Obituary Notice

ALEXANDER THOMAS CAMERON, 1882–1947

Alexander Thomas Cameron, Professor of Biochemistry in the University of Manitoba, and an original member of the Biochemical Society, died at his residence in Winnipeg on 25 September 1947.

Born in London in 1882, of Scottish parentage, he received his early education in Swindon, proceeding thence to the University of Edinburgh from which he graduated M.A. in 1904 and B.Sc. in 1906. In the latter year he was awarded an 1851 Exhibition Scholarship, and, his interests lying in the field of physical chemistry, for the next two years he studied radiochemistry at University College, London, under Sir William Ramsay, followed by a year at the Technical High School, Karlsruhe, under Fritz Haber. In 1909 he was appointed Lecturer in Physiology in the University of Manitoba, an event which proved to be the turning point in his career.

With this appointment his attention was diverted to the ill-defined field of physiological chemistry in which he speedily found problems with which his training and experience in the methods of physical chemistry enabled him to cope successfully. There, too, under the dynamic influence of Swale Vincent, he was introduced to the study of what were then known as the 'ductless glands', and commencing with an investigation of the distribution of iodine in plant and animal tissues, he laid the foundations of his reputation as an endocrinologist.

Except for a summer semester spent in research under Albrecht Kossel at the University of Heidelberg, and three years during the first World War when, as Captain, R.A.M.C., he acted as chemist officer for water purification with the British Expeditionary Force in France, his subsequent career was intimately linked with the University of Manitoba. The growing importance of physiological chemistry inevitably led to a separation from the parent department of physiology, and this was recognized by the institution in 1923 of a separate Chair of Biochemistry in the Faculty of Medicine, and the appointment of Cameron as Professor.

An indefatigable and painstaking worker, Cameron was author or joint author of over 100 published papers. His first paper, published while still a student at Edinburgh, appeared in the *Proceedings of the Royal Society of Edinburgh* in 1905. It dealt with the crystallization of potassium hydrogen succinate, and was followed by a series dealing with physicochemical concepts, including the effect of heat and cold on cold-blooded animals. His publications dealing with the biochemistry of iodine (for which he was awarded the degree of D.Sc. by the University of Edinburgh in 1925) were the forerunners of a long series on the effect of thyroid and thyroxine feeding on the growth rate and organ hypertrophy of the white rat. Another series of papers dealt with the biochemistry of calcium, hypoparathyroidism, and tetany, while other publications included the results of studies on creatine and creatinuria, pernicious anaemia, the production of tar carcinoma in mice, etc. The last of the long list was a monograph, the final proofs of which were submitted for his approval just prior to his death. It was entitled *The Taste Sense and the Relative Sweetness of Sugars and other Sweet Substances*, and embodied the results of some three years of experimental work in that little-known field.

He was, however, best known for his text books. Never a very fluent lecturer, he recognized his limitations in that respect, and carefully prepared his lectures in biochemistry by writing them out in full. Since at that time there was no concise and authoritative text on Biochemistry, on the urging of his students and friends he submitted the manuscripts to a well known firm of publishers. Thus was born Cameron's *Textbook of Biochemistry*, the success of which is borne out by the fact that since its initial appearance in 1928 it has gone through six editions, as well as a Chinese and two Spanish editions. It was followed two years later by *Practical Biochemistry* (Cameron & White), now in its fifth edition. In 1933 two more books appeared, the result of his outstanding ability to present in clear and concise form a comprehensive and critical appreciation of a subject. These were *Biochemistry of Medicine* (Cameron & Gilmour) and *Recent Advances in Endocrinology*, of which the latter is now in its sixth edition and has been translated into Italian and Roumanian.

Fully occupied though he was with his teaching, writing, and research work, Cameron still had time for the public duties which fell to him as Chairman of the Fisheries Research Board of Canada, a position he held with conspicuous success for thirteen years. In this capacity he was chosen as one of the Canadian delegates to the Empire Scientific Congress held in London and Oxford in the summer of

1946. While attending these meetings he received official notification that his services had been recognized by the award of the C.M.G.

