialogue, and are much more dramatic. In *The Mery Play between the Pardoner and the Frere, the Curate and Neybour Pratte* (printed 1533, but probably written much earlier) the Pardoner and the Friar both try to preach at the same time, and, coming at last to blows, are separated by the other two personages of the piece. The *Mery Play betwene Johan Johan the Husbande, Tyb the Wyfe, and Syr Jhan the Preest* (printed 1533) is the best constructed of all his pieces. Tyb and Syr Jhan eat the "Pye" which is the central "property" of the piece, while Johan Johan is made to chafe wax at the fire to stop a hole in a pail. This incident occurs in a French *Farce nouvelle très bonne et fort joyeuse de Pernet qui va au vin*. Heywood has sometimes been credited with the authorship of the dialogue of *Gentylnes and Nobylyte* printed by Rastell without date, and Mr Pollard adduces some ground for attributing to him the anonymous *New Enterlude called Thersytes* (played 1538). Heywood's other works are a collection of proverbs and epigrams, the earliest extant edition of which is dated 1562; some ballads, one of them being the "Willow Garland," known to Desdemona; and a long verse allegory of over 7000 lines entitled *The Spider and the Flie* (1556). A contemporary writer in Holinshed's *Chronicle* said that neither its author nor any one else could "reach unto the meaning thereof." But the flies are generally taken to represent the Roman Catholics and the spiders the Protestants, while Queen Mary is represented by the housemaid who with her broom (the sword) executes the commands of her master (Christ) and her mistress (the church). Dr A. W. Ward speaks of its "general lucidity and relative variety of treatment." Heywood says that he laid it aside for twenty years before he finished it, and, whatever may be the final interpretation put upon it, it contains a very energetic statement of the social evils of the time, and especially of the deficiencies of English law.

The proverbs and epigrams were reprinted by the Spenser Society in 1867, the *Dialogue on Wit and Folly* by the Percy Society from an MS. in the British Museum in 1846, with an account of Heywood by F. W. Fairholt, and there are modern reprints of *Johan Johan* (Chiswick Press, 1819), *The Foure PP*. (Dodsley's *Old Plays*, 1825, 1874), and *The Pardoner and the Frere* (Dodsley's *Old Plays*, 1874). *The Spider and the Flie* was edited by A. W. Ward for the Spenser Society in 1894. For notes and strictures on that edition see J. Haber in *Litterärhistorische Forschungen*, vol. xv. (1900). See also A. W. Pollard's introduction to the reprint of the *Play of the Wether* and *Johan Johan in Representative English Comedies* (1903), and *The Dramatic Writings of John Heywood*, edited by John S. Farmer for the Early English Drama Society (1905).

His son, Jasper Heywood (1535-1598), who translated into English three plays of Seneca, the *Troas* (1559), the *Thyestes* (1560) and *Hercules Furens* (1561), was a fellow of Merton College, Oxford, but was compelled to resign from that society in 1558. In the same year he was elected a fellow of All Souls College, but, refusing to conform to the changes in religion at the beginning of the reign of

Elizabeth, he gave up his fellowship and went to Rome, where he was received into the Society of Jesus. For seventeen years he was professor of moral theology and controversy in the Jesuit College at Dillingen, Bavaria. In 1581 he was sent to England as superior of the Jesuit mission, but his leniency in that position led to his recall. He was on his way back to the Continent when a violent storm drove him back to the English coast. He was arrested on the charge of being a priest, but, although extraordinary efforts were made to induce him to abjure his opinions, he remained firm. He was condemned to perpetual exile on pain of death, and died at Naples on the 9th of January 1598. His translations of Seneca were supplemented by other plays contributed by Alexander Neville, Thomas Nuce, John Studley and Thomas Newton. Newton collected these translations in one volume, *Seneca, his tenne tragedies translated into Englysh* (1581). The importance of this work in the development of English drama can hardly be over-estimated.

See Dr J. W. Cunliffe, *On the Influence of Seneca upon Elizabethan Tragedy* (1893).

HEYWOOD, THOMAS (d. *c.* 1650), English dramatist and miscellaneous author, was a native of Lincolnshire, born about 1575, and said to have been educated at Cambridge and to have become a fellow of Peterhouse. Heywood is mentioned by Philip Henslowe as having written a book or play for the Lord Admiral's company of actors in October 1596; and in 1598 he was regularly engaged as a player in the company, in which he presumably had a share, as no wages are mentioned. He was also a member of other companies, of Lord Southampton's, of the earl of Derby's and of the earl of Worcester's players, afterwards known as the Queen's Servants. In his preface to the *English Traveller* (1633) he describes himself as having had "an entire hand or at least a main finger in two hundred and twenty plays." Of this number, probably considerably increased before the close of his dramatic career, only twenty-three survive. He wrote for the stage, not for the press, and protested against the printing of his works, which he said he had no time to revise. He was, said Tieck, the "model of a light and rapid talent," and his plays, as might be expected from his rate of production, bear little trace of artistic elaboration. Charles Lamb called him a "prose Shakespeare"; Professor Ward, one of Heywood's most sympathetic editors, points out that this epigrammatic statement can only be accepted with reservations. Heywood had a keen eye for dramatic situations and great constructive skill, but his powers of characterization were not on a par with his stagecraft. He delighted in what he called "merry accidents," that is, in coarse, broad farce; his fancy and invention were inexhaustible. It was in the domestic drama of sentiment that he won his most distinctive success. For this he was especially fitted by his genuine tenderness and his freedom from affectation, by the sweetness and gentleness for which Lamb praised him. His masterpiece, *A Woman kilde with kindnesse* (acted 1603; printed 1607), is a type of the *comédie larmoyante*, and *The English Traveller* (1633) is a domestic tragedy scarcely inferior to it in pathos and in the elevation of its moral tone. His first play was probably *The Foure Prentises of London: With the Conquest of Jerusalem* (printed 1615, but acted some fifteen years earlier). This may have been intended as a burlesque of the old romances, but it is more likely that it was meant seriously to attract the apprentice public to whom it was dedicated, and its popularity was no doubt aimed at in Beaumont and Fletcher's travesty of the City taste in drama in their *Knight of the Burning Pestle*. The two parts of *King Edward the Fourth* (printed 1600), and of *If you know not me, you know no bodie; Or, The Troubles of Queene Elizabeth* (1605 and 1606) are chronicle histories. His other comedies include: *The Royall King, and the Loyall subject* (acted *c.* 1600; printed 1637); the two parts of *The Fair Maid of the West; Or, A Girle worth Gold* (two parts, printed 1631); *The Fayre Maid of the Exchange* (printed anonymously 1607); *The Late Lancashire Witches* (1634), written with Richard Brome, and prompted by an actual trial in the preceding year; *A Pleasant Comedy, called A Mayden-Head well lost* (1634); *A Challenge for Beautie* (1636); *The Wise-Woman of Hogsdon* (printed 1638), the witchcraft in this case being matter for comedy, not seriously treated as in the Lancashire play; and *Fortune by Land and Sea* (printed 1655), with William Rowley. The five plays called respectively *The Golden*, *The Silver*, *The Brazen* and *The Iron Age* (the last in two parts), dated 1611, 1613, 1613, 1632, are series of classical stories strung together with no particular connexion except that "old Homer" introduces the performers of each act in turn. *Loves Maistresse; Or, The Queens Masque* (printed 1636) is on the story of Cupid and Psyche as told by Apuleius; and the tragedy of the *Rape of Lucrece* (1608) is varied by a "merry lord," Valerius, who lightens the gloom of the situation by singing comic songs. A series of pageants, most of them devised for the City of London, or its guilds, by Heywood, were printed in 1637. In vol. iv. of his *Collection of Old English Plays* (1885), Mr A. H. Bullen printed for the first time a comedy by Heywood, *The Captives, or The Lost Recovered* (licensed 1624), and in vol. ii. of the same series, *Dicke of Devonshire*, which he tentatively assigns to the same hand.

Besides his dramatic works, twelve of which were reprinted by the "Shakespeare Society," and were published by Mr John Pearson in a complete edition of six vols. with notes and illustrations in 1874, he was the author of *Troia Britannica, or Great Britain's Troy* (1609), a poem in seventeen cantos "intermixed with many pleasant poetical tales" and "concluding with an universal chronicle from the creation until the present time"; *An Apology for Actors, containing three brief treatises*

(1612) edited for the Shakespeare Society in 1841; Γυναικεῖον *or nine books of various history concerning women* (1624); *England's Elizabeth, her Life and Troubles during her minority from the Cradle to the Crown* (1631); *The Hierarchy of the Blessed Angels* (1635), a didactic poem in nine books; *Pleasant Dialogue, and Dramas selected out of Lucian*, &c. (1637; ed. W. Bang, Louvain, 1903); and *The Life of Merlin surnamed Ambrosius* (1641).

See A. W. Ward, *History of English Dram. Lit.* ii. 550 seq. (1899); the same author's Introduction to *A woman killed with kindness* ("Temple Dramatists," 1897); J. A. Symonds in the Introduction to *Thomas Heywood* in the "Mermaid" series (new issue, 1903).

HEYWOOD, a municipal borough in the Heywood parliamentary division of Lancashire, England, 9 m. N. of Manchester on the Lancashire and Yorkshire railway. Pop. (1901) 25,458. It is of modern growth and possesses several handsome churches, chapels and public buildings. The Queen's Park, purchased and laid out at a cost of £11,000 with money which devolved to Queen Victoria in right of her duchy and county palatine of Lancaster, was opened in 1879. Heywood Hall in the neighbourhood of the town was the residence of Peter Heywood, who contributed to the discovery of the Gunpowder Plot. Heywood owes its rise to the enterprise of the Peels, its first manufactures having been introduced by the father of the first Sir Robert Peel. It is an important seat of the cotton manufacture, and there are power-loom factories, iron foundries, chemical works, boiler-works and railway wagon works. Coal is worked extensively in the neighbourhood. Heywood was incorporated in 1881, and the corporation consists of a mayor, 6 aldermen and 18 councillors. Area, 3660 acres.

HEZEKIAH (Heb. for "[my] strength is [of] Yah"), in the Bible son of Ahaz, one of the greatest of the kings of Judah. He flourished at the end of the 8th and beginning of the 7th century B.C., when Palestine passed through one of the most eventful periods of its history. There is much that is uncertain in his reign, and with the exception of the great crisis of 701 B.C. its chronology has not been unanimously fixed. Whether he came to the throne before or after the fall of Samaria (722-721 B.C.) is disputed,[1] nor is it clear what share Judah took in the Assyrian conflicts down to 701.[2] Shortly before this date the whole of western Asia was in a ferment; Sargon had died and Sennacherib had come to the throne (in 705); vassal kings plotted to recover their independence and Assyrian puppets were removed by their opponents. Judah was in touch with a general rising in S.W. Palestine, in which Ekron, Lachish, Ascalon (Ashkelon) and other towns of the Philistines were supported by the kings of Muṣri and Meluḫḫa.[3] Sennacherib completely routed them at Eltekeh (a Danite city), and thence turned against Hezekiah, who had been in league with Ekron and had imprisoned its king Padi, an Assyrian vassal. In this invasion of Judah the Assyrian claims entire success; 46 towns of Judah were captured, 200,150 men and many herds of cattle were carried off among the spoil, and Jerusalem itself was closely invested. Hezekiah was imprisoned "like a bird in a cage"[4]—to quote Sennacherib, and the Urbi (Arabian?) troops in Jerusalem laid down their arms. Thirty talents of gold, eight hundred of silver, precious stones, couches and seats of ivory—"all kinds of valuable treasure",—the ladies of the court, male and female attendants (perhaps "singers") were carried away to Nineveh. Here the Assyrian record ends somewhat abruptly, for, in the meanwhile, Babylonia had again revolted (700 B.C.) and Sennacherib's presence was urgently needed nearer home.

At what precise period the Babylonian Merodach (*i.e.* Marduk)-Baladan sent his embassy to Hezekiah is disputed. Although ostensibly to congratulate the king upon his recovery from a sickness, it was really sent in the hope of enlisting his support, and the excessive courtesy and complaisance with which it was received suggest that it found a ready ally in Judah (2 Kings xx. 12 sqq.; Isa. xxxix.). Merodach-Baladan was overthrown by Sargon in 710 B.C., but succeeded in making a fresh revolt some years later (704-703 B.C.), and opinion is much divided whether his embassy was to secure the friendship of the youthful Hezekiah at his succession or is to be associated with the later widespread attempt to remove the Assyrian yoke.[5]

The brief account of the Assyrian invasion, Hezekiah's submission, and the payment of tribute in 2 Kings xviii. 14-16, supplements the Assyrian record by the statement that Sennacherib besieged Lachish, a fact which is confirmed by a bas-relief (now in the British Museum) depicting the king in the act of besieging that town.[6] This thoroughly historical fragment is followed by two narratives which tell how the king sent an official from Lachish to demand the submission of Hezekiah and conclude with the unexpected deliverance of Jerusalem. Both these stories appear to belong to a biography of Isaiah, and, like the similar biographies of Elijah and Elisha, are open to the suspicion that historical facts have been subordinated to idealize the work of the prophet. See Kings, Books of.

The narratives are (*a*) 2 Kings xviii. 13, 17-xix. 8; cf. Isa. xxxvi. 1-xxxvii. 8, and (*b*) xix. 9b-35; cp. Isa. xxxvii. 9-36 (2 Chron. xxxii. 9 sqq. is based on both), and Jerusalem's deliverance is attributed to a certain rumour (xix. 7), to the advance of Tirhakah, king of Ethiopia (*v.* 9), and to a remarkable pestilence (*v.* 35) which finds an echo in a famous story related, not without some confusion of essential facts, by Herodotus (ii. 141; cf. Josephus *Antiq.* x. i. 5).[7] It is difficult to decide whether xix. 9*a* belongs to the first or second of these narratives; and whether the "rumour" refers to the approach of Tirhakah, or rather to the serious troubles which had arisen in Babylonia. It is equally difficult to determine whether Tirhakah actually appeared on the scene in 701, and the precise application of the term Muṣri (Mizraim) is much debated. Unless the two narratives are duplicates of the same event, it may be urged that Sennacherib's attack upon Arabia (apparently about 689) involved an invasion of Judah, by which time Egypt was in a position to be of material assistance (cf. Isa. xxx. 1-5, xxxi. 1-3?). This theory of a second campaign (first suggested by Sir Henry Rawlinson) has been contested, although it is pointed out that Sennacherib at all events did not invade Egypt, and that 2 Kings xix. 24 (Isa. xxxvii. 25) can only refer to his successor. The allusion to the murder of Sennacherib (xix. 36 sq.)[8] points to the year 681, but it is uncertain to which of the above narratives it belongs. On the whole, the question must be left open, and with it both the problem of the extension of the name Muṣri and Mizraim outside Egypt in the Assyrian and Hebrew records of this period and the true historical background of a number of the Isaianic prophecies. It is quite possible that later events which belong to the time of the Egyptian supremacy and the wars of Esarhaddon have been confused with the history of Sennacherib's invasion.

It is not certain whether Hezekiah's conflict with the Philistines as far as Gaza or his preparations to secure for Jerusalem a good water supply (xviii. 8, xx. 20; 2 Chron. xxxii. 30; Ecclus. xlviii. 17 sq.)[9] should precede or follow the events which have been discussed. On the other hand, the reforms which the compiler of the book has attributed to the early part of the reign were doubtless much later (2 Kings xviii. 1-8). Not the fall of Samaria, but the crisis of 701, is the earliest date that could safely be chosen, and the extent of these reforms must not be overestimated. They are related in terms that imply an acquaintance with the great "Deuteronomic" movement (see Deuteronomy), and are magnified further with characteristic detail by the chronicler (2 Chron. xxix.-xxxi.). The most remarkable was the destruction of a brazen serpent, the cult of which was traditionally traced back to the time of Moses (Num. xxi. 9).[10] This persistence of serpent-cult, and the idolatry (necromancy, tree-worship) which the contemporary prophets denounce, do not support the view that the apparently radical reforms of Hezekiah were extensive or permanent, and Jer. xxvi. 17-19 (which suggests that Micah had a greater influence than Isaiah) throws another light upon the conditions during his reign. Hezekiah was succeeded by his son Manasseh (*q.v.*).

See further W. R. Smith, *Prophets*, 359-364, and Hebrew Religion. According to Prov. xxv. 1, Hezekiah was a patron of literature (see Proverbs). The hymn which is ascribed to the king (Isa. xxxviii. 9-20, wanting in 2 Kings) is of post-exilic origin (see Cheyne, *Introd. to Isaiah*, 222 sq.), but is further proof of the manner in which the Judaean king was idealized in subsequent ages, partly, perhaps, in the belief that the deliverance of Jerusalem was the reward for his piety. For special discussions, see Stade, *Zeits. d. alttest. Wissenschaft*, 1886, pp. 173 sqq.; Winckler, *Alttest. Untersuch.*, 26 sqq.; Schrader, *Cuneiform Inscr. and Old Test.* (on 2 Kings, *l.c.*); Driver, *Isaiah, his Life and Times*, pp. 43-83; A. Jeremias, *Alte Test.* 304-310; Nagel, *Zug d. Sanherib gegen Jerus.* (Leipzig, 1903, conservative); and especially Prášek, Sanherib's "Feldzüge gegen Juda" (*Mitteil. d. Vorderasiat. Gesell.*, 1903, pp. 113-158), K. Fullerton, *Bibliotheca sacra*, 1906, pp. 577-634, A. Alt, *Israel u. Ägypten* (Leipzig, 1909); also the bibliography to Isaiah.

(S. A. C.)

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1 See W. R. Smith, Prophets of Israel,[2] 415 sqq.; O. C. Whitehouse, *Isaiah*, pp. 20 sqq., 372; J. Skinner, *Kings*, p. 43 seq.; T. K. Cheyne, *Ency. Bib.* col. 2058, n. 1, and references.

2 The chief dates are: 720, defeat of a coalition (Hamath, Gaza and Muṣri) at Ḳarḳar in north Syria and Raphia (S. Palestine); 715, a rising of Muṣri and Arabian tribes; 713-711, revolt and capture of Ashdod (cp. Is. xx.). That Judah was invaded on this latter occasion is not improbable.

3 Meluḥḥa is held by many critics to be N.W. Arabia; the identification of Muṣri is uncertain, see below.

4 The phrase was a favourite one of Rib-Addi, king of Gebal (Byblus), in the 15th century B.C.; *Tell-el-Amarna Letters* (ed. Knudtzon), Nos. 74, 79, &c. Jeremiah (v. 27) uses the simile in a different way. For a discussion of Sennacherib's record, see Wilke, *Jesaja u. Assur* (Leipzig, 1905), pp. 97 sqq.

5 For the early date (between 720 and 710), Winckler, *Alttest. Unt.* 139 sqq., Burney, *Kings*, 350 sq.; Driver; Küchler, &c.; for the later, Whitehouse, *Isaiah*, 29 sq., in agreement with Schrader, Wellhausen, W. R. Smith, Cheyne, M'Curdy, Paton, &c.

6 Isa. x. 28-32 may perhaps refer to this invasion. Allusions to the Assyrian oppression are found in Isa. x. 5-15, xiv. 24-27, xvii. 12-14; and to internal Judaean intrigues perhaps in Isa. xxii. 15-18, xxix. 15. For a picture of the ruins in Jerusalem, see Isa. xxii. 9-11. But see further Isaiah (Book).

7 See, on the story, Griffith, in D. Hogarth's *Authority and Archaeology*, p. 167, n. 1.

8 The house of *Nisroch* should probably be that of the god *Nusku*; see also Driver in Hogarth, *op. cit.* p. 109; Winckler, *op. cit.* p. 84.

9 It is commonly believed that Hezekiah constructed the conduit of Siloam, famous for its Hebrew inscription (see Inscriptions, Jerusalem). But Isa. viii. 6, would seem to show that the pool was already in existence, and, for palaeographical details, see *Pal. Explor. Fund, Quart. Stat.* (1909), pp. 289, 305 sqq.

10 The name Nehushtan (2 Kings xviii. 4, cp. *nāhāsh*, “serpent”) is obscure: see the commentaries.

HIATUS (Lat. for gaping, or gap), a break in continuity, whether in speech, thought or events, a lacuna. In anatomy the term is used for an opening or foramen, as the *hiatus Fallopii*, a foramen of the temporal bone. In logic a hiatus occurs when a step or link in reasoning is wanting; and in grammar it is the pause made for the sake of euphony in pronouncing two successive vowels, which are not separated by a consonant.

HIAWATHA (“he makes rivers”), a legendary chief (*c*. 1450) of the Onondaga tribe of North American Indians. The formation of the League of Six Nations, known as the Iroquois, is attributed to him by Indian tradition. In his miraculous character Hiawatha is the incarnation of human progress and civilization. He teaches agriculture, navigation, medicine and the arts, conquering by his magic all the powers of nature which war against man.

See J. N. B. Hewitt, in *Amer. Anthrop*. for April 1892.

HIBBING, a village of St Louis county, Minnesota, U.S.A., 75 m. N.W. of Duluth. Pop. (1900) 2481; (1905 state census) 6566, of whom 3537 were foreign-born (1169 Finns, 516 Swedes, 498 Canadians, 323 Austrians and 314 Norwegians); (1910) 8832. Hibbing is served by the Great Northern and the Duluth, Missabe & Northern railways. It lies in the midst of the great Mesabi iron-ore deposits of the state; in 1907 forty iron mines were in operation within 10 m. of the village. Lumbering and farming are also important industries. The village owns and operates the water-works and electric-lighting plant. Hibbing was settled in 1892 and was incorporated in 1893.

HIBERNACULUM (Lat. for winter quarters), in botany a term for a winter bud; in botanic gardens, the winter quarters for plants; in zoology, the winter bud of a polyzoan.

HIBERNATION (winter sleep), the dormant condition in which certain animals pass the winter in cold latitudes. Aestivation (summer sleep) is the similar condition in which other species pass periods of heat or drought in warm latitudes. The origins of these kindred phenomena are probably to be sought in the regularly recurrent failure of food supply or of other factors essential to existence due to the seasonal onset of cold in the one case and of excessively dry hot weather in the other. They are means whereby certain non-migratory species are enabled to live through unfavourable climatic conditions which would end fatally in starvation or desiccation were the animals to maintain their normal state of activity.

I. *The Physiology of Hibernation. Hibernation and Aestivation*.—The physiology of hibernation, as exemplified in mammalia, has been worked out in detail by several observers in the case of some European species, notably bats, hedgehogs, dormice and marmots. Of the physiology of aestivation nothing definite appears to have been ascertained. It seems probable, however, from observations upon the dormant animals that the physiological accompaniments of winter and summer sleep are to all intents and purposes the same. The state of hibernation, for example, in the European hedgehog (*Erinaceus europaeus*) is not distinguished by external signs from the state of aestivation of the allied Mascarene genus, the tenrec (*Centetes ecaudatus*). The lethargy in both cases appears to be directly due to fall in the temperature of the organisms; and the fall in temperature proceeds *pari*

passu with the slowing down and weakening of the respiration and with retardation in the circulation of the blood. Similarity, moreover, between hibernation and aestivation is shown not only in their physiological accompaniments but also in the species of animals which become seasonally dormant. Birds neither hibernate nor aestivate. The tenrec (*Centetes*) of Madagascar, which aestivates, closely resembles the hedgehog (*Erinaceus*) in habits and belongs to the same order of mammalia. In the case of reptiles and batrachians, snakes, lizards, tortoises, frogs and toads sleep the winter through in cold countries; and some species of these groups habitually bury themselves in the sand or mud in tropical latitudes where drought is of periodical occurrence. Terrestrial molluscs lie dormant in the winter in cold and temperate latitudes and their tropical allies aestivate in districts where conditions enforce the habit. Some fresh-water molluscs bury themselves in the mud at the bottom of ponds when the surface is covered with ice; others take refuge in the same way when pools and tanks become exhausted during the dry season in the tropics. In temperate and north temperate countries insects and arachnida either die or retire to winter quarters during the cold weather, and in the tropics they similarly disappear during times of drought.

Predisposing Causes of Hibernation.—The likeness between hibernation and aestivation and the coincidence of the one with cold and of the other with heat arrest the conclusion that the temperature of the surrounding medium, whether atmospheric or aquatic, is the prime, much less the sole, cause of either. The effect of extreme cold is to rouse the hibernating animal from its slumber; and its continuance thereafter brings about a state of torpor which proves fatal. This at least appears to be the case with mammals, where actual freezing of the tissues is followed by death because the gases are expelled from the fluids as bubbles and the salts separate in the form of crystals. Some cold-blooded animals, however, may be cooled to 0° C. Fish have been resuscitated after solidification in blocks of ice, and frogs have been known to recover when ice has been formed in the blood and in the lymph of the peritoneal cavity (Landois).

For the reasons given, all hibernating mammals take precautions against exposure to extreme cold. They either bury themselves in the soil or under the snow or seek the shelter of hollow trees or of caves, not infrequently congregating in the same spot so that the temperature is kept up by corporeal contact. Again the hibernating instinct may be suspended unless the conditions are favourable for safely entering upon winter sleep. It is alleged that bears in Scandinavia do not hibernate unless food has been sufficiently plentiful during the summer and autumn to fatten them for their winter fast; and hedgehogs and dormice in captivity have been known to remain active in the cold until warm sleeping-quarters were insured by placing hay and cotton-wool in their cages. Finally the wood-chucks (*Arctomys monax*) in the Adirondacks retire to winter quarters at about the time of the autumnal equinox, when the weather is warm and pleasant, and emerge at the vernal equinox before the snows of winter have vanished from the ground. These and other facts justify Marshall Hall’s conclusion that cold is merely a predisposing cause of hibernation in the sense that it is a predisposing cause of ordinary sleep. It has also been shown that the state of hibernation cannot be forced upon snails in summer by submitting them to artificial cold even almost to freezing point; but that at the proper season they prepare for winter quarters at temperatures varying from 37° to 77° Fahr. Again insects sometimes retire to winter quarters in the autumn when the temperature of the atmosphere is higher than that of preceding days during which they retain their activity.

Thus the oncoming and ceasing both of winter and summer sleep depend to a considerable extent upon conditions of existence other than those of temperature. Darwin saw scarcely a sign of a living thing on his arrival at Bahia Blanca, Argentina, on the 7th of Sept., although by digging several insects, large spiders and lizards were found in a half-torpid state. During the days of his visit when nature was dormant the mean temperature was 51°, the thermometer seldom rising above 55° at mid-day. But during the succeeding days when the mean temperature was 58° and that of the middle of the day between 60° and 70° both insect and reptilian life was in a state of activity. Nevertheless at Montevideo, lying only four degrees further north, between the 26th of July and the 19th of August when the mean temperature was 58.4° and the mean highest temperature of mid-day 65.5° almost every beetle, several genera of spiders, land molluscs, toads and lizards were all lying dormant beneath stones. Thus the animal-life at Montevideo remained dormant at a temperature which roused that at Bahia Blanca from its torpidity. Darwin unfortunately does not record whether the species observed were identical in the two localities.

The temperature of animals in a profound state of hibernation is approximately the same as that of the surrounding medium or at most a degree or two higher. If, however, the temperature of the chosen hibernaculum (winter quarters) falls as low as freezing point, life is endangered at least in the case of mammals.

In most cold-blooded animals, like reptiles, the temperature is normally only a little above that of the atmosphere, the two rising and falling together. But, setting aside the young, especially of those species in which the offspring are born or hatched at a comparatively early stage of development, the majority of warm-blooded animals are able to maintain a high and approximately level temperature irrespective of decline in the temperature of the surrounding medium. This faculty of temperature adjustment, however, appears to be absent or weakened in most if not in all hibernating mammals both in their normal nocturnal or diurnal sleep and in their winter sleep. In the case of European bats it has been shown that the ordinary day sleep in summer differs only in

the matter of duration from the prolonged slumber of the same animals in winter. The temperature falls with that of the atmosphere, respiration practically ceases and immersion in water for as many as eleven minutes has been known to prove innocuous. At moderate temperatures ranging from 45° to 50° F., dormice (*Muscardinus avellanarius*) and hedgehogs (*Erinaceus europaeus*) alternately wake to feed and sink into slumber. Dormice awake once in every twenty-four hours; the sleep of the hedgehogs may last for two or three days. The temperature of the hedgehog, when awake and active, rises to about 87° F., that of the dormouse to 92° or 94° F.; but during sleep the temperature of both species falls to about that of the atmosphere. In other words, all the phenomena characteristic of hibernation are exhibited in these animals during the periods of sleep interrupting their periods of wakeful activity. Sleep of this nature, for which the term “diurnation” has been proposed, because it has only been observed in nocturnal animals, lies phenomenally midway between the normal sleep of non-hibernating mammals and the dormant condition in winter of hibernating species. The stimulus of hunger appears to be the prime cause of its periodic cessation. Since then the faculty of temperature adjustment is in abeyance during the ordinary diurnal summer sleep in hibernating mammals, which in this physiological particular resemble reptiles, it seems probable that hibernation can only be practised by those species in which the power to maintain, when sleeping, a permanent average high temperature has been lost or perhaps never acquired. That there is no broad line of demarcation between the ordinary sleep of these hibernating mammals in which the temperature is known to drop considerably and that of non-hibernating species is indicated by the fact that the temperature of human beings and possibly of all non-hibernating species falls to a certain, though to a limited, extent in ordinary sleep.

The relation between the internal body-temperature and the respiratory movements has been worked out in hibernating dormice, hedgehogs, marmots and bats. When the temperature is below 12° C., the torpid animal exhibits long periods of apnoea of several minutes’ duration and interrupted by a few respirations. With the temperature rising above 13° C., the periods of apnoea in the still inactive animal become shorter, the respiration suddenly commencing and ceasing (Biot’s type), or gradually waxing and waning (Cheyne-Stokes’ type). When the temperature is at about 16° C., the periods of apnoea in the gradually awaking animal are very short and infrequent. When the temperature is about 20° and rising apace, respiration becomes continuous and rapid and the animal is awake. These stages have been especially recorded in the case of dormice. In the last stage the respiration of hedgehogs and marmots is somewhat different, there being a series of rapid respirations, often followed by a single deep sighing respiration.

Respiration appears to be totally suspended in animals in a complete state of hibernation, if left undisturbed. It may however, be readily re-excited by the slightest stimulus; and to this fact may perhaps be attributed the belief that breathing does not actually cease. If a hibernating hedgehog be lightly touched it draws a deep breath, and breathing is maintained for a longer or shorter time before again ceasing; but if at the same time the temperature of the atmosphere be raised, respiration becomes continuous and lethargy is succeeded by activity (Marshall Hall). The opinion that respiration is totally suspended is supported by a number of facts. Hibernating marmots and bats, for example, have been known to live four hours in carbon dioxide, a gas which proves almost instantly fatal to mammals in a state of normal activity (Spallanzani). A hedgehog which may be drowned in about three minutes when awake and active, has been removed from water uninjured when in deep winter sleep after twenty-two and a half minutes’ submergence. A hibernating noctule bat, when similarly treated, survived sixteen minutes’ immersion. Further proof of the suspension of respiration has been furnished by experiments upon a bat which while in a deep and undisturbed state of lethargy was kept in a pneumatometer for ten hours without appreciably affecting the percentage of oxygen in the air. The same animal, when active, removed over 5 cub. in. of oxygen in the space of one hour from the instrument.

As in the case of respiration, *alimentation* and *excretion* are suspended during hibernation.

The *circulation of the blood*, on the other hand, continues without interruption, though its rapidity is greatly retarded. This fact may be observed by microscopic examination of the wings of bats in a state of winter sleep. Moreover, in the case of a hedgehog lethargic from hibernation, it was experimentally shown that when the spinal cord was severed behind the occipital foramen, the brain removed and the entire spinal cord gently destroyed, the heart continued to beat strongly and regularly for several hours, the contraction of the auricles and ventricles being quite perceptible, though feeble, even after the lapse of ten hours. After eleven hours the organ was motionless; but resumed its activity when stimulated by a knife-point. Even after twelve hours both auricles responded to the same stimulus, though the ventricles remained motionless. Shortly afterwards the auricles gave no response. On the other hand, when the spinal cord of a hedgehog in a normal state of activity was severed at the occiput, the left ventricle ceased to beat almost at once, and the left auricle in less than fifteen minutes; the right auricle was the next to cease, whereas the right ventricle continued its contraction for about two hours. Experiments upon marmots have yielded very similar results. The heart of a marmot decapitated in a state of lethargy continued to beat for over three hours. The pulsations, at first strong and frequent and varying from 16 to 18 per minute, became gradually weaker and less frequent, until at the end of the third hour only 3 were recorded in the same length of time. Excised pieces of voluntary muscular tissue contracted vigorously three hours after death under electric stimulus. Only at the end of four hours did they cease to respond. The heart of an active marmot killed in the same way contracted about 28 times a minute at first,

the number of pulsations falling to about 12 at the end of fifteen minutes, to 8 at the end of thirty minutes, and ceasing altogether at the end of fifty minutes. Similarly the response of the muscles to galvanic shock failed at a correspondingly rapid rate. It is evident, therefore, that during hibernation the irritability of the heart is augmented in a marked degree, and that the irritability of the left side of the organ is scarcely less pronounced than that of the right side. Similar reduction in the rate of the circulation has been demonstrated in certain hibernating mollusca, Mr C. Ashford having proved experimentally that the number of pulsations of the heart per minute gradually lessens with a falling temperature. At a temperature of 52° F. the number was 22 in the common garden snail (*Helix hortensis*), and 21 in the cellar slug (*Hyalinia cellaria*). At a temperature of 30° F. the pulsation fell to 4 in the former and to 3 in the latter animal.

The nature of hibernation, and probably also of aestivation, and the principal physiological phenomena connected with them, may be briefly summarized as follows:—

1. During hibernation death from starvation and wasting of the tissues is prevented by the absorption of fat, which, at least in the case of mammalia, is stored in considerable quantities, sometimes in definite parts of the body, during the weeks of activity immediately preceding the period of winter sleep.

2. Every gradation seems to exist between ordinary sleep and hibernation; the differences between the ordinary diurnal or nocturnal sleep in summer of hibernating animals and their prolonged and lethargic quiescence in winter are merely differences of degree, differences, that is to say, of intensity and duration.

3. The physiological accompaniments of hibernation are: (*a*) Cessation of all activities associated with alimentation and excretion; (*b*) lowering of the body temperature to that of the surrounding medium or to within a few degrees of it; (*c*) total or almost total cessation of respiration, accompanied by power to survive immersion for a considerable time in water or asphyxiating gases, which prove rapidly fatal to the same animals when normally active; (*d*) marked increase in the irritability of the muscles, especially of those of the left side of the heart, whereby the pulsations of that organ, although retarded, are uninterruptedly maintained; (*e*) a slight exchange of gases in the lungs is kept up by the cardio-pneumatic movement.

4. Amongst cold-blooded animals, both vertebrate and invertebrate, devoid of the faculty of temperature adjustment, the phenomenon of hibernation or aestivation is of general occurrence wherever the conditions of existence accompanying the onset of cold or drought are inimical to active life. In hot-blooded vertebrates, on the contrary, the phenomena are non-existent so far as birds are concerned; aestivation is of very rare occurrence in mammalia, while hibernation is practised by a comparatively small number of species; and in these the faculty of temperature adjustment appears to be temporarily at all events in abeyance.

II. *The Zoology of Hibernation and Aestivation.*—Owing to the extreme difficulty of keeping wild animals under observation in their natural haunts for any lengthened time, it is almost impossible to get accurate knowledge of the details of this state of existence. In a general way it is known, or assumed from their disappearance, that certain species retire to winter quarters in particular districts, but on such important points as whether the winter sleep is continuous or interrupted, light or profound, assured information is for the most part not forthcoming. This is true even of familiar species inhabiting Europe and North America, which have been objects of study for many years. It is still more true of species occurring in countries uninhabited and rarely visited, especially in winter, by naturalists interested in such questions. The Chiroptera (bats) furnish an illustration of this truth. It was formerly assumed that the winter sleep of these animals in north and temperate Europe was complete and uninterrupted. Marshall Hall, for example, remarked that “perhaps the bat may be the only animal which sleeps profoundly the winter through without awaking to take food.” It was known, it is true, that in countries where gnats and other winged insects disappear with the first frosts of winter, bats which feed upon them retire to winter quarters in hollow trees, caves, sheds or other places likely to afford them sufficient shelter. Here they hang suspended, solitary or in companies according to the species. But a mild spell of weather in mid-winter will sometimes entice a few to take wing while it lasts, although they never appear in any numbers until crepuscular and nocturnal insects are plentiful. But Mr T. A. Coward has recently shown in the case of the greater and lesser horseshoe bats (*Rhinolophus ferrum-equinum* and *R. hipposiderus*), that during the early period of their occupation of the winter retreat, hibernation, in the strict sense of the word, does not take place, and that even later in the season the sleep is constantly interrupted, especially when the temperature of the air rises above 46° F., and that during their wakeful intervals they crawl about and feed apparently upon the insects which live throughout the year in the caves. This is also true of the long-eared bat (*Plecotus auritus*), and probably of other species of this group. At Mussoorie in the Himalayas, and in other parts of northern India, insectivorous bats, such as *Rhinolophus luctus* and *Rh. affinis*, pass the winter in a semi-torpid state, and are rarely seen abroad during the cold season. The fruit-eating bats, on the contrary (*Pteropidae*), which are more southern in their distribution and are restricted in the Himalayas to the warmer valleys and lower slopes of the mountains, are as active in the winter as at other times of the year (Blanford).

Although almost as exclusively insectivorous as bats, moles and shrews do not, so far as is known, hibernate. This distinction between two groups so nearly alike in diet, no doubt depends upon the difference in their habitats and in those of the creatures they live upon. By tunnelling deeper in

winter than in summer, moles are still able to find worms and various insects buried in the earth beyond the reach of frost; and shrews hunt out spiders, centipedes and insects which in their larval, pupal or sexual stages have taken shelter and lie dormant in holes and crannies of the soil, beneath the leaves of ground plants or under stones and logs of wood. In view of the perennially active life of the two insectivora just mentioned, it is a singular fact that the common hedgehog (*Erinaceus europaeus*)—the only member of this order besides genera referable to the moles (*Talpidae*) and shrews (*Soricidae*) that inhabits temperate and north-temperate latitudes in Europe and Asia—passes the winter in a state of torpor unsurpassed in profundity by that of any species of mammal so far as is known. Possibly the explanation of this seeming anomaly may be found in the bionomial differences between the three animals. The subterranean feeding habits of the mole render hibernation unnecessary on his part. Therefore the shrew and the hedgehog, both surface feeders for the most part, need only be considered in this connexion. As compared with shrews, amongst the smallest of palaearctic mammals, the hedgehog is of considerable size. Moreover, in point of vivacious energy it would be difficult to find two mammals of the same order more utterly unlike. Hence in winter when insects are scarce and demand active and diligent search, it is quite intelligible that the shrews, in virtue of their smallness and rapidity of movement, are able to procure sufficient food for their needs; whereas the hedgehogs, requiring a far larger quantity and handicapped by lack of activity, would probably starve under the same conditions. Like the common hedgehog of Europe, the long-eared hedgehog (*Erinaceus megalotis*) hibernates in Afghanistan from November till February. The tenrec (*Centetes ecaudatus*), a large insectivore from Madagascar, aestivates during the hottest weeks of the year; and specimens exhibited in the Zoological Gardens in London preserved the habit although kept at a uniform temperature and regularly supplied with food.

Amongst the Rodentia, no members of the Lagomorpha (hares, rabbits and picas) are known to hibernate, although some of the species, like the mountain hare (*Lepus timidus*), extend far to the north in the palaearctic region, and the picas (*Ochotona*) live at high altitudes in the Himalayas and Central Asia, where the cold of winter is excessive, and where the snow lies deep for many months. It is probable that the picas live in fissures and burrows beneath the snow, and feed on stores of food accumulated during the summer and autumn. The Hystrico-morpha also are non-hibernators. It is true that the common porcupine (*Hystrix cristata*) of south Europe and north Africa is alleged to hibernate; the statement cannot, however, be accepted without confirmation, because the cold is seldom excessive in the countries it frequents, and specimens exhibited in the Zoological Gardens in London remain active throughout the year, although kept in enclosures without artificial heat of any kind. Even the most northerly representative of this group, the Canadian porcupine (*Erethizon dorsatus*), which inhabits forest-covered tracts in the United States and Canada, may be trapped and shot in the winter. Some members of this group, like capybaras (*Hydrochaerus capybara*) and coypus (*Myocastors coypus*) which live in tropical America, are unaffected by the winter cold of temperate countries, and live in the open all the year round in parks and zoological gardens in England. Several of the genera of Myomorpha contain species inhabiting the northern hemisphere, which habitually hibernate. The three European genera of dormice (*Myoxidae*), namely *Muscardinus*, *Eliomys* and *Glis*, sleep soundly practically throughout the winter; and examples of the South African genus *Graphiurus* practise the same habit when imported to Europe. If a warm spell in the winter rouses dormice from their slumbers, they feed upon nuts or other food accumulated during the autumn, but do not as a rule leave the nests constructed for shelter during the winter. According to the weather, the sleep lasts from about five to seven months. In the family *Muridae*, the true mice and rats (*Murinae*) and the voles and lemmings (*Arvicolinae*) seem to remain active through the winter, although some species, like the lemmings, range far to the north in Europe and Asia; but the white-footed mice (*Hesperomys*) of North America, belonging to the *Cricetinae*, spend the winter sleeping in underground burrows, where food is laid up for consumption in the early spring. The Canadian jumping mouse (*Zapus hudsonianus*), one of the Jaculidae, also hibernates, although the sleep is frequently interrupted by milder days. Some of the most northerly species of jerboas (Jaculidae), namely *Alactaga decumana* of the Kirghiz Steppes and *A. indica* of Afghanistan, sleep from September or October till April; and the Egyptian species (*Jaculus jaculus*) and the Cape jumping hare (*Pedetes caffer*), one of the Hystrico-morpha, remain in their burrows during the wet season in a state analogous to winter sleep. The sub-order Sciuromorpha also contains many hibernating species. None of the true squirrels, however, appear to sleep throughout the winter. Even the red squirrel (*Sciurus hudsonianus*) of North America retains its activity in spite of the sub-arctic conditions that prevail. The same is true of its European ally *Sc. vulgaris*. The North American grey squirrel (*Sc. cinereus*), although more southerly in its distribution than the red squirrel of that country, hibernates partially. Specimens running wild in the Zoological Gardens in London disappear for a day or two when the cold is exceptionally keen, but for the most part they may be seen abroad throughout the season. On the other hand, ground squirrels like the chipmunks (*Tamias*) and the susliks or gophers (*Spermophilus*) of North America and Central Asia, at all events in the more northern districts of their range, sleep from the late autumn till the spring in their subterranean burrows, where they accumulate food for use in early spring and for spells of warmer weather in the winter which may rouse them from their slumbers. The North American flying squirrel (*Sciuropterus volucella*) and its ally *Pteromys inornatus* are believed to hibernate in hollow trees. All the true marmots (*Arctomys*), a genus of which the species live at tolerably high altitudes in Central Europe, Asia and North America, appear to spend the winter in uninterrupted slumber

buried deep in their burrows. They apparently lay up no store of food, but accumulate a quantity of fat as the summer and autumn advance, and frequently, as in the case of the woodchuck (*A. monax*) of the Adirondacks, retire to winter quarters in the autumn long before the onset of the winter cold. The prairie marmots or prairie dogs (*Cynomys ludovicianus*) of North America, which live in the plains, do not hibernate to the same extent as the true marmots, although they appear to remain in their burrows during the coldest portions of the winter. Beavers (*Castor*), although formerly at all events extending in North America from the tropic of Cancer up to the Arctic circle, do not hibernate. When the ground is deep in snow and the river frozen over, they are still able to feed on aquatic plants beneath the ice.

Amongst the terrestrial carnivora hibernation appears to be practised, with one possible exception, only by species belonging to the group Arctoidea. In north temperate latitudes both in Europe and Asia, as well as in the Himalayas, brown bears (*Ursus arctos*) hibernate, so also does the North American grizzly bear (*U. horribilis*), at least in the more northern districts of its range. The smaller black bear of the Himalayas (*U. tibetanus*) appears to lapse into a state of semi-torpor during the winter, only emerging from his retreat to hunt for food when occasional breaks in the weather occur. In the case of the American black bear (*U. americanus*) the female seeks winter quarters comparatively early in the season in preparation for the birth of her progeny soon after the turn of the year; but the males remain active so long as plenty of food is to be found. In the case of all bears, except the Polar bear (*U. maritimus*), the site chosen as the hibernaculum is either a cave or hole or some sheltered spot beneath a ledge of rock, or the roots of large trees, more or less overgrown with brushwood which holds the snow until it freezes into a solid roof over the hollow where the sleeping animal lies. In the hibernating brown and black bears the intestine is blocked by a plug commonly called “tappen” and composed principally of pine leaves, which is usually not evacuated until the spring. There is much diversity of opinion on the subject of the hibernation of Polar bears. Their absence during the winter from particular spots in the Arctic regions where icebound ships have spent the winter, and the occasional discovery of specimens buried beneath the snow, have led to the belief that these animals habitually retire to winter quarters through the cold sunless months of the year. This may possibly be the true explanation at least for certain districts. But it has been alleged that bears, both adult and half-grown, may be seen throughout the winter; and it is known that pregnant females bury themselves in the autumn under the snow, where they remain without feeding with their newly-born young until the spring of the following year. Hence the absence of bears in the winter from the neighbourhood of icebound ships may be explained on the supposition that the adult females alone hibernate for breeding purposes, while the full-grown males and half-grown specimens of both sexes migrate in the winter to the edges of the ice-floes and to coast lines, where the water is open. Before retiring to winter quarters the pregnant females store up sufficient quantity of fat in their tissues not only to sustain themselves but also to supply milk for their cubs. In the Adirondack region and probably in other districts of the same or more northern latitudes in North America, raccoons (*Procyon lotor*) retire in the winter to some sheltered place, such as a hollow tree-trunk, and pass the severest part of the season in sleep, emerging in February or March when the snow has begun to disappear. In the same country, the skunks (*Mephitis mephitica*), a member of the weasel family, also seek shelter during the coldest portion of the winter. Merriam believes that the hibernation of this animal is determined by cold, and not by failure of food-supply, for he observes that skunks may frequently be seen in numbers on snow lying 5 ft. deep at a time of the year when they feed almost entirely upon mice and shrews which do not hibernate even when the thermometer registers over twelve degrees of frost. In British North America the badger (*Taxidea americana*) is said to hibernate from October till April; but the duration of the period probably depends, as in the case of its European ally (*Meles meles*), upon the length and severity of the inclement season. In the last-named species the winter repose is not as a rule sufficiently profound to prevent a break in the weather rousing the animal from sleep to sally forth in search of food. This interrupted hibernation takes place at least in England and even in Scandinavia; but in countries where frost is continuous throughout the winter it is probable that the badger’s sleep is unbroken.

The one exception to the general rule that hibernation in the Carnivora is restricted to the Arctoidea, is supplied by the raccoon dog (*Nyctereutes procyonoides*) of Japan and north-eastern Asia, which is said by Radde to hibernate in burrows in Amurland if food has been sufficiently plentiful in late summer and autumn to enable the animal to lay on enough fat to resist the cold and sustain a long period of fast. If, however, food has been scarce, this dog is compelled to remain active all through the winter. The Arctic fox (*Vulpes lagopus*), although considerably more northern in range than the raccoon dog, does not hibernate. It was long a mystery how these animals obtained food in winter, but it has been ascertained that in some districts they migrate southwards in large numbers in the late autumn, whereas in other districts apparently they lay up stores of dead lemmings or hares, for food during the winter months. In Australia the porcupine ant-eater (*Echidna aculeata*) hibernates; and the habit is retained by specimens imported to Europe if exposed to the cold in outdoor cages.

Instances of quasi-hibernation have been recorded in the case of man. For example, in the government of Pskov in Russia, where food is scarce throughout the year and in danger of exhaustion during the winter, the peasants are said to resort to a practice closely akin to hibernation, spending at least one-half of the cold weather in sleep. From time immemorial it has

been the custom when the first snows fall for families to shut themselves up in their huts, huddle round the stove and lapse into slumber, each member taking his turn to keep the fire alight. Once a day only do the inmates rouse themselves from sleep to eat a little dry bread.

Reptiles in which the body-temperature falls with that of the surrounding medium pass the winter in temperate countries in a state of lethargy; and specimens exported from the tropics into northern latitudes become dormant when exposed to cold in virtue of their inability to maintain their temperature at a higher level than that of the atmosphere. The common land tortoise (*Testudo graeca*) of South Europe buries itself in the soil during the winter in its natural habitat, and even when imported to England is able, in some cases at least, to withstand the more rigorous winter by practising the same habit, as Gilbert White originally recorded. In Pennsylvania the box-tortoise (*Cistudo carolina*) passes the winter in a burrow; and *Testudo elegans*, which inhabits dry hilly districts in north India, takes shelter beneath tufts of grass or bushes as the cold weather approaches and remains in a semi-lethargic state until the return of the warmth. The European pond tortoise (*Emys orbicularis*) also hibernates buried in the soil; and the North American salt-water terrapin (*Malacoclemmys concentrica*), abundant in the salt-marshes round Charleston, S. Carolina, retires into the muddy banks to spend the cold months of the year. In certain parts of the tropics tortoises protect themselves from the excessive heat by burrowing into the soil which afterwards becomes indurated. When drought sets in with the dry season and the tanks become exhausted and food unobtainable, crocodiles and alligators sometimes wander across country in search of water, but more commonly bury themselves in the mud and remain in a state of quiescence until the return of the rains; and according to Humboldt, large snakes, anacondas or boa constrictors are often found by the Indians in South America buried in the same lethargic state. Snakes and lizards in all countries where there is any considerable seasonal variation in temperature become dormant or semi-dormant during the colder months.

Batrachians, like reptiles, hibernate in Europe and other countries situated in temperate latitudes. Frogs bury themselves in the mud at the bottom of tanks and ponds, often congregating in numbers in the same spot. Toads retire to burrows or other secluded places on the land, and newts either bury themselves in the mud of ponds, like frogs, or lie up beneath stones and pieces of wood on the land. According to Mr G. A. Boulenger, however, European frogs and toads do not pass the winter in profound torpor, but merely in a state of sluggish quiescence. In tropical countries, where wet and dry seasons alternate, frogs which, like the rest of the batrachians, are for the most part intolerant of great heat, especially when accompanied by dryness of atmosphere, bury themselves deep in the soil during the time of drought and emerge from their retreats in numbers with the breaking of the rains.

This habit of passing the dry season in the hardened mud forming the bottom of exhausted pools and rivers is practised by several species of tropical freshwater fishes, belonging principally to the family *Siluridae*. The members of this group are able to exist and thrive in moist mud, and can even support life for a comparatively long time out of water altogether. The instinct is exhibited by species occurring both in the eastern and western hemispheres, as is shown by its record in the case of species of *Callicthys* and *Loricaria* in Guiana and by *Clarias lazera* in Senegambia. It is also met with, according to Tennent, in a species of climbing perch (*Anabas oligolepis*) found in Ceylon and belonging to the family *Anabantidae*, all the species of which are able to live for a certain length of time out of water, and may sometimes be found crawling across land in search of fresh pools. The habit is also common to some species of mud fishes of the order Dipneusti, in which the air bladder plays the part of lungs. *Protopterus*, from tropical Africa, for instance, burrows into the mud and remains for nearly half the year coiled up at the bottom in a slightly enlarged chamber. The walls of this are lined with a layer of slime secreted from the fish’s skin, and the orifice is closed with a lid the centre of which is perforated and forms an inturned tube by means of which air is conducted to the fish’s mouth. The aestivating burrow of the Brazilian mudfish (*Lepidosiren*) is similar, except that the lid is perforated with several apertures. The Australian mudfish (*Ceratodus*) is not known to hibernate or aestivate.

In countries where winter frosts arrest the growth of vegetation terrestrial mollusca seek hibernacula beneath stones or fallen tree trunks, in rock crannies, holes in walls, in heaps of dead leaves, in moss or under the soil, and remain quiescent until the coming of spring. Amongst pulmonate gastropods, most species of snails (*Helix*, *Clausilia*) close the mouth of the shell at this period with a membranous or calcified plate, the epiphragm. Slugs (*Limax*, *Arion*), on the contrary, lie buried in the earth encysted in a coating of slime. Similarly in the tropics members of this group, such as *Achatina* in tropical Africa and *Orthalicus* in Brazil, aestivate during the dry season, the epiphragm preserving them against desiccation; and examples of two species of *Achatina* from east and west Africa exhibited in the Zoological Gardens in London remained concealed in their shells during the winter, although kept in an artificially warmed house, and resumed their activity in the summer.

Freshwater Pulmonata do not appear to hibernate, such forms as *Limnaea* and *Planorbis* having been frequently seen crawling about beneath the ice of frozen ponds. During periods of drought in England, however, they commonly bury themselves in the mud, a habit which is also practised during the dry season in the tropics by species of Prosobranchiate Gastropods belonging to the genera *Ampullaria*, *Melania* and others, which lie dormant until the first rains rouse them from their

lethargy. Freshwater Pelecypoda (*Anodonta*, *Unio*) spend the European winter buried deep in the muddy bottom of ponds and streams.

In cold and temperate latitudes a great majority of insects pass the winter in a dormant state, either in the larval, pupal or imaginal (reproductive) stages. In some the state of hibernation is complete in the sense that although the insects may be roused from their lethargy to the extent of movement by spells of warm weather, they do not leave their hibernacula to feed; in others it is incomplete in the sense that the insects emerge to feed, as in the case of the caterpillar of *Euprepia fuliginosa*, or to take the wing as in the case of the midge *Trichocera hiemalis*. Others again, like *Podura nivalis* and *Boreus hiemalis*, never appear to hibernate, at least in England. The insects which hibernate as larvae belong to those species which pass more than one season in that stage, such as the goat-moth (*Cossus ligniperda*), cockchafers (*Melolontha*), stagbeetles (*Lucanus*) and dragon-flies (*Libellula*), &c.; and to some species which, although they only live a few months in this immature state, are hatched in the autumn or summer and only reach the final stage of growth in the following spring, like the butterflies of the genus *Argynnis* (*paphia*, *aglaia*, &c.) in England. As an instance of species which survive the winter in the pupal or chrysalis stage may be cited the swallow-tailed butterfly of Europe (*Papilio machaon*); while to the category of species which hibernate as perfect insects belong many of the Coleoptera (Rhyncophora, *Coccinellidae*), &c., as well as some Hemiptera, Hymenoptera, Diptera and Lepidoptera (*Vanessa io*, *urticae*, &c.). In the case of the social Hymenoptera it is only the fertilized queen wasp out of the nest that survives the frost of winter, all the workers dying with the onset of cold in the autumn; the common hive bees (*Apis mellifica*), although they retire to the hive, do not hibernate, the numbers and activity of the individuals within the hive being sufficient to keep up the temperature above soporific point. Ants also remain actively at work underground unless the temperature falls several degrees below zero.

Spiders, like nearly all insects, hibernate in cold temperate latitudes. Burrowing species like trap-door spiders of the family *Ctenizidae* and some species of *Lycosidae* seal the doors of their burrows with silk or close up the orifice with a sheet of that material. Other non-burrowing species, like some species of *Clubionidae* and *Drassidae*, lie up in silken cases attached to the underside of stones or of pieces of loose bark, or buried under dead leaves or concealed in the cracks of walls. Other species, on the contrary, pass the winter in an immature state protected from the cold by the silken cocoon spun by the mother for her eggs before she dies in the late autumn, as in the “garden spider” (*Aranea diadema*). Commonly, however, when the cocoons are later in the making, or the cold weather sets in early, the eggs of this and of allied species do not hatch until the spring; but in either case the young emerge in the warm weather, become adult during the summer and die in the autumn after pairing and oviposition. Some members of this family, nevertheless, like *Zilla x-notata*, which live in the corners of windows, or in outhouses where the habitat affords a certain degree of protection from the cold, may survive the winter in the adult stage and be roused from lethargy by breaks in the weather and tempted by the warmth to spin new webs. Typical members of the Opiliones or harvest spiders, belonging to the family *Phalangiidae*, do not hibernate in temperate and more northern latitudes in Europe and America, but perish in the autumn, leaving their eggs buried in the soil to hatch in the succeeding spring. During the early summer, therefore, only immature individuals are found. Other species of this order, belonging to the family *Trogulidae*, spend the winter in a dormant state under stones or buried in the soil. False scorpions (*Pseudo-scorpiones*) also hibernate in temperate latitudes, passing the cold months, like many spiders, enclosed in silken cases attached to the underside of stones or loosened pieces of bark. Centipedes and millipedes bury themselves in the earth, or lie up in some secluded shelter such as stones or fallen tree trunks afford during the winter; and in the tropics millipedes lie dormant during seasons of drought.

What is true of the dormant condition of arthropod life in the winter of the northern hemisphere is also true in a general way of that of the southern hemisphere at the same season of the year. This is proved—to mention no other cases—by the observations of Darwin on the hibernation of insects and spiders at Montevideo and Bahia Blanca in South America, and by Distant’s account of the paucity of insect life in the winter in South Africa; by his discovery under stones of hibernating semi-torpid Coleoptera and Hemiptera at the end of August in the Transvaal, and of the gradual increase in the numbers of individuals and species of insects in that country as the spring advanced and the dry season came to an end.

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(R. I. P.)

HIBERNIA, in ancient geography, one of the names by which Ireland was known to Greek and Roman writers. Other names were Ierne, Iuverna, Iberio. All these are adaptations of a stem from which also Erin is descended. The island was well known to the Romans through the reports of traders, so far at least as its coasts. But it never became part of the Roman empire. Agricola (about A.D. 80) planned its conquest, which he judged an easy task, but the Roman government vetoed the enterprise. During the Roman occupation of Britain, Irish pirates seem to have been an intermittent nuisance, and Irish emigrants may have settled occasionally in Wales; the best attested emigration is that of the Scots into Caledonia. It was only in post-Roman days that Roman civilization, brought perhaps by Christian missionaries like Patrick, entered the island.

HICKERINGILL (or HICKHORNGILL), **EDMUND** (1631-1708), English divine, lived an eventful life in the days of the Commonwealth and the Restoration. After graduating at Caius College, Cambridge, where he was junior fellow in 1651-1652, he joined Lilburne’s regiment as chaplain, and afterwards served in the ranks in Scotland and in the Swedish service, ultimately becoming a captain in Fleetwood’s regiment. He then lived for a time in Jamaica, of which he published an account in 1661. In the same year he was ordained by Robert Sanderson, bishop of Lincoln, having already passed through such shades of belief as are connoted by the terms Baptist, Quaker and Deist. From 1662 until his death in 1708 he was vicar of All Saints’, Colchester. He was a vigorous pamphleteer, and came into collision with Henry Compton, bishop of London, to whom he had to pay heavy damages for slander in 1682. He made a public recantation in 1684, was excluded from his living in 1685-1688, and ended his career by being convicted for forgery in 1707.

HICKES, GEORGE (1642-1715), English divine and scholar, was born at Newsham near Thirsk, Yorkshire, on the 20th of June 1642. In 1659 he entered St John’s College, Oxford, whence after the Restoration he removed to Magdalen College and then to Magdalen Hall. In 1664 he was elected fellow of Lincoln College, and in the following year proceeded M.A. In 1673 he graduated in divinity, and in 1675 he was appointed rector of St Ebbe’s, Oxford. In 1676, as private chaplain, he accompanied the duke of Lauderdale, the royal commissioner, to Scotland, and shortly afterwards received the degree of D.D. from St Andrews. In 1680 he became vicar of All Hallows, Barking, London; and after having been made chaplain to the king in 1681, he was in 1683 promoted to the deanery of Worcester. He opposed both James II.’s declaration of indulgence and Monmouth’s rising, and he tried in vain to save from death his nonconformist brother John Hickes (1633-1685), one of the Sedgemoor refugees harboured by Alice Lisle. At the revolution of 1688, having declined to take the oath of allegiance, Hickes was first suspended and afterwards deprived of his deanery. When he heard of the appointment of a successor he affixed to the cathedral doors a “protestation and claim of right.” After remaining some time in concealment in London, he was sent by Sancroft and the other nonjurors to James II. in France on matters connected with the continuance of their episcopal succession; upon his return in 1694 he was himself consecrated suffragan bishop of Thetford. His later years were largely occupied in controversies and in writing, while in 1713 he persuaded two Scottish bishops, James Gadderar and Archibald Campbell, to assist him in consecrating Jeremy Collier, Samuel Hawes and Nathaniel Spinckes as bishops among the nonjurors. He died on the 15th of December 1715.

The chief writings of Hickes are the *Institutiones Grammaticae Anglo-Saxonicae et Moeso-*

Gothicae (1689), and *Linguarum veterum Septentrionalium Thesaurus grammatico-criticus et archaeologicus* (1703-1705), a work of great learning and industry.

Apart from these two works Hickes was a voluminous and laborious author. His earliest writings, which were anonymous, were suggested by contemporary events in Scotland that gave him great satisfaction—the execution of James Mitchell on a charge of having attempted to murder Archbishop Sharp, and that of John Kid and John King, Presbyterian ministers, "for high treason and rebellion" (*Ravillac Redivivus*, 1678; *The Spirit of Popery speaking out of the Mouths of Phanatical Protestants*, 1680). In his *Jovian* (an answer to S. Johnson's *Julian the Apostate*, 1683), he endeavoured to show that the Roman empire was not hereditary, and that the Christians under Julian had recognized the duty of passive obedience. His two treatises, one *Of the Christian Priesthood* and the other *Of the Dignity of the Episcopal Order*, originally published in 1707, have been more than once reprinted, and form three volumes of the *Library of Anglo-Catholic Theology* (1847). In 1705 and 1710 were published *Collections of Controversial Letters*, in 1711 a collection of *Sermons*, and in 1726 a volume of *Posthumous Discourses*. Other treatises, such as the *Apologetical Vindication of the Church of England*, are to be met with in Edmund Gibson's *Preservative against Popery*. There is a manuscript in the Bodleian Library which sketches his life to the year 1689, and many of his letters are extant in various collections. A posthumous publication of his *The Constitution of the Catholick Church and the Nature and Consequences of Schism* (1716) gave rise to the celebrated Bangorian controversy.

See the article by the Rev. W. D. Macray in the *Dictionary of National Biography*, vol. xxvi. (1891); and J. H. Overton, *The Nonjurors* (1902).

HICKOK, LAURENS PERSEUS (1798-1888), American philosopher and divine, was born at Bethel, Connecticut, on the 29th of December 1798. He took his degree at Union College in 1820. Until 1836 he was occupied in active pastoral work, and was then appointed professor of theology at the Western Reserve College, Ohio, and later (1844-1852) at the Auburn (N.Y.) Theological Seminary. From this post he was elected vice-president of Union College and professor of mental and moral science. In 1866 he succeeded Dr E. Nott as president, but in July 1868 retired to Amherst, Massachusetts, where he devoted himself to writing and study. A collected edition of his principal works was published at Boston in 1875. He died at Amherst on the 7th of May 1888. He wrote *Rational Psychology* (1848), *System of Moral Science* (1853), *Empirical Psychology* (1854), *Rational Cosmology* (1858), *Creator and Creation, or the Knowledge in the Reason of God and His Work* (1872), *Humanity Immortal* (1872), *Logic of Reason* (1874).

