work in two volumes); also Max Jähns, *Gesch. der Kriegswissen­schaften,* iii. 2154; Weise, *Scharnhorst und die Durchführung der allgemeinen Wehrpflicht* (1892); A. von Holleben, *Der Früh-*

*jahrsfeldzug, 1813* (1905); and F. N. Maude, *The Leipzig Campaign* (1908).

SCHAUMBURG-LIPPE, a principality forming part of the German Empire, consisting of the western half of the old countship of Schaumburg, and surrounded by Westphalia, Hanover and the Prussian part of Schaumburg. Area, 131 sq. m. Its northern extremity is occupied by a lake named the Steinhuder Meer. The southern part is hilly (Wesergebirge), but the remainder consists of a fertile plain. Besides husbandry, the inhabitants practise yarn-spinning and linen-weaving, and the coal-mines of the Bückeberg, on the south-eastern border, are very productive. The great bulk of the population (in 1905,44,992), are Lutherans. The capital is Bückeburg, and Stadthagen is the only other town. Under the constitution of 1868 there is a legislative diet of 15 members, 10 elected by the towns and rural districts and 1 each by the nobility, clergy and educated classes, the remaining 2 nominated by the prince. Schaumburg-Lippe sends one member to the Bundesrat (federal council) and one deputy to the reichstag. The annual revenue and expenditure amount each to about £41,000. The public debt is about £23,000.

SCHEDULE, originally a written strip or leaf of paper or parchment, a label or ticket, especially when attached to another document, as explaining or adding to its contents, hence any additional detailed statement such as cannot conveniently be embodied in the main statement. The word occurs first (14th century) as *cedule,* or *sedule,* representing the Fr. *cedule* (mod. *cédule,* cf. Ital. *cedola,* Ger. *Zettel,* &c.), which is derived from Late Lat. *scedula* or *schedula,* dim. of *sceda,* a written strip of parchment (late Gr. σχeδη), probably from *scindere,* to cleave, cf. *scindala,* a shingle. The original pronunciation in English was *sedule,* the modem pronunciation is *shedule-,* American usage has gone back to the original Latin or Greek, and adopts *skedule.*

SCHEELE, KARL WILHELM (1742-1786), Swedish chemist, was born at Stralsund, the capital of Pomerania, which then belonged to Sweden, on the 19th of December 1742. He was apprenticed at the age of fourteen to an apothecary in Gothen­burg, with whom he stayed for eight years. His spare time and great part of his nights were devoted to the experimental ex­amination of the different bodies which he dealt with, and the study of the standard works on chemistry. He thus acquired a large store of knowledge and great practical skill and manipula­tive dexterity. In 1765 he removed to Malmö, and in 1768 to Stockholm. While there he wrote an account of his experiments with cream of tartar, from which he had isolated tartaric acid, and sent it to T. O. Bergman, the leading chemist in Sweden. Bergman somehow neglected it, and this caused for a time a reluctance on Scheele’s part to become acquainted with that savant, but the paper, through the instrumentality of Anders Johann Retzius (1742-1821), was ultimately communicated to the Academy of Sciences at Stockholm. He left Stockholm in 1770 and took up his residence at Upsala, where through the agency of Johann Gottlieb Gahn (1745-1818), assessor of mines at Fahlun, he made the personal acquaintance of Bergman. A friendship, of mutual advantage, soon sprang up between the two men, and it has been said that Scheele was Bergman’s greatest discovery. In 1775, the year in which he was elected into the Stockholm Academy of Sciences, he left Stockholm for Köping, a small place on Lake Malar, where he became provisor and subsequently proprietor of a pharmacy. The business, however, was not what he had been led to expect, and it took him several years to put it on a sound footing. Yet in spite of his business cares he found time for an extraordinary amount of original research, and every year he published two or three papers, most of which contained some discovery or observation of importance. His unremitting work, it is said, especially at night, exposing him to cold and draughts, induced a rheumatic attack which brought about his death. He had intended, as soon as his circumstances permitted him, to marry the widow of his predecessor, but his illness

increased so rapidly that it was only on his death-bed, on the 19th of May 1786, that he carried out his design. Two days later he died, leaving his wife what property he had acquired.

