OBITUARY NOTICES.

ARTHUR PIPER ADAMS.

1859—1933.

ARTHUR PIPER ADAMS was born in 1859, and died at his home, Kelvin House, Smethwick, nr. Birmingham, on July 10th, 1933. He was educated at a middle-class school in Smethwick and later at the Birmingham and Midland Institute, the Mason University College, and the Royal College of Science, London. His successes included a Royal Exhibition at the Royal College, and a Dublin scholarship.

Among the appointments he held were those of a science lecturer at the Smethwick Technical School for thirty-two years: he also taught science at the Walsall Technical School, West Bromwich Technical School, Solihull Grammar School, Handsworth Grammar School, Stafford Grammar School, Bilston Technical School, Darlaston Technical School, Dudley Technical School, and Bourne College, Quinton. He was responsible for papers on the "Heat-producing Power of Fuel," "Electrical and Thermal Conditions in Alloys," and "Artificial Foods."

It is some seven years since the writer first knew Adams personally. He was a big man both physically and intellectually. He was then, and had been for some time, Honorary Librarian of the Birmingham and Midland Institute Scientific Society, of which Society he had been an original member. He retained this Honorary Librarianship until within a year or so of his death, and was then elected an Honorary Member of the Society's Committee. I felt him to be quiet, gravely humorous, and indefatigable. He had an obvious interest in all branches of science, and no mean knowledge in many of them. I can well believe what his older friends tell of his insatiable appetite for learning, his zest in examinations, and the strength which enabled him to enjoy long walks burdened with an old-fashioned full-plate camera. On one occasion he astonished the educational world by taking examinations in fourteen subjects, obtaining first-class honours in a large number and earning for himself the temporary nickname of "The Fourteen Subjects Young Man."

After he had retired from teaching he became Scientific Adviser for Messrs. W. & J. George, Ltd., scientific apparatus makers, Birmingham, and they speak with great esteem and gratitude of his skill and ingenuity in devising new apparatus for educational work, and in checking all details thereof before he would pass a single thing as fit for public use. He had considerable knowledge in mathematics, and this helped him greatly in such research and design.

His passion for science held till the end—he wished his body to be given to the Medical School of the Birmingham University for scientific purposes.

His widow and family mourn a brave and accomplished man, and his scientific friends will always remember him with esteem and honour.

G. W. M.

WALTER CRAVEN BALL.

1877—1933.

WALTER CRAVEN BALL was born at 9 Brampton Grove, Cheetham, Manchester, on October 3rd, 1877, and died in a Salisbury Nursing Home on Friday, June 16th of this year. He was the son of William Henry Ball, a cotton spinner and partner in the firm of Bowker and Ball, Dukinfield, Cheshire, of which the son was a partner at the time of his death. He received his school education at the Manchester Grammar School, where, like many others who have attained positions of prominence in the chemical world, he received his first instruction in the science at the hands of the late Francis Jones. From Manchester he went with a scholarship to Trinity College, Oxford, and graduated M.A. in