HICKORY, a shortened form of the American Indian name *pohickery*. Hickory trees are natives of North America, and belong to the genus *Carya*. They are closely allied to the walnuts (*Juglans*), the chief or at least one very obvious difference being that, whilst in *Carya* the husk which covers the shell of the nut separates into four valves, in *Juglans* it consists of but one piece, which bursts irregularly. The timber is both strong and heavy, and remarkable for its extreme elasticity, but it decays rapidly when exposed to heat and moisture, and is peculiarly subject to the attacks of worms. It is very extensively employed in manufacturing musket stocks, axle-trees, screws, rake teeth, the bows of yokes, the wooden rings used on the rigging of vessels, chair-backs, axe-handles, whip-handles and other purposes requiring great strength and elasticity. Its principal use in America is for hoop-making; and it is the only American wood found perfectly fit for that purpose.

The wood of the hickory is of great value as fuel, on account of the brilliancy with which it burns and the ardent heat which it gives out, the charcoal being heavy, compact and long-lived. The species which furnish the best wood are *Carya alba* (shell-bark hickory), *C. tomentosa* (mockernut), *C. olivaeformis* (pecan or pacane nut), and *C. porcina* (pig-nut), that of the last named, on account of its extreme tenacity, being preferred for axle-trees and axle-handles. The wood of *C. alba* splits very easily and is very elastic, so that it is much used for making whip-handles and baskets. The wood of this species is also used in the neighbourhood of New York and Philadelphia for making the back bows of Windsor chairs. The timber of *C. amara* and *C. aquatica* is considered of inferior quality.

FIG. 1.—Shell-bark Hickory (*Carya alba*) in flower.

Most of the hickories form fine-looking noble trees of from 60 to 90 ft. in height, with straight, symmetrical trunks, well-balanced ample heads, and bold, handsome, pinnated foliage. When confined in the forest they shoot up 50 to 60 ft. without branches, but when standing alone they expand into a fine head, and produce a lofty round-headed pyramid of foliage. They have all the qualities necessary to constitute fine graceful park trees. The most ornamental of the species are *C. olivaeformis*, *C. alba* and *C. porcina*, the last two also producing delicious nuts, and being worthy of cultivation for their fruit alone.

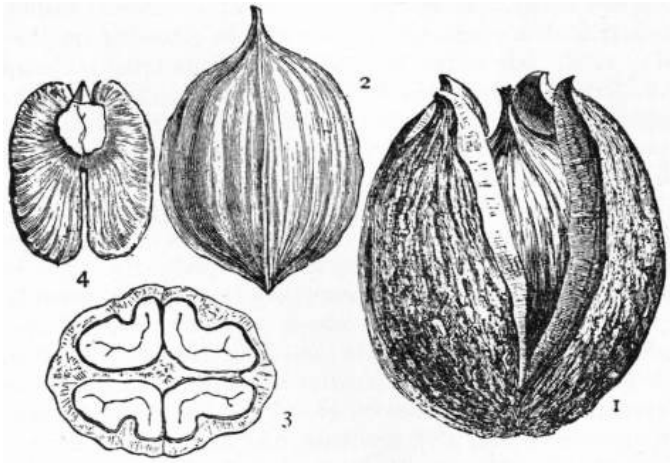

FIG. 2.—1, Fruit of *Carya alba*; 2, Hickory Nut; 3, Cross Section of Nut; 4, Vertical Section of the Seed.

The husk of the hickory nut, as already stated, breaks up into four equal valves or separates into four equal portions in the upper part, while the nut itself is tolerably even on the surface, but has four or more blunt angles in its transverse outline. The hickory nuts of the American markets are the produce of *C. alba*, called the shell-bark hickory because of the roughness of its bark, which becomes loosened from the trunk in long scales bending outwards at the extremities and adhering only by the middle. The nuts are much esteemed in all parts of the States, and are exported in considerable quantities to Europe. The pecan-nuts, which come from the Western States, are from 1 in. to 1½ in. long, smooth, cylindrical, pointed at the ends and thin-shelled, with the kernels full, not like those of most of the hickories divided by partitions, and of delicate and agreeable flavour. The thick-shelled fruits of the pig-nut are generally left on the ground for swine, squirrels, &c., to devour. In *C. amara* the kernel is so bitter that even squirrels refuse to eat it.

HICKS, ELIAS (1748-1830), American Quaker, was born in Hempstead township, Long Island, on the 19th of March 1748. His parents were Friends, but he took little interest in religion until he was about twenty; soon after that time he gave up the carpenter’s trade, to which he had been apprenticed when seventeen, and became a farmer. By 1775 he had “openings leading to the ministry” and was “deeply engaged for the right administration of discipline and order in the church,” and in 1779 he first set out on his itinerant preaching tours between Vermont and Maryland. He attacked slavery, even when preaching in Maryland; wrote *Observations on the*

Slavery of the Africans and their Descendants (1811); and was influential in procuring the passage (in 1817) of the act declaring free after 1827 all negroes born in New York and not freed by the Act of 1799. He died at Jericho, Long Island, on the 27th of February 1830. His preaching was practical rather than doctrinal and he was heartily opposed to any set creed; hence his successful opposition at the Baltimore yearly meeting of 1817 to the proposed creed which would make the Society in America approach the position of the English Friends by definite doctrinal statements. His *Doctrinal Epistle* (1824) stated his position, and a break ensued in 1827-1828, Hicks's followers, who call themselves the "Liberal Branch," being called "Hicksites" by the "Orthodox" party, which they for a time outnumbered. The village of Hicksville, in Nassau County, New York, 15 m. E. of Jamaica, lies in the centre of the Quaker district of Long Island and was named in honour of Elias Hicks.

See *A Series of Extemporaneous Discourses ... by Elias Hicks* (Philadelphia, 1825); *The Journal of the Life and Labors of Elias Hicks* (Philadelphia, 1828), and his *Letters* (Philadelphia, 1834).

HICKS, HENRY (1837-1899), British physician and geologist, was born on the 26th of May 1837 at St David's, in Pembrokeshire, where his father, Thomas Hicks, was a surgeon. He studied medicine at Guy's Hospital, London, qualifying as M.R.C.S. in 1862. Returning to his native place he commenced a practice which he continued until 1871, when he removed to Hendon. He then devoted special attention to mental diseases, took the degree of M.D. at St Andrews in 1878, and continued his medical work until the close of his life. In Wales he had been attracted to geology by J. W. Salter (then palaeontologist to the Geological Survey), and his leisure time was given to the study of the older rocks and fossils of South Wales. In conjunction with Salter, he established in 1865 the Menevian group (Middle Cambrian) characterized by the trilobite *Paradoxides*. Subsequently Hicks contributed a series of important papers on the Cambrian and Lower Silurian rocks, and figured and described many new species of fossils. Later he worked at the Pre-Cambrian rocks of St David's, describing the Dimetian (granitoid rock) and the Pebidian (volcanic series), and his views, though contested, have been generally accepted. At Hendon Dr Hicks gave much attention to the local geology and also to the Pleistocene deposits of the Denbighshire caves. For a few years before his death he had laboured at the Devonian rocks. With his keen eye for fossils he detected organic remains in the Morte slates, previously regarded as unfossiliferous, and these he regarded as including representatives of Lower Devonian and Silurian. His papers were mostly published in the *Geol. Mag.* and *Quart. Journ. Geol. Soc.* He was elected F.R.S. in 1885, and president of the Geological Society of London 1896-1898. He died at Hendon on the 18th of November 1899.

HICKS, WILLIAM (1830-1883), British soldier, entered the Bombay army in 1849, and served through the Indian mutiny, being mentioned in despatches for good conduct at the action of Sitka Ghaut in 1859. In 1861 he became captain, and in the Abyssinian expedition of 1867-68 was a brigade major, being again mentioned in despatches and given a brevet majority. He retired with the honorary rank of colonel in 1880. After the close of the Egyptian war of 1882, he entered the khedive's service and was made a pasha. Early in 1883 he went to Khartum as chief of the staff of the army there, then commanded by Suliman Niazi Pasha. Camp was formed at Omdurman and a new force of some 8000 fighting men collected—mostly recruited from the fellahin of Arabi's disbanded troops, sent in chains from Egypt. After a month's vigorous drilling Hicks led 5000 of his men against an equal force of dervishes in Sennar, whom he defeated, and cleared the country between the towns of Sennar and Khartum of rebels. Relieved of the fear of an immediate attack by the mahdists the Egyptian officials at Khartum intrigued against Hicks, who in July tendered his resignation. This resulted in the dismissal of Suliman Niazi and the appointment of Hicks as commander-in-chief of an expeditionary force to Kordofan with orders to crush the mahdi, who in January 1883 had captured El Obeid, the capital of that province. Hicks, aware of the worthlessness of his force for the purpose contemplated, stated his opinion that it would be best to "wait for Kordofan to settle itself" (telegram of the 5th of August). The Egyptian ministry, however, did not then believe in the power of the mahdi, and the expedition started from Khartum on the 9th of September. It was made up of 7000 infantry, 1000 cavalry and 2000 camp followers and included thirteen Europeans. On the 20th the force left the Nile at Duem and struck inland across the almost waterless wastes of Kordofan for Obeid. On the 5th of November the army, misled by treacherous guides and thirst-stricken, was ambuscaded in dense forest at Kashgil, 30 m. south of Obeid. With the exception of some 300 men the whole force was killed. According to the story of Hicks's cook, one of the survivors, the general was the last officer to fall, pierced by the spear of the khalifa Mahommed Sherif. After emptying his revolver, the pasha kept his assailants at bay for some time

with his sword, a body of Baggara who fled before him being known afterwards as “Baggar Hicks” (the cows driven by Hicks), a play on the words *baggara* and *baggar*, the former being the herdsmen and the latter the cows. Hicks’s head was cut off and taken to the mahdi.

See *Mahdiism and the Egyptian Sudan*, book iv., by Sir F. R. Wingate (London, 1891), and *With Hicks Pasha in the Soudan*, by J. Colborne (London, 1884), Also EGYPT: *Military Operations*.

HIDALGO, an inland state of Mexico, bounded N. by San Luis Potosi and Vera Cruz, E. by Vera Cruz and Puebla, S. by Tlaxcala and Mexico (state), and W. by Querétaro. Pop. (1895) 551,817, (1900) 605,051. Area, 8917 sq. m. The northern and eastern parts are elevated and mountainous, culminating in the Cerro de Navajas (10,528 ft.). A considerable area of this region on the eastern side of the state is arid and semi-barren, being part of the elevated tableland of Apam where the *maguey* (American aloe) has been grown for centuries. The southern and western parts of the state consist of rolling plains, in the midst of which is the large lake of Metztitlan. Hidalgo produces cereals in the more elevated districts, sugar, maguey, coffee, beans, cotton and tobacco. Maguey is cultivated for the production of *pulque*, the national drink. The chief industry, however, is mining, the mineral districts of Pachuca, El Chico, Real del Monte, San José del Oro, and Zimapán being among the richest in Mexico. The mineral products include silver, gold, mercury, copper, iron, lead, zinc, antimony, manganese and plumbago. Coal, marble and opals are also found. Railway facilities are afforded by a branch of the Vera Cruz and Mexico line, which runs from Ometusco to Pachuca, the capital of the state, and by the Mexican Central. Among the principal towns are Tulancingo (pop. 9037), a rich mining centre 24 m. E. of Pachuca, Ixmiquilpán (about 9000) with silver mines 80 m. N. by W. of the Federal Capital, and Actópan (2666), the chief town of the district N.N.W. of Pachuca, inhabited principally by Indians of the Othomies nation.

HIDALGO (a Spanish word, contracted from *hijo d’algo* or *hijo de algo*, son of something, or somewhat), originally a Spanish title of the lower nobility; the hidalgo being the lowest grade of nobility which was entitled to use the prefix “don.” The term is now used generally to denote one of gentle birth. The Portuguese *fidalgo* has a similar history and meaning.

HIDALGO Y COSTILLA, MIGUEL (1753-1811), Mexican patriot, was born on the 8th of May 1753, on a farm at Corralejos, near Guanajuato. His mother’s maiden name was Gallaga, but contrary to the usual custom of the Spaniards he used only the surname of his father, Cristobal Hidalgo y Costilla. He was educated at Valladolid in Mexico, and was ordained priest in 1779. Until 1809 he was known only as a man of pious life who exerted himself to introduce various forms of industry, including the cultivation of silk, among his parishioners at Dolores. But Napoleon’s invasion of Spain in 1808 caused a widespread commotion. The colonists were indisposed to accept a French ruler and showed great zeal in proclaiming Ferdinand VII. as king. The societies they formed for their professedly loyal purpose were regarded, however, by the Spanish authorities with suspicion as being designed to prepare the independence of Mexico. Hidalgo and several of his friends, among whom was Miguel Dominguez, mayor of Querétaro, engaged in consultation and preparations which the authorities considered treasonable. Dominguez was arrested, but Hidalgo was warned in time. He collected some hundred of his parishioners, and on the 16th of September 1810 they seized the prison at Dolores. This action began what was in fact a revolt against the Spanish and Creole elements of the population. With what is known as the “*grito*” or cry of Dolores as their rallying shout, a multitude gathered round Hidalgo, who took for his banner a wonder-working picture of the Virgin belonging to a popular shrine. At first he met with some success. A regiment of dragoons of the militia joined him, and some small posts were stormed. The whole tumultuous host moved on the city of Mexico. But here the Spaniards and Creoles were concentrated. Hidalgo lost heart and retreated. Many of his followers deserted, and on the march to Querétaro he was attacked at Aculco by General Felix Calleja on the 7th of November 1810, and routed. He endeavoured to continue the struggle, and did succeed in collecting a mob estimated at 100,000 about Guadalajara. With this ill-armed and undisciplined crowd he took up a position on the bridge of Calderon on the river Santiago. On the 17th of January 1811 he was completely beaten by Calleja and a small force of soldiers. Hidalgo was deposed by the other leaders, and soon afterwards

all of them were betrayed to the Spaniards. They were tried at Chihuahua, and condemned. Hidalgo was first degraded from the priesthood and then shot as a rebel, on the 31st of July or the 1st of August 1811.

See H. H. Bancroft, *The Pacific States*, vol. vii., which contains a copious bibliography.

HIDDENITE, a green transparent variety of spodumene, (*q.v.*) used as a gem-stone. It was discovered by William E. Hidden (b. 1853) about 1879 at Stonypoint, Alexander county, North Carolina, and was at first taken for diopside. In 1881 J. Lawrence Smith proved it to be spodumene, and named it. Hiddenite occurs in small slender monoclinic crystals of prismatic habit, often pitted on the surface. A well-marked prismatic cleavage renders the mineral rather difficult to cut. Its colour passes from an emerald green to a greenish-yellow, and is often unevenly distributed through the stone. The mineral is dichroic in a marked degree, and shows much "fire" when properly cut. The composition of the mineral is represented by the formula $LiAl(SiO_3)_2$, the green colour being probably due to the presence of a small proportion of chromium. The presence of lithia in this green mineral suggested the inappropriate name of lithia emerald, by which it is sometimes known. Hiddenite was originally found as loose crystals in the soil, but was afterwards worked in a veinstone, where it occurred in association with beryl, quartz, garnet, mica, rutile, &c.

HIDE[1] (Lat. *hida*, A.-S. *higíd*, *híd* or *hiwisc*, members of a household), a measure of land. The word was in general use in England in Anglo-Saxon and early English times, although its meaning seems to have varied somewhat from time to time. Among its Latin equivalents are *terra unius familiae*, *terra unius cassati* and *mansio*; the first of these forms is used by Bede, who, like all early writers, gives to it no definite area. In its earliest form the hide was the typical holding of the typical family. Gradually, this typical holding came to be regarded as containing 120 "acres" (not 120 acres of 4840 sq. yds. each, but 120 times the amount of land which a ploughteam of eight oxen could plough in a single day). This definition appears to have been very general in England before the Norman Conquest, and in Domesday Book 30, 40, 50 and 80 acres are repeatedly mentioned as fractions of a hide. Some historians, however, have thought that the hide only contained 30 acres or thereabouts.

"The question about the hide," says Professor Maitland in *Domesday Book and Beyond*, "is 'pre-judicial' to all the great questions of early English history." The main argument employed by J. M. Kemble (*The Saxons in England*) in favour of the "small" hide is that the number of hides stated to have existed in the various parts of England gives an acreage far in excess of the total acreage of these parts, making due allowance for pasture and for woodland, an allowance necessary because the hide was only that part of the land which came under the plough, and each hide must have carried with it a certain amount of pasture. Two illustrations in support of Kemble's theory must suffice. Bede says the Isle of Wight contained 1200 hides. Now 1200 hides of 120 acres each gives a total acreage of 144,000 acres, while the total acreage of the island to-day is only 93,000 acres. Again a document called *The Tribal Hidage* puts the number of hides in the whole of England at nearly a quarter of a million. This gives in acres a figure about equal to the total acreage of England at the present time, but it leaves no room for pasture and for the great proportion of land which was still woodland. On these grounds Kemble regarded the hide as containing 30 or 33, certainly not more than 40 acres, and thought that each acre contained about 4000 sq. yds., *i.e.* that it was roughly equal to the modern acre. Another argument brought forward is that 30 or 40 acres was enough land for the support of the average family, in other words that it was the *terra unius familiae* of Bede. Another Domesday student, R. W. Eyton, puts down the hide at 48 acres.

But formidable arguments have been advanced against the "small" hide. There is no doubt that at the time of Domesday the hide was equated with 120 and not with 30 acres. Then, taking the word *familia* in its proper sense, a household with many dependent members, and making an allowance for primitive methods of agriculture, it is questionable whether 30 or 40 acres were sufficient for its support; and again if the equation 1 hide = 120 acres is rejected there is no serious evidence in favour of any other. A possible explanation is that, although in early Anglo-Saxon times the hide consisted of 30 acres or thereabouts, it had come before the time of Domesday to contain 120 acres. But no trace of such change can be found; there is no break in the continuity of the land-charters which refer to hides and manses. Reviewing the whole question Professor Maitland accepts the view that the hide contained 120 acres. The difficulties are serious but they are not insuperable. Bede, writing in a primitive age and speaking for the most part of lands far away from Northumbria, uses figures in a vague and general fashion; then the hide of 120 acres does not mean 120 times 4840 yds., it means much less; and lastly at the time of Domesday the hide was not a unit of measurement,

it was a unit for purposes of taxation. On the other hand, Mr. H. M. Chadwick (*Studies on Anglo-Saxon Institutions*) says there is no evidence that the hide contained 120 acres before the 10th century. He suggests that possibly the size of the hide in Mercia may have been fixed at 40 acres, while in Wessex it was regarded as containing 120 acres. Dr Stubbs (*Const. Hist.* i.) suggests that the confusion may have arisen because the word was used "to express the whole share of one man in all the fields of the village." Thus it might refer to 30 acres, his share in one field, or to 120 acres, his share in the four fields. He adds, however, that this explanation is not adequate for all cases. But these differences about the size of the hide are not peculiar to modern times. Henry of Huntingdon says, *Hida Anglice vocatur terra unius aratri culturae sufficiens per annum*, while the *Dialogus de scaccario puts its size at 100 acres, though this may be the long hundred, or* 120. Perhaps, therefore, Selden is wisest when he says, "hides were of an incertain quantity." Certainly he gives a very good description of the early hide when he says (*Titles of Honour*): "Now a hide of land regularly is and was (as I think) as much land as might be well manured with one plough, together with pasture, meadow and wood competent for the maintenance of that plough, and the servants of the family." The view that the size of the hide varied from district to district is borne out by Professor Vinogradoff's more recent researches. In his *English Society in the Eleventh Century* he mentions that there was a hide of 48 acres in Wiltshire and one of 40 acres in Dorset. In addition some authorities distinguish between English hides and Welsh hides, and in Sussex the hide often contained 8 virgates. Sometimes again in the 11th century hides were not merely fiscal units; they were shares in the land itself.

The fact that the hide was a unit of assessment, has been established by Mr J. H. Round in his *Feudal England*, and is regarded as throwing a most valuable light upon the many problems which present themselves to the student of Domesday. The process which converted the hide from a unit of measurement to a unit for assessment purposes is probably as follows. Being in general use to denote a large piece of land, and such pieces of land being roughly equal all over England, the hide was a useful unit on which to levy taxation, a use which dates doubtless from the time of the Danegeld. For some time the two meanings were used side by side, but before the Norman Conquest the hide, a unit for taxation, had quite supplanted the hide, a measure of land, and this was the state of affairs when in 1086 William I. ordered his great inquest to be made. The formula used in Domesday varies from county to county, but a single illustration may be given. *Huntedun Burg defendebat se ad geldum regis pro quarta parte de Hyrstingestan hundred pro L. hidis*. This does not mean that the town of Huntingdon contained a certain fixed number of square yards multiplied by 50, but that for purposes of taxation Huntingdon was regarded as worth 50 times a certain fiscal unit.

This view of the nature of the hide was hinted at by R. W. Eyton in *A Key to Domesday* and was accepted by Maitland. Its proof rests primarily upon the prevalence of the five-hide unit. By collating various documents which formed part of the Domesday inquest Mr Round has brought together for certain parts of England, especially for Cambridgeshire and Bedfordshire, the holdings of the various lords in the different vills, and vill after vill shows a total of 5 hides or 10 hides or only a slight discrepancy therefrom. A similar result is shown for the hundreds where multiples of 5 are almost universal, and the total hidage for the county of Worcester is very near the round figure of 1200. This arrangement is obviously artificial; it must have been imposed upon the counties or the hundreds by the central authority and then divided among the vills. Another proof is found in what is called "beneficial hidation." It is shown that in certain cases the number of hides in a hundred has been reduced since the time of Edward the Confessor, and that this reduction had been transferred *pro rata* to the vills in the hundred. Thus Mr Round concludes that the hide was fixed "independently of area or value." Some slight criticism has been directed against the idea of "artificial hidation," but the most that can be said against it is that its proof rests upon isolated cases, a reproach which further research will doubtless remove. However, Professor Vinogradoff accepts the hide primarily as a fiscal unit "which corresponds only in a very rough way to the agrarian reality," and Maitland says the fiscal hide is "at its best a lame compromise between a unit of area and a unit of value."

What is the origin of the five-hide unit? Various conjectures have been hazarded, and the unit is undoubtedly older than the Danegeld. Rejecting the idea that it is of Roman or of British origin, and pointing to the serious difference in the rates at which the various counties were assessed, Mr Round thinks that it dates from the time when the various Anglo-Saxon kingdoms were independent. Possibly it was the unit of assessment for military service, possibly it was the recognized endowment of a Saxon thegn. In Anglo-Saxon times a man's standing in society was dependent to a great extent upon the number of hides which he possessed; this statement is fully proved from the laws. Moreover, in the laws of the Wessex king, Ine, the value of a man's oath is expressed in hides, the oath for a king's thegn being probably worth 60 hides and that of a ceorl 5 hides.

The usual division of the hide was into virgates, a virgate being, after the Conquest at least, the normal holding of the villein with two oxen. Mr Round holds that in Domesday at all events the hide always consisted of four virgates; Mr F. Seebohm in *The English Village Community*, although thinking that the normal hide "consisted as a rule of four virgates of 30 acres each," says that the Hundred Rolls for Huntingdonshire show that "the hide did not always contain the same number of virgates." The virgate, it may be noted, consisted of a strip of land in *each* acre of the hide, and there is undoubtedly a strong case in favour of the equation 1 hide = 4 virgates.

Mr Seebohm, propounding his theory that English institutions are rooted in those of Rome, argues for some resemblance between the methods of taxation of land in Rome and in England; he sees

some connexion between the Roman *centuria* and the hide, and between the Roman system of taxation called *jugatio* and the English hidage. Professor Vinogradoff (*Villainage in England*) summarizes the views of those who hold a contrary opinion thus: "The curious fact that the normal holding, the hide, was equal all over England can be explained only by its origin; it came full-formed from Germany and remained unchanged in spite of all diversities of geographical and economical conditions."

> In the Danish parts of England, or rather in the district of the "Five Boroughs," the carucate takes the place of the hide as the unit of value, and six supplants five, six carucates being the unit of assessment. In Leicestershire and in part of Lancashire the hide is quite different from what it is elsewhere in England. According to Mr Round the Leicestershire hide consisted of 18 carucates; Mr W. H. Stevenson (*English Historical Review*, vol. v.) argues that it contained only 12 and that it was a hundred and not a hide. Mr Seebohm thinks there was a *solanda* or double hide of 240 acres in Essex and other southern counties, but Mr Round does not think that this word refers to a measure or unit of assessment at all. For Kent, however, the word *sullung* or solin, is used in *Domesday Book* and in the charters instead of hide and carucate as elsewhere, and Vinogradoff thinks that this contained from 180 to 200 acres.

Under the Norman and early Plantagenet kings a levy of two or more shillings on each hide of land was a usual and recognized method of raising money, royal and some other estates, however, as is seen from Domesday, not being hidated and not paying the tax. This geld, or tax, received several names, one of the most general being *hidage* (Lat. *hidagium*). "Hidage," says Vinogradoff, "is historically connected with the old English Danegeld system," and as Danegeld and then hidage it was levied long after its original purpose was forgotten, and was during the 11th century "the most sweeping and the heaviest of all the taxes." Henry of Huntingdon says its usual rate was 2s. on each hide of land, and this was evidently the rate at the time of the famous dispute between Henry II. and Becket at Woodstock in 1163, but it was not always kept at this figure, as in 1084 William I. had levied a tax of 6s. on each hide, an unusual extortion. The feudal aids were levied on the hide. Thus in 1109 Henry I. raised one at the rate of 3s. per hide for the marriage of his daughter Matilda with the emperor Henry V., and in 1194, when money was collected for the ransom of Richard I., some of the taxation for this purpose seems to have been assessed according to the hidage given in Domesday Book.

By this time the word hidage as the designation of the tax was disappearing, its place being taken by the word *carucage*. The carucate (Lat. *caruca*, a plough) was a measure of land which prevailed in the north of England, the district inhabited by people of Danish descent. Some authorities regard it as equivalent to the hide, others deny this identity. In 1198, however, when Richard I. imposed a tax of 5s. on each *carucata terrae sive hyda*, the two words were obviously interchangeable, and about the same time the size of the carucate was fixed at 100 acres. The word carucage remained in use for some time longer, and then other names were given to the various taxes on land.

> One or two other questions with regard to the hide still remain unsolved. What is the connexion, if any, between the hundred and a hundred hides? Again, was the size of the hide fixed at 120 acres to make the work of reckoning the amount of Danegeld, or hidage, a simple process? 120 acres to the hide, 240 pence to the pound, makes calculations easy. Lastly, is the English hide derived from the German *hufe* or *huba*?
>
> (A. W. H.*)

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1 The homonym "hide," meaning to conceal, is in O. Eng. *hýdan*; the word appears in various forms in Old Teutonic languages. The root is probably seen in Gr. κεύθειν to hide, or may be the same as in "hide," skin, O. Eng. *hýd*, which is also seen in Ger. *Haut*, Dutch *huid*; the root appears in Lat. *cutis*, Gr. κύτος. The Indo-European root *ku-*, weakened form of *sku-*, seen in "sky," and meaning "to cover," may be the ultimate source of both words. The slang use of "to hide," to flog or whip, means "to take the skin off, to flay."

HIEL, EMMANUEL (1834-1899), Belgian-Dutch poet and prose writer, was born at Dendermonde, in Flanders, in May 1834. He acted in various functions, from teacher and government official to journalist and bookseller, busily writing all the time both for the theatre and the magazines of North and South Netherlands. His last posts were those of librarian at the Industrial Museum and professor of declamation at the Conservatoire in Brussels. Among his better-known poetic works may be cited *Looverkens* ("Leaflets," 1857); *Nieuwe Liedekens* ("New Poesies," 1861); *Gedichten* ("Poems," 1863); *Psalmen, Zangen, en Oratorios* ("Psalms, Songs, and Oratorios," 1869); *De Wind* (1869), an inspiriting cantata, which had a large measure of success and was crowned; *De Liefde in 't Leven* ("Love in Life," 1870); *Elle* and *Isa* (two musical dramas, 1874); *Liederen voor Groote en Kleine Kinderen* ("Songs for Big and Small Folk," 1879); *Jakoba van Beieren* ("Jacqueline of Bavaria," a poetic drama, 1880); *Mathilda van Denemarken* (a lyrical drama, 1890). His collected poetical works were published in three volumes at Rousselaere in 1885. Hiel took an active and prominent part in the so-called "Flemish movement" in Belgium, and his name is

constantly associated with those of Jan van Beers, the Willems and Peter Benoit. The last wrote some of his compositions to Hiel's verses, notably to his oratorios *Lucifer* (performed in London at the Royal Albert Hall and elsewhere) and *De Schelde* ("The Scheldt"); whilst the Dutch composer, Richard Hol (of Utrecht), composed the music to Hiel's "Ode to Liberty," and van Gheluwe to the poet's "Songs for Big and Small Folk" (second edition, much enlarged, 1879), which has greatly contributed to their popularity in schools and among Belgian choral societies. Hiel also translated several foreign lyrics. His rendering of Tennyson's *Dora* appeared at Antwerp in 1871. For the national festival of 1880 at Brussels, to commemorate the fiftieth anniversary of Belgian independence, Hiel composed two cantatas, *Belgenland* ("The Land of the Belgians") and *Eer Belgenland* ("Honour to Belgium"), which, set to music, were much appreciated. He died at Schaerbeek, near Brussels, on the 27th of August 1899. Hiel's efforts to counteract Walloon influences and bring about a *rapprochement* between the Netherlanders in the north and the Teutonic racial sympathizers across the Rhine made him very popular with both, and a volume of his best poems was in 1874 the first in a collection of Dutch authors published at Leipzig.

HIEMPSAL, the name of the two kings of Numidia. For Hiempsal I. see under JUGURTHA. Hiempsal II. was the son of Gauda, the half-brother of Jugurtha. In 88 B.C., after the triumph of Sulla, when the younger Marius fled from Rome to Africa, Hiempsal received him with apparent friendliness, his real intention being to detain him as a prisoner. Marius discovered this intention in time and made good his escape with the assistance of the king's daughter. In 81 Hiempsal was driven from his throne by the Numidians themselves, or by Hiarbas, ruler of part of the kingdom, supported by Cn. Domitius Ahenobarbus, the leader of the Marian party in Africa. Soon afterwards Pompey was sent to Africa by Sulla to reinstate Hiempsal, whose territory was subsequently increased by the addition of some land on the coast in accordance with a treaty concluded with L. Aurelius Cotta. When the tribune P. Servilius Rullus introduced his agrarian law (63), these lands, which had been originally assigned to the Roman people by Scipio Africanus, were expressly exempted from sale, which roused the indignation of Cicero (*De lege agraria*, i. 4, ii. 22). From Suetonius (*Caesar*, 71) it is evident that Hiempsal was alive in 62. According to Sallust (*Jugurtha*, 17), he was the author of an historical work in the Punic language.

Plutarch, *Marius*, 40, *Pompey*, 12; Appian, *Bell. civ.*, i. 62. 80; Dio Cassius xli. 41.

HIERAPOLIS. 1. (Arabic *Manbij* or *Mumbij*) an ancient Syrian town occupying one of the finest sites in Northern Syria, in a fertile district about 16 m. S.W. of the confluence of the Sajur and Euphrates. There is abundant water supply from large springs. In 1879, after the Russo-Turkish war, a colony of Circassians from Vidin (Widdin) was planted in the ruins, and the result has been the constant discovery of antiquities, which find their way into the bazaars of Aleppo and Aintab. The place first appears in Greek as *Bambyce*, but Pliny (v. 23) tells us its Syrian name was *Mabog*. It was doubtless an ancient Commagenian sanctuary; but history knows it first under the Seleucids, who made it the chief station on their main road between Antioch and Seleucia-on-Tigris; and as a centre of the worship of the Syrian Nature Goddess, Atargatis (*q.v.*), it became known to the Greeks as the city of the sanctuary Ἱερόπολις, and finally as the Holy City Ἱεράπολις. Lucian, a native of Commagene (or some anonymous writer) has immortalized this worship in the tract *De Dea Syria*, wherein are described the orgiastic luxury of the shrine and the tank of sacred fish, of which Aelian also relates marvels. According to the *De Dea Syria*, the worship was of a phallic character, votaries offering little male figures of wood and bronze. There were also huge *phalli* set up like obelisks before the temple, which were climbed once a year with certain ceremonies, and decorated. For the rest the temple was of Ionic character with golden plated doors and roof and much gilt decoration. Inside was a holy chamber into which priests only were allowed to enter. Here were statues of a goddess and a god in gold, but the first seems to have been the more richly decorated with gems and other ornaments. Between them stood a gilt *xoanon*, which seems to have been carried outside in sacred processions. Other rich furniture is described, and a mode of divination by movements of a *xoanon* of Apollo. A great bronze altar stood in front, set about with statues, and in the forecourt lived numerous sacred animals and birds (but not swine) used for sacrifice. Some three hundred priests served the shrine and there were numerous minor ministrants. The lake was the centre of sacred festivities and it was customary for votaries to swim out and decorate an altar standing in the middle of the water. Self-mutilation and other orgies went on in the temple precinct, and there was an elaborate ritual on entering the city and first visiting the shrine under the conduct of local guides, which reminds one of the Meccan Pilgrimage.

The temple was sacked by Crassus on his way to meet the Parthians (53 B.C.); but in the 3rd

century of the empire the city was the capital of the Euphratensian province and one of the great cities of Syria. Procopius called it the greatest in that part of the world. It was, however, ruinous when Julian collected his troops there ere marching to his defeat and death in Mesopotamia, and Chosroes I. held it to ransom after Justinian had failed to put it in a state of defence. Harun restored it at the end of the 8th century and it became a bone of contention between Byzantines, Arabs and Turks. The crusaders captured it from the Seljuks in the 12th century, but Saladin retook it (1175), and later it became the headquarters of Hulagu and his Mongols, who completed its ruin. The remains are extensive, but almost wholly of late date, as is to be expected in the case of a city which survived into Moslem times. The walls are Arab, and no ruins of the great temple survive. The most noteworthy relic of antiquity is the sacred lake, on two sides of which can still be seen stepped quays and water-stairs. The first modern account of the site is in a short narrative appended by H. Maundrell to his *Journey from Aleppo to Jerusalem*. He was at Mumbij in 1699.

The coinage of the city begins in the 4th century B.C. with an Aramaic series, showing the goddess, either as a bust with mural crown or as riding on a lion. She continues to supply the chief type even during imperial times, being generally shown seated with the *tympanum* in her hand. Other coins substitute the legend Θεᾶς Συρίας ἱεροπολιτῶν, within a wreath. It is interesting to note that from *Bambyce* (near which much silk was produced) were derived the *bombycina vestis* of the Romans and, through the crusaders, the bombazine of modern commerce.

See F. R. Chesney, *Euphrates Expedition* (1850); W. F. Ainsworth, *Personal Narrative of the Euphrates Expedition* (1888); E. Sachau, *Reise in Syrien*, &c. (1883); D. G. Hogarth in *Journal of Hellenic Studies* (1909).

2. A Phrygian city, altitude 1200 ft. on the right bank of the Churuk Su (Lycus), about 8 m. above its junction with the Menderes (Maeander), situated on a broad terrace, 200 ft. above the valley and 6 m. N. of Laodicea. On the terrace rise calcareous springs, that have deposited vast incrustations of snowy whiteness. To these springs, which are warm and slightly sulphureous, and to the "Plutonium"—a hole reaching deep into the earth, from which issued a mephitic vapour—the place owed its celebrity and sanctity. Here, at an early date, a religious establishment (*hieron*) existed in connexion with the old Phrygian Kydrara, a settlement of the tribe Hydrelitae; and the town which grew round it became one of the greatest centres of Phrygian native life but of non-political importance. The chief religious festival was the Letoia, named after the goddess Leto, a local variety of the Mother Goddess (Cybele), who was honoured with orgiastic rites in which elements of the original Anatolian matriarchate and Nature-cult survived: there was also a worship of Apollo Lairbenos. Hierapolis was the seat of an early church (Col. iv. 13), with which tradition closely connects the apostle Philip. Epictetus, the philosopher, and Papias, a disciple of St John and author of a lost work on the Sayings of Jesus, were born there. Hierapolis is now easily reached from Gonjeli, a station on the Dineir railway about 7 m. distant. A village of Yuruks has gradually grown below the site. The native name for the place is apparently *Pambuk Kale* (though doubt has been thrown on the statement), and this has always been explained by the cotton-like appearance of the white incrustations. It should be noted, however, that this name, if genuine, is curiously like that given by the Syrians to the Commagenian Hierapolis (above), *Bambyce*, the origin of which it has been suggested was a native name of the goddess Pambē or Mambē (whence Mabog). Considering that cotton is a comparatively modern phenomenon in Anatolia, it is worth suggesting that *Pambuk* in this case may be a survival of a primitive name, derived from the same goddess, Pambē. The goddesses of the two Hierapoleis were in any case closely akin. If an old native name has reappeared here after the decline of Greek influence, and been given a meaning in modern Turkish, it affords another instance of a very common feature of west Asian nomenclature. Combined with the petrified terraces, the ruins of Hierapolis present the most attractive of the easily accessible spectacles in Asia Minor. They are remarkable for the long avenue of tombs, mostly inscribed sarcophagi on plinths, by which the city is approached from the W., and for a very perfect theatre partly excavated in the hill at the N. side of the site. Stage buildings as well as auditorium are well preserved. On the S., just above the white terraces and largely blocked with petrified deposit, stand large baths, into which the natural warm spring was once conducted. Behind these is a fine triumphal arch, whence runs a colonnade. Ruins of several churches survive, and also of a large basilica. There is a sulphureous pool which may represent the "Plutonium," but it has no such deadly power as was ascribed to that pond. Ramsay thinks that the "Plutonium" was obliterated by Christians in the 4th century. Over 300 inscriptions have been collected, mostly sepulchral, whence Ramsay has deduced interesting facts about the very early Christian community which existed here. The site has been often visited and described, and was systematically examined in 1887 by parties under W. M. Ramsay and K. Humann respectively.

See K. Humann, *Altertümer v. Hierapolis* (1888); Sir W. M. Ramsay, *Cities and Bishoprics of Phrygia*, vol. i. (1895).

(C. W. W.; D. G. H.)

HIERARCHY (Gr. ἱερός, holy, and ἄρχειν, to rule), the office of a steward or guardian of holy things, not a "ruler of priests" or "priestly ruler" (see Boeckh, *Corp. inscr. Gr.* No. 1570), a term commonly used in ecclesiastical language to denote the aggregate of those persons who exercise authority within the Christian Church, the patriarchate, episcopate or entire three-fold order of the clergy. The word ἱεραρχία, which does not occur in any classical Greek writer, owes its present extensive currency to the celebrated writings of Dionysius Areopagiticus. Of these the most important are the two which treat of the celestial and of the ecclesiastical hierarchy respectively. Defining hierarchy as the "function which comprises all sacred things," or, more fully, as "a sacred order and science and activity, assimilated as far as possible to the godlike, and elevated to the imitation of God proportionately to the Divine illuminations conceded to it," the author proceeds to enumerate the nine orders of the heavenly host, which are subdivided again into hierarchies or triads, in descending order, thus: Seraphim, Cherubim, Thrones; Dominations, Virtues, Powers; Principalities, Archangels, Angels. These all exist for the common object of raising men through ascending stages of purification and illumination to perfection. The ecclesiastical or earthly hierarchy is the counterpart of the other. In it the first or highest triad is formed by baptism, communion and chrism. The second triad consists of the three orders of the ministry, bishop or hierarch, priest and minister or deacon (ἱεράρχης, ἱερεύς, λειτουργός); this is the earliest known instance in which the title hierarch is applied to a bishop. The third or lowest triad is made up of monks, "initiated" and catechumens. To Dionysius may be traced, through Thomas Aquinas and other Catholic writers of the intervening period, the definition of the term usually given by Roman Catholic writers—"coëtus seu ordo praesidum et sacrorum ministrorum ad regendam ecclesiam gignendamque in hominibus sanctitatem divinitus institutus"[1]—although it immediately rests upon the authority of the sixth canon of the twenty-third session of the council of Trent, in which anathema is pronounced upon all who deny the existence within the Catholic Church of a hierarchy instituted by divine appointment, and consisting of bishops, priests and ministers.[2] (See Order, Holy).

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1 Perrone, *De locis theologicis*, pt. i., sec. i. cap. 2.

2 Si quis dixerit in ecclesia catholica non esse hierarchiam divina ordinatione institutam, quae constat ex episcopis, presbyteris, et ministris: anathema sit.

HIERATIC, priestly or sacred (Gr. ἱερατικός, ἱερός, sacred), a term particularly applied to a style of ancient Egyptian writing, which is a simplified cursive form of hieroglyphic. The name was first given by Champollion (see Egypt, § *Language*).

HIERAX, or Hieracas, a learned ascetic who flourished about the end of the 3rd century at Leontopolis in Egypt, where he lived to the age of ninety, supporting himself by calligraphy and devoting his leisure to scientific and literary pursuits, especially to the study of the Bible. He was the author of Biblical commentaries both in Greek and Coptic, and is said to have composed many hymns. He became leader of the so-called sect of the Hieracites, an ascetic society from which married persons were excluded, and of which one of the leading tenets was that only the celibate could enter the kingdom of heaven. He asserted that the suppression of the sexual impulse was emphatically the new revelation brought by the Logos, and appealed to 1 Cor. vii., Heb. xii. 14, and Matt. xix. 12, xxv. 21. Hierax may be called the connecting link between Origen and the Coptic monks. A man of deep learning and prodigious memory, he seems to have developed Origen's Christology in the direction of Athanasius. He held that the Son was a torch lighted at the torch of the Father, that Father and Son are a bipartite light. He repudiated the ideas of a bodily resurrection and a material paradise, and on the ground of 2 Tim. ii. 5 questioned the salvation of even baptized infants, "for without knowledge no conflict, without conflict no reward." In his insistence on virginity as the specifically Christian virtue he set up the great theme of the church of the 4th and 5th centuries.

HIERO (strictly Hieron), the name of two rulers of Syracuse.

HIERO I. was the brother of Gelo, and tyrant of Syracuse from 478 to 467/6 B.C. During his reign he greatly increased the power of Syracuse. He removed the inhabitants of Naxos and Catana to Leontini, peopled Catana (which he renamed Aetna) with Dorians, concluded an alliance with Acragas (Agrigentum), and espoused the cause of the Locrians against Anaxilaus, tyrant of Rhegium. His most important achievement was the defeat of the Etruscans at Cumae (474), by which he saved the Greeks of Campania. A bronze helmet (now in the British Museum), with an inscription commemorating the event, was dedicated at Olympia. Though despotic in his rule Hiero was a liberal patron of literature. He died at Catana in 467.

See Diod. Sic. xi. 38-67; Xenophon, *Hiero*, 6. 2; E. Lübbert, *Syrakus zur Zeit des Gelon und Hieron* (1875); for his coins see NUMISMATICS (section *Sicily*).

HIERO II., tyrant of Syracuse from 270 to 216 B.C., was the illegitimate son of a Syracusan noble, Hierocles, who claimed descent from Gelo. On the departure of Pyrrhus from Sicily (275) the Syracusan army and citizens appointed him commander of the troops. He materially strengthened his position by marrying the daughter of Leptines, the leading citizen. In the meantime, the Mamertines, a body of Campanian mercenaries who had been employed by Agathocles, had seized the stronghold of Messana, whence they harassed the Syracusans. They were finally defeated in a pitched battle near Mylae by Hiero, who was only prevented from capturing Messana by Carthaginian interference. His grateful countrymen then chose him king (270). In 264 he again returned to the attack, and the Mamertines called in the aid of Rome. Hiero at once joined the Punic leader Hanno, who had recently landed in Sicily; but being defeated by the consul Appius Claudius, he withdrew to Syracuse. Pressed by the Roman forces, in 263 he was compelled to conclude a treaty with Rome, by which he was to rule over the south-east of Sicily and the eastern coast as far as Tauromenium (Polybius i. 8-16; Zonaras viii. 9). From this time till his death in 216 he remained loyal to the Romans, and frequently assisted them with men and provisions during the Punic wars (Livy xxi. 49-51, xxii. 37, xxiii. 21). He kept up a powerful fleet for defensive purposes, and employed his famous kinsman Archimedes in the construction of those engines that, at a later date, played so important a part during the siege of Syracuse by the Romans.

A picture of the prosperity of Syracuse during his rule is given in the sixteenth idyll of Theocritus, his favourite poet. See Diod. Sic. xxii. 24-xxvi. 24; Polybius i. 8-vii. 7; Justin xxiii. 4.

HIEROCLES, proconsul of Bithynia and Alexandria, lived during the reign of Diocletian (A.D. 284-305). He is said to have been the instigator of the fierce persecution of the Christians under Galerius in 303. He was the author of a work (not extant) entitled λόγοι φιλαλήθεις πρὸς τοὺς Χριστιανούς in two books, in which he endeavoured to persuade the Christians that their sacred books were full of contradictions, and that in moral influence and miraculous power Christ was inferior to Apollonius of Tyana. Our knowledge of this treatise is derived from Lactantius (*Instit. div.* v. 2) and Eusebius, who wrote a refutation entitled Ἀντιῤῥητικὸς πρὸς τὰ Ἰεροκλέους.

HIEROCLES OF ALEXANDRIA, Neoplatonist writer, flourished *c.* A.D. 430. He studied under the celebrated Neoplatonist Plutarch at Athens, and taught for some years in his native city. He seems to have been banished from Alexandria and to have taken up his abode in Constantinople, where he gave such offence by his religious opinions that he was thrown into prison and cruelly flogged. The only complete work of his which has been preserved is the commentary on the *Carmina Aurea* of Pythagoras. It enjoyed a great reputation in middle age and Renaissance times, and there are numerous translations in various European languages. Several other writings, especially one on providence and fate, a consolatory treatise dedicated to his patron Olympiodorus of Thebes, author of ἱστορικοὶ λόγοι, are quoted or referred to by Photius and Stobaeus. The collection of some 260 witticisms (ἀστεῖα) called Φιλόγελως (ed. A. Eberhard, Berlin, 1869), attributed to Hierocles and Philagrius, has no connexion with Hierocles of Alexandria, but is probably a compilation of later date, founded on two older collections. It is now agreed that the fragments of the *Elements of Ethics* (Ἠθικὴ στοιχείωσις) preserved in Stobaeus are from a work by a Stoic named Hierocles, contemporary of Epictetus, who has been identified with the "Hierocles Stoicus vir sanctus et gravis" in Aulus Gellius (ix. 5. 8). This theory is confirmed by the discovery of a papyrus (ed. H. von

Arnim in *Berliner Klassikertexte*, iv. 1906; see also C. Prächter, *Hierokles der Stoiker*, 1901).

There is an edition of the commentary by F. W. Mullach in *Fragmenta philosophorum Graecorum* (1860), i. 408, including full information concerning Hierocles, the poem and the commentary; see also E. Zeller, *Philosophie der Griechen* (2nd ed.), iii. 2, pp. 681-687; W. Christ, *Geschichte der griechischen Literatur* (1898), pp. 834, 849.

Another Hierocles, who flourished during the reign of Justinian, was the author of a list of provinces and towns in the Eastern Empire, called Συνέκδημος ("fellow-traveller"; ed. A. Burckhardt, 1893); it was one of the chief authorities used by Constantine Porphyrogenitus in his work on the "themes" of the Roman Empire (see C. Krumbacher, *Geschichte der byzantinischen Literatur*, 1897, p. 417). In Fabricius's *Bibliotheca Graeca* (ed. Harles), i. 791, sixteen persons named Hierocles, chiefly literary, are mentioned.

HIEROGLYPHICS (Gr. ἱερός, sacred, and γλυφή, carving), the term used by Greek and Latin writers to describe the sacred characters of the ancient Egyptian language in its classical phase. It is now also used for various systems of writing in which figures of objects take the place of conventional signs. Such characters which symbolize the idea of a thing without expressing the name of it are generally styled "ideographs" (Gr. ἰδέα, idea, and γράφειν, to write), *e.g.* the Chinese characters.

See EGYPT, *Language*; CUNEIFORM; INSCRIPTIONS and WRITING.

HIERONYMITES, a common name for three or four congregations of hermits living according to the rule of St Augustine with supplementary regulations taken from St Jerome's writings. Their habit was white, with a black cloak. (1) The Spanish Hieronymites, established near Toledo in 1374. The order soon became popular in Spain and Portugal, and in 1415 it numbered 25 houses. It possessed some of the most famous monasteries in the Peninsula, including the royal monastery of Belem near Lisbon, and the magnificent monastery built by Philip II. at the Escurial. Though the manner of life was very austere the Hieronymites devoted themselves to studies and to the active work of the ministry, and they possessed great influence both at the Spanish and the Portuguese courts. They went to Spanish and Portuguese America and played a considerable part in Christianizing and civilizing the Indians. There were Hieronymite nuns founded in 1375, who became very numerous. The order decayed during the 18th century and was completely suppressed in 1835. (2) Hieronymites of the Observance, or of Lombardy: a reform of (1) effected by the third general in 1424; it embraced seven houses in Spain and seventeen in Italy, mostly in Lombardy. It is now extinct. (3) Poor Hermits of St Jerome, established near Pisa in 1377: it came to embrace nearly fifty houses whereof only one in Rome and one in Viterbo survive. (4) Hermits of St Jerome of the congregation of Fiesole, established in 1406: they had forty houses but in 1668 they were united to (3).

See Helyot, *Histoire des ordres religieux* (1714), iii. cc. 57-60, iv. cc. 1-3; Max Heimbucher, *Orden und Kongregationen* (1896), i. § 70; and art. "Hieronymiten" in Herzog-Hauck, *Realencyklopädie* (ed. 3), and in Welte and Wetzer, *Kirchenlexicon* (ed. 2).

(E. C. B.)

HIERONYMUS OF CARDIA, Greek general and historian, contemporary of Alexander the Great. After the death of the king he followed the fortunes of his friend and fellow-countryman Eumenes. He was wounded and taken prisoner by Antigonus, who pardoned him and appointed him superintendent of the asphalt beds in the Dead Sea. He was treated with equal friendliness by Antigonus's son Demetrius, who made him polemarch of Thespiae, and by Antigonus Gonatas, at whose court he died at the age of 104. He wrote a history of the Diadochi and their descendants, embracing the period from the death of Alexander to the war with Pyrrhus (323-272 B.C.), which is one of the chief authorities used by Diodorus Siculus (xviii.-xx.) and also by Plutarch in his life of Pyrrhus. He made use of official papers and was careful in his investigation of facts. The simplicity of his style rendered his work unpopular, but it is probable that it was on a high level as compared with that of his contemporaries. In the last part of his work he made a praiseworthy attempt to

acquaint the Greeks with the character and early history of the Romans. He is reproached by Pausanias (i. 9. 8) with unfairness towards all rulers with the exception of Antigonus Gonatas.

See Lucian, *Macrobii*, 22; Plutarch, *Demetrius*, 39; Diod. Sic. xviii. 42. 44. 50, xix. 100; Dion. Halic. *Antiq. Rom.* i. 6; F. Brückner, "De vita et scriptis Hieronymi Cardii" in *Zeitschrift für die Alterthumswissenschaft* (1842); F. Reuss, *Hieronymus von Kardia* (Berlin, 1876); C. Wachsmuth, *Einleitung in das Studium der alten Geschichte* (1895); fragments in C. W. Müller, *Frag. hist. Graec.* ii. 450-461.

HIERRO, or Ferro, an island in the Atlantic Ocean, forming part of the Spanish archipelago of the Canary Islands (*q.v.*). Pop. (1900) 6508; area 107 sq. m. Hierro, the most westerly and the smallest island of the group, is somewhat crescent-shaped. Its length is about 18 m., its greatest breadth about 15 m., and its circumference 50 m. It lies 92 m. W.S.W. of Teneriffe. Its coast is bound by high, steep rocks, which only admit of one harbour, but the interior is tolerably level. Its hill-tops in winter are sometimes wrapped in snow. Better and more abundant grass grows here than on any of the other islands. Hierro is exposed to westerly gales which frequently inflict great damage. Fresh water is scarce, but there is a sulphurous spring, with a temperature of 102° Fahr. The once celebrated and almost sacred Til tree, which was reputed to be always distilling water in great abundance from its leaves, no longer exists. Only a small part of the cultivable land is under tillage, the inhabitants being principally employed in pasturage. Valverde (pop. about 3000) is the principal town. Geographers were formerly in the habit of measuring all longitudes from Ferro, the most westerly land known to them. The longitude assigned at first has, however, turned out to be erroneous; and the so-called "Longitude of Ferro" does not coincide with the actual longitude of the island.

HIGDON (or Higden), **RANULF** (*c.* 1299-*c.* 1363), English chronicler, was a Benedictine monk of the monastery of St Werburg in Chester, in which he lived, it is said, for sixty-four years, and died "in a good old age," probably in 1363. Higdon was the author of a long chronicle, one of several such works based on a plan taken from Scripture, and written for the amusement and instruction of his society. It closes the long series of general chronicles, which were soon superseded by the invention of printing. It is commonly styled the *Polychronicon*, from the longer title *Ranulphi Castrensis, cognomine Higdon, Polychronicon* (*sive Historia Polycratica*) *ab initio mundi usque ad mortem regis Edwardi III. in septem libros dispositum*. The work is divided into seven books, in humble imitation of the seven days of Genesis, and, with exception of the last book, is a summary of general history, a compilation made with considerable style and taste. It seems to have enjoyed no little popularity in the 15th century. It was the standard work on general history, and more than a hundred MSS. of it are known to exist. The Christ Church MS. says that Higdon wrote it down to the year 1342; the fine MS. at Christ's College, Cambridge, states that he wrote to the year 1344, after which date, with the omission of two years, John of Malvern, a monk of Worcester, carried the history on to 1357, at which date it ends. According, however, to its latest editor, Higdon's part of the work goes no further than 1326 or 1327 at latest, after which time it was carried on by two continuators to the end. Thomas Gale, in his *Hist. Brit. &c., scriptores*, xv. (Oxon., 1691), published that portion of it, in the original Latin, which comes down to 1066. Three early translations of the *Polychronicon* exist. The first was made by John of Trevisa, chaplain to Lord Berkeley, in 1387, and was printed by Caxton in 1482; the second by an anonymous writer, was written between 1432 and 1450; the third, based on Trevisa's version, with the addition of an eighth book, was prepared by Caxton. These versions are specially valuable as illustrating the change of the English language during the period they cover.

The *Polychronicon*, with the continuations and the English versions, was edited for the Rolls Series (No. 41) by Churchill Babington (vols. i. and ii.) and Joseph Rawson Lumby (1865-1886). This edition was adversely criticized by Mandell Creighton in the *Eng. Hist. Rev.* for October 1888.

HIGGINS, MATTHEW JAMES (1810-1868), British writer over the nom-de-plume "Jacob Omnium," which was the title of his first magazine article, was born in County Meath, Ireland, on the 4th of December 1810. His letters in *The Times* were instrumental in exposing many abuses. He

was a frequent contributor to the *Cornhill*, and was a friend of Thackeray, who dedicated to him *The Adventures of Philip*, and one of his ballads, "Jacob Omnium's Hoss," deals with an incident in Higgins's career. He died on the 14th of August 1868. Some of his articles were published in 1875 as *Essays on Social Subjects*.

HIGGINSON, THOMAS WENTWORTH (1823-1911), American author and soldier, was born in Cambridge, Massachusetts, on the 22nd of December 1823. He was a descendant of Francis Higginson (1588-1630), who emigrated from Leicestershire to the colony of Massachusetts Bay and was a minister of the church of Salem, Mass., in 1629-1630; and a grandson of Stephen Higginson (1743-1828), a Boston merchant, who was a member of the Continental Congress in 1783, took an active part in suppressing Shay's Rebellion, was the author of the "Laco" letters (1789), and rendered valuable services to the United States government as navy agent from the 11th of May to the 22nd of June 1798. Graduating from Harvard in 1841, he was a schoolmaster for two years, studied theology at the Harvard Divinity School, and was pastor in 1847-1850 of the First Religious Society (Unitarian) of Newburyport, Massachusetts, and of the Free Church at Worcester in 1852-1858. He was a Free Soil candidate for Congress (1850), but was defeated; was indicted with Wendell Phillips and Theodore Parker for participation in the attempt to release the fugitive slave, Anthony Burns, in Boston (1853); was engaged in the effort to make Kansas a free state after the passage of the Kansas-Nebraska Bill of 1854; and during the Civil War was captain in the 51st Massachusetts Volunteers, and from November 1862 to October 1864, when he was retired because of a wound received in the preceding August, was colonel of the First South Carolina Volunteers, the first regiment recruited from former slaves for the Federal service. He described his experiences in *Army Life in a Black Regiment* (1870). In politics Higginson was successively a Republican, an Independent and a Democrat. His writings show a deep love of nature, art and humanity, and are marked by vigour of thought, sincerity of feeling, and grace and finish of style. In his *Common Sense About Women* (1881) and his *Women and Men* (1888) he advocated equality of opportunity and equality of rights for the two sexes.

Among his numerous books are *Outdoor Papers* (1863); *Malbone: an Oldport Romance* (1869); Life of *Margaret Fuller Ossoli* (in "American Men of Letters" series, 1884); *A Larger History of the United States of America to the Close of President Jackson's Administration* (1885); *The Monarch of Dreams* (1886); *Travellers and Outlaws* (1889); *The Afternoon Landscape* (1889), poems and translations; *Life of Francis Higginson* (in "Makers of America," 1891); *Concerning All of Us* (1892); *The Procession of the Flowers and Kindred Papers* (1897); *Henry Wadsworth Longfellow* (in "American Men of Letters" series, 1902); *John Greenleaf Whittier* (in "English Men of Letters" series, 1902); *A Reader's History of American Literature* (1903), the Lowell Institute lectures for 1903, edited by Henry W. Boynton; and *Life and Times of Stephen Higginson* (1907). His volumes of reminiscence, *Cheerful Yesterdays* (1898), *Old Cambridge* (1899), *Contemporaries* (1899), and *Part of a Man's Life* (1905), are characteristic and charming works. His collected works were published in seven vols. (1900).

HIGHAM FERRERS, a market town and municipal borough in the Eastern parliamentary division of Northamptonshire, England, 63 m. N.N.W. from London, on branches of the London & North-Western and Midland railways. Pop. (1901), 2540. It is pleasantly situated on high ground above the south bank of the river Nene. The church of St Mary is among the most beautiful of the many fine churches in Northamptonshire. To the Early English chancel a very wide north aisle, resembling a second nave, was added in the Decorated period, and the general appearance of the chancel, with its north aisle and Lady-chapel, is Decorated. The tower with its fine spire and west front was partially but carefully rebuilt in the 17th century. Close to the church, but detached from it, stands a beautiful Perpendicular building, the school-house, founded by Archbishop Chichele in 1422. The Bede House, a somewhat similar structure by the same founder, completes a striking group of buildings. In the town are remains of Chichele's college. Higham Ferrers shares in the widespread local industry of shoemaking. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 1945 acres.

Higham (Hecham, Heccam, Hegham Ferers) was evidently a large village before the Domesday Survey. It was then held by William Peverel of the king, but on the forfeiture of the lordship by his son it was granted in 1199 to William Ferrers, earl of Derby. On the outlawry of Robert his grandson it passed to Edmund, earl of Lancaster, and, reverting to the crown in 1322, was granted to Aymer de Valence, earl of Pembroke, but escheated to the crown in 1327, and was granted to Henry, earl of Lancaster. The castle, which may have been built before Henry III. visited Higham in 1229, is

mentioned in 1322, but had been destroyed by 1540. It appears by the confirmation of Henry III. in 1251 that the borough originated in the previous year when William de Ferrers, earl of Derby, manumitted by charter ninety-two persons, granting they should have a free borough. A mayor was elected from the beginning of the reign of Richard II., while a town hall is mentioned in 1395. The revenues of Chichele's college were given to the corporation by the charter of 1566, whereby the borough returned one representative to parliament, a privilege enjoyed until 1832. James I. in 1604 gave the mayor the commission of the peace with other privileges which were confirmed by Charles II. in 1664. The old charters were surrendered in 1684 and a new grant obtained; a further charter was granted in 1887.

HIGHGATE, a northern district of London, England, partly in the metropolitan borough of St Pancras, but extending into Middlesex. It is a high-lying district, the greatest elevation being 426 ft. The Great North Road passes through Highgate, which is supposed to have received its name from the toll-gate erected by the bishop of London when the road was formed through his demesne in the 14th century. It is possible, however, that "gate" is used here in its old signification, and that the name means simply high road. The road rose so steeply here that in 1812 an effort was made to lessen the slope for coaches by means of an archway, and a new way was completed in 1900. In the time of stage-coaches a custom was introduced of making ignorant persons believe that they required to be sworn and admitted to the freedom of the Highgate before being allowed to pass the gate, the fine of admission being a bottle of wine. Not a few famous names occur among the former residents of Highgate. Bacon died here in 1626; Coleridge and Andrew Marvell, the poets, were residents. Cromwell House, now a convalescent home, was presented by Oliver Cromwell to his eldest daughter Bridget on her marriage with Henry Ireton (January 15, 1646/7). Lauderdale House, now attached to the public grounds of Waterlow Park, belonged to the Duke of Lauderdale, one of the "Cabal" of Charles II. Among various institutions may be mentioned Whittington's almshouses, near Whittington Stone, at the foot of Highgate Hill, on which the future mayor of London is reputed to have been resting when he heard the peal of Bow bells and "turned again." Highgate grammar school was founded (1562-1565) by Sir Roger Cholmley, chief-justice. St Joseph's Retreat is the mother-house of the Passionist Fathers in England. There is an extensive and beautiful cemetery on the slope below the church of St Michael.

HIGHLANDS, THE, that part of Scotland north-west of a line drawn from Dumbarton to Stonehaven, including the Inner and Outer Hebrides and the county of Bute, but excluding the Orkneys and Shetlands, Caithness, the flat coastal land of the shires of Nairn, Elgin and Banff, and all East Aberdeenshire (see SCOTLAND). This area is to be distinguished from the Lowlands by language and race, the preservation of the Gaelic speech being characteristic. Even in a historical sense the Highlanders were a separate people from the Lowlanders, with whom, during many centuries, they shared nothing in common. The town of Inverness is usually regarded as the capital of the Highlands. The Highlands consist of an old dissected plateau, or block, of ancient crystalline rocks with incised valleys and lochs carved by the action of mountain streams and by ice, the resulting topography being a wide area of irregularly distributed mountains whose summits have nearly the same height above sea-level, but whose bases depend upon the amount of denudation to which the plateau has been subjected in various places. The term "highland" is used in physical geography for any elevated mountainous plateau.

