

1659, Sidney again took his seat, and was placed on the council of state. He showed himself in this office especially anxious that the military power should be duly subordinated to the civil. On 5th June he was appointed one of three commissioners to mediate for a peace between Denmark supported by Holland and Sweden. He was probably intended to watch the conduct of Montague, who was in command of the Baltic squadron. Of his character we have an interesting notice from Whitelocke, who refused to accompany him on the ground of his "overruling temper and height." Upon the conclusion of the treaty he went to Stockholm as plenipotentiary; and in both capacities he behaved with resolution and address. When the restoration of Charles II. took place Sidney left Sweden, 28th June 1660, bringing with him from the king of Sweden a rich present in testimony of the estimation in which he was held. Sidney went first to Copenhagen, and then, being doubtful of his reception by the English court, settled at Hamburg. From there he wrote a celebrated letter vindicating his conduct, which will be found in the *Somers Tracts*. He shortly afterwards left Hamburg, and passed through Germany by way of Venice to Rome. His stay there, however, was embittered by misunderstandings with his father and consequent straits for money. Five shillings a day, he says, served him and two men very well for meat, drink, and firing. He devoted himself to the study of books, birds, and trees, and speaks of his natural delight in solitude being largely increased. In 1663 he left Italy, passed through Switzerland, where he visited Ludlow, and came to Brussels in September, where his portrait was painted by Van Egmond; it is now at Penshurst. He had thoughts of joining the imperial service, and offered to transport from England a body of the old Commonwealth men; but this was refused by the English court. It is stated that the enmity against him was so great that now, as on other occasions, attempts were made to assassinate him. On the breaking out of the Dutch war Sidney, who was at The Hague, urged an invasion of England, and shortly afterwards went to Paris, where he offered to raise a rebellion in England on receipt of 100,000 crowns. Unable, however, to come to terms with the French Government, he once more went into retirement in 1666,—this time to the south of France. In August 1670 he was again in Paris, and Arlington proposed that he should receive a pension from Louis; Charles II. agreed, but insisted that Sidney should return to Languedoc. In illustration of his austere principles it is related that, Louis having taken a fancy to a horse belonging to him and insisting on possessing it, Sidney shot the animal, which, he said, "was born a free creature, had served a free man, and should not be mastered by a king of slaves." His father was now very ill, and after much difficulty Sidney obtained leave to come to England in the autumn of 1677. Lord Leicester died in November; and legal business connected with other portions of the succession detained Sidney from returning to France as he had intended. He soon became involved in political intrigue, joining, in general, the country party, and holding close communication with Barillon, the French ambassador. In the beginning of 1679 he stood for Guildford, and was warmly supported by William Penn, with whom he had long been intimate, and to whom he afforded assistance in drawing up the constitution of Pennsylvania. He was defeated by court influence, and his petition to the House, complaining of an undue return, never came to a decision. His *Letters to Henry Savile*, written at this period, are of great interest. He was in Paris, apparently only for a short while, in November 1679. Into the prosecution of the Popish Plot Sidney threw himself warmly, and was among those who looked to Monmouth, rather than to

Orange, to take the place of James in the succession, though he afterwards disclaimed all interest in such a question. He now stood for Bramber (Sussex), again with Penn's support, and a double return was made. He is reported on 10th August 1679 as being elected for Amersham (Buckingham) with Sir Roger Hill. When parliament met, however, in October 1680, his election was declared void. But now, under the idea that an alliance between Charles and Orange would be more hostile to English liberty than would the progress of the French arms, he acted with Barillon in influencing members of parliament in this sense, and is twice mentioned as receiving the sum of 500 guineas from the ambassador. Of this there is no actual proof, and it is quite possible that Barillon entered sums in his accounts with Louis which he never paid away. In any case it is to be remembered that Sidney is not charged with receiving money for advocating opinions which he did not enthusiastically hold.

Upon the dissolution of the last of Charles's parliaments the king issued a justificatory declaration. This was at once answered by a paper entitled *A Just and Modest Vindication, &c.*, the first sketch of which is imputed to Sidney. It was then, too, that his most celebrated production, the *Discourses concerning Government*, was concluded, in which he upholds the doctrine of the mutual compact and traverses the High Tory positions from end to end. In especial he vindicates the propriety of resistance to kingly oppression or misrule, upholds the existence of an hereditary nobility interested in their country's good as the firmest barrier against such oppression, and maintains the authority of parliaments. In each point the English constitution, which he ardently admires, is, he says, suffering: the prerogatives of the crown are disproportionately great; the peerage has been degraded by new creations; and parliaments are slighted.

For a long while Sidney kept himself aloof from the duke of Monmouth, to whom he was introduced by Lord Howard. After the death of Shaftesbury, however, in November 1682, he entered into the conferences held between Monmouth, Russell, Essex, Hampden, and others. That treasonable talk went on seems certain, but it is probable that matters went no further. The watchfulness of the court was, however, aroused, and on the discovery of the Rye House Plot, Sidney, who had always been regarded in a vague way as dangerous, was arrested while at dinner on 26th June 1683. His papers were carried off, and he was sent at once to the Tower on a charge of high treason. For a considerable while no evidence could be found on which to establish a charge. Jeffreys, however, was made lord chief-justice in September; a jury was packed; and, after consultations between the judge and the crown lawyers, Sidney was brought to listen to the indictment on 7th November. The trial, which began on 21st November, was conducted with a shameless absence of equity: Sidney was refused a copy of the indictment, in direct violation of law, and—more shameful still—he was refused the assistance of counsel. Hearsay evidence and the testimony of the perjured informer Lord Howard, whom Sidney had been instrumental in introducing to his friends, were first produced. This being insufficient, partial extracts from papers found in Sidney's study, and supposed only to be in his handwriting, in which the lawfulness of resistance to oppression was upheld, were next relied on. He was indicted for "conspiring and compassing the death of the king." Sidney conducted his case throughout with great skill; he pointed especially to the fact that Lord Howard, whose character he easily tore to shreds, was the only witness against him as to treason, whereas the law required two, that the treason was not accurately defined, that no proof had been given that the papers produced

