

gress, and the duchy at that time may be looked upon as a bulwark or mark against the Slavs in the south-east of Germany, just as the duchy of Prussia was in the north-east. Henry extended his sway much beyond the limits of Silesia, and in fact united under his sceptre nearly three quarters of the old Polish dominions. His son Henry II. (1238-1241) had a short reign with a glorious end, falling in 1241 at the battle of Liegnitz, where his determined resistance turned back from Germany the alarming Mongolian invasion. On his death his territories were shared among his sons, and the series of divisions and subdivisions began which resulted in almost every Silesian town of any importance becoming the capital of an independent prince. At the beginning of the 14th century there were no fewer than 17 principalities of this kind, nearly all held by dukes of the Piast family. It was inevitable that these petty rulers should feel the want of a support against the encroachments of Poland, and it was inevitable, too, that the relation opened in consequence with Bohemia should gradually change from mere protection to feudal supremacy. By 1355 the supremacy of Bohemia was formally recognized as extending over the whole of Silesia, though the Silesians retained a considerable measure of independence, including the right to hold general diets for the settlement of their internal relations. The kings of Bohemia at this time (John, Charles IV.) were members of the German house of Luxemburg, and Silesia under their sway may be looked upon as an entirely German land.

During the Hussite wars of the 15th century Silesia, which adhered zealously to the old faith, suffered greatly from Hussite forays. The Luxemburg dominion broke up in 1458, when Hungary and Bohemia elected rulers of their own nationality. Silesia, however, neglected the opportunity to elect a German king for itself, and supported the Bohemian king George Podiebrad. Breslau, still the most powerful of the principalities, threw in its lot with Matthew Corvinus of Hungary, who fought many of his battles on Silesian soil. By the treaty of Olmütz in 1479 Matthew acquired all the tributary lands of the Bohemian crown, including Silesia, which remained attached to Hungary down to 1490. In that year Bohemia and Hungary became once more united under the same king. In 1526 Silesia passed with the rest of the Bohemian inheritance to the house of Hapsburg (see *BOHEMIA*). The Reformation at first made rapid progress in Silesia, and the native dukes placed little opposition in its way. The Hapsburg princes, however, acted very differently, and the Silesian Protestants suffered much persecution before, during, and after the Thirty Years' War. It was not indeed till the 18th century that they acquired formal recognition and the restoration of some of their confiscated churches.

The First Silesian War between Austria and Prussia, which broke out in 1740, had its ultimate cause (nominally at least) in a compact of mutual succession entered into in 1537 by the elector of Brandenburg on the one side and the duke of Liegnitz on the other. The emperor, as feudal superior of the duke, had indeed refused to recognize this agreement, but the Great Elector did not fail to put in his claim on the death of the last duke in 1675, and Frederick now thought the opportunity too good to be lost. The progress of the three Silesian wars is recounted in the article *AUSTRIA* (vol. iii. p. 127-129). At the peace of Hubertusburg (1763) Prussia was left in possession of nearly the whole of Silesia, with the frontier as it still exists. Frederick exerted himself to atone for the evils brought upon the district through the ravages of war by introducing colonists and capital, reforming the administration, granting complete religious liberty, and

the like. That this seed did not fall on ungrateful soil seems proved by the modern prosperity of Silesia and the loyalty with which its inhabitants have clung to the Prussian cause. Silesia formed part of the reduced kingdom of Prussia left by the peace of Tilsit in 1806, and it was the centre of the national rising of 1813, when the king issued his celebrated address "To my People" from Breslau. Stein's emancipating edict of 1807 was welcomed with profound satisfaction in Silesia, where the conditions of serfdom had been particularly oppressive, and no doubt contributed materially to the enthusiasm with which the Silesians flocked to the standard a few years later.¹

PRUSSIAN SILESIA, the largest province of Prussia (see vol. xx. plate I.), with an area of 15,560 square miles, forms the south-eastern limb of the kingdom, and is bounded by Brandenburg, Posen, Russian Poland, Galicia, Austrian Silesia, Moravia, Bohemia, and the kingdom and province of Saxony. Besides the bulk of the old duchy of Silesia, it comprises the countship of Glatz, a fragment of the Neumark, and part of Upper Lusatia, taken from Saxony in 1815. The province is divided into three governmental districts,—Liegnitz and Breslau corresponding to lower Silesia, while Oppeln takes in the greater part of upper, southern, or mountainous Silesia.

Physiographically Silesia is roughly divided into a flat and a hilly portion by the so-called Silesian Langenthal, which begins on the south-east near the Malapané, and extends across the province in a west-by-north direction to the Black Elster, following in part the valley of the Oder. The south-east part of the province, to the east of the Oder and south of the Malapané, consists of a hilly outpost of the Carpathians (the Tarnowitz plateau), with a mean elevation of about 1000 feet. To the west of the Oder the land rises gradually from the Langenthal towards the southern boundary of the province, which is formed by the central part of the Sudetic system, including the Glatz Mountains and the Riesengebirge (Schneekoppe, 5266 feet). Among the loftier elevations in advance of this southern barrier the most conspicuous is the Zobten (2215 feet), the historical connexion of which with the name of the province has been mentioned above. To the north and north-east of the Oder the province belongs almost entirely to the great North-German plain, though a hilly ridge, rarely attaining a height of 1000 feet, may be traced from east to west, asserting itself most definitely in the Katzegebirge. Nearly the whole of Silesia lies within the basin of the Oder, which flows through it from south-east to north-west, dividing the province into two approximately equal parts. The Vistula touches the province on the south-east, and receives a few small tributaries from it, while on the west the Spree and Black Elster belong to the system of the Elbe. The Iser rises among the mountains on the south. Among the chief feeders of the Oder are the Malapané (right), the Glatzer Neisse (left), the Katzbach (left), and the Bartsch (right); the Bober and Queiss flow through Silesia but join the Oder beyond the frontier. The only lake of any extent is the Schlawa See, 7 miles long, on the north frontier. There is a considerable difference in the climate of Lower and Upper Silesia, and some of the villages in the Riesengebirge have the lowest mean temperature of any inhabited place in Prussia (below 40° Fahr.).

