argued, elementary will-units, but units of a higher order comprising many elementary will-units. And these units of higher order may be thought of as in turn uniting to form higher unities still (*e.g.* the collective will of society), until in the end we reach the thought of a world-will including within itself the multiplicity of individual wills.

Many of Wundt's psychological theories—such, for example, as his well-known doctrine of apperception—only become intelligible in the light of his general view of Nature. Emphatic as he was in claiming for psychology a position of its own as an empirical science, he never ceased to regard it as standing in the closest and most intimate relation with philosophy. Even in the "Grundzüge," which is a storehouse of facts largely accumulated in his own laboratory, he turns again and again to the discussion of problems essentially philosophical in character. That work has often been severely criticised, yet when all is said it remains one of the great and permanent contributions to the modern science. The Leipzig Institute was started in a humble way in 1878, but it grew by rapid strides, and Wundt lived to see one of his early desires realised—namely, that the time would come when in every German university a psychological laboratory would be deemed a part of the necessary equipment. The "Philosophische Studien," of which he was the editor, served as a medium of publication for the work of his pupils, and many valuable articles of his own are likewise contained in the twenty volumes that appeared from 1883 to 1903. The last years of his life saw also the realisation of another of his early dreams. In 1900 the first volume of his "Völkerpsychologie" was published, and five other bulky volumes followed. Here, again, to some extent he was breaking new ground, where, however, he was entirely dependent for his material upon the labours of others.

Wundt married shortly after leaving Heidelberg; his son is distinguished as an authority in Greek philosophy, and to his daughter, his companion "im Urwald der Mythen und Märchen," one of the volumes of the "Völkerpsychologie" is dedicated. In private life he was a man of many lovable qualities. His old students look back to many delightful hours spent with him in the midst of his family, and remember with gratitude his kindly interest in them and their work. Slender in build, never of strong physique, and troubled with failing eyesight, it seems well-nigh incredible that he got through the multitudinous labours of which I have spoken, and survived so many of his former pupils. He was wonderfully effective as a lecturer; without a note, and usually to audiences of more than three hundred students, he would handle in a concise and lucid manner themes of notorious difficulty. Absorbed in his scientific pursuits, allowing himself little leisure, but content and happy in his modest and simple home, his life was a rounded whole, the memory of which one would not willingly let die.

G. DAWES HICKS.

ARMAND GAUTIER.

BY the death of Emile Justin Armand Gautier, at Cannes, in his eighty-third year, France loses one of her most distinguished chemists. Born at Montpellier, the son of a medical man, Gautier appears to have been destined to follow his father's profession, and to his early training is to be attributed, in all probability, the direction of much of his subsequent life's work in science, notably in biological chemistry. As a youth he obtained a post, under the Faculty of Montpellier, first as *aide-préparateur* and then as *préparateur* in the chemical laboratory, where he remained five years, and where he acquired that power and facility of manipulation which characterised his experimental work. In the early 'sixties he seems definitely to have decided to attach himself to chemistry as a career. At that period the science was experiencing profound changes, and chemical theory was developing with remarkable rapidity, more particularly owing to the progress in organic chemistry. Wurtz was everywhere recognised as one of the pioneers and leaders of the new movement, and accordingly young Gautier repaired to Paris to work under his inspiration and direction. At Paris he remained, becoming, in 1869, a member of the Faculty of Medicine, in 1872 director of the first laboratory of biological chemistry instituted in France, and in 1884, on the death of Wurtz, professor of medical chemistry. He was elected a member of the Academy in 1889.

During the fifty years of his scientific activity Armand Gautier published an extraordinary number of memoirs—upwards of 600, it is said. They range over every department of the science and practically every sub-section of it. Many of them, of course, are not of first-rate importance, but, collectively, they serve to show his breadth of sympathy, his receptivity, his intellectual keenness, his versatility, and the many-sidedness of his interests.

Here we can deal only with his more noteworthy contributions to the literature of chemistry. The influence of Wurtz is stamped on the earliest of them—as in his work on cyanogen derivatives, on the nitriles and their isomerides, the carbylamines—which mostly appeared in the Bulletin of the French Chemical Society and served to establish Gautier's position as one of the foremost investigators of the new French school. His appointment as director of the laboratory of biological chemistry, already referred to, gave a fresh impetus and a new departure to his work as an investigator. In 1872 he signalised the existence of a class of cadaveric alkaloids, termed by Selmi *ptomaines*, and presumed to be products of putrefaction. Earlier investigators, such as Panum, Dupré and Bence Jones, Marquardt, Schmidt, Bergmann and Schmiedeberg, Zuelzer and Sonnenschein, had obtained so-called putrefaction bases which occasioned physiological effects similar to certain vegeto-alkaloids. Selmi's term was adopted by Gautier to denote alkaloidal sub-

stances formed in the putrefaction of proteins. The earlier literature relating to the ptomaines—a term now fallen into disuse in scientific nomenclature—is full of errors, and there is practically no evidence that what is called "ptomaine poisoning" is due to poisonous alkaloids: it is rather to be attributed to bacterial infection and is caused by bacterial toxins. Gautier found in fresh tissues a number of basic substances, related to uric acid and creatinine, which he regarded as the products of ordinary metabolism, and to which he gave the name of *leucomaines*, to distinguish them from the products of bacterial action.