were his, and that, even if that were proved, these papers were in no way connected with the charge. Against the determination to secure a conviction, however, his courage, eloquence, coolness, and skill were of no avail, and the verdict of "guilty" was given. On 25th November Sidney presented a petition to the king, praying for an audience, which, however, under the influence of James and Jeffreys, Charles refused. On the 26th he was brought up for judgment, and again insisted on the illegality of his conviction. Upon hearing his sentence he gave vent to his feelings in a few noble and beautiful words. Jeffreys having suggested that his mind was disordered, he held out his hand and bade the chief-justice feel how calm and steady his pulse was. By the advice of his friends he presented a second petition, offering, if released, to leave the kingdom at once and for ever. The supposed necessity, however, of checking the hopes of Monmouth's partisans, caused the king to be inexorable. The last days of Sidney's life were spent in drawing up his *Apology* and in discourse with Independent ministers. He was beheaded on the morning of 7th December 1683. His remains were buried at Penshurst.

(O. A.)

SIDNEY, SIR PHILIP (1554-1586), although killed at the early age of thirty-two, was one of the most conspicuous figures at the court of Elizabeth, was known to the leading statesmen of Europe as a soldier and statesman of the highest promise, took a permanent place in history and legend as a romantic hero, and in literature is distinguished as the author of the first important body of English sonnets and a writer whose works mark a distinct advance in English prose. He was born at Penshurst in Kent on 29th November 1554. His father was Sir Henry Sidney, famous in his time as an administrator of Ireland, his mother a Dudley, sister of Elizabeth's favourite, the earl of Leicester, and daughter of the earl of Northumberland executed for high treason in the reign of Mary. Thus Sidney was of notable kindred on both sides—

"Others, because of both sides I do take  
My blood from them who did excel in this,  
Think Nature me a man-at-arms did make."<sup>1</sup>

He received his scholastic education at Shrewsbury school and at Christ Church, Oxford. He was entered at Shrewsbury on the same day with his lifelong friend and biographer Fulke Greville; afterwards Lord Brooke. In 1572 he set out with three years' leave of absence to complete his education by Continental travel; he was in Paris at the house of the English ambassador on the night of the massacre of St Bartholomew, and went thence to Frankfurt, Vienna, and the chief cities of Italy. During these travels he associated with scholars and statesmen, making an earnest study of European politics, winning golden opinions for his youthful gravity and sagacity. From that time Hubert Languet, the Reformer, whom he met at Frankfurt, maintained a constant correspondence with him. On his return he was introduced at court, won the favour of Elizabeth, who considered him "one of the jewels of her crown," and, in proof of the versatility which made him one of the wonders of his age, wrote a masque, *The Lady of the May*, for Leicester's great reception of the queen at Kenilworth, and distinguished himself in the tournament upon the same occasion. In 1577, at the age of twenty-two, being sent as ambassador in great state to congratulate and sound Rudolph II., the new emperor of Germany, he met William the Silent, who pronounced him one of the ripest statesmen in Europe. He returned in the following year, and from that time till the expedition to the Netherlands, in which he lost his life, he had no public employment, but lived partly at court, partly at his country seat at

<sup>1</sup> *Astrophel and Stella*, sonnet 41.

Penshurst in Kent. In 1583 he married the daughter of Sir Francis Walsingham, who after his death became countess of Essex. His most memorable interference in state affairs was a bold letter of remonstrance to Elizabeth against her suspected policy of marrying the duke of Anjou. The queen's anger at his boldness drove him for a time into retirement. He was a strong advocate of intervention on the Protestant side, and in 1585 accompanied Leicester in his expedition to the Netherlands, and was appointed governor of Flushing, one of the towns held by the queen as security. The historical truth of the famous incident at the battle of Zutphen (22d September 1586), when the wounded hero passed a cup of water to a dying soldier, has been questioned; but it is matter of fact that he owed his death to an impulse of romantic generosity. The lord marshal happening to enter the field of Zutphen without greaves, Sidney cast off his also, to put his life in the same peril, and thus exposed himself to the fatal shot. His death took place fifteen days later, on 7th October 1586, at Arnheim.

No poet's death was ever so lamented by poets as Sidney's. Pastoral elegy was in fashion, and all the numerous poets and rhymesters of the time from Spenser to Davison hastened to lay their tribute of verse on the bier of this the darling of all the shepherds—

"With whom all joy and jolly merriment  
Is also dead and in dolour drent."

