OBITUARY NOTICES.

DOUGLAS HERIOT BAIRD.

1883—1940.

WITH the death, on January 3rd, of Douglas Baird, Managing Director of Messrs. Baird and Tatlock (London), Ltd., and of Messrs. Hopkin and Williams, Ltd., one of the best known personalities has passed from the industrial side of British science. The country also has lost a man who will be difficult to replace at a time when science and industry are putting out their maximum effort, for it was during the last war that he performed valuable service as the connecting link between the scientist and the manufacturer.

Educated at Charterhouse, and then at the University of London, and at Karlsruhe (under Engler), he was well equipped for his life's work when in 1903 he first entered the firm, then under the management of his father, Hugh Harper Baird, who had founded it in 1879.

He succeeded his father as Managing Director in 1912, and carried on the tradition of making his business a personal one. In this connection it may be said that there are few scientists of eminence whom he had not met in the course of his career, many of them being his personal friends.

During the war, 1914—1918, at the request of the War Office, he undertook, rather unwillingly, the erection of a factory for filling gas shells at Walthamstow. This he did in no way as a matter of business, as the work involved in keeping up supplies from his firm to the various War Departments might have rightly been considered full-time war work. The factory was designed, erected, and producing all in the course of a few weeks.

As Chairman of Duroglass Ltd. he was also instrumental in assisting to establish the manufacture, in Britain, of chemical and graduated glassware, which he aptly described as a " master key industry."

Among other war-time activities, he was responsible to a great extent for the mobile bacteriological and hygiene laboratories, which are now part of the mobilisation equipment of our own and other armies, and on which the health of the troops in the field in a great measure depends.

For his war services, in the course of which he was severely gassed at Walthamstow, he was created Commander of the British Empire.

After the war, his vision showed him that British science must never again be dependent on supplies of apparatus and chemicals from the Continent. As Chairman of the British Chemical Ware Association, a post which he held for a number of years, he was largely responsible for putting the industry under the protection of the Safeguarding of Industries Act.

In his capacity of Managing Director of Messrs Hopkin and Williams, Ltd., of which Company his firm acquired the controlling interest in 1930, he made his mark in the sphere of fine chemicals. By the part he played in the establishment of " AnalaR " standards for laboratory reagents, and by employing only qualified chemists and chemical engineers in the laboratories he controlled, he went far to transfer the source of reagents, with a guaranteed and published degree of purity, from the Continent to this country.

As a man, his outstanding characteristics were his tireless energy, his largeness of heart, and the wideness of his knowledge and interests. No one who met him will fail to remember his personal charm, and the keenness with which he listened to any problem involving design of laboratories, before he set about finding the solution. He was widely travelled, his business tours including India, Egypt, Burma, Canada and South Africa, during which he visited all possible laboratories and scientific institutions, to make a special study of local conditions and problems. In this way he was enabled to foresee coming demands, and to meet the special requirements of Empire scientists. He also visited the Continent on many occasions in order to keep up to date with the latest developments in laboratory design, in which he specialised.

His interests outside his work included winter sports and swimming, at which he was a fine performer, botany, gardening, British and Colonial stamps, besides shooting and fishing during his all too short stays on his Perthshire property.

A member of his old School Lodge among others he was a keen Mason, who had advanced far on the Way, and was specially interested in the speculative side of the Craft.

His eldest son, Hugh Heriot Baird, has been a Director of the firm for several years, and is now serving as a Sub.-Lieut. R.N.V.R. with H.M. Forces at sea.

Douglas Baird was elected a Fellow of the Society on December 7th, 1916.

E. F. C.

WILLIAM ALEXANDER SKEEN CALDER.

1874—1940.

W. A. S. CALDER died suddenly at Worthing on January 6th. He was born in London of Scottish parents and was educated at Wilson's Grammar School, Camberwell. Before beginning to take up the study of chemistry as his profession, he had valuable business experience with Mr. H. Vavasseur, a London East India merchant. The years 1889—1891 were spent at the Royal College of Science, the Royal School of Mines, and King's College, London, where he had a thorough grounding in chemistry, physics, and engineering. During the next year he was assistant to Mr. R. H. Harland, F.I.C., consulting chemist and public analyst, in practice in the City of London.

Thence in 1892 he went to his first industrial post, as chemist to F. C. Hills and Co., sulphuric acid manufacturers, of Deptford and East Greenwich, where he worked until 1899. In that year he was invited by Mr. R. G. Perry to go as chief chemist to Chance and Hunt, Ltd., Oldbury, where he remained until his retirement, becoming Managing Director in 1917. Chance and Hunt were absorbed by Brunner, Mond and Co., in 1920, and became merged in Imperial Chemical Industries, Ltd., in 1927. Calder became a member of the Delegate Board of the General Chemical Group of I.C.I. and chairman of the Control Committee of the Midland and South Wales Division of the Group.

Of the development of the factory at Oldbury under his management much could be written. He invented, with Dr. C. C. Fox, the Calder–Fox scrubber for removing liquids and solids from industrial gases. But it is no disparagement to his chemical and engineering abilities to say that it is the human side of Calder's character that will be remembered and cherished by his many friends. To Calder the employees at the factory were not so many cogs in the production machine, but fellow men whose welfare was an essential part of his duties. He was always concerned with improvements in the arrangements for first aid at the works and many a time the wife of a sick workman was cheered by a visit and a kindly word from Calder. He never forgot an acquaintance, and speaking about one man to another, it was always the best qualities that were remembered. His was a very lovable nature, and it is doubtful whether any chemist of recent years will be missed by a wider circle of friends than he.

