



SIR JACK CECIL DRUMMOND,
D.Sc., F.R.I.C., F.R.S.
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Obituary

SIR JACK CECIL DRUMMOND, D.Sc., F.R.I.C., F.R.S.

(1891–1952)

Jack Cecil Drummond was born in Leicester on 12 January 1891. He was educated at King's College School and entered East London College (now Queen Mary College) in 1909 from which, 3 years later, he graduated with a First Class Honours degree in Chemistry of the University of London. In 1913 he was appointed to a research assistantship under Otto Rosenheim in the Department of Physiology at King's College, London. A year later he moved to a similar post under Casimir Funk, Director of Biochemical Research at the Royal Cancer Hospital Research Institute, a position to which Drummond himself was promoted on Funk's resignation in 1918. In 1919 he succeeded R. H. A. Plimmer as Reader in Physiological Chemistry at University College, London, and 3 years later was appointed to the newly created University Chair of Biochemistry.

Even during his early postgraduate career Drummond's interests and work were to be largely influenced by major world events. He was still a student when, in 1912, Hopkins published his well-known paper on accessory food factors, and when, in the same year, Funk suggested the existence of two such factors which conferred protection against beriberi and scurvy respectively, and postulated on less sure grounds the existence of two further factors associated with pellagra and rickets. Two years later saw the outbreak of the First World War, in which this country was for the first time forced to take active cognizance of the dietary needs of its population. Thus from his earliest formative period the environment in which Drummond worked provided close personal contacts on the one hand with the new and striking discoveries which were being made in the field of nutrition and on the other with the urgent need for securing their immediate practical application.

To his lasting regret Drummond's health did not permit him to serve in the armed forces in the First World War. Nevertheless, he quickly turned his energies to problems of national importance. He had already gained valuable experience in experimental feeding techniques at the Cancer Hospital and was able, as a result, to accept an invitation from W. D. Halliburton, who was a member of the Food (War) Committee of the Royal Society, to collaborate in studies of the nutritive value of margarines and butter substitutes. From this collaboration there resulted his first interest in the 'fat-soluble A' accessory food factor, while his joint work with Funk brought home to him the importance of the water-soluble B factors. His own early bent towards the practical application of such knowledge is well illustrated in a paper on infant feeding which he published in 1918, though his inferences had inevitably to be drawn from rat-feeding experiments. He pointed out in this paper that the demand for the accessory food factors was particularly marked during the growing period, that the protein, energy and the 'fat-soluble A' factor of the mother's tissues were sacrificed

if her diet was deficient, and that the young deprived of this factor not only failed to grow satisfactorily but were very susceptible to infection, particularly of the eyes. In addition to reviewing the need for the so-called water-soluble B and C factors, he discussed the feeding values of dried and condensed milks and referred to the danger of skimmed condensed milk as a food for infants, attributing this not to its shortage of fat (the theory then in vogue) but to its lack of 'fat-soluble A'. For this reason he suggested that butter or cod-liver oil, and not merely fat, was necessary to meet the deficiency that had been observed. He concluded his paper with the words 'it now remains for the practical worker in infant nutrition to apply the results of these experimental studies as soon as he is convinced of their accuracy'.