That there was much more than the worship of his rank and his bright eager personality in this is shown by the lasting reputation of what he wrote during the two years of retirement, 1580-81, which he seems to have given mainly to literature. The truth is that Sidney transferred his own strong, radiant, graceful, and lovable character to his writings with a freshness and fidelity such as few finished artists have achieved, so that he really and literally lives in them to charm for ever. None of his writings were published during his lifetime, and the dates of composition are uncertain. But it would seem that Sidney's first attempt at verse was a metrical version of the Psalms, written in conjunction with his sister, the countess of Pembroke.—"Sidney's sister, Pembroke's mother." The worth of these paraphrases, which have all Sidney's qualities of sincerity, directness, and sweetness of rhythm, has recently been recognized by Mr Ruskin, who has edited them under the title of *Rock Honeycomb* in the second volume of his *Bibliotheca Pastorum* (1877). Sidney's famous prose romance, *The Countess of Pembroke's Arcadia*, the "vain amatorious poem" with which Charles I. solaced his imprisonment, was also begun in 1580. It was published in 1590, and kept its popularity as long as that kind of high-flown sentiment and intricate adventure found readers. The buoyancy and freshness of Sidney's style give a certain air of reality even to the artificial scenes of the *Arcadia*, and many pretty songs are interspersed through the work. Sidney's greatest poetic achievement, however, was the series of sonnets entitled *Astrophel and Stella*, the first important body of sonnets in the English language. The sonnets, 110 in number, are a chronicle of the poet's love for Penelope Devereux, sister of the earl of Essex, afterwards Lady Rich. He first met the lady when she was a child of twelve at one of the stages in Elizabeth's progress to Kenilworth in 1575. A match was apparently arranged between them by their families, but upon Leicester's disgrace it was broken off and Penelope was given to Lord Rich. Sidney seems then to have discovered that he was in love with her. Whether the passion was real or feigned for artistic purposes is of little consequence, although the reality of it has been hotly maintained; he writes as if it were real, and the verisimilitude of the story recorded in the sonnets, which express his varying moods towards her throughout the incidents of subsequent intercourse and the distractions of his public life, adds greatly to their interest. Very few of the sonnets will bear separation from the context, though there is hardly one that does not contain some sweet ingenuity of fancy or casual felicity of phrase. Some of them were special favourites with Charles Lamb. Sidney's other work during this busy literary passage in his short life, the *Apologie for Poetrie*, has also established itself as a classic.

The best of the sonnets are selected by Mrs Ward in *Ward's English Poets*; Mr Main also makes a good selection in his *Treasury of English Sonnets*. The sonnets were probably written in 1581; they were not published till 1601, when they formed the first in a brilliant series of volumes of sonnet literature (see "Elizabethan Sonneteers," in *Minto's Characteristics of English Poets*). The *Apologie* is included in Arber's reprints.

SIDON (Arab. *Saida*), long the principal city of PHENICIA (*q.v.*), and even in the Middle Ages a place of importance, but now little more than a mere village, is situated on the Syrian coast in 33° 36' N. lat. and 35° 20'

9° E. long., about midway between Sur (Tyre) and Beirut (Beyrout). The ancient city extended some 800 yards farther inland, over ground now occupied by luxuriant fruit-gardens, on the produce of which the inhabitants of the town live. In front of the flat promontory to which the modern Sidon is confined there stretches northwards and southwards a rocky peninsula; at the northern extremity of this begins a series of small rocks enclosing the harbour, which at present is a very bad one, having been, to some extent at least, purposely filled up. The port was formerly protected on the north by the Kal'at el-Bahr ("Sea Castle"), a building of the 13th century, situated upon an island still connected with the mainland by a bridge. On the south side of the town lay the so-called Egyptian harbour, now quite useless. The wall by which Sidon is at present surrounded is pierced by two gates, those of Beirut and Akko (Acre); at the south-eastern angle, upon a heap of rubbish, stand the remains of the citadel. The streets are very narrow, and the buildings of any interest are few; most prominent are some large caravanserais belonging to the period of Sidon's modern prosperity, and the large mosque, formerly a church of the Knights of St John. Sidon looks best from the north. Of its 9000 inhabitants 7000 are Mohammedans; there are a number of institutions conducted by Catholic and Protestant Christians. In the neighbourhood are large Phœnician burial-places, which have been partially explored by Renan; the natives also engage in the search for antiquities. The principal finds are sarcophagi, and next to these sculptures and paintings. The most important discovery hitherto made has been that of the sarcophagus of Eshmunazar with a long inscription; it is now (1886) in the Louvre.

In 637-638 Sidon was taken by the Arabs. During the crusades it was alternately in possession of the Franks and the Mohammedans, but finally fell into the hands of the latter in 1291. As the residence of the Druse emir Fakhr ed-Din, it rose to some prosperity about the beginning of the 17th century, but towards the close of the 18th its commerce again passed away, principally to Beirut (Beyrout), and the prosperity of Sidon has ever since been steadily declining.

See Renan, *Mission de Phénicie*, Paris, 1865.

SIDONIUS APOLLINARIS. See APOLLINARIS SIDONIUS.

SIEBENBÜRGEN. See TRANSYLVANIA.

SIEBOLD, CARL THEODOR ERNST VON (1804-1885), physiologist and zoologist, the son of a physician and a descendant of what Oken called the "Asclepiad family of Siebolds," was born at Würzburg on 16th February 1804. Educated in medicine and science chiefly at the university of Berlin, he became successively professor of zoology, physiology, and comparative anatomy in Königsberg, Erlangen, Freiburg, Breslau, and Munich. In conjunction with Stannius he published (1845-48) a *Manual of Comparative Anatomy*, which is still of solid value; and along with Kölliker he founded in 1848 a journal which soon took and still retains a leading place in biological literature, *Zeitschrift für wissenschaftliche Zoologie*. He was also a laborious and successful helminthologist (see PARASITISM) and entomologist, in both capacities contributing many valuable papers to his journal, which he continued to edit until his death in 1885. In these ways, without being a man of marked genius, but rather an industrious and critical observer, he came to fill a peculiarly distinguished position in science, and was long reckoned, what his biographer justly calls him, the Nestor of German zoology. See Ehlers, *Zeitschr. f. wiss. Zool.*, 1885.