Calder was a member of many chemical organisations, and a regular attendant at their meetings and social functions. His witty addresses and speeches, the latter often impromptu, will be long remembered by those who heard them. At the time of his death he was President of the Institute of Chemistry. He had been President of the Society of Chemical Industry in 1935—36 and President of the Institution of Chemical Engineers in 1931—32. He was elected a Fellow of the Chemical Society in 1891, and served on the Council from 1935 to 1938.

F. P. DUNN.

PRINCE GINORI CONTI.

1865—1939.

PIERO GINORI CONTI, Prince of Trevignano, D. Soc. Sc., D. Sc. h.c., may be considered as one of the pioneers of the evolution of chemistry in Italy.

He was born in Florence, the capital of Toscana, on June 3rd, 1865, and died in the same town on December 3rd, 1939.

After finishing his college studies, he took his degrees of Social Science, in 1888, at the Istituto Cesare Alfieri.

He served as a volunteer in the Genova Regiment of Cavalry, and afterwards for some time studied social problems. In 1894 he married the Countess Adrienne de Larderel, and his activities then took quite another direction. He became interested in the production of boric acid, an industry which had existed for a long time in the district of Larderello. He drew plans for a large-scale development of that industry and suggested the extraction not only of boric acid, but of all the other products of this volcanic soil. He invented a method of utilising the volcanic steam of the " soffioni " as a source of electric power, and was the founder and Chairman of the Società Boracifera di Larderello.

Prince Ginori Conti realised with exceptional tenacity and wideness of mind the immense programme of work he had conceived. In course of time he added to the extraction of boric acid that of ammonia, carbon dioxide (solid), and rare gas. Under his energetic leadership, the steam jets, spurting out of the earth with the sound of thunder, were capped to furnish electric power to all the region of Larderello. This large industrial enterprise was later taken in charge by the State.

The tireless and multiform activities of Prince Ginori Conti led him to found in his country two important research bodies: an Optical Institute, designed to render Italy independent of foreign imports as far as optics are concerned; and an Institute for the study of the various applications of boron and silicon compounds.

Having fully perceived all the inconveniences from which Italian chemists suffered owing to their lack of co-operation, Prince Ginori Conti was, in 1919, one of the founders of the Associazione Italiana di Chimica, of which he became Chairman in 1922. It is mostly due to this Association that collaboration between science and technology was realised in Italy and has borne the remarkable results we admire to-day.

Prince Ginori Conti also took an important part in the organisation of the triennial chemical congresses, the first of which was held in Rome in May, 1923. He was Chairman of the Federazione Industriali Chimica, and represented Italy with great authority on various committees of the International Union of Chemistry.

The social and civic activities of Prince Ginori Conti must not remain unmentioned; he was concerned with the creation and direction of many schools, with the improvement of methods of cultivation in Toscana, and with the foundation of philanthropic establishments, etc.

Conscious of the political duties of his social position, he was elected Deputy, and afterwards Senator, and was Vice-President of the Provincial Council of Corporative Economy, of Florence. A few months before his death, he was granted by Mussolini the title of Minister of State.

Prince Ginori Conti was a Member of the Mineralogical Section of the famous Reale Accademia Nazionale dei Lincei. He was elected a Fellow of the Chemical Society on December 6th, 1923; he was also an Honorary Member of the Society of Chemical Industry and a Member of the Institution of Chemical Engineers and of the Ceramic Society. He was a foreign Honorary Member of the Royal Institution and of the Royal Society of Arts.

J. GERARD.

HARRY MEDFORTH DAWSON.

1876—1939.

HARRY MEDFORTH DAWSON was born in Bramley, Leeds, in 1876, and throughout his career was associated closely with his home city. Indeed with the exception of three years of Continental study he spent the whole of his working life in the University of Leeds, known in its early days as the Yorkshire College.

Educated at the Leeds Modern School, he gained a Baines Scholarship at the Yorkshire College and began life as a student in 1891 at the early age of fifteen.

Here he was attracted to the study of chemistry by the teaching of Arthur Smithells, who a few years previously had succeeded Sir Edward Thorpe in the Chair of Chemistry.

To the influence and guidance of Smithells, not only in his student days, but later when he was a member of the chemistry staff, Dawson always acknowledged that he owed a great deal. It was probably due to his collaboration with Smithells in one of his well-known investigations on flame that Dawson's interests were turned towards chemistry and chemical research as his career, for in his last year as a student he helped in a research on the conductivity and luminosity of flames containing salt vapours. This work was completed and published a few years later in the *Philosophical Transactions of the Royal Society* in the names of A. Smithells, H. M. Dawson and H. A. Wilson.

After graduating B.Sc. London in 1896, Dawson gained an 1851 Exhibition, the highest distinction then open to a student, and he proceeded to Germany, where he studied for three years, mainly with van 't Hoff in Berlin but also at Giessen with Elbs, at Leipzig, and with Abegg at Breslau.

It is evident that he made full use of his opportunities. Within two years he published two papers jointly with van 't Hoff, nearly finished a third, and was well on the way with a more comprehensive work which later was presented to the University of Giessen in dissertation form for the German doctorate.

It is not surprising that with so much to his credit the 1851 Commissioners renewed his Exhibition for a third year—an unusual honour.

Dawson was fortunate in visiting Germany in the decade immediately following those fundamental advances in the knowledge of solutions associated with the names of van 't Hoff, Arrhenius, Ostwald, Nernst and others. The application of kinetic and thermodynamic principles to chemical equilibria and to dilute solutions by van 't Hoff, coupled with the theory of electrolytic dissociation, had given a new stimulus to the study of almost every branch of chemistry. New ideas were in the air. Ostwald by his teaching and writings had presented the science in an entirely fresh light. Students of many nationalities were attracted to the research laboratories at Leipzig and Berlin to learn first-hand the new physical chemistry. Research in this new field was rapidly yielding fruitful results in many directions. It was a time of enthusiasm and quick progress. Work at this period in the German laboratories was a stimulating experience to a young man, and Dawson's natural gifts developed and expanded so that at the end of his time abroad he had gained a passion for research which held him all his days and which later vicissitudes and distractions were powerless to diminish.