HIGHNESS, literally the quality of being lofty or high, a term used, as are so many abstractions, as a title of dignity and honour, to signify exalted rank or station. These abstractions arose in great profusion in the Roman empire, both of the East and West, and "highness" is to be directly traced to the *altitudo* and *celsitudo* of the Latin and the ὑψηλότης of the Greek emperors. Like other "exorbitant and swelling attributes" of the time, they were conferred on ruling princes generally. In the early middle ages such titles, couched in the second or third person, were "uncertain and much more arbitrary (according to the fancies of secretaries) than in the later times" (Selden, *Titles of Honour*, pt. i. ch. vii. 100). In English usage, "Highness" alternates with "Grace" and "Majesty," as the honorific title of the king and queen until the time of James I. Thus in documents relating to the reign of Henry VIII. all three titles are used indiscriminately; an example is the king's judgment

against Dr Edward Crome (d. 1562), quoted, from the lord chamberlain's books, ser. 1, p. 791, in *Trans. Roy. Hist. Soc.* N.S. xix. 299, where article 15 begins with "Also the Kinges Highness" hath ordered, 16 with "Kinges Majestie," and 17 with "Kinges Grace." In the Dedication of the Authorized Version of the Bible of 1611 James I. is still styled "Majesty" and "Highness"; thus, in the first paragraph, "the appearance of Your Majesty, as of the Sun in his strength, instantly dispelled those supposed and surmised mists ... especially when we beheld the government established in Your Highness and Your hopeful Seed, by an undoubted title." It was, however, in James I.'s reign that "Majesty" became the official title. It may be noted that Cromwell, as lord protector, and his wife were styled "Highness." In present usage the following members of the British Royal Family are addressed as "Royal Highness" (H.R.H.): all sons and daughters, brothers and sisters, uncles and aunts of the reigning sovereign, grandsons and granddaughters if children of sons, and also great grandchildren (decree of 31st of May 1898) if children of an eldest son of any prince of Wales. Nephews, nieces and cousins and grandchildren, offspring of daughters, are styled "Highness" only. A change of sovereign does not entail the forfeiture of the title "Royal Highness," once acquired, though the father of the bearer has become a nephew and not a grandson of the sovereign. The principal feudatory princes of the Indian empire are also styled "Highness."

As a general rule the members of the blood royal of an Imperial or Royal house are addressed as "Imperial" or "Royal Highness" (*Altesse Impériale*, *Royale*, *Kaiserliche*, *Königliche Hoheit*) respectively. In Germany the reigning heads of the Grand Duchies bear the title of Royal or Grand Ducal Highness (*Königliche* or *Gross-Herzogliche Hoheit*), while the members of the family are addressed as *Hoheit*, Highness, simply. *Hoheit* is borne by the reigning dukes and the princes and princesses of their families. The title "Serene Highness" has also an antiquity equal to that of "highness," for γαληνότης and ἡμερότης were titles borne by the Byzantine rulers, and serenitas and *serenissimus* by the emperors Honorius and Arcadius. The doge of Venice was also styled *Serenissimus*. Selden (*op. cit.* pt. ii. ch. x. 739) calls this title "one of the greatest that can be given to any Prince that hath not the superior title of King." In modern times "Serene Highness" (*Altesse Sérénissime*) is used as the equivalent of the German *Durchlaucht*, a stronger form of *Erlaucht*, illustrious, represented in the Latin honorific *superillustris*. Thackeray's burlesque title "Transparency" in the court at Pumpernickel very accurately gives the meaning. The title of *Durchlaucht* was granted in 1375 by the emperor Charles IV. to the electoral princes (*Kurfürsten*). In the 17th century it became the general title borne by the heads of the reigning princely states of the empire (*reichsländische Fürsten*), as *Erlaucht* by those of the countly houses (*reichständische Grafen*). In 1825 the German Diet agreed to grant the title *Durchlaucht* to the heads of the mediatized princely houses whether domiciled in Germany or Austria, and it is now customary to use it of the members of those houses. Further, all those who are elevated to the rank of prince (*Fürst*) in the secondary meaning of that title (see PRINCE) are also styled *Durchlaucht*. In 1829 the title of *Erlaucht*, which had formerly been borne by the reigning counts of the empire, was similarly granted to the mediatized countly families (see *Almanack de Gotha*, 1909, 107).

HIGH PLACE, in the English version of the Old Testament, the literal translation of the Heb. *bāmāh*. This rendering is etymologically correct, as appears from the poetical use of the plural in such expressions as to ride, or stalk, or stand on the high places of the earth, the sea, the clouds, and from the corresponding usage in Assyrian; but in prose *bāmāh* is always a place of worship. It has been surmised that it was so called because the places of worship were originally upon hill-tops, or that the *bāmāh* was an artificial platform or mound, perhaps imitating the natural eminence which was the oldest holy place, but neither view is historically demonstrable. The development of the religious significance of the word took place probably not in Israel but among the Canaanites, from whom the Israelites, in taking possession of the holy places of the land, adopted the name also.

In old Israel every town and village had its own place of sacrifice, and the common name for these places was *bāmāh*, which is synonymous with *miḳdāsh*, holy place (Amos vii. 9; Isa. xvi. 12, &c.). From the Old Testament and from existing remains a good idea may be formed of the appearance of such a place of worship. It was often on the hill above the town, as at Ramah (I Sam. ix. 12-14); there was a stelè (*maṣṣēbāh*), the seat of the deity, and a wooden post or pole (*ashērāh*), which marked the place as sacred and was itself an object of worship; there was a stone altar, often of considerable size and hewn out of the solid rock[1] or built of unhewn stones (Ex. xx. 25; see ALTAR), on which offerings were burnt (*mizbēḥ*, lit. "slaughter place"); a cistern for water, and perhaps low stone tables for dressing the victims; sometimes also a hall (*lishkāh*) for the sacrificial feasts.

Around these places the religion of the ancient Israelite centred; at festival seasons, or to make or fulfil a vow, he might journey to more famous sanctuaries at a distance from his home, but ordinarily the offerings which linked every side of his life to religion were paid at the *bāmāh* of his own town. The building of royal temples in Jerusalem or in Samaria made no change in this respect; they simply took their place beside the older sanctuaries, such as Bethel, Dan, Gilgal, Beersheba, to which they were, indeed, inferior in repute.

The religious reformers of the 8th century assail the popular religion as corrupt and licentious, and as fostering the monstrous delusion that immoral men can buy the favour of God by worship; but they make no difference in this respect between the high places of Israel and the temple in Jerusalem (cf. Amos v. 21 sqq.; Hos. iv.; Isa. i. 10 sqq.); Hosea stigmatizes the whole cultus as pure heathenism—Canaanite baal-worship adopted by apostate Israel. The fundamental law in Deut. xii. prohibits sacrifice at every place except the temple in Jerusalem; in accordance with this law Josiah, in 621 B.C., destroyed and desecrated the altars (*bāmōth*) throughout his kingdom, where Yahweh had been worshipped from time immemorial, and forcibly removed their priests to Jerusalem, where they occupied an inferior rank in the temple ministry. In the prophets of the 7th and 6th centuries the word *bāmōth* connotes "seat of heathenish or idolatrous worship"; and the historians of the period apply the term in this opprobrious sense not only to places sacred to other gods but to the old holy places of Yahweh in the cities and villages of Judah, which, in their view, had been illegitimate from the building of Solomon's temple, and therefore not really seats of the worship of Yahweh; even the most pious kings of Judah are censured for tolerating their existence. The reaction which followed the death of Josiah (608 B.C.) restored the old altars of Yahweh; they survived the destruction of the temple in 586, and it is probable that after its restoration (520-516 B.C.) they only slowly disappeared, in consequence partly of the natural predominance of Jerusalem in the little territory of Judaea, partly of the gradual establishment of the supremacy of the written law over custom and tradition in the Persian period.

It may not be superfluous to note that the deuteronomic dogma that sacrifice can be offered to Yahweh only at the temple in Jerusalem was never fully established either in fact or in legal theory. The Jewish military colonists in Elephantine in the 5th century B.C. had their altar of Yahweh beside the high way; the Jews in Egypt in the Ptolemaic period had, besides many local sanctuaries, one greater temple at Leontopolis, with a priesthood whose claim to "valid orders" was much better than that of the High Priests in Jerusalem, and the legitimacy of whose worship is admitted even by the Palestinian rabbis.

See Baudissin, "Höhendienst," *Protestantische Realencyklopädie*[3] (viii. 177-195); Hoonacker, *Le Lieu du culte dans la législation rituelle des Hébreux* (1894); v. Gall, *Altisraelitische Kultstädte* (1898).

1 Several altars of this type have been preserved.

HIGH SEAS, an expression in international law meaning all those parts of the sea not under the sovereignty of adjacent states. Claims have at times been made to exclusive dominion over large areas of the sea as well as over wide margins, such as a 100 m., 60 m., range of vision, &c., from land. The action and reaction of the interests of navigation, however, have brought states to adopt a limitation first enunciated by Bynkershoek in the formula "terrae dominium finitur ubi finitur armorum vis." Thenceforward cannon-shot range became the determining factor in the fixation of the margin of sea afterwards known as "territorial waters" (*q.v.*). With the exception of these territorial waters, bays of certain dimensions and inland waters surrounded by territory of the same state, and serving only as a means of access to ports of the state by whose territory they are surrounded, and some waters allowed by immemorial usage to rank as territorial, all seas and oceans form part of the high sea. The usage of the high sea is free to all the nations of the world, subject only to such restrictions as result from respect for the equal rights of others, and to those which nations may contract with each other to observe. An interesting case affecting land-locked seas was that of the *Emperor of Japan* v. *The Peninsular and Oriental Steam Navigation Company*, in which a collision had taken place in the inland sea of Japan. The British Supreme Court at Shanghai declared this sea to form part of the high sea. On appeal to the privy council, the appellants were successful. Though the decision of the Shanghai court on the point in question was not dealt with by the privy council, Japan continues to treat her inland sea as under her exclusive jurisdiction.

(T. Ba.)

HIGHWAY, a public road over which all persons have full right of way—walking, riding or driving. Such roads in England for the most part either are of immemorial antiquity or have been created under the authority of an act of parliament. But a private owner may create a highway at common law by dedicating the soil to the use of the public for that purpose; and the using of a road for a number of years, without interruption, will support the presumption that the soil has been so dedicated. At common law the parish is required to maintain all highways within its bounds; but by special custom the obligation may attach to a particular township or district, and in certain cases

the owner of land is bound by the conditions of his holding to keep a highway in repair. Breach of the obligation is treated as a criminal offence, and is prosecuted by indictment. Bridges, on the other hand, and so much of the highway as is immediately connected with them, are as a general rule a charge on the county; and by 22 Henry VIII. c. 5 the obligation of the county is extended to 300 yds. of the highway on either side of the bridge. A bridge, like a highway, may be a burden on neighbouring land *ratione tenurae*. Private owners so burdened may sometimes claim a special toll from passengers, called a "toll traverse."

Extensive changes in the English law of highways have been made by various highway acts, viz. the Highway Act 1835, and amending acts of 1862, 1864, 1878 and 1891. The leading principle of the Highway Act 1835 is to place the highways under the direction of parish surveyors, and to provide for the necessary expenses by a rate levied on the occupiers of land. It is the duty of the surveyor to keep the highways in repair; and if a highway is out of repair, the surveyor may be summoned before justices and convicted in a penalty not exceeding £5, and ordered to complete the repairs within a limited time. The surveyor is likewise specially charged with the removal of nuisances on the highway. A highway nuisance may be abated by any person, and may be made the subject of indictment at common law. The amending acts, while not interfering with the operation of the principal act, authorize the creation of highway districts on a larger scale. The justices of a county may convert it or any portion of it into a highway district to be governed by a highway board, the powers and responsibilities of which will be the same as those of the parish surveyor under the former act. The board consists of representatives of the various parishes, called "way wardens" together with the justices for the county residing within the district. Salaries and similar expenses incurred by the board are charged on a district fund to which the several parishes contribute; but each parish remains separately responsible for the expenses of maintaining its own highways. By the Local Government Act 1888 the entire maintenance of main roads was thrown upon county councils. The Public Health Act 1875 vested the powers and duties of surveyors of highways and vestries in urban authorities, while the Local Government Act 1894 transferred to the district councils of every rural district all the powers of rural sanitary authorities and highway authorities (see ENGLAND: *Local Government*).

The Highway Act of 1835 specified as offences for which the driver of a carriage on the public highway might be punished by a fine, in addition to any civil action that might be brought against him—riding upon the cart, or upon any horse drawing it, and not having some other person to guide it, unless there be some person driving it; negligence causing damage to person or goods being conveyed on the highway; quitting his cart, or leaving control of the horses, or leaving the cart so as to be an obstruction on the highway; not having the owner's name painted up; refusing to give the same; and not keeping on the left or near side of the road, when meeting any other carriage or horse. This rule does not apply in the case of a carriage meeting a foot-passenger, but a driver is bound to use due care to avoid driving against any person crossing the highway on foot. At the same time a passenger crossing the highway is also bound to use due care in avoiding vehicles, and the mere fact of a driver being on the wrong side of the road would not be evidence of negligence in such a case.

The "rule of the road" given above is peculiar to the United Kingdom. Cooley's treatise on the *American Law of Torts* states that "the custom of the country, in some states enacted into statute law, requires that when teams approach and are about to pass on the highway, each shall keep to the right of the centre of the travelled portion of the road." This also appears to be the general rule on the continent of Europe.

By the Lights on Vehicles Act 1907, all vehicles on highways in England and Wales must display to the front a white light during the period between one hour after sunset and one hour before sunrise. Locomotives and motor cars, being dealt with by special acts, are excluded from the operation of the act, as are bicycles and tricycles (dealt with by the Local Government Act 1888), and vehicles drawn or propelled by hand, but every machine or implement drawn by animals comes within the act. There are two exceptions: (1) vehicles carrying inflammable goods in the neighbourhood of places where inflammable goods are stored, and (2) vehicles engaged in harvesting. The public have a right to pass along a highway freely, safely and conveniently, and any wrongful act or omission which prevents them doing so is a nuisance, for the prevention and abatement of which the highways and other acts contain provisions. Generally, nuisance to highway may be caused by encroachment, by interfering with the soil of the highway, by attracting crowds, by creating danger or inconvenience on or near the highway, by placing obstacles on the highway, by unreasonable user, by offences against decency and good order, &c.

The use of locomotives, motor cars and other vehicles on highways is regulated by acts of 1861-1903.

Formerly under the Turnpike Acts many of the more important highways were placed under the management of boards of commissioners or trustees. The trustees were required and empowered to maintain, repair and improve the roads committed to their charge, and the expenses of the trust were met by tolls levied on persons using the road. The various grounds of exemption from toll on turnpike roads were all of a public character, *e.g.* horses and carriages attending the sovereign or royal family, or used by soldiers or volunteers in uniform, were free from toll. In general horses and carriages used in agricultural work were free from toll. By the Highways and Locomotives Act of

1878 disturnpiked roads became “main roads.” Ordinary highways might be declared to be “main roads,” and “main roads” be reduced to the status of ordinary highways.

In Scotland the highway system is regulated by the Roads and Bridges Act 1878 and amending acts. The management and maintenance of the highways and bridges is vested in county road trustees, viz. the commissioners of supply, certain elected trustees representing ratepayers in parishes and others. One of the consequences of the act was the abolition of tolls, statute-labour, causeway mail and other exactions for the maintenance of bridges and highways, and all turnpike roads became highways, and all highways became open to the public free of tolls and other exactions. The county is divided into districts under district committees, and county and district officers are appointed. The expenses of highway management in each district (or parish), together with a proportion of the general expenses of the act, are levied by the trustees by an assessment on the lands and heritages within the district (or parish).

Highway, in the law of the states of the American Union, generally means a lawful public road, over which all citizens are allowed to pass and repass on foot, on horseback, in carriages and waggons. Sometimes it is held to be restricted to county roads as opposed to town-ways. In statutes dealing with offences connected with the highway, such as gaming, negligence of carriers, &c., “highway” includes navigable rivers. But in a statute punishing with death robbery on the highway, railways were held not to be included in the term. In one case it has been held that any way is a highway which has been used as such for fifty years.

See Glen, *Law Relating to Highways*; Pratt, *Law of Highways, Main Roads and Bridges*.

HIGINBOTHAM, GEORGE (1827-1893), chief-justice of Victoria, Australia, sixth son of T. Higinbotham of Dublin, was born on the 19th of April 1827, and educated at the Royal School, Dungannon, and at Trinity College, Dublin. After entering as a law student at Lincoln’s Inn, and being engaged as reporter on the *Morning Chronicle* in 1849, he emigrated to Victoria, where he contributed to the *Melbourne Herald* and practised at the bar (having been “called” in 1853) with much success. In 1850 he became editor of the *Melbourne Argus*, but resigned in 1859 and returned to the bar. He was elected to the legislative assembly in 1861 for Brighton as an independent Liberal, was rejected at the general election of the same year, but was returned nine months later. In 1863 he became attorney-general. Under his influence measures were passed through the legislative assembly of a somewhat extreme character, completely ignoring the rights of the legislative council, and the government was carried on without any Appropriation Act for more than a year. Mr Higinbotham, by his eloquence and earnestness, obtained great influence amongst the members of the legislative assembly, but his colleagues were not prepared to follow him as far as he desired to go. He contended that in a constitutional colony like Victoria the secretary of state for the colonies had no right to fetter the discretion of the queen’s representative. Mr Higinbotham did not return to power with his chief, Sir James M’Culloch, after the defeat of the short-lived Sladen administration; and being defeated for Brighton at the next general election by a comparatively unknown man, he devoted himself to his practice at the bar. Amongst his other labours as attorney-general he had codified all the statutes which were in force throughout the colony. In 1874 he was returned to the legislative assembly for Brunswick, but after a few months he resigned his seat. In 1880 he was appointed a puisne judge of the supreme court, and in 1886, on the retirement of Sir William Stawell, he was promoted to the office of chief justice. Mr Higinbotham was appointed president of the International Exhibition held at Melbourne in 1888-1889, but did not take any active part in its management. One of his latest public acts was to subscribe a sum of £10, 10s. a week towards the funds of the strikers in the great Australian labour dispute of 1890, an act which did not meet with general approval. He died in 1893.

HILARION, ST (*c.* 290-371), abbot, the first to introduce the monastic system into Palestine. The chief source of information is a life written by St Jerome; it was based upon a letter, no longer extant, written by St Epiphanius, who had known Hilarion. The accounts in Sozomen are mainly based on Jerome’s *Vita*; but Otto Zöcker has shown that Sozomen also had at his disposal authentic local traditions (see “Hilarion von Gaza” in the *Neue Jahrbücher für deutsche Theologie*, 1894), the most important study on Hilarion, which is written against the hypercritical school of Weingarten and shows that Hilarion must be accepted as an historical personage and the *Vita* as a substantially correct account of his career. He was born of heathen parents at Tabatha near Gaza about 290; he was sent to Alexandria for his education and there became a convert to Christianity; about 306 he visited St Anthony and became his disciple, embracing the eremitical life. He returned to his native

place and for many years lived as a hermit in the desert by the marshes on the Egyptian border. Many disciples put themselves under his guidance; but his influence must have been limited to south Palestine, for there is no mention of him in Palladius or Cassian. In 356 he left Palestine and went again to Egypt; but the accounts given in the *Vita* of his travels during the last fifteen years of his life must be taken with extreme caution. It is there said that he went from Egypt to Sicily, and thence to Epidaurus, and finally to Cyprus where he met Epiphanius and died in 371.

An abridged story of his life will be found in Alban Butler's *Lives of the Saints*, on the 21st of October, and a critical sketch with full references in Herzog-Hauck, *Realencyklopädie* (ed. 3).

(E. C. B.)

HILARIUS (HILARY[1]), **ST** (*c.* 300-367), bishop of Pictavium (Poitiers), an eminent "doctor" of the Western Church, sometimes referred to as the "malleus Arianorum" and the "Athanasius of the West," was born at Poitiers about the end of the 3rd century A.D. His parents were pagans of distinction. He received a good education, including what had even then become somewhat rare in the West, some knowledge of Greek. He studied, later on, the Old and New Testament writings, with the result that he abandoned his neo-platonism for Christianity, and with his wife and his daughter received the sacrament of baptism. So great was the respect in which he was held by the citizens of Poitiers that about 353, although still a married man, he was unanimously elected bishop. At that time Arianism was threatening to overrun the Western Church; to repel the irruption was the great task which Hilary undertook. One of his first steps was to secure the excommunication, by those of the Gallican hierarchy who still remained orthodox, of Saturninus, the Arian bishop of Arles and of Ursacius and Valens, two of his prominent supporters. About the same time he wrote to the emperor Constantius a remonstrance against the persecutions by which the Arians had sought to crush their opponents (*Ad Constantium Augustum liber primus*, of which the most probable date is 355). His efforts were not at first successful, for at the synod of Biterrae (Beziers), summoned in 356 by 459
Constantius with the professed purpose of settling the longstanding disputes, Hilary was by an imperial rescript banished with Rhodanus of Toulouse to Phrygia, in which exile he spent nearly four years. Thence, however, he continued to govern his diocese; while he found leisure for the preparation of two of the most important of his contributions to dogmatic and polemical theology, the *De synodis* or *De fide Orientalium*, an epistle addressed in 358 to the Semi-Arian bishops in Gaul, Germany and Britain, expounding the true views (sometimes veiled in ambiguous words) of the Oriental bishops on the Nicene controversy, and the *De trinitate libri xii.*,[2] composed in 359 and 360, in which, for the first time, a successful attempt was made to express in Latin the theological subtleties elaborated in the original Greek. The former of these works was not entirely approved by some members of his own party, who thought he had shown too great forbearance towards the Arians; to their criticisms he replied in the *Apologetica ad reprehensores libri de synodis responsa*. In 359 Hilary attended the convocation of bishops at Seleucia In Isauria, where, with the Egyptian Athanasians, he joined the Homoiousian majority against the Arianizing party headed by Acacius of Caesarea; thence he went to Constantinople, and, in a petition (*Ad Constantium Augustum liber secundus*) personally presented to the emperor in 360, repudiated the calumnies of his enemies and sought to vindicate his trinitarian principles. His urgent and repeated request for a public discussion with his opponents, especially with Ursacius and Valens, proved at last so inconvenient that he was sent back to his diocese, which he appears to have reached about 361, within a very short time of the accession of Julian. He was occupied for two or three years in combating Arianism within his diocese; but in 364, extending his efforts once more beyond Gaul, he impeached Auxentius, bishop of Milan, and a man high in the imperial favour, as heterodox. Summoned to appear before the emperor (Valentinian) at Milan and there maintain his charges, Hilary had the mortification of hearing the supposed heretic give satisfactory answers to all the questions proposed; nor did his (doubtless sincere) denunciation of the metropolitan as a hypocrite save himself from an ignominious expulsion from Milan. In 365 he published the *Contra Arianos vel Auxentium Mediolanensem liber*, in connexion with the controversy; and also (but perhaps at a somewhat earlier date) the *Contra Constantium Augustum liber*, in which he pronounced that lately deceased emperor to have been Antichrist, a rebel against God, "a tyrant whose sole object had been to make a gift to the devil of that world for which Christ had suffered." Hilary is sometimes regarded as the first Latin Christian hymn-writer, but none of the compositions assigned to him is indisputable. The later years of his life were spent in comparative quiet, devoted in part to the preparation of his expositions of the Psalms (*Tractatus super Psalmos*), for which he was largely indebted to Origen; of his *Commentarius in Evangelium Matthaei*, a work on allegorical lines of no exegetical value; and of his no longer extant translation of Origen's commentary on Job. While he thus closely followed the two great Alexandrians, Origen and Athanasius, in exegesis and Christology respectively, his work shows many traces of vigorous independent thought. He died in 367; no more exact date is trustworthy. He holds the highest rank among the Latin writers of his century. Designated already by Augustine as "the illustrious doctor of the churches," he by his works exerted an increasing influence in later centuries; and by Pius IX. he was formally recognized as "universae ecclesiae

doctor" at the synod of Bordeaux in 1851. Hilary's day in the Roman calendar is the 13th of January.[3]

EDITIONS.—Erasmus (Basel, 1523, 1526, 1528); P. Coustant (Benedictine, Paris, 1693); Migne (*Patrol. Lat.* ix., x.). The *Tractatus de mysteriis*, ed. J. F. Gamurrini (Rome, 1887), and the *Tractatus super Psalmos*, ed. A. Zingerle in the Vienna *Corpus scrip. eccl. Lat.* xxii. Translation by E. W. Watson in *Nicene and Post-Nicene Fathers*, ix.

LITERATURE.—The life by (Venantius) Fortunatus *c.* 550 is almost worthless. More trustworthy are the notices in Jerome (*De vir. illus.* 100), Sulpicius Severus (*Chron.* ii. 39-45) and in Hilary's own writings. H. Reinkens, *Hilarius von Poictiers* (1864); O. Bardenhewer, *Patrologie*; A. Harnack, *Hist. of Dogma*, esp. vol. iv.; F. Loofs, in Herzog-Hauck's *Realencyk.* viii.

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1 The name is derived from Gr. ἱλαρός, gay, cheerful, whence hilarious, hilarity.

2 Hilary's own title was *De fide contra Arianos*. It really deals less with the doctrine of the Trinity than with that of the Incarnation. That it is not an easy work to read is due partly to the nature of the subject, partly to the fact that it was issued in detached portions.

3 "Hilary" was the name of one of the four terms of the English legal year. These terms were abolished by the Judicature Act, 1873, s. 26, and "sittings" substituted. It is now the name of the sitting of the Supreme Court of Judicature which commences on the 11th of January and terminates on the Wednesday before Easter. In the Inns of Court, Hilary is one of the four dining terms; it begins on the 11th of January and ends on the 1st of February. It is also the name of one of the terms at the universities of Oxford (more usually "Lent term") and Dublin.

HILARIUS, or HILARUS (HILARY), bishop of Rome from 461 to 468, is known to have been a deacon and to have acted as legate of Leo the Great at the "robber" synod of Ephesus in 449. There he so vigorously defended the conduct of Flavian in deposing Eutyches that he was thrown into prison, whence he had great difficulty in making his escape to Rome. He was chosen to succeed Leo on the 19th of November 461. In 465 he held at Rome a council which put a stop to some abuses, particularly to that of bishops appointing their own successors. His pontificate was also marked by a successful encroachment of the papal authority on the metropolitan rights of the French and Spanish hierarchy, and by a resistance to the toleration edict of Anthemius, which ultimately caused it to be recalled. Hilarius died on the 17th of November 467, and was succeeded by Simplicius.

HILARIUS (fl. 1125), a Latin poet who is supposed to have been an Englishman. He was one of the pupils of Abelard at his oratory of Paraclete, and addressed to him a copy of verses with its refrain in the vulgar tongue, "*Tort avers vos li mestre*," Abelard having threatened to discontinue his teaching because of certain reports made by his servant about the conduct of the scholars. Later Hilarius made his way to Angers. His poems are contained in MS. supp. lat. 1008 of the Bibliothèque Nationale, Paris, purchased in 1837 at the sale of M. de Rosny. Quotations from this MS. had appeared before, but in 1838 it was edited by Champollion Figeac as *Hilarii versus et ludi*. His works consist chiefly of light verses of the goliardic type. There are verses addressed to an English nun named Eva, lines to Rosa, "*Ave splendor puellarum, generosa domina*," and another poem describes the beauties of the priory of Chaloutre la Petite, in the diocese of Sens, of which the writer was then an inmate. One copy of satirical verses seems to aim at the pope himself. He also wrote three miracle plays in rhymed Latin with an admixture of French. Two of them, *Suscitatio Lazari* and *Historia de Daniel repraesentanda*, are of purely liturgical type. At the end of *Lazarus* is a stage direction to the effect that if the performance has been given at matins, Lazarus should proceed with the *Te Deum*, if at vespers, with the *Magnificat*. The third, *Ludus super iconia Sancti Nicholai*, is founded on a sufficiently foolish legend. Petit de Julleville sees in the play a satiric intention and a veiled incredulity that put the piece outside the category of liturgical drama.

A rhymed Latin account of a dispute in which the nuns of Ronceray at Angers were concerned, contained in a cartulary of Ronceray, is also ascribed to the poet, who there calls himself Hilarius Canonicus. The poem is printed in the *Bibliothèque de l'École des Chartes* (vol. xxxvii. 1876), and is dated by P. Marchegay from 1121. See also a notice in *Hist. litt. de la France* (xii. 251-254), supplemented (in xx. 627-630), *s.v.* Jean Bodel, by Paulin Paris; also Wright, *Biographia Britannica literaria, Anglo-Norman Period* (1846); and Petit de Julleville, *Les Mystères* (vol. i. 1880).

HILARIUS (Hilary), **ST** (*c.* 403-449), bishop of Arles, was born about 403. In early youth he entered the abbey of Lérins, then presided over by his kinsman Honoratus (St Honoré), and succeeded Honoratus in the bishopric of Arles in 429. Following the example of St Augustine, he is said to have organized his cathedral clergy into a "congregation," devoting a great part of their time to social exercises of ascetic religion. He held the rank of metropolitan of Vienne and Narbonne, and attempted to realize the sort of primacy over the church of south Gaul which seemed implied in the vicariate granted to his predecessor Patroclus (417). Hilarius deposed the bishop of Besançon (Chelidonus), for ignoring this primacy, and for claiming a metropolitan dignity for Besançon. An appeal was made to Rome, and Leo I. used it to extinguish the Gallican vicariate (A.D. 444). Hilarius was deprived of his rights as metropolitan to consecrate bishops, call synods, or exercise ecclesiastical oversight in the province, and the pope secured the edict of Valentinian III., so important in the history of the Gallican church, "ut episcopis Gallicanis omnibusque pro lege esset quidquid apostolicae sedis auctoritas sanxisset." The papal claims were made imperial law, and violation of them subject to legal penalties (*Novellae Valent.* iii. tit. 16). Hilarius died in 449, and his name was afterwards introduced into the Roman martyrology for commemoration on the 5th of May. He enjoyed during his lifetime a high reputation for learning and eloquence as well as for piety; his extant works (*Vita S. Honorati Arelatensis episcopi* and *Metrum in Genesin*) compare favourably with any similar literary productions of that period.

A poem, *De Providentia*, usually included among the writings of Prosper, is sometimes attributed to Hilary of Arles.

HILDA, ST, strictly Hild (614-680), was the daughter of Hereric, a nephew of Edwin, king of Northumbria. She was converted to Christianity before 633 by the preaching of Paulinus. According to Bede she took the veil in 614, when Oswio was king of Northumbria and Aidan bishop of Lindisfarne, and spent a year in East Anglia, where her sister Hereswith had married Æthelhere, who was to succeed his brother Anna, the reigning king. In 648 or 649 Hilda was recalled to Northumbria by Aidan, and lived for a year in a small monastic community north of the Wear. She then succeeded Heiu, the foundress, as abbess of Hartlepool, where she remained several years. From Hartlepool Hilda moved to Whitby, where in 657 she founded the famous double monastery which in the time of the first abbess included among its members five future bishops, Bosa, Ætta, Oftfor, John and Wilfrid II. as well as the poet Cædmon. Hilda exercised great influence in Northumbria, and ecclesiastics from all over Christian England and from Strathclyde and Dalriada visited her monastery. In 655 after the battle of Winwæd Oswio entrusted his daughter Ælfled to Hilda, with whom she went to Whitby. At the synod of Whitby in 664 Hilda sided with Colman and Cedd against Wilfrid. In spite of the defeat of the Celtic party she remained hostile to Wilfrid until 679 at any rate. Hilda died in 680 after a painful illness lasting for seven years.

See Bede, *Hist. eccl.* (ed. C. Plummer, Oxford, 1869), iii. 24, 25, iv. 23; Eddius, *Vita Wilfridi* (Raine, *Historians of Church of York*, Rolls Series, vol. i., 1879), c. liv.

HILDBURGHAUSEN, a town of Germany, in the duchy of Saxe-Meiningen, situated in a wide and fruitful valley on the river Werra, 19 m. S.E. of Meiningen, on the railway Eisenach-Lichtenfels. Pop. (1905) 7456. The principal buildings are a ducal palace, erected 1685-1695, now used as barracks, with a park in which there is a monument to Queen Louisa of Prussia, the old town hall, two Evangelical and a Roman Catholic church and a theatre. A technical college occupies the premises in which Meyer's Bibliographisches Institut carried on business from 1828, when it removed hither from Gotha, until 1874, when it was transferred to Leipzig. A monument has been erected to those citizens who died in the Franco-Prussian War of 1870-71. The manufactures include linen fabrics, cloth, toys, buttons, optical instruments, agricultural machines, knives, mineral waters, condensed soups and condensed milk. Hildburghausen (in records *Hilpershusia* and *Villa Hilperti*) belonged in the 13th century to the counts of Henneberg, from whom it passed to the landgraves of Thuringia and then to the dukes of Saxony. In 1683 it became the capital of a principality which in 1826 was united to Saxe-Meiningen.

See R. A. Human, *Chronik der Stadt Hildburghausen* (Hildburghausen, 1888).

HILDEBERT, Hydalbert, Gildebert or Aldebert (*c.* 1055-1133), French writer and ecclesiastic, was born of poor parents at Lavardin, near Vendôme, and was intended for the church. He was probably a pupil of Berengarius of Tours, and became master (*scholasticus*) of the school at Le Mans; in 1091 he was made archdeacon and in 1096 bishop of Le Mans. He had to face the hostility of a section of his clergy and also of the English king, William II., who captured Le Mans and carried the bishop with him to England for about a year. Hildebert then travelled to Rome and sought permission to resign his bishopric, which Pope Paschal II. refused. In 1116 his diocese was thrown into great confusion owing to the preaching of Henry of Lausanne, who was denouncing the higher clergy, especially the bishop. Hildebert compelled him to leave the neighbourhood of Le Mans, but the effects of his preaching remained. In 1125 Hildebert was translated very unwillingly to the archbishopric of Tours, and there he came into conflict with the French king Louis VI. about the rights of ecclesiastical patronage and with the bishop of Dol about the authority of his see in Brittany. He presided over the synod of Nantes, and died at Tours probably on the 18th of December 1133. Hildebert, who built part of the cathedral at Le Mans, has received from some writers the title of saint, but there appears to be no authority for this. He was not a man of very strict life; his contemporaries, however, had a very high opinion of him and he was called *egregius versificator*.

The extant writings of Hildebert consist of letters, poems, a few sermons, two lives and one or two treatises. An edition of his works prepared by the Maurist, Antoine Beaugendre, and entitled *Venerabilis Hildeberti, primo Cenomannensis episcopi, deinde Turonensis archiepiscopi, opera tam edita quam inedita*, was published in Paris in 1708 and was reprinted with additions by J. J. Bourassé in 1854. These editions, however, are very faulty. They credit Hildebert with numerous writings which are the work of others, while some genuine writings are omitted. The revelation of this fact has affected Hildebert's position in the history of medieval thought. His standing as a philosopher rested upon his supposed authorship of the important *Tractatus theologicus*; but this is now regarded as the work of Hugh of St Victor, and consequently Hildebert can hardly be counted among the philosophers. His genuine writings include many letters. These *Epistolae* enjoyed great popularity in the 12th and 13th centuries, and were frequently used as classics in the schools of France and Italy. Those which concern the struggle between the emperor Henry V. and Pope Paschal II. have been edited by E. Sackur and printed in the *Monumenta Germaniae historica. Libelli de lite ii.* (1893). His poems, which deal with various subjects, are disfigured by many defects of style and metre, but they too were very popular. Hildebert attained celebrity also as a preacher both in French and Latin, but only a few of his sermons are in existence, most of the 144 attributed to him by his editors being the work of Peter Lombard and others. The *Vitae* written by Hildebert are the lives of Hugo, abbot of Cluny, and of St Radegunda. Undoubtedly genuine is also his *Liber de querimonia et conflictu carnis et spiritus seu animae*. Hildebert was an excellent Latin scholar, being acquainted with Cicero, Ovid and other authors, and his spirit is rather that of a pagan than of a Christian writer.

See B. Hauréau, *Les Mélanges poétiques d'Hildebert de Lavardin* (Paris, 1882), and *Notices et extraits de quelques manuscrits latins de la Bibliothèque nationale* (Paris, 1890-1893); Comte P. de Déservillers, *Un Évêque au XII^e siècle, Hildebert et son temps* (Paris, 1876); E. A. Freeman, *The Reign of Rufus*, vol. ii. (Oxford, 1882); tome xi. of the *Histoire littéraire de la France*, and H. Böhmer in Band viii. of Herzog-Hauck's *Realencyklopädie* (1900). The most important work, however, to be consulted is L. Dieudonné's *Hildebert de Lavardin, évêque du Mans, archévêque de Tours. Sa vie, ses lettres* (Paris, 1898).

HILDEBRAND, LAY OF (*Das Hildebrandslied*), a unique example of Old German alliterative poetry, written about the year 800 on the first and last pages of a theological manuscript, by two monks of the monastery of Fulda. The fragment, or rather fragments, only extend to sixty-eight lines, and the conclusion of the poem is wanting. The theory propounded by Karl Lachmann, that the poem had been written in its present form from memory, has been discredited by later philological investigation; it is clearly a transcript of an older original, which the copyists—or more probably the writer to whom we owe the older version—imperfectly understood. The language of the poem shows a curious mixture of Low and High German forms; as the High German elements point to the dialect of Fulda, the inference is that the copyists were reproducing an originally Low German lay in the form in which it was sung in Franconia.

The fragment is mainly taken up with a dialogue between Hildebrand and his son Hadubrand. When Hildebrand followed his master, Theodoric the Great, who was fleeing eastwards before Odoacer, he left his young wife and an infant child behind him. At his return to his old home, after thirty years' absence among the Huns, he is met by a young warrior and challenged to single combat. Before the fight begins, Hildebrand asks for the name of his opponent, and discovering his own son in him, tries to avert the fight, but in vain; Hadubrand only regards the old man's words as the excuse of cowardice. "In sharp showers the ashen spears fall on the shields, and then the warriors seize their swords and hew vigorously at the white shields until these are beaten to

pieces....” With these words the fragment breaks off abruptly, giving no clue as to the issue of the combat. There is little doubt, however, that, as in the Old Norse *Asmundar saga*, where the tale is alluded to, the fight must have been fatal to Hadubrand. But in the later traditions, both of the Old Norse *Thidreks saga* (13th century), and the so-called *Jüngere Hildebrandslied*—a German popular lay, preserved in several versions from the 15th to the 17th century—Hadubrand is simply represented as defeated, and obliged to recognize his father. The Old High German *Hildebrandslied* is dramatically conceived, and written in a terse, vigorous style; it is the only remnant that has come down from early Germanic times of an undoubtedly extensive ballad literature, dealing with the national sagas.

The MS. of the *Hildebrandslied*, originally in Fulda, is now preserved in the Landesbibliothek at Cassel. The literature on the poem will be found most conveniently in K. Müllenhoff and W. Scherer, *Denkmäler deutscher Poesie und Prosa aus dem VIII. bis XI. Jahrh.*, 3rd ed. (1892), and in W. Braune, *Althochdeutsches Lesebuch*, 5th ed. (1902), to which authorities the reader is referred for a critical text. The poem was discovered and first printed (as prose) by J. G. von Eckhart, *Commentarii de rebus Franciae orientalis* (1729), i. 864 ff.; the first scholarly edition was that of the brothers Grimm (1812). Facsimile reproductions of the MS. have been published by W. Grimm (1830), E. Sievers (1872), G. Könnecke in his *Bilderatlas* (1887; 2nd ed., 1895) and M. Enneccerus (1897). See also K. Lachmann, *Über das Hildebrandslied* (1833) in *Kleine Schriften*, i. 407 ff.; C. W. M. Grein, *Das Hildebrandslied* (1858; 2nd ed., 1880); O. Schröder, *Bemerkungen zum Hildebrandslied* (1880); H. Möller, *Zur althochdeutschen Alliterationspoesie* (1888); R. Heinzel, *Über die ostgotische Heldensage* (1889); B. Busse, “Sagengeschichtliches zum Hildebrandslied,” in Paul und Braune’s *Beiträge*, xxvi. (1901), pp. 1 ff.; R. Koegel, *Geschichte der deutschen Literatur bis zum Ausgang des Mittelalters*, i. (1894), pp. 210 ff.; and R. Koegel and W. Brückner, in Paul’s *Grundriss der germanischen Philologie*, 2nd ed., ii. (1901), pp. 71 ff.

(J. G. R.)

HILDEBRANDT, EDUARD (1818-1868), German painter, was born in 1818, and served as apprentice to his father, a house-painter at Danzig. He was not twenty when he came to Berlin, where he was taken in hand by Wilhelm Krause, a painter of sea pieces. Several early pieces exhibited after his death—a breakwater, dated 1838, ships in a breeze off Swinemünde (1840), and other canvases of this and the following year—show Hildebrandt to have been a careful student of nature, with inborn talents kept down by the conventionalisms of the formal school to which Krause belonged. Accident made him acquainted with masterpieces of French art displayed at the Berlin Academy, and these awakened his curiosity and envy. He went to Paris, where, about 1842, he entered the atelier of Isabey and became the companion of Lepoittevin. In a short time he sent home pictures which might have been taken for copies from these artists. Gradually he mastered the mysteries of touch and the secrets of effect in which the French at this period excelled. He also acquired the necessary skill in painting figures, and returned to Germany, skilled in the rendering of many kinds of landscape forms. His pictures of French street life, done about 1843, while impressed with the stamp of the Paris school, reveal a spirit eager for novelty, quick at grasping, equally quick at rendering, momentary changes of tone and atmosphere. After 1843 Hildebrandt, under the influence of Humboldt, extended his travels, and in 1864-1865 he went round the world. Whilst his experience became enlarged his powers of concentration broke down. He lost the taste for detail in seeking for scenic breadth, and a fatal facility of hand diminished the value of his works for all those who look for composition and harmony of hue as necessary concomitants of tone and touch. In oil he gradually produced less, in water colours more, than at first, and his fame must rest on the sketches which he made in the latter form, many of them represented by chromo-lithography. Fantasies in red, yellow and opal, sunset, sunrise and moonshine, distances of hundreds of miles like those of the Andes and the Himalaya, narrow streets in the bazaars of Cairo or Suez, panoramas as seen from mastheads, wide cities like Bombay or Pekin, narrow strips of desert with measureless expanses of sky—all alike display his quality of bravura. Hildebrandt died at Berlin on the 25th of October 1868.

HILDEBRANDT, THEODOR (1804-1874), German painter, was born at Stettin. He was a disciple of the painter Schadow, and, on Schadow’s appointment to the presidency of a new academy in the Rhenish provinces in 1828, followed that master to Düsseldorf. Hildebrandt began by painting pictures illustrative of Goethe and Shakespeare; but in this form he followed the traditions of the stage rather than the laws of nature. He produced rapidly “Faust and Mephistopheles” (1824), “Faust and Margaret” (1825), and “Lear and Cordelia” (1828). He visited the Netherlands with Schadow in 1829, and wandered alone in 1830 to Italy; but travel did not alter his style, though it led him to cultivate alternately eclecticism and realism. At Düsseldorf, about

1830, he produced “Romeo and Juliet,” “Tancred and Clorinda,” and other works which deserved to be classed with earlier paintings; but during the same period he exhibited (1829) the “Robber” and (1832) the “Captain and his Infant Son,” examples of an affected but kindly realism which captivated the public, and marked to a certain extent an epoch in Prussian art. The picture which made Hildebrandt’s fame is the “Murder of the Children of King Edward” (1836), of which the original, afterwards frequently copied, still belongs to the Spiegel collection at Halberstadt. Comparatively late in life Hildebrandt tried his powers as an historical painter in pictures representing Wolsey and Henry VIII., but he lapsed again into the romantic in “Othello and Desdemona.” After 1847 Hildebrandt gave himself up to portrait-painting, and in that branch succeeded in obtaining a large practice. He died at Düsseldorf in 1874.

HILDEGARD, ST (1098-1179), German abbess and mystic, was born of noble parents at Böckelheim, in the countship of Sponheim, in 1098, and from her eighth year was educated at the Benedictine cloister of Disibodenberg by Jutta, sister of the count of Sponheim, whom she succeeded as abbess in 1136. From earliest childhood she was accustomed to see visions, which increased in frequency and vividness as she approached the age of womanhood; these, however, she for many years kept almost secret, nor was it until she had reached her forty-third year (1141) that she felt constrained to divulge them. Committed to writing by her intimate friend the monk Godefridus, they now form the first and most important of her printed works, entitled *Scivias* (probably an abbreviation for “sciens vias” or “nosce vias Domini”) *s. visionum et revelatianum libri iii.*, and completed in 1151. In 1147 St Bernard of Clairvaux, while at Bingen preaching the new crusade, heard of Hildegard’s revelations, and became so convinced of their reality that he not only wrote to her a letter cordially acknowledging her as a prophetess of God, but also successfully advocated her recognition as such by his friend and former pupil Pope Eugenius III. in the synod of Trèves (1148). In the same year Hildegard migrated along with eighteen of her nuns to a new convent on the Rupertsberg near Bingen, over which she presided during the remainder of her life. By means of voluminous correspondence, as well as by extensive journeys, in the course of which she was unwearied in the exercise of her gift of prophecy, she wielded for many years an increasing influence upon her contemporaries—an influence doubtless due to the fact that she was imbued with the most widely diffused feelings and beliefs, fears and hopes, of her time. Amongst her correspondents were Popes Anastasius IV. and Adrian IV., the emperors Conrad III. and Frederick I., and also the theologian Guibert of Gembloux, who submitted numerous questions in dogmatic theology for her determination. She died in 1179, but has never been canonized; her name, however, was received into the Roman martyrology in the 15th century, September 17th being the day fixed for her commemoration.

Her biography, which was written by two contemporaries, Godefridus and Theodoricus, was first printed at Cologne in 1566. Hildegard’s writings, besides the *Scivias* already mentioned and first printed in Paris in 1513, include the *Liber divinorum operum*, *Explanatio regulae S. Benedicti*, *Physica* and *the Letters*, &c., are contained in Migne, *Patr. Lat.* t. cxcvii., and in Cardinal Pitra’s *Analecta sacra spicilegio Solesmensi parata; Nova S. Hildegardis opera* (Paris, 1882).

For a modern study of the saint’s writings, see *Sainte Hildegarde* by Pal Franche, “*Les Saints*” series (Paris, 1903); and U. Chevalier, *Répertoire des sources historiques, bio.-bibl.* 2153.

HILDEN, a town in the Prussian Rhine province on the Itter, 9 m. S.E. of Düsseldorf by rail. Pop. (1905) 13,946. It possesses an Evangelical and a Roman Catholic church and a monument to the emperor William I. Its manufactures include silks, velvets, carpets, calico-printing, machinery and brick-making.

HILDESHEIM, a town and episcopal see of Germany, in the Prussian province of Hanover, beautifully situated at the north foot of the Harz Mountains, on the right bank of the Innerste, 18 m. S.E. of Hanover by railway, and on the main line from Berlin, via Magdeburg to Cologne. Pop. (1885) 20,386, (1905) 47,060. The town consists of an old and a new part, and is surrounded by ramparts which have been converted into promenades. Its streets are for the most part narrow and irregular, and contain many old houses with overhanging upper storeys and richly and curiously

adorned wooden façades. Its religious edifices are five Roman Catholic and four Evangelical churches and a synagogue. The most interesting is the Roman Catholic cathedral, which dates from the middle of the 11th century and occupies the site of a building founded by the emperor Louis the Pious early in the 9th century. It is famous for its antiquities and works of art. These include the bronze doors executed by Bishop Bernward, with reliefs from the history of Adam and of Jesus Christ; a brazen font of the 13th century; two large candelabra of the 11th century; the sarcophagus of St Godehard; and the tomb of St Epiphanius. In the cathedral also there is a bronze column 15 ft. high, adorned with reliefs from the life of Christ and dating from 1022, and another column, at one time thought to be an Irminsäule erected in honour of the Saxon idol Irmin, but now regarded as belonging to a Roman aqueduct. On the wall of the Romanesque crypt, which was restored in 1896, is a rose-bush, alleged to be a thousand years old; this sends its branches to a height of 24 ft. and a breadth of 30 ft., and they are trained to interlace one of the windows. Before the cathedral is the pretty cloister garth, with the chapel of St Anne, erected in 1321 and restored in 1888. The Romanesque church of St Godehard was built in the 12th century and restored in the 19th. The church of St Michael, founded by Bishop Bernward early in the 11th century and restored after injury by fire in 1186, contains a unique painted ceiling of the 12th century, the sarcophagus and monument of Bishop Bernward, and a bronze font; it is now a Protestant parish church, but the crypt is used by the Roman Catholics. The church of the Magdalene possesses two candelabra, a gold cross, and various other works in metal by Bishop Bernward; and the Lutheran church of St Andrew has a choir dating from 1389 and a tower 385 ft. high. In the suburb of Moritzberg there is an abbey church founded in 1040, the only pure columnar basilica in north Germany.

The chief secular buildings are the town-hall (Rathaus), which dates from the 15th century and was restored in 1883-1892, adorned with frescoes illustrating the history of the city; the Tempelherrenhaus, in Late Gothic erroneously said to have been built by the Knights Templars; the Knochenhaueramthaus, formerly the gild-house of the butchers, which was restored after being damaged by fire in 1884, and is probably the finest specimen of a wooden building in Germany; the Michaelis monastery, used as a lunatic asylum; and the old Carthusian monastery. The Römer museum of antiquities and natural history is housed in the former church of St Martin; the buildings of Trinity hospital, partly dating from the 14th century, are now a factory; and the Wedekindhaus (1598) is now a savings-bank. The educational establishments include a Roman Catholic and a Lutheran gymnasium, a Roman Catholic school and college and two technical institutions, the Georgstift for daughters of state servants and a conservatoire of music. Hildesheim is the seat of considerable industry. Its chief productions are sugar, tobacco and cigars, stoves, machines, vehicles, agricultural implements and bricks. Other trades are brewing and tanning. It is connected with Hanover by an electric tram line, 19 m. in length.

Hildesheim owes its rise and prosperity to the fact that in 822 it was made the seat of the bishopric which Charlemagne had founded at Elze a few years before. Its importance was greatly increased by St Bernward, who was bishop from 993 to 1022 and walled the town. By his example and patronage the art of working in metals was greatly stimulated. In the 13th century Hildesheim became a free city of the Empire; in 1249 it received municipal rights and about the same time it joined the Hanseatic league. Several of its bishops belonged to one or other of the great families of Germany; and gradually they became practically independent. The citizens were frequently quarrelling with the bishops, who also carried on wars with neighbouring princes, especially with the house of Brunswick-Lüneburg, under whose protection Hildesheim placed itself several times. The most celebrated of these struggles is the one known as the *Hildesheimer Stiftsfehde*, which broke out early in the 16th century when John, duke of Saxe-Lauenburg, was bishop. At first the bishop and his allies were successful, but in 1521 the king of Denmark and the duke of Brunswick overran his lands and in 1523 he made peace, surrendering nearly all his possessions. Much, however, was restored when Ferdinand, prince of Bavaria, was bishop (1612-1650), as this warlike prelate took advantage of the disturbances caused by the Thirty Years' War to seize the lost lands, and at the beginning of the 19th century the extent of the prince bishopric was 682 sq. m. In 1801 the bishopric was secularized and in 1803 was granted to Prussia; in 1807 it was incorporated with the kingdom of Westphalia and in 1813 was transferred to Hanover. In 1866, along with Hanover, it was annexed by Prussia. In 1803 a new bishopric of Hildesheim, a spiritual organization only, was established, and this has jurisdiction over all the Roman Catholic churches in the centre of north Germany.

In October 1868 a unique collection of ancient Augustan silver plate was discovered on the Galgenberg near Hildesheim by some soldiers who were throwing up earthworks. This *Hildesheimer Silberfund* excited great interest among classical archaeologists. Some authorities think that it is the actual plate which belonged to Drusus himself. The most noteworthy pieces are a crater richly ornamented with arabesques and figures of children, a platter with a representation of Minerva, another with one of the boy Hercules and another with one of Cybele. The collection is in the Kunstgewerbemuseum in Berlin.

See the *Urkundenbuch der Stadt Hildesheim*, edited by R. Döbner (Hildesheim, 1881-1901); the *Urkundenbuch des Hochstifts Hildesheim*, edited by K. Janicke and H. Hoogeweg (Leipzig and Hanover, 1896-1903); C. Bauer, *Geschichte von Hildesheim* (Hildesheim, 1892); A. Bertram, *Geschichte des Bistums Hildesheim* (Hildesheim, 1899 fol.); C. Euling, *Hildesheimer Land und Leute des 16ten Jahrhunderts* (Hildesheim, 1892); O. Fischer, *Die Stadt Hildesheim während des*

dreissigjährigen Krieges (Hildesheim, 1897); A. Grebe, *Auf Hildesheimschem Boden* (Hildesheim, 1884); H. Cuno, *Hildesheims Künstler im Mittelalter* (Hildesheim, 1886); W. Wachsmuth, *Geschichte von Hochstift und Stadt Hildesheim* (Hildesheim, 1863); R. Döbner, *Studien zur Hildesheimischen Geschichte* (Hildesheim, 1901); Lachner, *Die Holzarchitektur Hildesheims* (Hildesheim, 1882); Seifart, *Sagen, Märchen, Schwänke und Gebräuche aus Stadt und Stift Hildesheims* (Hildesheim, 1889). For the *Hildesheimer Stiftsfehde*, see H. Delius, *Die Hildesheimische Stiftsfehde* 1519 (Leipzig, 1803). For the *Hildesheimer Silberfund*, see Wieseler, *Der Hildesheimer Silberfund* (Göttingen, 1869); Holzer, Der Hildesheimer antike Silberfund (Hildesheim, 1871); and E. Pernice and F. Winter, *Der Hildesheimer Silberfund der königlichen Museen zu Berlin* (Berlin, 1901).

HILDRETH, RICHARD (1807-1865), American journalist and author, was born at Deerfield, Massachusetts, on the 28th of June 1807, the son of Hosea Hildreth (1782-1835), a teacher of mathematics and later a Congregational minister. Richard graduated at Harvard in 1826, and, after studying law at Newburyport, was admitted to the bar at Boston in 1830. He had already taken to journalism, and in 1832 he became joint founder and editor of a daily newspaper, the Boston Atlas. Having in 1834 gone to the South for the benefit of his health, he was led by what he witnessed of the evils of slavery (chiefly in Florida) to write the anti-slavery novel *The Slave: or Memoir of Archy Moore* (1836; enlarged edition, 1852, *The White Slave*). In 1837 he wrote for the *Atlas* a series of articles vigorously opposing the annexation of Texas. In the same year he published *Banks, Banking, and Paper Currencies*, a work which helped to promote the growth of the free banking system in America. In 1838 he resumed his editorial duties on the *Atlas*, but in 1840 removed, on account of his health, to British Guiana, where he lived for three years and was editor of two weekly newspapers in succession at Georgetown. He published in this year (1840) a volume in opposition to slavery, *Despotism in America* (2nd ed., 1854). In 1849 he published the first three volumes of his *History of the United States*, two more volumes of which were published in 1851 and the sixth and last in 1852. The first three volumes of this history, his most important work, deal with the period 1492-1789, and the second three with the period 1789-1821. The history is notable for its painstaking accuracy and candour, but the later volumes have a strong Federalist bias. Hildreth's *Japan as It Was and Is* (1855) was at the time a valuable digest of the information contained in other works on that country (new ed., 1906). He also wrote a campaign biography of William Henry Harrison (1839); *Theory of Morals* (1844); and *Theory of Politics* (1853), as well as *Lives of Atrocious Judges* (1856), compiled from Lord Campbell's two works. In 1861 he was appointed United States consul at Trieste, but ill-health compelled him to resign and remove to Florence, where he died on the 11th of July 1865.

HILGENFELD, ADOLF BERNHARD CHRISTOPH (1823-1907), German Protestant divine, was born at Stappenbeck near Salzwedel in Prussian Saxony on the 2nd of June 1823. He studied at Berlin and Halle, and in 1890 became professor ordinarius of theology at Jena. He belonged to the Tübingen school. "Fond of emphasizing his independence of Baur, he still, in all important points, followed in the footsteps of his master; his method, which he is wont to contrast as *Literarkritik* with Baur's *Tendenzkritik*, is nevertheless essentially the same as Baur's" (Otto Pfleiderer). On the whole, however, he modified the positions of the founder of the Tübingen school, going beyond him only in his investigations into the Fourth Gospel. In 1858 he became editor of the *Zeitschrift für wissenschaftliche Theologie*. He died on the 12th of January 1907.

His works include: *Die elementarischen Recognitionen und Homilien* (1848); *Die Evangelien und die Briefe des Johannes nach ihrem Lehrbegriff* (1849); *Das Markusevangelium* (1850); *Die Evangelien nach ihrer Entstehung und geschichtlichen Bedeutung* (1854); *Das Unchristentum* (1855); *Jüd. Apokalyptik* (1857); *Novum Testamentum extra canonem receptum* (4 parts, 1866; 2nd ed., 1876-1884); *Histor.-kritische Einleitung in das Neue Testament* (1875); *Acta Apostolorum graece et latine secundum antiquissimos testes* (1899); the first complete edition of the *Shepherd of Hermas* (1887); *Ignatii et Polycarpi epistolae* (1902).

HILL, AARON (1685-1750), English author, was born in London on the 10th of February 1685. He was the son of George Hill of Malmesbury Abbey, Wiltshire, who contrived to sell an estate entailed on his son. In his fourteenth year he left Westminster School to go to Constantinople, where

William, Lord Paget de Beaudesert (1637-1713), a relative of his mother, was ambassador. Paget sent him, under care of a tutor, to travel in Palestine and Egypt, and he returned to England in 1703. He was estranged from his patron by the “envious fears and malice of a certain female,” and again went abroad as companion to Sir William Wentworth. On his return home in 1709 he published *A Full and Just Account of the Present State of the Ottoman Empire*, a production of which he was afterwards much ashamed, and he addressed his poem of *Camillus* to Charles Mordaunt, earl of Peterborough. In the same year he is said to have been manager of Drury Lane theatre and in 1710 of the Haymarket. His first play, *Elfrid: or The Fair Inconstant* (afterwards revised as *Athelwold*), was produced at Drury Lane in 1709. His connexion with the theatre was of short duration, and the rest of his life was spent in ingenious commercial enterprises, none of which were successful, and in literary pursuits. He formed a company to extract oil from beechmast, another for the colonization of the district to be known later as Georgia, a third to supply wood for naval construction from Scotland, and a fourth for the manufacture of potash. In 1730 he wrote *The Progress of Wit, being a caveat for the use of an Eminent Writer*. The “eminent writer” was Pope, who had introduced him into *The Dunciad* as one of the competitors for the prize offered by the goddess of Dullness, though the satire was qualified by an oblique compliment. A note in the edition of 1729 on the obnoxious passage, in which, however, the original initial was replaced by asterisks, gave Hill great offence. He wrote to Pope complaining of his treatment, and received a reply in which Pope denied responsibility for the notes. Hill appears to have been a persistent correspondent, and inflicted on Pope a series of letters, which are printed in Elwin & Courthope’s edition (x. 1-78). Hill died on the 8th of February 1750, and was buried in Westminster Abbey. The best of his plays were *Zara* (acted 1735) and *Merope* (1749), both adaptations from Voltaire. He also published two series of periodical essays, *The Prompter* (1735) and, with William Bond, *The Plaindealer* (1724). He was generous to fellow-men of letters, and his letters to Richard Savage, whom he helped considerably, show his character in a very amiable light.

The Works of the late Aaron Hill, consisting of letters ..., original poems.... With an essay on the Art of Acting appeared in 1753, and his *Dramatic Works* in 1760. His *Poetical Works* are included in Anderson’s and other editions of the British poets. A full account of his life is provided by an anonymous writer in Theophilus Cibber’s *Lives of the Poets*, vol. v.

HILL, AMBROSE POWELL (1825-1865), American Confederate soldier, was born in Culpeper county, Virginia, on the 9th of November 1825, and graduated from West Point in 1847, being appointed to the 1st U.S. artillery. He served in the Mexican and Seminole Wars, was promoted first lieutenant in September 1851, and in 1855-1860 was employed on the United States’ coast survey. In March 1861, just before the outbreak of the Civil War, he resigned his commission, and when his state seceded he was made colonel of a Virginian infantry regiment, winning promotion to the rank of brigadier-general on the field of Bull Run. In the Peninsular campaign of 1862 he gained further promotion, and as a major-general Hill was one of the most prominent and successful divisional commanders of Lee’s army in the Seven Days’, Second Bull Run, Antietam and Fredericksburg campaigns. His division formed part of “Stonewall” Jackson’s corps, and he was severely wounded in the flank attack of Chancellorsville in May 1863. After Jackson’s death Hill was made a lieutenant-general and placed in command of the 3rd corps of Lee’s army, which he led in the Gettysburg campaign of 1863, the autumn campaign of the same year, and the Wilderness and Petersburg operations of 1864-65. He was killed in front of the Petersburg lines on the 2nd of April 1865. His reputation as a troop leader in battle was one of the highest amongst the generals of both sides, and both Lee and Jackson, when on their death-beds their thoughts wandered in delirium to the battlefield, called for “A. P. Hill” to deliver the decisive blow.

HILL, DANIEL HARVEY (1821-1889), American Confederate soldier, was born in York district, South Carolina, on the 12th of July 1821, and graduated at the United States Military Academy in 1842, being appointed to the 1st United States artillery. He distinguished himself in the Mexican War, being breveted captain and major for bravery at Contreras and Churubusco and at Chapultepec respectively. In February 1849 he resigned his commission and became a professor of mathematics at Washington College (now Washington and Lee University), Lexington, Virginia. In 1854 he joined the faculty of Davidson College, North Carolina, and was in 1859 made superintendent of the North Carolina Military Institute of Charlotte. At the outbreak of the Civil War, D. H. Hill was made colonel of a Confederate infantry regiment, at the head of which he won the action of Big Bethel, near Fortress Monroe, Va., on the 10th of June 1861. Shortly after this he was made a brigadier-general. He took part in the Yorktown and Williamsburg operations in the

spring of 1862, and as a major-general led a division with great distinction in the battle of Fair Oaks and the Seven Days. He took part in the Second Bull Run campaign in August-September 1862, and in the Antietam campaign the stubborn resistance of D. H. Hill's division in the passes of South Mountain enabled Lee to concentrate for battle. The division bore a conspicuous part in the battles of the Antietam and Fredericksburg. On the reorganization of the army of Northern Virginia after Jackson's death, D. H. Hill was not appointed to a corps command, but somewhat later in 1863 he was sent to the west as a lieutenant-general and commanded one of Bragg's corps in the brilliant victory of Chickamauga. D. H. Hill surrendered with Gen. J. E. Johnston on the 26th of April 1865. In 1866-1869 he edited a magazine, The Land we Love, at Charlotte, N.C., which dealt with social and historical subjects and had a great influence in the South. In 1877 he became president of the university of Arkansas, a post which he held until 1884, and in 1885 president of the Military and Agricultural College of Milledgeville, Georgia. General Hill died at Charlotte, N.C., on the 24th of September 1889.