SIEBOLD, PHILIPP FRANZ VON (1796-1866), scientific explorer of Japan and elder brother of the physiologist noticed above, was born at Würzburg, Germany, on 17th February 1796. He studied medicine and natural science

at Würzburg, and obtained his doctor's diploma in 1820. In 1822 he entered the service of the king of the Netherlands as medical officer to the East Indian army. On his arrival at Batavia he was attached to a new mission to Japan, sent by the Dutch with a view to improve their trading relations with that country. Siebold was well equipped with scientific apparatus, and he remained in Japan for six years, with headquarters at the Dutch settlement on the little island of Deshima. His medical qualifications enabled him to find favour with the Japanese, and he gathered a vast amount of information concerning a country then almost as little known as Corea, especially concerning its natural history and ethnography. He had comparatively free access to the interior, and his reputation spreading far and wide brought him visitors from all parts of the country. His valuable stores of information were added to by trained natives whom he sent to collect for him in the interior. In 1824 he published *De Historia Naturalis in Japonia Statu* and in 1832 his splendid *Fauna Japonica*. His knowledge of the language enabled him also in 1826 to issue from Batavia his *Épître Lingua Japonicæ*. In Deshima he also laid the foundation of his *Catalogus Librorum Japonicorum* and *Isagoge in Bibliothecam Japonicam*, published after his return to Europe, as also his *Bibliotheca Japonica*, which, with the co-operation of J. Hoffmann, appeared at Leyden in 1833. During the visit which he was permitted to make to Yedo (Tokio), Siebold made the best of the rare opportunity; his zeal, indeed, outran his discretion, since, for obtaining a native map of the country, he was thrown into prison and compelled to quit Japan on 1st January 1830. On his return to Holland he was raised to the rank of major, and in 1842 to that of colonel. After his arrival in Europe he began to give to the world the fruits of his researches and observations in Japan. His *Nippon; Archiv zur Beschreibung von Japan und dessen Neben- und Schutz-Ländern* was issued in five quarto volumes of text, with six folio volumes of atlas and engravings. He also issued many fragmentary papers on various aspects of Japan. In 1854 he published at Leyden *Urkundliche Darstellung der Bestrebungen Niederlands und Russlands zur Eröffnung Japans*. In 1859 Siebold undertook a second journey to Japan, and was invited by the emperor to his court. In 1861 he obtained permission from the Dutch Government to enter the Japanese service as negotiator between Japan and the powers of Europe, and in the same year his eldest son was made interpreter to the English embassy at Yedo. Siebold was, however, soon obliged by various intrigues to retire from his post, and ultimately from Japan. Returning by Java to Europe in 1862, he set up his ethnographical collections, which were ultimately secured by the Government of Bavaria and removed to Munich. He continued to publish papers on various Japanese subjects, and received honours from many of the learned societies of Europe. He died at Munich on 18th October 1866. Siebold until recent years was our great authority on Japan, and even now his writings on the natural history of that country have not been superseded.

See biography by Moritz Wagner, in *Allgemeine Zeitung*, 13th to 16th November 1866.

SIEDLICE (Russ. *Syedlets*), a government of Russian Poland, between the Vistula and the Bug, having Warsaw on the N.W., Łomża on the N., Grodno and Volhynia on the E., Lublin and Radom on the S. Its area is 5535 square miles. The surface is mostly flat, only a few hilly tracts appearing in the middle, around Biata, and in the east on the banks of the Bug. Extensive marshes prevail in the north and south-east. Chalk, Jurassic, and Tertiary deposits cover the surface, and are overlain in their turn with widely spread Glacial deposits. The valley of

the Vistula is mostly wide, with several terraces covered with sand-dunes or peat-bog. Siedlice is watered by the Vistula, which borders it for 50 miles on the west; the Bug, which is navigable from Opalin and flows for 170 miles on the east and north-east borders of the province; the Wieprz, a tributary of the Vistula, which is also navigable, and flows for 25 miles along the southern boundary; and the Liwiec, a tributary of the Bug, which is navigable for some 30 miles below Wengroff.

Of the total surface of the government only 184,760 acres are unproductive; 695,420 acres are covered with forests; 1,703,100 are under crops, and 611,260 under meadows and pasture land. The population only increases at the rate of 0.75 per cent. a year, and in 1884 numbered 630,240; of these Poles constituted 39.7 per cent., Little Russians 43.1, Jews 15.1, and Germans about 2. According to religious belief they were distributed as follows:—out of 616,649 inhabitants in 1882 there were 367,187 Catholics, 142,945 Orthodox Greeks, 96,764 Jews, 8892 Protestants, 505 Baptists, and 356 Mohammedan Tatars. Agriculture is the chief occupation; in 1881 the crops yielded 1,531,400 quarters of corn and 10,988,400 bushels of potatoes. Cattle-breeding is in a relatively flourishing state, there being (1881) 57,500 horses, 292,670 horned cattle, 461,700 sheep, and 194,100 pigs. Manufactures are insignificant (2270 workmen); their aggregate production, chiefly from distilleries and breweries, was valued at £394,820 in 1881. Trade also is insignificant, although Siedlice has four railways, one of which, from Warsaw to Brest-Litovsk, crosses it from west to east. There are two gymnasia for boys (at Siedlice and Biata), one gymnasium for girls, one seminary for teachers (at Biata), and about 240 primary schools with 11,260 scholars. The government is divided into nine districts, the chief towns of which, with their populations in 1882, are—Siedlice (see below), Biata (19,435), Constantinoff (3200), Garvolin (14,620), Łukoff (11,030), Radzyn (4440), Sokotoff (6300), Wengroff (8140), and Włodawa (17,985). Janoff (3030), where a state stud is kept, has also municipal institutions.