Scheele’s power as an experimental investigator has seldom if ever been surpassed, and his accuracy is most remarkable when his primitive apparatus, his want of assistance, his place of residence, and the undeveloped state of chemical and physical science in his time, are all taken into account. Research was at once his occupation and his relaxation, and his natural endowments were cultivated by unceasing practice and unwearied attention. Study of his original papers shows that his dis- coveries were not made at haphazard, but were the outcome of experiments carefully planned to verify inferences already drawn, and successfully designed to settle the point at issue in the simplest and most direct manner. He left nothing in doubt if experiment would decide it, and he evidently did not consider that he had fully investigated any compound until he could both unmake and remake it. His record as a discoverer of new substances is probably unequalled. The analysis of manganese dioxide in 1774 led him to the discovery of chlorine and baryta; to the description of various salts of manganese itself, including the manganates and permanganates, and to the explanation of its action in colouring and decolourizing glass. In 1775 he investigated arsenic acid and its reactions, discovering arseniuretted hydrogen and “ Scheele’s green ” (copper arsenite), a process for preparing which on a large scale he published in 1778. Papers published in 1776 were concerned with quartz, alum and clay and with the analysis of *calculus υesicae* from which for the first time he obtained uric acid. In 1778 he proposed a new method of making calomel and powder of algaroth, and he got molybdic acid from mineral *molybdaena nitens* which he carefully distinguished from ordinary molybdena (plumbago or black lead of commerce). In the following year he showed that plumbago consists essentially of carbon, and he published a record of estimations of the proportions of oxygen in the atmosphere, which he had carried on daily during the whole of 1778—three years before Cavendish. In 1780 he proved that the acidity of sour milk is due to what was afterwards called lactic acid; and by boiling milk sugar with nitric acid he obtained mucic acid. His next discovery, in 1781, was the composition of the mineral tungsten, since called scheelite (calcium tungstate), from which he obtained tungstic acid. In 1782 he published some experiments on the formation of ether, and in 1783 examined the properties of glycerine, which he had discovered seven years before. About the same time he showed by a wonderful series of experiments that the colouring matter of Prussian blue could not be produced without the presence of a substance of the nature of an acid, to which the name of prussic acid was ultimately given; and he described the composition, properties and compounds of this body, and even ascertained its smell and taste, quite unaware of its poisonous character. In the last years of his life he returned to the vegetable acids, and investigated citric, malic, oxalic and gallic acids. His only book, on *Air and Fire,* was published in 1777, but was written some years before. The manuscript was in the hands of the printers in 1775, and most of the experimental work for it was done before 1773. Although it starts from the erroneous basis of the phlogistic theory, it contains much matter of permanent value. One of the chief observations recorded in it is that the atmosphere is composed of two gases—one which supports combustion and the other which prevents it. The former, “ fire-air,” or oxygen, he prepared from “ acid of nitre,” from saltpetre, from black oxide of manganese, from oxide of mercury and other substances, and there is little doubt but that he obtained it independently a considerable time before Priestley. Incidentally in 1777 Scheele prepared sulphuretted hydrogen, and noted the chemical action of light on silver compounds and other substances.

A list of Scheele’s papers is given in Poggendorff’s *Biographisch­literarisches Handwörterbuch* (Leipzig, 1863). They were collected and published in French as *Mémoires de chymie* (Paris, 1785-1788); in English as *Chemical Essays,* by Thomas Beddoes (London, 1786); in Latin as *Opuscula,* translated by Schafer, edited by Heben streit (Leipzig, 1788-1789); and in German as *Sämmtliche Werke,* edited