In Berlin, where his fellow-countryman and senior, Donnan, was at this time prominent, Dawson took part in the general investigations on the mode of formation of oceanic salt deposits then engaging the attention of van 't Hoff and his collaborators. His contribution to this comprehensive scheme of research was an investigation of the effect of pressure on the formation of tachydrite, the double hydrated chloride of magnesium and calcium, which at normal pressure is formed from the two chlorides at 22° according to the scheme

$$2MgCl_2,6H_2O + CaCl_2,6H_2O = Mg_2CaCl_6,12H_2O + 6H_2O$$

Increase of pressure raises the transition point. The rise observed was found to be small but in satisfactory agreement with that calculated thermodynamically. This work later was published as his " doktor arbeit."

Returning to England in 1899, he was appointed to the chemistry staff of the Yorkshire College as demonstrator in physical chemistry. Six years later in 1905 he was promoted to lecturer and in 1907 the degree of D.Sc. was conferred on him by the University. Although at this period of his career much of his energy was given to teaching, he always found time for research and soon the output of the Chemistry Department was augmented by a steady stream of papers of high merit dealing largely with various aspects of chemical equilibria and complex ion formation in solution. Year after year this flow of original publications came from his laboratory and in the course of his working life he published, either in his own name or jointly with his students, 119 papers. The majority of these appeared in the *Journal*, and for a number of years his articles on the progress of physical chemistry were a feature of its *Annual Reports*.

Whilst the elucidation of the many problems connected with solutions was the dominant interest of his life, he combined in a remarkable way the gifts of the successful teacher with the mental outlook of the discoverer of new knowledge. Gradually he built up the teaching of physical chemistry until the subject was recognised in the University curriculum as one of primary importance not only for the chemistry student but also for students of many branches of technology and of medicine. With the growing recognition of his scientific work and of his services to the University, it is hardly surprising that in 1920 a Chair of Physical Chemistry was instituted to which Dawson was appointed.

As a teacher Dawson had few equals. His lectures were greatly appreciated alike by advanced and elementary students. He possessed to a high degree the gift of logical and lucid exposition and he will be remembered by many generations of students as a friend and a guide in the intricacies of a difficult subject and as one who spared no effort in promoting their progress and welfare.

After his appointment as professor, departmental responsibilities and administrative duties made considerable demands on his spare time, but although his primary interests lay in the advancement of his subject he served the University of Leeds loyally and well in many directions. For some years he was Dean of the Faculty of Science and Chairman of and Council Representative of Convocation. He took a keen interest in elementary education and acted for a long period as the Leeds representative on the Joint Matriculation Board of the Northern Universities. He played an important part, too, on many Senate committees, where his good judgment, even temper and detachment gained the respect and admiration of all his colleagues.

Many friends both within and without the University will recall his happy association with the Priestley Club. This society, founded many years ago, is distinguished by the wide range of its scientific interests and the friendly spirit of informality and good fellowship that animates its meetings. Dawson did much to preserve its traditions and was at his best as genial secretary at its discussions.

These many activities and interests were not allowed in any way to limit his scientific work. As his old friend and colleague, Professor J. W. Cobb, testified, Dawson throughout this time was an indefatigable worker whose laboratory light was shining on most evenings and who seemed to regard University vacations as a provision for minimising interruptions to research work. In the end, however, those long hours of unremitting effort told on his health and contributed to the illness which terminated his life before he had reached the normal age for retirement. He was happy, however, in having accomplished in a large measure and with outstanding success the comprehensive programme of scientific work envisaged in earlier years and to have gained the recognition and appreciation of his scientific colleagues in all parts of the world.

The researches carried out in his laboratory form a contribution to physical chemistry of significance and importance. His earlier work was connected with various aspects of chemical equilibria, in which his interest had been aroused as a research student in van 't Hoff's laboratory. The most noteworthy of these researches dealt with the phenomenon of complex ion formation, which at that time had been but little studied. The cuprammonium compounds were first investigated. By means of distribution experiments he gave a clear proof of the existence of the complex ion $(Cu,4NH_3)^{++}$ in ammoniacal copper sulphate solutions, and he examined in some detail the conditions which govern the extent to which this is present. The other group of compounds in which he was interested at this time was the polyiodides. The pioneering work of Jakowkin related to aqueous solutions, where he had shown the existence of the tri-iodide KI_3. Dawson extended the observations to organic solvents, where he found the tendency to polyiodide formation is much more pronounced, since under appropriate conditions, as, for example, in nitrobenzene solution, the higher polyiodides KI_5, KI_7 and KI_9 all exist in significant proportions. It says much for Dawson's tenacity of purpose that shortly before his death he returned to the study of these compounds.

It was not until 1909 that Dawson turned his attention to the dynamics of chemical reactions in solution, but this was to become his chief interest throughout the remainder of his life. The reaction first chosen was the isomeric change of acetone in aqueous solution, which can be followed in the presence of iodine which reacts with the enol form. The problem he set himself in the first instance was an exact analysis of the processes involved when this reaction is catalysed by acids. It was no easy problem and Dawson recognised that its solution required the accumulation of a large amount of accurate quantitative data. Dawson never believed in the policy of obtaining quick results on the basis of a few sketchy experiments. By **1913** he had established for a number of acid catalysts that the acid acts in a dual capacity, since he found that measurable catalytic properties are associated not only with the hydrions which it produces in solution, but also with the molecules of the acid itself. This view had been held abroad for some years, but at this time it was not generally accepted. Dawson now put the matter beyond any real doubt by disentangling and measuring these two catalytic effects.