Of the total area of the province 56 per cent. is occupied by arable land, 10·8 per cent. by pasture and meadow, and nearly 29 per cent. by forests. The soil along the foot of the mountains is generally good, and the district between Ratibor and Liegnitz, where 70 to 80 per cent. of the surface is under the plough, is reckoned one of the most fertile in Germany. The parts of lower Silesia adjoining Brandenburg, and also the district to the east of the Oder, are sandy and comparatively unproductive. The different cereals are all grown with success, wheat and rye sometimes in quantity enough for exportation. Flax is still a frequent crop in the hilly districts, and more sugar-beets are raised in Silesia than in any other Prussian province except Saxony. Tobacco, oil-seeds, chicory, and hops may also be specified, while a little wine, of an inferior quality is produced near Grünberg. Mulberry trees for the silk-culture have been introduced and thrive fairly. Large estates are the rule in Silesia, where 35 per cent. of the land is in the hands of owners possessing at least 250 acres, while properties of 50,000 to 100,000 acres are common. The districts of Oppeln and Liegnitz are among the most richly wooded parts of Prussia. According to the live-stock census for 1883, Silesia contains 275,122 horses, 1,397,130 cows, 1,309,495 sheep, 518,612 pigs, 175,283 goats, and 128,828 bee-hives. The merino sheep was introduced by Frederick the Great, and since then the Silesian

¹ Compare Grünhagen, *Geschichte Schlesiens* (Gotha, 1884 sq.). An account of the poetical schools of Silesia is given under the heading *GERMANY* (vol. x. pp. 530-1).

breed of sheep has been greatly improved. The woods and mountains harbour large quantities of game, such as red deer, roe deer, wild boars, and hares, while an occasional wolf finds its way into the province from the Carpathians. The fishery includes salmon in the Oder, trout in the mountain-streams, and carp in the small lakes or ponds with which the province is sprinkled. Compare the tables in *PRUSSIA* (vol. xx. p. 14).

The great wealth of Silesia, however, lies underground, in the shape of large stores of coal and other minerals, and its mining records go back to the 12th century. The coal-measures of Upper Silesia, in the south-east part of the province, are among the most extensive in continental Europe, and there is another large field near Waldenburg. The annual output, ranging between twelve and fifteen millions of tons, valued at nearly £3,000,000 sterling, is equal to more than a quarter of the entire yield of Germany. The district of Oppeln also contains a great quantity of iron (annual produce 750,000 to 800,000 tons, value about £1,000,000). The deposits of zinc in the vicinity of Beuthen are perhaps the richest in the world, and produce four-fifths of the zinc of Germany (550,000 tons). The remaining mineral products include lead (from which a considerable quantity of silver is extracted), copper, cobalt, arsenic, the rare metal cadmium, alum, brown coal, marble, and a few of the commoner precious stones (jaspers, agates, amethysts, &c.). The province contains practically no salt or brine springs, but there are well-known mineral springs at Warmbrunn, Salzbrunn, and several other places.

A busy manufacturing activity has long been united with the underground industries of Silesia, and the province in this respect yields the palm to no other part of Prussia except districts in the Rhineland and Westphalia. On the plateau of Tarnowitz the working and smelting of metals is naturally the predominant industry, and in the neighbourhood of Beuthen, Königshütte, and Gleiwitz there seems an almost endless succession of iron-works, zinc-foundries, machine-shops, and the like. In 1881 the total value of the metals produced in the various foundries of the province was £2,376,250. At the foot of the Riesengebirge, and along the southern mountain line generally, the textile industries prevail. Weaving has been practised in Silesia, on a large scale, since the 14th century; and Silesian linen still maintains its reputation, though the conditions of production have greatly changed. Cotton and woollen goods of all kinds are also made in large quantities, and among the other industrial products are beetroot sugar (157,000 tons in 1883-84), spirits, chemicals, tobacco, starch, paper, pottery, and "Bohemian glass." Lace, somewhat resembling that of Brussels, is made by the women of the mountainous districts. The trade of Silesia is scarcely so extensive as might be expected from its important industrial activity. On the east it is hampered by the stringent regulations of the Russian frontier, and the great waterway of the Oder is sometimes too low in summer for navigation. The extension of the railway system has, however, had its usual effect in fostering commerce, and the mineral and manufactured products of the province are freely exported.

At the census of 1880 the population of Silesia was 4,007,925, of whom 2,082,084 were Roman Catholics, 1,867,489 Protestants, and 52,682 Jews. About 35 per cent. of the population is urban and 65 per cent. rural. The density is 257 per square mile, less than that of Westphalia (262) and the Rhineland (390); but the average is of course very greatly exceeded in the industrial districts, such as Beuthen. The occupation census of 1883 shows that 44 per cent. of the population are supported by agriculture, 36 per cent. by industries, 8·4 per cent. by trade, and 2·2 per cent. by daily labour and domestic service, while 4 per cent. belong to the official and 5 per cent. to the unemployed classes. Nearly three-fourths of the inhabitants and territory are German, but to the east of the Oder the Poles (nearly 1,000,000) form the bulk of the population, while there are about 50,000 Czechs in the south part of the province and 30,000 Wends near Liegnitz. The Roman Catholics, most of whom are under the ecclesiastical sway of the prince-bishop of Breslau, are predominant in Upper Silesia and Glatz; the Protestants prevail in Lower Silesia, to the west of the Oder, and in Lusatia. The noblesse is very numerous in Silesia, chiefly in consequence of the Polish districts it includes. The educational institutions of the province are headed by the university of Breslau. In 1883-84 the percentage of illiterate recruits, in spite of the large Polish-speaking contingent, was only 1·70. The capital and seat of the provincial diet is Breslau, which is also by far the largest and most important town (298,893 inhabitants in 1885). The towns next in point of size are Görlitz (55,120 inhabitants), Liegnitz (43,351), Königshütte (31,831), Beuthen (26,478), Schweidnitz (23,775), Neisse (21,444), and Glogau (20,003). The province sends thirty-five members to the reichstag and sixty-five to the Prussian chamber of deputies. The government divisions of Breslau and Oppeln together form the district of the 6th army corps (seat, Breslau), while Liegnitz belongs to that of the 5th army corps, the headquarters of which are at Posen. Glogau, Glatz, Neisse, and Cosel are fortresses.

