# OBITUARY NOTICES.

## PETER PHILLIPS BEDSON.

1853—1943.

PETER PHILLIPS BEDSON was born in Manchester on April 2nd, 1853, and died at Hove on April 2nd, 1943, at the age of 90 years. Of this long life 43 years were spent in teaching and for 22 years he lived in retirement. Entering Owens College, Manchester, he came under the influence of Roscoe, and it may be presumed that this, along with his native ability, stimulated by the award of the Dalton scholarship in 1875, decided him to embrace chemistry as a profession. Contributory to this decision was undoubtedly the connexion of his family with the wrought iron industry; for his father was the inventor of the continuous rolling mill, and it was his brother who, in 1905, took a leading part in the memorial ceremony to Cort, the inventor of the Puddling process, at Hampstead Church.

Bedson's early work was in the Roscoe tradition, his first publication dealing with the addition compounds of titanium tetrachloride and vanadium oxychloride with ethyl ether. Two years were spent at Bonn under Kekulé, and there Bedson investigated the products of the bromination and nitration of phenylacetic acid, as part of the scheme then being undertaken with a view to the synthesis of indigo. Returning to Manchester in 1878, he joined the chemical staff, where he worked for four years, and at the end of this time was appointed Professor of Chemistry at the Durham College of Science (later Armstrong College, now King's College), Newcastle-on-Tyne. Laboratories and equipment were there of a rudimentary kind, but this did not deter him from straightway undertaking experimental work. This, perforce, had soon to be abandoned temporarily on removal to new and more commodious quarters, which still constitute the main abode of the chemical department. In this busy period Bedson found time to translate, in collaboration with W. Carleton Williams, Lothar Meyer's " Modern Theories of Chemistry."

The major chemical industries of Tyneside and district at this time were those of sulphuric acid and alkali, lead, copper, iron, and the destructive distillation of coal; and there is little doubt that Bedson felt it a matter of duty to abandon the field of pure chemistry and to devote his talents, and such time as he could spare from teaching, to the study of subjects related to the local industries. It seems unquestionable that his choice was partly, at least, determined by humanitarian considerations. The scourge of the lead industry then was the poisoning of the workfolk, especially those engaged in the making of white lead, and Bedson collaborated with the late Sir Thomas Oliver in the study of this subject, his share of the work being, to a large extent, the extremely unpleasant task of determining the metal in the organs of the unfortunate victims. To this period belongs also the writing of the article on lead in Thorpe's " Dictionary of Applied Chemistry."

It is for his work on coal that Bedson is best known; and here he was concerned not with the carbonisation industry, nor at first with the chemistry of coal as a problem of purely chemical interest, but rather with extending our knowledge of the raw material in a manner which might benefit, in life and limb, those engaged in winning it. The dangerous nature of coal-dust, arising from its inflammability, was then forcing its attention on those concerned in coal-getting, and Bedson's early work was directed to the extraction and analysis of the gases occluded or enclosed in samples of the dust, which had been a source of trouble and danger in the coal-workings or at the screens. The presence of homologues of methane was indicated in some of the analyses—an important point, since their effect, if present in the firedamp, would be to lower its temperature of ignition, and, in addition, the lower explosive limit, in admixture with air, would contain less of the inflammable gas than would be the case if only methane were present. This work was extended in various ways, *e.g.*, to freshly-hewn coal, to the bright coal and dant separated from it, extraction at various temperatures under the mercurial pump, grinding of lump coal under these conditions, and absorption of air by the dust after the enclosed gases had escaped. Bedson was an ardent gas-analyst and he enjoyed the work of construction of his glass apparatus. Though not precisely an expert glass-blower (some of his apparatus being faintly reminiscent of Mr. Heath Robinson's creations), his plant usually stood up to the somewhat severe conditions of service required of it.

The study of the explosive inflammation of mixtures of coal-dust and air followed naturally upon that of the gases enclosed in coal, and the apparatus devised for the purpose (irreverently known in the department as the puff box) was demonstrated at meetings of the Institution of Mining Engineers. The retardation of inflammation by admixture of coal-dust with non-inflammable dusts was recorded in 1907. Though Galloway had made similar observations as early as 1887, and Garforth had been led to the same conclusions from his examination of the great explosion at the Altofts pit in 1886, it was not until 1908 that the Mining Association of Great Britain started the serious investigation of the subject, the work being continued at Eskmeals a few years later. The Home Office first issued regulations on stonedusting in 1920. The slow appreciation of the dangers of coal-dust in mines among those engaged in the industry is noteworthy, and Bedson's statement, at a meeting of the Institution of Mining Engineers in 1910, that " one of the objects of the experiments he had made was to familiarise people with the dangers of coal-dust " was thoroughly justified and gave a clue to the ideals underlying the work.

In the early nineties of last century Bedson's attention was turned to the chemical nature of coal—its proximate constituents—and he started a long course of study of the action of a great variety of reagents upon it, prominent among which were potassium permanganate and potassium chlorate, the latter in presence of hydrogen chloride. There was but little to show for all this work; for though numerous products were obtained,

some of promising appearance, their chemical individuality could not always be positively established. One thing was obvious from the chemical side, and that was the complexity of coal; and it is a curious circumstance that only a few hundred yards from the laboratory where these investigations were in progress, namely, in the Hancock Museum of the Natural History Society of Newcastle, the visual proof of this complexity existed in the form of some 90 micro-sections of coal, which challenge comparison with modern preparations, made by William Hutton in 1833, and only brought to the light of day a few years ago. Conviction of the great chemical complexity of coal led Bedson to study the action of organic solvents upon it, in the hope that thereby a preliminary separation of constituents might be effected, and this in turn led to the discovery of the considerable solvent action of pyridine on coal, which has proved of great value to later workers in this field.