A logical development of this work was the investigation of the catalytic properties of mixtures containing a weak acid and the corresponding salt, but this was scarcely commenced before the Great War interrupted normal research activities. It was not resumed till some years after the war. In the meantime Brönsted's work had done much to clarify the ideas as to the nature of salt action generally, and progress was now rapid. It was described in about twenty-five papers published in the *Journal* between **1926** and **1931** under the general title " Acid and Salt Effects in Catalysed Reactions." The first paper of this series marked a great advance, for it was now shown that the dual theory offered at the best but a partial explanation of the facts, for a catalysing acid could act in yet a third capacity, this in virtue of the basic anions to which it can give rise. This led Dawson to formulate his multiple theory, which is not so much a repudiation as an extension of the older theory. Primarily, it recognises as a potential catalyst not only the traditional acid and base, hydrion and hydroxyl ion, but also any molecule or ion which is acidic or basic in the wider sense of being able either to donate or to accept a proton. This is of great importance, for if it is regarded as a necessary consequence of the Lowry–Brönsted classification of acids and bases, it provides at the same time the most convincing justification for this view. It is important to note that in each stage of the evolution of the modern concept of acids and bases from the original theory of Ostwald, Dawson played a vitally important part, and indeed, this is probably his most valuable contribution to science.

On the more quantitative side the multiple theory requires the strict additivity of catalytic effects and a proportionality between reaction rate and volume concentration. The second of these postulates was for a time the subject of dispute. One of the reactions Dawson studied particularly from this point of view was the conversion of *N*-chloroacetanilide into the corresponding nuclear-substituted isomers. This takes place in aqueous solution under the specific influence of hydrochloric acid. Dawson's paper published in **1932** will certainly rank as a classic. By a very ingenious method he proved that the reaction does not involve hydrions and chloride ions, as had naturally been supposed, but undissociated hydrogen chloride, although this can be present only to the most minute extent. The velocity of the reaction is determined by the concentration of the hydrogen chloride, and contrary to some contemporary theories, is in no way related to thermodynamic activities.

This was one of the few occasions on which Dawson was engaged in a controversy. It was characteristic of him that he refrained from expressing an opinion until he had examined a question in detail, and until he felt sure he was in possession of all the relevant facts. As a consequence his views on both scientific and other matters were authoritative, and during his lifetime he found remarkably little to retract.

Dawson was much interested in examining the consequences which follow from the multiple theory. Of these, the catenary curves are perhaps the most noteworthy. A curve of this type results when p_H is plotted against velocity of reaction for a series of mixtures in which the concentration of the catalysing acid HA is the same for all, while that of the anion A′ is varied, the apex of the curve corresponding to the point of minimum velocity. In general, the equation of the catenary depends on the experimental circumstances, but Dawson found that it was possible to derive a general or reduced catenary, which should apply impartially to all acid- and base-catalysed reactions and under all conceivable experimental conditions. This was a generalisation of great simplicity and Dawson regarded its realisation in practice as a striking proof of the correctness of his views.

Other papers published about this time dealt with the determination of acid dissociation constants by means of catalytic measurements. The method is an old one in principle, but had fallen into disrepute on the rejection of the hydrion theory of acid catalysis. Dawson was now in a position to define the conditions under which it might safely be employed, and it proved to be of great use in his investigation of the influence of salts on acid strength. He found that on the addition of an inert salt the strength of an acid increases, at first rapidly and then more slowly, until a maximum is reached; still higher concentrations of salt now bring about a progressive decrease in the strength of the acid. These changes are summarised in the empirical equation

$$\log \frac{K_x}{K_0} = a\sqrt{x} - bx,$$

where K_x and K_0 represent the dissociation constant of the acid in x-molar salt solution and in water, and a and b are constants. It is of interest that the Debye–Hückel interionic attraction theory predicts an equation of this form, but assigns a different value to the constant a, and hence does not account quantitatively for the experimental results.

During the last few years of his life Dawson took up the study of the hydrolysis of the chloro- and bromo-acetates. These reactions are extraordinarily complicated. Not only are concurrent and consecutive reactions involved, but further difficulties arise through the formation during the reaction of complex intermediates. This was the kind of problem in which Dawson delighted, and he set to work to devise a suitable method of attack. Realising that a complete solution was impossible, he limited the analysis to the "idealised" reaction, which corresponds to the course the reaction would take in the absence of complex formation. He then showed how this idealised reaction could be reproduced in all its stages by the use of synthetic solutions containing the various interacting species in predetermined amounts. The conception of the idealised reaction is a notable one and should be of great value in the further study of complex reactions. In the case of the hydrolysis of sodium bromoacetate, the idealised hydrolysis represented by the simple stoicheiometric equation

$$CH_2Br{\cdot}CO_2Na + H_2O = CH_2(OH){\cdot}CO_2H + NaBr$$

actually involves six distinct bimolecular processes and can be completely accounted for on this basis.

Dawson published altogether well over a hundred experimental papers, the majority of which were in collaboration. A long succession of research students received at his hands a training in scientific method which could scarcely be surpassed. All who worked with him were attracted by his genial and kindly personality, and none could fail to be impressed by his complete honesty of mind and by the high, almost exacting, standards he set in scientific work. He had an almost uncanny faculty of detecting a flaw either in argument or in procedure; if Dawson approved of a paper for publication, there was little to fear in the way of criticism from the rest of the scientific world.

In his chosen field of chemical kinetics Dawson was pre-eminent, and here he has established a tradition which will not be easily maintained. He is assured of a worthy place in the history of the science to which he was devoted.

Dawson was fortunate too in his family life. In 1907 he married Miss Phillis Mary Barr and she, with three sons and two daughters, survives him. This happy home circle formed a background of helpful sympathy to a life devoted wholeheartedly to science and to the service of his University.

R. WHYTLAW GRAY.
G. F. SMITH.

JOHN HAYCOCK.