HILL, DAVID BENNETT (1843-1910), American politician, was born at Havana, New York, on the 29th of August 1843. In 1862 he removed to Elmira, New York, where in 1864 he was admitted to the bar. He at once became active in the affairs of the Democratic party, attracting the attention of Samuel J. Tilden, one of whose shrewdest and ablest lieutenants he became. In 1871 and 1872 he was a member of the New York State Assembly, and in 1877 and again in 1881, presided over the Democratic State Convention. In 1882 he was elected mayor of Elmira, and in the same year was chosen lieutenant-governor of the state, having been defeated for nomination as governor by Grover Cleveland. In January 1885, however, Cleveland having resigned to become president, Hill became governor, and in November was elected for a three-year term, and subsequently re-elected. In 1891-1897 he was a member of the United States Senate. During these years, and in 1892, when he tried to get the presidential nomination, he was prominent in working against Cleveland. In 1896 he opposed the free silver plank in the platform adopted by the Democratic National Convention which nominated W. J. Bryan; in the National Convention of 1900, however, the free-silver issue having been subordinated to anti-imperialism, he seconded Bryan's nomination. After 1897 he devoted himself to his law practice, and in 1905 retired from politics. He died in Albany on the 30th of October 1910.

HILL, GEORGE BIRKBECK NORMAN (1835-1903), English author, son of Arthur Hill, head master of Bruce Castle school, was born at Tottenham, Middlesex, on the 7th of June 1835. Arthur Hill, with his brothers Rowland Hill, the postal reformer, and Matthew Davenport Hill, afterwards recorder of Birmingham, had worked out a system of education which was to exclude compulsion of any kind. The school at Bruce Castle, of which Arthur Hill was head master, was founded to carry into execution their theories, known as the Hazelwood system. George Birkbeck Hill was educated in his father's school and at Pembroke College, Oxford. In 1858 he began to teach at Bruce Castle school, and from 1868 to 1877 was head master. In 1869 he became a regular contributor to the *Saturday Review*, with which he remained in connexion until 1884. On his retirement from teaching he devoted himself to the study of English 18th-century literature, and established his reputation as the most learned commentator on the works of Samuel Johnson. He settled at Oxford in 1887, but from 1891 onwards his winters were usually spent abroad. He died at Hampstead, London, on the 27th of February 1903. His works include: *Dr Johnson, his Friends and his Critics* (1878); an edition of Boswell's *Correspondence* (1879); a laborious edition of *Boswell's Life of Johnson, including Boswell's Journal of a Tour to the Hebrides, and Johnson's Diary of a Journey into North Wales* (Clarendon Press, 6 vols., 1887); *Wit and Wisdom of Samuel Johnson* (1888); *Select Essays of Dr Johnson* (1889); *Footsteps of Dr Johnson in Scotland* (1890); *Letters of Johnson* (1892); *Johnsonian Miscellanies* (2 vols., 1897); an edition (1900) of Edward Gibbon's *Autobiography*; Johnson's *Lives of the Poets* (3 vols., 1905), and other works on the 18th-century topics. Dr Birkbeck Hill's elaborate edition of Boswell's *Life* is a monumental work, invaluable to the student.

See a memoir by his nephew, Harold Spencer Scott, in the edition of the *Lives of the English Poets* (1905), and the *Letters* edited by his daughter, Lucy Crump, in 1903.

HILL, JAMES J. (1838-), American railway capitalist, was born near Guelph, Ontario, Canada, on the 16th of September 1838, and was educated at Rockwood (Ont.) Academy, a Quaker institution. In 1856 he settled in St Paul, Minnesota. Abandoning, because of his father's death, his plans to study medicine, he became a clerk in the office of a firm of river steamboat agents and shippers, and later the agent for a line of river packets; he established about 1870 transportation lines on the Mississippi and on the Red River (of the North). He effected a traffic arrangement between the St Paul Pacific Railroad and his steamboat lines; and when the railway failed in 1873 for $27,000,000, Hill interested Sir Donald A. Smith (Lord Strathcona), George Stephen (Lord Mount Stephen), and other Canadian capitalists, in the road and in the wheat country of the Red River Valley; he got control of the bonds (1878), foreclosed the mortgage, reorganized the road as the St Paul, Minneapolis & Manitoba, and began to extend the line, then only 380 m. long, toward the Pacific; and in 1883 he became its president. He was president of the Great Northern Railway (comprehending all his secondary lines) from 1893 to April 1907, when he became chairman of its board of directors. In the extension (1883-1893) of this railway westward to Puget Sound (whence it has direct steamship connexions with China and Japan), the line was built by the company itself, none of the work being handled by contractors. Subsequently his financial interests in American railways caused constant sensations in the stock-markets. The Hill interests obtained control not only of the Great-Northern system, but of the Northern Pacific and the Chicago, Burlington & Quincy, and proposed the construction of another northern line to the Pacific coast. Hill was the president of the Northern Securities Company, which in 1904 was declared by the United States Supreme Court to be in conflict with the Sherman Anti-Trust Law. (See Vol. 27, p. 733.) Among Hill's gifts to public institutions was one of $500,000 to the St. Paul Theological Seminary (Roman Catholic).

HILL, JOHN (*c.* 1716-1775), called from his Swedish honours, "Sir" John Hill, English author, son of the Rev. Theophilus Hill, is said to have been born in Peterborough in 1716. He was apprenticed to an apothecary and on the completion of his apprenticeship he set up in a small shop in St Martin's Lane, Westminster. He also travelled over the country in search of rare herbs, with a view to publishing a *hortus siccus*, but the plan failed. His first publication was a translation of Theophrastus's *History of Stones* (1746). From this time forward he was an indefatigable writer. He edited the *British Magazine* (1746-1750), and for two years (1751-1753) he wrote a daily letter, "The Inspector," for the *London Advertiser and Literary Gazette*. He also produced novels, plays and scientific works, and was a large contributor to the supplement of Ephraim Chambers's *Cyclopaedia*. 465
His personal and scurrilous writings involved him in many quarrels. Henry Fielding attacked him in the *Covent Garden Journal*, Christopher Smart wrote a mock-epic, *The Hilliad*, against him, and David Garrick replied to his strictures against him by two epigrams, one of which runs:—

> "For physics and farces, his equal there scarce is;
> His farces are physic, his physic a farce is."

He had other literary passages-at-arms with John Rich, who accused him of plagiarizing his *Orpheus*, also with Samuel Foote and Henry Woodward. From 1759 to 1775 he was engaged on a huge botanical work—*The Vegetable System* (26 vols. fol.)—adorned by 1600 copperplate engravings. Hill's botanical labours were undertaken at the request of his patron, Lord Bute, and he was rewarded by the order of Vasa from the king of Sweden in 1774. He had a medical degree from Edinburgh, and he now practised as a quack doctor, making considerable sums by the preparation of vegetable medicines. He died in London on the 21st of November 1775.

Of the seventy-six separate works with which he is credited in the *Dictionary of National Biography*, the most valuable are those that deal with botany. He is said to have been the author of the second part of *The Oeconomy of Human Life* (1751), the first part of which is by Lord Chesterfield, and Hannah Glasse's famous manual of cookery was generally ascribed to him (see Boswell, ed. Hill, iii. 285). Dr Johnson said of him that he was "an ingenious man, but had no veracity."

See a *Short Account of the Life, Writings and Character of the late Sir John Hill* (1779), which is chiefly occupied with a descriptive catalogue of his works; also *Temple Bar* (1872, xxxv. 261-266).

HILL, MATTHEW DAVENPORT (1792-1872), English lawyer and penologist, was born on the 6th of August 1792, at Birmingham, where his father, T. W. Hill, for long conducted a private school. He was a brother of Sir Rowland Hill. He early acted as assistant in his father's school, but in 1819

was called to the bar at Lincoln's Inn. He went the midland circuit. In 1832 he was elected one of the Liberal members for Kingston-upon-Hull, but he lost his seat at the next election in 1834. On the incorporation of Birmingham in 1839 he was chosen recorder; and in 1851 he was appointed commissioner in bankruptcy for the Bristol district. Having had his interest excited in questions relating to the treatment of criminal offenders, he ventilated in his charges to the grand juries, as well as in special pamphlets, opinions which were the means of introducing many important reforms in the methods of dealing with crime. One of his principal coadjutors in these reforms was his brother Frederick Hill (1803-1896), whose *Amount, Causes and Remedies of Crime*, the result of his experience as inspector of prisons for Scotland, marked an era in the methods of prison discipline. Hill was one of the chief promoters of the Society for the Diffusion of Useful Knowledge, and the originator of the *Penny Magazine*. He died at Stapleton, near Bristol, on the 7th of June 1872.

His principal works are *Practical Suggestions to the Founders of Reformatory Schools* (1855); *Suggestions for the Repression of Crime* (1857), consisting of charges addressed to the grand juries of Birmingham; *Mettray* (1855); *Papers on the Penal Servitude Acts* (1864); *Journal of a Third Visit to the Convict Gaols, Refuges and Reformatories of Dublin* (1865); *Addresses delivered at the Birmingham and Midland Institute* (1867). See *Memoir of Matthew Davenport Hill*, by his daughters Rosamond and Florence Davenport Hill (1878).

HILL, OCTAVIA (1838-) and **MIRANDA** (1836-1910), English philanthropic workers, were born in London, being daughters of Mr James Hill and granddaughters of Dr Southwood Smith, the pioneer of sanitary reform. Miss Octavia Hill's attention was early drawn to the evils of London housing, and the habits of indolence and lethargy induced in many of the lower classes by their degrading surroundings. She conceived the idea of trying to free a few poor people from such influences, and Mr Ruskin, who sympathized with her plans, supplied the money for starting the work. For £750 Miss Hill purchased the 56 years' lease of three houses in one of the poorest courts of Marylebone. Another £78 was spent in building a large room at the back of her own house where she could meet the tenants. The houses were put in repair, and let out in sets of two rooms. At the end of eighteen months it was possible to pay 5% interest, to repay £48 of the capital, as well as meet all expenses for taxes, ground rent and insurance. What specially distinguished this scheme was that Miss Hill herself collected the rents, thus coming into contact with the tenants and helping to enforce regular and self-respecting habits. The success of her first attempt encouraged her to continue. Six more houses were bought and treated in a similar manner. A yearly sum was set aside for the repairs of each house, and whatever remained over was spent on such additional appliances as the tenants themselves desired. This encouraged them to keep their tenements in good repair. By the help of friends Miss Hill was now enabled to enlarge the scope of her work. In 1869 eleven more houses were bought. The plan was to set a visitor over a small court or block of buildings to do whatever work in the way of rent-collecting, visiting for the School Board, &c., was required. As years went on Miss Octavia Hill's work was largely increased. Numbers of her friends bought and placed under her care small groups of houses, over which she fulfilled the duties of a conscientious landlord. Several large owners of tenement houses, notably the Ecclesiastical Commissioners, entrusted to her the management of such property, and consulted her about plans of rebuilding; and a number of fellow-workers were trained by her in the management of houses for the poor. The results in Southwark (where Red Cross Hall was established) and elsewhere were very beneficial. Both Miss Miranda and Miss Octavia Hill took an interest in the movement for bringing beauty into the homes of the poor, and the former was practically the founder of the Kyrle Society, the first suggestion of which was contained in a paper read to a small circle of friends. Both sisters worked for the preservation of open spaces, and helped to promote the work of the Charity Organization Society, and for several years Miss Miranda Hill (who died on the 31st of May 1910) did admirable work in Marylebone as a member of the Board of Guardians.

HILL, ROWLAND (1744-1833), English preacher, sixth son of Sir Rowland Hill, Bart. (d. 1783), was born at Hawkstone, Shropshire, on the 23rd of August 1744. He was educated at Shrewsbury, Eton and St John's College, Cambridge. Stimulated by George Whitefield's example, he scandalized the university authorities and his own friends by preaching and visiting the sick before he had taken orders. In 1773 he was appointed to the parish of Kingston, Somersetshire, where he soon attracted great crowds to his open-air services. Having inherited considerable property, he built for his own use Surrey Chapel, in the Blackfriars Road, London (1783). Hill conducted his services in accordance with the forms of the Church of England, in whose communion he always remained. Both at Surrey Chapel and in his provincial "gospel tours" he had great success. His oratory was

specially adapted for rude and uncultivated audiences. He possessed a voice of great power, and according to Southey “his manner” was “that of a performer as great in his own line as Kean or Kemble.” His earnest and pure purposes more than made up for his occasional lapses from good taste and the eccentricity of his wit. He helped to found the Religious Tract Society, the British and Foreign Bible Society, and the London Missionary Society, and was a stout advocate of vaccination. His best-known work is the *Village Dialogues*, which first appeared in 1810, and reached a 34th edition in 1839. He died on the 11th of April 1833.

See *Life* by E. Sidney (1833); *Memoirs*, by William Jones (1834); and *Memorials*, by Jas. Sherman (1857).

HILL, SIR ROWLAND (1795-1879), English administrator, author of the penny postal system, a younger brother of Matthew Davenport Hill, and third son of T. W. Hill, who named him after Rowland Hill the preacher, was born on the 3rd of December 1795 at Kidderminster. As a young child he had, on account of an affection of the spine, to maintain a recumbent position, and his principal method of relieving the irksomeness of his situation was to repeat figures aloud consecutively until he had reached very high totals. A similar bent of mind was manifested when he entered school in 1802, his aptitude for mathematics being quite exceptional. But he was indebted for the direction of his abilities in no small degree to the guidance of his father, a man of advanced political and social views, which were qualified and balanced by the strong practical tendency of his mind. At the age of twelve Rowland began to assist in teaching mathematics in his father’s school at Hilltop, Birmingham, and latterly he had the chief management of the school. On his suggestion the establishment was removed in 1819 to Hazelwood, a more commodious building in the Hagley Road, in order to have the advantages of a large body of boys, for the purpose of properly carrying out an improved system of education. That system, which was devised principally by Rowland, was expounded in a pamphlet entitled *Plans for the Government and Education of Boys in Large Numbers*, the first edition of which appeared in 1822, and a second with additions in 1827. The principal feature of the system was “to leave as much as possible all power in the hands of the boys themselves”; and it was so successful that, in a circular issued six years after the experiment had been in operation, it was announced that “the head master had never once exercised his right of veto on their proceedings.” It may be said that Rowland Hill, as an educationist, is entitled to a place side by side with Arnold of Rugby, and was equally successful with him in making moral influence of the highest kind the predominant power in school discipline. After his marriage in 1827 Hill removed to a new school at Bruce Castle, Tottenham, which he conducted until failing health compelled him to retire in 1833. About this time he became secretary of Gibbon Wakefield’s scheme for colonizing South Australia, the objects of which he explained in 1832 in a pamphlet on *Home Colonies*, afterwards partly reprinted during the Irish famine under the title *Home Colonies for Ireland*. It was in 1835 that his zeal as an administrative reformer was first directed to the postal system. The discovery which resulted from these investigations is when stated so easy of comprehension that there is great danger of losing sight of its originality and thoroughness. A fact which enhances its merit was that he was not a post-office official, and possessed no practical experience of the details of the old system. After a laborious collection of statistics he succeeded in demonstrating that the principal expense of letter carriage was in receiving and distributing, and that the cost of conveyance differed so little with the distance that a uniform rate of postage was in reality the fairest to all parties that could be adopted. Trusting also that the deficiency in the postal rate would be made up by the immense increase of correspondence, and by the saving which would be obtained from prepayment, from improved methods of keeping accounts, and from lessening the expense of distribution, he in his famous pamphlet published in 1837 recommended that within the United Kingdom the rate for letters not exceeding half an ounce in weight should be only one penny. The employment of postage stamps is mentioned only as a suggestion, and in the following words: “Perhaps the difficulties might be obviated by using a bit of paper just large enough to bear the stamp, and covered at the back with a glutinous wash which by applying a little moisture might be attached to the back of the letter.” Proposals so striking and novel in regard to a subject in which every one had a personal interest commanded immediate and general attention. So great became the pressure of public opinion against the opposition offered to the measure by official prepossessions and prejudices that in 1838 the House of Commons appointed a committee to examine the subject. The committee having reported favourably, a bill to carry out Hill’s recommendations was brought in by the government. The act received the royal assent in 1839, and after an intermediate rate of four-pence had been in operation from the 5th of December of that year, the penny rate commenced on the 10th of January 1840. Hill received an appointment in the Treasury in order to superintend the introduction of his reforms, but he was compelled to retire when the Liberal government resigned office in 1841. In consideration of the loss he thus sustained, and to mark the public appreciation of his services, he was in 1846 presented with the sum of £13,360. On the Liberals returning to office in the same year he was appointed secretary to the postmaster-general and in 1854 he was made chief secretary. His ability as a practical administrator

enabled him to supplement his original discovery by measures realizing its benefits in a degree commensurate with continually improving facilities of communication, and in a manner best combining cheapness with efficiency. In 1860 his services were rewarded with the honour of knighthood; and when failing health compelled him to resign his office in 1864, he received from parliament a grant of £20,000 and was also allowed to retain his full salary of £2000 a year as retiring pension. In 1864 the university of Oxford conferred on him the degree of D.C.L., and on the 6th of June 1879 he was presented with the freedom of the city of London. The presentation, on account of his infirm health, took place at his residence at Hampstead, and he died on the 27th of August following. He was buried in Westminster Abbey.

He wrote, in conjunction with his brother, Arthur Hill, a *History of Penny Postage*, published in 1880, with an introductory memoir by his nephew, G. Birkbeck Hill. See also *Sir Rowland Hill, the Story of a Great Reform*, told by his daughter (1907). To commemorate his memory the Rowland Hill Memorial and Benevolent Fund was founded shortly after his death for the purpose of relieving distressed persons connected with the post office who were outside the scope of the Superannuation Act. See also Post and Postal Service.

HILL, ROWLAND HILL, 1st Viscount (1772-1842), British general, was the second son of (Sir) John Hill, of Hawkstone, Shropshire, and nephew of the Rev. Rowland Hill (1744-1833), was born at Prees Hall near Hawkstone on the 11th of August 1772. He was gazetted to the 38th regiment in 1790, obtaining permission at the same time to study in a military academy at Strassburg, where he continued after removing into the 53rd regiment with the rank of lieutenant in 1791. In the beginning of 1793 he raised a company, and was promoted to the rank of captain. The same year he acted as assistant secretary to the British minister at Genoa, and served with distinction as a staff officer in the siege of Toulon. Hill took part in many minor expeditions in the following years. In 1800, when only twenty-eight, he was made a brevet colonel, and in 1801 he served with distinction in Sir Ralph Abercromby's expedition to Egypt, and was wounded at the battle of Alexandria. He continued to command his regiment, the 90th, until 1803, when he became a brigadier-general. During his regimental command he introduced a regimental school and a sergeants' mess. He held various commands as brigadier, and after 1805 as major-general, in Ireland. In 1805 he commanded a brigade in the abortive Hanover expedition. In 1808 he was appointed to a brigade in the force sent to Portugal, and from Vimeira to Vittoria, in advance or retreat, he proved himself Wellington's ablest and most indefatigable coadjutor. He led a brigade at Vimeira, at Corunna and at Oporto, and a division at Talavera (see Peninsular War). His capacity for independent command was fully demonstrated in the campaigns of 1810, 1811 and 1812. In 1811 he annihilated a French detachment under Girard at Arroyo-dos-Molinos, and early in 1812, having now attained a rank of lieutenant-general (January 1812) and become a K.B. (March), he carried by assault the important works of Almaraz on the Tagus. Hill led the right wing of Wellington's army in the Salamanca campaign in 1812 and at the battle of Vittoria in 1813. Later in this year he conducted the investment of Pampeluna and fought with the greatest distinction at the Nivelle and the Nive. In the invasion of France in 1814 his corps was victoriously engaged both at Orthez and at Toulouse. Hill was one of the general officers rewarded for their services by peerages, his title being at first Baron Hill of Almaraz and Hawkstone, and he received a pension, the thanks of parliament and the freedom of the city of London. For about two years previous to his elevation to the peerage, he had been M.P. for Shrewsbury. In 1815 the news of Napoleon's return from Elba was followed by the assembly of an Anglo-Allied army (see Waterloo Campaign) in the Netherlands, and Hill was appointed to one of the two corps commands in this army. At Waterloo he led the famous charge of Sir Frederick Adams's brigade against the Imperial Guard, and for some time it was thought that he had fallen in the mêlée. He escaped, however, without a wound, and continued with the army in France until its withdrawal in 1818. Hill lived in retirement for some years at his estate of Hardwicke Grange. He carried the royal standard at the coronation of George IV. and became general in 1825. When Wellington became premier in 1828, he received the appointment of general commanding-in-chief, and on resigning this office in 1842 he was created a viscount. He died on the 10th of December of the same year. Lord Hill was, next to Wellington, the most popular and able soldier of his time in the British service, and was so much beloved by the troops, especially those under his immediate command, that he gained from them the title of "the soldier's friend." He was a G.C.B, and G.C.H., and held the grand crosses of various foreign orders, amongst them the Russian St George and the Austrian Maria Theresa.

The *Life of Lord Hill, G.C.B.*, by Rev. Edwin Sidney, appeared in 1845.

HILL (O. Eng. *hyll*; cf. Low Ger. *hull*, Mid. Dutch *hul*, allied to Lat. *celsus*, high, *collis*, hill, &c.), a natural elevation of the earth's surface. The term is now usually confined to elevations lower than a mountain, but formerly was used for all such elevations, high or low.

HILLAH, a town of Asiatic Turkey, in the pashalik of Bagdad, 60 m. S. of the city of Bagdad, in 32° 2′ 35″ N., 44° 48′ 40½″ E., formerly the capital of a sanjak and the residence of a mutasserif, who in 1893 was transferred to Diwanieh. It is situated on both banks of the Euphrates, the two parts of the town being connected by a floating bridge, 450 ft. in length, in the midst of a very fertile district. The estimated population, which includes a large number of Jews, varies from 6000 to 12,000. The town has suffered much from the periodical breaking of the Hindieh dam and the consequent deflection of the waters of the Euphrates to the westward, as a result of which at times the Euphrates at this point has been entirely dry. This deflection of water has also seriously interfered with the palm groves, the cultivation of which constitutes a large part of the industry of the surrounding country along the river. The bazaars of Hillah are relatively large and well supplied. Many of the houses in the town are built of brick, not a few bearing an inscription of Nebuchadrezzar, obtained from the ruins of Babylon, which lie less than an hour away to the north.

Bibliography.—C. J. Rich, *Babylon and Persepolis* (1839); J. R. Peters, *Nippur* (1857); H. Rassam, *Asshur and the Land of Nimrod* (1897); H. V. Geere, *By Nile and Euphrates* (1904).

(J. P. Pe.)

HILLARD, GEORGE STILLMAN (1808-1879), American lawyer and author, was born at Machias, Maine, on the 22nd of September 1808. After graduating at Harvard College in 1828, he taught in the Round Hill School at Northampton, Massachusetts. He graduated at the Harvard Law School in 1832, and in 1833 he was admitted to the bar in Boston, where he entered into partnership with Charles Sumner. He was a member of the state House of Representatives in 1836, of the state Senate in 1850, and of the state constitutional convention of 1853, and in 1866-70 was United States district attorney for Massachusetts. He devoted a large portion of his time to literature. He became a member of the editorial staff of the *Christian Register*, a Unitarian weekly, in 1833; in 1834 he became editor of The *American Jurist* (1829-1843), a legal journal to which Sumner, Simon Greenleaf and Theron Metcalf contributed; and from 1856 to 1861 he was an associate editor of the Boston *Courier*. His publications include an edition of Edmund Spenser's works (in 5 vols., 1839); *Selections from the Writings of Walter Savage Landor* (1856); *Six Months in Italy* (2 vols., 1853); *Life and Campaigns of George B. McClellan* (1864); a part of the *Life, Letters, and Journals of George Ticknor* (1876); besides a series of school readers and many articles in periodicals and encyclopaedias. He died in Boston on the 21st of January 1879.

HILLEBRAND, KARL (1829-1884), German author, was born at Giessen on the 17th of September 1829, his father Joseph Hillebrand (1788-1871) being a literary historian and writer on philosophic subjects. Karl Hillebrand became involved, as a student in Heidelberg, in the Baden revolutionary movement, and was imprisoned in Rastatt. He succeeded in escaping and lived for a time in Strassburg, Paris—where for several months he was Heine's secretary—and Bordeaux. He continued his studies, and after obtaining the doctor's degree at the Sorbonne, he was appointed teacher of German in the *École militaire* at St Cyr, and shortly afterwards, professor of foreign literatures at Douai. On the outbreak of the Franco-German War he resigned his professorship and acted for a time as correspondent to *The Times* in Italy. He then settled in Florence, where he died on the 19th of October 1884. Hillebrand wrote with facility and elegance in French, English and Italian, besides his own language. His essays, collected under the title *Zeiten, Völker und Menschen* (Berlin, 1874-1885), show clear discernment, a finely balanced cosmopolitan judgment and grace of style. He undertook to write the *Geschichte Frankreichs von der Thronbesteigung Ludwig Philipps bis zum Fall Napoleons III.*, but only two volumes were completed (to 1848) (2nd ed., 1881-1882). In French he published *Des conditions de la bonne comédie* (1863), *La Prusse contemporaine* (1867), *Études italiennes* (1868), and a translation of O. Müller's *Griechische Literaturgeschichte* (3rd ed., 1883). In English he published his Royal Institution Lectures on *German Thought during the Last Two Hundred Years* (1880). He also edited a collection of essays dealing with Italy, under the title

Italia (4 vols., Leipzig, 1824-1877).

See H. Homberger, *Karl Hillebrand* (Berlin, 1884).

HILLEL, Jewish rabbi, of Babylonian origin, lived at Jerusalem in the time of King Herod. Though hard pressed by poverty, he applied himself to study in the schools of Shemaiah and Abtalion (Sameas and Pollion in Josephus). On account of his comprehensive learning and his rare qualities he was numbered among the recognized leaders of the Pharisaic scribes. Tradition assigns him the highest dignity of the Sanhedrin, under the title of nasi ("prince"), about a hundred years before the destruction of Jerusalem, *i.e.* about 30 B.C. The date at least can be recognized as historic; the fact that Hillel took a leading position in the council can also be established. The epithet *ha-zaḳen* ("the elder"), which usually accompanies his name, proves him to have been a member of the Sanhedrin, and according to a trustworthy authority Hillel filled his leading position for forty years, dying, therefore, about A.D. 10. His descendants remained, with few exceptions, at the head of Judaism in Palestine until the beginning of the 5th century, two of them, his grandson Gamaliel I. and the latter's son Simon, during the time when the Temple was still standing. The fact that Josephus (*Vita* 38) ascribes to Simon descent from a very distinguished stock (γένους σφόδρα λαμπροῦ), shows in what degree of estimation Hillel's descendants stood. When the dignity of *nasi* became afterwards hereditary among them, Hillel's ancestry, perhaps on the ground of old family traditions, was traced back to David. Hillel is especially noted for the fact that he gave a definite form to the Jewish traditional learning, as it had been developed and made into the ruling and conserving factor of Judaism in the latter days of the second Temple, and particularly in the centuries following the destruction of the Temple. He laid down seven rules for the interpretation of the Scriptures, and these became the foundation of rabbinical hermeneutics; and the ordering of the traditional doctrines into a whole, effected in the Mishna by his successor Judah I., two hundred years after Hillel's death, was probably likewise due to his instigation. The tendency of his theory and practice in matters pertaining to the Law is evidenced by the fact that in general he advanced milder and more lenient views in opposition to his colleague Shammai, a contrast which after the death of the two masters, but not until after the destruction of the Temple, was maintained in the strife kept up between the two schools named the House of Hillel and the House of Shammai. The well-known institution of the Prosbol (προσβολή), introduced by Hillel, was intended to avert the evil consequences of the scriptural law of release in the seventh year (Deut. xv. 1). He was led to this, as is expressly set forth (*M. Giṭṭin*, iv. 3), by a regard for the welfare of the community. Hillel lived in the memory of posterity chiefly as the great teacher who enjoined and practised the virtues of 468
charity, humility and true piety. His proverbial sayings, in particular, a great number of which were written down partly in Aramaic, partly in Hebrew, strongly affected the spirit both of his contemporaries and of the succeeding generations. In his Maxims (*Aboth,* i. 12) he recommends the love of peace and the love of mankind beyond all else, and his own love of peace sprang from the tenderness and deep humility which were essential features in his character, as has been illustrated by many anecdotes. Hillel's patience has become proverbial. One of his sayings commends humility in the following paradox: "My abasement is my exaltation." His charity towards men is given its finest expression in the answer which he made to a proselyte who asked to be taught the commandments of the Torah in the shortest possible form: "What is unpleasant to thyself that do not to thy neighbour; this is the whole Law, all else is but its exposition." This allusion to the scriptural injunction to love one's neighbour (Lev. xix. 18) as the fundamental law of religious morals, became in a certain sense a commonplace of Pharisaic scholasticism. For the Pharisee who accepts the answer of Jesus regarding that fundamental doctrine which ranks the love of one's neighbour as the highest duty after the love of God (Mark xii. 33), does so because as a disciple of Hillel the idea is familiar to him. St Paul also (Gal. v. 14) doubtless learned this in the school of Gamaliel. Hillel emphasized the connexion between duty towards one's neighbour and duty towards oneself in the epigrammatic saying: "If I am not for myself, who is for me? And if I am for myself alone, what then am I? And if not now, then when?" (*Aboth*, i. 14). The duty of working both with and for men he teaches in the sentence: "Separate not thyself from the congregation" (*ib.* ii. 4). The duty of considering oneself part of common humanity, of not differing from others by any peculiarity of behaviour, he sums up in the words: "Appear neither naked nor clothed, neither sitting nor standing, neither laughing nor weeping" (*Tosef. Ber.* c. ii.). The command to love one's neighbour inspired also Hillel's injunction (*Aboth*, ii. 4): "Judge not thy neighbour until thou art in his place" (cf. Matt. vii. 1). The disinterested pursuit of learning, study for study's sake, is commended in many of Hillel's sayings as being what is best in life: "He who wishes to make a name for himself loses his name; he who does not increase [his knowledge] decreases it; he who does not learn is worthy of death; he who works for the sake of a crown is lost" (*Aboth*, i. 13). "He who occupies himself much with learning makes his life" (*ib.* ii. 7). "He who has acquired the words of doctrine has acquired the life of the world to come" (*ib.*). "Say not: When I am free from other occupations I shall study; for may be thou shalt never at all be free" (*ib.* 4). One of his strings of proverbs runs as follows: "The uncultivated man is not innocent; the ignorant man is not devout; the bashful man learns not; the

wrathful man teaches not; he who is much absorbed in trade cannot become wise; where no men are, there strive thyself to be a man" (*ib.* 5). The almost mystical profundity of Hillel's consciousness of God is shown in the words spoken by him on the occasion of a feast in the Temple—words alluding to the throng of people gathered there which he puts into the mouth of God Himself: "If I am here every one is here; if I am not here no one is here" (*Sukkah* 53*a*). In like manner Hillel makes God say to Israel, referring to Exodus xx. 24: "Whither I please, thither will I go; if thou come into my house I come into thy house; if thou come not into my house, I come not into thine" (*ib.*).

It is noteworthy that no miraculous legends are connected with Hillel's life. A scholastic tradition, however, tells of a voice from heaven which made itself heard when the wise men had assembled in Jericho, saying: "Among those here present is one who would have deserved the Holy Spirit to rest upon him, if his time had been worthy of it." And all eyes turned towards Hillel (*Tos. Soṭah*, xiii. 3). When he died lamentation was made for him as follows: "Woe for the humble, woe for the pious, woe for the disciple of Ezra!" (*ib.*)

HILLEL II., one of the patriarchs belonging to the family of Hillel I., lived in Tiberias about the middle of the 4th century, and introduced the arrangement of the calendar through which the Jews of the Diaspora became independent of Palestine in the uniform fixation of the new moons and feasts.

The Rabbi HILLEL, who in the 4th century made the remarkable declaration that Israel need not expect a Messiah, because the promise of a Messiah had already been fulfilled in the days of King Hezekiah (Babli, *Sanhedrin*, 99a), is probably Hillel, the son of Samuel ben Naḥman, a well-known expounder of the scriptures.

(W. BA.)

HILLER, FERDINAND (1811-1885), German composer, was born at Frankfort-on-Main, on the 24th of October 1811. His first master was Aloys Schmitt, and when he was ten years of age his compositions and talent led his father, a well-to-do man, to send him to Hummel in Weimar. There he devoted himself to composition, among his work being the entr'actes to *Maria Stuart*, through which he made Goethe's acquaintance. Under Hummel, Hiller made great strides as a pianist, so much so that early in 1827 he went on a tour to Vienna, where he met Beethoven and produced his first quartet. After a brief visit home Hiller went to Paris in 1829, where he lived till 1836. His father's death necessitated his return to Frankfort for a time, but on the 8th of January 1839 he produced at Milan his opera *La Romilda*, and began to write his oratorio *Die Zerstörung Jerusalems*, one of his best works. Then he went to Leipzig, to his friend Mendelssohn, where in 1843-1844 he conducted a number of the Gewandhaus concerts and produced his oratorio. After a further visit to Italy to study sacred music, Hiller produced two operas, *Ein Traum* and *Conradin*, at Dresden in 1845 and 1847 respectively; he went as conductor to Düsseldorf in 1847 and Cologne in 1850, and conducted at the Opéra Italien in Paris in 1851 and 1852. At Cologne he became a power as conductor of the Gürzenich concerts and head of the Conservatorium. In 1884 he retired, and died on the 12th of May in the following year. Hiller frequently visited England. He composed a work for the opening of the Royal Albert Hall, his *Nala and Damayanti* was performed at Birmingham, and he gave a series of pianoforte recitals of his own compositions at the Hanover Square Rooms in 1871. He had a perfect mastery over technique and form in musical composition, but his works are generally dry. He was a sound pianist and teacher, and occasionally a brilliant writer on musical matters. His compositions, numbering about two hundred, include six operas, two oratorios, six or seven cantatas, much chamber music and a once-popular pianoforte concerto.

HILLER, JOHANN ADAM (1728-1804), German musical composer, was born at Wendisch-Ossig near Görlitz in Silesia on the 25th of December 1728. By the death of his father in 1734 he was left dependent to a large extent on the charity of friends. Entering in 1747 the Kreuzschule in Dresden, the school attended many years afterwards by Richard Wagner, he subsequently went to the university of Leipzig, where he studied jurisprudence, supporting himself by giving music lessons, and also by performing at concerts both on the flute and as a vocalist. Gradually he adopted music as his sole profession, and devoted himself more especially to the permanent establishment of a concert institute at Leipzig. It was he who in 1781 originated the celebrated Gewandhaus concerts which still flourish at Leipzig. In 1789 he became "cantor" of the Thomas school there, a position previously held by John Sebastian Bach. He died in Leipzig on the 16th of June 1804. Two of his pupils placed a monument to his memory in front of the Thomas school. Hiller's compositions comprise almost every kind of church music, from the cantata to the simple chorale. But much more important are his operettas, 14 in number, which for a long time retained their place on the boards,

and had considerable influence on the development of light dramatic music in Germany. The *Jolly Cobbler*, *Love in the Country* and the *Village Barber* were amongst the most popular of his works. Hiller also excelled in sentimental songs and ballads. With great simplicity of structure his music combines a considerable amount of genuine melodic invention. Although an admirer and imitator of the Italian school, Hiller fully appreciated the greatness of Handel, and did much for the appreciation of his music in Germany. It was under his direction that the *Messiah* was for the first time given at Berlin, more than forty years after the composition of that great work. Hiller was also a writer on music, and for some years (1766-1770) edited a musical weekly periodical named *Wöchentliche Nachrichten und Anmerkungen die Musik betreffend*.

HILLIARD, LAWRENCE (d. 1640), English miniature painter. The date of his birth is not known, but he died in 1640. He was the son of Nicholas Hilliard, and evidently derived his Christian name from that of his grandmother. He adopted his father's profession and worked out the unexpired time of his licence after Nicholas Hilliard died. It was from Lawrence Hilliard that Charles I. received the portrait of Queen Elizabeth now at Montagu House, since van der Dort's catalogue describes it as "done by old Hilliard, and bought by the king of young Hilliard." In 1624 he was paid £42 from the treasury for five pictures, but the warrant does not specify whom they represented. His portraits are of great rarity, two of the most beautiful being those in the collections of Earl Beauchamp and Mr J. Pierpont Morgan. They are as a rule signed L.H., but are also to be distinguished by the beauty of the calligraphy in which the inscriptions round the portraits are written. The writing is as a rule very florid, full of exquisite curves and flourishes, and more elaborate than the more formal handwriting of Nicholas Hilliard. The colour scheme adopted by the son is richer and more varied than that used by the father, and Lawrence Hilliard's miniatures are not so hard as are those of Nicholas, and are marked by more shade and a greater effect of atmosphere.

(G. C. W.)

HILLIARD, NICHOLAS (*c.* 1537-1619), the first true English miniature painter, is said to have been the son of Richard Hilliard of Exeter, high sheriff of the city and county in 1560, by Lawrence, daughter of John Wall, goldsmith, of London, and was born probably about 1537. He was appointed goldsmith, carver and portrait painter to Queen Elizabeth, and engraved the Great Seal of England in 1586. He was in high favour with James I. as well as with Elizabeth, and from the king received a special patent of appointment, dated the 5th of May 1617, and granting him a sole licence for the royal work for twelve years. He is believed to have been the author of an important treatise on miniature painting, now preserved in the Bodleian Library, but it seems more probable that the author of that treatise was John de Critz, Serjeant Painter to James I. It is probable, however, that the treatise was taken down from the instructions of Hilliard, for the benefit of one of his pupils, perhaps Isaac Oliver.

The esteem of his countrymen for Hilliard is testified to by Dr Donne, who in a poem called "The Storm" (1597) praises the work of this artist. He painted a portrait of himself at the age of thirteen, and is said to have executed one of Mary queen of Scots when he was eighteen years old. He died on the 7th of January 1619, and was buried in St Martin's-in-the-Fields, Westminster, leaving by his will twenty shillings to the poor of the parish, £30 between his two sisters, some goods to his maidservant, and all the rest of his effects to his son, Lawrence Hilliard, his sole executor.

It seems to be pretty certain that he visited France, and that he is the artist alluded to in the papers of the duc d'Alençon under the name of "Nicholas Belliart, peintre anglois" who was painter to this prince in 1577, receiving a stipend of 200 livres. The miniature of Mademoiselle de Sourdis, in the collection of Mr J. Pierpont Morgan, is certainly the work of Hilliard, and is dated 1577, in which year she was a maid of honour at the French Court; and other portraits which are his work are believed to represent Gabrielle d'Estrées, niece of Madame de Sourdis, la Princesse de Condé and Madame de Montgomery.

For further information respecting Hilliard's sojourn in France, see the privately printed catalogue of the collection of miniatures belonging to Mr J. Pierpont Morgan, compiled by Dr G. C. Williamson.

(G. C. W.)

HILLSDALE, a city and the county-seat of Hillsdale county, Michigan, U.S.A., about 87 m. W. by S. of Detroit. Pop. (1900) 4151, of whom 300 were foreign-born; (1904) 4809; (1910) 5001. Hillsdale is served by the Lake Shore & Michigan Southern railway. It has a public library, and is the seat of Hillsdale College (co-educational, Free Baptist), which was opened as Michigan Central College, at Spring Arbor, Michigan, in 1844, was removed to Hillsdale and received its present name in 1853 and was re-opened here in 1855. The college in 1907-1908 had 22 instructors and 345 students. The city is a centre for a rich farming region; among its manufactures are gasoline and gas engines, screen doors, wagons, barrels, shoes, fur-coats and flour. Hillsdale was first settled in 1837, was incorporated as a village in 1847, and was chartered as a city in 1869.

HILL TIPPERA, or TRIPURA, a native state of India, adjoining the British district of Tippera, in Eastern Bengal and Assam. Area, 4086 sq. m.; pop, (1901) 173,325; estimated revenue, £55,000. Six parallel ranges of hill cross it from north to south, at an average distance of 12 m. apart. The hills are covered for the most part with bamboo jungle, while the low ground abounds with trees of various kinds, canebrakes and swamps. The principal crop and food staple is rice. The other articles of produce are cotton, chillies and vegetables. The chief exports are cotton, timber, oilseeds, bamboo canes, thatching-grass and firewood, on all of which tolls are levied. The chief rivers are the Gumti, Haora, Khoyai, Dulai, Manu and Fenny (Pheni). During the heavy rains the people in the plains use boats as almost the sole means of conveyance.

The history of the state includes two distinct periods—the traditional period described in the *Rajmala*, or "Chronicles of the Kings of Tippera," and the period since A.D. 1407. The *Rajmala* is a history in Bengali verse, compiled by the Brahmans of the court of Tripura. In the early history of the state, the rajas were in a state of chronic feud with all the neighbouring countries. The worship of Siva was here, as elsewhere in India, associated with the practice of human sacrifice, and in no part of India were more victims offered. It was not until the beginning of the 17th century that the Moguls obtained any footing in this country. When the East India Company obtained the *diwani* or financial administration of Bengal in 1765, so much of Tippera as had been placed on the Mahommedan rent-roll came under British rule. Since 1808, each successive ruler has received investiture from the British government. In October 1905 the state was attached to the new province of Eastern Bengal and Assam. It has a chronological era of its own, adopted by Raja Birraj, from whom the present raja is 93rd in descent. The year 1875 corresponded with 1285 of the Tippera era.

Besides being the ruler of Hill Tippera, the raja holds an estate in the British district of Tippera, called *chakla* Roshnabad, which is far the most valuable of his possessions. The capital is Agartala (pop. 9513), where there is an Arts College. The raja's palace and other public buildings were seriously damaged by the earthquake of the 12th of June 1897. The late raja, who died from the result of a motor-car accident in 1909, succeeded his father in 1896, but he had taken a large share in the administration of the state for some years previously. The principle of succession, which had often caused serious disputes, was defined in 1904, to the effect that the chief may nominate any male descendant through males from himself or from any male ancestor, but failing such nomination, then the rule of primogeniture applies.

HILTON, JOHN (1804-1878), British surgeon, was born at Castle Hedingham, in Essex, in 1804. He entered Guy's Hospital in 1824. He was appointed demonstrator of anatomy in 1828, assistant-surgeon in 1845, surgeon 1849. In 1867 he was president of the Royal College of Surgeons, of which he became member in 1827 and fellow in 1843, and he also delivered the Hunterian oration in 1867. As Arris and Gale professor (1859-1862) he delivered a course of lectures on "Rest and Pain," which have become classics. He was also surgeon-extraordinary to Queen Victoria. Hilton was the greatest anatomist of his time, and was nick named "Anatomical John." It was he who, with Joseph Towne the artist, enriched Guy's Hospital with its unique collection of models. In his grasp of the structure and functions of the brain and spinal cord he was far in advance of his contemporaries. As an operator he was more cautious than brilliant. This was doubtless due partly to his living in the pre-anaesthetics period, and partly to his own consummate anatomical knowledge, as is indicated by the method for opening deep abscesses which is known by his name. But he could be bold when necessary; he was the first to reduce a case of obturator hernia by abdominal section, and one of the first to practise lumbar colostomy. He died at Clapham on the 14th of September 1878.

HILTON, WILLIAM (1786-1839), English painter, was born in Lincoln on the 3rd of June 1786, son of a portrait-painter. In 1800 he was placed with the engraver J. R. Smith, and about the same time began studying in the Royal Academy school. He first exhibited in this institution in 1803, sending a "Group of Banditti"; and he soon established a reputation for choice of subject, and qualities of design and colour superior to the great mass of his contemporaries. He made a tour in Italy with Thomas Phillips, the portrait-painter. In 1813, having exhibited "Miranda and Ferdinand with the Logs of Wood," he was elected an associate of the Academy, and in 1820 a full academician, his diploma-picture representing "Ganymede." In 1823 he produced "Christ crowned with Thorns," a large and important work, subsequently bought out of the Chantrey Fund; this may be regarded as his masterpiece. In 1827 he succeeded Henry Thomson as keeper of the Academy. He died in London on the 30th of December 1839, Some of his best pictures remained on his hands at his decease—such as the "Angel releasing Peter from Prison" (life-size), painted in 1831, "Una with the Lion entering Corceca's Cave" (1832), the "Murder of the Innocents," his last exhibited work (1838), "Comus," and "Amphitrite." The National Gallery now owns "Edith finding the Body of Harold" (1834), "Cupid Disarmed," "Rebecca and Abraham's Servant" (1829), "Nature blowing Bubbles for her Children" (1821), and "Sir Calepine rescuing Serena" (from the *Faerie Queen*) (1831). In the National Portrait Gallery is his likeness of John Keats, with whom he was acquainted. In a great school or period Hilton could not count as more than a respectable subordinate; but in the British school of the earlier part of the 19th century he had sufficient elevation of aim and width of attainment to stand conspicuous.

HILVERSUM, a town in the province of North Holland, 18 m. by rail S.E. of Amsterdam. It is connected with Amsterdam by a steam tramway, passing by way of the small fortified towns of Naarden and Muiden on the Zuider Zee. Pop. (1900) 20,238. It is situated in the middle of the Gooi, a stretch of hilly country extending from the Zuider Zee to about 5 m. south of Hilversum, and composed of pine woods and sandy heaths. A convalescent home, the Trompenberg, was established here in 1874, and there are a town hall, middle-class and technical schools, and various places of worship, including a synagogue. Hilversum manufactures large quantities of floor-cloths and horse-blankets.

HIMALAYA, the name given to the mountains which form the northern boundary of India. The word is Sanskrit and literally signifies "snow-abode," from *him*, snow, and *álaya*, abode, and might be translated "snowy-range," although that expression is perhaps more nearly the equivalent of *Himachal*, another Sanskrit word derived from *him*, snow, and *áchal*, mountain, which is practically synonymous with Himalaya and is often used by natives of northern India. The name was converted by the Greeks into *Emodos* and *Imaos*.

Modern geographers restrict the term Himalaya to that portion of the mountain region between India and Tibet enclosed within the arms of the Indus and the Brahmaputra. From the bend of the Indus southwards towards the plains of the Punjab to the bend of the Brahmaputra southwards towards the plains of Assam, through a length of 1500 m., is Himachal or Himalaya. Beyond the Indus, to the north-west, the region of mountain ranges which stretches to a junction with the Hindu Kush south of the Pamirs, is usually known as Trans-Himalaya. Thus the Himalaya represents the southern face of the great central upheaval—the plateau of Tibet—the northern face of which is buttressed by the Kuen Lun.

Structure of the Himalaya.

Throughout this vast space of elevated plateau and mountain face geologists now trace a system of main chains, or axes, extending from the Hindu Kush to Assam, arranged in approximately parallel lines, and traversed at intervals by main lines of drainage obliquely. Godwin-Austen indicates six of these geological axes as follows:

1. The main Central Asian axis, the Kuen Lun forming the northern edge or ridge of the Tibetan plateau.

2. The Trans-Himalayan chain of Muztagh (or Karakoram), which is lost in the Tibetan uplands, passing to the north of the sources of the Indus.

3. The Ladakh chain, partly north and partly south of the Indus—for that river breaks across it about 100 m. above Leh. This chain continues south of the Tsanpo (or Upper Brahmaputra), and becomes part of the Himalayan system.

4. The Zaskar, or main chain of the Himalaya, *i.e.* the "snowy range" *par excellence* which is indicated by Nanga Parbat (overlooking the Indus), and passes in a south-east direction to the

southern side of the Deosai plains. Thence, bending slightly south, it extends in the line of snowy peaks which are seen from Simla to the famous peaks of Gangotri and Nanda Devi. This is the best known range of the Himalaya.

5. The outer Himalaya or Pir Panjal-Dhaoladhar ridge.

6. The Sub-Himalaya, which is "easily defined by the fringing line of hills, more or less broad, and in places very distinctly marked off from the main chain by open valleys (dhúns) or narrow valleys, parallel to the main axis of the chain." These include the Siwaliks.

Interspersed between these main geological axes are many other minor ridges, on some of which are peaks of great elevation. In fact, the geological axis seldom coincides with the line of highest elevation, nor must it be confused with the main lines of water-divide of the Himalaya.

The great northern watershed of India.

On the north and north-west of Kashmir the great water-divide which separates the Indus drainage area from that of the Yarkand and other rivers of Chinese Turkestan has been explored by Sir F. Younghusband, and subsequently by H. H. P. Deasy. The general result of their investigations has been to prove that the Muztagh range, as it trends south-eastwards and finally forms a continuous mountain barrier together with the Karakoram, is the true water-divide west of the Tibetan plateau. Shutting off the sources of the Indus affluents from those of the Central Asian system of hydrography, this great water-parting is distinguished by a group of peaks of which the altitude is hardly less than that of the Eastern Himalaya. Mount Godwin-Austen (28,250 ft. high), only 750 ft. lower than Everest, affords an excellent example in Asiatic geography of a dominating, peak-crowned water-parting or divide. From Kailas on the far west to the extreme north-eastern sources of the Brahmaputra, the great northern water-parting of the Indo-Tibetan highlands has only been occasionally touched. Littledale, du Rhins and Bonvalot may have stood on it as they looked southwards towards Lhasa, but for some 500 or 600 m. east of Kailas it appears to be lost in the mazes of the minor ranges and ridges of the Tibetan plateau. Nor can it be said to be as yet well defined to the east of Lhasa.

Eastern Tibet.

The Tibetan plateau, or Chang, breaks up about the meridian of 92° E., and to the east of this meridian the affluents of the Tsanpo (the same river as the Dihong and subsequently as the Brahmaputra) drain no longer from the elevated plateau, but from the rugged slopes of a wild region of mountains which assumes a systematic conformation where its successive ridges are arranged in concentric curves around the great bend of the Brahmaputra, wherein are hidden the sources of all the great rivers of Burma and China. Neither immediately beyond this great bend, nor within it in the Himalayan regions lying north of Assam and east of Bhutan, have scientific investigations yet been systematically carried out; but it is known that the largest of the Himalayan affluents of the Brahmaputra west of the bend derive their sources from the Tibetan plateau, and break down through the containing bands of hills, carrying deposits of gold from their sources to the plains, as do all the rivers of Tibet.

Himalaya north of the central chain of snowy peaks.

Although the northern limits of the Tsanpo basin are not sufficiently well known to locate the Indo-Tibetan watershed even approximately, there exists some scattered evidence of the nature of that strip of Northern Himalaya on the Tibeto-Nepalese border which lies between the line of greatest elevation and the trough of the Tsanpo. Recent investigations show that all the chief rivers of Nepal flowing southwards to the Tarai take their rise north of the line of highest crests, the "main range" of the Himalaya; and that some of them drain long lateral high-level valleys enclosed between minor ridges whose strike is parallel to the axis of the Himalaya and, occasionally, almost at right angles to the course of the main drainage channels breaking down to the plains. This formation brings the southern edge of the Tsanpo basin to the immediate neighbourhood of the banks of that river, which runs at its foot like a drain flanking a wall. It also affords material evidence of that wrinkling or folding action which accompanied the process of upheaval, when the Central Asian highlands were raised, which is more or less marked throughout the whole of the north-west Indian borderland. North of Bhutan, between the Himalayan crest and Lhasa, this formation is approximately maintained; farther east, although the same natural forces first resulted in the same effect of successive folds of the earth's crust, forming extensive curves of ridge and furrow, the abundant rainfall and the totally distinct climatic conditions which govern the processes of denudation subsequently led to the erosion of deeper valleys enclosed between forest-covered ranges which rise steeply from the river banks.

Height of Himalayan peaks.

Although suggestions have been made of the existence of higher peaks north of the Himalaya than that which dominates the Everest group, no evidence has been adduced to support such a contention. On the other hand the observations of Major Ryder and other surveyors who explored from Lhasa to the sources of the Brahmaputra and Indus, at the conclusion of the Tibetan mission in 1904, conclusively prove that Mount Everest, which appears from the Tibetan plateau as a single dominating peak, has no rival amongst Himalayan altitudes, whilst the very remarkable investigations made by permission of the Nepal durbar from peaks near Kathmandu in 1903, by Captain Wood, R.E., not only place the Everest group apart from other peaks with which they have been confused by

scientists, isolating them in the topographical system of Nepal, but clearly show that there is no one dominating and continuous range indicating a main Himalayan chain which includes both Everest and Kinchinjunga. The main features of Nepalese topography are now fairly well defined. So much controversy has been aroused on the subject of Himalayan altitudes that the present position of scientific analysis in relation to them may be shortly stated. The heights of peaks determined by exact processes of trigonometrical observation are bound to be more or less in error for three reasons: (1) the extraordinary geoidal deformation of the level surface at the observing stations in submontane regions; (2) ignorance of the laws of refraction when rays traverse rarefied air in snow-covered regions; (3) ignorance of the variations in the actual height of peaks due to the increase, or decrease, of snow. The value of the heights attached to the three highest mountains in the world are, for these reasons, adjudged by Colonel S. G. Burrard, the Supt. Trigonometrical Surveys in India, to be in probable error to the following extent:

	Present Survey Value of Height	Most probable Value.
Mount Everest	29,002	29,141
K_2 (Godwin Austen)	28,250	28,191
Kinchinjunga	28,146	28,225

These determinations have the effect of placing Kinchinjunga second and K_2 third on the list.

(T. H. H.*)

Geology.—The Himalaya have been formed by violent crumpling of the earth's crust along the southern margin of the great tableland of Central Asia. Outside the arc of the mountain chain no sign of this crumpling is to be detected except in the Salt Range, and the Peninsula of India has been entirely free from folding of any importance since early Palaeozoic times, if not since the Archean period itself. But the contrast between the Himalaya and the Peninsula is not confined to their structure: the difference in the rocks themselves is equally striking. In the Himalaya the geological sequence, from the Ordovician to the Eocene, is almost entirely marine; there are indeed occasional breaks in the series, but during nearly the whole of this long period the Himalayan region, or at least its northern part, must have been beneath the sea—the Central Mediterranean Sea of Neumayr or Tethys of Suess. In the peninsula, however, no marine fossils have yet been found of earlier date than Jurassic and Cretaceous, and these are confined to the neighbourhood of the coasts; the principal fossiliferous deposits are the plant-bearing beds of the Gondwana series, and there can be no doubt that, at least since the Carboniferous period, nearly the whole of the Peninsula has been land. Between the folded marine beds of the Himalaya and the nearly horizontal strata of the peninsula lies the Indo-Gangetic plain, covered by an enormous thickness of alluvial and wind-blown deposits of recent date. The deep boring at Lucknow passed through 1336 ft. of sands—reaching nearly to 1000 ft. below sea-level—without any sign of approaching the base of the alluvial series. It is clear, then, that in front of the Himalaya there is a great depression, but as yet there is no indication that this depression was ever beneath the sea.

In the light thrown by recent researches on the structure and origin of mountain chains the explanation of these facts is no longer difficult. From early Palaeozoic times the peninsula of India has been dry land, a part, indeed, of a great continent which in Mesozoic times extended across the Indian Ocean towards South Africa. Its northern shores were washed by the Sea of Tethys, which, at least in Jurassic and Cretaceous times, stretched across the Old World from west to east, and in this sea were laid down the marine deposits of the Himalaya. The tangential pressures which are known to be set up in the earth's crust—either by the contraction of the interior or in some other way—caused the deposits of this sea to be crushed up against the rigid granites and other old rocks of the peninsula and finally led to the whole mass being pushed forward over the edge of the part which did not crumple. The Indo-Gangetic depression was formed by the weight of the over-riding mass bending down the edge over which it rode, or else it is the lower limb of the **S**-shaped fold which would necessarily result if there were no fracture—the Himalaya representing the upper limb of the **S**.

Geologically, the Himalaya may be divided into three zones which correspond more or less with orographical divisions. The northern zone is the Tibetan, in which fossiliferous beds of Palaeozoic and Mesozoic age are largely developed—excepting in the north-west no such rocks are known on the southern flanks. The second is the zone of the snowy peaks and of the lower Himalaya, and is composed chiefly of crystalline and metamorphic rocks together with unfossiliferous sedimentary beds supposed to be of Palaeozoic age. The southern zone comprises the Sub-Himalaya and consists entirely of Tertiary beds, and especially of the upper Tertiaries. The oldest beds which have hitherto yielded fossils, belong to the Ordovician system, but it is highly probable that the underlying "Haimantas" of the central Himalaya are of Cambrian age. From these beds up to the top of the Carboniferous there appears to be no break; but the Carboniferous beds were in some places eroded before the deposition of the *Productus* shales, which belong to the Permian period. It is, however, possible that this erosion was merely local, for in other places there seems to be a complete passage from the Carboniferous to the Permian. From the Permian to the Lias the sequence in the central Himalaya shows no sign of a break, nor has any unconformity been proved between the Liassic beds and the overlying Spiti shales, which contain fossils of Middle and Upper Jurassic age. The Spiti shales are succeeded conformably by Cretaceous beds (Gieumal sandstone below and Chikkim limestone above), and these are followed without a break by Nummulitic beds of Eocene age, much

disturbed and altered by intrusions of gabbro and syenite. Thus, in the Spiti area at least, there appears to have been continuous deposition of marine beds from the Permian *Productus* shales to the Eocene Nummulitic formation. The next succeeding deposit is a sandstone, often highly inclined, which rests unconformably upon the Nummulitic beds and resembles the Lower Siwaliks of the Sub-Himalaya (Pliocene) but which as yet has yielded no fossils of any kind. The whole is overlaid unconformably by the younger Tertiaries of Hundes, which are perfectly horizontal and have been quite unaffected by any of the folds.

From the absence of any well-marked unconformity it is evident that in the northern part of the Himalayan belt, at least in the Spiti area, there can have been no post-Archaean folding of any magnitude until after the deposition of the Nummulitic beds, and that the folding was completed before the later Tertiaries of Hundes were laid down. It was, therefore, during the Miocene period that the elevation of this part of the chain began, while the disturbance of the Siwalik-like sandstone indicates that the folding continued into the Pliocene period. Along the southern flanks of the Himalaya the history of the chain is still more clearly shown. The sub-Himalaya are formed of Tertiary beds, chiefly Siwalik or upper Tertiary, while the lower Himalaya proper consist mainly of pre-Tertiary rocks without fossils. Throughout the whole length of the chain, wherever the junction 472 of the Siwaliks with the pre-Tertiary rocks has been seen, it is a great reversed fault. West of the Blas river a similar reversed fault forms the boundary between the lower Tertiaries and the pre-Tertiary rocks of the Himalaya, while between the Sutlej and the Jumna rivers, where the lower Tertiaries help to form the lower Himalaya, the fault lies between them and the Siwaliks. The hade of the fault is constantly inwards, towards the centre of the chain, and the older rocks which form the Himalaya proper, have been pushed forward over the later beds of the sub-Himalaya. But the fault is more than an ordinary reversed fault: it was, nearly everywhere, the northern boundary of deposition of the Siwalik beds, and only in a few instances do any of the Siwalik deposits extend even to a short distance beyond it. The fault in fact was being formed during the deposition of the Siwalik beds, and as the beds were laid down, the Himalaya were pushed forward over them, the Siwaliks themselves being folded and upturned during the process. Accordingly, in some places the Siwaliks now form a continuous and conformable series from base to summit, in other places the middle beds are absent and the upper beds of the series rest upon the upturned and denuded edges of the lower beds. The Siwaliks are fluviatile and torrential deposits similar to those which are now being formed at the foot of the mountains, in the Indo-Gangetic plain; and their relations to the older rocks of the Himalaya proper were very similar to those which now exist between the deposits of the plain and the Siwaliks themselves. But the great fault just described is not the only one of this character. There is a series of such faults, approximately parallel to one another, and although they have not been traced throughout the whole chain, yet wherever they occur they seem to have formed the northern boundary of deposition of the deposits immediately to the south of them. It appears, therefore, that the Himalaya grew southwards in a series of stages. A reversed fault was formed at the foot of the chain, and upon this fault the mountains were pushed forward over the beds deposited at their base, crumpling and folding them in the process, and forming a sub-Himalayan ridge in front of the main chain. After a time a new fault originated at the foot of the sub-Himalayan zone thus raised, which now became part of the Himalaya themselves, and a new sub-Himalayan chain was formed in front of the previous one. The earthquakes of the present day show that the process is still in operation, and in time the deposits of the present Indo-Gangetic plain will be involved in the folds.

The regular form of the Himalaya, constituting an arc of a true circle, appears to indicate that the whole chain has been pushed forward as one mass upon a gigantic thrust-plane; but, if so, the dip of the plane must be low, for a line drawn along the southern foot of the Himalaya would coincide with the outcrop of a plane inclined to the surface at an angle of about 14°. The thrust-plane, then, does not coincide with any of the boundary faults already mentioned, which are usually inclined at angles of 50° or 60°. The latter are due to the fact that, although, perhaps, the whole mass above the thrust-plane may move, yet the pressure which pushes it forwards necessarily proceeds from behind. The back, accordingly, moves faster than the front, and the whole is packed together; as when an ice-floe drives against the shore, the ice breaks and the outer fragments ride over those within. The great thrust-plane which is thus imagined to exist at the base of the Himalaya, corresponds with the "major thrusts" of the N.W. Highlands of Scotland, and the reversed faults which appear at the surface with the "minor thrusts."

(P. La.)

Topographical results of evolution.

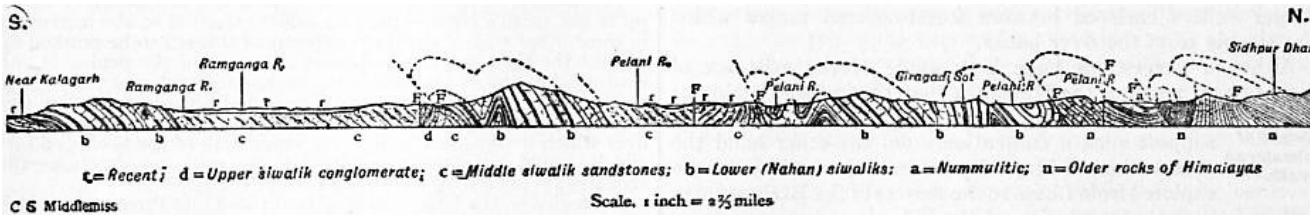
Such is the general outline of Himalayan evolution as now understood, and the process of it has led to certain marked features of scenery and topography. Within the area of the trans-Indus mountains we have beds of hard limestone or sandstone alternating with soft shales, which leads to the scooping out by erosion of long narrow valleys where the shales occur, and the passage of the streams through deep rifts or gorges across the hard limestone anticlinals, which stand in irregular series of parallel ridges with the eroded valleys between. The great mass of the Himalaya exhibits the same structure, due to the same conditions acting for longer periods and on a much larger scale; but the structure is varied in the eastern portions of the mountains by the effect of different climatic conditions, and especially by the greater rainfall. Instead of wide, barren, wind-swept valleys, here are found fertile alluvial plains—such as Manipur—but for the most part the erosive action of the river has been able to keep pace with the rise of the river bed, and we have deep, steep-sided valleys arranged between the same parallel system of folds as we see on the western frontier, connected by short transverse gaps where the rivers cross the folds, frequently to resume a course parallel to that originally held. An instance of this occurs where the Indus suddenly breaks through the well-defined

Ladakh range in the North-west Himalaya to resume its north-westerly course after passing from the northern to the southern side of the range. The reason assigned for these extraordinary diversions of the drainage right across the general strike of the ridges is that it is antecedent—*i.e.* that the lines of drainage were formed ere the folds or anticlinals were raised; and that the drainage has merely maintained the course originally held, by the power of erosion during the gradual process of upheaval.

