search station there. These great peaks of administration, however, convey little idea of the continuous demands made of him in running the many activities of the Society It has some 120 committees and he was Secretary of nearly all of them. He also attended many of the scientific lectures, for he always retained his interest in science for its own sake.

Ever since Babbage's celebrated attack on the Society in 1830 in his *Reflections on the Decline of Science in England*, the function of the Society has from time to time been questioned. I can remember Martin's chuckle when I drew his attention to the fact that his 1830 predecessor had come directly under Babbage's attack for taking a 10% commission from the keeper of the tavern in which he persuaded the Royal Society to hold its annual dinner. Martin's own quiet good humour contributed to that sense of proportion which he always maintained, both in dealing with the occasional challenges to the Society and with the idiosyncracies of some of its Fellows.

One result of Babbage's attack, incidentally, was that the British Association was formed in order to become the main forum for professional men of science, in contrast to the Society, to which laymen were often elected at that time. Over the years, the functions of the two bodies have tended to exchange, and one of Martin's further interests lay in the Association; he was a member of its Council almost continuously from 1959 onwards. Once again, he played a part in getting Government support for the British Association, with funds that have been channelled through the Society.

His abilities were very widely drawn upon. He was a member of the Councils of the Royal Society of Arts, the Society for the Protection of Science and Learning, and the Charities Aid Foundation; and he was on the Executive Council of the CIBA Foundation. The Royal Society of Edinburgh elected him a Fellow in 1956. Since 1967 he had been Chairman of the B.B.C. Science Consultative Group, and since 1950 a Commissioner of Income Tax. His work was recognised by the award of a C.B.E. in 1960, and a Knighthood in 1970, and Honorary Degrees of D.Sc. from the University of Edinburgh and of D.C.L. from Newcastle.

But with all his public service, the Royal Society—both for itself and what he believed it could do—was his absorbing interest. It recognised the increased responsibilities of his office when it re-designated him Executive Secretary in 1962. By a Statute of 1847 he could not be a Fellow, for in a sense his post is one in which the holder has to be a man apart from any of the sectional interests that constitute the full spectrum of science: "A means for the Fellows to express their policies" as he himself put it, adding "I have tried to organise affairs so that all the decisions on scientific matters are taken by the Fellows." To him, his part lay in securing all the information that they needed before taking a decision, and in smoothly implementing the decision once it was taken. He was careful not to volunteer guidance but members of Council, and many of its committee chairmen, gratefully found that he always had something helpful to say when he was asked for his opinion.

Although he could not be a Fellow, few Fellows have done more or had greater influence for good in the Society since World War II than David Martin. With his fervent belief in its cause, his valedictory words are a message for the future: "As the years have passed I have become more and more convinced that it is not enough to leave the advancement of science to scientists alone. The need to see it as making a contribution, and only one contribution, to the world's problems has caused me to recognise the desirability of seeking liaison with other bodies. . . . These bodies operate in different or wider canvasses and, in my belief, operate better in liaison with the scientific activities which the Royal Society represents. The ivory tower concept for scientists is now anachronistic and although I feel an elitist organisation for science has a vital and important role, the base of the pyramid of excellence must reside in the ordinary everyday life of the people."

As for a personal appreciation, what he said of Harold Hartley on the latter's 90th birthday might well have been said of himself: "I would not dissent from a eulogy that ascribed to him the philosophical powers of a Socrates, the strength of a Hercules and the decisive action of a Churchill, but above all he has a warm humanity, which secures a place of affection in the hearts of all those privileged to know him as a friend."

R. V. Jones

Leopold Ruzicka

LEOPOLD RUZICKA, one of the greatest and most influential organic chemists, died on September 26, 1976. His work exemplifies that combination of severely disciplined empiricism wtih intellectual fantasy and imagination, which is the hallmark of first class organic chemistry. Ruzicka moreover was a unique character with a personality which was perpetually interesting and stimulating to all who knew him. His life also could teach us a lesson sorely needed in the United Kingdom—how to make an effective combination of academic and industrial efforts in research—if only those in authority would pay heed.

Ruzicka was born on September 13, 1887, in Vukovar, a small town in Eastern Croatia where the river Drava joins the Danube. The family name is Czech, going back to his great-grandfather. Ruzicka's father, a cooper and timber merchant, died when the boy was four years old, and the family moved to the neighbouring town of Osijek, where the young Leopold attended the classical high school, learning much Latin and Greek but neither chemistry nor geometry. At an early age Ruzicka was determined to become a priest, but this ambition had to be abandoned and, after much thought, he decided that his life's work should be in the organic chemistry of natural products. The circumstances which influenced this decision, remarkable at such an early age, are obscure; but we have Ruzicka's own word for it.