The rapid expansion of the College in the early part of this century, along with the claims of administrative work, in which he became more and more immersed, and the paucity of post-graduate students, all conspired to limit Bedson's activity in research; and, indeed, it was practically brought to a close at the outbreak of war in 1914, for the College buildings were taken over as a hospital and the chemical department was scattered in several inadequate buildings, widely apart from one another. Return to the old haunts after the war brought no relief, for the energies of the staff were fully called upon to cope with the great inrush of students which then took place. Retirement to Purley, and later to Hove, brought a well-merited rest.

Bedson was in some ways fortunate in that his youth was passed in an age when one could aspire to become a chemist—without adjectival qualification. This he certainly did become, for he had a wide and full knowledge, along with a common-sense grip, of his subject, and his opinion on any relevant problem always commanded respect. As a teacher his main concern was with pure science, and he had little or no sympathy with technical education. The justification of this attitude is to be found in the success of so many of his students who took up positions in industrial chemistry after leaving college. Though somewhat deficient in the rhetorical arts, he was yet a good and clear lecturer, skilful at the blackboard, and an apt experimentalist, and he spent infinite pains in the preparation of lecture experiments. His teaching duties were ever his first consideration and hardly a day passed but that he visited every student in the laboratory, often spending a great deal of time in clearing up their difficulties. This undoubtedly gave him power over errant students and was partly responsible for the good order which was always maintained in the lecture-room. It was supplemented by a piercing eye which, directed towards an unruly or inattentive student, soon brought him to a semblance, at least, of receptivity. Viewing his activities as a whole, he did a great work for the College in the developmental stage from small beginnings to full university stature. The Redbrick Universities owe much to men of his stamp.

As a man Bedson was small and spare of body, but wiry and energetic, always cheerful, bating an occasional flare-up of temper, which however quickly subsided and left no malice or ill-feeling. He was always Peter, to students and staff alike, and the eternal boy in him was never much below the surface; as an old colleague put it, at one of the last staff dinners he attended, he was the Peter Pan of the College. J. A. SMYTHE.

## HENRY GEORGE DENHAM.

1880—1943.

AMONG the outstanding men of science produced by New Zealand, the late Professor Henry George Denham occupied a special place. Rarely does it happen that the holder of a Chair of Chemistry and Rector of a University College, combines with these positions a life of such influence in the organisation of scientific research applied to national needs. Denham was an initial member of the New Zealand Council of Scientific and Industrial Research, succeeding Sir George Shirtcliffe in the Chairmanship of this body in 1934. In addition, he was Chairman of the Wheat Research Institute from its inception, and a member of the committees of the Dairy Research Institute and of the Wool Manufacturers' Research Association.

In University administration he played an equally important part. He was a member of the Senate of the University of New Zealand and of its Academic Board, composed of representatives of the four constituent University Colleges. For some years he was also Chairman of Governors of Canterbury Agricultural College. He assisted in the founding of the Australian Chemical Institute and of the New Zealand Institute of Chemistry, was a foundation Fellow of both and President of the latter in 1934 and 1935. In addition he was a Fellow of the Royal Society of New Zealand, a Fellow of the Australian and New Zealand Association for the Advancement of Science, and President of Section B of this Association in 1928. This may give an indication of the range of his interests and responsibilities.

Denham was a graduate of Canterbury University College, which he entered in 1901. Graduating first in Arts, he took the M.Sc. degree in 1906, carrying out research on the conditions for the combustion of methane on the surface of palladised asbestos and was awarded the 1851 Science Research Scholarship. This led him to Donnan at the new Muspratt Laboratories in the University of Liverpool, where he graduated D.Sc. During this period he was actively engaged in the pioneering application of the hydrogen electrode to the determination of the hydrolysis of salts, work which developed into an interest in the possibility of the existence of sub-salts of the transition elements and led, in later work at Liverpool, in New Zealand and at the University of Queensland, Brisbane, to the isolation of sub-salts of lead and bismuth. The sub-salts of lead were prepared by a general method involving the action of the vapour of the alkyl halide, acetate or sulphate, on lead suboxide, which was obtained by heating the oxalate under reduced pressure. Leaving Liverpool for a period, he proceeded to Bredig at Heidelberg, working on heterogeneous catalysis, in particular that of the interaction

of titanous and hydrogen ions, and of the reduction of hydrogen cyanide to methylamine, and in due course receiving the Ph.D. degree. His interests in inorganic chemistry during this period were also exemplified by papers on the anomalous transport numbers observed, due to formation of complex ions, in solutions of copper chloride, copper bromide and cobalt bromide. Of these days both at Liverpool and at Heidelberg he retained the liveliest and warmest memories.

After returning to New Zealand, he proceeded to the University of Queensland, Brisbane, as lecturer in Chemistry and when Professor Steele went to England in connection with war industry, Denham became Acting-Professor. In 1921, he was appointed Professor of Inorganic Chemistry at Capetown. It was at this time that his textbook " An Inorganic Chemistry " was published, a third edition of which appeared in 1939. After two years at Capetown, he accepted the invitation to return to Canterbury University College in succession to his former teacher, Professor W. P. Evans. The experience as Professor of Chemistry in three Dominions was undoubtedly most valuable in the field of University administration and twenty years of University work at Canterbury College culminated in his appointment as Rector in 1941.