In the outer valleys of the Himalaya the sides are generally steep, so steep as to be liable to landslip, whilst the streams are still cutting down the river beds and have not yet reached the stage of equilibrium. Here and there a valley has become filled with alluvial detritus owing to some local impediment in the drainage, and when this occurs there is usually to be found a fertile and productive field for agriculture. The straits of the Jhelum, below Baramulla, probably account for the lovely vale of Kashmir, which is in form (if not in principles of construction) a repetition on grand scale of the Maidan of the Afridi Tirah, where the drainage from the slopes of a great amphitheatre of hills is collected and then arrested by the gorge which marks the outlet to the Bara.

Other rivers besides the Indus and the Brahmaputra begin by draining a considerable area north of the snowy range—the Sutlej, the Kosi, the Gandak and the Subansiri, for example. All these rivers break through the main snowy range ere they twist their way through the southern hills to the plains of India. Here the "antecedent" theory will not suffice, for there is no sufficient catchment area north of the snows to support it. Their formation is explained by a process of "cutting back," by which the heads of these streams are gradually eating their way northwards owing to the greater rainfall on the southern than on the northern slopes. The result of this process is well exhibited in the relative steepness of slope on the Indian and Tibetan sides of the passes to the Indus plateau. On the southern or Indian side the routes to Tibet and Ladakh follow the levels of Himalayan valleys with no remarkably steep gradients till they near the approach to the water-divide. The slope then steepens with the ascending curve to the summit of the pass, from which point it falls with a comparatively gentle gradient to the general level of the plateau. The Zoji La, the Kashmir water-divide between the Jhelum and the Indus, is a prominent case in point, and all the passes from the Kumaon and Garhwal hills into Tibet exhibit this formation in a marked degree. Taking the average elevation of the central axial line of snowy peaks as 19,000 ft., the average height of the passes is not more than 10,000 owing to this process of cutting down by erosion and gradual encroachment into the northern basin.

General Himalayan formation is typical.



Section across the sub-Himalayan zone.

Meteorology.—Independently of the enormous variety of topographical conformation contained in the Himalayan system, the vast altitude of the mountains alone is sufficient to cause modifications of climate in ascending over their slopes such as are not surpassed by those observed in moving from the equator to the poles. One half of the total mass of the atmosphere and three-fourths of the water suspended in it in the form of vapour lie below the average altitude of the Himalaya; and of the residue, one-half of the air and virtually almost all the vapour come within the influence of the highest peaks. The regular variations in pressure of the air indicated by the barometer and the annual and diurnal oscillations are as well marked in the Himalaya as elsewhere, but the amount of vapour held in suspension diminishes so rapidly with the altitude that not more than one-sixth (sometimes only one-tenth) of that observed at the foot of the mountains is found at the greatest heights. This is dependent on the temperature of the air which rapidly decreases with altitude. On the mountains every altitude has its corresponding temperature, an elevation of 1000 ft. producing a fall of 3½°, or about 1° to each 300 ft. The mean winter temperature at 7000 ft. (which is about the average height of Himalayan "hill stations") is 44° F. and the summer mean about 65° F. At 9000 ft. the mean temperature of the coldest month is 32° F. At 12,000 ft. the thermometer never falls below freezing-point from the end of May to the middle of October, and at 15,000 ft. it is seldom above that point even in the height of summer. It should be noted that the thermometrical conditions of Tibet vary considerably from those of the Himalaya. At 12,000 ft. in Tibet the mean of the hottest month is about 60° F. and of the coldest about 10° F. whilst, at 15,000 ft. the frost is only permanent from the end of October to the end of April. The distribution of vegetation and topographical conformation largely influence the question of local temperature. For instance it may be found that the difference of temperature between forest-clad ranges and the Indian plains is twice as much in April and May as in December or January; and the difference between the temperature of a well-wooded hill top and the open valley below may vary from 9° to 24° within twenty-four hours. The general relations of temperature to altitude as determined by Himalayan observations are as follows: (1) The decrease of temperature with altitude is most rapid in summer. (2) The annual range diminishes with the elevation. (3) The diurnal range diminishes with the elevation. Comparisons are, however, apt to become anomalous when applied to elevated zones with a dense covering of forest and a great quantity of cloud and open and uncloudy regions both above and below the forest-clad tracts.

The chief rainfall occurs in the summer months between May and October (*i.e.* the period of the monsoon rains of India), the remainder of the year being comparatively dry. The fall of rain over the great plain of northern India gradually diminishes in quantity, and begins later, as we pass from east to west. At the same time the rain is heavier as we approach the Himalaya and the greatest falls are measured in its outer ranges; but the quantity again diminishes as we pass onward across the chain, and on arriving at the border of Tibet, behind the great line of snowy peaks, the rain falls in such small quantities as to be hardly susceptible of measurement. Diurnal currents of wind, which are established from the plains to the mountains during the day, and from the hills to the plains during the night, are important agents in distributing the rainfall. The condensation of vapour from the ascending currents and their gradual exhaustion as they are precipitated on successive ranges is very obvious in the cloud effects produced during the monsoon, the southern or windward face of each range being clothed day after day with a white crest of cloud whilst the northern slopes are often left entirely free. This shows how large a proportion of the vapour is arrested and how it is that only by drifting through the deeper gorges can any moisture find its way to the Tibetan table-land.

Rainfall.

The yearly rainfall, which amounts to between 60 and 70 in. in the delta of the Ganges, is reduced to about 40 in. when that river issues from the mountains, and diminishes to 30 in. at the debouchment of the Indus into the plains. At Darjeeling (7000 ft. altitude) on the outer ranges of the eastern Himalaya it amounts to about 120 in. At Naini Tal north of the United Provinces it is about 90 in.; at Simla about 80 in., diminishing still further as one approaches the north-western hills. All these stations are about the same altitude.

In the eastern Himalaya the ordinary winter limit of snow is 6000 ft. and it never lies for many days even at 7000 ft. In Kumaon, on the west, it usually reaches down to the 5000 ft. level and occasionally to 2500 ft. Snow has been known to fall at Peshawar. At Leh, in western Tibet, hardly 2 ft. of snow are usually registered and the fall on the passes between 17,000 and 19,000 ft. is not generally more than 3 ft., but on the Himalayan passes farther east the falls are much heavier. Even in September these passes may be quite blocked and they are not usually open till the middle of June. The snow-line, or the level to which snow recedes in the course of the year, ranges from 15,000 to 16,000 ft. on the southern exposures of the Himalaya that carry perpetual snow, along all that part of the system that lies between Sikkim and the Indus. It is not till December that the snow begins to descend for the winter, although after September light falls occur which cover the mountain sides down to 12,000 ft., but these soon disappear. On the snowy range the snow-line is not lower than 18,500 ft. and on the summit of the table-land it reaches to 20,000 ft. On all the passes into Tibet vegetation reaches to about 17,500 ft., and in August they may be crossed in ordinary years up to 18,400 ft. without finding any snow upon them; and it is as impossible to find snow in the summer in Tibet at 15,500 ft. above the sea as on the plains of India.

Snowfall.

Glaciers.—The level to which the Himalayan glaciers extend is greatly dependent on local conditions, principally the extent and elevation of the snow basins which feed them, and the slope and position of the mountain on which they are formed. Glaciers on the outer slopes of the Himalaya descend much lower than is commonly the case in Tibet, or in the most elevated valleys near the snowy range. The glaciers of Sikkim and the eastern mountains are believed not to reach a lower level than 13,500 or 14,000 ft. In Kumaon many of them descend to between 11,500 and 12,500 ft. In the higher valleys and Tibet 15,000 and 16,000 ft. is the ordinary level at which they end, but there are exceptions which descend far lower. In Europe the glaciers descend between 3000 and 5000 ft. below the snow-line, and in the Himalaya and Tibet about the same holds good. The summer temperatures of the points where the glaciers end on the Himalaya also correspond fairly with those of the corresponding positions in European glaciers, viz. for July a little below 60° F., August 58° and September 55°.

Measurements of the movement of Himalayan glaciers give results according closely with those obtained under analogous conditions in the Alps, viz. rates from 9½ to 14¼ in. in twenty-four hours. The motion of one glacier from the middle of May to the middle of October averaged 8 in. in the twenty-four hours. The dimensions of the glaciers on the outer Himalaya, where, as before remarked, the valleys descend rapidly to lower levels, are fairly comparable with those of Alpine glaciers, though frequently much exceeding them in length—8 or 10 m. not being unusual. In the elevated valleys of northern Tibet, where the destructive action of the summer heat is far less, the development of the glaciers is enormous. At one locality in north-western Ladakh there is a continuous mass of snow and ice extending across a snowy ridge, measuring 64 m. between the extremities of the two glaciers at its opposite ends. Another single glacier has been surveyed 36 m. long.

The northern tributaries of the Gilgit river, which joins the Indus near its south-westerly bend towards the Punjab, take their rise from a glacier system which is probably unequalled in the world for its extent and magnificent proportions. Chief amongst them are the glaciers which have formed on the southern slopes of the Muztagh mountains below the group of gigantic peaks dominated by Mount Godwin-Austen (28,250 ft. high). The Biafo glacier system, which lies in a long narrow trough extending south-west from Nagar on the Hunza to near the base of the Muztagh peaks, may be traced for 90 m. between mountain walls which tower to a height of from 20,000 to 25,000 ft. above sea-level on either side.

In connexion with almost all the Himalayan glaciers of which precise accounts are forthcoming are ancient moraines indicating some previous condition in which their extent was much larger than

now. In the east these moraines are very remarkable, extending 8 or 10 m. In the west they seem not to go beyond 2 or 3 m. reach. They have been observed on the summit of the table-land as well as on the Himalayan slope. The explanation suggested to account for the former great extension of glaciers in Norway would seem applicable here. Any modification of the coast-line which should submerge the area now occupied by the North Indian plain, or any considerable part of it, would be accompanied by a much wetter and more equable climate on the Himalaya; more snow would fall on the highest ranges, and less summer heat would be brought to bear on the destruction of the glaciers, which would receive larger supplies and descend lower.

Botany.—Speaking broadly, the general type of the flora of the lower, hotter and wetter regions, which extend along the great plain at the foot of the Himalaya, and include the valleys of the larger rivers which penetrate far into the mountains, does not differ from that of the contiguous peninsula and islands, though the tropical and insular character gradually becomes less marked going from east to west, where, with a greater elevation and distance from the sea and higher latitude, the rainfall and humidity diminish and the winter cold increases. The vegetation of the western part of the plain and of the hottest zone of the western mountains thus becomes closely allied to, or almost identical with, that of the drier parts of the Indian peninsula, more especially of its hilly portions; and, while a general tropical character is preserved, forms are observed which indicate the addition of an Afghan as well as of an African element, of which last the gay lily *Gloriosa superba* is an example, pointing to some previous connexion with Africa.

The European flora, which is diffused from the Mediterranean along the high lands of Asia, extends to the Himalaya; many European species reach the central parts of the chain, though few reach its eastern end, while genera common to Europe and the Himalaya are abundant throughout and at all elevations. From the opposite quarter an influx of Japanese and Chinese forms, such as the rhododendrons, the tea plant, *Aucuba*, *Helwingia*, *Skimmia*, *Adamia*, *Goughia* and others, has taken place, these being more numerous in the east and gradually disappearing in the west. On the higher and therefore cooler and less rainy ranges of the Himalaya the conditions of temperature requisite for the preservation of the various species are readily found by ascending or descending the mountain slopes, and therefore a greater uniformity of character in the vegetation is maintained along the whole chain. At the greater elevations the species identical with those of Europe become more frequent, and in the alpine regions many plants are found identical with species of the Arctic zone. On the Tibetan plateau, with the increased dryness, a Siberian type is established, with many true Siberian species and more genera; and some of the Siberian forms are further disseminated, even to the plains of Upper India. The total absence of a few of the more common forms of northern Europe and Asia should also be noticed, among which may be named *Tilia*, *Fagus*, *Arbutus*, *Erica*, *Azalea* and *Cistacae*.

In the more humid regions of the east the mountains are almost everywhere covered with a dense forest which reaches up to 12,000 or 13,000 ft. Many tropical types here ascend to 7000 ft. or more. To the west the upper limit of forest is somewhat lower, from 11,500 to 12,000 ft. and the tropical forms usually cease at 5000 ft.

In Sikkim the mountains are covered with dense forest of tall umbrageous trees, commonly accompanied by a luxuriant growth of under shrubs, and adorned with climbing and epiphytal plants in wonderful profusion. In the tropical zone large figs abound, *Terminalia*, *Shorea* (sál), laurels, many *Leguminosae*, *Bombax*, *Artocarpus*, bamboos and several palms, among which species of Calamus are remarkable, climbing over the largest trees; and this is the western limit of *Cycas* and *Myristica* (nutmeg). Plantains ascend to 7000 ft. *Pandanus* and tree-ferns abound. Other ferns, *Scitamineae*, orchids and climbing *Aroideae* are very numerous, the last named profusely adorning 474
the forests with their splendid dark-green foliage. Various oaks descend within a few hundred feet of the sea-level, increasing in numbers at greater altitudes, and becoming very frequent at 4000 ft., at which elevation also appear *Aucuba*, *Magnolia*, cherries, *Pyrus*, maple, alder and birch, with many *Araliaceae*, *Hollböllea*, *Skimmia*, *Daphne*, *Myrsine*, *Symplocos* and *Rubus*. Rhododendrons begin at about 6000 ft. and become abundant at 8000 ft., from 10,000 to 14,000 ft. forming in many places the mass of the shrubby vegetation which extends some 2000 ft. above the forest. Epiphytal orchids are extremely numerous between 6000 and 8000 ft. Of the Coniferae, *Podocarpus* and *Pinus longifolia* alone descend to the tropical zone; *Abies Brunoniana* and *Smithiana* and the larch (a genus not seen in the western mountains) are found at 8000, and the yew and *Picea Webbiana* at 10,000 ft. *Pinus excelsa*, which occurs in Bhutan, is absent in the wetter climate of Sikkim.

On the drier and higher mountains of the interior of the chain, the forests become more open, and are spread less uniformly over the hill-sides, a luxuriant herbaceous vegetation appears, and the number of shrubby *Leguminosae*, such as *Desmodium* and *Indigofera*, increases, as well as *Ranunculaceae*, *Rosaceae*, *Umbelliferae*, *Labiatae*, *Gramineae*, *Cyperaceae* and other European genera.

Passing to the westward, and viewing the flora of Kumaon, which province holds a central position on the chain, on the 80th meridian, we find that the gradual decrease of moisture and increase of high summer heat are accompanied by a marked change of the vegetation. The tropical forest is characterized by the trees of the hotter and drier parts of southern India, combined with a few of European type. Ferns are more rare, and the tree-ferns have disappeared. The species of palm are also reduced to two or three, and bamboos, though abundant, are confined to a few species.

The outer ranges of mountains are mainly covered with forests of *Pinus longifolia*, rhododendron, oak and *Pieris*. At Naini Tal cypress is abundant. The shrubby vegetation comprises *Rosa*, *Rubus*,

Indigofera, *Desmodium*, *Berberis*, *Boehmeria*, *Viburnum*, *Clematis*, with an *Arundinaria*. Of herbaceous plants species of *Ranunculus*, *Potentilla*, *Geranium*, *Thalictrum*, *Primula*, *Gentiana* and many other European forms are common. In the less exposed localities, on northern slopes and sheltered valleys, the European forms become more numerous, and we find species of alder, birch, ash, elm, maple, holly, hornbeam, *Pyrus*, &c. At greater elevations in the interior, besides the above are met *Corylus*, the common walnut, found wild throughout the range, horse chestnut, yew, also *Picea Webbiana*, *Pinus excelsa*, *Abies Smithiana*, *Cedrus Deodara* (which tree does not grow spontaneously east of Kumaon), and several junipers. The denser forests are commonly found on the northern faces of the higher ranges, or in the deeper valleys, between 8000 and 10,500 ft. The woods on the outer ranges from 3000 up to 7000 ft. are more open, and consist mainly of evergreen trees.

The herbaceous vegetation does not differ greatly, generically, from that of the east, and many species of *Primulaceae*, *Ranunculaceae*, *Cruciferae*, *Labiatae* and *Scrophulariaceae* occur; balsams abound, also beautiful forms of *Campanulaceae*, *Gentiana*, *Meconopsis*, *Saxifraga* and many others.

Cultivation hardly extends above 7000 ft., except in the valleys behind the great snowy peaks, where a few fields of buckwheat and Tibetan barley are sown up to 11,000 or 12,000 ft. At the lower elevations rice, maize and millets are common, wheat and barley at a somewhat higher level, and buckwheat and amaranth usually on the poorer lands, or those recently reclaimed from forest. Besides these, most of the ordinary vegetables of the plains are reared, and potatoes have been introduced in the neighbourhood of all the British stations.

As we pass to the west the species of rhododendron, oak and *Magnolia* are much reduced in number as compared to the eastern region, and both the Malayan and Japanese forms are much less common. The herbaceous tropical and semi-tropical vegetation likewise by degrees disappears, the *Scitamineae*, epiphytal and terrestrial *Orchideae*, *Araceae*, *Cyrtandraceae* and *Begoniae* only occur in small numbers in Kumaon, and scarcely extend west of the Sutlej. In like manner several of the western forms suited to drier climates find their eastern limit in Kumaon. In Kashmir the plane and Lombardy poplar flourish, though hardly seen farther east, the cherry is cultivated in orchards, and the vegetation presents an eminently European cast. The alpine flora is slower in changing its character as we pass from east to west, but in Kashmir the vegetation of the higher mountains hardly differs from that of the mountains of Afghanistan, Persia and Siberia, even in species.

The total number of flowering plants inhabiting the range amounts probably to 5000 or 6000 species, among which may be reckoned several hundred common English plants chiefly from the temperate and alpine regions; and the characteristic of the flora as a whole is that it contains a general and tolerably complete illustration of almost all the chief natural families of all parts of the world, and has comparatively few distinctive features of its own.

The timber trees of the Himalaya are very numerous, but few of them are known to be of much value. The “Sál” is one of the most valuable of the trees; with the “Toon” and “Sissoo,” it grows in the outer ranges most accessible from the plains. The “Deodar” is also much used, but the other pines produce timber that is not durable. Bamboos grow everywhere along the outer ranges, and rattans to the eastward, and are largely exported for use in the plains of India.

Though one species of coffee is indigenous in the hotter Himalayan forests, the climate does not appear suitable for the growth of the plant which supplies the coffee of commerce. The cultivation of tea, however, is carried on successfully on a large scale, both in the east and west of the mountains. In the western Himalaya the cultivated variety of the tea plant of China succeeds well; on the east the indigenous tea of Assam, which is not specifically different, and is perhaps the original parent of the Chinese variety, is now almost everywhere preferred. The produce of the Chinese variety in the hot and wet climate of the eastern Himalaya, Assam and eastern Bengal is neither so abundant nor so highly flavoured as that of the indigenous plant.

The cultivation of the cinchona, several species of which have been introduced from South America and naturalized in the Sikkim Himalaya, promises to yield at a comparatively small cost an ample supply of the febrifuge extracted from its bark. At present the manufacture is almost wholly in the hands of the Government, and the drug prepared is all disposed of in India.

Zoology.—The general distribution of animal life is determined by much the same conditions that have controlled the vegetation. The connexion with Europe on the north-west, with China on the north-east, with Africa on the south-west, and with the Malayan region on the south-east is manifest; and the greater or less prevalence of the European and Eastern forms varies according to more western or eastern position on the chain. So far as is known these remarks will apply to the extinct as well as to the existing fauna. The Palaeozoic forms found in the Himalaya are very close to those of Europe, and in some cases identical. The Triassic fossils are still more closely allied, more than a third of the species being identical. Among the Jurassic Mollusca, also, are many species that are common in Europe. The Siwalik fossils contain 84 species of mammals of 45 genera, the whole bearing a marked resemblance to the Miocene fauna of Europe, but containing a larger number of genera still existing, especially of ruminants, and now held to be of Pliocene age.

The fauna of the Tibetan Himalaya is essentially European or rather that of the northern half of the old continent, which region has by zoologists been termed Palaearctic. Among the characteristic animals may be named the yak, from which is reared a cross breed with the ordinary horned cattle of India, many wild sheep, and two antelopes, as well as the musk-deer; several hares and some burrowing animals, including pikas (*Lagomys*) and two or three species of marmot; certain arctic

forms of carnivora—fox, wolf, lynx, ounce, marten and ermine; also wild asses. Among birds are found bustard and species of sand-grouse and partridge; water-fowl in great variety, which breed on the lakes in summer and migrate to the plains of India in winter; the raven, hawks, eagles and owls, a magpie, and two kinds of chough; and many smaller birds of the passerine order, amongst which are several finches. Reptiles, as might be anticipated, are far from numerous, but a few lizards are found, belonging for the most part to types, such as *Phrynocephalus*, characteristic of the Central-Asiatic area. The fishes from the headwaters of the Indus also belong, for the most part, to Central-Asiatic types, with a small admixture of purely Himalayan forms. Amongst the former are several peculiar small-scaled carps, belonging to the genus *Schizothorax* and its allies.

The ranges of the Himalaya, from the border of Tibet to the plains, form a zoological region which is one of the richest of the world, particularly in respect to birds, to which the forest-clad mountains offer almost every range of temperature.

Only two or three forms of monkey enter the mountains, the langur, a species of *Semnopithecus*, ranging up to 12,000 ft. No lemurs occur, although a species is found in Assam, and another in southern India. Bats are numerous, but the species are for the most part not peculiar to the area; several European forms are found at the higher elevations. Moles, which are unknown in the Indian peninsula, abound in the forest regions of the eastern Himalayas at a moderate altitude, and shrews of several species are found almost everywhere; amongst them are two very remarkable forms of water-shrew, one of which, however, *Nectogale*, is probably Tibetan rather than Himalayan. Bears are common, and so are a marten, several weasels and otters, and cats of various kinds and sizes, from the little spotted *Felis bengalensis*, smaller than a domestic cat, to animals like the clouded leopard rivalling a leopard in size. Leopards are common, and the tiger wanders to a considerable elevation, but can hardly be considered a permanent inhabitant, except in the lower valleys. Civets, the mungoose (*Herpestes*), and toddy cats (*Paradoxurus*) are only found at the lower elevations. Wild dogs (*Cyon*) are common, but neither foxes nor wolves occur in the forest area. Besides these carnivora some very peculiar forms are found, the most remarkable of which is Aelurus, sometimes called the cat-bear, a type akin to the American racoon. Two other genera, *Helictis*, an aberrant badger, and linsang, an aberrant civet, are representatives of Malayan types. Amongst the rodents squirrels abound, and the so-called flying squirrels are represented by several species. Rats and mice swarm, both kinds and individuals being numerous, but few present much peculiarity, a bamboo rat (*Rhizomys*) from the base of the eastern Himalaya being perhaps most worthy of notice. Two or three species of vole (*Arvicola*) have been detected, and porcupines are common. The elephant is found in the outer forests as far as the Jumna, and the rhinoceros as far as the Sarda; the spread of both of these animals as far as the Indus and into the plains of India, far beyond their present limits, is authenticated by historical records; they have probably retreated before the advance of cultivation and fire-arms. Wild pigs are common in the lower ranges, and one peculiar species of pigmy-hog (*Sus salvanius*) of very small size inhabits the forests at the base of the mountains in Nepál and Sikim. Deer of several kinds are met with, but do not ascend very high on the hillsides, and belong exclusively to Indian forms. The musk deer keeps to the greater elevations. The chevrotains of India and the Malay countries are unrepresented. The gaur or wild ox is found at the base of the hills. Three very characteristic ruminants, having some affinities with goats, inhabit the Himalaya; these are the “serow” (*Nemorhaedus*), “goral” (*Cemas*) and “tahr” (*Hemitragus*), the last-named ranging to rather high elevations. Lastly, the pangolin (*Manis*) is represented by two species in the eastern Himalaya. A dolphin (*Platanista*) living in the Ganges ascends that river and its affluents to their issue from the mountains.

Almost all the orders of birds are well represented, and the marvellous variety of forms found in the eastern Himalaya is only rivalled in Central and South America. Eagles, vultures and other birds of prey are seen soaring high over the highest of the forest-clad ranges. Owls are numerous, and a small species, *Glaucidium*, is conspicuous, breaking the stillness of the night by its monotonous though musical cry of two notes. Several kinds of swifts and nightjars are found, and gorgeously-coloured trogons, bee-eaters, rollers, and beautiful kingfishers and barbets are common. Several large hornbills inhabit the highest trees in the forest. The parrots are restricted to parrakeets, of which there are several species, and a single small lory. The number of woodpeckers is very great and the variety of plumage remarkable, and the voice of the cuckoo, of which there are numerous species, resounds in the spring as in Europe. The number of passerine birds is immense. Amongst them the sun-birds resemble in appearance and almost rival in beauty the humming-birds of the New Continent. Creepers, nuthatches, shrikes, and their allied forms, flycatchers and swallows, thrushes, dippers and babblers (about fifty species), bulbuls and orioles, peculiar types of redstart, various sylviads, wrens, tits, crows, jays and magpies, weaver-birds, avadavats, sparrows, crossbills and many finches, including the exquisitely coloured rose-finches, may also be mentioned. The pigeons are represented by several wood-pigeons, doves and green pigeons. The gallinaceous birds include the peacock, which everywhere adorns the forest bordering on the plains, jungle fowl and several pheasants; partridges, of which the chikor may be named as most abundant, and snow-pheasants and partridges, found only at the greatest elevations. Waders and waterfowl are far less abundant, and those occurring are nearly all migratory forms which visit the peninsula of India—the only important exception being two kinds of solitary snipe and the red-billed curlew.

Of the reptiles found in these mountains many are peculiar. Some of the snakes of India are to be seen in the hotter regions, including the python and some of the venomous species, the cobra being found as high up as 8000 or 9000 ft., though not common. Lizards are numerous, and as well as frogs are found at all elevations from the plains to the upper Himalayan valleys, and even extend to Tibet.

The fishes found in the rivers of the Himalaya show the same general connexion with the three neighbouring regions, the Palaearctic, the African and the Malayan. Of the principal families, the *Acanthopterygii*, which are abundant in the hotter parts of India, hardly enter the mountains, two genera only being found, of which one is the peculiar amphibious genus *Ophiocephalus*. None of these fishes are found in Tibet. The *Siluridae*, or scaleless fishes, and the *Cyprinidae*, or carp and loach, form the bulk of the mountain fish, and the genera and species appear to be organized for a mountain-torrent life, being almost all furnished with suckers to enable them to maintain their positions in the rapid streams which they inhabit. A few *Siluridae* have been found in Tibet, but the carps constitute the larger part of the species. Many of the Himalayan forms are Indian fish which appear to go up to the higher streams to deposit their ova, and the Tibetan species as a rule are confined to the rivers on the table-land or to the streams at the greatest elevations, the characteristics of which are Tibetan rather than Himalayan. The *Salmonidae* are entirely absent from the waters of the Himalaya proper, of Tibet and of Turkestan east of the Terektag.

The Himalayan butterflies are very numerous and brilliant, for the most part belonging to groups that extend both into the Malayan and European regions, while African forms also appear. There are large and gorgeous species of *Papilio*, *Nymphalidae*, *Morphidae* and *Danaidae*, and the more favoured localities are described as being only second to South America in the display of this form of beauty and variety in insect life. Moths, also, of strange forms and of great size are common. The cicada's song resounds among the woods in the autumn; flights of locusts frequently appear after the summer, and they are carried by the prevailing winds even among the glaciers and eternal snows. Ants, bees and wasps of many species, and flies and gnats abound, particularly during the summer rainy season, and at all elevations.

Mountain Scenery.—Much has been written about the impressiveness of Himalayan scenery. It is but lately, however, that any adequate conception of the magnitude and majesty of the most stupendous of the mountain groups which mass themselves about the upper tributaries and reaches of the Indus has been presented to us in the works of Sir F. Younghusband, Sir W. M. Conway, H. C. B. Tanner and D. Freshfield. It is not in comparison with the picturesque beauty of European Alpine scenery that the Himalaya appeals to the imagination, for amongst the hills of the outer Himalaya—the hills which are known to the majority of European residents and visitors—there is often a striking absence of those varied incidents and sharp contrasts which are essential to picturesqueness in mountain landscape. Too often the brown, barren, sun-scorched ridges are obscured in the yellow dust haze which drifts upwards from the plains; too often the whole perspective of hill and vale is blotted out in the grey mists that sweep in soft, resistless columns against these southern slopes, to be condensed and precipitated in ceaseless, monotonous rainfall. Few Europeans really see the Himalaya; fewer still are capable of translating their impressions into language which is neither exaggerated nor inadequate.

Some idea of the magnitude of Himalayan mountain construction—a magnitude which the eye totally fails to appreciate—may, however, be gathered from the following table of comparison of the absolute height of some peaks above sea-level with the actual amount of their slopes exposed to view:—

Relative Extent of Snow Slopes Visible.

Name of Mountain.	Place of Observation.	Height above sea.	Amount of Slope exposed.
Everest	Dewanganj	29,002	8,000
Everest	Sandakphu	”	12,000
K_2 or Godwin-Austen	Between Gilgit and Gor, 16,000 ft.	28,250	
Pk. XIII. or Makalu	Purnea, 200 ft	27,800	8,000
Pk. XIII. or Makalu	Sandakphu, 12,000 ft.	”	9,000
Nanga Parbat	Gor, 16,000 ft.	26,656	23,000
Tirach Mir	Between Gilgit and Chitral, 8000 ft.	25,400	17-18,000
Rakapushi	Chaprot (Gilgit), 13,000 ft.	25,560	18,000
Kinchinjunga	Darjeeling, 7000 ft.	28,146	16,000
Mont Blanc	Above Chamonix, 7000 ft.	15,781	11,500

It will be observed from this table that it is not often that a greater slope of snow-covered mountain side is observable in the Himalaya than that which is afforded by the familiar view of Mont Blanc from Chamonix.

(T. H. H.*)

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HIMERA, a city on the north coast of Sicily, on a hill above the east bank of the Himeras Septentrionalis. It was founded in 648 B.C. by the Chalcidian inhabitants of Zancle, in company with many Syracusan exiles. Early in the 5th century the tyrant Terillas, son-in-law of Anaxilas of Rhegium and Zancle, appealed to the Carthaginians, who came to his assistance, but were utterly defeated by Gelon of Syracuse in 480 B.C.—on the same day, it is said, as the battle of Salamis. Thrasydaeus, son of Theron of Agrigentum, seems to have ruled the city oppressively, but an appeal made to Hiero of Syracuse, Gelon’s brother, was betrayed by him to Theron; the latter massacred all his enemies and in the following year resettled the town. In 415 it refused to admit the Athenian fleet and remained an ally of Syracuse. In 408 the Carthaginian invading army under Hannibal, after capturing Selinus, invested and took Himera and razed the city to the ground, founding a new town close to the hot springs (Thermae Himeraeae), 8 m. to the west. The only relic of the ancient town now visible above ground is a small portion (four columns, lower diameter 7 ft.) of a Doric temple, the date of which (whether before or after 480 B.C.) is uncertain.

HIMERIUS (*c.* A.D. 315-386), Greek sophist and rhetorician, was born at Prusa in Bithynia. He completed his education at Athens, whence he was summoned to Antioch in 362 by the emperor Julian to act as his private secretary. After the death of Julian in the following year Himerius returned to Athens, where he established a school of rhetoric, which he compared with that of Isocrates and the Delphic oracle, owing to the number of those who flocked from all parts of the world to hear him. Amongst his pupils were Gregory of Nazianzus and Basil the Great, bishop of Caesarea. In recognition of his merits, civic rights and the membership of the Areopagus were conferred upon him. The death of his son Rufinus (his lament for whom, called μονῳδία, is extant) and that of a favourite daughter greatly affected his health; in his later years he became blind and he died of epilepsy. Although a heathen, who had been initiated into the mysteries of Mithra by Julian, he shows no prejudice against the Christians. Himerius is a typical representative of the later rhetorical schools. Photius (cod. 165, 243 Bekker) had read 71 speeches by him, of 36 of which he has given an epitome; 24 have come down to us complete and fragments of 10 or 12 others. They consist of epideictic or “display” speeches after the style of Aristides, the majority of them having been delivered on special occasions, such as the arrival of a new governor, visits to different cities (Thessalonica, Constantinople), or the death of friends or well-known personages. The *Polemarchicus*, like the *Menexenus* of Plato and the *Epitaphios Logos* of Hypereides, is a panegyric of those who had given their lives for their country; it is so called because it was originally the duty of the polemarch to arrange the funeral games in honour of those who had fallen in battle. Other declamations, only known from the excerpts in Photius, were imaginary orations put into the mouth of famous persons—Demosthenes advocating the recall of Aeschines from banishment, Hypereides supporting the policy of Demosthenes, Themistocles inveighing against the king of Persia, an orator unnamed attacking Epicurus for atheism before Julian at Constantinople. Himerius is more of a poet than a rhetorician, and his declamations are valuable as giving prose versions or even the actual words of lost poems by Greek lyric writers. The prose poem on the marriage of Severus and his greeting to Basil at the beginning of spring are quite in the spirit of the old lyric. Himerius possesses vigour of language and descriptive powers, though his productions are spoilt by too frequent use of imagery, allegorical and metaphorical obscurities, mannerism and ostentatious learning. But they are valuable for the history and social conditions of the time, although lacking the sincerity characteristic of Libanius.

See Eunapius, *Vitae sophistarum*; Suidas, *s.v.*; editions by G. Wernsdorf (1790), with valuable introduction and commentaries, and by F. Dübner (1849) in the Didot series; C. Teuber, *Quaestiones Himerianae* (Breslau, 1882); on the style, E. Norden, *Die antike Kunstprosa* (1898).

HIMLY (LOUIS), AUGUSTE (1823-1906), French historian and geographer, was born at Strassburg on the 28th of March 1823. After studying in his native town and taking the university course in Berlin (1842-1843) he went to Paris, and passed first in the examination for fellowship (*agrégation*) of the *lycées* (1845), first in the examinations on leaving the École des Chartes, and first in the examination for fellowship of the faculties (1849). In 1849 he took the degree of doctor of letters with two theses, one of which, *Wala et Louis le Débonnaire* (published in Paris in 1849), placed him in the front rank of French scholars in the province of Carolingian history. Soon, however, he turned his attention to the study of geography. In 1858 he obtained an appointment as teacher of geography at the Sorbonne, and henceforth devoted himself to that subject. It was not till 1876 that he published, in two volumes, his remarkable *Histoire de la formation territoriale des états de l'Europe centrale*, in which he showed with a firm, but sometimes slightly heavy touch, the reciprocal influence exerted by geography and history. While the work gives evidence throughout of wide and well-directed research, he preferred to write it in the form of a student's manual; but it was a manual so original that it gained him admission to the Institute in 1881. In that year he was appointed dean of the faculty of letters, and for ten years he directed the intellectual life of that great educational centre during its development into a great scientific body. He died at Sèvres on the 6th of October 1906.

HIMMEL, FREDERICK HENRY (1765-1814), German composer, was born on the 20th of November 1765 at Treuenbrietzen in Brandenburg, Prussia, and originally studied theology at Halle. During a temporary stay at Potsdam he had an opportunity of showing his self-acquired skill as a pianist before King Frederick William II., who thereupon made him a yearly allowance to enable him to complete his musical studies. This he did under Naumann, a German composer of the Italian school, and the style of that school Himmel himself adopted in his serious operas. The first of these, a pastoral opera, *Il Primo Navigatore*, was produced at Venice in 1794 with great success. In 1792 he went to Berlin, where his oratorio *Isaaco* was produced, in consequence of which he was made court Kapellmeister to the king of Prussia, and in that capacity wrote a great deal of official music, including cantatas, and a coronation Te Deum. His Italian operas, successively composed for Stockholm, St Petersburg and Berlin, were all received with great favour in their day. Of much greater importance than these is an operetta to German words by Kotzebue, called *Fanchon*, an admirable specimen of the primitive form of the musical drama known in Germany as the *Singspiel*. Himmel's gift of writing genuine simple melody is also observable in his songs, amongst which one called "To Alexis" is the best. He died in Berlin on the 8th of June 1814.

HINCKLEY, a market town in the Bosworth parliamentary division of Leicestershire, England, 14½ m. S.W. from Leicester on the Nuneaton-Leicester branch of the London & North-Western railway, and near the Ashby-de-la-Zouch canal. Pop. of urban district (1901), 11,304. The town is well situated on a considerable eminence. Among the principal buildings are the church of St Mary, a Decorated and Perpendicular structure, with lofty tower and spire; the Roman Catholic academy named St Peter's Priory, and a grammar school. The ditch of a castle erected by Hugh de Grentismenil in the time of William Rufus is still to be traced. Hinckley is the centre of a stocking-weaving district, and its speciality is circular hose. It also possesses a boot-making industry, brick and tile works, and lime works. There are mineral springs in the neighbourhood.

HINCKS, EDWARD (1792-1866), British assyriologist, was born at Cork, Ireland, and educated at Trinity College, Dublin. He took orders in the Protestant Church of Ireland, and was rector of Killyleagh, Down, from 1825 till his death on the 3rd of December 1866. Hincks devoted his spare time to the study of hieroglyphics, and to the deciphering of the cuneiform script (see CUNEIFORM), in which he was a pioneer, working out contemporaneously with Sir H. Rawlinson, and independently of him, the ancient Persian vowel system. He published a number of original and scholarly papers on assyriological questions of the highest value, chiefly in the *Transactions* of the Royal Irish Academy.

HINCKS, SIR FRANCIS (1807-1885), Canadian statesman, was born at Cork, Ireland, the son of an Irish Presbyterian minister. In 1832 he engaged in business in Toronto, became a friend of Robert Baldwin, and in 1835 was chosen to examine the accounts of the Welland Canal, the management of which was being attacked by W. L. Mackenzie. This turned his attention to political life and in 1838 he founded the *Examiner*, a weekly paper in the Liberal interest. In 1841 he was elected M.P. for the county of Oxford, and in the following year was appointed inspector-general, the title then borne by the finance minister, but in 1843 resigned with Baldwin and the other ministers on the question of responsible government. In 1848 he again became inspector-general in the Baldwin-Lafontaine ministry, and on their retirement in 1851 became premier of Canada, his chief colleague being A. N. Morin (1803-1865). While premier he was prominent in the negotiations which led to the construction of the Grand Trunk railway, and in co-operation with Lord Elgin negotiated with the United States the reciprocity treaty of 1854. In the same year the bitter hostility of the “Clear Grits” under George Brown compelled his resignation, and he was prominent in the formation of the Liberal-Conservative Party. In 1855 he was chosen governor of Barbados and the Windward Islands, and subsequently governor of British Guiana. In 1869 he was created K.C.M.G. and returned to Canada, becoming till 1873 finance minister in the cabinet of Sir John Macdonald. In February of that year he resigned, but continued to take an active part in public life. In 1879 the failure of the Consolidated Bank of Canada, of which he was president, led to his being tried for issuing false statements. Though found guilty on a technicality (see *Journal* of the Canadian Bankers’ Association, April 1906) judgment was suspended, his personal credit remained unimpaired, and he continued to take part in the discussion of public questions till his death on the 18th of August 1885.

His writings include: *The Political History of Canada between 1840 and 1855* (1877); *The Political Destiny of Canada* (1878), and his *Reminiscences* (1884).

HINCMAR (*c.* 805-882), archbishop of Reims, one of the most remarkable figures in the ecclesiastical history of France, belonged to a noble family of the north or north-east of Gaul. Destined, doubtless, to the monastic life, he was brought up at St Denis under the direction of the abbot Hilduin (d. 844), who brought him in 822 to the court of the emperor Louis the Pious. When Hilduin was disgraced in 830 for having joined the party of Lothair, Hincmar accompanied him into exile at Corvey in Saxony, but returned with him to St Denis when the abbot was reconciled with the emperor, and remained faithful to the emperor during his struggle with his sons. After the death of Louis the Pious (840) Hincmar supported Charles the Bald, and received from him the abbacies of Notre-Dame at Compiègne and St Germer de Fly. In 845 he obtained through the king’s support the archbishopric of Reims, and this choice was confirmed at the synod of Beauvais (April 845). Archbishop Ebbo, whom he replaced, had been deposed in 835 at the synod of Thionville (Diedenhofen) for having broken his oath of fidelity to the emperor Louis, whom he had deserted to join the party of Lothair. After the death of Louis, Ebbo succeeded in regaining possession of his see for some years (840-844), but in 844 Pope Sergius II. confirmed his deposition. It was in these circumstances that Hincmar succeeded, and in 847 Pope Leo IV. sent him the pallium.

One of the first cares of the new prelate was the restitution to his metropolitan see of the domains that had been alienated under Ebbo and given as benefices to laymen. From the beginning of his episcopate Hincmar was in constant conflict with the clerks who had been ordained by Ebbo during his reappearance. These clerks, whose ordination was regarded as invalid by Hincmar and his adherents, were condemned in 853 at the council of Soissons, and the decisions of that council were confirmed in 855 by Pope Benedict III. This conflict, however, bred an antagonism of which Hincmar was later to feel the effects. During the next thirty years the archbishop of Reims played a very prominent part in church and state. His authoritative and energetic will inspired, and in great measure directed, the policy of the west Frankish kingdom until his death. He took an active part in all the great political and religious affairs of his time, and was especially energetic in defending and extending the rights of the church and of the metropolitans in general, and of the metropolitan of the church of Reims in particular. In the resulting conflicts, in which his personal interest was in question, he displayed great activity and a wide knowledge of canon law, but did not scruple to resort to disingenuous interpretation of texts. His first encounter was with the heresiarch Gottschalk, whose predestinarian doctrines claimed to be modelled on those of St Augustine. Hincmar placed himself at the head of the party that regarded Gottschalk’s doctrines as heretical, and succeeded in procuring the arrest and imprisonment of his adversary (849). For a part at least of his doctrines Gottschalk found ardent defenders, such as Lupus of Ferrières, the deacon Florus and Amolo of Lyons. Through the energy and activity of Hincmar the theories of Gottschalk were condemned at Quierzy (853) and Valence (855), and the decisions of these two synods were confirmed at the synods of Langres and Savonnières, near Toul (859). To refute the predestinarian heresy Hincmar composed his *De praedestinatione Dei et libero arbitrio*, and against certain propositions advanced by Gottschalk on the Trinity he wrote a treatise called *De una et non trina deitate*. Gottschalk died in prison in 868. The question of the divorce of Lothair II., king of Lorraine,

who had repudiated his wife Theutberga to marry his concubine Waldrada, engaged Hincmar's literary activities in another direction. At the request of a number of great personages in Lorraine he composed in 860 his *De divortio Lotharii et Teutbergae*, in which he vigorously attacked, both from the moral and the legal standpoints, the condemnation pronounced against the queen by the synod of Aix-la-Chapelle (February 860). Hincmar energetically supported the policy of Charles the Bald in Lorraine, less perhaps from devotion to the king's interests than from a desire to see the whole of the ecclesiastical province of Reims united under the authority of a single sovereign, and in 869 it was he who consecrated Charles at Metz as king of Lorraine.

In the middle of the 9th century there appeared in Gaul the collection of false decretals commonly known as the Pseudo-Isidorian Decretals. The exact date and the circumstances of the composition of the collection are still an open question, but it is certain that Hincmar was one of the first to know of their existence, and apparently he was not aware that the documents were forged. The importance assigned by these decretals to the bishops and the provincial councils, as well as to the direct intervention of the Holy See, tended to curtail the rights of the metropolitans, of which Hincmar was so jealous. Rothad, bishop of Soissons, one of the most active members of the party in favour of the pseudo-Isidorian theories, immediately came into collision with his archbishop. Deposed in 863 at the council of Soissons, presided over by Hincmar, Rothad appealed to Rome. Pope Nicholas I. supported him zealously, and in 865, in spite of the protests of the archbishop of Reims, Arsenius, bishop of Orta and legate of the Holy See, was instructed to restore Rothad to his episcopal see. Hincmar experienced another check when he endeavoured to prevent Wulfad, one of the clerks deposed by Ebbo, from obtaining the archbishopric of Bourges with the support of Charles the Bald. After a synod held at Soissons, Nicholas I. pronounced himself in favour of the deposed clerks, and Hincmar was constrained to make submission (866). He was more successful in his contest with his nephew Hincmar, bishop of Laon, who was at first supported both by the king and by his uncle, the archbishop of Reims, but soon quarrelled with both. Hincmar of Laon refused to recognize the authority of his metropolitan, and entered into an open struggle with his uncle, who exposed his errors in a treatise called *Opusculum LV. capitulorum*, and procured his condemnation and deposition at the synod of Douzy (871). The bishop of Laon was sent into exile, probably to Aquitaine, where his eyes were put out by order of Count Boso. Pope Adrian protested against his deposition, but it was confirmed in 876 by Pope John VIII., and it was not until 878, at the council of Troyes, that the unfortunate prelate was reconciled with the Church. A serious conflict arose between Hincmar on the one side and Charles and the pope on the other in 876, when Pope John VIII., at the king's request, entrusted Ansegisus, archbishop of Sens, with the primacy of the Gauls and of Germany, and created him vicar apostolic. In Hincmar's eyes this was an encroachment on the jurisdiction of the archbishops, and it was against this primacy that he directed his treatise *De jure metropolitanorum*. At the same time he wrote a life of St Remigius, in which he endeavoured by audacious falsifications to prove the supremacy of the church of Reims over the other churches. Charles the Bald, however, upheld the rights of Ansegisus at the synod of Ponthion. Although Hincmar had been very hostile to Charles's expedition into Italy, he figured among his testamentary executors and helped to secure the submission of the nobles to Louis the Stammerer, whom he crowned at Compiègne (8th of December 877).

During the reign of Louis, Hincmar played an obscure part. He supported the accession of Louis III. and Carloman, but had a dispute with Louis, who wished to instal a candidate in the episcopal see of Beauvais without the archbishop's assent. To Carloman, on his accession in 882, Hincmar addressed his *De ordine palatii*, partly based on a treatise (now lost) by Adalard, abbot of Corbie (*c.* 814), in which he set forth his system of government and his opinion of the duties of a sovereign, a subject he had already touched in his *De regis persona et regio ministerio*, dedicated to Charles the Bald at an unknown date, and in his *Instructio ad Ludovicum regem*, addressed to Louis the Stammerer on his accession in 877. In the autumn of 832 an irruption of the Normans forced the old archbishop to take refuge at Epernay, where he died on the 21st of December 882. Hincmar was a prolific writer. Besides the works already mentioned, he was the author of several theological tracts; of the *De villa Noviliaco*, concerning the claiming of a domain of his church; and he continued from 861 the *Annales Bertiniani*, of which the first part was written by Prudentius, bishop of Troyes, the best source for the history of Charles the Bald. He also wrote a great number of letters, some of which are extant, and others embodied in the chronicles of Flodoard.

Hincmar's works, which are the principal source for the history of his life, were collected by Jacques Sirmond (Paris, 1645), and reprinted by Migne, *Patrol. Latina*, vol. cxxv. and cxxvi. See also C. von Noorden, *Hinkmar, Erzbischof von Reims* (Bonn, 1863), and, especially, H. Schrörs, *Hinkmar, Erzbischof von Reims* (Freiburg-im-Breisgau, 1884). For Hincmar's political and ecclesiastical theories see preface to Maurice Prou's edition of the *De ordine palatii* (Paris, 1885), and the abbé Lesné, *La Hiérarchie épiscopale en Gaule et en Germanie* (Paris, 1905).

(R. Po.)

HIND, the female of the red-deer, usually taken as being three years old and over, the male being

known as a “hart.” It is sometimes also applied to the female of other species of deer. The word appears in several Teutonic languages, cf. Dutch and Ger. *Hinde*, and has been connected with the Goth. *hinÞan* (*hinthan*), to seize, which may be connected ultimately with “hand” and “hunt.” “Hart,” from the O.E. *heort*, may be in origin connected with the root of Gr. κέρας, horn. “Hind” (O.E. *hine*, probably from the O.E. *hinan*, members of a family or household), meaning a servant, especially a labourer on a farm, is another word. In Scotland the “hind” is a farm servant, with a cottage on the farm, and duties and responsibilities that make him superior to the rest of the labourers. Similarly “hind” is used in certain parts of northern England as equivalent to “bailiff.”

HINDERSIN, GUSTAV EDUARD VON (1804-1872), Prussian general, was born at Wernigerode near Halberstadt on the 18th of July 1804. He was the son of a priest and received a good education. His earlier life was spent in great poverty, and the struggle for existence developed in him an iron strength of character. Entering the Prussian artillery in 1820 he became an officer in 1825. From 1830 to 1837 he attended the Allgemeine Kriegsakademie at Berlin, and in 1841, while still a subaltern, he was posted to the great General Staff, in which he afterwards directed the topographical section. In 1849 he served with the rank of major on the staff of General Peucker, who commanded a federal corps in the suppression of the Baden insurrection. He fell into the hands of the insurgents at the action of Ladenburg, but was released just before the fall of Rastadt. In the Danish war of 1864 Hindersin, now lieutenant-general, directed the artillery operations against the lines of Düppel, and for his services was ennobled by the king of Prussia. Soon afterwards he became inspector-general of artillery. His experience at Düppel had convinced him that the days of the smooth-bore gun were past, and he now devoted himself with unremitting zeal to the rearmament and reorganization of the Prussian artillery. The available funds were small, and grudgingly voted by the parliament. There was a strong feeling moreover that the smooth-bore was still tactically superior to its rival (see Artillery, § 19). There was no practical training for war in either the field or the fortress artillery units. The latter had made scarcely any progress since the days of Frederick the Great, and before von Hindersin’s appointment had practised with the same guns in the same bastion year after year. All this was altered, the whole “foot-artillery” was reorganized, manoeuvres were instituted, and the smooth-bores were, except for ditch defence, eliminated from the armament of the Prussian fortresses. But far more important was his work in connexion with the field and horse batteries. In 1864 only one battery in four had rifled guns, but by the unrelenting energy of von Hindersin the outbreak of war with Austria one and a half years later found the Prussians with ten in every sixteen batteries armed with the new weapon. But the battles of 1866 showed, besides the superiority of the rifled gun, a very marked absence of tactical efficiency in the Prussian artillery, which was almost always outmatched by that of the enemy. Von Hindersin had pleaded, in season and out of season, for the establishment of a school of gunnery; and in spite of want of funds, such a school had already been established. After 1866, however, more support was obtained, and the improvement in the Prussian field artillery between 1866 and 1870 was extraordinary, even though there had not been time for the work of the school to leaven the whole arm. Indeed, the German artillery played by far the most important part in the victories of the Franco-German war. Von Hindersin accompanied the king’s headquarters as chief of artillery, as he had done in 1866, and was present at Gravelotte, Sedan and the siege of Paris. But his work, which was now accomplished, had worn out his physical powers, and he died on the 23rd of January 1872 at Berlin.

See Bartholomäus, *Der General der Infanterie von Hindersin* (Berlin, 1895), and Prince Kraft zu Hohenlohe-Ingelfingen, *Letters on Artillery* (translated by Major Walford, R.A.), No. xi.

HINDĪ, EASTERN, one of the “intermediate” Indo-Aryan languages (see Hindostani). It is spoken in Oudh, Baghelkhand and Chhattisgarh by over 22,000,000 people. It is derived from the Apabhraṁśa form of Ardhamāgadhī Prakrit (see Prakrit), and possesses a large and important literature. Its most famous writer was Tulsī Dās, the poet and reformer, who died early in the 17th century, and since his time it has been the North-Indian language employed for epic poetry.

HINDĪ, WESTERN, the Indo-Aryan language of the middle and upper Gangetic Doab, and of the

country to the north and south. It is the vernacular of over 40,000,000 people. Its standard dialect is Braj Bhāshā, spoken near Muttra, which has a considerable literature mainly devoted to the religion founded on devotion to Krishna. Another dialect spoken near Delhi and in the upper Gangetic Doab is the original from which Hindostani, the great *lingua franca* of India, has developed (see HINDOSTANI). Western Hindī, like Punjabi, its neighbour to the west, is descended from the Apabhraṁśa form of Śaurasēnī Prakrit (see PRAKRIT), and represents the language of the Madhyadēśa or Midland, as distinct from the intermediate and outer Indo-Aryan languages.

HINDKI, the name given to the Hindus who inhabit Afghanistan. They are of the Khatri class, and are found all over the country even amongst the wildest tribes. Bellew in his *Races of Afghanistan* estimates their number at about 300,000. The name Hindki is also loosely used on the upper Indus, in Dir, Bajour, &c., to denote the speakers of Punjabi or any of its dialects. It is sometimes applied in a historical sense to the Buddhist inhabitants of the Peshawar Valley north of the Kabul river, who were driven thence about the 5th or 6th century and settled in the neighbourhood of Kandahar.

HINDLEY, an urban district in the Ince parliamentary division of Lancashire, England, 2 m. E.S.E. of Wigan, on the Lancashire & Yorkshire and Great Central railways. Pop. (1901) 23,504. Cotton spinning and the manufacture of cotton goods are the principal industries, and there are extensive coal-mines in the neighbourhood. It is recorded that in the time of the Puritan revolution Hindley church was entered by the Cavaliers, who played at cards in the pews, pulled down the pulpit and tore the Bible in pieces.

HINDOSTANI (properly *Hindōstāni*, of or belonging to Hindostan[1]), the name given by Europeans to an Indo-Aryan dialect (whose home is in the upper Gangetic Doab and near the city of Delhi), which, owing to political causes, has become the great *lingua franca* of modern India. The name is not employed by natives of India, except as an imitation of the English nomenclature. Hindostani is by origin a dialect of Western Hindi, and it is first of all necessary to explain what we mean by the term "Hindi" as applied to language. Modern Indo-Aryan languages fall into three groups,—an outer band, the language of the Midland and an intermediate band. The Midland consists of the Gangetic Doab and of the country to its immediate north and south, extending, roughly speaking, from the Eastern Punjab on the west, to Cawnpore on its east. The language of this tract is called "Western Hindi"; to its west we have Panjabi (of the Central Punjab), and to the east, reaching as far as Benares, Eastern Hindi, both Intermediate languages. These three will all be dealt with in the present article. Panjabi and Western Hindi are derived from Śaurasēnī, and Eastern Hindi from Ardham gadhā Prakrit, through the corresponding Apabhraṁśas (see PRAKRIT). Eastern Hindi differs in many respects from the two others, but it is customary to consider it together with the language of the Midland, and this will be followed on the present occasion. In 1901 the speakers of these three languages numbered: Panjabi, 17,070,961; Western Hindi, 40,714,925; Eastern Hindi, 22,136,358.

Linguistic Boundaries.—Taking the tract covered by these three forms of speech, it has to its west, in the western Punjab, Lanndā (see SINDHI), a language of the Outer band. The parent of Lahndā once no doubt covered the whole of the Punjab, but, in the process of expansion of the tribes of the Midland described in the article INDO-ARYAN LANGUAGES, it was gradually driven back, leaving traces of its former existence which grow stronger as we proceed westwards, until at about the 74th degree of east longitude there is a mixed, transition dialect. To the west of that degree Lahndā may be said to be established, the deserts of the west-central Punjab forming a barrier and protecting it, just as, farther south, a continuation of the same desert has protected Sindhi from Rajasthani. It is the old traces of Lahndā which mainly differentiate Panjabi from Hindostani. To the south of Panjabi and Western Hindi lies Rajasthani. This language arose in much the same way as Panjabi. The expanding Midland language was stopped by the desert from reaching Sindhi, but to the south-west it found an unobstructed way into Gujarat, where, under the form of Gujarati, it broke the continuity of the Outer band. Eastern Hindi, as an Intermediate form of speech, is of much older lineage. It has been an Intermediate language since, at least, the institution of Jainism (say, 500 B.C.), and is much less subject to the influence of the Midland than is Panjabi. To its east it has Bihari, and, stretching far to

the south, it has Marathi as its neighbour in that direction, both of these being Outer languages.

Dialects.—The only important dialect of Eastern Hindi is Awadhī, spoken in Oudh, and possessing a large literature of great excellence. Chhattīsgaṛhī and Baghēlī, the other dialects, have scanty literatures of small value. Western Hindi has four main dialects, Bundēlī of Bundelkhand, Braj Bhasha (properly "Braj Bhāṣā") of the country round Mathura (Muttra), Kanaujī of the central Doab and the country to its north, and vernacular Hindostani of Delhi and the Upper Doab. West of the Upper Doab, across the Jumna, another dialect, Bāngarū, is also found. It possesses no literature. Kanauji is very closely allied to Braj Bhasha, and these two share with Awadhi the honour of being the great literary speeches of northern India. Nearly all the classical literature of India is religious in character, and we may say that, as a broad rule, Awadhi literature is devoted to the Ramaite religion and the epic poetry connected with it, while that of Braj Bhasha is concerned with the religion of Krishna. Vernacular Hindostani has no literature of its own, but as the *lingua franca* now to be described it has a large one. Panjabi has one dialect, Dōgrī, spoken in the Himalayas.

Hindostani as a Lingua Franca.—It has often been said that Hindostani is a mongrel "pigeon" form of speech made up of contributions from the various languages which met in Delhi bazaar, but this theory has now been proved to be unfounded, owing to the discovery of the fact that it is an actual living dialect of Western Hindi, existing for centuries in its present habitat, and the direct descendant of Śaurasēnī Prakrit. It is not a typical dialect of that language, for, situated where it is, it represents Western Hindi merging into Panjabi (Braj Bhasha being admittedly the standard of the language), but to say that it is a mongrel tongue thrown together in the market is to reverse the order of events. It was the natural language of the people in the neighbourhood of Delhi, who formed the bulk of those who resorted to the bazaar, and hence it became the bazaar language. From here it became the *lingua franca* of the Mogul camp and was carried everywhere in India by the lieutenants of the empire. It has several recognized varieties, amongst which we may mention Dakhinī, Urdū, Rēkhta and Hindī. Dakhini or "southern," is the form current in the south of India, and was the first to be employed for literature. It contains many archaic expressions now extinct in the standard dialect. Urdu, or *Urdū zabān*, "the language of the camp," is the name usually employed for Hindostani by natives, and is now the standard form of speech used by Mussulmans. All the early Hindostani literature was in poetry, and this literary form of speech was named "Rēkhta," or "scattered," from the way in which words borrowed from Persian were "scattered" through it. The name is now reserved for the dialect used in poetry, Urdu being the dialect of prose and of conversation. The introduction of these borrowed words, which has been carried to even a greater extent in Urdu, was facilitated by the facts that the latter was by origin a "camp" language, and that Persian was the official language of the Mogul court. In this way Persian (and, with Persian, Arabic) words came into current use, and, though the language remained Indo-Aryan in its grammar and essential characteristics, it soon became unintelligible to any one who had not at least a moderate acquaintance with the vocabulary of Iran. This extreme Persianization of Urdu was due rather to Hindu than to Persian influence. Although Urdu literature was Mussulman in its origin, the Persian element was first introduced in excess by the pliant Hindu officials employed in the Mogul administration, and acquainted with Persian, rather than by Persians and Persianized Moguls, who for many centuries used only their own languages for literary purposes.[2] Prose Urdu literature took its origin in the English occupation of India and the need for text-books for the college of Fort William. It has had a prosperous career since the commencement of the 19th century, but some writers, especially those of Lucknow, have so overloaded it with Persian and Arabic that little of the original Indo-Aryan character remains, except, perhaps, an occasional pronoun or auxiliary verb. The Hindi form of Hindostani was invented simultaneously with Urdu prose by the teachers at Fort William. It was intended to be a Hindostani for the use of Hindus, and was derived from Urdu by ejecting all words of Persian or Arabic birth, and substituting for them words either borrowed from Sanskrit (*tatsamas*) or derived from the old primary Prakrit (*tadbhavas*) (see Indo-Aryan Languages). Owing to the popularity of the first book written in it, and to its supplying the need for a *lingua franca* which could be used by the most patriotic Hindus without offending their religious prejudices, it became widely adopted, and is now the recognized vehicle for writing prose by those inhabitants of northern India who do not employ Urdu. This Hindi, which is an altogether artificial product of the English, is hardly ever used for poetry. For this the indigenous dialects (usually Awadhi or Braj Bhasha) are nearly always employed by Hindus. Urdu, on the other hand, having had a natural growth, has a vigorous poetical literature. Modern Hindi prose is often disfigured by that too free borrowing of Sanskrit words instead of using home-born *tadbhavas*, which has been the ruin of Bengali, and it is rapidly becoming a Hindu counterpart of the Persianized Urdu, neither of which is intelligible except to persons of high education.

Not only has Urdu adopted a Persian vocabulary, but even a few peculiarities of Persian construction, such as reversing the positions of the governing and the governed word (*e.g. báp mērā* for *mērā bāp*), or of the adjective and the substantive it qualifies, or such as the use of Persian phrases with the preposition *ba* instead of the native postposition of the ablative case (*e.g. ba-khushí* for *khushī-sē*, or *ba-ḥukm sarkār-kē* instead of *sarkār-kē ḥukm-sē*) are to be met with in many writings; and these, perhaps, combined with the too free indulgence on the part of some authors in the use of high-flown and pedantic Persian and Arabic words in place of common and yet chaste Indian words, and the general use of the Persian instead of the Nāgarī character, have induced some to regard Hindostani or Urdu as a language distinct from Hindi. But such a view betrays a

radical misunderstanding of the whole question. We must define Urdu as the Persianized Hindostani of educated Mussulmans, while Hindi is the Sanskritized Hindostani of educated Hindus. As for the written character, Urdu, from the number of Persian words which it contains, can only be written conveniently in the Persian character, while Hindi, for a parallel reason, can only be written in the Nagari or one of its related alphabets (see SANSKRIT). On the other hand, "Hindostani" implies the great *lingua franca* of India, capable of being written in either character, and, without purism, avoiding the excessive use of either Persian or Sanskrit words when employed for literature. It is easy to write this Hindostani, for it has an opulent vocabulary of *tadbhava* words understood everywhere by both Mussulmans and Hindus. While "Hindostani," "Urdu" and "Hindi" are thus names of dialects, it should be remembered that the terms "Western Hindi" and "Eastern Hindi" connote, not dialects, but languages.