1900. From 1901 to 1913 he was a demonstrator in chemistry and physics at Guy's Hospital Medical School, and during this period was able to carry out some important research work for which he received the D.Sc. of Trinity College, Dublin, in 1912. This work included papers, published in the *Journal* of the Society, on " Complex Nitrites of Bismuth " (1905), " A New Method for the Detection of Sodium, Cæsium, and Rubidium " (1909), " The Slow Decomposition of Ammonium Chromate, Dichromate, and Trichromate by Heat " (1909), " Estimation of Sodium " (1910), " The Nitrites of Thallium, Lithium, Cæsium, and Rubidium " (1913); also a paper, published in the *Proceedings of the Royal Society*, 1912, *A*, **87**, on " Changes in the Absorption Spectra of Didymium Salts." In 1913 Ball started a consulting business in London, but abandoned this in 1915 when the war claimed him. In the first instance he joined as a civilian chemist and was attached to the Base Hygiene Laboratory, Boulogne (R.A.M.C.), where he remained 12 months, being commissioned as Lieutenant (General List) on August 4th, 1916. He was transferred to the R.E. and the Anti-gas Department, London, on February 1st, 1918, being promoted to the rank of Captain, and was demobilised on March 31st, 1920, having previously been raised to the rank of Major (acting). For his services during the war he was created an officer of the Order of the British Empire (Military Division). His connection with the Porton Experimental Ground dates from the time of its establishment in 1916. For many years he served as Superintendent of the Chemical Laboratories and it was only last year that he succeeded Mr. N. K. Johnson as Director of Experiments, a position he held until he died. While in charge of the Chemical Laboratories he was ever active in the interests of Chemical Defence, ascertaining those deleterious substances which might be used against us and devising means by which our men could be protected against them. Such work required a wide knowledge of both theoretical and practical chemistry, a knowledge which Ball was able to bring to bear on the intricate problems in hand.

He had a very lovable disposition and was a firm and staunch friend. During a friendship extending over more than twenty years the writer does not remember having heard him speak disparagingly of anyone. Surely this can be said of few of us. A stern but kindly disciplinarian, he endeared himself to all associated with him either as seniors or as juniors. The two words which he evidently kept underlined in the dictionary of his mind were thoroughness and accuracy and no man (certainly no chemist) can desire a better epitaph than this. His loss will be grievously felt by all his friends and especially by his colleagues of the Department he served so well.

On December 20th, 1905, he married Miss Mary Goddard Spicer, only daughter of the late F. S. Spicer and Mrs. Spicer of Godalming and Alton, who, with two sons and three daughters, survives him.

J. F. T.

FREDERICK WILLIAM FLETCHER.

1853—1933.

MR. FLETCHER, governing director of Messrs. Fletcher, Fletcher & Co., Ltd., Vibrona Laboratories, Holloway, London, N. 7, and Sydney, New South Wales, died at his residence, Windsmill, Enfield, on October 19th, 1933, aged 80. He had been a Member of the Society of Chemical Industry since its foundation in 1881, and was elected a Fellow of the Chemical Society on April 16th, 1874. He was a distinguished student, and medallist in chemistry in 1873, at the Pharmaceutical Society's School at Bloomsbury Square, now a constituent College of the University of London. An early appointment as assistant to the public analyst for the West Riding of Yorkshire may be said to have influenced his subsequent scientific career. He engaged soon thereafter—in 1879—in business as a chemical manufacturer in London, and he consistently maintained throughout the highest standards attainable of chemical purity and accuracy. The Company which bears his name was founded in 1898. His research work was more in the field of pharmaceutical chemistry and was published in papers contributed to meetings of the British Pharmaceutical Conference. These included :—*Year Book of Pharmacy*, " Arsenic in Solution and Tincture

of Perchloride of Iron" (1880, 545); "Gravimetric Estimation of Minute Quantities of Arsenic" (1880, 546); "Hydrobromic Acid" (1881, 460); "New Double Iodide" (1878, 598); "Bismuth Iodides" (1882, 475); "Quinine Hydrate" (1886, 60).

Fletcher's monographs and tables on tinctures are classic (*Chemist and Druggist*, 1889, I, 108, 238; 1900, II, 12; 1901, I, 138)—the latter on alkaloidal standards—and led directly to the introduction in the British Pharmacopœia of 1898 of definite strengths of alcohol as menstrua for tinctures in place of the previous "Spiritus Rectificatus" and "Spiritus Tenuior" (proof spirit).

Fletcher was a pioneer in the preparation of concentrated liquors for standardised galenical preparations, originally in chemical syrups, now a commonplace, and later for tinctures, alkaloidal and otherwise, which principle has at length received a considerable measure of recognition in the B.P. of 1932.