This ability to appreciate on the one hand the importance of fundamental nutritional studies and on the other the need for securing their practical application in the light of human needs was to be one of the outstanding characteristics of Drummond's subsequent work. It would be inappropriate in this journal to attempt to assess his own achievements in the field of biochemistry; these have been admirably reviewed elsewhere (Marrian, 1953). It will suffice to note that over the next 20 years, during which his department at University College became one of the most important centres of biochemical teaching and research in the country, he published more than 150 original papers covering a wide field of interests. Indeed, it was perhaps inevitable, with his active and inquiring mind and with his facility for appreciating the practical implications of the work on which he and his colleagues were engaged, that his personal contributions to biochemistry were such that they are likely to be remembered rather for the variety of their scope and the stimulus they gave to the work of others than for any signal achievement in a single specialized field. Moreover, he not only possessed a remarkable ability to inspire those working within his own department (witness the number and calibre of his research students), but his wide interests, combined with his personal charm, enabled him to collaborate productively with many leading workers in allied fields, as well as in industry. Thus, whereas his publications included, for example, a valuable series of fundamental studies on the nature and functions of the 'fat-soluble A' factors (which in the course of his work had been differentiated into vitamins A and D) and of the subsequently identified vitamin E, he was also closely concerned with investigations into such practical subjects as the significance of vitamin D in relation to rickets in pigs, the effect of the diet of the cow on the nutritive value of butterfat, and the importance of fish-liver oils as sources of the fat-soluble vitamins. In his later years at University College he extended these interests in applied nutrition to wider problems, such as those involved in the composition of bread (particularly in relation to human requirements for vitamin B) and the effects of heat treatment on the nutritive value of milk. By the mid-1930's he had summarized many of his collected views in a monograph appropriately entitled *Biochemical Studies of Nutritional Problems*, a work which is particularly notable for its integration of the biochemical findings of his own and other laboratories with a great variety of medical, social and historical observations.

Throughout this period the need for the wider application of the more modern concepts of nutrition was, indeed, becoming increasingly clear. McCarrison's work in

India had demonstrated the importance for good health of a well-balanced diet. Orr had made similar investigations into the relationship between diet and health among East African native tribes and was engaged in collecting results indicating that even in Britain certain sections of the population were not enjoying a diet necessary for optimum health. Moreover, in 1931 a committee had been appointed 'to advise the Minister of Health on the practical application of modern advances in the knowledge of nutrition', and 2 years later the British Medical Association had also constituted a committee 'to determine the minimum weekly expenditure on foodstuffs which must be incurred by families of varying size if health and working capacity are to be maintained, and to construct specimen diets'. No doubt all these developments influenced Drummond's thinking and, together with his wide knowledge of nutrition and his general interest in gastronomy and in the pleasures of good food and good wine, led him to embark on his study of the dietary habits of the English over the past 500 years. The results of this study appeared in 1939 in the production, with Anne Wilbraham, of *The Englishman's Food*. The publication of this unique survey, just before the outbreak of war, might be said to be the culmination of Drummond's preparation for the supremely important task that lay ahead of him.

Thus the wheel had turned full circle, and Drummond faced the outbreak of war in 1939—as he had faced the outbreak of the First World War—not only with an intimate knowledge of the most recent advances in nutritional science but with a lively sense both of the need for, and of the practical possibilities of, their application on a national scale—a field in which, however, on this occasion he was himself, with his greater maturity and wider experience and influence, to play a unique part.

The records relating to Drummond's appointment as Scientific Adviser to the Ministry of Food make it clear that he was concerned, as soon as war was imminent, to place his knowledge at the disposal of those who were to be responsible for feeding the nation. On 16 October 1939 he was seconded from the University as Chief Adviser on Food Contamination. Almost immediately he prepared a memorandum stressing the need for the co-ordination of all scientific investigations into food problems. On 31 January 1940 he submitted a further memorandum 'on certain nutritional aspects of the food position'. In this notable document he reviewed the prewar nutritional position of the United Kingdom and the probable effects on it of wartime conditions, particularly in relation to the poorer sections of the population. He stressed the need for providing bread of high nutritive value, for increasing the consumption of potatoes, oatmeal, cheese and green vegetables, for supplying not less than a pint of milk a day to expectant and nursing mothers and to all children up to the age of 15, and for fortifying margarine with vitamins A and D. While drawing attention to the importance of pigmeat as a source of vitamin B₁, he made it clear that in his view manual workers had no particular need for large quantities of meat and that, provided supplies of cheese and fish were adequate, restriction of meat consumption would be relatively unimportant.