AUSTRIAN SILESIA, the part of the duchy that remained to

Austria after the Seven Years' War, is a mere fraction of the whole, its area being only 1980 square miles, or about one-eighth of that of Prussian Silesia. It falls into two small portions of territory, separated by a projecting limb of Moravia and surrounded by Prussian Silesia, Moravia, Hungary, and Galicia. Until 1849 it was for administrative purposes reckoned a part of Moravia, but since that year it has been a crownland of the Austrian empire (the smallest of all), with the style of duchy. The Troppau or western division of the crownland is flanked by the Sudetic Mountains (Altvater, 4678 feet), and the Teschen of eastern half by the Carpathians (Lissahorn, 4330 feet), and a great proportion of the surface is occupied by offshoots of these ranges. The Vistula rises on the Carpathians, within Austrian Silesia, while the western part of the crownland is close to the headwaters of the Oder, which rises near at hand in Moravia. Owing to its mountainous character and its slope towards the north and north-east the crownland has a somewhat severe climate for its latitude, the mean temperature being only 50° Fahr., while the annual rainfall varies from 20 to 30 inches. Upwards of 45 per cent. of the surface is occupied by arable land, 7½ per cent. by meadows and gardens, 10½ per cent. by pastures, and 32 per cent. by forests, while 4½ per cent. is unproductive ground. The soil cannot as a rule be termed rich, though some of the valleys are fertile. The chief crops are oats, rye, barley, potatoes, clover, and flax. Dairy-farming is carried on in the mountains after the Alpine fashion, and sheep are fairly numerous. Geese and pigeons are reared in great quantities, and the hunting and fishing are both very prolific. The principal mineral resources are coal (Silesia producing 13 per cent. of the produce of Austria-Hungary), iron, marble, and slate. Like its Prussian neighbour, the crownland boasts a very busy industrial activity, the chief products of which are its iron and steel goods, textile fabrics (linen, woollen, cotton, velvet, silk), chemicals, liqueurs, and beetroot sugar. The trade is chiefly a transit one, though the manufactures and agricultural produce of the province are exported in considerable quantity. Troppau, the capital of the duchy, contains large cloth manufactories, while Teschen, Bielitz, and Jägerndorf are also busy places. The population in 1885 was 577,593, of whom 81,000 were Protestants and 9000 Jews. About 43 per cent. of the population is supported by agriculture and 27·5 per cent. by industry. Divided according to nationalities, there are 275,000 Germans, 130,000 Czechs, and 158,000 Poles. The German element is predominant in the towns, the Polish in the eastern or Teschen division. The duchy sends ten members to the Austrian house of representatives and has a provincial diet of thirty-one members. (J. F. M.)

SILICA, the only known oxide of silicon (see *CHEMISTRY*, vol. v. pp. 521-524), occurs native in a great variety of forms, which, however, correspond to only the four distinct species of QUARTZ (*q.v.*; see also *MINERALOGY*, vol. xvi. p. 389), tridymite, OPAL (*q.v.*, and compare vol. xvi. p. 390), and siliceous earth. Ordinary quartz-rock and sand are more impure forms of quartz. Tridymite differs from quartz only by a lower specific gravity, and in crystallographic details; the crystals are as a rule arranged in triplets—hence the name (see vol. xvi. p. 389). Siliceous earth when dry forms a very voluminous, soft, fine powder; it consists of the shells of *Infusoria*. As a chemical species it differs little from opal. Siliceous earth, having a very low rate of thermal conductivity, serves well as a stuffing for the hollow walls of ice-chests, fire-proof safes, &c. It is used besides for the making of DYNAMITE (*q.v.*). Silica of any kind is absolutely non-volatile, and is fusible only at the temperature of the oxy-hydrogen flame; a slight admixture of base (potash, lime, &c.), however, suffices to cause it to "frit" at a red heat. It is absolutely proof against the action of water and ordinary mineral acids; hydrofluoric acid acts on it energetically, as explained in *CHEMISTRY*, vol. v. p. 522.

Alkaline Silicates.—Silica readily dissolves at a red heat in fused alkaline carbonates, with evolution of carbonic acid and formation of alkaline silicates. In this process one molecule SiO₂ of silica is capable of decomposing at most 2R₂OCO₃ (where R=K or Na). The compound SiO₂.2R₂O, "orthosilicate" of alkali, freezes into a compact non-transparent mass, readily soluble in water, with formation of an intensely alkaline solution. It does not unite with any additional alkali, but readily fuses up with more silica. Without going beyond a red heat it is easy to produce thus homogeneous masses of any composition, Na₂O.xSiO₂, from x=½ up to x= (at least) 4.