The epoch of Akbar, which first saw a regular revenue system established, with toleration and the free use of their religion to the Hindus, was, there can be little doubt, the period of the formation of the language. But its final consolidation did not take place till the reign of Shah Jahān. After the date of this monarch the changes are comparatively immaterial until we come to the time when European sources began to mingle with those of the East. Of the contributions from these sources there is little to say. Like the greater part of those from Arabic and Persian, they are chiefly nouns, and may be regarded rather as excrescences which have sprung up casually and have attached themselves to the original trunk than as ingredients duly incorporated in the body. In the case of the Persian and Arabic element, indeed, we do find not a few instances in which nouns have been furnished with a Hindi termination, *e.g.* *kharīdnā*, *badalnā*, *guzarnā*, *dāghnā*, *bakhshnaā*, *kamīnapan*, &c.; but the European element cannot be said to have at all woven itself into the grammar of the language. It consists, as has been observed, solely of nouns, principally substantive nouns, which on their admission into the language are spelt phonetically, or according to the corrupt pronunciation they receive in the mouths of the natives, and are declined like the indigenous nouns by means of the usual postpositions or case-affixes. A few examples will suffice. The Portuguese, the first in order of seniority, contributes a few words, as *kamarā* or *kamrā* (*camera*), a room; *mārtōl* (*martello*), a hammer; *nīlām* (*leilão*), an auction, &c. &c. Of French and Dutch influence scarcely a trace exists. English has contributed a number of words, some of which have even found a place in the literature of the language; *e.g.* *kamishanar* (commissioner); *jaj* (judge); *ḍākṭar* (doctor); *ḍākṭarī*, "the science of medicine" or "the profession of physicians"; *inspēkṭar* (inspector); *isṭanṭ* (assistant); *sōsayaṭí* (society); *apīl* (appeal); *apīl karnā*, "to appeal"; *ḍikrī* or *ḍigrī* (decree); *ḍigrī* (degree); *inc* (inch); *fut* (foot); and many more, are now words commonly used. Some borrowed words are distorted into the shape of genuine Hindostani words familiar to the speakers; *e.g.* the English railway term "signal" has become *sikandar*, the native name for Alexander the Great, and "signal-man" is *sikandar-mān*, or "the pride of Alexander." How far the free use of Anglicisms will be adopted as the language progresses is a question upon which it would be hazardous to pronounce an opinion, but of late years it has greatly increased in the language of the educated, especially in the case of technical terms. A native veterinary surgeon once said to the present writer, "*kuttē-kā saliva bahut antiseptic hai*" for "a dog's saliva is very antiseptic," and this is not an extravagant example.[3]

The vocabulary of Panjabi and Eastern Hindi is very similar to that of Western Hindi. Panjabi has no literature to speak of and is free from the burden of words borrowed from Persian or Sanskrit, only the commonest and simplest of such being found in it. Its vocabulary is thus almost entirely *tadbhava*, and, while capable of expressing all ideas, it has a charming rustic flavour, like the Lowland Scotch of Burns, indicative of the national character of the sturdy peasantry that employs it. Eastern Hindi is very like Panjabi in this respect, but for a different reason. In it were written the works of Tulsī Dās, one of the greatest writers that India has produced, and his influence on the language has been as great as that of Shakespeare on English. The peasantry are continually quoting him without knowing it, and his style, simple and yet vigorous, thoroughly Indian and yet free from purism, has set a model which is everywhere followed except in the large towns where Urdu or Sanskritized Hindi prevails. Eastern Hindi is written in the Nāgarī alphabet, or in the current character related to it called "Kaithi" (see BIHARI). The indigenous alphabet of the Punjab is called *Laṇḍā* or "clipped." It is related to Nāgarī, but is hardly legible to any one except the original writer, and sometimes not even to him. To remedy this defect an improved form of the alphabet was devised in the 16th century by Angad, the fifth Sikh Guru, for the purpose of recording the Sikh scriptures. It was named *Gurmukhī*, "proceeding from the mouth of the Guru," and is now generally used for writing the language.

Grammar.—In the following account we use these contractions: Skr. = Sanskrit; Pr. = Prakrit; Ap. = Apabhraṁśa; W.H. = Western Hindi; E.H. = Eastern Hindi; H. = Hindostani; Br. = Braj Bhasha; P. = Panjabi.

(A) *Phonetics.*—The phonetic system of all three languages is nearly the same as that of the Apabhraṁśas from which they are derived. With a few exceptions, to be noted below, the letters of the alphabets of the three languages are the same as in Sanskrit. Panjabi, and the western dialects of Western Hindi, have preserved the old Vedic cerebral l. There is a tendency for concurrent vowels to run into each other, and for the semi-vowels y and v to become vowels. Thus, Skr. *carmakāras*, Ap. *cammaāru*, a leather-worker, becomes H. *camār*; Skr. *rajani*, Ap. *ra(y)aṇi*, H. *rain*, night; Skr. *dhavalakas*, Ap. *dhavalau*, H. *dhaulā*, white. Sometimes the semi-vowel is retained, as in Skr. *kātaras*, Ap. *kā(y)aru*, H. *kāyar*, a coward. Almost the only compound consonants which survived in

the Pr. stage were double letters, and in W.H. and E.H. these are usually simplified, the preceding vowel being lengthened and sometimes nasalized, in compensation. P., on the other hand, prefers to retain the double consonant. Thus, Skr. *karma*, Ap. *kammu*, W.H. and E.H. *kām*, but P. *kamm*, a work; Skr. *satyas*, Ap. *saccu*, W.H. and E.H. *sāc*, but P. *sacc*, true (H., being the W.H. dialect which lies nearest to P., often follows that language, and in this instance has *sacc*, usually written *sac*); Skr. *hastas*, Ap. *hatthu*, W.H. and E.H. *hāth*, but P. *hatth*, a hand. The nasalization of vowels is very frequent in all three languages, and is here represented by the sign ~ over the vowel. Sometimes it is compensatory, as in *sa͂c*, but it often represents an original *m*, as in *kawâl* from Skr. *kamalas*, a lotus. Final short vowels quiesce in prose pronunciation, and are usually not written in transliteration; thus the final *a*, *i* or *u* has been lost in all the examples given above, and other *tatsama* examples are Skr. *mati*-which becomes *mat*, mind, and Skr. *vastu*-, which becomes *bast*, a thing. In all poetry, however (except in the Urdū poetry formed on Persian models, and under the rules of Persian prosody), they reappear and are necessary for the scansion.

In *tadbhava* words an original long vowel in any syllable earlier than the penultimate is shortened. In P. and H. when the long vowel is *ē* or *ō* it is shortened to *i* or *u* respectively, but in other W.H. dialects and in E.H. it is shortened to *e* or *o*; thus, *bēṭī*, daughter, long form H. *biṭiyā*, E.H. *beṭiyā*; *ghōṛī*, mare, long form H. *ghuṛiyā*, E.H. *ghoṛiyā*. The short vowels *e* and *o* are very rare in P. and H., but are not uncommon (though ignored by most grammars) in E.H. and the other W.H. dialects. A medial *ḍ* is pronounced as a strongly burred cerebral *ṛ*, and is then written as shown, with a supposited dot. All these changes and various contractions of Prakrit syllables have caused considerable variations in the forms of words, but generally not so as to obscure the origin.

(B) *Declension.*—The nominative form of a *tadbhava* word is derived from the nominative form in Sanskrit and Prakrit, but *tatsama* words are usually borrowed in the form of the Skr. crude base; thus, Skr. *hastin*-, nom. *hastī*, Ap. nom. *hatthī*, H. *hāthī*, an elephant; Skr. base *mati*-, nom. *matis*, H. (*tatsama*) *mati*, or, with elision of the final short vowel, *mat*. Some *tatsamas* are, however, borrowed in the nominative form, as in Skr. *dhanin*-, nom. *dhanī*, H. *dhanī*, a rich man. As another example of a *tadbhava* word, we may take the Skr. nom. *ghōṭas*, Ap. *ghōḍu*, H. *ghōṛ*, a horse. Here again the final short vowel has been elided, but in old poetry we should find *ghōṛu*, and corresponding forms in *u* are occasionally met with at the present day.

In the article Prakrit attention is drawn to the frequent use of pleonastic suffixes, especially *-ka-* (fem.*-(i)kā*). With such a suffix we have the Skr. *ghōṭa-kas*, Ap. *ghōḍa-u*, Western Hindi *ghoṛau*, or in P. and H. (which is the W.H. dialect nearest in locality to P.) *ghōṛā*, a horse; Skr. *ghōṭi-kā*, Ap. *ghōḍi-ā*, W.H. and P. *ghōḍī*, a mare. Such modern forms made with one pleonastic suffix are called "strong forms," while those made without it are called "weak forms." All strong forms end in *au* (or *ā*) in the masculine, and in *ī* in the feminine, whereas, in Skr., and hence in *tatsamas*, both *ā* and *ī* are generally typical of feminine words, though sometimes employed for the masculine. It is shown in the article Prakrit that these pleonastic suffixes can be doubled, or even trebled, and in this way we have a new series of *tadbhava* forms. Let us take the imaginary Skr. **ghōṭa-ka-kas* with a double suffix. From this we have the Ap. *ghōḍa-a-u*, and modern *ghoṛawā* (with euphonic *w* inserted), a horse. Similarly for the feminine we have Skr. **ghōṭi-ka-kā*, Ap. *ghōḍi-a-ā*, modern *ghoṛiyā* (with euphonic *y* inserted), a mare. Such forms, made with two suffixes, are called "long forms," and are heard in familiar conversation, the feminine also serving as diminutives. There is a further stage, built upon three suffixes, and called the "redundant form," which is mainly used by the vulgar. As a rule masculine long forms end in *-awā*, *-iyā* or *-uā*, and feminines in *-iyā*, although the matter is complicated by the occasional use of pleonastic suffixes other than the *-ka-* which we have taken for our example, and is the most common. Strong forms are rarely met with in E.H., but on the other hand long forms are more common in that language.

There are a few feminine terminations of weak nouns which may be noted. These are *-inī*, *-in*, *-an*, *-nī* (Skr. *-inī*, Pr. *-iṇī*); and *-ānī*, *-āni*, *-āin* (Skr. *-ānī*, Pr. *-āṇī*). These are found not only in words derived from Prakrit, but are added to Persian and even Arabic words; thus, *hathinī*, *hathnī*, *hāthin* (Skr. *hastinī*, Pr. *hatthiṇī*), a she-elephant; *sunārin*, *sunāran*, a female goldsmith (*sōnār*); *shērnī*, a tigress (Persian *shēr*, a tiger); *Naṣīban*, a proper name (Arabic *naṣīb*); *paṇḍitānī*, the wife of a *paṇḍit*; *caudhrāin*, the wife of a *caudhrī* or head man; *mehtrānī*, the wife of a sweeper (Pres. *mehtar*, a sweeper). With these exceptions weak forms rarely have any terminations distinctive of gender.[4]

The synthetic declension of Sanskrit and Prakrit has disappeared. We see it in the actual stage of disappearance in Apabhraṁśa (see Prakrit), in which the case terminations had become worn down to *-hu*, *-ho*, *-hi*, *-hī* and *-hã*, of which *-hi* and *-hĩ* were employed for several cases, both singular and plural. There was also a marked tendency for these terminations to be confused, and in the earliest stages of the modern vernaculars we find *-hi* freely employed for any oblique case of the singular, and *-hĩ* for any oblique case of the plural, but more especially for the genitive and the locative. In the case of modern weak nouns these terminations have disappeared altogether in W.H. and P. except in sporadic forms of the locative such as *gā͂wē* (for *gā͂wahi*), in the village. In E.H. they are still heard as the termination of a form which can stand for any oblique case, and is called the "oblique form" or the "oblique case." Thus, from *ghar*, a house (a weak noun), we have W.H. and P. oblique form *ghar*, E.H. *gharahi*, *gharē* or *ghar*. In the plural, the oblique form is sometimes founded on the Ap. terminations *-hã* and *-hu*, and sometimes on the Skr. termination of the genitive plural *-ānām* (Pr. *-āṇa*, *-aṇhaṃ*), as in P. *gharā͂*, W.H. *gharaū̃*, *gharõ*, *gharani*, E.H. *gharan*. In the case of masculine weak forms, the plural nominative has dropped the old termination, except in E.H., where it has adopted the oblique plural form for this case also, thus *gharan*. The nominative plural of feminine weak forms follows the example of the masculine in E.H. In P. it also takes the oblique plural form,

while in W.H. it takes the old singular oblique form in *-ahĩ*, which it weakens to *aĩ* or (H.) *ẽ*; thus *bāt* (fem.), a word, nom. plur. E.H. *bāt-an*, P. *bāt-ã̄*, W.H. *bātaĩ* or (H.) *bāte*.

Strong masculine bases in Ap. ended in *-a-a* (nom. *-a-u*); thus *ghōḍa-a-* (nom. *ghōḍa-u*), and adding *-hi* we get *ghōḍa-a-hi*, which becomes contracted *ghōḍāhi* and finally to *ghōṛē*. The nominative plural is the same as the oblique singular, except in E.H. where it follows the oblique plural. The oblique plural of all closely follows in principle the weak forms. Feminine strong forms in Ap. ended in *-i-ā*, contracted to *ī* in the modern languages. Except in E.H. the *-hi* of the original oblique form singular disappears, so that we have E.H. *ghōṛihi* or *ghōṛī*, others only *ghōṛī*. The nominative plural of feminine strong forms exhibits some irregularities. In E.H., as usual, it follows the plural oblique forms. In W.H. (except Hindostani) it simply nasalizes the oblique form singular (*i.e.* adds *-hĩ* instead of *-hi*), as in *ghōrĩ*, but first on line looks like -hĩ]. P. and H. adopt the oblique long form for the plural and nasalize it, thus, P. *ghōṛīã̄*, H. *ghōṛiyã̄*. The oblique plurals call for no further remarks. We thus get the following summary, illustrating the way in which these nominative and oblique forms are made.

	Panjabi.	Hindostani.	Braj Bhasha.	Eastern Hindi.
Weak Noun Masc.—				
Nom. Sing.	*ghar*	*ghar*	*ghar*	*ghar*
Obl. Sing.	*ghar*	*ghar*	*ghar*	*ghar, gharahi*
Nom. Plur.	*ghar*	*ghar*	*ghar*	*gharan*
Obl. Plur.	gharã̄	*gharȭ*	*gharaũ, gharani*	*gharan*
Strong Noun Masc.—				
Nom. Sing.	*ghōṛā*	*ghōṛā*	*ghōṛau*	*ghōṛā*
Obl. Sing.	*ghōṛē*	*ghōṛē*	*ghōṛē, ghōṛai*	*ghōṛā, ghōṛē*
Nom. Plur.	*ghōṛē*	*ghōṛē*	*ghōṛē*	*ghōṛan*
Obl. Plur.	*ghōṛīã̄*	*ghōṛō̄*	*ghōṛaũ, ghōṛani*	*ghōṛan*
Weak Noun Fem.—				
Nom. Sing.	*bāt*	*bāt*	*bāt*	*bāt*
Obl. Sing.	*bāt*	*bāt*	*bāt*	*bāt*
Nom. Plur.	*bātã̄*	*bātẽ̄*	*bātaī*	*bātan*
Obl. Plur.	*bātã̄*	*bātȭ*	*bātaū, bātani*	*bātan*
Strong Noun Fem.—				
Nom. Sing.	*ghōṛī*	*ghōṛī*	*ghōṛī*	*ghōṛī*
Obl. Sing.	*ghōṛī*	*ghōṛī*	*ghōṛī*	*ghōṛī, ghōṛihi*
Nom. Plur.	*ghōṛīã̄*	*ghōṛiyã̄*	*ghōṛĩ*	*ghōṛin*
Obl. Plur.	*ghōṛīã̄*	*ghōṛiyȭ*	*ghōṛiyaũ, ghōṛiyani*	*ghōṛin*

We have seen that the oblique form is the resultant of a general melting down of all the oblique cases of Sanskrit and Prakrit, and that in consequence it can be used for any oblique case. It is obvious that if it were so employed it would often give rise to great confusion. Hence, when it is necessary to show clearly what particular case is intended, it is usual to add defining particles corresponding to the English prepositions "of," "to," "from," "by," &c., which, as in all Indo-Aryan languages they follow the main word, are here called "postpositions." The following are the postpositions commonly employed to form cases in our three languages:—

	Agent.	Genitive.	Dative.	Ablative.	Locative.
Panjabi	*nai*	*dā*	*nũ̄*	*tē*	*vicc*
Hindostani	*nē*	*kā*	*kō*	*sē*	*mẽ̄*
Braj Bhasha	*nẽ̄*	*kau*	*kaũ*	*tẽ̄, saũ*	*maĩ*
Eastern Hindi	None	*kēr, k*	*kã̄*	*sē*	*mẽ̄, bikhē*

The agent case is the case which a noun takes when it is the subject of a transitive verb in a tense formed from the past participle. This participle is passive in origin, and must be construed passively. In the Prakrit stage the subject was in such cases put into the instrumental case (see PRAKRIT), as in the phrase *ahaṁ tēṇa māriō*, I by-him (was) struck, *i.e.* he struck me. In Eastern Hindi this is still the case, the old instrumental being represented by the oblique form without any suffix. The other two languages define the fact that the subject is in the instrumental (or agent) case by the addition of the postposition *nē*, &c., an old form employed elsewhere to define the dative. It is really the oblique form (by origin a locative) of *nā* or *nō*, which is employed in Gujarati (*q.v.*) for the genitive. As this suffix is never employed to indicate a material instrument but here only to indicate the agent or subject of a verb, it is called the postposition of the "agent" case.

The genitive postpositions have an interesting origin. In Buddhist Sanskrit the words *kṛtas*, done, and *kṛtyas*, to be done, were added to a noun to form a kind of genitive. A synonym of *kṛtyas* was *kāryas*. These three words were all adjectives, and agreed with the thing possessed in gender, number, and case; thus, *māla-kṛtē karaṇḍē*, in the basket of the garland, literally, in the garland-made basket. In the various dialects of Apabhraṁśa Prakrit *kṛtas* became (strong form) *kida-u* or *kia-u*, *kṛtyas* became *kicca-u*, and *kāryas* became *kēra-u* or *kajja-u*, the initial *k* of which is liable to elision after a vowel. With the exception of Gujarati (and perhaps Marathi, *q.v.*) every Indo-Aryan language has genitive postpositions derived from one or other of these forms. Thus from *(ki)da-u* we have Panjabi *dā*; from *kia-u* we have H. *kā*, Br. *kau*, E.H. and Bihari *k* and Naipali *kō*; from *(ki)cca-u*

we have perhaps Marathi *cā*; from *kēra-u*, E.H. and Bihari *kēr*, *kar*, Bengali Oriya and Assamese *-r*, and Rajasthani *-rō*; while from *(ka)jja-u* we have the Sindhi *jō*. It will be observed that while *k*, *kēr*, *kar*, and *r* are weak forms, the rest are strong. As already stated, the genitive is an adjective. *Bāp* means "father," and *bāp-kā ghōrā* is literally "the paternal horse." Hence (while the weak forms as usual do not change) these genitives agree with the thing possessed in gender, number, and case. Thus, *bāp-kā ghōṛā*, the horse of the father, but *bāp-kī ghōṛī*, the mare of the father, and *bāp-kē ghōṛē-kō*, to the horse of the father, the *kā* being put into the oblique case masculine *kē*, to agree with *ghōṛē*, which is itself in an oblique case. The details of the agreement vary slightly in P. and W.H., and must be learnt from the grammars. The E.H. weak forms do not change in the modern language. Finally, in Prakrit it was customary to add these postpositions (*kēra-u*, &c.) to the genitive, as in *mama* or *mama kēra-u*, of me. Similarly these postpositions are, in the modern languages, added to the oblique form.

The locative of the Sanskrit *kṛtas*, *kṛtē*, was used in that language as a dative postposition, and it can be shown that all the dative postpositions given above are by origin old oblique forms of some genitive postposition. Thus H. *kō*, Br. *kaũ*, is a contraction of *kahũ*, an old oblique form of *kia-u*. Similarly for the others. The origin of the ablative postpositions is obscure. To the present writer they all seem (like the Bengal *haitē*) to be connected with the verb substantive, but their derivation has not been definitely fixed. The locative postpositions *mẽ̃* and *maī* are derived from the Skr. *madhyē*, in, through *majjhi*, *māhī*, and so on. The derivation of *vicc* and *bikhē* is obscure.

		Apabhraṁśa.	Panjabi.	Hindostani.	Braj Bhasha.	Eastern Hindi.
I,	Nom.	*haū*	*maī*	*maĩ*	*haũ*	*maī*
	Obl.	*maī, mahu, majjhu*	*mai*	*mujh*	*mohi*	*mō*
WE,	Nom.	*amhē*	*asī̃*	*ham*	*ham*	*ham*
	Obl.	*amahã*	*asā*	*hamõ̃*	*hamaū, hamani*	*ham*
THOU,	Nom.	*tuhũ*	*tũ̃*	*tū*	*tū*	*taĩ*
	Obl.	*taĩ, tuha, tujjhu*	*tai*	*tujh*	*tohi*	*tō*
YOU,	Nom.	*tumhē*	*tusī̃*	*tum*	*tum*	*tum*
	Obl.	*tumhahã*	*tusā*	*tumhõ̃*	*tumhaū*	*tum*

The pronouns closely follow the Prakrit originals. This will be evident from the preceding table of the first two personal pronouns compared with Apabhraṁśa.

It will be observed that in most of the nominatives of the first person, and in the E.H. nominative of the second person, the old nominative has disappeared, and its place has been supplied by an oblique form, exactly as we have observed in the nominative plural of nouns substantive. The P. *asī̃*, *tusī̃*, &c., are survivals from the old Lahndā (see *Linguistic Boundaries*, above). The genitives of these two pronouns are rarely used, possessive pronouns (in H. *mērā*, my; *hamārā*, our; *tērā*, thy; *tumhārā*, your) being employed instead. They can all (except P. *asāḍā*, our; *tusāḍā*, your, which are Lahndā) be referred to corresponding Ap. forms.

There is no pronoun of the third person, the demonstrative pronouns being used instead. The following table shows the principal remaining pronominal forms, with their derivation from Ap.:—

		Apabhraṁśa.	Panjabi.	Hindostani.	Braj Bhasha.	Eastern Hindi.
THAT, HE,	Nom.	?	*uh*	*woh*	*wō*	*ū*
	Obl.	?	*uh*	*us*	*wā*	*ō*
THOSE, THEY,	Nom.	*ōi*	*ōh*	*wē*	*wai*	*unh*
	Obl.	?	*unhã̃*	*unh*	*uni*	*unh*
THIS, HE,	Nom.	*ēhu*	*ih*	*yeh*	*yah*	*ī*
	Obl.	*ēhasu, ēhaho*	*ih*	*is*	*yā*	*ē*
THESE, THEY,	Nom.	*ēi*	*ēh*	*yē*	*yai*	*inh*
	Obl.	*ēhāṇa*	*inhã̃*	*inh*	*ini*	*inh*
THAT,	Nom.	*sō*	*sō*	*sō*	*sō*	*sē*
	Obl.	*tasu, taho*	*tih*	*tis*	*tā*	*tē*
THOSE,	Nom.	*sē*	*sō*	*sō*	*sō*	*sē*
	Obl.	*tāṇa*	*tinhã̃*	*tinh*	*tini*	*tenh*
WHO,	Nom.	*jō*	*jō*	*jō*	*jō*	*jē*
	Obl.	*jasu, jaho*	*jih*	*jis*	*jā*	*jē*
WHO (pl.),	Nom.	*jē*	*jō*	*jō*	*jō*	*jē*
	Obl.	*jāṇa*	*jinhã̃*	*jinh*	*jini*	*jenh*
WHO?	Nom.	*kō, kawaṇu*	*kauṇ*	*kaun*	*kō*	*kē*
	Obl.	*kasu, kaho*	*kih*	*kis*	*kā*	*kē*
WHO? (pl.),	Nom.	*kē*	*kauṇ*	*kaun*	*kō*	*kē*
	Obl.	*kāṇa*	*kinhã̃*	*kinh*	*kini*	*kenh*
WHAT?(Neut.),	Nom.	*kiṁ*	*kiā*	*kyā*	*kahā*	*kā*
	Obl.	*kāha, kāsu*	*kāh, kās*	*kāhē*	*kāhē*	*kāhē*

The origin of the first pronoun given above (that, he; those, they) cannot be referred to Sanskrit. It is derived from an Indo-Aryan base which was not admitted to the classical literary language, but of

which we find sporadic traces in Apabhraṁśa. The existence of this base is further vouched for by its occurrence in the Iranian language of the Avesta under the form *ava-*. The base of the second pronoun is the same as the base of the first syllable in the Skr. *ē-ṣas*, this, and other connected pronouns, and also occurs in the Avesta. Ap. *ēhu* is directly derived from *ē-sas*.

There are other pronominal forms upon which, except perhaps *kōī* (Pr. *kō-vi*, Skr. *kō-'pi*), any one, it is unnecessary to dwell. The phrase *kōī haī*? "Is any one (there)?" is the usual formula for calling a servant in upper India, and is the origin of the Anglo-Indian word "Qui-hi." The reflexive pronoun is *āp* (Ap. *appu*, Skr. *ātmā*), self, which, something like the Latin *suus* (Skr. *svas*), always refers to the subject of the sentence, but to all persons, not only to the third. Thus *maĩ apnē* (not *mērē*) *bāp-kō dēkhtā-hū̃*, "I see my father."

C. *Conjugation*.—The synthetic conjugation was already commencing to disappear in Prakrit, and in the modern languages the only original tenses which remain are the present, the imperative, and here and there the future. The first is now generally employed as a present subjunctive. In the accompanying table we have the conjugation of this tense, and also the three participles, present active, and past and future passive, compared with Apabhraṁśa, the verb selected being the intransitive root *call* or *cal*, go. In Ap. the word may be spelt with one or with two *ls*, which accounts for the variations of spelling in the modern languages.

The imperative closely resembles the old present, except that it drops all terminations in the 2nd person singular; thus, *cal*, go thou.

In P. and H. a future is formed by adding the syllable *gā* (fem. *gī*) to the simple present. Thus, H. *calū̃-gā*, I shall go. The *gā* is commonly said to be derived from the Skr. *gatas* (Pr. *gaō*), gone, but this suggestion is not altogether acceptable to the present writer, although he is not now able to propose a better. Under the form of *-gau* the same termination is used in Br., but in that dialect the old future has also survived, as in *calihaũ* (Ap. *calihaũ*, Skr. *caliṣyāmi*), I shall go, which is conjugated like the simple present. The E.H. formation of the future is closely analogous to what we find in Bihari (*q.v.*). The third person is formed as in Braj Bhasha, but the first and second persons are formed by adding pronominal suffixes, meaning "by me," "by thee," &c., to the future passive participle.

	Apabhramśa.	Panjabi.	Hindostani.	Braj Bjasja.	Eastern Hindi.
Old Present—					
Singular 1.	*callaũ*	*callā̃*	*calū̃*	*calaũ*	*calaū*
Singular 2.	*callasi, callahi*	*callẽ*	*calē*	*calai*	*calas*
Singular 3.	*callai*	*callē*	*calē*	*calai*	*calai*
Plural 1.	*callahū*	*calliyē*	*calẽ*	*calaī*	*calaī*
Plural 2.	*callahu*	*callō*	*calō*	*calau*	*calau*
Plural 3.	*callanti, callahĩ*	*callaṇ*	*calẽ*	*calaī*	*calaī*
Present Participle	*callanta-u*	*calldā*	*caltā*	*calatu*	*calat*
Past Part. Passive	*callia-u*	*calliā*	*calā*	*calyau*	*calā*
Future Part. Passive	*callaṇia-u*	*callṇā*	*calnā*	*calnaũ*	
	calliavva-u	. .	. .	*caliwaũ*	*calab*

Thus, *calab-ū̃*, it-is-to-be-gone by-me, I shall go. We thus get the following forms. It will be observed that, as in many other Indo-Aryan languages, the first person plural has no suffix:—

	Sing.	Plur.
1.	*calabũ*	*calab*
2.	*calabē*	*calabō*
3.	*calihai*	*calihaī*

In old E.H. the future participle passive, *calab*, takes no suffix for any person, and is used for all persons.

The last remark leads us to a class of tenses in P. and W.H., in which a participle, by itself, can be employed for any person of a finite tense. A few examples of the use of the present and past participles will show the construction. They are all taken from Hindostani. *Woh caltā*, he goes; *woh caltī*, she goes; *maī calā*, I went; *woh calī*, she went; *wē calē*, they went. The present participle in this construction, though it may be used to signify the present, is more commonly employed to signify a past conditional "(if) he had gone." It will have been observed that in the above examples, in all of which the verb is intransitive, the past as well as the present participle agrees with the subject in gender and number; but, if the verb be transitive, the passive meaning of the past participle comes into force. The subject must be put into the case of the agent, and the participle inflects to agree with the object. If the object be not expressed, or, as sometimes happens, be expressed in the dative case, the participle is construed impersonally, and takes the masculine (for want of a neuter) form. Thus, *maī-nē kahā*, by-me it-was-said, *i.e.* I said; *us-nē ciṭṭhī likhī*, by-him a-letter (fem.) was-written, he wrote a letter; *rājā-nē shērnī-kō mārā*, the king killed the tigress, lit., by-the-king, with-reference-to-the-tigress, it (impersonal) -was-killed. In the article PRAKRIT it is shown that the same construction is obtained in that language.

In E.H. the construction is the same, but is obscured by the fact that (as in the future) pronominal suffixes are added to the participle to indicate the person of the subject or of the agent, as in *calat-eũ*, (if) I had gone; *cal-eũ*, I went; *mār-eũ* (transitive), I struck, lit., struck-by-me; *mār-es*, struck-by-him, he struck. If the participle has to be feminine, it (although a weak form) takes the feminine termination *i*, as in *māri-ũ*, I struck her; *calati-ũ*, (if) I (fem.) had gone; *cali-ũ*, I (fem.) went.

Further tenses are formed by adding the verb substantive to these participles, as in H. *maĩ caltā-hū*, I am going; *maĩ caltā-thā*, I was going; *maĩ calā-hū*, I have gone; *maĩ calā-thā*, I had gone. These and other auxiliary verbs need not detain us long. They differ in the various languages. For "I am" we have P. *hā̃*, H. *hū*, Br. *haũ*, E.H. *bāṭyeũ* or *aheũ*. For "I was" we have P. *sī* or *sā*, H. *thā*, Br. *hau* or *hutau*, E.H. *raheũ*. The H. *hũ* is thus conjugated:—

	Sing.	Plur.
1.	*hū̃*	*haĩ*
2.	*hai*	*hō*
3.	*hai*	*haī*

The derivation of *hā̃*, *hū̃*, *haũ*, and *aheũ* is uncertain. They are usually derived from the Skr. *asmi*, I am; but this presents many difficulties. An old form of the third person singular is *hwai*, and this points to the Pr. *havaï*, he is, equivalent to the Skr. *bhavati*, he becomes. On the other hand this does not account for the initial *a* of *aheũ*. This last word is in the *form* of a past tense, and it may be a secondary formation from *asmi*. The P. *sī* is not a feminine of *sā*, as usually stated, but is a survival of the Skr. *āsīt*, Pr. *āsī*, was. As in the Prakrit form, *sī* is employed for both genders, both numbers and all persons. *Sā* is a secondary formation from this, on the analogy of the H. *thā*, which is from the Skr. *sthitas*, Pr. *thiō*, stood, and is a participial form like *cal*ā; thus, *woh thā*, he was; *woh thī*, she was. The Br. *hau* is a modern past of *haū*, while *hutau* is probably by origin a present participle of the Skr. *bhũ*, become, Pr. *huntaō*. The E.H. *bāṭeũ*, is the Skr. *vartē*, Ap. *vaṭṭaũ*. *Raheũ* is the past tense of the root *rah*, remain.

The future participle passive is everywhere freely used as an infinitive or verbal noun; thus, H. *calnā*, E.H. *calab*, the act of going, to go. There is a whole series of derivative verbal forms, making potential passives and transitives from intransitives, and causals (and even double causals) from transitives. Thus *dīkhnā*, to be seen; potential passive, *dikhānā*, to be visible; transitive, *dēkhnā*, to see; causal, *dikhlānā*, to show.

D. *Literature*.—The literatures of Western and Eastern Hindi form the subject of a separate article (see HINDOSTANI LITERATURE). Panjabi has no formal literature. Even the *Granth*, the sacred book of the Sikhs, is mainly in archaic Western Hindi, only a small portion being in Panjabi. On the other hand, the language is peculiarly rich in folksongs and ballads, some of considerable length and great poetic beauty. The most famous is the ballad of *Hīr* and *Rānjhā* by Wāris Shāh, which is considered to be a model of pure Panjabi. Colonel Sir Richard Temple has published an important collection of these songs under the title of *The Legends of the Punjab* (3 vols., Bombay and London, 1884-1900), in which both texts and translations of nearly all the favourite ones are to be found.

AUTHORITIES.—(*a*) General: The two standard authorities are the comparative grammars of J. Beames (1872-1879) and A. F. R. Hoernle (1880), mentioned in the article INDO-ARYAN LANGUAGES. To these may be added G. A. Grierson, "On the Radical and Participial Tenses of the Modern Indo-Aryan Languages" in the *Journal of the Asiatic Society of Bengal*, vol. lxiv. (1895), part i. pp. 352 et seq.; and "On Certain Suffixes in the Modern Indo-Aryan Vernaculars" in the *Zeitschrift für vergleichende Sprachforschung auf dem Gebiete der indogermanischen Sprachen* for 1903, pp. 473 et seq.

(*b*) For the separate languages, see C. J. Lyall, *A Sketch of the Hindustani Language* (Edinburgh, 1880); S. H. Kellogg, *A Grammar of the Hindi Language* (for both Western and Eastern Hindi), (2nd ed., London, 1893); J. T. Platts, *A Grammar of the Hindūstānī or Urdū Language* (London, 1874); and *A Dictionary of Urdū, Classical Hindi and English* (London, 1884); E. P. Newton, *Panjābī Grammar: with Exercises and Vocabulary* (Ludhiana, 1898); and Bhai Maya Singh, *The Panjabi Dictionary* (Lahore, 1895). *The Linguistic Survey of India*, vol. vi., describes Eastern Hindi, and vol. ix., Hindostani and Panjabi, in each instance in great detail.

(G. A. GR.)

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1 "Hindōstān" is a Persian word, and in modern Persian is pronounced "Hindūstān." It means the country of the Hindūs. In medieval Persian the word was "Hindōstān," with an *ō*, but in the modern language the distinctions between *ē* and *ī* and between *ō* and *ū* have been lost. Indian languages have borrowed Persian words in their medieval form. Thus in India we have *shēr*, a tiger, as compared with modern Persian *shīr*; *gō*, but modern Pers. *gū*; *bōstān*, but modern Pers. *būstān*. The word "Hindu" is in medieval Persian "Hindō" representing the ancient Avesta *hendava* (Sanskrit, *saindhava*), a dweller on the *Sindhu* or Indus. Owing to the influence of scholars in modern Persian the word "Hindū" is now established in English and, through English, in the Indian literary languages; but "Hindō" is also often heard in India. "Hindostan" with *o* is much more common both in English and in Indian languages, although "Hindustan" is also employed. Up to the days of Persian supremacy inaugurated in Calcutta by Gilchrist and his friends, every traveller in India spoke of "Indostan" or some such word, thus bearing testimony to the current pronunciation. Gilchrist introduced "Hindoostan," which became "Hindustan" in modern spelling. The word is not an Indian one, and both pronunciations, with *ō* and with *ū*, are current in India at the present day, but that with *ō* is unquestionably the one demanded by the history of the word and of the form which other Persian words take on Indian soil. On the other hand "Hindu" is too firmly established in English for

us to suggest the spelling “Hindo.”. The word “Hindī” has another derivation, being formed from the Persian *Hind*, India (Avesta *hindu*, Sanskrit *sindhu*, the Indus). “Hindi” means “of or belonging to India,” while “Hindu” now means “a person of the Hindu religion.” (Cf. Sir C. J. Lyall, *A Sketch of the Hindustani Language*, p. 1).

2 Sir C. J. Lyall, *op. cit.* p. 9.

3 This and the preceding paragraph are partly taken from Mr Platts’s article in vol. xi. of the 9th edition of this encyclopaedia.

4 In some dialects of W.H. weak forms have masculines ending in u and corresponding feminines in *i*, but these are nowadays rarely met in the literary forms of speech. In old poetry they are common. In Braj Bhasha they have survived in the present participle.

HINDŌSTĀNĪ LITERATURE. The writings dealt with in this article are those composed in the vernacular of that part of India which is properly called Hindōstān,—that is, the valleys of the Jumna and Ganges rivers as far east as the river Kōs, and the tract to the south including Rajpūtānā, Central India (Bundēlkhaṇḍ and Baghēlkhaṇḍ), the Narmadā (Nerbudda) valley as far west as Khandwā, and the northern half of the Central Provinces. It does not include the Punjab proper (though the town population there speak Hindōstānī), nor does it extend to Lower Bengal.

In this region several different dialects prevail. The people of the towns everywhere use chiefly the form of the language called *Urdū* or *Rēkhta*,[1] stocked with Persian words and phrases, and ordinarily written in a modification of the Persian character. The country folk (who form the immense majority) speak different varieties of *Hindī*, of which the word-stock derives from the Prākrits and literary Sanskrit, and which are written in the Dēvanāgari or Kaithī character. Of these the most important from a literary point of view, proceeding from west to east, are *Mārwāṛī* and *Jaipurī* (the languages of Rajpūtānā), *Brajbhāshā* (the language of the country about Mathurā and Agra), *Kanaujī* (the language of the lower Ganges-Jumna Doāb and western Rohilkhaṇḍ), *Eastern Hindī*, also called *Awadhī* and *Baiswārī* (the language of Eastern Rohilkhaṇḍ, Oudh and the Benares division of the United Provinces) and *Bihārī* (the language of Bihār or Mithilā, comprising several distinct dialects). What is called *High Hindī* is a modern development, for literary purposes, of the dialect of Western Hindi spoken in the neighbourhood of Delhi and thence northwards to the Himālaya, which has formed the vernacular basis of Urdū; the Persian words in the latter have been eliminated and replaced by words of Sanskritic origin, and the order of words in the sentence which is proper to the indigenous speech is more strictly adhered to than in Urdū, which under the influence of Persian constructions has admitted many inversions. 484

As in many other countries, nearly all the early vernacular literature of Hindōstān is in verse, and works in prose are a modern growth.[2] Both Hindī and Urdū are, in their application to literary purposes, at first intruders upon the ground already occupied by the learned languages Sanskrit and Persian, the former representing Hindū and the latter Musalmān culture. But there is this difference between them, that, whereas Hindī has been raised to the dignity of a literary speech chiefly by impulses of revolt against the monopoly of the Brahmans, Urdū has been cultivated with goodwill by authors who have themselves highly valued and dexterously used the polished Persian. Both Sanskrit and Persian continue to be employed occasionally for composition by Indian writers, though much fallen from their former estate; but for popular purposes it may be said that their vernacular rivals are now almost in sole possession of the field.

The subject may be conveniently divided as follows:—

1. Early Hindī, of the period during which the language was being fashioned as a literary medium out of the ancient Prākrits, represented by the old heroic poems of Rajpūtānā and the literature of the early *Bhagats* or Vaishnava reformers, and extending from about A.D. 1100 to 1550;

2. Middle Hindī, representing the best age of Hindī poetry, and reaching from about 1550 to the end of the 18th century;

3. The rise and development of literary Urdū, beginning about the end of the 16th century, and reaching its height during the 18th;

4. The modern period, marked by the growth of a prose literature in both dialects, and dating from the beginning of the 19th century.

1. *Early Hindī.*—Our knowledge of the ancient metrical chronicles of Rajpūtānā is still very imperfect, and is chiefly derived from the monumental work of Colonel James Tod, called *The Annals and Antiquities of Rājāsthān* (published in 1829-1832), which is founded on them. It is in the nature of compositions of this character to be subjected to perpetual revision and recasting; they are the production of the family bards of the dynasties whose fortunes they record, and from generation to generation they are added to, and their language constantly modified to make it intelligible to the people of the time. Round an original nucleus of historical fact a rich growth of legend accumulates;

later redactors endeavour to systematize and to assign dates, but the result is not often such as to inspire confidence; and the mass has more the character of ballad literature than of serious history. The materials used by Tod are nearly all still unprinted; his manuscripts are now deposited in the library of the Royal Asiatic Society in London; and one of the tasks which, on linguistic and historical grounds, should first be undertaken by the investigator of early Hindī literature is the examination and sifting, and the publication in their original form, of these important texts.

Omitting a few fragments of more ancient bards given by compilers of accounts of Hindī literature, the earliest author of whom any portion has as yet been published in the original text is Chand Bardāī, the court bard of Prithwī-Rāj, the last Hindū sovereign of Delhi. His poem, entitled *Prithī-Rāj Rāsau* (or *Rāysā*), is a vast chronicle in 69 books or cantos, comprising a general history of the period when he wrote. Of this a small portion has been printed, partly under the editorship of the late Mr John Beames and partly under that of Dr Rudolf Hoernle, by the Asiatic Society of Bengal; but the excessively difficult nature of the task prevented both scholars from making much progress.[3] Chand, who came of a family of bards, was a native of Lahore, which had for nearly 170 years (since 1023) been under Muslim rule when he flourished, and the language of the poem exhibits a considerable leaven of Persian words. In its present form the work is a redaction made by Amar Singh of Mēwār, about the beginning of the 17th century, and therefore more than 400 years after Chand's death, with his patron Prithwī-Rāj, in 1193. There is, therefore, considerable reason to doubt whether we have in it much of Chand's composition in its original shape; and the nature of the incidents described enhances this doubt. The detailed dates contained in the Chronicle have been shown by Kabirāj Syāmal Dās[4] to be in every case about ninety years astray. It tells of repeated conflicts between the hero Prithwī-Rāj and Sultān Shihābuddin, of Ghōr (Muhammad Ghori), in which the latter always, except in the last great battle, comes off the worst, is taken prisoner and is released on payment of a ransom; these seem to be entirely unhistorical, our contemporary Persian authorities knowing of only one encounter (that of Tiraurī (Tirawari) near Thēnēsar, fought in 1191) in which the Sultān was defeated, and even then he escaped uncaptured to Lahore. The Mongols (Book XV.) are brought on the stage more than thirty years before they actually set foot in India, and are related to have been vanquished by the redoubtable Prithwī-Rāj. It is evident that such a record cannot possibly be, in its entirety, a contemporary chronicle; but nevertheless it appears to contain a considerable element which, from its language, may belong to Chand's own age, and represents the earliest surviving document in Hindī. "Though we may not possess the actual text of Chand, we have certainly in his writings some of the oldest known specimens of Gaudian literature, abounding in pure Apabhramśa Śaurasēnī Prākrit forms" (Grierson).

> It is very difficult now to form a just estimate of the poem as literature. The language, essentially transitional in character, consists largely of words which have long since died out of the vernacular speech. Even the most learned Hindus of the present day are unable to interpret it with confidence; and the meaning of the verses must be sought by investigating the processes by which Sanskrit and Prākrit forms have been transfigured in their progress into Hindī. Chand appears, on the whole, to exhibit the merits and defects of ballad chroniclers in general. There is much that is lively and spirited in his descriptions of fight or council; and the characters of the Rājpūt warriors who surround his hero are often sketched in their utterances with skill and animation. The sound, however, frequently predominates over the sense; the narrative is carried on with the wearisome iteration and tedious unfolding of familiar themes and images which characterize all such poetry in India; and his value, for us at least, is linguistic rather than literary.

Chand may be taken as the representative of a long line of successors, continued even to the present day in the Rājpūt states. Many of their compositions are still widely popular as ballad literature, but are known only in oral versions sung in Hindōstān by professional singers. One of the most famous of these is the *Alhā-khaṇḍ*, reputed to be the work of a contemporary of Chand called Jagnik or Jagnāyak, of Mahōbā in Bundēlkhaṇḍ, who sang the praises of Rājā-Parmāl, a ruler whose wars with Prithwī-Rāj are recorded in the Mahōbā-Khaṇḍ of Chand's work. Ālhā and Ūdal, the heroes of the poem, are famous warriors in popular legend, and the stories connected with them exist in an eastern recension, current in Bihār, as well as in the Bundēlkhaṇḍī or western form which is best known. Two versions of the latter have been printed, having been taken down as recited by illiterate professional rhapsodists. Another celebrated bard was Sārangdhar of Rantambhōr, who flourished in 1363, and sang the praises of Hammīr Dēo (Hamir Deo), the Chauhān chief of Rantambhōr who fell in a heroic struggle against Sultān 'Alā'uddīn Khiljī in 1300. He wrote the *Hammīr Kāvya* and *Hammīr Rāsau*, of which an account is given by Tod;[5] he was also a poet in Sanskrit, in which language he compiled, in 1363, the anthology called *Sārngadhara-Paddhati*. Another work which may be mentioned (though much more modern) is the long chronicle entitled *Chhattra-Prakās*, or the history of Rājā Chhatarsāl, the Bundēlā rājā of Pannā, who was killed, fighting on behalf of Prince Dārā-Shukōh, in the battle of Dhōlpur won by Aurangzēb in 1658. The author, Lāl Kabi, has given in this work a history of the valiant Bundēlā nation which was rendered into English by Captain W. R. Pogson in 1828, and printed at Calcutta.

Before passing on to the more important branch of early Hindī literature, the works of the *Bhagats*, mention may be made here of a remarkable composition, a poem entitled the *Padmāwat*, the materials of which are derived from the heroic legends of Rajpūtānā, but which is not the work of a bard nor even of a Hindu. The author, Malik Muḥammad of Jā'is, in Oudh, was a venerated Muslim devotee, to whom the Hindu rājā of Amēṭhī was greatly attached. Malik Muḥammad wrote

the Padmāwat in 1540, the year in which Shēr Shāh Sūr ousted Humāyān from the throne of Delhi. The poem is composed in the purest vernacular Awadhī, with no admixture of traditional Hindu learning, and is generally to be found written in the Persian character, though the metres and language are thoroughly Indian. It professes to tell the tale of Padmāwatī or Padminī, a princess celebrated for her beauty who was the wife of the Chauhān rājā of Chītōr in Mēwār. The historical Padminī's husband was named Bhīm Singh, but Malik Muḥammad calls him Ratan Sēn; and the story turns upon the attempts of 'Alā'uddīn Khiljī, the sovereign of Delhi, to gain possession of her person. The tale of the siege of Chītōr in 1303 by 'Alā'uddīn, the heroic stand made by its defenders, who perished to the last man in fight with the Sultan's army, and the self-immolation of Padminī and the other women, the wives and daughters of the warriors, by the fiery death called *jōhar*, will be found related in Tod's *Rājāsthān*, i. 262 sqq. Malik Muḥammad takes great liberties with the history, and explains at the end of the poem that all is an allegory, and that the personages represent the human soul, Divine wisdom, Satan, delusion and other mystical characters.

> Both on account of its interest as a true vernacular work, and as the composition of a Musalmān who has taken the incidents of his morality from the legends of his country and not from an exotic source, the poem is memorable. It has often been lithographed, and is very popular; a translation has even been made into Sanskrit. A critical edition has been prepared by Dr G. A. Grierson and Paṇḍit Sudhākar Dwivēdi.

The other class of composition which is characteristic of the period of early Hindī, the literature of the *Bhagats*, or Vaishnava saints, who propagated the doctrine of *bhakti*, or faith in Vishnu, as the popular religion of Hindōstān, has exercised a much more powerful influence both upon the national speech and upon the themes chosen for poetic treatment. It is also, as a body of literature, of high intrinsic interest for its form and content. Nearly the whole of subsequent poetical composition in Hindī is impressed with one or other type of Vaishnava doctrine, which, like Buddhism many centuries before, was essentially a reaction against Brahmanical influence and the chains of caste, a claim for the rights of humanity in face of the monopoly which the "twice-born" asserted of learning, of worship, of righteousness. A large proportion of the writers were non-Brahmans, and many of them of the lowest castes. As Śiva was the popular deity of the Brahmans, so was Vishnu of the people; and while the literature of the Śaivas and Śāktas[6] is almost entirely in Sanskrit, and exercised little or no influence on the popular mind in northern India, that of the Vaishnavas is largely in Hindī, and in itself constitutes the great bulk of what has been written in that language.

The Vaishnava doctrine is commonly carried back to Rāmānuja, a Brahman who was born about the end of the 11th century, at Perambur in the neighbourhood of the modern Madras, and spent his life in southern India. His works, which are in Sanskrit and consist of commentaries on the Vēdānta Sūtras, are devoted to establishing "the personal existence of a Supreme Deity, possessing every gracious attribute, full of love and pity for the sinful beings who adore him, and granting the released soul a home of eternal bliss near him—a home where each soul never loses its identity, and whose state is one of perfect peace."[7] In the Deity's infinite love and pity he has on several occasions become incarnate for the salvation of mankind, and of these incarnations two, Rāmachandra, the prince of Ayōdhyā, and Kṛishṇa, the chief of the Yādava clan and son of Vasudēva, are pre-eminently those in which it is most fitting that he should be worshipped. Both of these incarnations had for many centuries[8] attracted popular veneration, and their histories had been celebrated by poets in epics and by weavers of religious myths in *Purānas* or "old stories"; but it was apparently Rāmānuja's teaching which secured for them, and especially for Rāmachandra, their exclusive place as the objects of *bhakti*—ardent faith and personal devotion addressed to the Supreme. The adherents of Rāmānuja were, however, all Brahmans, and observed very strict rules in respect of food, bathing and dress; the new doctrine had not yet penetrated to the people.

Whether Rāmānuja himself gave the preference to Rāma against Krishna as the form of Vishnu most worthy of worship is uncertain. He dealt mainly with philosophic conceptions of the Divine Nature, and probably busied himself little with mythological legend. His *mantra*, or formula of initiation, if Wilson[9] was correctly informed, implies devotion to Rāma; but Vāsudēva (Krishna) is also mentioned as a principal object of adoration, and Rāmānuja himself dwelt for several years in Mysore, at a temple erected by the rājā, at Yādavagiri in honour of Krishna in his form Raṇchhōṛ.[10] It is stated that in his worship of Krishna he joined with that god as his *Śaktī*, or Energy, his wife Rukminī; while the later varieties of Krishna-worship prefer to honour his mistress Rādhā. The great difference, in temper and influence upon life, between these two forms of Vaishnava faith appears to be a development subsequent to Rāmānuja; but by the time of Jaidēo (about 1250) it is clear that the theme of Krishna and Rādhā, and the use of passionate language drawn from the relations of the sexes to express the longings of the soul for God, had become fully established; and from that time onwards the two types of Vaishnava religious emotion diverged more and more from one another.

The cult of Rāma is founded on family life, and the relation of the worshipper to the Deity is that of a child to a father. The morality it inculcates springs from the sacred sources of human piety which in all religions have wrought most in favour of pureness of life, of fraternal helpfulness and of humble devotion to a loving and tender Parent, who desires the good of mankind, His children, and hates violence and wrong. That of Krishna, on the other hand, had for its basis the legendary career of a less estimable human hero, whose exploits are marked by a kind of elvish and fantastic wantonness; it has more and more spent its energy in developing that side of devotion which is

perilously near to sensual thought, and has allowed the imagination and ingenuity of poets to dwell on things unmeet for verse or even for speech. It is claimed for those who first opened this way to faith that their hearts were pure and their thoughts innocent, and that the language of erotic passion which they use as the vehicle of their religious emotion is merely mystical and allegorical. This is probable; but that these beginnings were followed by corruption in the multitude, and that the fervent impulses of adoration made way in later times for those of lust and lasciviousness, seems beyond dispute.

The worship of Krishna, especially in his infant and youthful form (which appeals chiefly to women), is widely popular in the neighbourhood of Mathurā, the capital of that land of Braj where as a boy he lived. Its literature is mainly composed in the dialect of this region, called Brajbhāshā. That of Rāma, though general throughout Hindōstān, has since the time of Tulsī Dās adopted for poetic use the language of Oudh, called Awadhī or Baiswārī, a form of Eastern Hindī easily understood throughout the whole of the Gangetic valley. Thus these two dialects came to be, what they are to this day, the standard vehicles of poetic expression.

Subsequently to Rāmānuja his doctrine appears to have been set forth, about 1250, in the vernacular of the people by Jaidēo, a Brahman born at Kinduvilva, the modern Kenduli, in the Bīrbhūm district of Bengal, author of the Sanskrit *Gītā Gōvinda*, and by Nāmdēo or Nāmā, a tailor[11] of Mahārāshtra, of both of whom verses in the popular speech are preserved in the *Ādi Granth* of the Sikhs. But it was not until the beginning of the 15th century that the Brahman Rāmānand, a prominent *Gōsāīn* of the sect of Rāmānuja, having had a dispute with the members of his order in regard to the stringent rules observed by them, left the community, migrated to northern India (where he is said to have made his headquarters Galtā in Rajpūtānā), and addressed himself to those outside the Brahman caste, thus initiating the teaching of Vaishnavism as the popular faith of Hindōstān. Among his twelve disciples or apostles were a Rājpūt, a Jāt, a leather-worker, a barber and a Musalmān weaver; the last-mentioned was the celebrated Kabīr (see separate article). One short Hindī poem by Rāmānand is contained in the *Ādi Granth*, and Dr Grierson has collected hymns (*bhajans*) attributed to him and still current in Mithilā or Tirhūt. Both Rāmānand and Kabīr were adherents of the form of Vaishnavism where devotion is specially addressed to Rāama, who is regarded not only as an incarnation, but as himself identical with the Deity. A contemporary of Rāmānand, Bidyāpati Ṭhākur, is celebrated as the author of numerous lyrics in the Maithilī dialect of Bihār, expressive of the other side of Vaishnavism, the passionate adoration of the Deity in the person of Krishna, the aspirations of the worshipper being mystically conveyed in the character of Rādhā, the cowherdess of Braj and the beloved of the son of Vasudēva. These stanzas of Bidyāpati (who was a Brahman and author of several works in Sanskrit) afterwards inspired the Vaishnava literature of Bengal, whose most celebrated exponent was Chaitanya (b. 1484). Another famous adherent of the same cult was Mīrā Bāī, "the one great poetess of northern India" (Grierson). This lady, daughter of Rājā Ratiyā Rānā, Rāṭhōr, of Mērtā in Rajpūtānā, must have been born about the beginning of the 15th century; she was married in 1413 to Rājā Kumbhkaran of Mēwār, who was killed by his son Uday Rānā in 1469. She was devoted to Krishna in the form of Raṇchhōṛ, and her songs have a wide currency in northern India.

An important compilation of the utterances of the early Vaishnava saints or *Bhagats* is contained in the sacred book, or *Ādi Granth*, of the Sikh *Gurus*. Nānak, the founder of this sect (1469-1538), though a native of the Punjab (born at Talvandī on the Rāvī near Lahore), took his doctrine from the *Bhagats* (see Kabīr); and each of the thirty-one *rāgs*, forming the body of the *Granth*, is followed by a compilation of texts from the utterances of Vaishnava saints, chiefly of Kabīr, in confirmation of the teaching of the *Gurus*, while the whole book is closed by a *bhōg* or conclusion, containing more verses by the same authors, as well as by a celebrated Indian Sūfī, Shēkh Farīd of Pākpaṭṭan. The body of the *Granth* (*q.v.*), being in old Panjābī, falls outside the scope of this article; but the extracts included in it from the early writers of old Hindī are a precious store of specimens of authors some of whom have left no other record in the surviving literature. The *Ādi Granth*, which was put together about 1600 by Arjun, the fifth *Guru* of the Sikhs, sets forth the creed of the sect in its original pietistic form, before it assumed the militant character which afterwards distinguished it under the five *Gurus* who succeeded him.

2. *Middle Hindī.*—The second period, that of middle Hindī, begins with the reign of the Emperor Akbar (1556-1605); and it is not improbable that the broad and liberal views of this great monarch, his active sympathy with his Hindū subjects, the interest which he took in their religion and literature, and the peace which his organization of the empire secured for Hindostan, had an important effect on the great development of Hindī poetry which now set in.[12] Akbar's court was itself a centre of poetical composition. The court musician Tān Sēn (who was also a poet) is still renowned, and many verses composed by him in the Emperor's name live to this day in the memory of the people. Akbar's favourite minister and companion, Rājā Bīrbal (who fell in battle on the north-western frontier in 1583), was a musician and a poet as well as a politician, and held the title, conferred by the Emperor, of *Kabi-Rāy*, or poet laureate; his verses and witty sayings are still extremely popular in northern India, though no complete work by him is known to exist. Other nobles of the court were also poets, among them the *Khān-khānān* 'Abdur-Raḥīm, son of Bairam Khān, whose Hindī *dōhās* and *kabittas* are still held in high estimation, and Faiẓī, brother of the celebrated Abul-Faẓl, the Emperor's annalist.

By this time the worship of Krishna as the lover of Rādhā (*Rādhā-ballabh*) had been systematized,

and a local habitation found for it at Gokul, opposite Mathurā on the Jumna, some 30 m. upstream from Agra, Akbar's capital, by Vallabhāchārya, a Tailinga Brāhman from Madras. Born in 1478, in 1497 he chose the land of Braj as his headquarters, thence making missionary tours throughout India. He wrote chiefly, if not entirely, in Sanskrit; but among his immediate followers, and those of his son Biṭṭhalnāth (who succeeded his father on the latter's death in 1530), were some of the most eminent poets in Hindī. Four disciples of Vallabhāchārya and four of Biṭṭhalnāth, who flourished between 1550 and 1570, are known as the *Ashṭ Chhāp*, or "Eight Seals," and are the acknowledged masters of the literature of Braj-bhāshā, in which dialect they all wrote. Their names are Krishna-Dās Pay-ahārī, Sūr Dās (the Bhāṭ), Parmānand Dās, Kumbhan Dās, Chaturbhuj Dās, Chhīt Swāmī, Nand Dās and Gōbind Dās. Of these much the most celebrated, and the only one whose verses are still popular, is Sūr Dās. The son of Bābā Rām Dās, who was a singer at Akbar's court, Sūr Dās was descended, according to his own statement, from the bard of Prithwī-Rāj, Chand Bardāī. A tradition gives the date of his birth as 1483, and that of his death as 1573; but both seem to be placed too early, and in Abul-Faẓl's *Aīn-i Akbarī* he is mentioned as living when that work was completed (1596/7). He was blind, and entirely devoted to the worship of Krishna, to whose address he composed a great number of hymns (*bhajans*), which have been collected in a compilation entitled the *Sūr Sāgar*, said to contain 60,000 verses; this work is very highly esteemed as the high-water mark of Braj devotional poetry, and has been repeatedly printed in India. Other compositions by him were a translation in verse of the *Bhāgavata Purāna*, and a poem dealing with the famous story of Nala and Damayanti; of the latter no copies are now known to exist.

The great glory of this age is Tulsī Dās (*q.v.*). He and Sūr Dās between them are held to have exhausted the possibilities of the poetic art. It is somewhat remarkable that the time of their appearance coincided with the Elizabethan age of English literature.

To these great masters succeeded a period of artifice and reflection, when many works were composed dealing with the rules of poetry and the analysis and the appropriate language of sentiment. Of their writers the most famous is Kēsab Dās, a Brahman of Bundēlkhaṇḍ, who flourished during the latter part of Akbar's reign and the beginning of that of Jahāngīr. His works are the *Rasik-priyā*, on composition (1591), the *Kavi-priyā*, on the laws of poetry (1601), a highly esteemed poem dedicated to Parbīn Rāi Pāturī, a celebrated courtesan of Orchha in Bundēlkhaṇḍ, the *Rāmachandrikā*, dealing with the history of Rāma, (1610), and the *Vigyān-gītā* (1610). The fruit of this elaboration of the poetic art reached its highest perfection in Bihārī Lāl, whose *Sat-saī*, or "seven centuries" (1662), is the most remarkable example in Hindī of the rhetorical style in poetry (see separate article).

Side by side with this cultivation of the literary use of the themes of Rāma and Krishna, there grew up a class of compositions dealing, in a devotional spirit, with the lives and doings of the holy men from whose utterances and example the development of the popular religion proceeded. The most famous of these is the *Bhakta-mālā*, or "Roll of the *Bhagats*," by Nārāyan Dās, otherwise called Nābhā Dās, or Nābhājī. This author, who belonged to the despised caste of Dōms and was a native of the Deccan, had in his youth seen Tulsī Dās at Mathurā, and himself flourished in the first half of the 17th century. His work consists of 108 stanzas in *chhappāī* metre, each setting forth the characteristics of some holy personage, and expressed in a style which is extremely brief and obscure. Its exact date is unknown, but it falls between 1585 and 1623. The book was furnished with a *īkā* (supplement or gloss) in the *kabitta* metre, by Priyā Dās in 1713, gathering up, in an allusive and disjointed fashion, all the legendary stories related of each saint. This again was expanded about a century later by a modern author named Lachhman into a detailed work of biography, called the *Bhakta-sindhu*. From these nearly all our knowledge (such as it is) of the lives of the Vaishnava authors, both of the Rāma and the Krishna cults, is derived, and much of it is of a very legendary and untrustworthy character. Another work, somewhat earlier in date than the *Bhakta-mālā*, named the *Chaurāsī Vārta*, is devoted exclusively to stories of the followers of Vallabhāchārya. It is reputed to have been written by Gōkulnāth, son of Biṭṭhalnāth, son of Vallabhāchārya, and is dated in 1551.

> The matter of these tales is justly characterized by Professor Wilson[13] (who gives some translated specimens) as "marvellous and insipid anecdotes"; but the book is remarkable for being in very artless prose, and, though written more than 300 years ago, shows that the current language of Braj was then almost precisely identical with that now spoken in that region. A specimen of the text will be found at p. 296 of Mr F. S. Growse's *Mathura, a District Memoir* (3rd ed., 1883).

It would be tedious to enumerate the many authors who succeeded the great period of Hind poetical composition which extended through the reigns of Akbar, Jahāngīr and Shāhjahān. None of them attained to the fame of Sūr Dās, Tuls Dās or Bihārī Lāl. Their themes exhibit no novelty, and they repeat with a wearisome monotony the sentiments of their predecessors. The list of Hindī authors drawn up by Dr G. A. Grierson, and printed in the *Journal of the Asiatic Society of Bengal* in 1889, may be consulted for the names and works of these *epigoni*. The courts of Chhatarsāl, rājā of Pannā in Bundēlkhaṇḍ, who was killed in battle with Aurangzēb in 1658, and of several rājās of Bāndhō (now called Rīwān or Rewah) in Baghēlkhaṇḍ, were famous for their patronage of poets; and the Mogul court itself kept up the office of *Kabi-Rāy* or poet laureate even during the fanatical reign of Aurangzēb.