At the age of 18 Ruzicka left the Austro-Hungarian domain and sought training in Switzerland or Germany. His first aim was to enter the Polytechnic in Zürich, but the entrance examination was forbidding in its requirement for geometry as well as chemistry. So Leopold went to the Technische Hochschule at Karlsruhe, where he was accepted without examinations. The choice was fortunate because he was free to select the lectures suited to his special interests, and he joined Hermann Staudinger. It is typical of Ruzicka's extraordinary energy and intellectual ability that in only four years he completed the course for both first and higher degrees, graduating in 1910 as Doctor Ingenieur. Staudinger invited his outstanding pupil to join him in investigating the then unknown constituents, poisonous to insects, of *Chrysanthemum cinerariifolium*, the pyrethrins now of such economic importance. And in 1912 Staudinger succeeded Richard Willstätter at the Eidgenössische Technische Hochschule, Zürich. So Ruzicka arrived eventually, without examination, at the institute which he was to serve so well for many years. In 1916 he ceased collaboration with Staudinger in order to work on his habilitation thesis, which in 1918 brought him the rank (unpaid) of Privat Dozent and in 1923 of titular Professor. His researches were in the field of alicyclic compounds, which always remained his chemical interest.

Finance was a great problem to the unpaid lecturer, and in 1921 he accepted an invitation to collaborate

with the perfume factory in Geneva, then Naef et Cie and nowadays Firmenich et Cie. So began an academic-industrial collaboration, fruitful for both partners. Ruzicka's research proposal was 'synthesis of the sesquiterpene perfumes farnesol and nerolidol; clarification of the structure of the four important odorous ketones, civetone, muscone, irone, and jasmone'. Until 1925 the work was carried out in Zürich in a cellar, with eventually eight co-workers, but then it was transferred to better quarters in Geneva. It was one of the classical, seminal investigations in organic chemistry. Nowadays it is difficult to remember that accepted dogma precluded stability for macrocyclic carbon structures, such as were proved to be the basis of the commercially important perfumes of musk and civet. The structures of the natural products were elucidated, they were synthesised, and a simpler, cheaper synthetic musk perfume, 'exaltone', was produced. Ruzicka spent only 18 months in the industrial laboratory, but that cemented a lasting relationship between it and the ETH, Zürich.

In 1926 Ruzicka accepted a call to the Professorship in Utrecht, where he pursued the chemistry of the many membered rings and of the higher ketones. In addition he began to acquire that deep love and knowledge of Dutch painting, which was to become almost as important as his love for chemistry. The stay was, however, short because Staudinger's successor at the ETH, Richard Kuhn, returned to Germany, and the President of the ETH, Rohn, came to Utrecht to offer the post to Ruzicka. Thus Ruzicka, who had became a Swiss citizen in 1917, became the first non-German to occupy the chair, although in due course he continued their tradition, still maintained by his own successor, of becoming a Nobel Laureate.

At the ETH Ruzicka threw himself into the task of making it the leading organic chemical institute in the whole world. He built so well that this position has, in the perhaps prejudiced view of the writer, never been lost. Ruzicka had an oft-quoted saying, "academic freedom consists in being allowed to work far harder than is prescribed." He certainly followed his own precept —and made similar demands on his colleagues. From the Zürich laboratory poured many publications opening up the detailed chemistry of the higher terpenes, the steroids and especially the sex hormones. The series of papers *Ueber Steroide und Sexualhormone*, continued by former collaborators, has reached part 256 and another series *Ueber Triterpene* likewise reached part 196. Ruzicka took pride in the way in which these marathons were continued by relays of his pupils. The triterpene series, notable for the skill and exactitude shown in unravelling immensely difficult problems, was joint work with O. Jeger. Jeger went on to investigate the photochemistry of alicyclic compounds, and yet another long series of papers emerged and yet another first-class chemist, a "chemical grandson" of Ruzicka, K. Schaffner, now at the Max-Planck Institute, Mülheim.

Ruzicka had an instinct for the significance of apparently minor natural products. Few could have discerned that the constituents of wool fat, especially lanosterol, would turn out to have great importance as the precursor of the steroids.

In this work Ruzicka shrewdly enlisted financial support from both the CIBA company in Basle and the Rockefeller Foundation. The close contact with CIBA included supply of personnel for their laboratories and assignment of patents, which proved to be profitable. It is worth noting in passing that Ruzicka's successor, Vladimir Prelog, became a member of the board of CIBA, now CIBA-GEIGY.