In 1936, two years after he had been appointed Chairman of the Council of Scientific and Industrial Research, he spent a sabbatical year in Great Britain and the United States, accompanied by Mrs. Denham, renewing old friendships and seeing something of other national research institutions. It was on the occasion of his visit to Great Britain that I first met him, a man of tall, active figure and of thoughtful manner which could be readily tempered by a warm smile. Later I had the privilege of knowing him well. Always approachable, he had a generosity of mind and an infectious enthusiasm and courage. These qualities were given full scope in his various fields of work. With the coming of the war, his activities as Rector, as Chairman of the Council of Scientific and Industrial Research and as member of the New Zealand Defence Advisory Committee, increased. Many nights had to be spent on the ferry steamer travelling the 200 miles to and from Wellington. Yet, despite the range and complexity of his interest, and the weight of his responsibilities, he remained his normal self, a delightful and stimulating companion. Particularly gratifying to his friends was the fact that he was able to enjoy, if only for a month, the honour the Society of Chemical Industry conferred on him in January in electing him to Honorary Membership. In making this election, the Council of the Society referred to his career, which, in the words of the citation " illustrates also the remarkable degree of influence which a man of scientific attainment can exert on the general life of the community when he is sufficiently public spirited to sacrifice all hope of leisure."

Although, however, his was a life of little or no leisure, he preserved a genuine interest in the problems of students, new and old, and it was probably this quality of courteous consideration that made his students feel that he was the true father of his Department and that not only was kindly shrewd advice always ready for the asking but that his interest followed them in their careers in New Zealand and overseas.

Recollections of his clear-cut personality and the warmth of his humanity are treasured by a wide circle, which includes former students, colleagues and friends. Now as time elapses after his death on February 15th at the age of 62, one realises even more fully the extent of the loss his death has occasioned to New Zealand chemistry, and to the academic and public life of this country. He leaves a widow and one son, who is on active service in the Middle East.

F. G. SOPER.

I am much indebted to Mr. J. Packer and Dr. H. N. Parton of the Chemistry Department, Canterbury University College, for information supplied.

F. G. S.

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## ALEXANDER LAUDER.

### 1870—1943.

ALEXANDER LAUDER died at Greenock, his birthplace, on November 11th, 1943, at the age of 73. He studied first under Professor Dittmar, in what is now the Royal Glasgow Technical College, and then with Professor Crum Brown at Edinburgh before taking up his first appointment as Assistant to Professor (later Sir J. J.) Dobbie in the newly founded University College of North Wales at Bangor.

In addition to assisting in the Chemistry Department he took up the study of Agricultural Chemistry and carried out experimental work, more particularly in connection with the field experiments. In conjunction with Professor Dobbie, he made an elaborate investigation into the alkaloids of *Corydalis cava* and worked out the constitution of these alkaloids—the results being published in a series of papers in the *Journal*, 1892—1904. Along with Professor Dobbie, he took up the study of absorption spectra and investigated the connection between the chemical constitution and the absorption spectra of certain organic compounds. With Professor Dobbie, he was a pioneer in this work.

In 1904 he was appointed Head of the Chemistry Department of the newly founded Agricultural College, Edinburgh, and in 1907 also became responsible for the teaching of Agricultural and Forest Chemistry to the University Degree Classes. In addition to his teaching, he carried out many investigations in various branches, giving particular attention to the composition of milk as affected by the feeding of the animal, the composition of swede turnips and heather and differences of a chemical nature in potato varieties. Most of that work was published in the *Scottish Journal of Agriculture* and in *Agricultural Progress* or in special reports. He retired in 1936.

Lauder had also a long record in administration, for he acted at various times as Secretary and Treasurer

to the College and as Director of Studies for four or five years immediately after the last war. He served on the Councils of the Institute of Chemistry and the Society of Chemical Industry, and was Chairman of the East of Scotland Branches of the Chemical Society and the Institute of Chemistry. He was prominently identified with the work of the Royal Society of Edinburgh and served on the Council for ten years and was Assistant Secretary to the Ordinary Meetings for five years. He also took an active share in the work of the British Association, being for a time Secretary of the Agricultural Section, and President of the Section for the Leicester Meeting in 1933, the subject of his address being " Chemistry and Agriculture."

Lauder was much interested in music and in English literature. He was a member of the Reid Orchestral Committee for many years, an active member of the Bach Society, and various other musical bodies. He had accumulated a library of standard English works, the study of which gave him much pleasure.

By those who knew him, he will always be remembered for the services he gave so ungrudgingly, for his sound judgment, for his wit and generous nature. ALEX. M. SMITH.

## ERNEST WILSON McCLELLAND.

1896—1943.

ERNEST WILSON MCCLELLAND was born on November 17th, 1896, the son of a schoolmaster teaching mathematics and science at the Model School, Belfast. From boyhood he suffered from the asthma which overshadowed his mature years, and, because of this, was home educated, by tutors who not only gave their son the grounding essential for his future career, but also stimulated his interest in a great variety of other subjects. Entering the Queen's University in 1914, McClelland graduated with a First in Chemistry in 1917, and was awarded a post-graduate studentship as the best man of his year. He subsequently joined the Aeronautical Inspection Directorate, and only in 1919 took up his deferred research studentship, going to work with Professor Smiles at Armstrong College, Newcastle-upon-Tyne. He followed the latter to King's College, London, in 1920 and a year later was awarded the degree of Ph.D. (Dunelm). For the next three years, he was a Senior Assistant at the Queen's University, under Professor Stewart, proceeding to the degree of D.Sc. at the end of this period. In 1924 he joined the staff of King's College, London, where he remained until his untimely death, at Bristol, on February 4th, 1943. The strain following on a successful effort to finish a rather heavy piece of examining work to time proved too much for his heart, weakened as it was by a lifelong and courageous fight with asthma.