Such, in the briefest outline, is the character of Hind literature during the period when it grew and flourished through its own original forces. Founded by a popular and religious impulse in many

respects comparable to that which, nearly 1600 years before, had produced the doctrine and literature, in the vernacular tongue, of Jainism and Buddhism, and cultivated largely (though by no means exclusively) by authors not belonging to the Brahmanical order, it was the legitimate descendant in spirit, as Hindī is the legitimate descendant in speech, of the Prākrit literature which preceded it. Entirely in verse, it adopted and elaborated the Prākrit metrical forms, and carried them to a pitch of perfection too often overlooked by those who concern themselves rather with the substance than the form of the works they read. It covers a wide range of style, and expresses, in the works of its greatest masters, a rich variety of human feeling. Little studied by Europeans in the past, it deserves much more attention than it has received. The few who have explored it speak of it as an "enchanted garden" (Grierson), abounding in beauties of thought and phrase. Above all it is to be remembered that it is genuinely popular, and has reached strata of society scarcely touched by literature in Europe. The ballads of Rajput prowess, the aphorisms of Kabīr, Tulsī Dās's *Rāmāyan*, and the *bhajans* of Sūr Dās are to this day carried about everywhere by wandering minstrels, and have found their way, throughout the great plains of northern India and the uplands of the Vindhyā plateau, to the hearts of the people. There is no surer key to unlock the confidence of the villager than an apt quotation from one of these inspired singers.

3. *Literary Urdū.*—The *origines* of Urdū as a literary language are somewhat obscure. The popular account refers its rise to the time of Tīmūr's invasion (1398). Some authors even claim for it a higher antiquity, asserting that a *dīwān*, or collection of poems, was composed in *Rēkhta* by Mas'ūd, son of Sa'd, in the last half of the 11th or beginning of the 12th century, and that Sa'di of Shīrāz and his friend Amīr Khusrau[14] of Delhi likewise made verses in that dialect before the end of the 13th century. This, however, is very improbable. It has already been seen that during the early centuries of Muslim rule in India adherents of that faith used the language and metrical forms of the country for their compositions. Persian words early made their way into the popular speech; they are common in Chand, and in Kabīr's verses (which are nevertheless unquestionable Hindī) they are in many places used as freely as in the modern dialect. Much of the confusion which besets the subject is due to the want of a clear understanding of what Urdū, as opposed to Hindī, really is.

Urdū, as a literary language, differs from Hindī rather in its form than in its substance. The grammar, and to a large extent the vocabulary, of both are the same. The really vital point of difference, that in which Hindī and Urdū are incommensurable, is the *prosody*. Hardly one of the metres taken over by Urdū poets from Persian agrees with those used in Hindī. In the latter language it is the rule to give the short *a* inherent in every consonant or *nexus* of consonants its full value in scansion (though in prose it is no longer heard), except occasionally at the metrical pause; in Urdū this is never done, the words being scanned generally as pronounced in prose, with a few exceptions which need not be mentioned here. The great majority of Hindī metres are scanned by the number of *mātrās* or syllabic instants—the value in time of a short syllable—of which the lines consist; in Urdū, as in Persian, the metre follows a special order of long and short syllables.

The question, then, is not When did Persian first become intermixed with Hindī in the literary speech?—for this process began with the first entry of Muslim conquerors into India, and continued for centuries before a line of Urdū verse was composed; nor When was the Persian character first employed to write Hindī?—for the written form is but a subordinate matter; as already mentioned, the MSS. of Malik Muḥammad's purely Hindī poem, the *Padmāwat*, are ordinarily found to be written in the Persian character; and copies lithographed in Dēvanāgarī of the popular compositions of the Urdū poet Naẕīr are commonly procurable in the bāzārs. We must ask When was the first verse composed in Hindī, whether with or without foreign admixture, according to the forms of Persian prosody, and not in those of the indigenous metrical system? Then, and not till then, did Urdū poetry come into being. This appears to have happened, as already mentioned, about the end of the 16th century. Meantime the vernacular speech had been gradually permeated with Persian words and phrases. The impulse which Akbar's interest in his Hindū subjects had given to the translation of Sanskrit works into Persian had brought the indigenous and the foreign literatures into contact. The current language of the neighbourhood of the capital, the Hindī spoken about Delhi and thence northwards to the Himālaya, was naturally the form of the vernacular which was most subject to foreign influences; and with the extension of Mogul territory by the conquests in the south of Akbar and his successors, this idiom was carried abroad by their armies, and was adopted by the Musalmān kingdoms of the Deccan as their court language some time before their overthrow by the campaigns of Aurangzēb.

It is not a little remarkable that, as happened with the Vaishnava reformation initiated by Rāmānuja and Rāmānand, and with the Vallabhāchārya cult of Krishna established at Mathurā, the first impulse to literary composition in Urdū should have been given, not at the headquarters of the empire in the north, but at the Muhammadan courts of Gōlkondā and Bījāpur in the south, the former situated amid an indigenous population speaking Telugu, and the latter among one whose speech was Kanarese, both Dravidian languages having nothing in common with the Aryan tongues of the north. This fact of itself defines the nature of the literature thus inaugurated. It had nothing to do with the idiom or ideas of the people among whom it was born, but was from the beginning an imitation of Persian models. It adopted the standards of form and content current among the poets of Ērān. The *qaṣīda* or laudatory ode, the *ghazal* or love-sonnet, usually of mystical import, the *marṯiya* or dirge, the *maṯnavī* or narrative poem with coupled rhymes, the *hijā* or satire, the *rubā'ī* or epigram—these were the types which Urdū took over ready-made. And with the forms were

appropriated also all the conventions of poetic diction. The Persians, having for centuries treated the same themes with a fecundity which most Europeans find extremely wearisome, had elaborated a system of rhetoric and a stock of poetic images which, in the exhaustion of original matter, made the success of the poet depend chiefly upon dexterity of artifice and cleverness of conceit. Pleasing hyperbole, ingenious comparison, antithesis, alliteration, carefully arranged gradation of noun and epithet, are the means employed to obtain variety; and few of the most eloquent passages of later Persian verse admit of translation into any other language without losing that which in the original makes their whole charm. What is true of Persian is likewise true of Urdū poetry. Until quite modern times, there is scarcely anything in it which can be called original.[15] Differences of school, which are made much of by native critics, are to us hardly perceptible; they consist in the use of one or other range of metaphor or comparison, classed, according as they repeat the well-worn poetical stock-in-trade of the Persians, or seek a slightly fresher and more Indian field of sentiment, as the old or the new style of composition.

Shujā'uddīn Nūrī, a native of Gujarāt, a friend of Faiẓī and contemporary of Akbar, is mentioned by the native biographers as the most ancient Urdū poet after Amīr Khusrau. He was tutor of the son of the *wazīr* of Sultān Abu-l-Ḥasan Kuṭb Shāh of Golkonda, and several *ghazals* by him are said to survive. Kulī Kuṭb Shāh of Golkonda, who reigned from 1581, and his successor 'Abdullāh Kuṭb Shāh, who came to the throne in 1611, have both left collections of verse, including *ghazals*, *rubā'īs*, *maṯnavīs* and *qaṣīdas*. And during the reign of the latter Ibn Nishāṭī wrote two works which are still famous as models of composition in Dakhni; they are *maṯnavīs* entitled the *Ṭūṭī-nāma*, or "Tales of a Parrot," and the *Phūl-ban*. The first, written in 1639, is an adaptation of a Persian work by Nakhshabī, but derives ultimately from a Sanskrit original entitled the *Śuka-saptati*; this collection has been frequently rehandled in Urdū, both in verse and prose, and is the original of the *Ṭōṭā-Kahāni*, one of the first works in Urdū prose, composed in 1801 by Muḥammad Ḥaidar-bakhsh Ḥaidarī of the Fort William College. The *Phūl-ban* is a love tale named from its heroine, said to be translated from a Persian work entitled the *Basātīn*. Another famous work which probably belongs to the same place and time is the *Story of Kāmrūp and Kalā* by Taḥsīnuddīn, a *maṯnavī* which has been published (1836) by M. Garcin de Tassy; what makes this poem remarkable is that, though the work of a Musalmān, its personages are Hindu. Kāmrūp, the hero, is son of the king of Oudh, and the heroine, Kalā, daughter of the king of Ceylon; the incidents somewhat resemble those of the tale of as-Sindibād in the *Thousand and One Nights*; the hero and heroine dream one of the other, and the former sets forth to find his beloved; his wanderings take him to many strange countries and through many wonderful adventures, ending in a happy marriage.

The court of Bījāpur was no less distinguished in literature. Ibrāhīm 'Ādil Shāh (1579-1626) was the author of a work in verse on music entitled the *Nau-ras* or "Nine Savours," which, however, appears to have been in Hindī rather than Urdū; the three prefaces (*dībājas*) to this poem were rendered into Persian prose by Maulā ẕuhūrī, and, under the name of the *Sih naṯr-i ẕuhūrī*, are well-known models of style. A successor of this prince, 'Alī 'Ādil Shāh, had as his court poet a Brahman known poetically as Nuṣratī, who in 1657 composed a *maṣnavī* of some repute entitled the *Gulshan-i 'Ishq*, or "Rose-garden of Love," a romance relating the history of Prince Manōhar and Madmālatī,—like the *Kāmrūp*, an Indian theme. The same poet is author of an extremely long *maṯnavī* entitled the *'Alī-nāma*, celebrating the monarch under whom he lived.

These early authors, however, were but pioneers; the first generally accepted standard of form, a standard which suffered little change in two centuries, was established by Walī of Aurangābād (about 1680-1720) and his contemporary and fellow-townsman Sirāj. The former of these is commonly called "the Father of Rēkhtah"—*Bābā-e Rēkhta*; and all accounts agree that the immense development attained by Urdū poetry in northern India during the 18th century was due to his example and initiative. Very little is known of Walī's life; he is believed to have visited Delhi towards the end of the reign of Aurangzēb, and is said to have there received instruction from Shāh Gulshan in the art of clothing in a vernacular dress the ideas of the Persian poets. His *Kullīyāt* or complete works have been published by M. Garcin de Tassy, with notes and a translation of selected passages (Paris, 1834-1836), and may be commended to readers desirous of consulting in the original a favourable specimen of Urdū poetical composition.

The first of the Delhi school of poets was Zuhūruddīn Hātim, who was born in 1699 and died in 1792. In the second year of Muhammad Shāh (1719), the *dīwān* of Walī reached Delhi, and excited the emulation of scholars there. Hātim was the first to imitate it in the Urdū of the north, and was followed by his friends Nājī, Mazmūn and Ābrū. Two *dīwāns* by him survive. He became the founder of a school, and one of his pupils was Rafī us-Saudā, the most distinguished poet of northern India. Khān Ārzū (1689-1756) was another of the fathers of Urdū poetry in the north. This author is chiefly renowned as a Persian scholar, in which language he not only composed much poetry, but one of the best of Persian lexicons, the *Sirāju-l-lughāt*; but his compositions in Urdū are also highly esteemed. He was the master of Mīr Taqī, who ranks next to Saudā as the most eminent Urdū poet. Ārzū died at Lucknow, whither he betook himself after the devastation of Delhi by Nādir Shāh (1739). Another of the early Delhi poets who is considered to have surpassed his fellows was In'āmullāh Khān Yaqīn, who died during the reign of Ahmad Shāh (1748-1754), aged only twenty-five. Another was Mīr Dard, pupil of the same Shāh Gulshan who is said to have instructed Walī; his *dīwān* is not long, but extremely popular, and especially esteemed for the skill with which it develops the themes of spiritualism. In his old age he became a *darwēsh* of the *Naqshbandī* following, and died in 1793.

Saudā and Mīr Taqī are beyond question the most distinguished Urdū poets. The former was born at Delhi about the beginning of the 18th century, and studied under Hātim. He left Delhi after its

devastation, and settled at Lucknow, where the Nawāb Āṣafuddaulah gave him a *jāgīr* of Rs. 6000 a year, and where he died in 1780. His poems are very numerous, and cover all the styles of Urdū poetry; but it is to his satires that his fame is chiefly due, and in these he is considered to have surpassed all other Indian poets. Mīr Taqī was born at Agra, but early removed to Delhi, where he studied under Ārzū; he was still living there at the time of Saudā's death, but in 1782 repaired to Lucknow, where he likewise received a pension; he died at a very advanced age in 1810. His works are very voluminous, including no less than six *dīwāns*. Mīr is counted the superior of Saudā in the *ghazal* and *maṯnavī*, while the latter excelled him in the satire and *qaṣīda*. Sayyid Aḥmad, an excellent authority, and himself one of the best of modern authors in Urdū, says of him in his *Āṯāru-ṣ-Ṣanādīd*: "Mīr's language is so pure, and the expressions which he employs so suitable and natural, that to this day all are unanimous in his praise. Although the language of Saudā is also excellent, and he is superior to Mīr in the point of his allusions, he is nevertheless inferior to him in style."

The tremendous misfortunes which befell Delhi at the hands of Nādir Shāh (1739), Ahmad Shāh Durrānī (1756), and the Marāṭhās (1759), and the rapid decay of the Mogul empire under these repeated shocks, transferred the centre of the cultivation of literature from that city to Lucknow, the capital of the newly founded and flourishing state of Oudh. It has been mentioned how Ārzū, Saudā and Mīr betook themselves to this refuge and ended their days there; they were followed in their new residence by a school of poets hardly inferior to those who had made Delhi illustrious in the first half of the century. Here they were joined by Mīr Hasan (d. 1786), Mīr Sōz (d. 1800) and Qalandar-bakhsh Jur'at (d. 1810), also like themselves refugees from Delhi, and illustrious poets. Mīr Hasan was a friend and collaborator of Mīr Dard, and first established himself at Faizābād and subsequently at Lucknow; he excelled in the *ghazal*, *rubā'ī*, *maṯnavī* and *marṯiya*, and is counted the third, with Saudā and Mīr Taqī, among the most eminent of Urdū poets. His fame chiefly rests upon a much admired *maṯnavī* entitled the *Siḥru-l-bayān*, or "Magic of Eloquence," a romance relating the loves of Prince Bë-naẕīr and the Princess Badr-i Munīr; his *maṯnavī* called the *Gulzār-i Iram* ("Rose-garden of Iram," the legendary 'Ādite paradise in southern Arabia), in praise of Faizābād, is likewise highly esteemed. Mīr Muḥammadī Sōz was an elegant poet, remarkable for the success with which he composed in the dialect of the harem called *Rekhtī*, but somewhat licentious in his verse; he became a *darwēsh* and renounced the world in his later years. Jur'at was also a prolific poet, but, like Sōz, his *ghazals* and *maṯnavīs* are licentious and full of double meanings. He imitated Saudā in satire with much success; he also cultivated Hindī poetry, and composed *dohās* and *kabittas*. Miskīn was another Lucknow poet of the same period, whose *marṯiyas* are especially admired; one of them, that on the death of Muslim and his two sons, is considered a masterpiece of this style of composition. The school of Lucknow, so founded and maintained during the early years of the century, continued to flourish till the dethronement of the last king, Wājid 'Alī, in 1856. Ātash and Nāsikh (who died respectively in 1847 and 1841) are the best among the modern poets of the school in the *ghazal*; Mīr Anīs, a grandson of Mīr Hasan, and his contemporary Dabīr, the former of whom died in December 1875 and the latter a few months later, excelled in the *marṯiyah*. Rajab Alī Beg Surūr, who died in 1869, was the author of a much-admired romance in rhyming prose entitled the *Fisānah-e 'Ajāib* or "Tale of Marvels," besides a *dīwān*. The dethroned prince Wājid 'Alī himself, poetically styled Akhtar, was also a poet; he published three dīwāns, among them a quantity of poetry in the rustic dialect of Oudh which is philologically of much interest.

Though Delhi was thus deserted by its brightest lights of literature, it did not altogether cease to cultivate the poetic art. Among the last Moguls several princes were themselves creditable poets. Shāh Ālam II. (1761-1806) wrote under the name of Āftāb, and was the author of a romance entitled ***Manẕūm-i Aqdas***, besides a *dīwān*. His son Sulaimān-shukoh, brother of Akbar Shāh II., who had at first, like his brother authors, repaired to Lucknow, returned to Delhi in 1815, and died in 1838; he also has left a *dīwān*. Lastly, his nephew Bahādur Shāh II., the last titular emperor of Delhi (d. 1862), wrote under the name of ẕafar, and was a pupil in poetry of Shaikh Ibrāhīm ẕauq, a distinguished writer; he has left a voluminous *dīwān*, which has been printed at Delhi. Maṣḥafī (Ghulām-i Hamdānī), who died about 1814, was one of the most distinguished of the revived poetic school of Delhi, and was himself one of its founders. Originally of Lucknow, he left that city for Delhi in 1777, and held conferences of poets, at which several authors who afterwards acquired repute formed their style; he has left five *dīwāns*, a *Taẕkira* or biography of Urdū poets, and a *Shāh-nāma* or account of the kings of Delhi down to Shāh 'Ālam. Qāim (Qiyāmuddīn 'Alī) was one of his society, and died in 1792; he has left several works of merit. Ghālib, otherwise Mirzā Asadullāh Khān Naushāh, laureate of the last Mogul, who died in 1869, was undoubtedly the most eminent of the modern Delhi poets. He wrote chiefly in Persian, of which language, especially in the form cultivated by Firdausī, free from intermixture of Arabic words, he was a master; but his Urdū *dīwān*, though short, is excellent in its way, and his reputation spread far and wide. To this school, though he lived and died at Agra, may be attached Mīr Walī Muḥammad Naẕīr (who died in the year 1832); his *maṯnavīs* entitled *Jogī-nāma*, *Kauṛī-nāma*, *Baṇjāre-nāma*, and *Buṛḥāpe-nāma*, as well as his *dīwān*, have been frequently reprinted, and are extremely popular. His language is less artificial than that of the generality of Urdū poets, and some of his poems have been printed in Nāgarī, and are as well known and as much esteemed by Hindus as by Mahommedans. His verse is defaced by much obscenity.

4. *Modern Period.*—While such, in outline, is the history of the literary schools of the Deccan, Delhi and Lucknow, a fourth, that of the Fort William College at Calcutta, was being formed, and was destined to give no less an impulse to the cultivation of Urdū prose than had a hundred years before been given to that of poetry by Walī. At the commencement of the 19th century Dr John Gilchrist was the head of this institution, and his efforts were directed towards getting together a

body of literature suitable as text-books for the study of the Urdū language by the European officers of the administration. To his exertions we owe the elaboration of the vernacular as an official speech, and the possibility of substituting it for the previously current Persian as the language of the courts and the government. He gathered together at Calcutta the most eminent vernacular scholars of the time, and their works, due to his initiative, are still notable as specimens of elegant and serviceable prose composition, not only in Urdū, but also in Hindī. The chief authors of this school are Ḥaidarī (Sayyid Muḥammad Ḥaidar-bakhsh), Ḥusainī (Mīr Bahādur ʻAlī), Mīr Amman Luṭf, Ḥafīẓuddīn Aḥmad, Shēr ʻAlī Afsōs, Nihāl Chand of Lahore, Kāẓim ʻAlī Jawān, Lallū Lāl Kavi, Maẓhar ʻAlī Wilā and Ikrām ʻAlī.

Ḥaidarī died in 1828. He composed the *Ṭoṭā-Kahānī* (1801), a prose redaction of the *Ṭūṭī-nāmah* which has been already mentioned; a romance named *Ārāish-i Maḥfil* ("Ornament of the Assembly"), detailing the adventures of the famous Arab chief Ḥātim-i Ṭai; the *Gul-i Maghfirat* or *Dah Majlis*, an account of the holy persons of the Muhammadan faith; the *Gulzār-i Dānish*, a translation of the *Bahār-i Dānish*, a Persian work containing stories descriptive of the craft and faithlessness of women; and the *Tārīkh-i Nādirī*, a translation of a Persian history of Nādir Shāh. Ḥusainī is the author of an imitation in prose of Mīr Ḥasan's *Siḥru-l-bayān*, under the name of *Naṣr-i Bēnaẓīr* ("the Incomparable Prose," or "the Prose of Bēnaẓīr," the latter being the name of the hero), and of a work named *Akhlāq-i Hindī*, or "Indian Morals," both composed in 1802. The *Akhlāq-i Hindī* is an adaptation of a Persian work called the *Mufarriḥu-l-qulūb* ("the Delighter of Hearts"), itself a version of the *Hitōpadēša*. Mīr Amman was a native of Delhi, which he left in the time of Aḥmad Shāh Durrānī for Patna, and in 1801 repaired to Calcutta. To him we owe the *Bāgh o Bahār* (1801-1802), an adaptation of Amīr Khusrau's famous Persian romance entitled the *Chahār Darwēsh*, or "Story of the Four Dervishes." Amman's work is not itself directly modelled on the Persian, but is a rehandling of an almost contemporary rendering by Tahsīn of Etāwā, called the *Nau-ṭarz-i Muraṣṣaʻ*. The style of this composition is much admired by natives of India, and editions of it are very numerous. Amman also composed an imitation of Husain Wāʻiz Kāshifī's *Akhlāq-i Muḥsinī* under the name of the *Ganj-i Khūbī* ("Treasure of Virtue"), produced in 1802. Ḥafiẓuddīn Ahmad was a professor at the Fort William College; in 1803 he completed a translation of Abu-l-Faẓl's *ʻIyār-i Dānish*, under the name of the *Khirad-afrōz* ("Enlightener of the Understanding"). The *ʻIyār-i Dānish* ("Touchstone of Wisdom") is one of the numerous imitations of the originally Sanskrit collection of apologues known in Persian as the *Fables of Bīdpāī*, or *Kalīlah and Dimna*. Afsōs was one of the most illustrious of the Fort William school; originally of Delhi, he left that city at the age of eleven, and entered the service of Qāsim ʻAlī Khān, Nawāb of Bengal; he afterwards repaired to Hyderābād in the Deccan, and thence to Lucknow, where he was the pupil of Mīr Ḥasan, Mīr Sōz and Mīr Ḥaidar ʻAlī Ḥairān. He joined the Fort William College in 1800, and died in 1809. He is the author of a much esteemed dīwān; but his chief reputation is founded on two prose works of great excellence, the *Ārāish-i Mahfil* (1805), an account of India adapted from the introduction of the Persian *Khulāṣatu-t-tawārikh* of Sujān Rāe, and the *Bāgh-i Urdū* (1808), a translation of Saʻdī's *Gulistān*. Nihāl Chand translated into Urdū a *maṯnavī*, entitled the *Gul-i Bakāwalī*, under the name of *Maẓhab-i ʻIshq* ("Religion of Love"); this work is in prose intermingled with verse, was composed in 1804, and has been frequently reproduced. Jawān, like most of his collaborators, was originally of Delhi and afterwards of Lucknow; he joined the College in 1800. He is the author of a version in Urdū of the well-known story of Sakuntalā, under the name of *Sakuntalā Nāṭak*; the Urdū was rendered from a previous Braj-bhāshā version by Nawāz Kabīshwar made in 1716, and was printed in 1802. He also composed a *Bārah-māsā*, or poetical description of the twelve months (a very popular and often-handled form of composition), with accounts of the various Hindu and Muhammadan festivals, entitled the *Dastūr-i Hind* ("Usages of India"), printed in 1812. Ikrām ʻAli translated, under the name of the *Ikhwānu-ṣ-ṣafā*, or "Brothers of Purity" (1810), a chapter of a famous Arabian collection of treatises on science and philosophy entitled *Rasāilu Ikhwāni-ṣ-ṣafā*, and composed in the 10th century. The complete collection, due to different writers who dwelt at Baṣra, has recently been made known to European readers by the translation of Dr F. Dieterici (1858-1879); the chapter selected by Ikrām ʻAlī is the third, which records an allegorical strife for the mastery between men and animals before the king of the *Jinn*. The translation is written in excellent Urdū, and is one of the best of the Fort William productions.

Srī Lallū Lāl was a Brahman, whose family, originally of Gujarāt, had long been settled in northern India. What was done by the other Fort William authors for Urdū prose was done by Lallū Lāl almost alone for Hindī. He may indeed without exaggeration be said to have created "High Hindī" as a literary language. His *Prem Sāgar* and *Rājnīti*, the former a version in pure Hindī of the 10th chapter of the *Bhāgavata Purāna*, detailing the history of Kṛishṇa, and founded on a previous Braj-bhāshā version by Chaturbhuj Misr, and the latter an adaptation in Braj-bhāshā prose of the *Hitōpadēša* and part of the *Pancha-tantra*, are unquestionably the most important works in Hindī prose. The *Prem Sāgar* was begun in 1804 and ended in 1810; it enjoys immense popularity in northern India, has been frequently reproduced in a lithographed form, and has several times been printed. The *Rājnīti* was composed in 1809; it is much admired for its sententious brevity and the purity of its language. Besides these two works, Lallū Lāl was the author of a collection of a hundred anecdotes in Hindī and Urdū entitled *Latāif-i Hindī*, an anthology of Hindī verse called the *Sabhā-bilās*, a *Sat-saī* in the style of Bihāri-Lāl called *Sapta-satika* and several other works. He and Jawān worked together at the *Singhāsan Battīsī* (1801), a redaction in mixed Urdū and Hindī (Dēvanāgarī character) of a famous collection of legends relating the prowess of King Vikramāditya; and he also aided the latter author in the production of the *Sakuntalā Nāṭak*. Maẓhar ʻAli Wilā was his collaborator in the *Baitāl Pachīsī*, a collection of stories similar in many respects to the *Singhāsan Battīsī*, and also in mixed Urdū-Hindī; and he aided Wilā in the preparation in Urdū of the *Story of Mādhōnal*, a romance originally

composed in Braj-bhāshā by Mōtī Rām.

The works of these authors, though compiled and published under the superintendence of Dr Gilchrist, Captain Abraham Lockett, Professor J. W. Taylor, Dr W. Hunter and other European officers of the college of Fort William, and originally intended for the instruction of the Company's officers in the vernacular, are essentially Indian in taste and style, and, until superseded by the more recent developments of literature noticed below, enjoyed a very wide reputation and popularity. They may, indeed, be said to have set the standard of prose composition in Urdū and Hindī, and for the first half of the 19th century their influence in this respect continued almost unchallenged. Side by side with them, among the Musalmān population of northern India, another almost contemporaneous impulse did much for the expansion of the Urdū language, and, like the work of the Vaishnava reformers in moulding literary Hindī, gave an impetus to composition which might otherwise have been lacking. This was the reform in Islam led by Sayyid Ahmad[16] and his followers. In all Eastern countries religion is the first and chief subject of literary production; and the controversies which the new preaching aroused in India at once afforded abundant material for authorship in Urdū, and interested deeply the people to whom the works were addressed.

Sayyid Aḥmad was born in 1782, and received his early education at Delhi; his instructors were two learned Muslims, Shāh 'Abdul-'Azīz, author of a celebrated commentary on the Qur'ān (the *Tafsīr-i 'Azīziyyah*), and his brother 'Abdu-l-Qādir, the writer of the first translation of the holy volume into Urdū. Under their guidance Sayyid Aḥmad embraced the doctrines of the Wahhābīs, a sect whose preaching appears at this time to have first reached India. He gathered round him a large number of fervent disciples, among others Ismā'īl Ḥājī, nephew of 'Abdu-l'Azīz and 'Abdu-l-Qādir, the chief author of the sect. After a course of preaching and apostleship at Delhi, Sayyid Aḥmad set out in 1820 for Calcutta, attended by numerous adherents. Thence in 1822 he started on a pilgrimage to Mecca, whence he went to Constantinople, and was there received with distinction and gained many disciples. He travelled for nearly six years in Turkey and Arabia, and then returned to Delhi. The religious degradation and coldness which he found in his native country strongly impressed him after his sojourn in lands where the life of Islām is stronger, and he and his disciples established a propaganda throughout northern India, reprobating the superstitions which had crept into the faith from contact with Hindus, and preaching a *jihād* or holy war against the Sikhs. In 1828 he started for Peshāwar, attended by, it is said, upwards of 100,000 Indians, and accompanied by his chief followers, Ḥājī Ismā'īl and 'Abdu-l-Ḥayy. He was furnished with means by a general subscription in northern India, and by several Muhammadan princes who had embraced his doctrines. At the beginning of 1829 he declared war against the Sikhs, and in the course of time made himself master of Peshāwar. The Afghāns, however, with whom he had allied himself in the contest, were soon disgusted by the rigour of his creed, and deserted him and his cause. He fled across the Indus and took refuge in the mountains of Pakhlī and Dhamtōr, where in 1831 he encountered a detachment of Sikhs under the command of Shēr Singh, and in the combat he and Ḥājī Isma'īl were slain. His sect is, however, by no means extinct; the Wahhābī doctrines have continued to gain ground in India, and to give rise to much controversial writing, down to our own day.

The translation of the Quran by 'Abdu-l-Qādir was finished in 1803, and first published by Sayyid 'Abdullāh, a fervent disciple of Sayyid Aḥmad, at Hūghlī in 1829. The *Tambīhu-l-ghāfilīn*, or "Awakener of the Heedless," a work in Persian by Sayyid Aḥmad, was rendered into Urdū by 'Abdullāh, and published at the same press in 1830. Hājī Ismā'īl was the author of a treatise in Urdū entitled *Taqwiyatu-l-Īmān* ("Confirmation of the Faith"), which had great vogue among the following of the Sayyid. Other works by the disciples of the *Tarīqah-e Muḥammadiyyah* (as the new preaching was called) are the *Targhīb-i Jihād* ("Incitation to Holy War"), *Hidāyatu-l-Mūminīn* ("Guide of the Believers"), *Mūẓiḥu-l-Kabāir* wa-l-Bid'ah ("Exposition of Mortal Sins and Heresy"), *Naṣlhatu-l-Muslimīn* ("Admonition to Muslims"), and the *Mi'at Masāil*, or "Hundred Questions."

Printing was first used for vernacular works by the College Press at Fort William, at the end of the 18th and the beginning of the 19th century, and all the compositions prepared for Dr Gilchrist and his successors which have been mentioned were thus given to the public. But the expense of this method of reproduction long precluded its extensive use in India, and movable types, though well suited for alphabets derived from the Sanskrit, were not equally applicable to the flowing and graceful characters of Persian. Lithography was introduced about 1837, when the first press was set up at Delhi, and immediately gave a powerful stimulus to the multiplication of literature, both original and editions of older works. In 1832 the vernaculars were substituted for Persian as the official language of the courts and the acts of the legislature, and this at once led to the transfer to the former of a mass of technical and forensic terms which had previously been only to a limited extent in popular use. Thirdly, the spread of education in subjects of Western learning, for which text-books (many of them translations from English) were required, not only greatly enlarged the vocabulary of the common speech, but led by degrees to the use of a simpler and more direct style, and the abandonment wholesale of the florid and artificial ornament which was the legacy of the Persian literature upon which Urdū prose had at first modelled itself. Lastly, the establishment of a vernacular newspaper press, which lithography had rendered possible, placed within the reach of a continually widening public the means of becoming acquainted with new ideas in every department of culture, and practised the writers who contributed to it in the art of wielding their mother-tongue with effect in its application to European themes.

All these revolutionary agencies were at work, though in a tentative and limited fashion, when the great change, following on the Mutiny of 1857, of the transfer of the government of India from the

Company to the Crown inaugurated a new era. Since 1860 their operation has become extremely rapid and far-reaching. The use of lithography both for Urdū and Hindī annually gives birth to hundreds of works. The extension of education through both public and private agency has created an immense mass of school-books, and the spread of instruction in English and the activity of translators have filled the vernaculars with a multitude of new words drawn from that language. The newspaper press, in Urdū and Hindī, now counts over two hundred journals, the majority issued in the United Provinces of Agra and Oudh and in the Punjab, but a few at Madras, Hyderabad, Bangalore, Bombay and Calcutta. Of this great body of literary production it is possible to speak only in general terms. Style and vocabulary are still in a somewhat fluid and unsettled condition, and the subjects treated are almost as various as they are in European literatures. Much, indeed, of the work produced has scarcely any claim to literary excellence, and in the crowd of writers we may content ourselves with mentioning only a few whose influence and authority make it probable that they will hereafter be known as leaders in the new culture.

One of the first effects of the new literary inspiration seemed to be the extinction of poetical composition as previously practised. With the deaths of Ẕauq (1854) and Ghālib (1869) of the Delhi school, and those of Anīs (1875) and Dabīr (1876) of Lucknow, the end of Urdū poetry appeared to have come. The new age was intensely practical and eager to engage in the race for material and political advancement, and had no time for sentiment, or taste for mystical conceits. Moreover, poetical composition in India, as in other Eastern countries, has always owed much to the patronage of courts and princes. The thrones of Delhi and Lucknow had passed away, and the new rulers showed little interest in this form of achievement. Only at Hyderabad in the Deccan, under the patronage of the Nizam, were laureates still honoured; the last of these, Mirzā Khān Dāgh (1831-1905), enjoyed a wide reputation as a graceful and eloquent master of the poetic art.

But prose and material prosperity did not succeed in monopolizing the genius of the people. The great movement of reform and liberalism in Islām led by Sir Sayyid Aḥmad Khān (1817-1898) found its bard in Sayyid Alṭāf Ḥusain of Pānipāṭ, poetically styled Ḥālī—an ambiguous *nom-de-plume* now generally taken in the sense of “modern,” or “up-to-date.” Ḥālī in his youth was a pupil of the famous Ghālib, whose life he has written and of whose writings he has published an able criticism. At the age of forty he came under the influence of Sir Sayyid Aḥmad Khān, and from that time devoted his great poetic gifts to the service of his co-religionists. He has published much verse, of which an interesting specimen will be found in the edition of his *Rubā'īs* or quatrains (101 in number), with an English translation, by Mr G. E. Ward (Oxford, 1904); in this is included a famous poem addressed to his muse, setting forth his ideals in poetry—simplicity, avoidance of exaggeration and unreality, direct and emotional appeal to the heart, and above all sincerity. There can be no doubt that he has succeeded in becoming the leader of a new poetic school, which shows much vigour and promise.

Perhaps the most memorable of all Ḥālī’s compositions is his long poem in six-line stanzas (called *musaddas*) on “the flow and ebb of Islam” (1879), which has had an extraordinary influence in stimulating enthusiasm in the cause of progress among the Musalmāns of the north of India. In it he draws, in simple and direct but searching and eloquent language, a rapid sketch of the glories of Islam in the past, its principles and precepts, and the sources of its strength; and then turns to contrast with this picture the degradation and decay into which it had, when he wrote, fallen in Hindōstān. Never have the vices and shortcomings of a people been lashed by one of themselves with more vigorous denunciation, or with more earnestness of moral purpose. In his preface he explains how the poem came to be written—after a youth spent in heedlessness and unsettlement, at the instigation of Sir Sayyid Aḥmad Khān, and in the cause of that great reformer. The poem is still recited and imitated by Muslims in the Punjab and United Provinces, though the picture which it presents of Indian Musalmāns is no longer wholly applicable to the community. Ḥālī has recently completed a life of Sir Sayyid Aḥmad Khān in two volumes, entitled *Ḥayāt-i Jāvīd* (“eternal life”), a work of great merit.

Another writer whose work, though chiefly in prose, deals with poetry and poetic style, is Maulavī Muḥammad Ḥusain Āzād, lately professor of Arabic at the Government College, Lahore. He has not himself composed much verse; but his biographies of Urdū poets, with criticisms of their works, entitled *Äb-i Ḥayāt* (“Water of Life,” Lahore, 1883), is by far the best book dealing with the subject. His prose style is much admired. As Ḥālī was the pupil of Ghālib, so was Āzād that of Ẕauq, of whose poems he has published a revised and annotated edition. His other works in prose are *Qiṣaṣ-i Hind*, episodes of Indian history arranged for schools; *Nairang-i Khayāl*, an allegory dealing with human life; and *Darbār-i Akbarī*, an account of the reign of Akbar.

Sir Sayyid Aḥmad Khān’s life and work are dealt with elsewhere. Among his literary achievements may be mentioned the *Āṣāruṣ-Ṣanādid* (“Vestiges of Princes”), an excellent account of Delhi and its monuments, which has passed through several editions since it was first lithographed in 1847. His essays and occasional papers, published in the *Alīgaṛh Institute Gazette* (started in 1864), and afterwards (from 1870 onwards) in a periodical entitled *Tahẕībul-Akhlāq* (or “Muhammadan Social Reformer”), handle all the problems of religious, social and educational advancement among Indian Musalmāns—the cause with which his life was identified. His great *Commentary on the Qur'ān*, in seven volumes, the last finished only a few days before his death in 1898, is carried to the end of Sūrah xx., a little more than half the book. In him Urdū prose found its most powerful wielder for the diffusion of modern ideas, and the movement which he set on foot has been the spring of the best literature in the language during recent years.

Another excellent writer of Urdū is Shamsul-’Ulamā Maulavī Naẕīr Aḥmad of Delhī, who is the author of a series of novels describing domestic life, of a somewhat didactic character, which have

had a wide popularity, and from their admirable moral tone have been specially serviceable in the education of Indian women. These are entitled the *Mir'ātul-'Arūs* (or "Brides' Mirror"); *Taubatun-Naṣūḥ* ("the Repentance of Naṣūḥ"), *Banātun-Na'sh* ("the Seven Stars of the Great Bear"), *Ibnul-Waqt* ("Son of the Age"), and *Ayāmā* ("Widows"). But Naẕīr Aḥmad is a man of many sides; before he took to novel-writing he was the principal translator into Urdū of the *Indian Penal Code* (1861), which is reckoned a masterpiece in the exact rendering of European legal ideas; and more lately he gave to the world the best Urdū version of the Quran. He has been a popular lecturer on social subjects, displaying a rich vein of humour, and in his old age even ventured upon verse. During the latter portion of his life he was most closely associated with Sir Sayyid Aḥmad Khān.

The novel is one of the most noteworthy features of recent literary composition in Urdū. India has from time immemorial been rich in stories and romances of adventure; but the description of actual life and character in action, as the modern novel is understood in Europe, is quite a new development. The most admired production of this kind in Urdū is a work entitled *Fisāna-e Āzād*, by Paṇḍit Ratan-nāth Sarshār of Lucknow. The story, which is very long, is remarkable for the faithful and vivid pictures of Lucknow society which it presents, and its exact and lifelike delineation of character; it appeared originally as a *feuilleton* of the *Awadh Akhbār*, of which paper the author was at the time editor. Another good writer in the same branch of literature is Maulavī 'Abdul-Ḥalīm Sharar, also a native of the neighbourhood of Lucknow, but settled at Hyderabad. He was editor of a monthly periodical called the *Dil-gudāz* ("melter of hearts"), which contained essays and papers in European style, and in it his novels, which are all of an historical character, in the style of Sir Walter Scott, originally appeared. The best are *'Azīz and Virginā*, a tale of the Crusades, and *Mansūr and Mōhinā*, a story of which the scene is laid in India at the time of the invasions of Sultan Maḥmūd of Ghaznī.

Although Urdū chiefly represents Musalmān culture, its use is by no means confined to adherents of that faith. It has just been mentioned that the most popular Urdū novelist is a Hindū (a Brāhman from Kashmīr); and the statistics of the vernacular press show that this form of the language is widely used by Hindūs as well as Musalmāns. Thus, of eighty periodicals in Urdū published in the United Provinces, twenty-nine are conducted by Hindūs; similarly, in the Punjab, of forty-eight Urdū journals, twenty are edited by Hindus.

"High Hindī" has scarcely adapted itself to modern requirements with the thoroughness displayed by Urdū. It is taught in the schools where the population is mainly Hindū, and books of science have been written in it with a terminology borrowed from Sanskrit, in place of the Persian terms used in the other dialect. But Sanskrit is far removed from the daily life of the people, and the majority of works in this style are read only by Paṇḍits, the great bulk of them dealing with religion, philosophy and the ancient literature. There are thirty-seven Hindī and four Hindī-Urdū journals in the United Provinces; but many of them are exclusively religious in their character, and several, though written in Dēvanāgarī, employ a mixed language which admits Persian words freely. The old dialects of literature, Awadhī and Braj-bhāshā, are now only used for poetry; High Hindī has been a complete failure for this purpose.

The most noticeable authors in Hindī since the middle of the 19th century have been Bābū Harishchandra and Rājā Śiva Prasād, both of Benares. The former, during his short life (1850-1885), was an enthusiastic cultivator of the old poetic art, using the dialects just mentioned. He published in the *Sundarī Tilak* an anthology of the best Hindī poetry, and in the *Kabi-bachan-Sudhā* ("ambrosia of the words of poets") and the magazine called *Harishchandrikā* a quantity of old texts, with much added matter. He also wrote a volume of biographies of famous men, European and Indian, and many critical studies, historical and literary. In history especially he cleared up many problems, and traced the lines for further investigation. In his *Kashmīr Kusum*, or history of Kashmīr, a list is given of about a hundred works by him. He was also the real founder of the modern Hindī drama; he wrote plays himself, and inspired others. Rājā Śiva Prasād (1823-1895) served for many years in the educational department, and published a number of works intended for use in schools, which have greatly contributed to the formation of a sound vernacular form of Hindī, not excessively Sanskritized, and not rejecting current Persian forms. The society at Benares called the *Nāgarī Prachārinī Sabhā* ("Society for promoting the use of the Nāgarī character") has, since the death of Harishchandra, been active in procuring the publication of works in Hindī, and has issued many useful books, besides conducting a systematic search for old MSS.

BIBLIOGRAPHY.—The best account in English of Hindī literature is Dr G. A. Grierson's *Modern Vernacular Literature of Hindōstān*, issued by the Asiatic Society of Bengal in 1889; the dates in this work, which is founded on indigenous compilations, have, however, in many cases to be received with caution. Before it appeared, Garcin de Tassy's *Histoire de la littérature Hindouie et Hindoustanie*, and his annual summaries of the progress made from 1850 to 1877, were our chief authority, and may still be consulted with advantage. For the religious literature of the Vaishnava sects, Professor H. H. Wilson's *Essay on the Religious Sects of the Hindus* (vol. i. of his collected works) has not yet been superseded.

For Urdū poets, Professor Āzād's *Āb-i Ḥayāt* (in Urdū) is the most trustworthy record. For the new school of Urdū literature reference may be made to a series of lectures (in English) by Shaikh 'Abdul-Qādir of Lahore, printed in 1898. The catalogues by Professor Blumhardt of Hindōstānī and Hindī books in the libraries of the British Museum and the India Office will give a good idea of the volume of the recent productions of the press in those languages.

(C. J. L.)

1 *Urdū* is a Turkish word meaning a camp or army with its followers, and is the origin of the European word *horde*. *Rēkhta* means "scattered, strewn," referring to the way in which Persian words are intermixed with those of Indian origin; it is used chiefly for the literary form of Urdū.

2 The only known exceptions are a work in Hindī called the *Chaurāsī Vārtā* (mentioned below) and a few commentaries on poems; the latter can scarcely be called literature.

3 A fresh critical edition of the text by Paṇḍit Mōhan Lāl Vishnu Lāl Paṇḍia at Benares, under the auspices of the *Nāgarī Prachārinī Sabhā*, had reached canto xxiv. in 1907.

4 See *J.A.S.B.* (1886), pp. 6 sqq.

5 *Annals and Antiquities*, ii. 452 n. and 472 n.

6 Worshippers of the energic power—*Śaktī*—of Śiva, represented by his consort Pārvatī or Bhawānī.

7 Quoted from G. A. Grierson, chapter on "Literature," in the *India Gazetteer* (ed. 1907).

8 The worship of Krishna is as old as Megasthenes (about 300 B.C.), who calls him Herakles, and was then, as now, located at Mathurā on the Jumna river. That of Rāma is probably still more ancient; the name occurs in stories of the Buddha.

9 *Religious Sects of the Hindus*, p. 40.

10 This name of Krishna, which means "He who quits the battle," is connected with the story of the transfer of the Yādava clan from Mathurā to the new capital on the coast of the peninsula of Kāthiawār, the city of Dwārāka. This migration was the result of an invasion of Braj by Jarāsandha, king of Magadhā, before whom Krishna resolved to retreat. As his path southwards took him through Rajpūtānā and Gujarāt, it is in these regions that his form Raṇchhōṛ is most generally venerated as a symbol of the shifting of the centre of divine life from Gangetic to southern India.

11 In the *Granth* Nāmdēo is called a calico-printer, *Chhīpī*. The Marāthi tradition is that he was a tailor, *Shimpī*; it is probable that the latter word, being unknown in northern India, has been wrongly rendered by the former.

12 It will be remembered that Akbar's reign was remarkable for the translation into Persian of a large number of Sanskrit works of religion and philosophy, most of the versions being made by, or in the names of, members of his court.

13 *Religious Sects*, p. 132.

14 Amīr Khusrau is credited with the authorship of many still popular rhymes, riddles or punning verses (called *pahēlīs* and *mukurīs*); but these, though often containing Persian words, are in Hindī and scanned according to the prosody of that language; they are, therefore, like Malik Muḥammad's *Padmāwat*, not Urdū or Rekhta verse (see Professor Āzād's *Āb-i-Ḥayāt*, pp. 72-76). A late Dakkhanī poet who used the *takkalluṣ* of Sa'dī is said by Āzād (p. 79) to have been confused by Mīrzā Rafī'us-Saudā in his *Tazkira* with Sa'dī of Shīrāz.

15 An exception may be made to this general statement in favour of the *genre* pictures of city and country life contained in the *maṣnavīs* of Saudā and Naẓīr. These are often satires (in the vein of Horace rather than Juvenal), and are full of interest as pictures of society. In Saudā, however, the conventional language used in description is often Persian rather than Indian.

16 To be carefully distinguished from the reformer of the same name who flourished half a century later.

HINDU CHRONOLOGY. The subject of Hindu chronology divides naturally into three parts: the calendar, the eras, and other reckonings.

I. The Calendar

The Hindus have had from very ancient times the system of lunisolar cycles, made by the combination of solar years, regulated by the course of the sun, and lunar years, regulated by the course of the moon, but treated in such a manner as to keep the beginning of the lunar year near the beginning of the solar year. The exact manner in which they arranged the details of their earliest calendar is still a subject of research. We deal here with their calendar as it now stands, in a form which was developed from about A.D. 400 under the influence of the Greek astronomy which had been introduced into India at no very long time previously.

The Hindu calendar, then, is determined by years of two kinds, solar and lunar. For civil purposes, solar years are used in Bengal, including Orissa, and in the Tamil and Malayāḷam districts of Madras, and lunar years throughout the rest of India. But the lunar year regulates everywhere the general religious rites and festivals, and the details of private and domestic life, such as the selection of auspicious occasions for marriages and for starting on journeys, the choice of lucky moments for shaving, and so on. Consequently, the details of the lunar year are shown even in the almanacs which follow the solar year. On the other hand, certain details of the solar year, such as the course of the sun through the signs and other divisions of the zodiac, are shown in the almanacs

which follow the lunar year. We will treat the solar year first, because it governs the lunisolar system, and the explanation of it will greatly simplify the process of explaining the lunar calendar.

The civil solar year is determined by the astronomical solar year. The latter professes to begin at the vernal equinox, but the actual position is as follows. In our Western astronomy the signs of the zodiac have, in consequence of the precession of the equinoxes, drawn away to a large extent from the constellations from which they derived their names; with the result that the sun now comes to the vernal equinox, at the first point of the sign Aries, not in the constellation Aries, but at a point in Pisces, about 28 degrees before the beginning of Aries. The Hindus, however, have disregarded precession in connexion with their calendar from the time (A.D. 499, 522, or 527, according to different schools) when, by their system, the signs coincided with the constellations; and their sign Aries, called Mēsha by them, is still their constellation Aries, beginning, according to them, at or near the star ζ Piscium. Their astronomical solar year is, in fact, not the tropical year, in the course of which the sun really passes from one vernal equinox to the next, but a sidereal year, the period during which the earth makes one revolution in its orbit round the sun with reference to the first point of Mēsha; its beginning is the moment of the Mēsha-saṁkrānti, the entrance of the sun into the sidereal sign Mēsha, instead of the tropical sign Aries; and it begins, not with the true equinox, but with an artificial or nominal equinox.

The astronomical solar year.

The length of this sidereal solar year was determined in the following manner. The astronomer selected what the Greeks termed an *exeligmos*, the Romans an *annus magnus* or *mundanus*, a period in the course of which a given order of things is completed by the sun, moon, and planets returning to a state of conjunction from which they have started. The usual Hindu *exeligmos* has been the Great Age of 4,320,000 sidereal solar years, the aggregate of the Kṛita or golden age, the Trētā or silver age, the Dvāpara or brazen age, and the Kali or iron age, in which we now are; but it has sometimes been the Kalpa or aeon, consisting according to one view of 1000, according to another view of 1008, Great Ages. He then laid down the number of revolutions, in the period of his *exeligmos*, of the *nakshatras*, certain stars and groups of stars which will be noticed more definitely in our account of the lunar year; that is, the number of rotations of the earth on its axis, or, in other words, the number of sidereal days. A deduction of the number of the years from the number of the sidereal days gave, as remainder, the number of civil days in the *exeligmos*. And, this remainder being divided by the number of the years, the quotient gave the length of the sidereal solar year: refinements, suggested by experience, inference, or extraneous information, were made by increasing or decreasing the number of sidereal days assigned to the *exeligmos*. The Hindus now recognize three standard sidereal solar years determined in that manner. (1) A year of 365 days 6 hrs. 12 min. 30 sec. according to the *Āryabhaṭīya*, otherwise called the *First Ārya-Siddhānta*, which was written by the astronomer Āryabhaṭa (b. A.D. 476): this year is used in the Tamil and Malayāḷam districts, and, we may add, in Ceylon. (2) A year of 365 days 6 hrs. 12 min. 30.915 sec. according to the *Rājamṛigā ka*, a treatise based on the *Brāhma-Siddhānta* of Brahmagupta (b. A.D. 598) and attributed to king Bhōja, of which the epoch, the point of time used in it for calculations, falls in A.D. 1042: this year is used in parts of Gujarāt (Bombay) and in Rājputānā and other western parts of Northern India. (3) A year of 365 days 6 hrs. 12 min. 36.56 sec. according to the present *Sūrya-Siddhānta*, a work of unknown authorship which dates from probably about A.D. 1000: this year is used in almost all the other parts of India. It may be remarked that, according to modern science, the true mean sidereal solar year measures 365 days 6 hrs. 9 min. 9.6 sec., and the mean tropical year measures 365 days 5 hrs. 48 min. 46.054440 sec.

The result of the use of this sidereal solar year is that the beginning of the Hindu astronomical solar year, and with it the civil solar year and the lunar year and the nominal incidence of the seasons, has always been, and still is, travelling slowly forward in our calendar year by an amount which varies according to the particular authority.[1] For instance, Āryabhaṭa's year exceeds the Julian year by 12 min. 30 sec. This amounts to exactly one day in 115⅕ years, and five days in 576 years. Thus, if we take the longer period and confine ourselves to a time when the Julian calendar (old style) was in use, according to Āryabhaṭa the Mēsha-saṁkrānti began to occur in A.D. 603 on 20th March, and in A.D. 1179 on 25th March. The intermediate advances arrange themselves into four steps of one day each in 116 years, followed by one step of one day in 112 years: thus, the Mēsha-saṁkrānti began to occur on 21st March in A.D. 719, on 22nd March in A.D. 835, on 23rd March in A.D. 951, and on 24th March in A.D. 1067 (whence 112 years take us to 25th March in A.D. 1179). It is now occurring sometimes on 11th April, sometimes on the 12th; having first come to the 12th in A.D. 1871.

The civil solar year exists in more varieties than one. The principal variety, conveniently called the Mēshādi year, *i.e.* "the year beginning at the Mēsha-saṁkrānti," is the only one that we need notice at this point. The beginning of it is determined directly by the astronomical solar year; and for religious purposes it begins, with that year, at the moment of the Mēsha-saṁkrānti. Its first civil day, however, may be either the day on which the *saṁkrānti* occurs, or the next day, or even the day after that: this is determined partly by the time of day or night at which the *saṁkrānti* occurs, which, moreover, of course varies in accordance with the locality as well as the particular authority that is followed; partly by differing details of practice in different parts of the country. In these circumstances an exact equivalent of

The civil solar year.

the Mēshādi civil solar year cannot be stated; but it may be taken as now beginning on or closely about the 12th of April.

The solar year is divided into twelve months, in accordance with the successive *saṁkrāntis* or entrances of the sun into the (sidereal) signs of the zodiac, which, as with us, are twelve in number.

The solar month.

The names of the signs in Sanskṛit are as follows: Mēsha, the ram (Aries); Vṛishabha, the bull (Taurus); Mithuna, the pair, the twins (Gemini); Karka, Karkaṭa, Karkaṭaka, the crab (Cancer); Siṁha, the lion (Leo); Kanyā, the maiden (Virgo); Tulā, the scales (Libra); Vṛiśchika, the scorpion (Scorpio); Dhanus, the bow (Sagittarius); Makara, the sea-monster (Capricornus); Kumbha, the water-pot (Aquarius); and Mīna, the fishes (Pisces). The solar months are known in some parts by the names of the signs or by corrupted forms of them; and these are the best names for them for general use, because they lead to no confusion. But they have elsewhere another set of names, preserving the connexion of them with the lunar months: the Sanskṛit forms of these names are Chaitra, Vaiśākha, Jyaishṭha, Āshāḍha, Śrāvaṇa, Bhādrapada, Āśvina or Āśvayuja, Kārttika, Mārgaśira or Mārgaśīrsha (also known as Agrahāyaṇa), Pausha, Māgha, and Phālguna: in some localities these names are used in corrupted forms, and in others vernacular names are substituted for some of them; and, while in some parts the name Chaitra is attached to the month Mēsha, in other parts it is attached to the month Mīna, and so on throughout the series in each case. The astronomical solar month runs from the moment of one *saṁkrānti* of the sun to the moment of the next *saṁkrānti*; and, as the signs of the Hindu zodiac are all of equal length, 30 degrees, as with us, while the speed of the sun (the motion of the earth in its orbit round the sun) varies according to the time of the year, the length of the month is variable: the shortest month is Dhanus; the longest is Mithuna. The civil solar month begins with its first civil day, which is determined, in different localities, in the same manner with the first civil day of the Mēshādi year, as indicated above. The civil month is of variable length; partly for that reason, partly because of the variation in the length of the astronomical month. No exact equivalents of the civil months, therefore, can be stated; but, speaking approximately, we may say that, while the month Mēsha now begins on or closely about 12th April, the beginning of a subsequent month may come as late as the 16th day of the English month in which it falls.

The solar year is also divided into six seasons, the Sanskrit names of which are Vasanta, spring; Grīshma, the hot weather; Varshā, the rainy season; Śarad, autumn; Hēmanta, the cold weather; and Śiśira, the dewy season. Vasanta begins at the Mīna-saṁkrānti; the other seasons begin at each successive second *saṁkrānti* from that. Originally, this scheme was laid out with reference to the true course of the sun, and the starting-point of it was the real winter solstice, with Śiśira, as the first season, beginning then; now, owing partly to the disregard of precession, partly to our introduction of New Style, each season comes about three weeks too late; Vasanta begins on or about 12th March, instead of 19th or 20th February, and so on with the rest. It may be added that in early times the year was also divided into three or four, and even into five or seven, seasons; and there appears to have been also a practice of reckoning the seasons according to the lunar months, which, however, would only give a very varying arrangement, in addition to neglecting the point that the seasons are naturally determined by the course of the sun, not of the moon. But there is now recognized only the division into six seasons, determined as stated above.

The seasons.

The solar year is also divided into two parts called Uttarāyaṇa, the period during which the sun is moving to the north, and Dakshiṇāyana, the period during which it is moving to the south. The Uttarāyaṇa begins at the nominal winter solstice, as marked by the Makara-saṁkrānti; and the day on which this solstice occurs, usually 12th January at present, is still a special occasion of festivity and rejoicing; the Dakshiṇāyana begins at the nominal summer solstice, as marked by the Karka-saṁkrānti. It may be added here that, while the Hindus disregard precession in the actual computation of their years and the regulation of their calendar, they pay attention to it in certain other respects, and notably as regards the solstices: the precessional solstices are looked upon as auspicious occasions, as well as the non-precessional solstices, and are customarily shown in the almanacs; and some of the almanacs show also the other precessional *saṁkrāntis* of the sun.

The solstitial divisions of the year.

The civil day.

The civil days of the solar month begin at sunrise. They are numbered 1, 2, 3, &c., in unbroken succession to the end of the month. And, the length of the month being variable for the reasons stated above, the number of the civil days may range from twenty-nine to thirty-two.

The civil days are named after the weekdays, of which the usual appellations (there are various synonyms in each case, and some of the names are used in corrupted forms) are in Sanskrit Ādityavāra or Ravivāra, the day of the sun, sometimes called Ādivāra, the beginning-day (Sunday); Sōmavāra, the day of the moon (Monday); Maṅgalavāra, the day of Mars (Tuesday); Budhavāra, the day of Mercury (Wednesday); Bṛihas-pativāra or Guruvāra, the day of Jupiter (Thursday); Sukravāra, the day of Venus (Friday); and Śanivāra, the day of Saturn (Saturday). It may be mentioned, as a matter of archaeological interest, that, while some of the astronomical books perhaps postulate an earlier knowledge of the "lords of the days," and other writings indicate a still earlier use of the period of seven days, the first proved instance of the use of the name of a weekday is of the year A.D. 484, and is furnished by an inscription in the Saugor district, Central India.

The weekday.

The divisions of the civil day, as far as we need note them, are 60 *vipalas* = 1 *pala* = 24 seconds; 60 *palas* = 1 *ghaṭikā* = 24 minutes; 60 *ghaṭikās* = 24 hours = 1 day. There is also the *muhūrta* = 2

Divisions of the day.

ghaṭikās = 48 minutes: this is the nearest approach to the "hour." The comparative value of these measures of time may perhaps be best illustrated thus: 2½ *muhūrtas* = 2 hours; 2½ *ghaṭikās* = 1 hour; 2½ *palas* = 1 minute; 2½ *vipalas* = 1 second.

Civil time.

As their civil day begins at sunrise, the Hindus naturally count all their times, in *ghaṭikās* and *palas*, from that moment. But the moment is a varying one, though not in India to anything like the extent to which it is so in European latitudes; and under the British Government the Hindus have recognized the advantage, and in fact the necessity, especially in connexion with their lunar calendar, of having a convenient means of referring their own times to the time which prevails officially. Consequently, some of the almanacs have adopted the European practice of showing the time of sunrise, in hours and minutes, from midnight; and some of them add the time of sunset from noon.

The lunar year.

The lunar year consists primarily of twelve lunations or lunar months, of which the present Sanskṛit names, generally used in more or less corrupted forms, are Chaitra, Vaiśākha, &c., to Phālguna, as given above in connexion with the solar months. It is of two principal varieties, according as it begins with a certain day in the month Chaitra, or with the corresponding day in Kārttika: the former variety is conveniently known as the Chaitrādi year; the latter as the Kārttikādi year. For religious purposes the lunar year begins with its first lunar day: for civil purposes it begins with its first civil day, the relation of which to the lunar day will be explained below. Owing to the manner in which, as we shall explain, the beginning of the lunar year is always shifting backwards and forwards, it is not practicable to lay down any close equivalents for comparison: but an indication may be given as follows. The first civil day of the Chaitrādi year is the day after the new-moon conjunction which occurs next after the entrance of the sun into Mīna, and it now falls from about 13th March to about 11th April: the first civil day of the Kārttikādi year is the first day after the new-moon conjunction which occurs next after the entrance of the sun into Tulā, and it now falls from about 17th October to about 15th November.

The lunar month.

The present names of the lunar months, indicated above, were derived from the *nakshatras*, which are certain conspicuous stars and groups of stars lying more or less along the neighbourhood of the ecliptic. The *nakshatras* are regarded sometimes as twenty-seven in number, sometimes as twenty-eight, and are grouped in twelve sets of two or three each, beginning, according to the earlier arrangement of the list, with the pair Kṛittikā and Rōhiṇī, and including in the sixth place Chitrā and Svāti, and ending with the triplet Rēvatī, Aśvinī and Bharaṇī. They are sometimes styled lunar mansions, and are sometimes spoken of as the signs of the lunar zodiac; and it is, no doubt, chiefly in connexion with the moon that they are now taken into consideration. But they mark divisions of the ecliptic: according to one system, twenty-seven divisions, each of 13 degrees 20 minutes; according to two other systems, twenty-seven or twenty-eight unequal divisions, which we need not explain here. The almanacs show the course of the sun through them, as well as the course of the moon; and the course of the sun was marked by them only, before the time when the Hindus began to use the twelve signs of the solar zodiac. So there is nothing exclusively lunar about them. The present names of the lunar months were derived from the *nakshatras* in the following manner: the full-moon which occurred when the moon was in conjunction with Chitrā (the star α Virginis) was named Chaitrī, and the lunar month, which contained the Chaitrī full-moon, was named Chaitra; and so on with the others. The present names have superseded another set of names which were at one time in use concurrently with them; these other names are Madhu (= Chaitra), Mādhava, Śukra, Śuchi, Nabhas, Nabhasya, Isha, Ūrja (= Kārttika), Sahas, Sahasya, Tapas, and Tapasya (= Phālguna): they seem to have marked originally solar season-months of the solar year, rather than lunar months of the lunar year.

A lunar month may be regarded as ending either with the new-moon, which is called *amāvāsyā*, or with the full-moon, which is called *pūrṇamāsī*, *pūrṇimā*: a month of the former kind is termed *amānta*, "ending with the new-moon," or *śuklādi*, "beginning with the bright fortnight;" a month of the latter kind is termed pūrṇimānta, "ending with the full-moon," or *kṛishṇādi*, "beginning with the dark fortnight." For all purposes of the calendar, the *amānta* month is used in Southern India, and the *pūrṇimānta* month in Northern India. But only the *amānta* month, the period of the synodic revolution of the moon, is recognized in Hindu astronomy, and for the purpose of naming the lunations and adjusting the lunar to the solar year by the intercalation and suppression of lunar months; and the rule is that the lunar Chaitra is the *amānta* or synodic month at the first moment of which the sun is in the sign Mīna, and in the course of which the sun enters Mēsha: the other months follow in the same way; and the lunar Kārttika is the *amānta* month at the first moment of which the sun is in Tulā, and in the course of which the sun enters Vṛiśchika. The connexion between the lunar and the solar months is maintained by the point that the name Chaitra is applied according to one practice to the solar Mīna, in which the lunar Chaitra begins, and according to another practice to the solar Mēsha, in which the lunar Chaitra ends. Like the lunar year, the lunar month begins for religious purposes with its first lunar day, and for civil purposes with its first civil day.

