

Obituary notice

MAJOR-GENERAL ROBERT McCARRISON, Kt,
C.I.E., M.A., M.D., D.Sc., LL.D., F.R.C.P.

(15 March 1878–18 May 1960)

Robert McCarrison, who died in May 1960 in Oxford at the age of 82, is the seventh member of The Nutrition Society to be commemorated by an obituary memoir in this *Journal* for outstanding contributions to the modern science of nutrition. A pioneer worker of great originality, he was one of the founders of that science and a leader in applying it. The fact that his work was done not in Western laboratories but in isolated places in British India lends interest and significance to his life history and achievements.

He was born in Portadown in County Armagh in 1878, the second son of Robert McCarrison, and one of a family of five. At some stage the family moved to Lisburn, County Antrim. His father was an expert in the growing of flax and associated with the Belfast linen industry. The McCarrisons, originally from Donegal, belonged to the vigorous group which the Americans call the 'Scotch-Irish'—neither the Irish nor the Scotch themselves use that expression—descended from Scottish settlers established on plantations in Ulster in Elizabethan and later times. They were 'Church of Ireland' and it is likely that the family was brought up in an atmosphere of strict evangelical piety. Portadown is proverbial in Ireland for its militant protestantism. Robert McCarrison the second remained a regular church-goer all his life and in his later years was churchwarden of his parish church in Oxford, St Andrews, where, as Professor Gardner has affectionately recorded in an obituary note in the *British Medical Journal*, he 'read the lessons beautifully'.

McCarrison was educated at Queen's College, Belfast, and qualified in medicine in Dublin in 1900. Because the family means were restricted, he went to the old Royal University of Ireland rather than to the more expensive Trinity College. As a student he worked in the Richmond Hospital, a well-known and ancient Dublin teaching hospital which he revisited for the first time when attending the Conference of the British Medical Association in Dublin in 1933. A few months after qualification he passed the stiff competitive examination for the Indian Medical Service which in those days offered a highly attractive career. His father gave him a small sum of money in final discharge of parental responsibility. He does not appear to have been anything out of the ordinary as a medical student and during the short period between graduation and entry into the I.M.S., though he did well in his final examinations. At this stage in his life he was no more than one of the army of young Irishmen who qualify in medicine and seek their fortunes abroad.

Sailing for India on my twenty-third birthday, fresh from the medical schools and but a child in knowledge, it chanced that the earlier years of my service were spent in the remote regions of Chitral and Gilgit where nature makes large-scale experiments upon man. . . . About



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(Photograph by Walter Bird, London)

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the size of Wales, Chitral lies wedged between Kafiristan and Badakshan on the one side and Yasin, Punyal and Gilgit on the other. . . . Here the inhabitants, formerly as turbulent as the torrents that traverse their territory, were reduced to order by the campaign of 1895; and, in the days of which I speak, a relatively small garrison of Indian troops served as warden of these frontier marches. . . . Here, robed in perpetual snow, are Dubanni, Rakapushi, Haramosh and Nanga Parbat, raising their majestic heads to heights of 21,000 to 26,500 feet above sea-level. Here is the place of glaciers and glacier-born torrents, here is Bam-i-Dunya—'the roof of the world'.

So McCarrison wrote 30 years later, no doubt recapturing something of the exhilaration of his first postings in India. He served first as regimental medical officer in Chitral and later as Agency Surgeon in Gilgit. Worthy of note is his position as the sole doctor responsible for the medical and surgical care of the troops and the local inhabitants, at an age below that of medical qualification today. In *Adventures in Research* (McCarrison, 1937), he gave an account of his first investigation, on the disease which he called the 'three-day fever of Chitral', transmitted, as he correctly surmised, by the sandfly. 'My student's microscope', he wrote, 'was sent to me from India as well as some slides, coverslips and stains. Materials for the making of a few simple culture media arrived; an incubator and sterilizer were improvised from kerosine oil tins. Thus equipped I faced the future.' It is remarkable that a man in his twenties, without training in research, should have undertaken an investigation of this nature and described his observations so lucidly. McCarrison himself, in all his writings, never tells what first attracted him to research, which was not part of the duties of a regimental medical officer or Agency Surgeon. If the author's experience as a medical student in Dublin some 20 years later is any guide, he could have heard little about research during his student career. Nor is there any indication of his being inspired and encouraged by an older colleague in the Service.