McClelland was by nature a man of equable temperament and balanced mind. Forced, by his precarious health, to husband his strength, he had an air of deliberation, even slowness, which gave no clue to the vigour and healthy independence of his judgments, combined as they were with an ability, whilst dissenting, to weigh and appreciate the views of others. He was a man of great honesty and charity of mind, of indomitable cheerfulness however adverse the conditions, and a very staunch friend. His interests far transcended Chemistry, and his colleagues in the King's College Senior Common Room will not readily forget the dry and tolerant humour which characterised his talk. He made a very happy marriage, and is survived by his widow and a son.

Professionally, McClelland applied himself with equal zest to all aspects of his work. He was a successful teacher, both in the lecture room and in the laboratory, and his obvious competence, his devotion and inherent kindliness earned him a quite unsought-for popularity, both with students and with colleagues. His research work, which testified amply to his manipulative skill, lay essentially in the field of heterocyclic sulphur compounds, particularly in the study of derivatives of thionaphthen, benzthiazole and the benzthiazines, and nineteen papers by himself and his pupils appeared in the Journal between the years 1923—1941, subsequent to two joint publications with Professor Smiles. Many of his results in this field, recently somewhat neglected, remain at present unpublished, in particular, a number of examples where ring systems open with great ease, with subsequent closure to form new systems.

By McClelland's death, chemical science has lost an individual worker, one who followed his own bent without any particular thought to fame or to advancement, and who knew that research brings its own rewards. King's College, London, has lost a teacher who could be relied on implicitly in everything he undertook to do. As for his friends, they cherish of him many happy, and sometimes whimsical, memories. One of them recalls the interest " Mac " took in crime and criminology, and his working out, from data tabled in the " Hangman's Handbook," the exact drop which would be suitable for a man of his own height and weight. Another recollects meeting him in a bar in Belfast on Armistice Day, 1918, when " we caused a lot of amusement by getting a quiet corner table and playing a game of chess whilst Bedlam roared around." A third writes of how, when in a nursing home, McClelland " used to come down night after night to have a talk and help me to pass the evenings which, without him, would have been dreary indeed." Those who knew him will recognise these incidents as typical, and one not more than another. A. J. ALLMAND.

## HENRY FORSTER MORLEY.

1855—1943.

BY the death of Dr. Henry Forster Morley in his 88th year the Chemical Society lost one of its oldest members. He was elected a Fellow of the Society on December 18th, 1879, and served two periods of office as an ordinary member of council, *viz.*, 1887—1890 and 1896—1900.

Morley was born on October 25th, 1855, and was the eldest son of the late Henry Morley, LL.D., J.P., one time Professor of English Literature at University College, London. He was educated at the University College School and subsequently at University College, where he came under the influence of Professor A. W. Williamson. Morley has admitted in print how profoundly any success attained in his subsequent scientific career was due to the ideas instilled into him by Professor Williamson, who had probably as clear an insight into the fundamental principles of chemistry as any scientist then living.

Morley took his B.Sc. degree (1875) in the old London University and two years later the M.A. in mathematics. During this period his work led to his first paper—on the action of a Groves gas battery (*Phil. Mag.*, 1878). After graduating, Morley spent two or more years working in various laboratories on the Continent—first at Bonn (1878) under Prof. Kekulé, then under Prof. Baeyer in München (1879), next in 1880 at the Ecole de Médecine, Paris, followed by a short time in the laboratory of Berlin University. Morley often expressed to the writer how much he owed to Kekulé, in particular, and also to Baeyer for his knowledge of structural organic chemistry. During his sojourn abroad, besides attending lectures, Morley, like most senior foreign students, took part in the research work being carried out in the various laboratories. His first work in Bonn—an attempt to replace the chlorine in $Cl{\cdot}CO{\cdot}CO_2Et$ by SH by hydrogen sulphide—had negative results, and he evidently turned to another subject, for in *Ber.* of 1878 a paper appeared by Dr. L. Claisen and H. F. Morley—Ueber eine neue Bildungsweise der Phenylglyoxylsäure—in which, by the interaction of ethyl oxalyl chloride and mercury diphenyl, the preparation of phenylglyoxylic acid was described and some account of its properties and of its ester given.

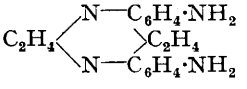
While in Munich Morley collaborated with Dr. C. Wurster—an Assistant to Baeyer—well known for his work on complex members of the amine group. In *Ber.*, 1879, **12**, 1514, Wurster and Morley described the preparation and properties of tetramethyl-*m*-phenylenediamine, which proved more stable than the corresponding *p*-derivative. It combined with methyl iodide, giving a crystalline compound,

$$N(CH_3)_2{\cdot}C_6H_4{\cdot}N(CH_3)_2,CH_3I$$

It readily reacted with bromine, forming a dibromo-derivative, isolated as crystalline dihydrochloride, $C_6H_2Br_2N_2(CH_3)_4,2HCl$. By the action of nitric acid they obtained a crystalline trinitro-compound containing one nitroso-group, $C_6H(NO_2)_3N_2(CH_3)_3{\cdot}NO$. This gave no Liebermann reaction and was stable to hot hydrochloric acid.