1884—1939.

JOHN HAYCOCK, whose death at the age of 55 took place suddenly on June 5th, 1939, at Arnside whilst he was on holiday, was educated at Great Glen School and at Alderman Newton's Higher Grade School, Leicester. He subsequently attended the Technical

School, Leicester, and University College, Nottingham. He qualified as Chemist and Druggist in January 1908 and as Pharmaceutical Chemist in July, 1909. In 1908 he was engaged in the analytical laboratory of Messrs. Howard Lloyd and Co., Ltd., Leicester, and in 1924 was appointed Chief Chemist to Messrs. E. W. Sleath and Co., of Manchester, and at the time of his death was a Director of the Company.

Apart from his work, Haycock's main interests were cricket and music, and he was for many years Organist at the Salem Methodist Church near Manchester.

He was a Fellow of the Institute of Chemistry and was elected a Fellow of the Chemical Society on June 16th, 1910.

GEORGE WILLIAM THOMAS HORROD.

1882—1939.

GEORGE WILLIAM THOMAS HORROD died at his home at Pinner on December 26th, 1939. His father was a Hills Prizeman of the Pharmaceutical Society and he himself chose pharmacy as the starting point of his career. Educated at the Regent Street Polytechnic School, where he experienced the influence and valued friendship of Quinton Hogg, he received his professional training at the Brixton School of Pharmacy. He qualified in 1904 and after early experience with the Portland Cement Co. at Gravesend and then with Burroughs Wellcome and Co., he joined Messrs. Fassett and Johnson.

He travelled extensively abroad for this firm and became a Director before resigning in 1922. For some time his interests had been developing on the legal side and he characteristically gratified his ambition of being "called" to the Bar by joining the Middle Temple as a student and passing the qualifying examination in the relatively short period of eighteen months. Regulations prevented his being "called" for a further eighteen months and during this period he gained experience in the chambers of the late Sir Duncan Kerly—the great authority on trade mark law.

He abandoned his intention to practise, on account of private responsibilities, and was appointed to the post of General Manager of Bayer Products, which had at that time come under the control of Drug Incorporated of America.

Five years later, after a further short period at the Bar, he became General Manager of Benger's Foods, Ltd., and was supervising the erection of their new factory at Holmes Chapel, when serious ill-health encroached and forced him, after a long struggle on his part, to give up his activities.

Early in 1939 he felt fully recovered and retirement seemed irksome; he joined the staff of Glaxo Laboratories, Ltd., where his interests, marching with his inclinations, were mainly legal. Ill-health, however, again intervened, a further operation became necessary and from this he never fully recovered.

Among other activities, he spent a short period after his call to the Bar as Assistant Secretary to the Federation of Master Printers, and later contributed the section on Medicine and Pharmacy to Halsbury's "Statutes of England."

Intellectually, he was a man of wide interests and much activity and his personal qualities were marked by an intense sincerity and a most affectionate, though retiring, nature.

He leaves a widow and a son.

He was elected a Fellow of the Chemical Society on December 1st, 1904.

MORRIS CHARLES LAMB.

1877—1940.

MORRIS CHARLES LAMB died on January 16th at the age of 63 years. He had a few years previously retired from his position as Principal of Leathersellers' Technical College.

He entered Yorkshire College, now Leeds University, as a student-assistant to the late Professor R. H. Procter, F.R.S., in 1892 and later became demonstrator in the Leather

Department. He afterwards received an appointment at Herold's Institute, Bermondsey, under Dr. J. Gordon Parker to give instruction on the manufacture of light leathers. Herold's Institute subsequently developed into Leathersellers' Technical College and Lamb was firstly head of the light leather department and afterwards Principal, a post he held from 1927 to 1936.

Lamb's interest in chemistry was essentially on the technical side. He wrote two books on the manufacture of light leather, namely, " Leather Dressing " and " The Manufacture of Chrome Leather." Lamb was well known in the leather trade and had a high reputation with tanners, particularly with regard to his knowledge of the practical problems of leather dyeing and finishing.

He also took considerable interest in the organisations of the leather trade. He was for a time (with Dr. Gordon Parker) joint Hon. Secretary to the original International Association of Leather Trades Chemists and during the last war edited the English edition of the Association's journal *Collegium.*

He was President of the British Section of the Society in 1935—36. He also took an active part in founding the London Section of the Society of Dyers and Colourists and, in 1919, shared with G. F. Cross and E. V. Greenwood the Dyers' Company Research Medal for a thesis on " Colloidal Tannin Compounds and their Applications."

He was elected a Fellow of the Society on December 6th, 1900. D. JORDAN-LLOYD.

HAROLD THEODORE G. VAN DER LINDE.

1861—1937.

HAROLD THEODORE G. VAN DER LINDE, who died in Canada on July 23rd, 1937, aged 76, although born and educated in Britain, spent most of his life in the Dominion, where he played an important part in the development of the rubber industry. His mother was an Englishwoman; his father, Theodore van der Linde, born at Rotterdam, and later a naturalised British subject, was at one time connected in an engineering capacity with laying the first cable across the Atlantic, whither in time the son went to live. Later, the father graduated in medicine at the Univeristy of Edinburgh. The son, born on August 14th, 1861, after receiving his early education in or near Plymouth, followed his father's footsteps in entering upon the study of medicine at Edinburgh. Before completing his course, however, he went, in the middle 'eighties, to the United States, to join his brother, who had preceded him there.

For some years he worked for Edison, on storage batteries for tram cars and on incandescent lamps. Then, in 1889, he went, still with the Edison Company, first to Sherbrooke, Quebec, and later, when the works were moved, to Peterborough, Ontario. During this period, which ran to 1893, he became specially interested in rubber, through his concern with insulated wire.

