and in addition, physical chemistry requires to be utilised.

Probably the most extensive attempt to use chemical constituents for botanical classification has been made by R. T. Baker and H. G. Smith, in the case of the Australian genus *Eucalyptus* with about two hundred species : the essential oils from well over half of these have been examined. Baker and Smith trace a relation between the venation of the mature leaves and the composition of their essential oil. The genus is thus divided into fairly well-marked groups, and it is possible to suggest the probable constituents of the oil of a given species by examining the venation of the leaves, and, conversely, by chemical investigation of the oil to gain a clue to the species. Maiden, the botanical expert on *Eucalyptus*, did not always agree with the classification of the chemists, but upon occasion he discovered morphological differences after a delimitation of species had been proposed on chemical grounds.

The main biological interest of alkaloids is not botanical in their distribution, but pharmacological in their action. This leads to a mention of the great developments in synthetic drugs, due to organic chemistry. In particular there is great scope for the organic chemist in chemotherapy, the combating of general infections of the host by synthetic drugs. The production of salvarsan, which has made such a great change to the treatment of syphilis and other protozoal diseases, and the subsequent introduction of germanin (or Bayer 205) in the treatment of sleeping sickness, indicate great possibilities of applying organic chemistry to this particular department of medicine, and constitute a link between workers in very different fields.

I have directed attention to the many points of contact between organic chemistry and biology in the past and present, and if finally I am permitted to draw a conclusion it would be an educational one. I hold it to be desirable that biologists should have at least an elementary knowledge of organic chemistry, in spite of the difficulties imposed by ever-increasing specialisation in science. These difficulties are particularly felt in apportioning the time available for medical education among the many subjects of a crowded curriculum, and may to some extent be met by a careful consideration of what is really useful.

The chemical training of the physician (and of the biologist) should not be identical with the preliminary training of the professional chemist, although it still is so in many universities. In order to save time, much elementary chemistry, particularly inorganic, must be abandoned, thus making room for those aspects of the subject which have biological applications. This differentiation between the chemical needs of various groups of students requires special courses, and teachers who have a sympathetic understanding of the peculiar needs of their students, medical and biological.

Obituary.

Prof. Charles Moureu.

NOT only the French but also chemists generally suffer a specially severe loss by the death of Charles Moureu, professor of organic chemistry in the Collége de France, the second to succeed Berthelot. In France, the leader in his subject, he was not merely a chemist of great achievement and high repute but also a man of outstanding personal character and social distinction. During the War he rendered inestimable service to his country by organising and directing the work—defensive and offensive—of the French chemists ; in this connexion he was brought into close contact with our English workers. Since then he has been a familiar figure in England.

At the close of the War, Moureu entered upon a vigorous campaign in which he made clear to politicians and the public the importance of chemistry in the modern State and the great need of improving the status and financial position of the French scientific schools. His efforts to this end were in large measure successful. His success was in no slight degree due to the eloquence with which he stated his case in his book " La Chimie et la Guerre ". Known throughout the world of chemistry, a shrewd man of affairs, a polished diplomat, in fact, Moureu was particularly endeared to the chemists of other nationalities, who met him during recent years at various international conferences, by his engaging manner and the obvious sincerity and breadth of his outlook. The thesis developed in his book is that stated by his countryman Duclaux, which he quotes : " La chimie est au fond de tout et rien ne lui échappe ". He expressed what to him was a profound truth when he said : " Le Français le plus illettré a le sentiment, net ou confus, que sa patrie est grande et belle entre toutes. Fier, sans arrogance, d'être Français, il est profondement patriote." Patriotic to the core, at the same time he was so scientifically minded, so sane in his judgments, that he was not only willing but also able to deal with international problems broadly and dispassionately. He was the first president of the International Union of Pure and Applied Chemistry and contributed greatly to the foundation of the Union. At the conference at the Hague last summer, he rendered most important service in the very difficult discussion on the constitution of the Union which occupied the meeting.

Moureu was a son of the mountains, a native of the Basque region. He was born on April 19, 1863, at Moureux, a village in the Bearnese country, in which his family had lived during centuries ; he died at Biarritz on June 13. An eloquent funeral discourse was delivered there, by his colleague and friend, Prof. Camille Matignon, on June 17 ; he was buried the following day at Oberon, in the Basses Pyrénées. The youngest of a large family, his father having died while he was an infant, he was cared for by an elder brother, Félix Moureu, who lavished upon him the affection of a father,

an affection which, throughout his life, he fully reciprocated. Félix Moureu died only last year, at the age of seventy-eight. He was a pharmacist of distinction in Biarritz, ten years Mayor of the town; he did much to develop its attractions. Charles Moureu's early training was in his brother's pharmacy at Biarritz. In Paris, he quickly passed through the courses in pharmacy and those at the Sorbonne. He qualified as pharmacist, in the first class, in 1891. After serving, during several years, as chief assistant, he was admitted to the Faculty of Pharmacy in 1899 and became professor of pharmaceutical chemistry in 1907. Ten years later he succeeded Jüngfleisch, Berthelot's successor in the chair of chemistry at the Collége de France. He also became Director of the Verdun Agricultural Research Station, founded by Berthelot. He was elected into the Academy of Medicine in 1907 and into the Academy of Sciences in 1911. During more than thirty years he has been a prolific worker.