A subject which engaged Gautier's attention for some time, and to which he occasionally returned, was the widespread diffusion of arsenic in the animal organism, which led to work on improved methods of detecting and estimating that element in micro-chemical quantities. His speculations concerning the *rôle* played by arsenic, as well as by iodine, in our organism may be said to be at the basis of modern therapeutics. The question of the influence of the infinitely little on hygiene had, in fact, a special attraction for him. It is seen in his work on the action of the impurities of the air of towns on the public health. He detected the constant presence in air of iodine, as well as of hydrogen; the former, he imagined, was due to the presence of microscopic algæ, the latter to emanations from primitive rocks, volcanoes, and thermal springs.

Gautier, as a biochemist, also engaged himself in questions of plant physiology and on the chemical transformations of various products in the life-history of vegetable organisms. These studies occasionally took a practical turn, as, for example, in his inquiries into the colouring matter of the grape and the detection of the fraudulent colouring and dilution of wine, and into the influence of "plastering," "collage," and fortifying on the weight of the dry extract. The nature of tobacco-smoke also attracted his attention. He found that when tobacco is smoked in a pipe the volatile liquid products consist mainly of basic compounds, among them nicotine, a higher homologue, $C_{11}H_{16}N_2$, which pre-exists in tobacco leaf, and a base, C_6H_9NO, which appears to be related to picoline. Hydropyridines and other alkaloids are also present, resulting from the decomposition at relatively low temperatures of the carbopyridic and carbohydropyridic acids present in the leaf.

Gautier was a fellow-worker with Maxwell Simpson in Wurtz's laboratory, and the two collaborated in the study of the action of hydrocyanic acid upon aldehyde. He was an occasional visitor to this country, and represented France at various academic gatherings in London. He was a genial soul, and, as was said of him by M. Deslandres, president of the Academy of Sciences, when pronouncing his *éloge*, remained young in spirit and young of heart until the end.

T. E. THORPE.

BY the death of MR. HENRY BASSETT, F.I.C., at the age of eighty-three, on August 30, we have lost one of the few remaining survivors of that ardent band of young chemists who studied under Dr. A. W. Hofmann at the Royal College of Chemistry. Handicapped at the start by the death of his father when he was only nine years old, Mr. Bassett hail an uphill fight all his life; but he was animated by the same spirit which often enables the poet and the artist to produce good work under most unfavourable conditions. For a time he acted as assistant to Brodie at Oxford, but most of the best years of his life were taken up in testing anthracene as assistant to Mr. F. A. Manning. In 1894, at an age when men more fortunately situated are thinking of retiring, he started a consulting practice of his own, first at St. Andrew's Hill and then at 104 Queen Victoria Street, specialising in non-ferrous alloy and anthracene work. Never lacking in ideas, Mr. Bassett always had some research work in hand, and at intervals, from 1863, he published some seventeen papers and short notes, mainly in the Journal of the Chemical Society or the *Chemical News*. Several of these had reference to anthracene testing, into which he introduced some improvements, and on which he was a recognised authority. His most important research was certainly that on ethyl orthocarbonate, which he prepared by the action of sodium on a mixture of chloropicrin and absolute alcohol. This was published in the Journal of the Chemical Society for 1864, and may give him a permanent place in chemical literature. Several short papers on chlorides of carbon and one on eulyte and dyslyte may also be mentioned. During the course of his consulting practice Mr. Bassett carried out a considerable amount of research work, notably on the corrosion of manganese and other bronzes by sea water, which was never intended for publication. Of recent years he had been doing some very interesting work on graphite, and until within a fortnight of his death had been trying to get his results into a form suitable for publication.

WE regret to note that the death of Mr. ISHAM RANDOLPH on August 2, at seventy-two years of age, is announced in the *Engineer* for September 10. Mr. Randolph's most prominent work was on the Chicago drainage canal, of which he was chief engineer from 1893 until 1907, and was thereafter its consulting engineer until 1912; this great work cost about 12,000,000*l*., and has a hydro-electric plant of 40,000 h.p. He was a member of the international board of consulting engineers for the Panama Canal, and occupied many other important public posts. Mr. Randolph was a member of many engineering societies, including the American Society of Civil Engineers. The Franklin Institute awarded him the Elliott Cresson Medal for distinguished achievements in civil engineering, and the University of Illinois conferred upon him the degree of Doctor of Engineering in 1910.