Compounds approximating to x=4 are known as *water glasses*. Potash water glass, K₂O.4SiO₂, was discovered in 1825 by Fuchs in

Munich, who noticed all its practically important properties and saw their significance. Water glass when in compact pieces looks like ordinary glass, and is not at all obviously attacked by cold water. But when the powdered substance is boiled with water it dissolves, and the solution can be boiled down to the consistence of a syrup without anything separating out even in the cold. Such water-glass syrup, when applied as a coating to wood, pasteboard, &c., dries up into a coherent varnish which renders the object non-inflammable, because in the heat of a fire the coating melts into a continuous viscid covering which prohibits access of oxygen to the interior. The early application of water glass to the scenery of the Munich court theatre explains its long immunity from destructive fires. When mixed with powdered chalk, magnesite, phosphate of lime, and many other similar materials, it gradually unites with these into hard stone-like masses. Caustic lime and magnesia (MgO) thus unite with it with exceptional promptitude, with elimination of alkali. Water glass, in short, is to the class of mineral substances referred to what ordinary glue is to wood and paper, &c., and it is used largely for analogous purposes. Fuchs himself based upon this property of his preparation a new process of wall painting which was subsequently developed and brought to great perfection by Kaulbach and others. In this process of "stereochromy," as it is called, the more immediate basis for the painting consists of a thin layer of a kind of cement made up of powdered marble, dolomite, quartz, and air-worn quicklime with water glass. On it the colours are laid with plain water, which causes them to stick on, but quite loosely, so that the artist can work at leisure and correct mistakes. The finished painting is fixed by applying to it a spray of water glass solution, which, in the course of a few days makes it perfectly fast. All that then remains to be done is to wash the painting with alcohol to remove the eliminated alkali and any dust that may have collected. A stereochromic painting (unlike one made by the old fresco process) is practically proof against atmospheric influences, even under a northern climate. In a water-glass solution the alkali is, so to say, only half combined with the silica; part of it in fact must be presumed to be present in the free state. At any rate the solution emulsionizes fats, and therefore is a cleansing agent in the same sense as soap-solution is. Water glass and other alkaline silicates are accordingly used as additions to some of the cheaper kinds of soap.

SILISTRIA, or SILISTRA, a fortified town on the south side of the Danube, 75 miles below Rustchuk, and 150 miles from the mouth of the river, is now at the head of a district in the principality of Bulgaria. In 1881 the population was 10,657.

Silistria is the Durostorum of the Romans, the Durostolos of the Byzantines, the Dŕstr of the Bulgarians. It was one of the most important towns of the Roman province of Mesia Inferior, successively the headquarters of the legio I. Italica and the legio XI. Claudia. It was defended by the Bulgarian czar Simeon against the Hungarians (893). Captured by Svyatoslaff, the Varian called to the assistance of the emperor Nicephorus (967), it was subsequently recovered by the Bulgarians after a three months' heroic defence. Under the Turks, whose rule began in the latter part of the 14th century, Silistria continued to flourish: Hajji Khalfa describes it as the most important of all the Danubian towns. It was the seat of a Greek metropolitan with five bishops under him; and a settlement of Ragusan merchants kept alive its commercial interests. The Russians, who captured Silistria in 1810, destroyed its fortifications before they withdrew; but they were rebuilt by foreign engineers, and in 1828-9 were strong enough to offer a serious resistance to the Russians, who lost 3000 men. At that date the population, including the garrison, was 24,000, but in 1837 it was only about 4000. In 1854 the town was successfully defended by General Krach against the Russians till the arrival of the Austrians in the peninsula. It was again invested by the Russians in 1877, and on the conclusion of peace was evacuated by the Turks.

SILIUS ITALICUS, a Latin epic poet, was born in 25 and died in 101 A.D. His birthplace is unknown. From his cognomen Italicus the conclusion has been drawn that he came from the town of Italica in Spain; but Latin usage would in that case have demanded the form *Italicensis*, and it is highly improbable that Martial would have failed to name him among the literary celebrities of Spain in the latter half of the 1st century. The conjecture that Silius was from Italica, the capital of the Italian confederation during the Social War, is open to still stronger objection. Most likely some ancestor of the poet acquired the title "Italicus" from having been a member of one of the corporations of "Italici" who are often mentioned

in inscriptions from Sicily and elsewhere. In early life Silius was a renowned forensic orator, later a safe and cautious politician, without ability or ambition enough to be legitimately obnoxious to the cruel rulers under whom he lived. But mediocrity was hardly an efficient protection against the murderous whims of Nero, and Silius was generally believed to have secured at once his own safety and his promotion to the consulship by putting his oratorical powers to discreditable use in the judicial farces which often ushered in the doom of the emperor's victims. He was consul in the year of Nero's death (69), and is mentioned by Tacitus as having been one of two witnesses who were present at the conferences between Vitellius and Flavius Sabinus, the elder brother of Vespasian, when the legions from the East were marching rapidly on the capital. The life of Silius after his consulship is well depicted by the younger Pliny:—"He conducted himself wisely and courteously as the friend of the luxurious and cruel Vitellius; he won repute by his proconsulship of Asia, and obliterated by the praiseworthy use he made of his leisure the stain he had incurred through his active exertions in former days. In dignity and contentment, avoiding power and therefore hostility, he outlived the Flavian dynasty, keeping to a private station after his governorship of Asia." His poem contains only two passages relating to the Flavians; in both Domitian is eulogized as a warrior; in one he figures as a singer whose lyre is sweeter than that of Orpheus himself. Silius had evidently little taste for bowing down in the house of Rimmon, and refrained from using the many opportunities which his epic afforded for humouring the vanity of the imperial house. He was a great student and patron of literature and art, and a passionate collector. Two great Romans of the past, Cicero and Virgil, were by him idealized and veritably worshipped; and he was the happy possessor of their estates at Tusculum and Naples. The later life of Silius was passed on the Campanian shore, hard by the tomb of Virgil, at which he offered the homage of a devotee. He closely emulated the lives of his two great heroes: the one he followed in composing epic verse, the other in debating philosophic questions with his friends of like tastes. Among these was Epictetus, who judged him to be the most philosophic spirit among the Romans of his time, and Cornutus, the Stoic, rhetorician, and grammarian, who appropriately dedicated to Silius a commentary upon Virgil. Though the verse of Silius is not wrapped in Stoic gloom like that of Lucan, yet Stoicism lends in many places a not ungraceful gravity to his poem. Silius was one of the numerous Romans of the early empire who had the courage of their opinions, and carried into perfect practice the theory of suicide adopted by their school. Stricken by an incurable disease, he starved himself to death, keeping a cheerful countenance to the end.