For the sixteen years 1893 to 1909 he was associated with the rubber manufacturing firm, the Gutta Percha and Rubber Company, Ltd., Toronto. Here, in 1893, he opened the first laboratory in the rubber industry in Canada, and was responsible for much pioneering technical work, both on the scientific control of rubber manufacturing and on new developments. In regard to control, he was, for example, responsible for great advances in the specifications to which ingredients used in rubber mixes were supplied, and stressed the importance of a fine state of sub-division in fillers, which at the time was never better than 80 mesh. In regard to development, he was a pioneer in the use of alkali in reclaiming rubber, which was used on a commercial scale for the first time at the Toronto works, although he failed to patent his development.

In 1909 he became actively connected with the exploitation of the native Mexican shrub which yields guayule rubber, and he contributed much to the improvement of technical practice. It is of passing interest to note that not only had van der Linde a number of young Canadian chemists with him in Mexico, but that two other Canadians were also connected with guayule at this time, namely, F. E. Lloyd, later Professor of

Botany, McGill University, and W. B. Macallum, a botanist, who has devoted his life to breeding strains of guayule adapted to the climate of California. Most of van der Linde's few publications refer to his activities at this time (*J. Soc. Chem. Ind.*, 1910, **29**, 1283; U.S. Pat. 979,902). Revolutions having destroyed shrubs and equipment, he left Mexico, and joined a rubber manufacturing firm in the United States. Here, in 1912, he developed what is probably the first low-pressure tyre. It was not a balloon tyre in the modern sense, since it was designed to fit a standard rim, but, like the balloon, it had a maximum surface in contact with the road and carried only fifteen pounds pressure. It was called the "Gripground."

During the greater part of the last war van der Linde devoted himself to the manufacture of picric acid in the United States. He then returned to Canada, and established companies, first to manufacture phenolic plastics (the first establishment of such manufacture in Canada) and then rubber goods. Both these companies ultimately fell victims to the post-war slump, and from 1922 onwards van der Linde was engaged in the business of dealing in raw materials for the rubber industry.

He was a prominent and much-loved personality in Canadian chemical circles, and had a good deal to do with the establishment of the first organisation of chemists there—the Toronto Branch of the Society of Chemical Industry. He was a man of charm and appeal, with a face that was at once whimsical and distinguished in aspect; a man one is glad to have known, even though, as in the writer's case, only for a few years. I remember the way, humorous yet tolerant, in which, the first time I heard him speak in public, he referred to a visiting Englishman who had spoken of Canada as a "colony."

All his life he manfully faced the difficulties which the translation of technical and scientific knowledge to industrial operation inevitably presents; and I cannot conclude better than by quoting, as a tribute, the description which L. E. Westman gives of van der Linde in his article on him in "Canadian Chemistry and Metallurgy," August, 1937: "he was a scientist and industrial trooper of that substantial kind which has done so much for mankind."

G. Stafford Whitby.

JAMES SCOTT MACLAURIN.

1864—1939.

Maclaurin came to New Zealand in early boyhood and was educated at the Auckland Grammar School and at Auckland University College, where he studied chemistry under Professor F. D. Brown. He graduated B.Sc. in 1891, and in 1897 was awarded the degree of Doctor of Science for outstanding research on the solution of gold in dilute solutions of potassium cyanide. This research aroused great interest in gold-mining circles throughout the world, confirming as it did that oxygen was necessary for the solution of the gold, and was the basis of many subsequent improvements in the cyanide process for treatment of gold ores. It gained for him election to the Fellowship of the Society in 1897. It also enabled him to qualify for an 1851 Exhibition Scholarship, tenable in Great Britain, but this he declined, and the way was thus opened for Ernest Rutherford, who took up the scholarship, to enter at Cambridge on the career which made him the outstanding scientist of his day.

Maclaurin was appointed Colonial Analyst in 1901, the title being changed to that of Dominion Analyst in 1909, when New Zealand was raised to Dominion status. He became in effect the chief chemical adviser to the New Zealand Government. He was also Chief Inspector of Explosives and Chief Gas Examiner, displaying considerable administrative ability in both positions. He retired into private life in 1931.

Maclaurin was a skilful analyst, always alert for new methods, which, however, were not adopted without rigorous trial. His analytical work for the Geological Survey gave him an extensive acquaintance with the mineral resources of New Zealand. He was an authority on the relative inflammability of New Zealand coals, also on the mineral waters of the thermal districts. He noted the presence of and determined the amount of pentathionic acid in water from White Island, an acid not previously noted as occurring in Nature. He also determined the radioactivity and radium content of many gases, waters and sinters. In his later years he devoted much time to industrial research on Kauri Gum and Phormium Tenax (New Zealand Flax).

Maclaurin inspired the full confidence of all who were associated with him in public duties. There was a strong bond of personal affection between him and all members of his staff. In private life he was quiet and unostentatious, and essentially friendly. In his passing New Zealand has lost a true gentleman and an able scientist. W. DONOVAN.

WILLIAM FREDERICK MAWER.

1867—1940.

WILLIAM FREDERICK MAWER, whose death took place on January 31st, 1940, was born at Boston, Lincs., on October 18th, 1867. He was educated at Boston Grammar School and later received his chemical training at Muter's School of Pharmacy in South London, passing the Minor and Major Examinations of the Pharmaceutical Society while there. Relinquishing in 1890 the practice of pharmacy, he was appointed Lecturer at Muter's School of Pharmacy in that year and held this post until 1905, acting as Secretary from 1902. From 1906 to 1911, Mawer conducted his own business as a pharmaceutical chemist, but for the next 14 years the state of his health precluded him from undertaking anything but temporary work, and in 1925 he was compelled by ill-health to retire from active work.

Mawer was a man of strong personality, and being exceedingly well read and possessing an active mind, his interests were wide and varied.