McCarrison began to interest himself in goitre and cretinism soon after his arrival in India. In certain areas in the Himalayas, as in the Andes, goitre was and no doubt still is enormously prevalent. In some villages every single inhabitant may be afflicted; one such village was called 'The Abode of Fools' because of the cretinous mentality of the population. McCarrison notes that when he began his studies on goitre little or nothing was known about causation, or at least that he himself knew nothing, because the few text-books available to him contained no information. In his numerous investigations on goitre, which he continued until 1935, he combined field studies and animal experiments and was able to give concentrated attention to the subject when in 1913 he was assigned to special duty for the investigation of goitre and cretinism in India. He accepted the importance of iodine deficiency in causation but insisted that the problem is a complex one. 'The causes of goitre', he wrote, 'are multiple and their effects manifold.' In particular he emphasized the importance of goitrogenic agents such as that present in cabbage and was convinced, on the basis of experiments in Kashrote in Gilgit and later in Kasauli, that there is a link between goitre and impure water supplies. He records that his own thyroid gland began to swell when he was taking part in a human experiment in which 'suspended matter' from the water supply of a highly goitrous village was given to a group of volunteers.

It was his work on goitre which first won McCarrison world-wide recognition, and during the years immediately preceding and following the First World War led to a

series of honours and distinctions, including the Prix Amussat of the Academy of Medicine of Paris (1914). In 1921 he made a lecture tour of the U.S.A., during which he gave the Mellon lecture in Pittsburgh, the Mary Scott Newbold lecture in Philadelphia, the Hanna lecture in Cleveland, the Mayo Foundation lecture in Rochester and the De Lamar lecture in Baltimore. This must surely be a unique tour in America for a visiting medical lecturer. In general, his work received less attention in England than in countries, including the U.S.A., in which goitre was a serious and extensive public-health problem. It coincided with a period at which public-health authorities were beginning to develop preventive measures.

The goitre, cretinism, deaf mutism and idiocy which McCarrison saw in the Himalayas occupy an important position in his career. But more important was his acquaintance with the Hunza people. A passage in *Studies in Deficiency Disease* (McCarrison, 1921) in which he describes the Hunzas is worth quoting in full since it is the key to much of his later work.

My own experience provides an example of a race, unsurpassed in perfection of physique and in freedom from disease in general, whose sole food consists to this day of grains, vegetables and fruits, with a certain amount of milk and butter, and goat's meat only on feast days. I refer to the people of the State of Hunza, situated in the extreme northernmost point of India. So limited is the land available for cultivation that they can keep little livestock other than goats, which browse on the hills, while the food supply is so restricted that the people, as a rule, do not keep dogs. They have, in addition to grains—wheat, barley and maize—an abundant crop of apricots. These they dry in the sun and use very largely in their food. Amongst these people the span of life is extraordinarily long; and such service as I was able to render them during some seven years spent in their midst was confined chiefly to the treatment of accidental lesions, the removal of senile cataract, plastic operations for granular eyelids, or the treatment of maladies wholly unconnected with food supply. Appendicitis, so common in Europe, was unknown. When the severe nature of the winter in that part of the Himalayas is considered, and the fact that their housing accommodation and conservancy arrangements are of the most primitive, it becomes obvious that the enforced restriction to the unsophisticated foodstuffs of nature is compatible with long life, continued vigour, and perfect physique.

In 1918 McCarrison found himself in Coonoor in the Nilgiri Hills in South India, convalescing from an illness contracted during wartime service in the Near East. He liked Coonoor, which is indeed a very pleasant place, and remained there until he retired from India with the rank of Major-General in 1935, having during these years established as a going concern the Nutrition Research Laboratories of the Indian Research Fund Association (now the Indian Council of Medical Research). The story of the ups and downs of various research units in Coonoor, beginning in 1918 with the 'Beriberi Inquiry' consisting of McCarrison and a single assistant, which preceded the setting up of the Nutrition Research Laboratories in 1929, has been told in detail by the author in a chapter in *The Work of Sir Robert McCarrison* (Sinclair, 1953). Perhaps too much has been made of the obscurantism of the authorities who were reluctant to finance nutrition research in those early days and succeeded in axing the Beriberi Inquiry in 1922. Nutrition had not yet, to use McCarrison's own phrase, been 'put on the map in India'. He himself, within a short period of years, put it very firmly on the map. A turning point was the visit to Coonoor in 1926 of the Royal Commission on Agriculture in India, headed by the late Lord Linlithgow, subsequently to be Viceroy. It was during this visit that the famous incident of the