In the course of much work on the chemistry of cinchona and its extraction by hydrobromic acid, Fletcher devised the process for the manufacture of hydrobromic acid which was adopted in the B.P. of 1885 and has since been official.

He patented a "thermohydrometer," in series from 0·600 to 1·850, giving at one reading specific gravity and temperature, which has proved of much utility in some industrial processes, and applied the same principle to a "thermourinometer," equally practical in clinical practice. Another ingenious patent is Fletcher's "autometric stopper," a rubber stopper and pipette combined, accurately graduated to measure 30, 60, and 120 minims, also 2 and 5 c.c., for laboratory solutions and medicines, one to each reagent, whereby minute quantities can be taken up from within the bottle by slight pressure and expelled by release of an air valve, the use of a separate measure or pipette thus being avoided. His "endolytic tubes" are hermetically sealed capillary tubes containing the respective reagents for clinical testing at the bedside for albumen, glucose, acetone, and diacetic acid.

In 1915 his well-appointed laboratories were engaged in research work of national importance. They had been completed three or four years previously: the architects' drawings for the fine new laboratories, offices, and printing department were exhibited in the Royal Academy of 1910.

Apart from his world-wide business as a manufacturing chemist, Fletcher's interests were largely in hospital administration. He had held governorships of the Middlesex and Great Northern Hospitals and was for many years Chairman of the Enfield Cottage Hospital. Among his earlier contemporaries and friends was the late Mr. A. H. Allen, to whose work—"Allen's Commercial Organic Analysis"—Fletcher contributed "Citrate of Iron and Quinine" (4th Edn., VI, 532). A process for "Estimation of Total Astringent Matter in Tea," devised by F. W. Fletcher and Allen, was published (*Chem. News*, 1874, **29**, 167, 189).

Fletcher was a man of remarkably fine personality, of exceptional charm, scholarly, of refined tastes, and of the highest rectitude of thought and purpose. His gracious presence and cherished counsel are much missed: it was a brevet of worth to be counted among his friends.

W. MAIR.

SYDNEY ALEXANDER KAY.

1874—1933.

SYDNEY ALEXANDER KAY was born in Dundee and after leaving the High School became a student at University College, Dundee, under Professor (now Sir) James Walker. The association thus begun continued through most of Kay's life. His student career was a brilliant one—he gained the medals in Chemistry, Natural Philosophy, Mathematics, and Physiology. Graduating as B.Sc. in 1896, he engaged in research with Walker, and two papers—"On the So-called Magnesium Hypoiodite" (*Proc. Roy. Soc. Edinburgh*, 1896, **21**, 236) and "Velocity of Urea Formation in Aqueous Alcohol" (J., 1897, **71**, 489)—recorded the investigations. The award of the 1851 Exhibition enabled him to study under Arrhenius at Stockholms Högskola and under Ostwald at Leipzig. The work done at Stockholm furnished material for a lengthy paper on "Equilibrium between Sulphuric Acid and Sulphates in Aqueous Solution" (*Proc. Roy. Soc. Edinburgh*, 1899, **22**, 484).

The next ten years were spent at St. Andrews, where Kay proved himself an efficient assistant to Professor Purdie and an extraordinarily conscientious teacher. Perhaps one might say that conscientiousness was his outstanding quality. While at St. Andrews the degree of D.Sc. was conferred upon him in 1902 and three years later he became a Fellow of the Chemical Society, London.