On 1 February 1940 Drummond was officially appointed Scientific Adviser to the Ministry. He brought to this position unique experience, his laboratory discipline, his detailed knowledge of modern nutritional developments, his flair for applying such

knowledge, a strong sense of history (typified in *The Englishman's Food*), and a delightful personality in which were blended common sense, humour and courage. He also brought an outstanding capacity for getting his ideas across to his non-scientific colleagues, and an ability to inspire confidence, loyalty and enthusiasm in those who worked with and for him.

Shortly after his appointment he made strong recommendations against measures to reduce the country's total consumption of food, drawing at this time, not on his own practical experiments, but on the experience in the First World War when (as he wrote) 'most unwisely and against expert advice, a campaign urging voluntary restriction in the consumption of foods, particularly bread, was launched by the Government' and when 'those who loyally responded suffered loss of weight and reduction of efficiency'. The first official indication of Drummond's influence on food policy appeared in May 1940 in the Ministry's import programme for the 2nd year of war, to which was appended *A Survey of Wartime Nutrition*, setting out in detailed and quantitative form what were in effect Drummond's own views on the type of nutritional strategy that the Ministry of Food would need to adopt. The scientific principles underlying this survey were not new—but neither were they universally familiar. It was, moreover, something of a novelty to apply modern concepts of nutrition to the job of planning the food supplies of a nation at war, and Drummond's unique contribution at this stage was his success in collaborating with statisticians and economists in producing a document that could form the practical basis of the national wartime food policy. The survey furnished estimates of the nutritional requirements of the population and showed that national food supplies before the war had been adequate in energy-rich foods but short in protective foods, particularly in those supplying calcium, vitamin A and vitamin B₁. The dietary changes that occurred during the First World War were then reviewed; these showed a deterioration in the supply of minerals and of vitamins, particularly among the more vulnerable sections of the population. Means were indicated by which this danger could be averted. Home production during 1940–1 was expected to provide about one-third of the nation's energy requirements, two-thirds of the calcium, one-third of the vitamin A, two-fifths of the vitamin B₁ and, as a result of the increased potato production, all the necessary vitamin C. The import programme was then considered and the resulting total food supplies assessed. As a result recommendations were made for increasing the supply of vitamin B₁, either by raising the extraction rate of flour or by fortifying white flour with synthetic vitamin B₁; for expanding the home production of milk and vegetables, including potatoes; for increasing the overseas supplies of cheese, dried and condensed milks, canned fatty fish and pulses; and for importing vitamin A and D concentrates to add to margarine. On the other hand, it was recommended that imports of fruit (other than oranges), nuts and eggs in shell should be reduced as being wasteful of shipping. The impossibility of reducing energy-rich foods without impairing health was again emphasized.

The practical importance of much of the earlier work of Drummond and his collaborators was implicit in this document. In it, too, much of his future work and that of his Division in the Ministry was foreshadowed, work on nutritional require-

ments, on food composition, on the use of unfamiliar foods such as dried eggs and dried skim milk, and on methods for the conservation of vitamin C during the cooking of green vegetables. The necessity for teaching simple nutrition to all manner of people was stressed, as well as the need to devise checks (such as the National Food Survey and the Body Weight Survey) on the adequacy of the national diet.

Thereafter similar reports were written by Drummond at roughly yearly intervals until 1946, when he resigned from his appointment as Scientific Adviser. These reports provide illuminating records of the current nutritional interpretations of food-supply data, of prevalent trends in nutritional thought and of contemporary observations on the health of the population. It is obvious from them that Drummond aimed, not just to maintain the nutritional value of the diet, but to improve it. Moreover, they and other documents make it abundantly clear that he never lost an opportunity to press his nutritional arguments and that his own work, and that of his Division, was founded on clearly expressed objectives.