Whether Silius committed to writing his philosophic dialogues or not, we cannot say. Chance has preserved to us his epic poem entitled *Punica*, in seventeen books, and comprising some fourteen thousand lines. The epics of Silius, Lucan, Statius, and Valerius Flaccus are but a few waifs carried down to us by the wandering stream of time from the vast mass of post-Virgilian epics. Long before Silius bethought himself of his epic all possible historical and mythological themes had been worn to tatters by these poets. In choosing the Second Punic War for his subject, Silius had, we know, many predecessors, as he doubtless had many followers. From the time of Nevius onwards every great military struggle in which the Romans had been engaged had found its poet over and over again. In justice to Silius and Lucan, it should be observed that the mythologic poet had a far easier task than the historic. In a well-known passage Petronius pointedly describes the difficulties of the historic theme. A poet, he said, who should take upon him the vast subject of the civil wars would break down beneath the burden unless he were "full of learning," since he would have not merely to record facts, which the historians did much better, but must possess an unshackled

genius, to which full course must be given by the use of digressions, by bringing divine beings on to the stage, and by giving generally a mythologic tinge to the subject. The Latin laws of the historic epic were fixed by Ennius, and were still binding when Claudian wrote. They were never seriously infringed, except by Lucan, who substituted for the *dei ex machina* of his predecessors the vast, dim, and imposing Stoic conception of destiny. By protracted application, and being (to use the significant phrase of Petronius) "full of learning," Silius had acquired excellent recipes for every ingredient that went to the making of the conventional historic epic. Though he is not named by Quintilian, he is probably hinted at in the mention of a class of poets who, as the writer says, "write to show their learning." To seize the moments in the history, however unimportant, which were capable of picturesque treatment; to pass over all events, however important, which could not readily be rendered into heroic; to stuff out the somewhat modern heroes to something like Homeric proportions; to subject all their movements to the passions and caprices of the Olympians; to ransack the poetry of the past for incidents and similes on which a slightly new face might be put; to foist in by well-worn artifices episodes, however strange to the subject, taken from the mythologic or historic glories of Rome and Greece,—all this Silius knew how to do, as he knew his own fingers and nails. He did it all with the languid grace of the inveterate connoisseur, and with a simplicity foreign to his time, which sprang in part from cultivated taste and horror of the venturesome word, and in part from the subdued tone of a life which had come unscathed through the reigns of Caligula, Nero, and Domitian. The more threadbare the theme, and the more worn the machinery, the greater the need of genius. Two of the most rigid requirements of the ancient epic were abundant similes and abundant single combats. But all the obvious resemblances between the actions of heroic man and external nature had long been worked out, while for the renovation of the single combat little could be done till the hero of the Homeric type was replaced by the mediæval knight. Silius, however, had perfect poetic appreciation, with scarce a trace of poetic creativeness. No writer has ever been more correctly and more uniformly judged by contemporaries and by posterity alike. Only the shameless flatterer, Martial, ventured to call his friend a poet as great as Virgil. But the younger Pliny gently says that he wrote poems with greater diligence than talent, and that, when, according to the fashion of the time, he recited them to his friends, "he sometimes found out what men really thought of them." It is indeed strange that the poem lived on. Silius is never mentioned by ancient writers after Pliny except Sidonius, who, under different conditions and at a much lower level, was such another as he. Since the discovery of Silius by Poggio, no modern enthusiast has arisen to sing his praises, and in the last sixty years he has found no editor, even for his text. Eighteenth-century editors, at a time when modern Silii were numerous in the field of literature and more fashionable than they have been since, found in the *Punica* passages not unworthy of comparison with the *Henriade*, and thought that Silius did not disgrace Virgil; but even such gentle commendation is not likely to be repeated again. Yet, by the purity of his taste and his Latin in an age when taste was fast becoming vicious and Latin corrupt, by his presentation to us of a type of a thousand vanished Latin epics, and by the historic aspects of his subject, Silius merits better treatment from scholars than he has received. The general reader he can hardly interest again. He is indeed of imitation all compact, and usually dilutes what he borrows; he may add a new beauty, but new strength he never gives. Hardly a dozen lines anywhere are without an echo of Virgil, and there are frequent admixtures of Lucretius, Horace, Ovid, Lucan, Homer, Hesiod, and many other poets still extant. If we could reconstitute the library of Silius we should probably find that scarcely an idea or a phrase in his entire work was wholly his own.

The raw material of the *Punica* was supplied in the main by the third decade of Livy, though Silius may have consulted other historians of the Hannibalic war. Such facts as are used are generally presented with their actual circumstances unchanged, and in their historic sequence. The spirit of the *Punica* times is but rarely misconceived,—as when to secret voting is attributed the election of men like Flaminius and Varro, and distinguished Romans are depicted as contending in a gladiatorial exhibition. Silius clearly intended the poem to consist of twenty-four books, like the *Iliad* and the *Odyssey*, but after the twelfth he hurries in visible weariness to the end and concludes with seventeen. The general plan of the epic follows that of the *Iliad* and the *Æneid*. Its theme is conceived as a duel between two mighty nations, with parallel dissensions among the gods. Scipio and Hannibal are the two great heroes who take the place of Achilles and Hector on the one hand and of Æneas and Turnus on the other, while the minor figures are all painted with Virgilian or Homeric pigments. In the delineation of character our poet is neither very powerful nor very consistent. His imagination was too weak to realize the actors with distinctness and individuality. His