On the retirement of Professor Purdie in 1909, Kay went to Edinburgh, once more to be associated with Walker, who had succeeded Crum Brown in the Chair of Chemistry in the previous year. He devoted himself anew to teaching and more especially the teaching of chemical analysis. The textbook—Cumming and Kay's "Quantitative Chemical Analysis"—first appeared in 1913, the fifth edition in 1928, and, at the time of his death, Kay was looking forward to bringing out, during a term's leave of absence, a completely revised edition of the book. Another volume by Kay alone appeared in 1921 under the title "Qualitative Analysis of Inorganic Substances." He became much interested in water analysis and with Walker published "The Acidity and Alkalinity of Natural Waters" (*J. Soc. Chem. Ind.*, 1912, **31**, 1013) and with Susan H. Newlands "Determination of the Hardness of Natural Waters and the Use of Methyl-red as an Indicator" and "The Determination of Calcium and Magnesium in Natural Waters" (*ibid.*, 1916, **35**, 445, 447). During the second half of the Great War he did good service as Deputy Inspector of High Explosives for the South of Scotland.

Kay was appointed a Lecturer in Chemistry in 1914 and from 1922 gave lectures to the Agriculture and Forestry students and was in charge of the Advanced Inorganic Laboratory. From him generations of students learned method and accuracy and the value of skilful manipulation.

Kay was a lover of nature and his vacations were generally spent in the Highlands, where he found great happiness in the study of wild life. His skill with the camera was notable and he was at one period President of the St. Andrews Amateur Photographic Society.

In 1905 he married Margaret Frazer Plenderleath. The union proved a happy one and the sympathy of his colleagues and friends goes out to her in her great bereavement. After a very brief illness, Dr. Kay died on the 26th of May and those of us who knew him have lost a true friend.

J. E. M.

WILLIAM HARRISON MARTINDALE.

1875—1933.

THE death of Dr. William Harrison Martindale, which occurred on April 8th, 1933, removed from British pharmacy one of its most distinguished representatives, whose work and writings had rendered him well known in chemical, medical and pharmaceutical circles. He received his scientific training at University College, London, and subsequently in the University of Marburg, where he studied under Professor Ernst Schmidt. He graduated Ph.D. of this University, his thesis being entitled "Researches on Corydaline." About this time, in 1898, he obtained the "Minor" and "Major" qualifications of the Pharmaceutical Society. He also served successively as apprentice and assistant to two pharmaceutical firms and on the death of his father, William Martindale, also an eminent pharmacist, he became proprietor of the old pharmacy at 10 New Cavendish Street, which had been his birthplace in 1875. This establishment, originally founded in 1850 by Messrs. Hopkin and Williams, had been in his father's possession since 1873. He at once enlarged the scope of his business by increasing the manufacturing department. Further extensions were effected in 1928 and again shortly before his death when he was engaged in negotiations for the erection of a new factory, which is now completed.

Martindale was always keenly anxious to assist in the discovery and utilisation of new drugs and at an early stage in their history he worked on organic arsenicals and published several contributions on this subject. He also examined the curative possibilities of radium and thorium preparations. Together with the late Dr. Lovell Drage and the writer he

collaborated in the preparation of numerous chemical substances likely to be of therapeutic interest such as the isomeric coumaric acids and their acetyl derivatives, and the copper, cerium, and thorium salts of many organic acids.

Martindale's chief life work was, however, the compilation and continual revision of the "Extra Pharmacopœia." The first edition of this well-known book was written by his father and Dr. Wynn Westcott in 1883. It has now reached its twentieth edition and since Dr. Westcott's death in 1925 Dr. Martindale has been solely responsible for its compilation. In recent years many of his own original observations were recorded in this comprehensive epitome of pharmaceutical knowledge.

Martindale's strenuous effort to combine the three heavy tasks of research, manufacture and authorship were largely responsible for his illness and early death, but his love for pharmacy was not to be denied and he never stopped to count the cost. Personally Martindale had a remarkably shy and unassuming disposition and in the last ten years he had the misfortune to suffer increasingly from deafness. This infirmity and his natural modesty explain why he was less prominent in public affairs than his father. Nevertheless in 1924 he maintained the family tradition by becoming Mayor of Winchelsea, a civic office which carries with it the time-honoured title of a Baron of the Cinque Ports.