Parlakimedi grant occurred. The Rajah of Parlakimedi, a member of the Commission, was so impressed by McCarrison's exposition of his work that he handed him a lakh of rupees (£7000) 'across the table'. This was used for the creation of two Parlakimedi Research Fellowships, the first fellowships in India supported by private donation.

In Coonoor McCarrison embarked on a long series of investigations on the effects of faulty food on the animal organism. 'I say "faulty food"', he wrote in *Adventures in Research*, 'for my object throughout these investigations was not the effects of deficiency of this or that vitamin *per se*, since it appeared to me that deficiency of a single vitamin in a diet having no other fault was a rare occurrence. . . the faults are usually those of multiple deficiencies combined with carbohydrate excess. . . it was hoped thereby to learn what forms of ailments might reasonably be attributed to such faulty diets.' The results of this method of research, which involved feeding animals on 'natural' foods and diets, were inevitably less clear-cut and reproducible than those obtained in experiments with purified synthetic diets designed to study individual nutrients. This fact underlies some of the criticism levelled at McCarrison's work by investigators more familiar with the latter approach. But whatever the disadvantages of McCarrison's method, it was an original one and yielded some striking data. During the years 1918 to 1921, under the so-called Beriberi Inquiry, he undertook the enormous task of studying almost every organ in the body in animals on a variety of faulty diets. In this he had the help of his Sikh assistant, the redoubtable Mula Singh, who had won the Indian Order of Merit for gallantry in East Africa during the war. Mula Singh, in his own way almost as remarkable a character as McCarrison himself, was sent to Oxford to learn how to cut and stain sections. In Coonoor he looked after the animals and cut and stained thousands of sections for inspection by his chief.

There is little in the literature of nutrition which parallels the extensive pathological studies described in *Studies in Deficiency Disease*. The modern reader is likely to be reminded of current work on 'protein malnutrition', usually a 'multiple deficiency', which has demonstrated the existence of pathological lesions in many organs and tissues. Those engaged on research in this field might find a good deal of suggestive material in McCarrison's book. He was also among the first to draw attention to the effect of infection and parasitism in precipitating food-deficiency states, which again is in line with recent work on protein malnutrition. His demonstration of the widespread tissue damage caused by faulty diets was in itself a novel and fundamental contribution. Apart from these general findings, his discovery that the adrenal glands are enlarged in various deficiency states, subsequently confirmed by numerous workers, was of special importance.

Within the same area of interest were the comparisons drawn by McCarrison between the growth rates and vital statistics of rats fed on good diets and bad diets. One of the good diets was the so-called Sikh diet, resembling that of the Hunzas whom he never forgot; this diet, composed mainly of whole wheat, milk and vegetables, became the stock diet of the thriving Coonoor rat colony. The poor diets, including one called the 'poor Madrassi diet' or 'the poor rice-eater's diet' which was used in much subsequent work, produced opposite effects: a high infant mortality, poor growth, disease of various kinds and premature death.