Hannibal is evidently at the outset meant for an incarnation of cruelty and treachery, the embodiment of all that the vulgar Roman attached to the name "Punic." But in the course of the poem the greatness of Hannibal is borne in upon the poet, and his feeling of it betrays itself in many touches. Thus he names Scipio "the great Hannibal of Ausonia"; he makes Juno assure the Carthaginian leader that if fortune had only permitted him to be born a Roman he would have been admitted to a place among the gods; and, when the ungenerous monster of the first book accords in the fifteenth a splendid burial to Marcellus, the poet cries, "You would fancy it was a Sidonian chief who had fallen." Silius deserves little pity for the failure of his attempt to make Scipio an equivoque to Hannibal and the counterpart in personal prowess and prestige of Achilles. He becomes in the process almost as mythical a figure as the mediæval Alexander. The best drawn of the minor characters are Fabius Cunctator, an evident copy of Lucan's Cato, and Paulus, the consul killed at Cannæ, who fights, hates, and dies like a genuine man.

Clearly it was a matter of religion with Silius to repeat and adapt all the striking episodes of Homer and Virgil. Hannibal must have a shield of marvellous workmanship like Achilles and Æneas; because Æneas descended into Hades and had a vision of the future history of Rome, so must Scipio have his revelation from heaven; Trebia, choked with bodies, must rise in ire like Xanthus, and be put to flight by Vulcan; for Virgil's Camilla there must be an Asbyte, heroine of Saguntum; the beautiful speech of Eurymachus when Nisus seeks to leave him is too good to be thrown away,—furnished up a little, it will serve as a parting address from Imilce to her husband Hannibal. The descriptions of the numerous battles are made up in the main, according to epic rule, of single combats—wearisome sometimes in Homer, wearisome oftener in Virgil, painfully wearisome in Silius. The different component parts of the poem are on the whole fairly well knit together, and the transitions are not often needlessly abrupt; yet occasionally incidents and episodes are introduced with all the irrelevancy of the modern novel. A son of Regulus escapes from Thrasymene to a hut, merely to find there an old servant of his father, and to afford him the opportunity of telling over again the tale of the first war against the Carthaginians. To give scope for a eulogy of Cicero, an ancestor of his fights at Cannæ, and strong devices sometimes usher in such stories as the judgment of Paris and the choice of Hercules. The interposition of the gods is, however, usually managed with dignity and appropriateness.

As to diction and detail, we miss, in general, power rather than taste. The metre runs on with correct smooth monotony, with something always of the Virgilian sweetness, though attenuated, but nothing of the Virgilian variety and strength. The dead level of literary execution is seldom broken by a rise into the region of genuine pathos and beauty, or by a descent into the ludicrous or the repellent. There are few absurdities, but the restraining force is trained perception and not a native sense of humour, which, ever present in Homer, not entirely absent in Virgil, and sometimes finding grim expression in Lucan, fails Silius entirely. The address of Anna, Dido's sister, to Juno compels a smile. Though deified on her sister's death, and for a good many centuries already an inhabitant of heaven, Anna meets Juno for the first time on the outbreak of the Second Punic War, and deprecates the anger of the queen of heaven for having deserted the Carthaginians and attached herself to the Roman cause. Hannibal's parting address to his child is also comical: he recognizes in the "heavy wailing" of the year-old babe "the seeds of rages like his own." But Silius might have been forgiven for a thousand more weaknesses than he has if in but a few things he had shown strength. The grandest scenes in the history before him fail to lift him up; his treatment, for example, of Hannibal's Alpine passage falls immensely below Lucan's vigorous delineation of Cato's far less stirring march across the African deserts.

But in the very weaknesses of Silius we may discern merit. He at least does not try to conceal defects of substance by contorted rhetorical conceits and feebly forcible exaggerations. In his ideal of what Latin expression should be he comes near to his contemporary Quintilian, and resolutely holds aloof from the tenor of his age. Perhaps his want of success with the men of his time was not wholly due to his faults. His self-control rarely fails him; it stands the test of the horrors of war, and of Venus working her will on Hannibal at Capua. The reader of Statius and even Propertius will be thankful for the rarity of recondite epithets, such as "Rhotæan destiny," "Garamanian standards," "Lagean river," "Smyrnan strings." Only a few passages here and there betray the true silver Latin extravagance, as when Hannibal is compared for speed to a tigress reft of her cubs, which darts forth and in a few hours traverses the Caucasus, and with a "winged" leap flies across the Ganges; or when the Carthaginians after Capua launch their spears but are too enervated to make them whiz; or when the plague-stricken and famine-

wasted men of Syracuse hide their diminished faces far within their helmets, and carefully shade their pallor lest hope should arise for the enemy. In the avoidance of rhetorical artifice and epigrammatic antithesis Silius stands in marked contrast to Lucan. Yet he can be pointed; so of Fabius, "laudum cladumque quieta Mente capax"; and of Scævola, "Aspera semper amans et par cuiusque periclo"; and of Africa, "Altrix bellorum bellatorumque virorum Tellus, nec fidens nudo sine fraudibus ensi." Looking at Silius merely as a poet he may not deserve high praise; but, as he is a unique specimen and probably the best of a once numerous

class, the preservation of his poem among the remains of Latin literature is a fortunate accident.

The poet's full name, T. Catus Silius Italicus, is preserved in an inscription (C. I. L., vi. 1984). The poem was discovered in a MS., possibly at Constance, by Foggio, in 1416 or 1417; from this now lost MS. all existing MSS., which belong entirely to the 15th century, are derived. A valuable MS. of the 8th or 9th century, found at Cologne by L. Carrion in the latter part of the 16th century, disappeared soon after its discovery. Two editions *principes* appeared at Rome in 1471; the principal editions since have been those of Heinsius (1600), Drakenborch (1717), and Ernesti (Leipzig, 1791). A useful *variorum* edition is that of Lemaire (Paris, 1823). The recent *Incorporations* on Silius are mostly small pamphlets, enumerated by Engelmann (*Bibl. Script. Class.*, 1876). (J. S. R.)