Cameron was a Fellow of the Royal Society of Canada, a Fellow of the Royal Institute of Chemistry, a Past President of the Canadian Institute of Chemistry (now the Chemical Institute of Canada), and a member of various chemical, biochemical, and medical societies. One of his life-long interests was the Scientific Club of Winnipeg, of which he was one of the early members, for twelve years its Secretary, and to whose Scientific Proceedings he made 46 contributions.

Although of a very reserved nature, Cameron made friends in all parts of the Dominion, and they, together with many others to whom he was only known by name, mourn the passing of a scientist and scholar.

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A Note on the Estimation of Vitamin B_1 in Urine

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The accurate measurement of the vitamin B_1 content of urine by the thiochrome method is made difficult by the interference of non-specific fluorescent substances. Adsorption on the zeolite Decalso (The Permutit Co. Ltd.) as described by Hennessy & Cerecedo (1939) removes some of these, but not nicotinamide methochloride which occurs in the urine of man and some other animals including the rat. Treatment with alkali, ferricyanide and *iso*-butanol in the thiochrome procedure converts nicotinamide methochloride to a violet-fluorescing compound (F_2) (Coulson, 1944), which is indistinguishable fluorimetrically from thiochrome. When ferricyanide is omitted, another substance (F_2) with a bluish-white fluorescence is formed from nicotinamide methochloride (Najjar & Holt, 1941). This makes the so-called 'NaOH blank' unsatisfactory. Several ways of overcoming this difficulty have been proposed (Mason & Williams, 1942; Najjar & Ketron, 1944; Coulson, 1944; Mickelsen, Condiff & Keys, 1945), but for reasons which will be given subsequently we believe that none of them is entirely satisfactory.

During work on the effect of sulphonamides on the excretion of vitamin B_1 by rats, we developed a procedure for avoiding interference by nicotinamide methochloride which, in our opinion, is an improvement on those at present in use. It depends on the fact that the blue fluorescence of thiochrome disappears on addition of acid to the *iso*butanol extract, whereas the fluorescence of F_3 is unaffected. By measuring the fluorescence before and after the addition of acid, a measure of the fluorescence due to thiochrome is obtained.

METHOD

A sample of urine (2–20 ml.), containing if possible 2–3 μg. vitamin B_1, is adjusted to pH 4·5 with glacial acetic acid, and diluted to 50 ml. with glass-distilled water. One 25 ml. portion is poured on to a Decalso column 5 cm. long and 0·6 cm. in diameter; 1·3 μg. vitamin B_1 is added to the other 25 ml. portion which is poured on to another column. The shape and size of the adsorption tube and the activation of the zeolite are as described by Hennessy (1941). The columns are washed three times with 10 ml. water, and the vitamin B_1 is then eluted with successive portions of 3, 3 and 5 ml. 25% (w/v) KCl in 0·1 N-HCl. The volume of the eluate is adjusted to 11·0 ml.

For oxidation to thiochrome, 40% NaOH (1 ml.), freshly prepared 1% $K_3Fe(CN)_6$ (0·1 ml.) and redistilled *iso*butanol (15 ml.) are added to a 5 ml. portion of the eluate in a glass-stoppered 2 oz. bottle. The contents of the bottle are well mixed after each addition and allowed to stand for 1 hr. If measurement of the fluorescence of F_2 is desired, a second bottle may be prepared in the same way except that ferricyanide is omitted, but this is not part of our routine procedure. Otherwise, the second 5 ml. portion of the eluate may be used for a duplicate determination of vitamin B_1.

Measurement of the fluorescence in a Cohen-type instrument (Henry, Houston, Kon & Osborne, 1939) is made with a 10 ml. portion of the *iso*butanol layer. While this is still in the test tube of the fluorimeter, seven drops of a mixture of three parts methanol and four parts N-HCl are added, the contents mixed, and the fluorescence measured again. The difference between the two readings is a measure of the fluorescence of thiochrome. This procedure makes the 'NaOH blank' unnecessary for the measurement of vitamin B_1, but useful as an indication of the amount of nicotinamide methochloride present.