McCarrison's researches on the relation between diet and specific diseases were on the whole less fruitful than his broader studies. He claimed to have produced in pigeons what he called true beriberi, analogous to wet beriberi in man, by giving diets deficient but not completely lacking in vitamin B₁. This work has not been followed up, possibly because adult beriberi has ceased to be a major public-health problem during the last 30 years. His conclusion that vitamin A deficiency is among the causes of urinary calculus is out of line with epidemiological facts, but here it should be added that subsequent attempts to determine the aetiology of the urinary calculus common in boys in certain areas in South and East Asia have been equally unsuccessful. His attention was drawn to the high incidence of gastric and duodenal ulcer in Travancore by Dr T. H. Somervell, a missionary surgeon and an early Mount Everest climber. Unquestionably McCarrison was right in ascribing this to some error in the local diet, but his claim to have reproduced the condition in rats by feeding them on Travancore diets was unconvincing. His experiments which purported to show that rice grown on naturally manured soil was of higher nutritive value than rice grown on unmanured soil and soil treated with chemical fertilizers, often quoted by 'return to Mother Earth' enthusiasts, were of doubtful statistical validity. But on the relation between agriculture and nutrition in general, McCarrison was a sound and creative thinker. 'Malnutrition', he wrote, 'is the chief among the problems facing those engaged in agricultural research. The ultimate aim of agricultural research is the adequate nutrition of the people. So far, then, from agricultural and nutritional research being carried out in isolated compartments, there should be the closest co-operation between them, to the mutual advantage of each' (McCarrison, 1927). To the author, who assisted at the birth of FAO, founded to 'marry health and agriculture', these words have a special significance.

McCarrison's main contributions to nutrition may perhaps be summarized as follows. First, he demonstrated that what he called faulty diets damage the body and impair health in numerous ways. His faulty diets were composed of natural foods and usually resembled diets consumed by human groups; they were not artificial laboratory mixtures of purified ingredients. He was the first to use this method of approach extensively in nutrition research. Secondly, through his forceful writings and personality, he created public awareness, not only in India, of the dependence of good health on good food. Possibly he did more to create that awareness than any other scientist of his generation. Thirdly, he established, against apathy and opposition in the early stages, an institution which remains one of the leading centres for nutrition research in the world.

McCarrison had the attractive quality which may perhaps be called *panache*, if this means going through life with something of a flourish and a continuing sense of adventure. His writings—even the short excerpts from these quoted in this memoir—illustrate his personality. He was an individualist who throughout his career followed his own bent, remote and rather aloof from both I.M.S. colleagues and scientific contemporaries. He was also a preacher with a sense of mission, aware of the social implications of his work, and genuinely eager to convert others. The missionaries who visited the Coonoor laboratories were sometimes told by McCarrison that he himself

was also a missionary, with a suitable text for his sermons, this being 'Hearken diligently unto me and eat ye that which is good' (*Isaiah*, Iv, 2). He himself was careful to eat that which is good; remembering the Hunzas he breakfasted on whole wheat chappatis. His handsome and dignified appearance reinforced his powers of persuasion and real oratorical gifts; as a lecturer he was impressive and successful and evoked enthusiastic responses from his audiences. His manner towards subordinates and the young was always kind and courteous. In his seventies he was chairman and director of postgraduate medical education in Oxford, and Professor Gardner has told of the 'guidance and mothering' which he gave to young men and women graduates in their efforts to get a good postgraduate training. He married in 1906 the daughter of a member of the Indian Civil Service, Helen Stella Johnson, who survives him. His happy marriage, a true partnership, was of great importance in his life.

In India itself McCarrison was and remains a well-known figure, esteemed by Indians in many walks of life. When the volume *The Work of Sir Robert McCarrison* was presented to him on his 75th birthday, he received a telegram from the Minister of Health in India, Rajkumari Amrit Kaur, expressing the gratitude of the people of India for his services to their country.

All McCarrison's academic and other distinctions have not been listed in this memoir. It should, however, be recorded that he was elected an Honorary Member of The Nutrition Society in 1953.

The Kiplingesque story of how McCarrison performed a miracle in Gilgit, now a little dim in detail through the passage of time, is worth re-telling in conclusion. The people of Gilgit, it is said, were losing faith in western medicine and surgery and becoming reluctant to submit to treatment. Possibly McCarrison's surgery, learnt during a few months' residence in the Richmond Hospital, was a little crude and his youthful appearance against him. He and the Assistant Political Agent, probably a few years older than McCarrison himself, decided that something must be done about this. It happened that a high-born local lady had had a leg amputated, for reasons lost to history, and was crippled as a result. McCarrison and the A.P.A. arranged for an artificial limb of the latest type to be sent from England and carried secretly by runner over the mountain passes to Gilgit. This was successfully fitted and the lady, dressed in traditional finery including long skirts, was suddenly paraded at a polo match—walking. The spectators were impressed by the miracle and regained their faith in western medicine and the Residency Surgeon.

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