Intercalation and suppression

One mean lunar year of twelve lunations measures very nearly 354 days 8 hrs. 48 min. 34 sec.; and one Hindu solar year measures 365 days 6 hrs. 12 min. 30 sec. according to Āryabhaṭa, or slightly more according to the other two authorities. Consequently, the beginning of a lunar year pure and simple would be always travelling backwards through the solar year, by about eleven days on each occasion, and would in course of time recede entirely through the solar year, as it does in the Mahommedan calendar.

of lunar months. The Hindus prevent that in the following manner. The length of the Hindu astronomical solar month, measured by the *saṁkrāntis* of the sun, its successive entrances into the signs of the zodiac, ranges, in accordance with periodical variations in the speed of the sun, from about 29 days 7 hrs. 38 min. up to about 31 days 15 hrs. 28 min. The length of the *amānta* or synodic lunar month ranges, in accordance with periodical variations in the speed of the moon and the sun, from about 29 days 19 hrs. 30 min. down to about 29 days 7 hrs. 20 min. Consequently, it happens from time to time that there are two new-moon conjunctions, so that two lunations begin, in one astronomical solar month, between two *saṁkrāntis* of the sun, while the sun is in one and the same sign of the zodiac, and there is no *saṁkrānti* in the lunation ending with the second new-moon: when this is the case, there are two lunations to which the same name is applicable, and so there is an additional or intercalated month, in the sense that a name is repeated: thus, when two new-moons occur while the sun is in Mēsha, the lunation ending with the first of them, during which the sun has entered Mēsha, is Chaitra; the next lunation, in which there is no *saṁkrānti*, is Vāiśākha, because it begins when the sun is in Mēsha; and the next lunation after that is again Vaiśākha, for the same reason, and also because the sun enters Vṛishabha in the course of it: in these circumstances, the first of the two Vaiśākhas is called Adhika-Vaiśākha, "the additional or intercalated Vaiśākha," and the second is called simply Vaiśākha, or sometimes Nija-Vaiśākha, "the natural Vaiśākha." On the other hand, it occasionally happens, in an autumn or winter month, that there are two *saṁkrāntis* of the sun in one and the same *amānta* or synodic lunar month, between two new-moon conjunctions, so that no lunation begins between the two *saṁkrāntis*: when this is the case, there is one lunation to which two names are applicable, and there is a suppressed month, in the sense that a name is omitted: thus, if the sun enters both Dhanus and Makara during one synodic lunation, that lunation is Mārgaśira, because the sun was in Vṛiśchika at the first moment of it and enters Dhanus in the course of it;[2] the next lunation is Māgha, because the sun is in Makara by the time when it begins and will enter Kumbha in the course of it; and the name Pausha, between Mārgaśira and Māgha, is omitted. When a month is thus suppressed, there is always one intercalated month, and sometimes two, in the same Chaitrādi lunar year, so that the lunar year never contains less than twelve months, and from time to time consists of thirteen months. There are normally seven intercalated months, rising to eight when a month is suppressed, in 19 solar years, which equal very nearly 235 lunations;[3] and there is never less than one year without an intercalated month between two years with intercalated months, except when there is only one such month in a year in which a month is suppressed; then there is always an intercalated month in the next year also. The suppression of a month takes place at intervals of 19 years and upwards, regarding which no definite statement can conveniently be made here. It may be added that an intercalated Chaitra or Kārttika takes the place of the ordinary month as the first month of the year; an intercalated month is not rejected for that purpose, though it is tabooed from the religious and auspicious points of view.

The manner in which this arrangement of intercalated and suppressed months works out, so as to prevent the beginning of the Chaitrādi lunar year departing far from the beginning of the Mēshādi solar year, may be illustrated as follows. In A.D. 1815 the Mēsha-saṁkrānti occurred on 11th April; and the first civil day of the Chaitrādi year was 10th April. In A.D. 1816 and 1817 the first civil day of the Chaitrādi year fell back to 29th March and 18th March. In A.D. 1817, however, there was an intercalated month, Śrāvaṇa; with the result that in A.D. 1818 the first civil day of the Chaitrādi year advanced to 6th April. And, after various shiftings of the same kind—including in A.D. 1822 an intercalation of Āśvina and a suppression of Pausha, followed in A.D. 1823, when the first civil day of the Chaitrādi year had fallen back to 13th March, by an intercalation of Chaitra itself—in A.D. 1834, when the Mēsha-saṁkrānti occurred again on 11th April, the first civil day of the Chaitrādi year was again 10th April.

The lunar fortnight. The lunar month is divided into two fortnights (*paksha*), called bright and dark, or, in Indian terms, *śukla* or *śuddha*, *śudi*, *sudi*, and *kṛishṇa* or *bahula*, *badi*, *vadi*: the bright fortnight, *śukla-paksha*, is the period of the waxing moon, ending at the full-moon; the dark fortnight, *kṛishṇa-paksha*, is the period of the waning moon, ending at the new-moon. In the *amānta* or *śuklādi* month, the bright fortnight precedes the dark; in the *pūrṇimānta* or *kṛishṇādi* month, the dark fortnight comes first; and the result is that, whereas, for instance, the bright fortnight of Chaitra is the same period of time throughout India, the preceding dark fortnight is known in Northern India as the dark fortnight of Chaitra, but in Southern India as the dark fortnight of Phālguna. This, however, does not affect the period covered by the lunar year; the Chaitrādi and Kārttikādi years begin everywhere with the bright fortnight of Chaitra and Kārttika respectively; simply, by the *amānta* system the dark fortnights of Chaitra and Kārttika are the second fortnights, and by the *pūrṇimānta* system they are the last fortnights, of the years. Like the month, the fortnight begins for religious purposes with its first lunar day, and for civil purposes with its first civil day.

The lunar day. The lunar fortnights are divided each into fifteen tithis or lunar days.[4] The *tithi* is the time in which the moon increases her distance from the sun round the circle by twelve degrees; and the almanacs show each *tithi* by its ending-time; that is, by the moment, expressed in *ghaṭikās* and *palas*, after sunrise, at which the moon completes that distance. In accordance with that, the *tithi* is usually used and cited with the weekday on which it ends; but there are special rules regarding certain rites, festivals, &c., which sometimes require the *tithi* to be used and cited with the weekday on which it begins or is current at a particular time. The first *tithi* of each fortnight begins immediately after the moment of new-moon and full-moon respectively; the last *tithi* ends at the moment of full-moon and new-moon. The *tithis*

are primarily denoted by the numbers 1, 2, 3, &c., for each fortnight; but, while the full-moon *tithi* is always numbered 15, the new-moon *tithi* is generally numbered 30, even where the *pūrṇimānta* month is used. The *tithis* may be cited either by their figures or by the Sanskṛit ordinal words *prathamā*, "first," *dvitīyā*, "second," &c., or corruptions of them. But usually the first *tithi* of either fortnight is cited by the term *pratipad*, *pratipadā*, and the new-moon and full-moon *tithis* are cited by the terms *amāvāsyā* and *pūrṇimā*; or here, again, corruptions of the Sanskṛit terms are used. And special names are sometimes prefixed to the numbers of the *tithis*, according to the rites, festivals, &c., prescribed for them, or events or merits assigned to them: for instance, Vaiśākha śukla 3 is Akshaya or Akshayya-tṛitīyā, the third *tithi* which ensures permanence to acts performed on it; Bhādrapada śukla 4 is Gaṇēsa-chaturthī, the fourth *tithi* dedicated to the worship of the god Gaṇēśa, Gaṇapati, and the *amānta* Bhādrapada or *pūrṇimānta* Āśvina kṛishṇa 13 is Kaliyugādi-trayōdaśī, as being regarded (for some reason which is not apparent) as the anniversary of the beginning of the Kaliyuga, the present Age. The first *tithi* of the year is styled Saṁvatsara-pratipadā, which term answers closely to our "New Year's Day."

The civil day.

The civil days of the lunar month begin, like those of the solar month, at sunrise, and bear in the same way the names of the weekdays. But they are numbered in a different manner; fortnight by fortnight and according to the *tithis*. The general rule is that the civil day takes the number of the *tithi* which is current at its sunrise. And the results are as follows. As the motions of the sun and the moon vary periodically, a tithi is of variable length, ranging, according to the Hindu calculations, from 21 hrs. 34 min. 24 sec. to 26 hrs. 6 min. 24 sec.: it may, therefore, be either shorter or longer than a civil day, the duration of which is practically 24 hours (one minute, roughly, more or less, according to the time of the year). A *tithi* may end at any moment during the civil day; and ordinarily it ends on the civil day after that on which it begins, and covers only one sunrise and gives its number to the day on which it ends. It may, however, begin on one civil day and end on the next but one, and so cover two sunrises; and it is then treated as a repeated *tithi*, in the sense that its number is repeated: for instance, if the seventh *tithi* so begins and ends, the civil day on which it begins is numbered 6, from the *tithi* which is current at the sunrise of that day and ends on it; the day covered entirely by the seventh *tithi* is numbered 7, because that *tithi* is current at its sunrise; the next day, at the sunrise of which the seventh *tithi* is still current and during which it ends, is again numbered 7; and the number 8 falls to the next day after that, when the eighth tithi is current at sunrise.[5] On the other hand, a *tithi* may begin and end during one and the same civil day, so as not to touch a sunrise at all: in this case, it exists for any practical purposes for which it may be wanted (it is, however, to be avoided if possible, as being an unlucky occasion), but it is suppressed or expunged for the numbering of the civil day, in the sense that its number is omitted; for instance, if the seventh *tithi* begins and ends during one civil day, that day is numbered 6 from, as before, the *tithi* which is current at its sunrise and ends when the seventh *tithi* begins; the next day is numbered 8, because the eighth *tithi* is current at its sunrise; and there is, in this case, no civil day bearing the number seven. In consequence of this method of numbering, it sometimes happens, as the result of the suppression of a *tithi*, that the day of a full-moon is numbered 14 instead of 15; that the day of a new-moon is numbered 14 instead of 30; and that the first day of a fortnight, and even the first day of a lunar year, is numbered 2 instead of 1.

There are, on an average, thirteen suppressed *tithis* and seven repeated *tithis* in twelve lunar months; and so the lunar year averages 354 days, rising to about 384 when a month is intercalated. It occasionally happens that there are two suppressions of *tithis* in one and the same fortnight; and the almanacs show such a case in the bright fortnight of Jyaishṭha, A.D. 1878: but this occurs only after very long intervals.

The Karana.

The *tithi* is divided into two *karanas*; each *karana* being the time in which the moon increases her distance from the sun by six degrees. But this is a detail of astrological rather than chronological interest. So, also, are two other details to which a prominent place is given in the lunar calendars; to yōga, or time in which the joint motion in longitude, the sum of the motions of the sun and the moon, is increased by 13 degrees 20 minutes; and the *nakshatra*, the position of the moon as referred to the ecliptic by means of the stars and groups of stars which have been mentioned above under the lunar month.

In the Indian calendar everything depends upon exact times, which differ, of course, on every different meridian; and (to cite what is perhaps the most frequent and generally important occurrence) suppression and repetition may affect one *tithi* and civil day in one locality, and another *tithi* and civil day in another locality not very far distant. Consequently, neither for the lunar nor for the solar calendar is there any almanac which is applicable to even the whole area in which any particular length of the astronomical solar year prevails; much less, for the whole of India. Different almanacs are prepared and published for places of leading importance; details for minor places, when wanted, have to be worked out by the local astrologer, the modern representative of an ancient official known as Sāṁmvatsara, the "clerk of the year."

II. Eras

As far as the available evidence goes (and we have no reason to expect to discover anything opposed to it), any use of eras, in the sense of continuous reckonings which originated in historical occurrences or astronomical epochs and were employed for official and other public chronological purposes, did not prevail in India before the 1st century B.C. Prior to that time, there existed, indeed,

in connexion with the sacrificial calendar, a five-years lunisolar cycle, and possibly some extended cycles of the same nature; and there was in Buddhist circles a record of the years elapsed since the death of Buddha, which we shall mention again further on. But, as is gathered from books and is well illustrated by the edicts of Aśōka (reigned 264-227 B.C.) and the inscriptions of other rulers, the years of the reign of each successive king were found sufficient for the public dating of proclamations and the record of events. There is no known case in which any Indian king, of really ancient times, deliberately applied himself to the foundation of an era: and we have no reason for thinking that such a thing was ever done, or that any Hindu reckoning at all owes its existence to a recognition of historical requirements. The eras which came into existence from the 1st century B.C. onwards mostly had their origin in the fortuitous extension of regnal reckonings. The usual course has been that, under the influence of filial piety, pride in ancestry, loyalty to a paramount sovereign, or some other such motive, the successor of some king continued the regnal reckoning of his predecessor, who was not necessarily the first king in the dynasty, and perhaps did not even reign for any long time, instead of starting a new reckoning, beginning again with the year 1, according to the years of his own reign. Having thus run for two reigns, the reckoning was sufficiently well established to continue in the same form, and to eventually develop into a generally accepted local era, which might or might not be taken over by subsequent dynasties ruling afterwards over the same territory. In these circumstances, we find the establisher of any particular era in that king who first continued his predecessor's regnal reckoning, instead of replacing it by his own; but we regard as the founder of the era that king whose regnal reckoning was so continued. We may add here that it was only in advanced stages that any of the Hindu eras assumed specific names: during the earlier period of each of them, the years were simply cited by the term *saṁvatsara* or *varsha*, "the year (bearing such-and-such a number)," or by the abbreviations *saṁvat* and *sam*, without any appellative designation.

The Hindus have had two religious reckonings, which it will be convenient to notice first. Certain, statements in the Ceylonese chronicles, the *Dīpavaṁsa* and *Mahāvaṁsa*, endorsed by an entry in a record of Aśōka, show that in the 3rd century B.C. there existed among the Buddhists a record of the time elapsed since the death of Buddha in 483 B.C., from which it was known that Aśōka was anointed to the sovereignty 218 years after the death. The reckoning, however, was confined to esoteric Buddhist circles, and did not commend itself for any public use; and the only known inscriptional use of it, which also furnishes the latest known date recorded in it, is found in the Last Edict of Aśōka, which presents his dying speech delivered in 226 B.C., 256 years after the death of Buddha. In Ceylon, where, also the original reckoning was not maintained, there was devised in the 12th century A.D. a reckoning styled Buddhavarsha, "the years of Buddha," which still exists, and which purports to run from the death of Buddha, but has set up an erroneous date for that event in 544 B.C. This later reckoning spread from Ceylon to Burma and Siam, where, also, it is still used. It did not obtain any general recognition in India, because, when it was devised, Buddhism had practically died out there, except at Bōdh-Gayā. But, as there seems to have been constant intercourse between Bōdh-Gayā and Ceylon as well as other foreign Buddhist countries, we should not be surprised to find an occasional instance of its use at Bōdh-Gayā: and it is believed that one such instance, belonging to A.D. 1270, has been obtained.

The Buddhist and Jain religious reckonings.

The Jains have had, and still maintain, a reckoning from the death of the founder of their faith, Vīra, Mahāvīra, Vardhamāna, which event is placed by them in 528 B.C. This reckoning figures largely in the Jain books, which put forward dates in it for very early times. But the earliest known synchronous date in it—by which we mean a date given by a writer who recorded the year in which he himself was writing—is one of the year 980, or, according to a different view mentioned in the passage itself, of the year 993. This reckoning, again, did not commend itself for any official or other public use. And the only known inscriptional instances of the use of it are modern ones, of the 19th century. While it is certain that the Jain reckoning, as it exists, has its initial point in 528 B.C. it has not yet been determined whether that is actually the year in which Vīra died. All that can be said on this point is that the date is not inconsistent with certain statements in Buddhist books, which mention, by a Prākrit name of which the Sanskṛit form is Nirgrantha-Jńāta-putra, a contemporary of Buddha, in whom there is recognized the original of the Jain Vīra, Mahāvīra, or Vardhamāna, and who, the same books say, died while Buddha was still alive. But there are some indications that Nirgrantha-Jñātaputra may have died only a short time before Buddha himself; and the event may easily have been set back to 528 B.C. in circumstances, attending a determination of the reckoning long after the occurrence, analogous to those in which the Ceylonese Buddhavarsha set up the erroneous date of 544 B.C. for the death of Buddha.

In the class of eras of royal origin, brought into existence in the manner indicated above, the Hindus have had various reckonings which have now mostly fallen into disuse. We may mention them, without giving them the detailed treatment which the more important of the still existing reckonings demand.

Bygone Eras of royal origin.

The Kalachuri or Chēdi era, commencing in A.D. 248 or 249, is known best from inscriptional records, bearing dates which range from the 10th to the 13th century A.D., of the Kalachuri kings of the Chēdi country in Central India; and it is from them that it derived the name under which it passes. In earlier times, however, we find this era well established, without any appellation, in Western India, in Gujarāt and the Ṭhāṇa district of Bombay,

where it was used by kings and princes of the Chalukya, Gurjara, Sēndraka, Kaṭachchuri and Traikūṭaka families. It is traced back there to A.D. 457, at which time there was reigning a Traikūṭaka king named Dahrasēna. Beyond that point, we have at present no certain knowledge about it. But it seems probable that the founder of it may be recognized in an Ābhīra king Īśvaṛasēna, or else in his father Śivadatta, who was reigning at Nāsik in or closely about A.D. 248-49.

The Gupta era, commencing in A.D. 320, was founded by Chandragupta I., the first paramount king in the great Gupta dynasty of Northern India. When the Guptas passed away, their reckoning was taken over by the Maitraka kings of Valabhī, who succeeded them in Kāṭhiāwār and some of the neighbouring territories; and so it became also known as the Valabhī era.

From Halsi in the Beḷgaum district, Bombay, we have a record of the Kadamba king Kākusthavarman, which was framed during the time when he was the Yuvarāja or anointed successor to the sovereignty, and may be referred to about A.D. 500. It is dated in "the eightieth victorious year," and thus indicates the preservation of a reckoning running from the foundation of the Kadamba dynasty by Mayūravarman, the great-grandfather of Kākusthavarman. But no other evidence of the existence of this era has been obtained.

The records of the Gāṅga kings of Kaliṅganagara, which is the modern Mukhaliṅgam-Nagarikaṭakam in the Gañjām district, Madras, show the existence of a Gāṅga era which ran for at any rate 254 years. And various details in the inscriptions enable us to trace the origin of the Gāṅga kings to Western India, and to place the initial point of their reckoning in A.D. 590, when a certain Satyāśraya-Dhruvarāja-Indravarman, an ancestor and probably the grandfather of the first Gāṅga king Rājasiṁha-Indravarman I., commenced to govern a large province in the Koṅkaṇ under the Chalukya king Kīrtivarman I.

An era commencing in A.D. 605 or 606 was founded in Northern India by the great king Harshavardhana, who reigned first at Ṭhāṇēsar and then at Kanauj, and who was the third sovereign in a dynasty which traced its origin to a prince named Naravardhana. A peculiarity about this era is that it continued in use for apparently four centuries after Harshavardhana, in spite of the fact that his line ended with him.

The inscriptions assert that the Western Chālukya king Vikrama or Vikramāditya VI. of Kalyāṇi in the Nizam's dominions, who reigned from A.D. 1076 to 1126, abolished the use of the Śaka era in his dominions in favour of an era named after himself. What he or his ministers did was to adopt, for the first time in that dynasty, the system of regnal years, according to which, while the Śaka era also remained in use, most of the records of his time are dated, not in that era, but in the year so-and-so of the Chālukya-Vikrama-kāla or Chālukya-Vikrama-varsha, "the time or years of the Chālukya Vikrama." There is some evidence that this reckoning survived Vikramāditya VI. for a short time. But his successors introduced their own regnal reckonings; and that prevented it from acquiring permanence.

In Tirhut, there is still used a reckoning which is known as the Lakshmaṇasēna era from the name of the king of Bengal by whom it was founded. There is a difference of opinion as to the exact initial point of this reckoning; but the best conclusion appears to be that which places it in A.D. 1119. This era prevailed at one time throughout Bengal: we know this from a passage in the *Akbarnāma*, written in A.D. 1584, which specifies the Śaka era as the reckoning of Gujarāt and the Dekkan, the Vikrama era as the reckoning of Mālwā, Delhi, and those parts, and the Lakshmaṇasēna era as the reckoning of Bengal.

The last reckoning that we have to mention here is one known as the Rājyābhishēka-Śaka, "the era of the anointment to the sovereignty," which was in use for a time in Western India. It dated from the day Jyaishṭha śukla 13 of the Śaka year 1597 current, = 6 June, A.D. 1674, when Śivajī, the founder of the Marāṭhā kingdom, had himself enthroned.

Miscellaneous Eras.

There are four reckonings which it is difficult at present to class exactly. Two inscriptions of the 15th and 17th centuries, recently brought to notice from Jēsalmēr in Rājputānā, present a reckoning which postulates an initial point in A.D. 624 or in the preceding or the following year, and bears an appellation, Bhāṭika, which seems to be based on the name of the Bhaṭṭi tribe, to which the rulers of Jēsalmēr belong. No historical event is known, referable to that time, which can have given rise to an era. It is possible that the apparent initial date represents an epoch, at the end of the Śaka year 546 or thereabouts, laid down in some astronomical work composed then or soon afterwards and used in the Jēsalmēr territory. But it seems more probable that it is a purely fictitious date, set up by an attempt to evolve an early history Of the ruling family.

In the Tinnevelly district of Madras, and in the territories of the same presidency in which the Malayāḷam language prevails, namely, South Kanara below Mangalore, the Malabar district, and the Cochin and Travancore states, there is used a reckoning which is known sometimes as the Kollam or Kōlamba reckoning, sometimes as the era of Paraśurāma. The years of it are solar: in the southern parts of the territory in which it is current, they begin with the month Siṁha; in the northern parts, they begin with the next month, Kanyā. The initial point of the reckoning is in A.D. 825; and the year 1076 commenced in A.D. 1900. The popular view about this reckoning is that it consists of cycles of 1000 years; that we are now in the fourth cycle; and that the reckoning originated in 1176 B.C. with the mythical Paraśurāma, who exterminated the Kshatriya or warrior caste, and reclaimed the Koṅkaṇ countries, Western India below the Ghauts, from the ocean. But the earliest known date in it, of the year 149, falls in A.D. 973; and the reckoning has run on in continuation of the thousand,

instead of beginning afresh in A.D. 1825. It seems probable, therefore, that the reckoning had no existence before A.D. 825. The years are cited sometimes as "the Kollam year (of such-and-such a number)," sometimes as "the year (so-and-so) after Kollam appeared;" and this suggests that the reckoning may possibly owe its origin to some event, occurring in A.D. 825, connected with one or other of the towns and ports named Kollam, on the Malabar coast; perhaps Northern Kollam in the Malabar district, perhaps Southern Kollam, better known as Quilon, in Travancore. But the introduction of Paraśurāma into the matter, which would carry back (let us say) the foundation of Kollam to legendary times, may indicate, rather, a purely imaginative origin. Or, again, since each century of the Kollam reckoning begins in the same year A.D. with a century of the Saptarshi reckoning (see below under III. Other Reckonings), it is not impossible that this reckoning may be a southern offshoot of the Saptarshi reckoning, or at least may have had the same astrological origin.

In Nēpāl there is a reckoning, known as the Nēwār era and commencing in A.D. 879, which superseded the Gupta and Harsha eras there. One tradition attributes the foundation of it to a king Rāghavadēva; another says that, in the time and with the permission of a king Jayadēvamalla, a merchant named Sākhwāl paid off, by means of wealth acquired from sand which turned into gold, all the debts then existing in the country, and introduced the new era in commemoration of the occurrence. It is possible that the era may have been founded by some ruler of Nēpāl: but nothing authentic is known about the particular names mentioned in connexion with it. This era appears to have been discarded for state and official purposes, in favour of the Śaka era, in A.D. 1768, when the Gūrkhas became masters of Nēpāl; but manuscripts show that in literary circles it has remained in use up to at any rate A.D. 1875.

Inscriptions disclose the use in Kāṭhiāwār and Gujarāt, in the 12th and 13th centuries, of a reckoning, commencing in A.D. 1114, which is known as the Siṁha-saṁvat. No historical occurrence is known, on which it can have been based; and the origin of it is obscure.

Three great Eras in general use.

The eras mentioned above have for the most part served their purposes and died out. But there are three great reckonings, dating from a very respectable antiquity, which have held their own and survived to the present day. These are the Kaliyuga, Vikrama, and Śaka eras. It will be convenient to treat the Kaliyuga first, though, in spite of having the greatest apparent antiquity, it is the latest of the three in respect of actual date of origin.

The Kaliyuga Era of 3102 B.C.

The Kaliyuga era is the principal astronomical reckoning of the Hindus. It is frequently, if not generally, shown in the almanacs: but it can hardly be looked upon as being now in practical use for civil purposes; and, as regards the custom of previous times as far as we can judge it from the inscriptional use, which furnishes a good guide, the position is as follows: from Southern India we have one such instance of A.D. 634, one of A.D. 770, three of the 10th century, and then, from the 12th century onwards, but more particularly from the 14th, a certain number of instances, not exactly very small in itself, but extremely so in comparison with the number of cases of the use of the Vikrama and Śaka eras and other reckonings: from Northern India the earliest known instance of is A.D. 1169 or 1170, and the later ones number only four. Its years are by nature sidereal solar years, commencing with the Mēsha-saṁkrānti, the entrance of the sun into the Hindu constellation and sign Mēsha, *i.e.* Aries (for this and other technical details, see above, under the Calendar);[6] but they were probably cited as lunar years in the inscriptional records which present the reckoning; and the almanacs appear to treat them either as Mēshādi civil solar years with solar months, or as Chaitrādi lunar years with lunar months *amānta* (ending with the new-moon) or *pūrṇimānta* (ending with the full-moon) as the case may be, according to the locality. Its initial point lies in 3102 B.C.; and the year 5002 began in A.D. 1900.[7]

This reckoning is not an historical era, actually running from 3102 B.C. It was devised for astronomical purposes at some time about A.D. 400, when the Hindu astronomers, having taken over the principles of the Greek astronomy, recognized that they required for purposes of computation a specific reckoning with a definite initial occasion. They found that occasion in a conjunction of the sun, the moon, and the five planets which were then known, at the first point of their sign Mēsha. There was not really such a conjunction; nor, apparently, is it even the case that the sun was actually at the first point of Mēsha at the moment arrived at. But there was an approach to such a conjunction, which was turned into an actual conjunction by taking the mean instead of the true positions of the sun, the moon, and the planets. And, partly from the reckoning which has come down to us, partly from the astronomical books, we know that the moment assigned to the assumed conjunction was according to one school the midnight between Thursday the 17th, and Friday the 18th, February, 3102 B.C., and according to another school the sunrise on the Friday.

The reckoning thus devised was subsequently identified with the Kaliyuga as the iron age, the last and shortest, with a duration of 432,000 years, of the four ages in each cycle of ages in the Hindu system of cosmical periods. Also, traditional history was fitted to it by one school, represented notably by the Purāṇas, which, referring the great war between the Pāṇḍavas and the Kurus, which is the topic of the Mahābhārata, to the close of the preceding age, the Dvāpara, placed on the last day of that age the culminating event which ushered in the Kali age; namely, the death of Kṛishṇa (the return to heaven of Vishṇu on the termination of his incarnation as Kṛishṇa), which was followed by the abdication of the Pāṇḍava king Yudhishṭhira, who, having installed his grand-nephew Parikshit as his successor, then set out on his own journey to heaven. Another school, however, placed the Pāṇḍavas and the Kurus 653 years later, in 2449 B.C. A third school places in 3102 B.C.

the anointment of Yudhishṭhira to the sovereignty, and treats that event as inaugurating the Kali age; from this point of view, the first 3044 years of the Kaliyuga—the period from its commencement in 3102 B.C. to the commencement of the first historical era, the so-called Vikrama era, in 58 B.C.—are also known as “the era of Yudhishṭhira.”

The Vikrama Era of 58 B.C.

The Vikrama era, which is the earliest of all the Hindu eras in respect of order of foundation, is the dominant era and the great historical reckoning of Northern India—that is, of the territory on the north of the rivers Narbadā and Mahānadī—to which part of the country its use has always been practically confined. Like, indeed, the Kaliyuga and Śaka eras, it is freely cited in almanacs in any part of India; and it is sometimes used in the south by immigrants from the north: but it is, by nature, so essentially foreign to the south that the earliest known inscriptional instance of the use of it in Southern India only dates from A.D. 1218, and the very few later instances that have been obtained, prior to the 15th century A.D., come, along with the instance of A.D. 1218, from the close neighbourhood of the dividing-line between the north and the south. The Vikrama era has never been used for astronomical purposes. Its years are lunar, with lunar months, but seem liable to be sometimes regarded as solar, with solar months, when they are cited in almanacs of Southern India which present the solar calendar. Originally they were Kārtti-kādi, with *pūrṇimānta* months (ending with the full-moon). They now exist in the following three varieties: in Kāṭhiāwār and Gujarāt, they are chiefly Kārttikādi, with *amānta* months (ending with the new-moon); and they are shown in this form in almanacs for the other parts of the Bombay Presidency; but there is also found in Kāṭhiāwār and that neighbourhood an Āshāḍhādi variety, commencing with Āshāḍha śukla I, similarly with *amānta* months; in the rest of Northern India, they are Chaitrādi, with *pūrṇimānta* months. The era has its initial point in 58 B.C., and its first civil day, Kārttika śukla I, is 19th September in that year if we determine it with reference to the Hindu Tulā-saṁkrānti, or 18th October if we determine it with reference to the tropical equinox. The years of the three varieties, Chaitrādi, Āshaḍhādi, and Kārttikādi, all commence in the same year A.D.; and the year 1958 began in A.D. 1900.

Hindu legend connects the foundation of this era with a king Vikrama or Vikramāditya of Ujjain in Mālwā, Central India: one version is that he began to reign in 58 B.C.; another is that he died in that year, and that the reckoning commemorates his death. Modern research, however, based largely on the inscriptional records, has shown that there was no such king, and that the real facts are very different. The era owes its existence to the Kushan king Kaṇishka, a foreign invader, who established himself in Northern India and commenced to reign there in B.C. 58.[8] He was the founder of it, in the sense that the opening years of it were the years of his reign. It was established and set going as an era by his successor, who continued the reckoning so started, instead of breaking it by introducing another according to his own regnal years. And it was perpetuated as an era, and transmitted as such to posterity by the Mālavas, the people from whom the modern territory Mālwā derived its name, who were an important section of the subjects of Kaṇishka and his successors. In consonance with that, records ranging in date from A.D. 473 to 879 style it “the reckoning of the Mālavas, the years of the Mālava lords, the Mālava time or era.” Prior to that, it had no specific name; the years of it were simply cited, in ordinary Hindu fashion, by the term *saṁvatsara*, “the year (of such-and-such a number),” or by its abbreviations *saṁvat* and *saṁ*: and the same was frequently done in later times also, and is habitually done in the present day; and so, in modern times, this era has often been loosely styled “the Saṁvat era.” The idea of a king Vikrama in connexion with it appears to date from only the 9th or 10th century A.D.

The Śaka Era of A.D. 78.

The Śaka era, though it actually had its origin in the south-west corner of Northern India, is the dominant era and the great historical reckoning of Southern India; that is, of the territory below the rivers Narbadā and Mahānadī. It is also the subsidiary astronomical reckoning, largely used, from the 6th century A.D. onwards, in the *Karaṇas*, the works dealing with practical details of the calendar, for laying down epochs or points of time furnishing convenient bases for computation. As a result of that, it came to be used in past times for general purposes also, to a limited extent, in parts of Northern India where it was not indigenous. And it is now used more or less freely, and is cited in almanacs everywhere. Its years are usually lunar, Chaitrādi, and its months are *pūrṇimānta* (ending with the full-moon) in Northern India, and *amānta* (ending with the new-moon) in Southern India; but in times gone by it was sometimes treated for purposes of calculation as having astronomical solar years, and it is now treated as having Mēsh di civil solar years and solar months in those parts of India where that form of the solar calendar prevails. It has its initial point in A.D. 78; and its first civil day, Chaitra śukla I, is 3rd March in that year, as determined with reference either to the Hindu M’na-saṁkrānti or to the entrance of the sun into the tropical Pisces. The year 1823 began in A.D. 1900.

Regarding the origin of the Śaka era, there was current in the 10th and 11th centuries A.D. a belief which, ignoring the difference of a hundred and thirty-five years between the two reckonings, connected the legendary king Vikrāmaditya of Ujjain, mentioned above under the Vikrama era, with the foundation of this era also. The story runs, from this point of view, that the Śakas were a barbarous people who established themselves in the western and north-western dominions of that king, but were met in battle and destroyed by him, and that the era was established in celebration of that event. The modern belief, however, ascribes the foundation of this era to a king Śālivāhana of Pratishṭhāna, which is the modern Paiṭhaṇ, on the Gōdāvarī, in the Nizam’s dominions. But in this case, again, research has shown that the facts are very different. Like the Vikrama era, the Śaka era owes its existence to foreign invaders. It was founded by the Chhaharāta or Kshaharāta king

Nahapāna, who appears to have been a Pahlava or Palhava, *i.e.* of Parthian extraction, and who reigned from A.D. 78 to about 125.[9] He established himself first in Kāṭhiāwār, but subsequently brought under his sway northern Gujarāt (Bombay) and Ujjain, and, below the Narbadā, southern Gujarāt, Nāsik and probably Khāndēsh. His capital seems to have been Dōhad, in the Pańch Mahāls. And he had two viceroys: one, named Bhūmaka, of the same family with himself, in Kāṭhiāwār; and another, Chashṭana, son of Ghsamotika, at Ujjain. Soon after A.D. 125, Nahapāna was overthrown, and his family was wiped out, by the Sātavāhana-Sātakarṇi king Gautamīputra-Śrī-Sātakarṇi, who thereby recovered the territories on the south of the Narbadā, and perhaps secured for a time Kāṭhiāwār and some other parts on the north of that river. Very soon, however, Chashṭana, or else his son Jayadāman, established his sway over all the territory which had belonged to Nahapāna on the north of the Narbadā; founded a line of Hinduized foreign kings, who ruled there for more than three centuries; and, continuing Nahapāna's regnal reckoning, established the era to which the name Śaka eventually became attached. Inscriptions and coins show that, up to at least the second decade of its fourth century, this reckoning had no specific appellation; its years were simply cited, in the usual fashion, as *varsha*, "the year (of such-and-such a number)." The reckoning was then taken up by the astronomers. And we find it first called Śakakāla, "the time or era of the Śakas," in an epochal date, the end of the year 427, falling in A.D. 505, which was used by the astronomer Varāhamihira (d. A.D. 587) in his Pańchasiddhāntikā. That this name came to be attached to it appears to be due to the points that, along with some of the Pahlavas or Palhavas and the Yavanas or descendants of the Asiatic Greeks, some of the Śakas, the Scythians, had made their way into Kāṭhiāwār and neighbouring parts by about A.D. 100, and that the Śakas incidentally came to acquire prominence in the memory of the Hindus regarding these occurrences, in such a manner that their name was selected when the occasion arose to devise an appellation for an era the exact origin of which had been forgotten. The name of the imaginary king Sālivāhana first figures in connexion with the era in a record of A.D. 1272, and seems plainly to have been introduced in imitation of the coupling of the name Vikrama, Vikramāditya, with the era of B.C. 58.

> That the Śaka era, though it had its origin in the south-west corner of Northern India, is essentially an era of Southern India, is proved by its inscriptional and numismatic history. During the period before the time when it was taken up by the astronomers, it is found only in the inscriptions of Nahapāna, and in the similar records and on the coins of the descendants of Chashṭana. After that same time, it figures first in a record of the Chalukya king Kīrtivarman I., at Bādāmi in the Bijāpūr district, Bombay, which is dated on the full-moon day of the month Kārttika, falling in A.D. 578, "when there had elapsed five centuries of the years of the anointment of the Śaka king to the sovereignty." And from this date onwards the records of a large part of Southern India are mostly dated in this era, by various expressions all of which include the term Śaka or Śāka. In Northern India the case is very different. We have a record dated in the month Kārttika, the Śaka year 631 (expired), falling in A.D. 709: it comes from Multāī in the Bētūl district, Central Provinces, that is, from the south of the Narbadā; but it belongs to Gujarāt (Bombay), and perhaps to the north, though more probably to the south, of that province. But, setting that aside, the earliest inscriptional instance of the use of this era in Northern India, outside Kāṭhiāwār and Gujarāt, is found in a record of A.D. 862 at Dēōgaṛh near Lalitpūr, the headquarters town of the Lalitpūr district, United Provinces of Agra and Oude; here, however, the record is primarily dated, with the full details of the month, &c., in "Saṁvat 919," that is, in the Vikrama year 919; it is only as a subsidiary detail that the Śaka year 784 is given in a separate passage at the end of the record, a sort of postscript. From this date onwards the era is found in other records of Northern India, but to any appreciable extent only from A.D. 1137, and to only a very small extent in comparison with the Vikrama and other northern eras; and the cases in which it was used exclusively there, without being coupled with one or other of the northern reckonings, are still more conspicuously few. In short, the general position is that the Śaka era has been essentially foreign to Northern India until recent times; it was used there quite exceptionally and sporadically, and in very few cases indeed at any appreciable distance from the dividing-line between the north and the south. That it found its way into Northern India, outside Kāṭhiāwār and northern Gujarāt at all, is unquestionably due to its use by the astronomers. It also travelled, across the sea, by the 7th century A.D. to Cambodia, and somewhat later to Java; to which parts it was doubtless taken in almanacs, or in invoices, statements of account, &c., by the persons engaged in the trade between Broach and the far east via Tagara (Tēr) and the east coast. It also found its way in subsequent times to Assam and Ceylon, and more recently still to Nēpāl.

III. Other Reckonings

The Cycles of Jupiter.

We come now to certain reckonings consisting of cycles, and will take first the cycles of Guru or Bṛihaspati, Jupiter. This planet, a very conspicuous object in eastern skies, requires a period of 4332.6 days, = 50.4 days less than twelve Julian years, to make a circuit of the heavens, and has provided the Hindus with two reckonings, each in more than one variety; a cycle of twelve years, and a cycle of sixty years. The years of Jupiter, in all their varieties, are usually styled *saṁvatsara*; and it is convenient to use this term here, in order to preserve clearly the distinction between them and the solar and lunar years. The *saṁvatsaras* have no divisions of their own; the months, days, &c., cited with them are those of the ordinary solar or lunar calendar, as the case may be.

The older reckoning of Jupiter appears to be that of the 12-years cycle, which is found in two

varieties; in both of them the *saṁvatsaras* bear, according to certain rules which need not be explained here, the same names with the lunar months, Chaitra, Vaiśākha, &c. In one variety, each *saṁvatsara* runs from one of the planet's heliacal risings—that is, from the day on which it becomes visible as a morning star on the eastern horizon—to the next such rising; and the length of such a *saṁvatsara*, according to the Hindu data, is from 392 to 405 days, with an average of 399 days. Inscriptional instances of the use of this cycle are found in six of the Gupta records of Northern India, ranging from A.D. 475 to 528.

The 12-years Cycle.

In the other variety of the 12-years cycle, which is mentioned in astronomical works from the time of Āryabhaṭa onwards (b. A.D. 476), the *saṁvatsaras* are regulated by Jupiter's course with reference to his mean motion and mean longitude: a *saṁvatsara* of this variety commences when Jupiter thus enters a sign of the zodiac, and lasts for the time occupied by him in traversing that sign from the same point of view; and the period taken by him to do that—that is, the duration of such a *saṁvatsara*—is slightly in excess, according to the Hindu data, of 361.02 days, which amount is very close to the actual fact, 361.05 days. Inscriptional instances of the use of this cycle are perhaps found in two records of Southern India of the Kadamba series, belonging to about A.D. 575.

The 12-years mean-sign cycle seems to be still used in some parts. And the heliacal risings of Jupiter, as also, indeed, those of the other planets, are shown in almanacs for astrological purposes. In either variety, however, the 12-years cycle is now chiefly of antiquarian interest.

The cycle of Jupiter now in general use is a cycle of sixty years, the *saṁvatsaras* of which bear certain special names, Prabhava, Vibhava, Śukla, Pramōda, &c., again in accordance with certain rules which we need not explain here. This cycle exists in three varieties.

The 60-years cycle.

According to the original constitution of this cycle, the *saṁvatsaras* are determined as in the second or mean-sign variety of the 12-years cycle: each *saṁvatsara* commences when Jupiter enters a sign of the zodiac with reference to his mean motion and longitude; and it lasts for slightly more than 361.02 days. This variety is traced back in inscriptional records to A.D. 602, and is still used in Northern India.

Now, the *saṁvatsaras* are calculated by means of the astronomical solar year commencing with the Mēsha-saṁkrānti, the entrance of the sun into the sign Mēsha (Aries). The process gives the number of the *saṁvatsara* last expired before any particular Mēsha-saṁkrānti, with a remainder denoting the portion of the current *saṁvatsara* elapsed up to the same time; and the remainder, reduced to months, &c., gives the moment of the commencement of the current *saṁvatsara*, by reckoning back from the Mēsha-saṁkrānti. As the result, apparently, of unwillingness to take the trouble to work out the full details, at some time about A.D. 800 a practice arose, in some quarters, according to which that *saṁvatsara* of the 60-years cycle which was current at any particular Mēsha-saṁkrānti was taken as coinciding with the astronomical solar year beginning at that *saṁkrānti*, and with the Chaitrādi lunar year belonging to that same solar year. And this practice set up a lunisolar variety of the cycle, in connexion with which we have to notice the following point. While the duration of a mean-sign *saṁvatsara* is closely about 361.02 days, the length of the Hindu astronomical solar year is closely about 365.258 days. It consequently happens, after every 85 or 86 years, that a mean-sign *saṁvatsara* begins and ends between two successive Mēsha-saṁkrāntis. In the mean-sign cycle, such a *saṁvatsara* retains its existence unaffected; and the names Prabhava, Vibhava, &c., run on without any interruption. According to the lunisolar system, however, the position is different; the *saṁvatsara* beginning and ending between the two Mēsha-saṁkrāntis is expunged or suppressed, in the sense that its name is omitted and is replaced by the next name on the list. The second variety of the 60-years cycle, thus started, ran on alongside of the mean-sign variety, and, being eventually transferred, with that variety, to Northern India, is now known as the northern lunisolar variety. It preserves a connexion between the *saṁvatsaras* and the movements of Jupiter: but the connexion is an imperfect one; and both in this variety, and still more markedly in the remaining one still to be described, the *saṁvatsaras* practically became mere appellations for the solar and lunar years.

Meanwhile, just after A.D. 900, another development occurred, and there was started a third variety, which is now known as the southern lunisolar variety. The precise year in which this happened depends on the particular authority that we follow. If we take the elements adopted in the Sūrya-Siddhānta as the proper data for that time and for the locality—Western India below the Narbadā—to which the early history of the cycle belongs, the position was as follows. At the Mēsha-saṁkrānti in A.D. 908 there was current, by the mean-sign system, the *saṁvatsara* No. 2, Vibhava: but No. 4, Pramōda, was current by the same system at the Mēsha-saṁkrānti in A.D. 909; and No. 3, Śukla, began and ended between the two Mēsha-saṁkrāntis. Accordingly, No. 2, Vibhava, was the lunisolar *saṁvatsara* for the Mēshādi solar year and the Chaitrādi lunar year commencing in A.D. 908; and by the strict lunisolar system, which was adhered to by some people and is now known as the northern lunisolar system, it was followed in A.D. 909 by No. 4, Pramōda, the name of the intermediate *saṁvatsara*, No. 3, Śukla, being passed over. On the other hand, whether through oversight, or whatever the reason may have been, by other people the name of No. 3, Śukla, was not passed over, but that *saṁvatsara* was taken as the lunisolar *saṁvatsara* for the Mēshādi solar year and the Chaitrādi lunar year beginning in A.D. 909, and No. 4, Pramōda, followed it in A.D. 910. On subsequent similar occasions, also, there was, in the same quarters, no passing over of the name of

any *saṁvatsara*. And this practice established itself in Southern India, to the exclusion there of the mean-sign and the northern lunisolar varieties; the discrepancy between the last-mentioned variety and the variety thus set up continuing, of course, to increase by one *saṁvatsara* after every 85 or 86 years. In this variety, the southern lunisolar variety, all connexion between the *saṁvatsaras* and the movements of Jupiter has now been lost.

The present position of the 60-years cycle in its three varieties may be illustrated thus. In Northern India, by the mean-sign system the *saṁvatsara* No. 46, Paridhāvin, began, according to different authorities, in August, September or October, A.D. 1899. Consequently, by the northern or expunging lunisolar system, that same *saṁvatsara*, No. 46, Paridhāvin, coincided with the Mēshādi civil solar year beginning with or just after 12th April, and with the Chaitrādi lunar year beginning with 31st March, A.D. 1900. But by the southern or non-expunging lunisolar system those same solar and lunar years were No. 34, Śarvarin.

The treatment of the cycles of Jupiter in the Sanskrit books shows that it was primarily from the astrological point of view that they appealed to the Hindus; it was only as a secondary consideration that they acquired anything of a chronological nature. For the practical application of any of them to historical purposes, it is, of course, necessary that, along with the mention of a *saṁvatsara*, there should always be given the year of some known era, or some other specific guide to the exact period to which that *saṁvatsara* is to be referred. But it is fortunately the case that the *saṁvatsaras* have been but rarely cited in the inscriptional records without such a guide, of some kind or another.

The Saptarshi reckoning.

The Saptarshi reckoning is used in Kashmīr, and in the Kāṇgra district and some of the Hill states on the south-east of Kashmir; some nine centuries ago it was also in use in the Punjab, and apparently in Sind. In addition to being cited by such expressions as Saptarshi-saṁvat, "the year (so-and-so) of the Saptarshis," and Śāstra-saṁvatsara, "the year (so-and-so) of the scriptures," it is found mentioned as Lōkakāla, "the time or era of the people," and by other terms which mark it as a vulgar reckoning. And it appears that modern popular names for it are Pahāṛī-saṁvat and Kachchā-saṁvat, which we may render by "the Hill era" and "the crude era." The years of this reckoning are lunar, Chaitrādi; and the months are *pūrṇimānta* (ending with the full-moon). As matters stand now, the reckoning has a theoretical initial point in 3077 B.C.; and the year 4976, more usually called simply 76, began in A.D. 1900; but there are some indications that the initial point was originally placed one year earlier.

The idea at the bottom of this reckoning is a belief that the Saptarshis, "the Seven Rishis or Saints," Marīchi and others, were translated to heaven, and became the stars of the constellation Ursa Major, in 3076 B.C. (or 3077); and that these stars possess an independent movement of their own, which, referred to the ecliptic, carries them round at the rate of 100 years for each *nakshatra* or twenty-seventh division of the circle. Theoretically, therefore, the Saptarshi reckoning consists of cycles of 2700 years; and the numbering of the years should run from 1 to 2700, and then commence afresh. In practice, however, it has been treated quite differently. According to the general custom, which has distinctly prevailed in Kashmīr from the earliest use of the reckoning for chronological purposes, and is illustrated by Kalhaṇa in his history of Kashmīr, the *Rājataraṁgiṇī*, written in A.D. 1148-1150, the numeration of the years has been centennial; whenever a century has been completed, the numbering has not run on 101, 102, 103, &c., but has begun again with 1, 2, 3, &c. Almanacs, indeed, show both the figures of the century and the full figures of the entire reckoning, which is treated as running from 3076 B. C., not from 376 B.C. as the commencement of a new cycle, the second; thus, an almanac for the year beginning in A.D. 1793 describes that year as "the year 4869 according to the course of the Seven Ṛishis, and similarly the year 69." And elsewhere sometimes the full. figures are found, sometimes the abbreviated ones; thus, while a manuscript written in A.D. 1648 is dated in "the year 24" (for 4724), another, written in A.D. 1224 is dated in "the year 4300." But, as in the *Rājataraṁgiṇī*, so also in inscriptions, which range from A.D. 1204 onwards, only the abbreviated figures have hitherto been found. Essentially, therefore, the Saptarshi reckoning is a centennial reckoning, by suppressed or omitted hundreds, with its earlier centuries commencing in 3076, 2976 B.C., and so on, and its later centuries commencing in A.D. 25, 125, 225, &c.; on precisely the same lines with those according to which we may use, *e.g.* 98 to mean A.D. 1798, and 57 to mean A.D. 1857, and 9 to mean A.D. 1909. And the practical difficulties attending the use of such a system for chronological purposes are obvious; isolated dates recorded in such a fashion cannot be allocated without some explicit clue to the centuries to which they belong. Fortunately, however, as regards Kashmīr, we have the necessary guide in the facts that Kalhaṇa recorded his own date in the Śaka era as well as in this reckoning, and gave full historical details which enable us to determine unmistakably the equivalent of the first date in this reckoning cited by him, and to arrange with certainty the chronology presented by him from that time.

The belief underlying this reckoning according to the course of the Seven Ṛishis is traced back in India, as an astrological detail, to at least the 6th century A.D. But the reckoning was first adopted for chronological purposes in Kashmīr and at some time about A.D. 800; the first recorded date in it is one of "the year 89," meaning 3889, = A.D. 813-814, given by Kalhaṇa. It was introduced into India between A.D. 925 and 1025.

The

The Grahaparivṛitti is a reckoning which is used in the southernmost parts of Madras, particularly in the Madura district. It consists of cycles of 90 Mēshādi solar years, and is said, in conformity with its name, which means "the revolution of planets," to be made up by the sum of the days in 1 revolution of the sun, 22 of Mercury, 5 of Venus, 15 of Mars, 11 of Jupiter,

Grahaparivṛitti cycle. and 29 of Saturn. The first cycle is held to have commenced in 24 B.C., the second in A.D. 67, and so on; and, in accordance with that view, the year 34, which began in A.D. 1900, was the 34th year of the 22nd cycle.

No inscriptional use of this cycle has come to notice. There seems no substantial reason for believing that the reckoning was really started in 24 B.C. The alleged constitution of the cycle, which appears to be correct within about twelve days, and might possibly be made apparently exact, suggests an astrological origin. And, if a guess may be hazarded, we would conjecture that the reckoning is an offshoot of the southern lunisolar variety of the 60-years cycle of Jupiter, and had its real origin in some year in which a Prabhava *samvatsara* of that variety commenced, and to which the first year of a Grahaparivṛitti cycle can be referred: that was the case in A.D. 967 and at each subsequent 180th year.

In part of the Gañjām district, Madras, there is a reckoning, known as the Oṅko or Aṅka, *i.e.* literally "the number or numbers," consisting of lunar years, each commencing with Bhādrapada śukla 12, which run theoretically in cycles of 59 years. But the reckoning has the peculiarity that, whether the explanation is to be found in a superstition about certain numbers or in some other reason, the year 6, and any year the number of which ends with 6 or 0 (except the year 10), is omitted from the numbering; so that, for instance, the year 7 follows next after the year 5. The origin of the reckoning is not known. But the use of it seems to be traceable in records of the Gaṅga kings who reigned in that part of the country and in Orissa in the 12th and following centuries. And the initial day, Bhādrapada śukla 12, which figures again in the Vilayāti and Amli reckoning of Orissa (see farther on), is perhaps to be accounted for on the view that this day was the day of the anointment, in the 7th century, of the first Gāṅga king, Rājasiṁha-Indravarman I.

The Oṅko cycle.

In the Chittagong district, Bengal, there is a solar reckoning, known by the name Maghī, of which the year 1262 either began or ended in A.D. 1900; so that it has an initial point in A.D. 639 or 638. It appears that Chittagong was conquered by the king of Arakan in the 9th century, and remained usually in the possession of the Maghs—the Arakanese or a class of them—till A.D. 1666, when it was finally annexed to the Mogul empire. In these circumstances it is plain that the Magh reckoning took its name from the Maghs; its year, which is Mēshādi, from Bengal; and its numbering from the Sakkarāj, the ordinary era of Arakan and Burma, which has its initial point in A.D. 638.

The Maghī reckoning.

The Hijra (Hegira) era, the reckoning from the flight of Mahomet, which dates from the 16th of July, A.D. 662, is, of course, used by the Mahommedans in India, and is customarily shown, with the details of its calendar, in the Hindu almanacs. An account of it does not fall within the scope of this article. But we have to mention it because we come now to certain Hinduized reckonings which are hybrid offshoots of it. We need only say, however, in explanation of some of the following figures, that the years of the Hijra era are purely lunar, consisting of twelve lunar months and no more; with the result that the initial day of the year is always travelling backwards through the Julian year, and makes a complete circuit in thirty-four years. The reckonings derived from it, which we have to describe, have apparent initial points in A.D. 591, 593, 594, and 600. They had their real origin, however, in the 14th, 16th, and 17th centuries.

Hinduized offshoots of the Hijra era.

The emperor Akbar succeeded to the throne in February, A.D. 1556, in the Hijra year 963, which ran from 16th November 1555 to 3rd November 1556. Amongst the reforms aimed at by him and his officials, one was to abolish, or at least minimize, by introducing uniformity of numbering, the confusion due to the existence of various reckonings, both Mahommedan and Hindu. And one step taken in that direction was to assign to the Hindu year the same number with the Hijra year. It is believed that this was first done by the Persian clerks of the revenue and financial offices at an early time in Akbar's reign, and that it received authoritative sanction in the Hijra year 971 (21st August 1563 to 8th August 1564). At any rate, the innovation was certainly first made in Upper India; and the numbering started there was introduced into Bengal and those parts as Akbar extended his dominions, but without interfering with local customs as to the commencement of the Hindu year. The result is that we now have the following reckonings, the years of which are used as revenue years:—

In the United Provinces and the Punjab, there is an Āśvinādi lunar reckoning, known as the Fasli, according to which the year 1308 began in A.D. 1900; so that the reckoning has an apparent initial point in A.D. 593. The name of this reckoning is derived from *faṣl*, "a harvest," of which there are two; the *faṣl-i-rabī* or "spring harvest," commencing in February, and the *faṣl-i-kharīf*, or "autumn harvest" commencing in October. The years of this reckoning begin with the *pūrṇimānta* Āśvina krishna 1, which now falls in September. A peculiar feature of it is that, though the months are lunar, they are not divided into fortnights, and the numbering of the days runs on, as in the Mahommedan month, from the first to the end of the month without being affected by any expunction and repetition of *tithis*; and, for this and other reasons, it seems that in this case a new form of Hindu year was devised, of such a kind as to enable the agriculturists to realize their produce and pay their assessments comfortably within the year. The Hijra era has, of course, now drawn somewhat widely away from this and the other reckonings derived from it; the Hijra year commencing in A.D. 1900 was 1318, ten years in advance of the Fasli year.

The Fasli reckoning of Upper India.

In Orissa and some other parts of Bengal, there is a reckoning, or two almost identical reckonings, the facts of which are not quite clear. According to one account, the term Amli-san, "the official year," is only another name of the Vilāyati-san, "the year received from the *vilāyat* or province of Hindustān." But we are also told that the Vilāyati-san is a Kanyādi solar year, whereas the Amli-san, though it too has solar months, changes its number on the lunar day Bhādrapada śukla 12 (mentioned above in connexion with the Oṅko cycle of Orissa), which comes sometimes in Kanyā, but sometimes in the preceding month, Siṁha. Elsewhere, again, it is the Vilāyati-san which is shown as changing its number on Bhādrapada śukla 12. In either case, the year 1308 of this reckoning, also, began in A.D. 1900; and so, like the Fasli of Upper India, this reckoning, too, has an apparent initial point in A.D. 593. The day Bhādrapada śukla 12 now usually falls in September, but may come during the last three days of August. The first day of the solar month Kanyā now falls on 15th or 16th September.

The Vilāyati-san and Amli-san of Orissa.

In Bengal there is in more general use a Mēshādi solar reckoning, known as the Bengāli-san or "Bengal year," according to which the year 1307 began in A.D. 1900; so that this reckoning has an apparent initial point in A.D. 594. The initial day of the year is the first day of the solar month Mēsha, now falling on 12th or 13th April.

The Bengāli-san.

The system of Fasli reckonings was introduced into Southern India under the emperor Shāh Jahān, at some time in the Hijra year 1046, which ran from 26th May, A.D. 1636, to 15th May, A.D. 1637. But the numbering which was current in Northern India was not taken over. A new start was made; and, as the year of the Hijra had gone back, during the intervening seventy-three Julian years, by two years and a quarter (less by only five days) from the date of its commencement in the year 971, the Fasli reckoning of Southern India began with a nominal year 1046 (instead of 971 + 73 = 1044), commencing in A.D. 1636. The Fasli reckoning of Southern India exists in two varieties. The years of the Bombay Fasli are popularly known as Mrigasāl years, because they commence when the sun enters the *nakshatra* Mṛigaśiras, which occurs now on 6th or 7th June: the reckoning seems to have taken over this initial day from the Marāṭhā Sūr-san (see below). The Fasli years of Madras originally began at the Karka-saṁkrānti, the nominal summer solstice: under the British government, the commencement of them was first fixed to 12th July, on which day the *saṁkrānti* was then usually occurring; but it was afterwards changed to 1st July as a more convenient date. The years of the Bombay and Madras Fasli have no division of their own into months, fortnights, &c.; the year is always used along with one or other of the real Hindu reckonings, and the details are cited according to that reckoning.

The Fasli of Bombay and Madras.

Another offshoot of the Hijra era, but one of earlier date and not belonging to the class of Fasli reckonings, is found, in the Marāṭhā country, in the Sūr-san or Shahūr-san, "the year of months," also known as Arabī-san, "the Arab year." This reckoning, which is met with chiefly in old *sanads* or charters, appears to have branched off in or closely about the Hijra year 745, which ran from 15th May, A.D. 1344, to 3rd May, A.D. 1345; but the exact circumstance in which it originated is not known. The years of this reckoning begin, like those of the Bombay Fasli, with the entrance of the sun into the *nakshatra* Mṛigaśiras, which now occurs on 6th or 7th June; but the months and days are those of the Hijra year. The Sūr-san year 1301 began in A.D. 1900; and so the reckoning has an apparent initial point in A.D. 600. A peculiarity attending this reckoning is that, whatever may be the vernacular of a clerk, he uses the Arabic numeral words in reading out the year; and the same words are given alongside of the figures in the Hindu almanacs.

The Marāṭhā Sūr-san or Arabī-san.

Authorities.—The Hindu astronomy had already begun to attract attention before the close of the 18th century. The investigation, however, of the calendar and the eras, along with the verification of dates, was started by Warren, whose *Kala Sankalita* was published in 1825. The inquiry was carried on by Prinsep in his *Useful Tables* (1834-1836), by Cowasjee Patell in his *Chronology* (1866), and by Cunningham in his *Book of Indian Eras* (1883). But Warren's processes, though mostly giving accurate results, were lengthy and troublesome; and calculations made on the lines laid down by his successors gave results which might or might not be correct, and could only be cited as approximate results. The exact calculation of Hindu dates by easy processes was started by Shankar Balkrishna Dikshit, in an article published in the *Indian Antiquary*, vol. 16 (1887). This was succeeded by methods and tables devised by Jacobi, which were published in the next volume of the same journal. There then followed several contributions in the same line by other scholars, some for exact, others for closely approximate, results, and some valuable articles by Kielhorn on some of the principal Hindu eras and other reckonings, which were published in the same journal, vols. 17 (1888) to 26 (1897). And the treatment of the matter culminated for the time being in the publication, in 1896, of Sewell and Dikshit's *Indian Calendar*, which contains an appendix by Schram on eclipses of the sun in India, and was supplemented in 1898 by Sewell's *Eclipses of the Moon in India*. The present article is based on the above-mentioned and various detached writings, supplemented by original research. For the exact calculation of Hindu dates and the determination of the European equivalents of them, use may be made either of Sewell and Dikshit's works mentioned above, or of the improved tables by Jacobi which were published in the *Epigraphia Indica*, vols. 1 and 2 (1892-1894).

(J. F. F.)

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1 The disregard of precession, and the consequent travelling forward of the year through the natural seasons, is, of course, a serious defect in the Hindu calendar, the principles of which are otherwise good. Accordingly, an attempt was made by a small band of reformers to rectify this state of things by

introducing a precessional calendar, taking as the first lunar month the synodic lunation in which the sun enters the tropical Aries, instead of the sidereal Mēsha; and the publication was started, in or about 1886, of the Sāyana-Pañchāng or "Precessional Almanac."

Further, the Hindu sidereal solar year is in excess of the true mean sidereal year by (if we use Āryabhaṭa's value) 3 min. 20.4 sec. If we take this, for convenience, at 3 min. 20 sec., the excess amounts to exactly one day in 432 years. And so even the sidereal Mēsha-saṁkrānti is now found to occur three or four days later than the day on which it should occur. Accordingly, another reformer had begun, in or about 1865, to publish the Navīn athavā Paṭwardhanī Pañchāng, the "New or Paṭwardhanī Almanac," in which he determined the details of the year according to the proper Mēsha-saṁkrānti.

2 It might also be called Pausha, because the sun enters Makara in the course of it; and it may be observed that, in accordance with a second rule which formerly existed, it would have been named Pausha because it ends while the sun is in Makara, and the omitted name would have been Mārgaśira. But the more important condition of the present rule, that Pausha begins while the sun is in Dhanus, is not satisfied.

3 The well-known Metonic cycle, whence we have by rearrangement our system of Golden Numbers, naturally suggests itself; and we have been told sometimes that that cycle was adopted by the Hindus, and elsewhere that the intercalation of a month by them generally takes place in the years 3, 5, 8, 11, 14, 16, and 19 of each cycle, differing only in respect of the 14th year, instead of the 13th, from the arrangement which is said to have been fixed by Meton. As regards the first point, however, there is no evidence that a special period of 19 years was ever actually used by the Hindus during the period with which we are dealing, beyond the extent to which it figures as a component of the number of years, 19 × 150 = 2850, forming the lunisolar cycle of an early work entitled *Rōmaka-Siddhānta*; and, as was recognized by Kalippos not long after the time of Meton himself, the Metonic cycle has not, for any length of time, the closeness of results which has been sometimes supposed to attach to it; it requires to be readjusted periodically. As regards the second point, the precise years of the intercalated months depend upon, and vary with, the year that we may select as the apparent first year of a set of 19 years, and it is not easy to arrange the Hindu years in sets answering to a direct continuation of the Metonic cycle.

4 It is customary to render the term *tithi* by "lunar day:" it is, in fact, explained as such in Sanskṛit works; and, as the *tithis* do mark the age of the moon by periods approximating to 24 hours, they are, in a sense, lunar days. But the *tithi* must not be confused with the lunar day of western astronomy, which is the interval, with a mean duration of about 24 hrs. 54 min., between two successive meridian passages of the moon.

5 We illustrate the ordinary occurrences. But there are others. Thus, a repeated *tithi* may occasionally be followed by a suppressed one: in this case the numbering of the civil days would be 6, 7, 7, 9, &c., instead of 6, 7, 7, 8, 9, &c. Or it may occasionally be preceded by a suppressed one: in this case the numbering would be 5, 7, 7, 8, &c., instead of 5, 6, 7, 7, 8, &c.

6 It is always to be borne in mind that, as already explained, while the Hindu Mēsha answers to our Aries, it does not coincide with either the sign or the constellation Aries.

7 We select A.D. 1900 as a gauge-year, in preference to the year in which we are writing, because its figures are more convenient for comparative purposes. In accordance with the general tendency of the Hindus to cite expired years, the almanacs would mostly show 5001 (instead of 5002) as the number for the Kaliyuga year answering to A.D. 1900-1901. And, for the same reason, this reckoning has often been called the Kaliyuga era of 3101 B.C. There is, perhaps, no particular objection to that, provided that we then deal with the Vikrama and Śaka eras on the same lines, and bear in mind that in each case the initial point of the reckoning really lies in the preceding year. But we prefer to treat these reckonings with exact correctness.

8 It may be remarked that there are about twelve different views regarding the date of Kaṇishka and the origin of the Vikrama era. Some writers hold that Kaṇishka began to reign in A.D. 78, and founded the so-called Śaka era beginning in that year; one writer would place his initial date about A.D. 123, others would place it in A.D. 278. The view maintained by the present writer was held at one time by Sir A. Cunningham: and, as some others have already begun to recognize, evidence is now steadily accumulating in support of the correctness of it.

9 See the preceding note.

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