He was elected a Fellow of the Chemical Society on December 7th, 1893.

BENJAMIN DAWSON PORRITT.

1884—1940.

BENJAMIN DAWSON PORRITT died at Croydon on January 28th, 1940, at the age of 56 years.

Born in Canada, he came at an early age to England and was educated at the Whitgift Grammar School, Croydon, University College, London, and the Heriot Watt College, Edinburgh. After graduating in chemistry, he became chemist to the North British Rubber Co. of Edinburgh and there acquired a thorough knowledge of the practical processes and of the basic scientific principles of the rubber industry.

In 1920, he was selected to become Director of the research organisation which was being set up by a group of influential British Rubber Manufacturers under the scheme of the Department of Scientific and Industrial Research and he occupied the position of Director of the Research Association of British Rubber Manufacturers until his death. His capacity for organisation and his steadfast perseverance are well exemplified by the establishment and eventual success of a Research Association which has won the admiration and support of the rubber industry. Indeed its fame is now world-wide.

Porritt published numerous papers in the Transactions of the learned societies and with the assistance of his staff at the Research Association recently compiled and published a comprehensive monumental reference book entitled " Rubber, Physical and Chemical Properties."

Porritt also devoted himself wholeheartedly to the development of the activities of the Institution of the Rubber Industry, of which he was a Fellow and also a Vice-President. His enthusiastic support of the development particularly of educational schemes for the rubber industry and of the regulations for the Diplomas of the Institution won for him unqualified admiration.

He was an original member of the Rubber Advisory Committee of the Rubber School of the Northern Polytechnic, where his visits were always hailed as an inspiration to staff and students alike. In addition, he was entrusted on occasions, as an Inspector under the Board of Education, with visiting institutions and reporting on rubber education throughout the country.

He was a Fellow of the Royal Society of Edinburgh. He was elected an Associate of the Institute of Chemistry in 1908, proceeded to the Fellowship in 1911 and served as a member of the Council of the Institute from 1920—22 and from 1924—26. He was elected a Fellow of the Chemical Society in 1906, and served on the Council from 1925 to 1928; he had been an active member of the Council of the Institution of the Rubber Industry continuously since 1922. In 1936 he became a Vice-President of the Institution, and in 1938 was awarded the Colwyn Gold Medal by that body, the highest award the Institution can bestow.

By Porritt's death, the rubber industry has sustained a severe loss, and all those who knew him, a real friend of sterling character. T. J. DRAKELEY.

RICHARD VERNON WHEELER.

1883—1939.

RICHARD VERNON WHEELER, only son of R. J. Wheeler, Chief Inspector of Machinery, R.N., attended school at Plymouth College, Plymouth. In the year 1900 he entered the first year honours course in chemistry in the Owens College, Manchester. Before the end of the year he had become a devoted assistant to the late Professor W. A. Bone, at the time a lecturer in the College, and during the rest of his course as an undergraduate he spent most of his vacations and no inconsiderable part of term-time in providing much of the experimental basis for the hydroxylation theory of the oxidation of hydrocarbons. This work gained him the Dalton Chemical Scholarship in 1903 and a University Fellowship in 1904.

From 1905 to 1908 Wheeler was at first chemist, later gas-plant manager, to Messrs. Monks, Hall and Co. of Warrington. Here he took the opportunity to make careful tests of the consequences of varying the steam saturation temperature in a gas-producer, and was allowed to publish the results in the *Journal* of the Iron and Steel Institute. For this work he needed accurate gas-analyses, and in co-operation with W. A. Bone produced a simplified form of the apparatus then in use in the Owens College, a McLeod type. The new apparatus rapidly gained popularity in both academic and industrial laboratories, for, besides being much cheaper, it was easier to operate and to maintain than the old, whilst losing nothing in accuracy. In various modifications it is still generally known as the " Bone and Wheeler " apparatus.

In 1908 came the opportunity which settled the chief direction of Wheeler's work for the rest of his life. On the nomination of H. B. Dixon and W. A. Bone he was appointed as chemist to assist Mr. (later Sir) William E. Garforth at Altofts Colliery, Yorkshire, in experiments on the explosibility of coal-dust and the use of stone-dust as a preventive of coal-dust explosions in mines—experiments financed by the Mining Association of Great Britain and directed by a committee of the Association. In 1911 the financing and control of this work were taken over by the Home Office, who transferred the large galleries and laboratory to Eskmeals in Cumberland. Here, as previously at Altofts, Wheeler took a full share in the experimental work, and here he must have laid his plans for the more comprehensive attack on means to prevent explosions of coal-dust and firedamp, an attack made possible in 1921 when the Safety in Mines Research Board was appointed by the Secretary for Mines " to direct generally the work of research of the Mines Department into the causes of mining dangers and the means for preventing such dangers." The laboratory work was gradually transferred to Sheffield and the large-scale explosion work was found a home near Buxton, where it could more easily be shown to the colliery workers for whose benefit it was being done. Wheeler was made Director of these two research stations.

Wheeler was also Professor of Fuel Technology in the University of Sheffield from the year 1920 until his death. This enabled him to widen the scope of his work to include such industrial problems as the blending of coals for coke production, low-temperature carbonisation of coal, the cracking of hydrocarbons and the nature of " knock " in internal-combustion engines.

Only a very inadequate review of the results of Wheeler's researches is possible here. He described them in more than 200 papers in the journals of scientific and technical societies and in official publications. A list of them can be found in " Fuel in Science and Practice " (1940, **19**, 27).

Coal-dust Explosions.—Up to the time of Wheeler's death, all the large-scale experimental explosions of coal-dust in Britain were supervised by him. He demonstrated the efficacy of stone-dust as a practical preventive of coal-dust explosions in mines, determined the relative efficacies of stone-dusts of various sizes and chemical composition, found how wide was the variation in inflammability of the dusts of various coals and related this property to the volatile-matter content of the coal. Regulations governing the nature and amount of stone-dust to be strewn in coal-mines are based on these experiments.