SIEDLICE, capital of the above government, is situated 57 miles east-south-east of Warsaw, on the Brest-Litovsk Railway. It received municipal institutions in 1547. The Oginskis, to whom it belonged, have embellished it with a palace and gardens; but it is still nothing more than a large village, where the provincial authorities have their seat. Its population was 12,950 in 1882.

SIEGE. See FORTIFICATION.

SIEGEN, an ancient mining and manufacturing town of Prussia, in the province of Westphalia, is situated 47 miles to the east of Cologne on the Sieg, a tributary entering the Rhine opposite Bonn. The surrounding district, to which it gives its name, abounds in iron-mines, so that iron founding and smelting are important branches of industry in and near the town. Large tanneries and leather-works, and factories for cloth paper, and machinery, are among the other industrial establishments. The population in 1880 was 15,024, of whom 3632 were Roman Catholics and 111 Jews.

Siegen was the capital of an early principality belonging to the house of Nassau; and from 1606 onwards it gave name to the junior branch of Nassau-Siegen. Napoleon incorporated Siegen in the grand-duchy of Berg in 1806; and in 1815 the congress of Vienna assigned it to Prussia, under whose rule it has nearly quintupled its population. Rubens is said to have been born here in 1577.

SIEGFRIED. See NIBELUNGENLIED, vol. xvii. p. 475. SIEMENS, SIR WILLIAM (1823-1883), christened Carl Wilhelm, an eminent inventor, engineer, and natural philosopher, was born at Lenthe in Hanover on 4th April 1823. After being educated in the polytechnic school of Magdeburg and the university of Göttingen, he visited England at the age of nineteen, in the hope of introducing a process in electro-plating invented by himself and his brother Werner. The invention was adopted by Messrs Elkington, and Siemens returned to Germany to enter as a pupil the engineering works of Count Stolberg at Magdeburg. In 1844 he was again in England with another invention, the "chronometric" or differential governor for steam-engines (see STEAM-ENGINE). Finding that British patent laws afforded the inventor a protection which was then wanting in Germany, he thenceforth made England his

home; but it was not till 1859 that he formally became a naturalized British subject. After some years spent in active invention and experiment at mechanical works near Birmingham, he went into practice as an engineer in 1851. He laboured mainly in two distinct fields, the applications of heat and the applications of electricity, and was characterized in a very rare degree by a combination of scientific comprehension with practical instinct. In both fields he played a part which would have been great in either alone; and, in addition to this, he produced from time to time miscellaneous inventions and scientific papers sufficient in themselves to have established a reputation. His position was recognized by his election in 1862 to the Royal Society, and later to the presidency of the Institute of Mechanical Engineers, the Society of Telegraph Engineers, the Iron and Steel Institute, and the British Association; by honorary degrees from the universities of Oxford, Glasgow, Dublin, and Würzburg; and by knighthood. He died in London on the 19th of November 1883.

In the application of heat Siemens's work began just after Joule's experiments had placed the doctrine of the conservation of energy on a sure basis. While Rankine, Clausius, and Thomson were developing the dynamical theory of heat as a matter of physical and engineering theory, Siemens, in the light of the new ideas, made a bold attempt to improve the efficiency of the steam-engine as a converter of heat into mechanical work. Taking up the regenerator—a device invented by Stirling twenty years before, the importance of which had meanwhile been ignored—he applied it to the steam-engine in the form of a regenerative condenser with some success. This was in 1847, and in 1855 engines constructed on Siemens's plan were worked at the Paris exhibition. Later he made many attempts to apply the regenerator to internal-combustion or gas engines; but neither in steam-engines nor in gas-engines were his inventions directly and permanently fruitful, though the direction they followed is that in which improvement is still looked for. The regenerative principle, however, as a means of economizing heat soon received at his hands another and far wider application. In 1856 he introduced the regenerative furnace, the idea of his brother Friedrich, with whom William associated himself in directing its applications. In an ordinary furnace a very large part of the heat of combustion is lost by being carried off in the hot gases which pass up the chimney. In the regenerative furnace the hot gases pass through a regenerator, or chamber stacked with loose bricks, which absorb the heat. When the bricks are well heated the hot gases are diverted so to pass through another similar chamber, while the air necessary for combustion, before it enters the furnace, is made to traverse the heated chamber, taking up as it goes the heat which has been stored in the bricks. After a suitable interval the air currents are again reversed. The process is repeated periodically, with the result that the products of combustion escape only after being cooled, the heat which they take from the furnace being in great part carried back in the heated air. But another invention was required before the regenerative furnace could be thoroughly successful. This was the use of gaseous fuel, produced by the crude distillation and incomplete combustion of coal in a distinct furnace, now known as Siemens's gas-producer. From this the gaseous fuel passes by a flue to the regenerative furnace, and it, as well as the entering air, is heated by the regenerative method, four brick-stacked chambers being used instead of two. The complete invention was applied at Chance's glass-works in Birmingham in 1861, and furnished the subject of Faraday's farewell lecture to the Royal Institution. It was soon applied to many industrial processes, but it found its greatest development a few years later at the hands of Siemens himself in the manufacture of steel. To produce steel directly from the ore, or by melting together wrought-iron scrap with cast-iron upon the open hearth, had been in his mind from the first, but it was not till 1867, after two years of experiment in "sample steel works" erected by himself for the purpose, that he achieved success. The modern forms of the Siemens steel process are described in the article IRON (vol. xiii. p. 347 sq.). The product is a mild steel of exceptionally trustworthy quality, the use of which for boiler-plates has done much to make possible the high steam-pressures that are now common, and has consequently contributed, indirectly, to that improvement in the thermodynamic efficiency of heat engines which Siemens had so much at heart. Just before his death he was again at work upon the same subject, his plan being to use gaseous fuel from a Siemens producer in place of solid fuel beneath the boiler, and to apply the regenerative principle to boiler furnaces. His faith in gaseous fuel led him to anticipate that its use would in time supersede that of solid coal for domestic and industrial purposes, cheap gas being supplied either from special works or direct from the pit; and