SILK

SILK is a fibrous substance produced by many insects, principally in the form of a cocoon or covering within which the creatures are enclosed and protected during the period of their principal transformations. The webs and nests, &c., formed by spiders are also of silk. But the fibres used for manufacturing purposes are exclusively produced by the mulberry silk-moth of China, *Bombyx mori*, and a few other moths closely allied to that insect (see vol. iv. p. 596). Among the Chinese the name of the silk-worm is "si," Korean "soi"; to the ancient Greeks it became known as *σῆρα*, the nation whence it came was to them *Σῆρες*, and the fibre itself *σηρικόν*, whence the Latin *sericum*, the French *soie*, the German *Seide*, and the English *silk*.

The silk industry originated in China; and according to native records it has existed there from a very remote period. The empress Se-ling-she, wife of a famous emperor, Hwang-te (2640 B.C.), encouraged the cultivation of the mulberry tree, the rearing of the worms, and the reeling of silk. This empress is said to have devoted herself personally to the care of silkworms, and she is by the Chinese credited with the invention of the loom. A voluminous ancient literature testifies not only to the antiquity but also to the importance of Chinese sericulture, and to the care and attention bestowed on it by royal and noble families. The Chinese guarded the secrets of their valuable art with vigilant jealousy; and there is no doubt that many centuries passed before the culture spread beyond the country of its origin. Through Corea a knowledge of the silkworm and its produce reached Japan, but not before the early part of the 3d century. One of the most ancient books of Japanese history, the *Nihongi*, states that towards 300 A.D. some Coreans were sent from Japan to China to engage competent people to teach the arts of weaving and preparing silk goods. They brought with them four Chinese girls, who instructed the court and the people in the art of plain and figured weaving; and to the honour of these pioneer silk weavers a temple was erected in the province of Setsu. Great efforts were made to encourage the industry, which from that period grew into one of national importance. At a period probably little later a knowledge of the working of silk travelled westward, and the cultivation of the silkworm was established in India. According to a tradition the eggs of the insect and the seed of the mulberry tree were carried to India by a Chinese princess concealed in the lining of her headdress. The fact that sericulture was in India first established in the valley of the Brahmaputra and in the tract lying between that river and the Ganges renders it probable that it was introduced overland from the Chinese empire. From the Ganges valley the silkworm was slowly carried westward and spread in Khotan, Persia, and the states of Central Asia.

Most critics recognize in the obscure word *dmeshēz*, Amos iii. 12, a name of silk corresponding to the Arabic *dimaks*, late Greek *μέραξα*, English *damask*, and also follow the ancients in understanding *meshi*, Ezek. xvi. 10, 13, of "silken gauze." But the first notice of the silkworm in

Western literature occurs in Aristotle, *Hist. Anim.*, v. 19 (17), 11 (6), where he speaks of "a great worm which has horns and so differs from others. At its first metamorphosis it produces a caterpillar, then a bombylius, and lastly a chrysalis,—all these changes taking place within six months. From this animal women separate and reel off the cocoons and afterwards spin them. It is said that this was first spun in the island of Cos by Pamphile, daughter of Plates." Aristotle's vague knowledge of the worm may have been derived from information acquired by the Greeks with Alexander the Great; but long before this time raw silk must have begun to be imported at Cos, where it was woven into a gauzy tissue, the famous *Cos vestis*, which revealed rather than clothed the form.

Towards the beginning of the Christian era raw silk began to form an important and costly item among the prized products of the East which came to Rome. Allusions to silk and its source became common in classical literature; but, although these references show familiarity with the material, they are singularly vague and inaccurate as to its source; even Pliny knew nothing more about the silkworm than could be learned from Aristotle's description. The silken textures which at first found their way to Rome were necessarily of enormous cost, and their use by men was deemed a piece of effeminate luxury. From an anecdote of Aurelian, who neither used silk himself nor would allow his wife to possess a single silken garment, we learn that silk was worth its weight in gold.

Notwithstanding its price and the restraints otherwise put on the use of silk the trade grew. Under Justinian a monopoly of the trade and manufacture was reserved to the emperor, and looms, worked by women, were set up within the imperial palace at Constantinople. Justinian also endeavoured, through the Christian prince of Abyssinia, to divert the trade from the Persian route along which silk was then brought into the east of Europe. In this he failed, but two Persian monks who had long resided in China, and there learned the whole art and mystery of silkworm rearing, arrived at Constantinople and imparted their knowledge to the emperor. By him they were induced to return to China and attempt to bring to Europe the material necessary for the cultivation of silk, which they effected by concealing the eggs of the silkworm in a hollow cane. From the precious contents of that bamboo tube, brought to Constantinople about the year 550, were produced all the races and varieties of silkworm which stocked the Western world, and which gave trade, prosperity, and untold wealth to great communities for more than twelve hundred years. The necessity for again going to the East for a supply of silkworm eggs has only arisen in our own day.