In the same year, Baeyer having suggested that a study of nitroso-derivatives of more complex amines might yield useful results, Morley undertook work in this field and chose as starting materials the easily available mono- and di-ethylenediphenyldiamines described by Hofmann. By the action of nitrous acid on ethylenediphenyldiamine Morley obtained a dinitroso-compound, $C_2H_4[N(C_6H_5){\cdot}NO]_2$. It formed no salts and gave no Liebermann reaction; and on reduction the original diamine was re-formed.

Diethylenediphenyldiamine was prepared by Hofmann's recipe but the yield was not so good as expected. On suitable treatment with nitrous acid a solid was formed difficult to purify; it proved to be dinitrosodiethylenediphenyldiamine. This gave no Liebermann reaction and was stable to alkalis. On reduction with tin and hydrochloric acid it gave in quantitative yield a beautifully crystalline base,



In 1880 Morley carried out a considerable amount of work, partly in Paris and partly in the laboratory of the Berlin University, on oxyamines of the choline group. Most of these amino-derivatives were isolated for analysis in the form of double salts of their hydrochlorides with platinum tetrachloride. An account of this work was published in the following journals, those in different languages covering more or less similar grounds: from the École de Médecine—*Ber.*, 1880, **13**, 1805, and *Compt. rend.*, 1880, **91**, 332, both on *iso*propyleneneurine; and from the Berlin laboratory—Ueber methylirte Dioxyethylen Amine, and covering much the same field in J., 1880, **37**, 232. In 1882 another paper was published (J., **41**, 387) on *iso*propyltoluidine: *n*- and *iso*-propyl compounds were compared and their nitroso-derivatives described.

On his return to London Morley was elected a Fellow of University College and Dean of a hostel for U.C. students founded by his father, who was Principal. During 1882 he devoted his time to the preparation of a thesis—A Study of the Amines—for London D.Sc., which he was awarded in the following year.

In 1883 Morley was appointed Assistant Professor of Chemistry at University College under Professor Williamson, a post which he held until Williamson was succeeded by Sir W. Ramsay in 1887. During this period Morley continued his researches with the help of senior students. In 1885 a paper appeared (J., **47**, 132) by H. F. Morley and A. G. Green on the constitution of common propylenechlorohydrin in which they showed it consisted mainly of $CH_3{\cdot}CH(OH){\cdot}CH_2Cl$, though simultaneous production of traces of its isomer was not excluded. In the same Journal (p. 134) they gave an account of experiments on the action of zinc ethide on the benzoate of propylenechlorohydrin. The reaction took an unexpected course and they discovered a new series of substances which they termed ketates. Instead of attacking the chlorine, the zinc ethide attached itself directly to the carbonyl group of the benzoyl radical, $C_6H_5{\cdot}CEt(OZnEt){\cdot}O{\cdot}C_3H_6Cl$. On elimination of the metal as chloroethide they obtained a substance which may be viewed as the propylene ether of phenyl ethyl orthoketone derived from orthoketone, $\begin{matrix}C_6H_5\\C_2H_5\end{matrix}\!\!>\!C\!<\!\!\begin{matrix}O\\O\end{matrix}\!\!>\!C_3H_6$ from $\begin{matrix}C_6H_5\\C_2H_5\end{matrix}\!\!>\!C(OH)_2$.

Later in the same year Morley and W. J. Saint published in the Journal an account of the preparation and properties of methyl ethyl thio-oxalate, $MeS{\cdot}CO{\cdot}CO_2Et$, by the action of methyl mercaptan on $Cl{\cdot}CO{\cdot}CO_2Et$. This work was in extension of Morley's unsuccessful experiments in his early Bonn days.

In 1887 he had some controversy with H. E. Armstrong (J., **51**, 579) on substitution in the benzene ring, but this is now of historical interest only.

Morley's last experimental work, as far as I have been able to ascertain, was undertaken in conjunction with E. Hori on *n*- and *iso*-propyl-*p*-toluidine (J., 1891, **59**, 33). In this paper they compare various salts and nitroso-derivatives.

After leaving University College, Morley in 1888 was appointed Professor of Chemistry at Queen's College, London, a part time post which he retained until 1901. In 1894 he was also appointed Lecturer in chemistry and physics at the Medical School of Charing Cross Hospital, where he continued until the teaching of these subjects was given up some ten years later. After leaving Univrsity College, Morley undertook very little research and devoted his energies largely to the literary side of his subject. His first book—" Outlines of Organic Chemistry "—was published in 1886 by Messrs. J. A. Churchill & Co. Morley held strong views as to how such a book should be written. He insisted that chemistry is an inductive science and protested against the dogmatic teaching of structural formulæ, apparently then in vogue. In his preface he discusses the various methods that might be adopted, and finally decided on a plan of describing simple compounds in the order in which they may be synthesised so that any compound should be a product of the one before and a producer of the one after. In this way the truth of its formula should be self-evident. Unfortunately owing to the requirements of various Examining Bodies and for other reasons, he was obliged to include a number of substances that could scarcely be dealt with in such way within the limits of a small volume. However he produced an admirable little book which served a crying need and had a deservedly long and successful run.

His next important work was the revision of the famous " Watts's Dictionary of Chemistry " published by Longmans Green & Co. Twenty-five years had passed since the work was first published, and seven years since the second part of the last supplement. Mr. Watts had undertaken the revision, but unfortunately died. The revised edition was edited by Dr. H. Forster Morley and (the late) Professor M. M. Pattison Muir, assisted by a staff of specialists. It was found necessary to rewrite the whole work and make it a true Dictionary of Pure Chemistry. Stern condensation was necessary, as the huge mass of material to be recorded had to be compressed into four volumes of about 800 pages.