among his last inventions was a house grate to burn gas along with coke, which he regarded as a possible cure for city smoke.

In electricity Siemens's name is closely associated with the growth of land and submarine telegraphs, the invention and development of the dynamo, and the application of electricity to lighting and to locomotion. In 1860, with his brother Werner, he invented the earliest form of what is now known as the Siemens armature; and in 1867 he communicated a paper to the Royal Society "On the Conversion of Dynamical into Electrical Force without the aid of Permanent Magnetism," in which he announced the invention by Werner Siemens of the dynamo-electric machine, an invention which was also reached independently and almost simultaneously by Wheatstone and by S. A. Varley. The Siemens-Alteneck or multiple-coil armature followed in 1873, and became the basis of the modern Siemens dynamo as developed, with great labour, by the firm of Siemens Brothers themselves, and (with later modifications) by Edison, Hopkinson, and others. While engaged in constructing a trans-Atlantic cable for the Direct United States Telegraph Company, Siemens designed the very original and successful ship "Faraday," by which that and other cables were laid. One of the last of his works was the Portrush and Bushmills electric tramway, in the north of Ireland, opened in 1883, where the water-power of the river Bush drives a Siemens dynamo, from which the electric energy is conducted to another dynamo serving as a motor on the car. In the Siemens electric furnace the intensely hot atmosphere of the electric arc between carbon points is employed to melt refractory metals. Another of the uses to which he turned electricity was to employ light from arc lamps as a substitute for sunlight in hastening the growth and fructification of plants. Among his miscellaneous inventions were the differential governor already alluded to, and a highly scientific modification of it, described to the Royal Society in 1866; a water-meter which acts on the principle of counting the number of turns made by a small reaction turbine through which the supply of water flows; an electric thermometer and pyrometer, in which temperature is determined by its effect on the electrical conductivity of metals; an attraction meter for determining very slight variations in the intensity of a gravity; and the bathometer, by which he applied this idea to the problem of finding the depth of the sea without a sounding-line. In a paper read before the Royal Society in 1882 "On the Conservation of Solar Energy," he suggested a bold but unsatisfactory theory of the sun's heat, in which he sought to trace on a cosmic scale an action similar to that of the regenerative furnace. His fame, however, does not rest on his contributions to pure science, valuable as some of these were. His strength lay in his grasp of scientific principles, in his skill to perceive where and how they could be applied to practical affairs, in his zealous and instant pursuit of thought with action, and in the indomitable persistence with which he clung to any basis of effort that seemed to him theoretically sound.

Siemens's writings consist for the most part of lectures and papers scattered through the scientific journals and the publications of the Royal Society, the Institution of Civil Engineers, the Institute of Mechanical Engineers, the Iron and Steel Institute, the British Association, &c. A biography by Dr William Pole is now (1886) in preparation. (J. A. E.)

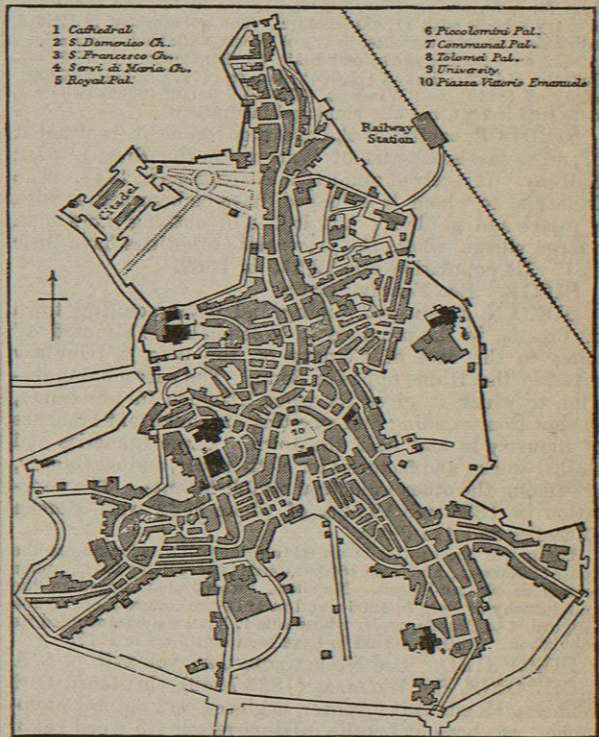
SIENA, a city of Italy, and one of the most characteristic of Tuscany, stands (43° 19' N. lat., 11° 19' E. long.) on a hill near the mountainous region of Chianti, the Maremma, and Val di Chiana. It is 60 miles by rail south of Florence and 160 north-west of Rome. The area of the city within the walls is about 2½ square miles and its population in 1881 was 25,204. The province of Siena, comprising about 1467 square miles, with 37 communes, and a total population of 207,000, by the political redistribution of 1882 forms a single electoral college and returns four members to parliament. The diocese of Siena, an archbishopric dating from 1459, includes 18 city and 95 rural parishes divided into 12 vicariates.