In a country at war and dependent on imports for about two-thirds of the energy value of its food supply, food technology became one of the essential tools of applied nutrition. Drummond therefore devoted much thought and energy to technological problems. All his early Ministry memoranda contain references to the need for good-quality bread of high vitamin B₁ content. As early as April 1940 he expressed the view that the right way to tackle the problem was to provide the public with bread baked from 82–85% extraction flour. The subsequent history of the nation's flour policy is well known and is documented in a series of reports by Drummond and Moran and their colleagues on 85, 82½ and 80% extraction flour. The issue of these reports culminated in 1945 in the Conference on the Post War Loaf at which both Drummond and Moran were among the Ministry of Food's representatives. It is interesting to note that the views then put forward by the official scientific and medical members of the Conference were subsequently given continuing effect under the 1953 Flour and Bread Orders.

The development of dehydrated foods as a means of conserving shipping space was another of Drummond's major interests. In a memorandum written in March 1941 on nutritionally desirable foods that might be imported from the United States, he noted that considerable quantities of spray-dried egg were available in California and possibly also in Wisconsin, and asked whether this commodity could be shipped to this country; it was in fact imported under the Lend Lease Act the following year. In the same memorandum he suggested that, if sufficiently large quantities of dried skim milk could be secured, it might be sold in small domestic packs. Within 9 months small packs of National Household Milk were on the market, and dried skim milk was also allocated for school and hospital meals.

Perhaps Drummond's name is most closely associated with the provision of special foods for mothers and children. From the outset he pressed the claims of the nutritionally vulnerable groups. The success of his efforts in this direction is seen in the schemes that were gradually evolved for the cheap supply and priority rationing of liquid milk, in the early experiments with black-currant syrup and rose-hip syrup as sources of vitamins for expectant mothers and young children, in the subsequent

provision of concentrated orange juice and cod-liver oil to these two groups, and in the generous allocation of rationed foods for school meals and the provision of national-milk cocoa for adolescents. It is again interesting to note that in 1946 the schemes for providing cheap milk and vitamin supplements to mothers and children were established as a recognized Welfare Food Service in association with the Family Allowances benefits. Drummond's influence was also evident both in the wartime establishment of a Food Advice Service by the Ministry and in the notable expansion and improvement in large-scale catering that took place both during and after the war, particularly in factories, schools and hospitals. He was Chairman of the Hospital Catering and Diet Committee of the King Edward's Hospital Fund for London from 1943 to 1949 and first President of the Hospital Caterers' Association.

But Drummond's work and influence were by no means confined to this country. On the invitation of the Secretary of State for the Colonies, he flew to Malta in 1942 to inquire into the island's system of food rationing, distribution and control, and to suggest how the import programme might be revised so as to improve the local diet. He always worked in close contact with the Services, particularly over problems associated with the rations of the armed forces, both at home and overseas. He was also closely concerned with plans for relieving malnutrition and starvation in liberated Europe and played a personal part in putting these plans into effect, particularly in the Netherlands and western Germany. He was one of the British delegates to the Hot Springs Conference which resulted in the formation of the Food and Agriculture Organization of the United Nations. Probably the last contribution he made to war-time nutritional planning was a paper presented to a joint American, British and Canadian Conference on the food aspects of civil defence as recently as December 1951.

Drummond became Director of Research to Boots Pure Drug Company at Nottingham in 1946 and was soon afterwards elected to its Board. His primary task was to reorganize and enlarge the Company's research facilities. This he did with characteristic energy and enthusiasm, while continuing to place his wide experience of national nutrition at the disposal of his successor at the Ministry of Food.

He was knighted and elected Fellow of the Royal Society in 1944. After the liberation of Europe the Netherlands Government showed their appreciation of his services to Holland by appointing him a Commander of the Order of Orange Nassau, and the United States awarded him the Medal of Freedom, with Silver Palms. He was granted the honorary degree of Docteur by the Sorbonne in 1948.

As a scientist his influence on events was remarkably wide. It touched on almost all subjects to which the principles of nutrition can be applied. As a man his influence on those whom he met was no less marked. Let it suffice to say that he left a wealth of friends, and that the many whom he helped by his knowledge and experience will not forget the gaiety and determination of his spirit and the courage of his actions.

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REFERENCE

Marrian, G. F. (1953). *J. chem. Soc.* p. 357.