Muir was responsible for Inorganic and General Chemistry and Morley for the Organic portion. The new edition differed from the old in that all references to processes of chemical technology were omitted, as these were being dealt with in a new dictionary edited by the late Professor T. E. Thorpe. General articles on allied subjects were also omitted, and even details of analytical processes. The new work was criticised as lacking the general interest of the old—but with the space available, it is difficult to see how this could have been otherwise. However the new dictionary supplied a great and growing need. Even to-day it has its use, since it affords an easy and accurate reference book for those who require historical information on any subject up to the date of publication.

Morley is perhaps best known for his important work on the International Catalogue of Scientific Literature. The Royal Society had prepared catalogues of scientific papers which were printed at first by H.M. Stationery Office. Subsequently financial aid for this purpose was supplied by the Treasury and by private donors. Towards the end of the last century it was felt that the work was too big for the resources available and it was decided to call for international co-operation. Accordingly the Royal Society took action and eventually conferences of delegates appointed by foreign Governments were held in London in 1896, 1898, and 1900. A scheme was agreed at the last conference under which control of the publication was to be vested in an international committee The Royal Society undertook publication and advanced the necessary capital on loan. The catalogue was to be published yearly in 17 volumes dating from Jan., 1902, and Dr. H. Forster Morley was appointed Director of the Central Bureau. This was a great success and, in 1904, a convention of 14 States decided to continue the work; in the following year the Royal Society agreed to publish and finance it for another 5 years. In 1910 a convention of 18 States decided on further publication to 1915 and on a further extension 1916—1920. The Royal Society continued the printing arrangement until the 15th issue, dealing with 1915, but in 1916 the work was suspended owing to war-time difficulties. After the war, considerable further difficulties were encountered in the way of resumption of the Catalogue and in 1922 an executive committee decided not to continue the enterprise, the Treasurer of the Royal Society was appointed Receiver, and the accounts were finally closed. All this must have constituted an arduous task for Morley and given full scope for his business and organising abilities.

After ceasing to teach at the Medical school, Morley continued to take an interest in medical education and his membership of the Board of Preliminary Medical Studies was continued in the class of " Other Persons " and he gave much valuable help during a critical period. He served as secretary of the Board 1929—1930 and as chairman 1931—1932. For many years Morley did a good deal of examining work for various Universities and qualifying Bodies. His first important Examinership in chemistry was in the Final Honour School of Natural Science, Oxford University. At the London University he frequently examined in chemistry in the Preliminary and Intermediate Medical Examinations, in which he always viewed the claims of his subject in sane perspective in reference to the whole medical curriculum. For many years he acted as examiner in

chemistry for the Society of Apothecaries and did not retire until his 84th year, though pressed to continue for another year.

Morley was a member of the British Association, and on several occasions functioned as secretary to the chemical section. He and his accomplished wife were frequent in their attendance at social scientific gatherings in London, particularly at the Royal Institution, where they customarily were present at conversaziones and at the evening meetings.

Morley was a Liveryman of the City of London, and a member of the Society of Apothecaries, of which he was one of the most senior members of the Livery. He had a discriminating liking for the good things of this world and rarely missed dinners at the Apothecaries Company, which in pre-war days was fortunate in the possession of a good cook and a quite remarkable cellar.

Morley was a man of happy disposition and retained until late in life a very boyish outlook, which the writer found very fascinating. He was a genial and kindly host and loved to welcome his friends at his house in Hampstead or at Midhurst often to view paintings by his accomplished wife. He will be greatly missed by many old friends. Nevertheless in spite of his apparent simplicity of character he was very shrewd and a first-rate organiser and man of business. The writer has often thought that had Morley taken to commerce instead of science he would have made a fortune, and in the City might have attained high civic dignity.

The death of his beloved wife a couple of months before his own must have been a great shock. His troubles were further added to by a bomb through his house at Midhurst. Fortunately nobody was injured—Morley was in his dining-room at the time—but his library was much disturbed and a number of his papers were lost.

J. A. GARDNER.

## WILLIAM COLEBROOK REYNOLDS.

### 1870—1940.

WILLIAM COLEBROOK REYNOLDS, who died in his 71st year on March 20th, 1940, was a most distinctive personality. Scientific enthusiasm dominated his life from early youth until death. His earliest contact with Chemistry was when as a boy he began experimenting in his father's pharmacy in Harrogate and attended classes in the Mechanics' Institute in Leeds. He gained a scholarship at Dalton Hall, Manchester, later a National Scholarship at the Royal College of Science, finally taking his D.Sc. at London University.

His scientific interests were widespread. His earliest published paper appeared in the *Transactions* in 1898; it relates to the properties of double salts of potassium and copper. Among the results of interest to be found in his subsequently published papers are the following:

In conjunction with F. L. Pyman the isolation of a new alkaloid, meteloidine, and the reduction products of papaverine.

With Francis H. Carr, showing the wide variation in the sparteine content of *Cytisus scoparius* during different months of the year; proof that the specific rotation of an alkaloidal basic ion cannot always be calculated from that of its salts; and the characterisation and constitution of norhyoscyamine, an alkaloid occurring in various plants of the *Solanaceæ*.

He published in collaboration with W. H. Taylor papers on the decomposition of nitric acid by light and the theory of sulphuric acid manufacture.