The city possesses a university, founded in 1203 and limited to the faculties of law and medicine. Among the other public institutions the following are the more important:—the town library, first opened to students in the 17th century; the Archivio, a record office, instituted in 1858, containing a valuable and splendidly arranged collection of documents; the Fine Arts Institution, founded in 1816; and the natural history museum of the Royal Academy of the Physiocrats, inaugurated in the same year. There are also many flourishing charities, including an excellent hospital and a school for the deaf and dumb.

The public festivals of Siena known as the "Palio delle Contrade" have a European celebrity. They are held in

the public square, the curious and historic Piazza del Campo (now Piazza di Vittorio Emanuele), on 2d July and 16th August of each year; they date from the Middle Ages and were instituted in commemoration of victories and in honour of the Virgin Mary (the old title of Siena, as shown by seals and medals, having been "Sena vetus civitas Virginis"). In the 15th and 16th centuries the celebrations consisted of bull-fights. At the close of the 16th century these were replaced by races with mounted buffaloes, and since 1650 by (ridden) horses. Siena is divided into seventeen *contrade* (wards), each with a distinct appellation and a chapel and flag of its own; and every year ten of these *contrade*, chosen by lot, send each one horse to compete for the prize *palio* or banner. The aspect of Siena during these meetings is very characteristic, and the whole festivity bears a mediæval stamp in harmony with the architecture and history of the town.

Among the noblest fruits of Siennese art are the public buildings adorning the city. The cathedral, one of the finest examples of Italian Gothic architecture, was begun in the early years of the 13th century, and in 1317 its walls were extended to the baptistry of San Giovanni; a further enlargement was begun in 1339 but never carried out, and a few ruined walls and arches alone remain to show the magnificence of the uncompleted design. The splendid west front, of tricuspidal form, enriched with a multitude of columns, statues, and inlaid marbles, was finished in 1380. Space



Plan of Siena.

fails for the enumeration of the art treasures of the interior, but conspicuous among them is the well-known octagonal pulpit by Niccolò Pisano, dating from about 1274. The cathedral pavement is almost unique. It is inlaid with designs in colour and black and white, representing Biblical and legendary subjects, and is supposed to have been begun by Duccio della Buoninsegna. But the finest portions beneath the domes, with scenes from the history of Abraham, Moses, and Elijah, are by Domenico Beccafumi and are executed with marvellous boldness and effect. The choir stalls also deserve mention: the older ones (remains of the original choir) are in *tarsia* work; the others, dating from the 16th century, are carved from Riccio's designs. The Piccolomini Library, adjoining the *duomo*, was founded by Cardinal Francesco Piccolomini-Todeschini

(afterwards Pius III.) in honour of his uncle, Pius II. Here are Pinturicchio's famous frescos of scenes from the life of the latter pontiff and the collection of choir books (supported on sculptured desks) with splendid illuminations by Siennese and other artists. The church of San Giovanni, the ancient baptistry, beneath the cathedral is approached by an outer flight of marble steps built in 1451. It has a beautiful façade designed by Giovanni di Mino del Pellicciaio in 1382, and a marvellous font with bas-reliefs by Donatello, Ghiberti, Giacomo della Quercia, and other 15th-century sculptors. The other churches are—the Collegiata di Provenzano, a vast building of some elegance, designed by Schifardini (1594); Sant' Agostino, rebuilt by Vanvitelli in 1755, containing a Crucifixion and Saints by Perugino, a Massacre of the Innocents by Matteo di Giovanni, the Coming of the Magi by Sodoma, and a St Antony by Spagnoletto or his school; the beautiful church of the Servites (15th century), which contains another Massacre of the Innocents by Matteo di Giovanni and other good examples of the Siennese school; San Francesco, designed by Agostino and Agnolo about 1326, and now (1887) being restored, which once possessed many fine paintings by Duccio Buoninsegna, Lorenzetti, Sodoma, and Beccafumi, but some of these perished in the great fire of 1655, and the rest were removed to the Institute of Fine Arts after 1862 during the temporary desecration of the church; San Domenico, a fine 13th-century building with a single nave and transept, containing Sodoma's splendid fresco the Swoon of St Catherine, the Madonna of Guido da Siena, and a crucifix by Sano di Pietro. This church crowns the Fontebranda hill above the famous fountain of that name immortalized by Dante, and in a steep lane below stands the house of St Catherine, now converted into a church and oratory, and maintained at the expense of the inhabitants of the Contrada dell' Oca. It contains some good pictures by Pacchia and other works of art, but is chiefly visited for its historic interest and as a striking memorial of the characteristic piety of the Siennese.

Municipal buildings.