While much of these researches comprised detailed experimental exploration of complex organic structures, the organic chemist's characteristic underlying interest in correlating experimental data was never neglected. The isoprenoid origin—in modern terms derived from mevalonate—of these natural products was always in Ruzicka's mind and eventually there emerged the biogenetic isoprene rule. Such interests naturally led Ruzicka towards biochemistry proper, and he was largely instrumental in the establishment of a biochemical institute in the ETH. Moreover his younger colleagues, notably V. Prelog and D. Arigoni, have extended the scope of organic chemical researches into enzymology and experimental, as distinct from merely speculative biosynthesis.

In his prime Ruzicka had a rather conservative view of organic chemical theory, but again it is noteworthy that another of his brilliant pupils, A. Eschenmoser, has transformed much of our outlook on organic chemical synthesis by thorough understanding of theoretical concepts.

Initially Ruzicka had a critical view of physical chemistry, but, as his interest in spectroscopic and other physical methods grew—and he ensured that his institute lacked nothing in instrumentation in that regard—his sympathy for physical chemistry increased. He helped the growth of young physical chemists and the development of a separate institute in the ETH.

The patents on partial synthesis of the male hormones, testosterone and methyltestosterone, generated substantial sums of money. Ruzicka used them to built up a superb collection of Dutch painting—works by Franz Hals, Rembrandt, Rubens, and many others—which was presented to the Zürich Kunsthaus. One example of the quality of this collection will suffice: a Dutch art expert considered that of all the views of Haarlem painted by Jacob van Ruisdael, the finest was in Ruzicka's collection. This collection was not assembled by merely following the advice of art dealers. On the contrary, Ruzicka was a very knowledgeable amateur, in the best sense of the word, and his Zürich endowment includes an important library. The former director of the Mauritshuis in the Hague has testified to Ruzicka's expertise and his characteristic cunning and energy in acquisition of the best pictures for his collection. The writer remembers Ruzicka's indignation when difficulties were raised about an export licence for the portrait *Philip the Fourth* (Rubens) bought in London. Various letters, one translated into "too polite Cambridge English", another in Ruzicka's own words, were ineffective. Eventually a successful arrangement was made through the diplomacy of the Swiss Ambassador in London.

No memorial to Leopold Ruzicka would be complete without reference to his wit and penchant for entertaining stories. Although a very loyal Swiss citizen, he loved to parade his left wing views, suitably exaggerated for the benefit of the conservative Swiss, while being proud of his membership of the Papal Academy of Sciences, not forgetting his simultaneous membership of the Soviet Academy. It is recorded that in a Leningrad hotel he announced loudly that "as we are all good Party members, we can speak freely". As his hosts blenched, he went on to compare unfavourably the contributions made by Stalin to the Hermitage collection with those derived from Catherine the Great. This outspokenness was evident in the laboratory. The writer well remembers a distinguished American author of a popular textbook on organic chemistry, being distinctly disconcerted by the interruption of his lecture in Zürich because Ruzicka would not tolerate a pentavalent carbon atom on the blackboard of his laboratory. But there was no malice in Leopold Ruzicka. He loved to see his younger colleagues develop and the superb institute at Zürich stands as a lasting memorial to his life and work.

Ruzicka detested Nazism, and he gave generous succour to victims of Nazi oppression.

He received, of course, numerous honours, among them the Nobel Prize (1939) and Foreign Membership of the Royal Society (1942).

The autobiographical memoir *In the borderland between bioorganic chemistry and biochemistry*[1] makes rewarding

reading, as does Ruzicka's own obituary notice of Arthur Stoll[2], which reveals much of Ruzicka himself as well as the subject of the memoir.

The writer thanks Professor O. Jeger and V. Prelog for their help in providing information and advice.

G. W. Kenner

[1] *A. Rev. Biochem.* **43**, 1–20 (1973).
[2] *Biogr. Mem. Fellows R. Soc.* **18**, 567–593 (1972).

R. A. Morton

RICHARD ALAN MORTON, Emeritus Professor of Biochemistry in The University of Liverpool, an outstanding British biochemist of his generation, died peacefully at his home on January 21 after a short illness; he was seventy-seven. Born in Liverpool of Welsh parents, Professor Morton received his early education at Oulton School. After a short time in the Army he entered Liverpool University as an undergraduate in 1919 and, apart from a sabbatical year in the United States as Visiting Professor at Ohio State University in 1931, remained there until he retired in 1966. He graduated in chemistry and worked for his Ph.D. under Professor E. C. C. Baly, a pioneer in the application of spectroscopy to chemical problems; in 1924 he was appointed special lecturer in spectroscopy in the Chemistry Department where he remained until 1944, when, with great foresight, the University elected him Johnston Professor of Biochemistry. He held this chair, the first established chair of biochemistry in the UK, with great distinction for twenty-two years.