Martindale's love of old institutions was reflected in his ardent patriotism. In the last preface he wrote for the "Extra Pharmacopœia" in 1932, only a few months before his death, he pleaded the cause of the British producer and pointed out that it was within the power of the Medical Profession "to create employment within the Empire literally for thousands of men and women where to-day the figure is of the order of tens or at most hundreds." He himself made many attempts, especially during the War, to extend the manufacture of pharmaceutical products in this country. His services to British pharmacy were many and notable; his name will always connote that which is most admirable in this ancient profession.

He leaves a widow and one son.

G. T. MORGAN.

JOHN BRYSON ORR.

1840—1933.

JOHN BRYSON ORR was born in 1840 in Blantyre, Lanarkshire, where his father was in business as a dyer. He was apprenticed to the firm of Lewis, McLellan & Co., Oil and Colourmen and Drysalters in Glasgow, and studied Chemistry in that City at the Andersonian College.

In 1861, he carried out experiments on mixed zinc and barium pigment and seven years later produced the pigment in bulk. Shortly after, he travelled on the Continent in connection with a colour business, and on the outbreak of the Franco-German war, served as an unofficial war correspondent for a Glasgow newspaper.

Orr returned to Glasgow in 1872 and set up a factory for the manufacture of lithopone. In 1880, shortly after this factory had been burnt down, he, with his partner, formed the Silica Paint Co. in London, where he manufactured lithopone (sold under the name of Charlton White) and the first washable distemper, known as "Duresco." In 1896, he founded in Widnes the firm of Orr's Zinc White, Ltd., and in 1930 this business was acquired by the Imperial Smelting Corporation, of which Orr remained a director until the time of his death.

Possessed of great mental and bodily vigour, Orr travelled much and interested himself in many literary and artistic pursuits. His death on September 23rd, 1933, removed a striking personality from the industrial life of Widnes.

John Bryson Orr was elected a Fellow of the Chemical Society on December 15th, 1881.

THOMAS CUNNINGHAM PORTER.

1860—1933.

" Never imagine yourself not to be otherwise than what it might appear to others that what you were or might have been was not otherwise than what you had been would have appeared to them to be otherwise," might have been, or might not have been, T. C. Porter's comment to the writer of a biographical notice. He liked to quote Lewis Carroll, the whimsicalities of Wonderland appealed to him.

How can the life of a man be set within the bounds of the meaning of a few words, when it is still the source of the action of a multitude of living folk?

Dr. Porter, of Eton College, was and is an influence. He was a great teacher. It is as a teacher that he is first to be remembered: for he devoted his life to inspiring others. Even to the very last, ill though he was, he spared none of himself.

Gifted with remarkable talent, he never allowed himself to specialise in one direction. He could certainly have made himself renowned in any direction in which he cared to let his talents carry him. He preferred to maintain a wide range of interests, and it is to this many-sidedness that his pupils owe much of the inspiration that they gained from him. For whether it were in travel, photography, painting, music, geology, meteorology, astronomy, those sparks of interest which might be present in his pupils could be inflamed to enthusiasm by his influence, let alone in those subjects, physics and chemistry, which it was his daily work to teach. As Shane Leslie writes in his delightful Biographical Sketch of Porter in the Etonian Review, " Dr. Porter had that rare gift amongst Schoolmasters of interesting the uninteresting boy, perhaps for the first time in his life."

Thomas Cunningham Porter was born on February 16th, 1860, at Bristol: educated at the Grammar School, he gained a scholarship in Natural Science at Exeter College, Oxford, in 1878. He took honours in mathematical moderations and finals, and also in chemistry. He left Oxford in 1884, being appointed on the staff of Carlisle Grammar School. Very shortly after this, at the beginning of the summer " half," 1885, he was called to Eton to teach science and mathematics. From this date onwards for 48 years he taught at Eton. When Mr. H. G. Madan retired, Porter was given charge of the chemistry laboratory, and here he collected valuable apparatus to demonstrate his teaching, and installed electricity at his own expense several years before it was used elsewhere in the school. He had water laid on to the roof of the laboratory, so as to keep the building cool in summer. On the death of Dr. Hale in 1894, Porter became Senior Science Master.