Reynolds worked on disinfectants and it was probably this interest which led to his describing emulsions which can be inverted without change of composition by warming—a number of the inverted emulsions being capable of complete reversion. Subsequent work on interfacial tension led to two papers published in *Transactions* in 1921 in which an improved method of measuring interfacial tension by the capillary method is described.

Other interests which claimed Reynolds's attention were the structure of the atom. A book on "Atomic Structure as modified by Oxidation and Reduction," published in 1928, expounds his original views on changes in atomic structure during oxidation and reduction processes. Also he published in letters to *Nature* and in a paper in the *Journal* of the Society of Chemical Industry in 1930 results of his observations on atmospheric phenomena based on work carried out at his home in Upminster and during holidays in Switzerland.

In social activities he displayed the same thoroughness and enthusiasm as in his scientific work, organising horticultural and athletic activities; even in his sixties he played cricket and took a full share in bowling and batting. His wife, son and two daughters survive him.

FRANCIS H. CARR.

## SIEGFRIED RUHEMANN.

### 1859—1943.

SIEGFRIED RUHEMANN was well known to British chemists prior to the Great War of 1914—1918; from then on, after leaving this country until his death this year, his British friends lost contact with him, and the contact was not renewed on his return to England in 1939. When I was asked to write this obituary notice I felt that it was a revival of the old days of my association with him as a student and collaborator from 1888 to 1900. The stimulus given by him in fundmental research has had a great influence on many students, including myself, who look back on the time spent under his guidance as being of the highest value in their life work.

His enthusiasm, dogged perserverance and skill in manipulation were infectious. He was the pioneer of Organic Chemistry in the University of Cambridge in the days when research in that subject was not warmly encouraged.

Dr. Martin Ruhemann has kindly supplied me with details of his father's early life and of his later days. He was born at Johannesburg in East Prussia in 1859, where his father was in the leather trade, and was apparently one of the notables in the little place. When he was seven years old his father died and his mother a few years later took him to Berlin with his two elder brothers and several older stepbrothers and sisters. There was very little money and his father had great difficulty in working his way through the University. He took his degree in 1882 and worked for a short time with Professor Wichelhaus. He was very dissatisfied with his position and soon transferred to Professor Hofmann, for whom he preserved throughout the whole of his life a sincere respect and admiration. Professor Hofmann was asked by Sir James Dewar to supply an organic chemist from among his pupils and selected Siegfried Ruhemann.

Ruhemann was appointed Assistant to the Jacksonian Professor (Sir James Dewar) and delivered the elementary and advanced lectures in Organic Chemistry and soon collected a number of workers in the Laboratory. I am indebted to Dr. J. T. Hewitt for his recollections. He says, " I do not think that I met Ruhemann until after taking Part I of the Nat. Sci. Tripos in 1889, and never attended the celebrated course of lectures in Elementary Organic Chemistry. I started in his laboratory and went to his advanced course of lectures, which I thoroughly enjoyed. His accent was somewhat foreign, but he spoke English fluently, even if some of the expressions he used were literal translations of German equivalents. He always seemed to be as pleased in giving the lectures as the audience was in hearing them. Within a short time of the end of the lecture he came round the laboratory asking each individual who had been present, whether there was any further point that needed explanation. As a teacher of practical Organic Chemistry Ruhemann was even more in his element than in the lecture room.

" He had rooms at the top of the new chemical building, so that there was no need to be away for a long time at meals, and as soon as one of these was finished he could turn again to his beloved work. Added to this attention to research pure and simple, he was not much engaged in examining work and seemed to have no desire to make an extra income by side-lines, commercial or otherwise. This was all to the good so far as his students were concerned."

Numerous stories might be told of Ruhemann's idiosyncrasies in the lecture room and in the laboratory, for these have remained in the memories of both his elementary and advanced students, even to the present day. His dramatic style at the blackboard in the development of the formation of an organic compound was most striking, and often met with loud applause. As to his advanced course, there was unanimous appreciation of its value. In order not to interfere with his research work, the advanced lectures were at 9 a.m. and the elementary from 1 to 2 p.m., and in spite of these inconvenient hours the attendance was always large.

After some years differences arose between the Jacksonian Professor and his Assistant and these resulted in the appointment of Ruhemann to a University Lectureship in Organic Chemistry. In 1891 he removed to the Caius College Laboratory, where accommodation was found for his research students, now increasing in number, and for his senior students. Here he worked until 1908, when the College Laboratory was closed and Ruhemann returned to the University Laboratory, where he continued his advanced lectures, but not the elementary course, and with a much reduced number of collaborators.

He took British nationality in 1906 and in 1914 was elected F.R.S. for his valuable contributions to Organic Chemistry. During the first Great War he resigned his lectureship, and in 1919 returned to Germany.

The record of Ruhemann's work in Cambridge is striking. From 1888 to 1915 he published 94 papers either alone or with collaborators, and of these he had 27; 68 papers appeared in the *Journal*. The subjects dealt with were varied and included tetrazines, pyrimidines, pyrazolones, studies in β-ketonic acids, diketohydrindene hydrate as a test for α-amino-acids and protein derivatives, studies in cyclic ketones, etc. It was pioneer work and essentially exploratory in character; no reaction is named after him and he put forward no hypothesis nor engaged in any great controversy, for the accuracy of his results was generally admitted. The value of his work is inestimable and progress ahead is assured by such careful survey of unexplored regions.