The communal palace in the Piazza del Campo was begun in 1288 and finished in 1309. It is built of brick, is a fine specimen of Pointed Gothic, and was designed by Agostino and Agnolo. The light and elegant tower (Torre del Mangia) soaring from one side of the palace was begun in 1325, and the chapel standing at its foot, raised at the expense of the Opera del Duomo as a public thank-offering after the plague of 1348, dates from 1352. This grand old palace has other attractions besides the beauty of its architecture, for its interior is lined with works of art. The atrium has a fresco by Bartolo di Fredi and the two ground-floor halls contain a Coronation of the Virgin by Sano di Pietro and a splendid Resurrection by Sodoma. In the Sala dei Nove or della Pace above are the noble allegorical frescos of Ambrogio Lorenzetti representing the effects of just and unjust government; the Sala delle Balestre or del Mappamondo is painted by Simone di Martino (Memmi) and others, the Cappella della Signoria by Taddeo di Bartolo, and the Sala del Concistorio by Beccafumi. Another hall is now being prepared in memory of Victor Emmanuel II., and its frescos and decorations are to be entrusted exclusively to Siennese artists. The former hall of the grand council, built in 1327, was converted into the chief theatre of Siena by Riccio in 1560, and, after being twice burnt, was rebuilt in 1753 from Bibbiena's designs. Another Siennese theatre, the Rozzi, in Piazza San Pellegrino, designed by A. Doveri and erected in 1816, although modern, has an historic interest as the work of an academy dating from the 16th century, called the Congrega de' Rozzi, that played an important part in the history of the Italian comic stage.

The city is adorned by many other noble edifices both public and private, of which we will mention the following palaces—the Tolomei (1205); Buonsignori, formerly Tegliacci, an elegant 14th-century construction, restored in 1848; Grottanelli, formerly Pecci and anciently the residence of the captain of war, recently restored in its original style; Sansedoni; Marsilii; Piccolomini, now belonging to the Government and containing the state archives; Piccolomini delle Papesse, like the other Piccolomini mansion, designed by Bernardo Rossellino, and now the national bank; the enormous block of the Monte de' Paschi, enlarged and partly rebuilt in the original style between 1877 and 1881, and including the old Dogana and Spannocchi palaces; the Loggia di Mercanzia (15th century), now a club; the Loggia del Papa, erected by Pius II.; and other fine buildings. We must also mention the two celebrated fountains, Fonte Gaia and Fontebranda; the Fonte Nuova, near Porta Ovale, by Camaino di Crescentino also deserves notice. Thanks to all these architectural treasures, the narrow Siennese streets with their many windings and steep ascents are full of picturesque charm, and, together with the collections of excellent paintings, foster the local pride of the inhabitants and preserve their taste and feeling for art.

*History.*—The origin of Siena, like that of other Italian cities, is lost in a mist of legendary tradition. It was probably founded by the Etruscans, and then falling under the Roman rule became a colony in the reign of Augustus, or

a little earlier, and was distinguished by the name of *Sena Julia*. Few memorials of the Roman era or of the first centuries of Christianity have been preserved, and none at all of the interval preceding the Lombard period. We have documentary evidence that during this epoch, in the reign of Rotaris (or Rotari), there was a bishop of Siena named Mouro. Attempts to trace earlier bishops as far back as the 5th century have yielded only vague and contradictory results. Under the Lombards the civil government was in the hands of a *gastaldo*, under the Carolingians of a count, whose authority, by slow degrees and a course of events similar to what took place in other Italian communes, gave way to that of the bishop, whose power in turn gradually diminished and was superseded by that of the consuls and the commonwealth.

We have written evidence of the consular government of Siena from 1125 to 1212; the number of consuls varied from three to twelve. This government, formed of *gentiluomini* or nobles, did not remain unchanged throughout the whole period, but was gradually forced to accept the participation of the *popolani* or lower classes, whose efforts to rise to power were continuous and determined. Thus in 1137 they obtained a third part of the government by the reconstitution of the general council with 100 nobles and 50 *popolani*. In 1199 the institution of a foreign *podestà* gave a severe blow to the consular magistracy, which was soon extinguished; and in 1233 the people again rose against the nobles in the hope of ousting them entirely from office. The attempt was not completely successful; but the Government was now equally divided between the two estates by the creation of a supreme magistracy of twenty-four citizens,—twelve nobles and twelve *popolani*. During the rule of the nobles and the mixed rule of nobles and *popolani* the commune of Siena was enlarged by fortunate acquisitions of neighbouring lands and by the submission of feudal lords, such as the Scialenghi, Aldobrandeschi, Pannocchieschi Visconti di Campiglia, &c. Before long the reciprocal need of fresh territory and frontier disputes, especially concerning Poggibonsi and Montepulciano, led to an outbreak of hostilities between Florence and Siena. Thereupon, to spite the rival republic, the Siennese took the Ghibelline side, and the German emperors, beginning with Frederick Barbarossa, rewarded their fidelity by the grant of various privileges.

War with Florence.

During the 12th and 13th centuries there were continued disturbances, petty wars, and hasty reconciliations between Florence and Siena, until in 1254-55 a more binding peace and alliance was concluded. But this treaty, in spite of its apparent stability, led in a few years to a fiercer struggle; for in 1258 the Florentines complained that Siena had infringed its terms by giving refuge to the Ghibellines they had expelled, and on the refusal of the Siennese to yield to these just remonstrances both states made extensive preparations for war. Siena applied to Manfred, obtained from him a strong body of German horse, under the command of Count Giordano, and likewise sought the aid of its Ghibelline allies. Florence equipped a powerful citizen army, of which the original registers are still preserved in the volume entitled *Il Libro di Montaperti* in the Florence archives. This army, led by the *podestà* of Florence and twelve burgher captains, set forth gaily on its march towards the enemy's territories in the middle of April 1260, and during its first campaign, ending 18th May, won an insignificant victory at Santa Petronilla, outside the walls of Siena. But in a second and more important campaign, in which the militia of the other Guelf towns of Tuscany took part, the Florentines were signally defeated at Montaperti on 4th September 1260. This defeat crushed the power of Florence for many years, reduced the city to desolation, and apparently annihilated