For ten years Porter held the position of a house master in the school, but his main interest was in the laboratory, and after giving up his house in 1904 he devoted himself entirely to his teaching and scientific work. He was a Fellow of the Royal Astronomical Society, of the Physical Society, of the Chemical Society, and of the Royal Photographic Society. In 1904 he became a Doctor of Science of his old University.

In 1893 Porter married Helen Henriett Allenby, a sister of Field Marshal Lord Allenby. After the house was given up they settled down in Upton Park, Slough.

Dr. Porter officially retired from his position in 1930, but voluntarily " took school " and continued work to within three days of his death, which occurred on March 31st of this year.

Porter was an originator and co-founder of the Public Schools Science Masters' Association. He was an enthusiastic teacher. His was not the method of the text-book. He taught in his own way. It would hardly have been a success apart from his own personality. A carefully thought-out course, on the simplest possible basis, was developed to include the main principles of the subjects, and illustrated by experiments and side shows. The lessons were dictated, and the laws had to be learnt and repeated by the whole division, timed by a stop-watch. To those who took the trouble to produce good notes, an invitation to a G.B.L. (good boy lecture) was issued, when they had the opportunity of being entertained by T.C.P.: he was quite inimitable on these occasions. The lantern and the phonograph,—provided with enormous horns, and special sound boxes of his own invention,—were the main instruments which his wizardry employed; but his powers of

expression, his puckish humour, and his imagination conspired to hold his audience spellbound.

In the laboratory it was again not the text-book of practical chemistry that mattered—it was technique. There was one way of boring the cork, and that was the way it should be bored. Then there were things that were interesting, like the examination of a rare mineral from Norway, often too difficult for a boy to attempt; but much was learnt from such abortive exercises, and one felt it all might be very important and new. Porter was imbued with the spirit of investigation, and those who had a scientific bent found in him an ideal stimulus. This was all the more felt by those specialists who came under his more direct tuition, carried out mainly by means of interesting and ingeniously devised problems. Porter always kept himself abreast of the latest happenings in science, and thus was able not only to excite enthusiasm, but to impart to those who were sympathetic the outlook of the scientific man and the importance of this attitude of mind in human affairs.

Those who were allowed to watch his photographic technique, or to help him in some of his original experiments, or were admitted to the sanctum of his private room in the laboratory, amongst his journals, his books, and his own apparatus, not only gained from him a delight in science and a right outlook, but found they possessed a friend, whose affection lasted in their hearts. Who could not but admire, and find many interests in common with a man of so many parts, an adventurous traveller, a clever photographer, a capable painter, a competent organist, one who had knowledge of the stars, of the forces of nature, of the elements, and indeed of the classics? No wonder he could be a stimulus. It was perhaps Porter's versatility that kept him a bit aloof from some of his colleagues: he had not much patience for the common-a-day outlook, for petty affairs, for the business of life, for things that solicitors, politicians and old ladies bother about. Too eccentric for some, and some too absurdly " circular and bounded " for him, he went his own way, looking out upon the world at large with a round red face, and a smile full of self-confidence and almost mischievous humour. His companionship was full of delight.

This excess of talents and interests, the equipment for his success as a teacher, also explains to a great extent why his enquiring, philosophic, whimsical, and even artistic turn of mind did not lead him to become a specialist in some branch of natural philosophy.

His investigations are scattered over a wide field of subjects. Nevertheless they are marked by originality, and often led to important conclusions. There were investigations of the phenomenon of " flicker," of ebullition, of crystals and magnetism, of X-rays, of stereoscopy, and of fluorescence; adventures in meteorology and observational astronomy.