Under the care of the Greeks the silkworm took kindly to its Western home and flourished, and the silken textures of Byzantium became famous. At a later period the conquering Saracens obtained a mastery over the trade, and by them it was spread both east and west,—the textures becoming meantime impressed with the

patterns and colours peculiar to that people. They established the trade in the thriving towns of Asia Minor, and they planted it as far west as Sicily, as Sicilian silks of the 12th century with Saracenic patterns still testify. Ordericus Vitalis, who died in the first half of the 12th century, mentions that the bishop of St Evroul, in Normandy, brought with him from Apulia in southern Italy several large pieces of silk, out of the finest of which four copes were made for his cathedral chanters. The cultivation and manufacture spread northwards to Florence, Milan, Genoa, and Venice—all towns which became famous for silken textures in mediæval times. In 1480 silk weaving was begun under Louis XI at Tours, and in 1520 Francis I. brought from Milan silkworm eggs, which were reared in the Rhone valley. About the beginning of the 17th century Olivier de Serres and Lafémas, somewhat against the will of Sully, obtained royal edicts favouring the growth of mulberry plantations and the cultivation of silk; but it cannot be said that these industries were firmly established till Colbert encouraged the planting of the mulberry by premiums, and otherwise stimulated local efforts.

Into England silk manufacture was introduced during the reign of Henry VI.; but the first serious impulse to manufactures of that class was due to the immigration in 1585 of a large body of skilled Flemish weavers who fled from the Low Countries in consequence of the struggle with Spain then devastating their land. Precisely one hundred years later religious troubles again gave the second and most effective impetus to the silk-trade of England, when the revocation of the edict of Nantes sent simultaneously to Switzerland, Germany, and England a vast body of the most skilled artisans of France, who planted in these countries silk-weaving colonies which are to this day the principal rivals of the French manufacturers. The bulk of the French Protestant weavers settled at Spitalfields, London,—an incorporation of silk throwsters having been there formed in 1629. James I. used many efforts to encourage the planting of the mulberry and the rearing of silkworms both at home and in the colonies. In 1825 a public company was formed and incorporated under the name of the British, Irish, and Colonial Silk Company, with a capital of £1,000,000, principally with the view of introducing sericulture into Ireland, but it was a complete failure, and the rearing of the silkworm cannot be said ever to have become a branch of British industry.

In 1522 Cortes appointed officials to introduce sericulture into New Spain (Mexico), and mulberry trees were then planted and eggs were brought from Spain. The Mexican adventure is mentioned by Acosta, but all trace of the culture had died out before the end of the century. In 1609 James I. attempted to reinstate the silkworm on the American continent, but his first effort failed through shipwreck. An effort made in 1619 obtained greater success, and, the materials being present, the Virginian settlers were strongly urged to devote attention to the profitable industry of silk cultivation. Sericulture was enjoined under penalties by statute; it was encouraged by bounties and rewards; and its prosecution was stimulated by learned essays and rhapsodical rhymes, of which this is a sample:—

Where Wormes and Food doe naturally abound
A gallant Silken Trade must there be found.
Virginia excels the World in both—
Envie nor malice can gaine say this troth!

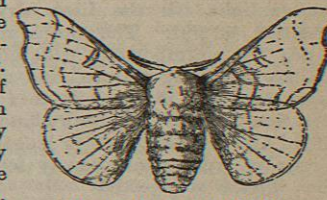
In the prospectus of Law's great *Compagnie des Indes Occidentales* the cultivation of silk occupies a place among the glowing attractions which allured so many to disaster. Onward till the period of the War of Independence

bounties and other rewards for the rearing of worms and silk filature continued to be offered; and just when the war broke out Benjamin Franklin and others were engaged in nursing a filature into healthy life at Philadelphia. With the resumption of peaceful enterprise, the stimulus of bounties was again applied—first by Connecticut in 1783; and such efforts have been continued sporadically down almost to the present day. Bounties were last offered by the State of California in 1865–66, but the State law was soon repealed, and an attempt to obtain State encouragement again in 1872 was defeated. About 1858 a speculative mania for the cultivation of silk developed itself with remarkable severity in the United States. It was caused principally through the representations of Samuel Whitmarsh as to the capabilities of the South Sea Islands mulberry (*Morus multicaulis*) for feeding silkworms; and so intense was the excitement that plants and crops of all kinds were displaced to make room for plantations of *multicaulis*. In Pennsylvania as much as \$300,000 changed hands for plants in one week, and frequently the young trees were sold two and three times over within a few days at ever-advancing prices. Plants of a single year's growth reached the ridiculous price of \$1 each at the height of the fever, which, however, did not last long, for in 1839 the speculation collapsed; the famous *Morus multicaulis* was found to be no golden tree and the costly plantations were uprooted.

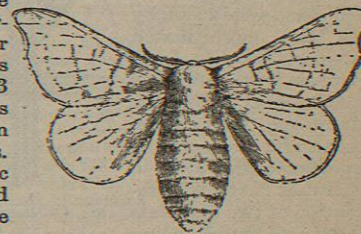
The most singular feature in connexion with the history of silk is the persistent efforts which have been made by monarchs and other potentates to stimulate sericulture within their dominions, efforts which continue to this day in British colonies, India, and America. These endeavours to stimulate by artificial means have in scarcely any instance resulted in permanent success. In truth raw silk can only be profitably brought to the market where there is abundant and very cheap labour,—the fact that China, Japan, Bengal, Piedmont, and the Levant are the principal producing localities making that plain.

The Silkworm.

The mulberry-feeding moth, *Bombyx mori*, which is the principal source of silk, belongs to the *Bombycidae*, a family of *Lepidoptera* in which are embraced some of the largest and most handsome moths (see vol. iv. p. 596). *B. mori* is itself an inconspicuous moth

FIG. 1.—*Bombyx mori* (male).

(figs. 1 and 2) of an ashy white colour, with a body not half an inch in length, the female being a little longer and stouter. Its wings are short and weak; the fore pair are falcate, and the hind pair do not reach to the end of the body. The larva (fig. 3) is hairless, of an ashy grey or cream colour, attains to a length of from 3 to 3½ inches, and is slender in comparison with many of its allies. The second thoracic ring is humped, and there is a spine-like horn or protuberance at the tail. The common silkworm produces as a rule only one generation during the year; but there are races in cultivation which

FIG. 2.—*Bombyx mori* (female).