The Composition of Coal.—During his first attacks on the problem of coal-dust explosions, Wheeler formed the view that, whilst a particle of coal-dust probably burnt directly in a well-developed explosion, the dust was subject to distillation in the early part of the explosion and the successful initiation of an explosion therefore depended on the combustion of the first gaseous products of thermal decomposition. This led to a study of these products and to some conclusions as to the nature of the coal-substance. Hence arose Wheeler's persistent attacks on the chemical constitution of coal, represented by some 25 papers in this *Journal.* A landmark in this work is the monograph written in collaboration with Dr. Marie C. Stopes, " The Constitution of Coal," published in 1918 by the Department of Scientific and Industrial Research. It was a comprehensive review of the subject and indicated many lines for future advance. Wheeler himself proceeded to find solvents suitable for resolving the coal and separating resins and hydrocarbons from it, to separate by reagents the various morphologically distinct components from the ulmins, and to ascertain the products of distillation and of partial oxidation of the separated parts. The constitutions of the various parts of the coal substance were not elucidated by these researches, but important progress was made. For example, he recognised benzene-carboxylic acids in the products of partial oxidation of coal at low temperatures, thus proving the existence of the six-carbon ring in coal.

Flame, and Gaseous Combustion.—The development in methods of coal-mining in recent years introduced into the mine new sources of potential ignition of firedamp, and it was mainly left to Wheeler to define the conditions in which new apparatus could be safely used. He had, for example, to examine electric signalling and telephone systems, and exploders for shot-firing, in order to ascertain whether they might present dangers of unsafe " open " sparking. At first in collaboration with Professor W. M. Thornton, he devised means for guarding such apparatus so that the power remained sufficient for the desired purpose but the spark at an accidental break or short in the circuit was not sufficiently incendive to ignite firedamp.

In order to base such safeguards on a knowledge of the properties of the inflammable medium, Wheeler directed a large amount of work to repeating and extending, with the advantage of modern apparatus, Mallard and Le Chatelier's pioneering investigations published in 1883 on the same subject. Although little of general theoretical importance came from this work, it provided the necessary basis on which a high degree of safety has been reached by manufacturers of all electrical apparatus used in coal-mines, including not only those named above but also the power equipment which cannot at all times remain free from the entry of firedamp and must therefore be made incapable of propagating flame outside when an ignition incurs inside a casing.

Mining Explosives.—Among the many dangers of a coal-mine, the use of explosives for winning coal and making roadways was at one time probably the most fertile of explosions. The replacement of gunpowder by the more modern high explosive, duly weakened by the admixture of cooling salts, removed most of the danger, but there still occurred cases in which the "safety explosive" was responsible for explosions of gas underground. Under Wheeler's direction the phenomenon has been investigated in various ways and the conditions necessary for the safe use of safety explosives in coal-mines have been defined. For these conditions to be invariably observed, during the firing of each of the millions of shots made underground in the course of a year, is almost an impossibility. Hence the recent introduction of the sheathing of explosives by a layer of sodium bicarbonate, which according to experiment and to a limited experience in coal-mines is a further advance in safety.

Mine Lighting.—As a member of the Miners' Lamps Committee of the Home Office, Wheeler contributed the results of several experimental investigations which enabled the Committee to indicate methods for improving the light of the flame lamp. In the early days of the Committee (1920), men were frequently doing their work in the pit with a flame lamp giving no more than 0·3 candle power. It was shown that by the use of gauzes of wider mesh a greater supply of air could be provided, and by simple devices the fresh air could be directed to the flame without pollution by the products of combustion. These and other improvements were made without impairing the safety of the lamp, and the miner using a flame lamp has now from 2 to 3 candle power to light his work. As a result, the flame lamp has kept pace with the improved light provided by the electric lamp; it retains an advantage over the ordinary electric lamp, in that it is a sure indicator of the presence of firedamp and of irrespirable atmospheres in the pit.

Those who have known Wheeler for most of his life will probably agree that he was happiest when at work with the small staffs available in the laboratories at Altofts and Eskmeals. In later life, his administrative responsibilities left him no time to take an active part in experimental work, but he continued to plan new lines of research for staff and students as well as for large industrial laboratories which sought his advice.

Wheeler had a caustic wit which, at times, he exercised recklessly; rarely with subordinates, however, to whom he was considerate and helpful. He was generous to students individually and collectively.

Characteristic of Wheeler and of W. A. Bone, his former teacher, were their arguments, notably that over the so-called "law of flame speeds." This dispute may perhaps be summarised by the statement, with which close colleagues of Bone and Wheeler, namely, Professor D. T. A. Townend and Dr. W. Payman, associate themselves, that each of the disputants argued his case over-forcefully at one time; it is now recognised that many mixtures of inflammable gases accord well with the "law" but many others do not. In recent years, work in both laboratories has led to a more fundamental understanding of the factors affecting flame propagation than was possible at that time.

Wheeler was a member of the Safety in Mines Research Board, 1921—39, and of the Fuel Research Board, 1923—29; President of the Midland Institute of Mining Engineers, 1929—32; Member of Council of the Institution of Mining Engineers, 1936—39; Gold Medallist of that Institution, 1937; Melchett Medallist of the Institute of Fuel, 1938; and a member of Council of this Society, 1936—39. He took a leading part in founding and maintaining the Coal Research Club, and in editing for many years their organ "Fuel in Science and Practice." He was a prime mover in organising an international conference of Directors of research stations dealing with safety in mines, which met biennially from 1931 to 1937.

He was elected a Fellow of the Chemical Society on December 2nd, 1909.

H. F. COWARD.