Porter's studies on the phenomenon of flicker, published in three papers in the *Proceedings of the Royal Society* (1898, 1902, 1912), were his most serious written contributions to science, and these papers contain a wealth of observations carried out with meticulous care and with great ingenuity. He determined the relative retinal stimulation by light of different colours, and the time during which that stimulation lasted undiminished, which is shorter for yellow light than for any other colour. The speed with which the black and white sectored disc must be driven in order that flicker may just vanish was found to vary with the logarithm of the illumination; this came to be known as Porter's law. The investigations led to further original work on the effect of unequal duration of stimulus.

Another investigation of importance was one carried out in the early days of X-rays: Porter first noticed the non-homogeneity of X-rays (*Nature*, June, 1896). By heating the focus tube, less penetrating rays were obtained. By the use of a Wimshurst machine and spark gaps, the penetrating power could be controlled. It had been suggested that the difference in penetrating power was due to difference of electric charge on particles, but by raising plates of aluminium to a high potential, Porter showed that no difference in penetration resulted, and that it was probable that his X_1, X_2, and X_3 rays were not essentially different, but were more likely related " as red is to violet."

Porter's investigations bore a physical more than a chemical aspect: papers on Newton's rings, and on the use of flames for enhancing the intensity of sound, are amongst those to be found in the *Philosophical Magazine*. Nevertheless, chemical matters were often occupying his interest in the laboratory, and he read two papers before the Chemical Society, one on the vaporisation of sulphur, and the other on blue fluorescent substances produced

by the action of alkaline sulphites on *p*-benzoquinone and quinhydrone. Another paper, published in the *Proceedings of the Royal Society*, described " Experiments in Magnetism." This contains an account of the electro-deposition of iron on platinum in a strong magnetic field, whereby the film of deposited metal becomes permanently magnetised.

But perhaps Porter's powers are appreciated most readily from his two papers on the results of eclipse expeditions. The communication entitled " A Private Expedition to Philippeville, Algeria, 30th August, 1905 " (*Proc. Roy. Soc.*, 1907, **79**, 296) shows his remarkable competence in this other field. And here again it is his observational acuteness that one admires.

Porter had a real love of nature; gifted from his earliest years with remarkable talent for painting, he used those powers to record natural scenery with great fidelity. He painted as a scientist recording an observed fact, the personality of the observer being eliminated. The excellence of his technique, both in oils and in water-colour, and its significance in relation to a specific purpose provide quite a definite artistic merit to his paintings.

Porter travelled widely so far as the length of the Eton holidays allowed; the Peak of Teneriffe was a favourite resort. This provided material for studies on dust in the air, and its significance in relation to sunset and sunrise effects. But Corsica, in days when it was less tamed, the Cape Verde Islands, the Azores, and Norway were also favourite haunts. He went further afield too, to Brazil, and to the United States. His interesting " Impressions of America " were published in 1899 in book form, illustrated with stereoscopic photographs. A tough constitution and much self-confidence carried him through many exciting adventures on mountain and road—for he was terrific with a bicycle. These journeys provided material for his masterpieces as a photographer, and both boys and masters reaped the advantage. These exquisite photographs were cast on the screen at those G.B.L. and G.M.L.'s (good boy or good master lectures), to which reference has already been made.

T. C. Porter was a remarkable man, but he was more than that, he was an influence that resides deep within those he taught; in other words he excited not only admiration, but affection.

A. C. G. E.

JOHN WATTS.

1843—1933.

THE death on February 9th, 1933, of John Watts, for sixty years associated with Oxford Chemistry, removes one of the last links with the chemists of the mid-Victorian epoch. He came of an old Rochester family, extending back to the days of Queen Elizabeth, and appears to have been practically the last survivor. Originally a London University man—matriculating in 1865, Senior Bell Scholar, Pharmaceutical Society 1866, B.Sc. 1867, and D.Sc. 1870—he was personally acquainted with Faraday, who died in 1867, and acted for three years as Professor Odling's assistant at the Royal Institution. When the latter became Waynflete Professor of Chemistry at Oxford in 1872, Watts, after a short space under Crum Brown at Edinburgh, rejoined him as his assistant and remained continuously in Oxford till his death. He joined Balliol College, and graduated in 1876 with First Class Honours in Chemistry, but Merton College became his permanent home.