From 1919 to his death his British friends for the most part lost sight of him, but it is evident from information supplied by his son that the fundamental research " urge " still persisted. His son writes as follows :—

" On his return to Germany in 1919, my father worked for a time on his own in Fischer's laboratory until, in 1921, he was put in charge of a research laboratory in Charlottenburg. It was called ' Braunkohlen und Mineralölforschungsinstitut ' and was run jointly by the Technical College and the ' Braunkohleninstitut.' When my father took this over it was quite small. The staff consisted of one technician, two students and a boy. He worked there for 10 years and built it up very considerably. When he left in 1933, there were well over a dozen people working there. He found it difficult at first to do industrial research, but at times I think he enjoyed it and published a number of papers. Working with seven collaborators, he published seven papers, chiefly in *Brennstoff-Chemie*.

After his retirement he lived peacefully in Zehlendorf for some years on his savings and a pension, and for long could not make up his mind to leave Germany, although he hated the new régime, but he felt too old to move. Finally, in May, 1939, only a few months before the war started, my father and mother returned to England. They had retained their British nationality and we lived for some years together in Muswell Hill. My father was taken ill early in August and died very soon and without much suffering. He felt during his last

years in England a very strong and sincere attachment to this country, and wished earnestly for an opportunity to express this to some of his old friends. Unfortunately infirmity prevented him from taking up old associates."

The record of Ruhemann's work is one of which any investigator might be proud. Chemists of the former generation who were his students will acknowledge a deep debt of gratitude to him as a teacher and as a stimulator in research.

R. S. MORRELL.

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## PERCY WILLIAMS.

### 1873—1942.

PERCY WILLIAMS died in February, 1942, at the age of 69. He was born in 1873 in Hackney, his father, Robey Williams, being described as a mercantile clerk. His parents were deeply religious, and sent their son to a Chapel School in Lower Clapton. From school he passed on to the Alexandra Palace, where his early scientific training was obtained, but he owed his main education to Sir William Ramsay, under whom he studied at University College for several years. In a testimonial written some years later Ramsay refers to Williams' " exceptionally brilliant career and his great experience of research methods in many different branches of Chemistry " obtained in London, France and Germany, for after completing his work at Gower Street, to which reference will be made later, Williams used the proceeds of a South Kensington Scholarship to cross over to Paris, and to enrol in the team of chemists then working under Henri Moissan, with whom he remained for two years, collaborating in a number of researches on the preparation of borides of calcium, strontium and barium, a carbide of tungsten and a double carbide of tungsten and iron. The results were later presented to the Academy by Moissan.

In 1898 Williams migrated to Berlin, where he completed his education in the laboratory of J. H. van 't Hoff before returning to England for the purpose of taking up an industrial career.

His first employment appears to have been with the British Uralite Company of Higham, Kent, where he was in charge of the laboratory under the general direction of the late Gordon Salamon. In 1900 he journeyed to Russia on behalf of his Company, which, at that time, drew its supplies of asbestos from the Ural Mountains. In 1906 Williams left England to become chemist to the Borneo Rubber & Trading Company at their factory at Sockadana, where he first supervised the installation of a double-effect evaporating plant, and was later in charge of the production of quinine. In 1911 the factory was closed owing to the failure of the bark supply and Williams returned to England. For a time he worked under Professor Bone with the Bone-Court Combustion Company, and in 1914 he became chemist to the Aluminium Plant and Vessel Company Limited at Wandsworth, where he worked for the remainder of his life.

Williams' most important scientific contribution was the part he played in the joint research of Rayleigh and Ramsay which led to the isolation of argon by absorption of the nitrogen of the air by magnesium. Unfortunately, Williams could never be induced in later years to discuss the matter, but the present Lord Rayleigh has kindly informed the writer that he recalls that Sir William Ramsay told his father that he would like to make special mention of Williams in the paper they were about to publish, as he had been of the greatest help; that he (Ramsay) had told Williams to try magnesium and that Williams had carried out that part of the work without further guidance. Williams was, in fact, specially acknowledged, but exactly what form his assistance took it is now impossible to ascertain.

In all his work Williams was distinguished by the directness of the methods he evolved and the simplicity of the apparatus which he used to solve the innumerable problems with which he was confronted. Perhaps his method for determining the proneness of certain alloys to the form of corrosion which U. R. Evans has described as " crevice attack " may serve as an example. Separate drops of the corrosive fluid were placed upon the sample of the metal under investigation, and on each drop was placed a piece of glass rod about 2 cm. in length. Through these, of which if desired a large number could be placed on a small piece of metal, the development of the attack could be watched as through a magnifying glass. The atmosphere could be controlled by placing the specimens under a bell jar, filled with the appropriate gas.

Gifted with extraordinary manual dexterity, Williams was able to make almost all the utensils he needed, whether they were constructed of glass or metals. His reading was wide and catholic and his memory unfailing, whilst his scientific honesty drew from Henri Moissan the tribute " Je me rapelle . . . la façon consciencieuse et intelligente avec laquelle vous avez travaillé auprés de moi et l'honnêteté que vous apportiez à vos analyses." His ingenuity in devising his experiments and his pertinacity in carrying them through almost invariably brought definite results, and the writer can only remember one case among the hundreds presented to Williams during the course of 28 years, and ranging over a very wide field, in which the problem remained unsolved.

To his colleagues of all ages and many branches of science and industry he was unfailingly helpful, and no trouble was too great to enable him to meet the many demands which their confidence in him led them to make upon his time.

With Williams has passed one of those all-round chemists who are become distressingly rare in these days of intense specialisation.

He was elected a Fellow of the Chemical Society in December, 1907.

RICHARD SELIGMAN.

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