Moureu began by studying various vegetable essences, eugenol, etc. He also worked on alkaloids, determining the constitution of sparteine. Following the Berthelot tradition, he devoted himself to synthetic studies in the acetylene series. His most noteworthy discovery is that of the *red hydrocarbon*, rubrene, which is remarkable on account of the way in which it simulates the behaviour of hæmoglobin towards oxygen, absorbing the gas with avidity, *when irradiated*, forming a colourless peroxide from which the oxygen may be removed by exposure in a vacuum. If heated, at temperatures below 140°, this gives off oxygen alone, to within 80 per cent of the theoretical amount. Even at ordinary temperatures, if exposed to light but not in the dark, the peroxide dissociates reversibly, the dissociation pressure at 16° being of the order of 0·5 cm. of mercury. Light is emitted during the deoxidation. If the hydrocarbon be subjected to oxygen in admixture with either benzaldehyde or propionic aldehyde only the rubrene absorbs the gas; its oxidation is retarded by quinol and other anti-oxidants; it is not oxidised at all in the presence of carbonic oxide. Moureu has suggested, in view of the behaviour of rubrene towards oxygen, that in oxyhæmoglobin the oxygen may well be in organic connexion with the molecule, not through the iron.

From 1906 onwards, Moureu devoted himself to the study of the rare gases present in French mineral waters, oil springs, etc., even extending his researches in this field to Madagascar, where he made a careful survey of the chemical resources of the island. For this last service he was promoted to the rank of Grand Officer of the Legion of Honour. A summary of his work on the rare gases was presented to our Chemical Society, of which he was an honorary member, in a lecture which he delivered on June 14, 1923. Fifty-seven springs in all were studied. The results are very remarkable. The amount of helium present varied greatly, reaching 5·92 per cent in the gas collected at Maizieres, Côte d'Or. The other gases, krypton, argon, neon and xenon, however, were present in practically the same proportion, whatever the source. In 1913 he initiated an Institute of Hydrology and Climatology for the study of mineral waters and problems of climate in France and its colonies.

Being familiar with acrolein from his early studies, during the War Moureu sought to utilise this aldehyde as a tear excitant. The difficulty was to preserve it unchanged, as it soon set to a solid. Having traced the polymerisation to the action of acid formed by atmospheric oxidation, he set to work to discover means of preventing the change. He soon found that a great variety of substances could be used as anti-oxidants: phenols, aldehydes, amines, even potassium iodide. From 1919 onwards, Dufraisse and he, assisted by various young workers, systematically explored the field thus opened up, with the result that we are now in possession of a mass of exact data of extreme value. The full importance of the work, in its bearing upon vital phenomena, is yet to be realised. It is already clear that, more often than not, when two oxidisable substances are together subjected to attack by oxygen gas, oxidation is apparently inhibited because both are simultaneously oxidised to oxides which interact reversibly. Obviously, if the living organism were not in some way protected against excessive oxidation, through the heat developed, the action would necessarily tend to take place at an increasing rate: there is little doubt that, through what may be termed the Moureu effect, a control is exercised preventing excessive action. Maybe the office of some advitants is of this order.

Moureu's work in general is characterised by a breadth and philosophical exactitude which renders it of special importance and value. In him we lose a true chemist of the old school—a man who worshipped at the shrine of severe laboratory practice, a cult to-day by no means overpopular even in France. Fortunately, the name survives in his son, already a young chemist of distinction.

HENRY E. ARMSTRONG.

MR. H. C. ROBINSON.

MR. HERBERT CHRISTOPHER ROBINSON, who was born in Liverpool on Nov. 4, 1874, died on May 30 last, after an illness which had lasted for nearly a year. Mr. Robinson belonged to one of the leading Liverpool families, whilst one of his uncles, Mr. William Fothergill Robinson, had been Vice-Chancellor of the Duchy of Lancaster.

Robinson was educated at Marlborough College, and on leaving school went to the Royal School of Mines, for which he had obtained a scholarship. In 1894, constant ill-health compelled him to give up his studies, and he then commenced his career as a zoologist at Davos, where he resided for a couple of years. Here his health considerably improved, and in 1896 he went to Queensland, where he made a large collection of birds in Cooktown and its vicinity, but was obliged to return home owing to chronic dysentery. On his return to England he was appointed an assistant in the Liverpool Museum, where between 1897 and 1900 he