Professor Morton's early research work was concerned with relating the absorption spectra of chemical compounds to their structure and earned him the Royal Institute of Chemistry's Meldola Medal in 1930; later he pioneered the application of absorption spectroscopy to biology. This interest was first aroused in 1926 when he collaborated with Professor (later Sir Ian) Heilbron to show that an impurity in cholesterol isolated from cod liver oil and which exhibited absorption bands in the ultra violet region of the spectrum, was the compound which was converted by ultra violet irradiation into the anti-rachitic principle. These were the days before the structure of cholesterol was known, but the active compound eventually turned out to be 7-dehydrocholesterol. He then particularly concerned himself with vitamin A which had two spectroscopic 'labels', an ultra violet absorption band (λ_{max} 328nm) and the blue colour (λ_{max} 617nm) which it gave on treatment in chloroform with a saturated chloroformic solution of antimony trichloride. Critical examination of the colour test led to his discovery of vitamin A_2 which was found particularly in liver oils from fresh water fish. Again, thoughtful assessment of the absorption spectrum of 'retinene', the prosthetic group of the visual pigment rhodopsin, began work which led to his discovery in 1941–1942 that retinene was vitamin A aldehyde (retinal) and that the corresponding compound from porphyropsin from fresh water fish retinas was the aldehyde of vitamin A_2. These penetrating discoveries, which gave studies on the biochemistry of visual pigments a new impetus, resulted in Morton's election to the Fellowship of the Royal Society in 1950.

Other important investigations on vitamin A followed but the later stages of Professor Morton's research career saw two extremely important additional discoveries: the first was ubiquinone, discovered independently at the same time in the United States, and the second was the family of polyprenols. The impact of these discoveries on modern biochemistry was profound. The experts on electron transport could from then on carry out their experiments secure in the knowledge that in the case of ubiquinone they were dealing with a well characterised compound. Later work revealed the importance of polyprenols as carrier compounds particularly in cell wall biosynthesis. It gave Professor Morton great satisfaction in his retirement to follow the detailed elucidation of the biochemical significance of these compounds particularly when these developments were carried out by his old students.

During the second world war Morton was concerned with an investigation organised by The Accessory Food Factors Committee of the MRC to determine the vitamin A requirements of humans. The experiments were carried out on conscientious objectors who volunteered as experimental subjects. This stimulated a life-long interest in nutrition and although he never experimented further in nutrition he read deeply in the subject and made many thoughtful contributions to a number of nutritional working parties. In 1969 he was elected a member of The American Institute of Nutrition.

Under Professor Morton's sympathetic guidance the Department of Biochemistry at Liverpool prospered and his crowning achievement was to persuade the University to build the large new building in which the department is now housed. He developed an effective research school and a remarkably large number of his students now hold positions of high responsibility in places as far apart as India and Canada. Professor Morton's great gifts as a scientist and as a wise counsellor became well known outside the University early in his career and he was constantly in demand for professional committees; he served twice on the Council of the Royal Society, was Chairman of the Biochemical Society and was a member of many government committees. From 1963 to 1968, he held the important position of Chairman of the Committee on Food Additives. He enjoyed writing and editing and was a member of the Editorial Board of the Biochemical Journal for seven years and Chairman of the Publications Board of the Royal Society 1961–1962.

He received honorary degrees from the University of Wales, Trinity College Dublin and The University of Coimbra, where his first research student became Rector. When he retired he was elected an Honorary Member of the Biochemical Society.

In retirement he continued to be as active as ever and he retained his fresh and enthusiastic approach to biochemistry right to the end. Indeed he had only just returned from an international symposium in India and at the time of his death was busy editing the proceedings. He spent a great deal of time on the work of the Oceanography and Fisheries Committee of the Natural Environment Research Council and in 1969 was Royal Society Visiting Professor at The Royal University of Malta. In spite of all this extramural activity he found time to complete two projects close to his heart: one was the *History of the Biochemical Society* (1911–1969) and the other a mammoth two volume new edition of his book *Absorption spectra of Vitamins and Hormones* last published in 1942.

In spite of his great achievements and international renown Professor Morton remained unassuming, friendly and approachable. His life shows that shrewdness and devotion to the demanding career of a scientist need not be divorced from kindness, gentleness and sympathy. His many friends and colleagues will remember Alan Morton as a distinguished scientist, wise in his judgement, humane in his outlook, whose long career brought lustre to biochemistry and to the University of Liverpool.

T. W. Goodwin

A hundred years ago

A bright violet meteor was observed at St Etienne on 11 March at two o'clock in the morning, in the southern part of the horizon. It was travelling with great velocity from west to east. No detonation was heard.

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