Sir Herbert Warren, the late President of Magdalen and his friend and contemporary at Balliol, described him as, in his youth, unusually vivacious and brilliant. But an early disappointment seems to have much changed him and he mellowed into the very successful tutor of chemistry, affectionately referred to by his pupils as " Johnny," always courteous and helpful, but with few very intimate friends. He died at the age of 89, after a very gradual decline, in the rooms he had occupied at Merton for over fifty years, where he had taught an unusually large number of chemists, destined in one capacity or another to achieve prominence. J. E. Marsh, who, although not one of his pupils, was intimately associated with him as a colleague in the Chemistry Department under Odling's regime for nearly forty years, mentions especially the following, though no doubt there are also many others of distinction :

1882. B. P. Lascelles, Science Master at Harrow, and known when an undergraduate as the Magdalen Giant.
1883. C. J. Baker, Science Master at Shrewsbury, brother of H. B. Baker.
1884. G. W. S. Howson, Headmaster of Holt School, Norfolk.
1888. Sir H. A. Colefax, K.C., Barrister-at-law.
1889. H. H. Cousins, Government Chemist, Jamaica.
1892. J. Addyman Gardner, Reader in Physiological Chemistry, London University.
1894. G. W. Hedley, Science Master at Cheltenham.
1896. Sir Harold H. C. Carpenter, Prof. of Metallurgy, Imperial College, London.
1898. F. Soddy, Dr. Lee's Professor of Chemistry, Oxford.
1902. T. S. Moore, Secretary of the Chemical Society.
1903. B. Lambert, Aldrichian Praelector of Chemistry, Oxford.
1905. C. S. Gibson, Vice-President of the Chemical Society.

Watts lived through a period of great changes and none more so than in Chemistry, for the University Department was at first practically a single room, the octagonal Glastonbury Kitchen, of which there is a replica at Glasgow, then in its original cathedral-like proportions. He continued teaching quantitative analysis there after the main department was built and, again, after the floor was raised to allow access below to the new Science Library. Even so, however, the windows in the roof and the roof lantern were inaccessible except to a steeple-jack : they were not cleaned for 30 years. He was ejected from his haunt again when the whole place recently had to be internally gutted and reconstructed. Though a new bench was reserved there for his use, and he visited the Department daily, he hardly took root again and plainly preferred it all as it once had been.

His experimental work was chiefly in analysis, his first paper, which appeared in the *Journal* for 1866 when he was still a student, being on the strength of phosphoric acid solution of various densities, and later he became recognised as an expert in the chemistry of tanning and in the estimation of tannic acid. He lectured usually on organic chemistry. However, it is chiefly in the field of tuition that he excelled, and his successes there have remained somewhat of a mystery to a later and possibly harder-working generation. There is no doubt that they flowed as much from his power of selecting likely winners in the scholarship examinations as from any unusual faculty in teaching. At the same time he understood what so many teachers never seem to understand, that the able cannot be taught without being levelled down. They must teach themselves, or at most they can only be taught how to learn. Watts would teach you if nothing better offered but much preferred you should try to teach him, and though with the great majority of teachers and taught the method might be disappointing in results, the hermit in him, dealing with enthusiasts he had selected through the scholarship system, kept the relationship within the confines of the subject. In 1898, the year the writer took the Honours School of Chemistry, all of the First Classes were his pupils. His memorial stone in Holywell Cemetery, might well, though it does not, bear as inscription

" He had to perfection the high secret of the profession, that teaching is the last resort as between fools."

F. S.