

THE NUTRITION RESEARCH LABORATORIES,
INDIAN RESEARCH FUND ASSOCIATION,
COONOOR, SOUTH INDIA

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THE Nutrition Research Laboratories, Coonoor, occupy a unique and honoured place among the scientific institutions in this country. This status has been achieved within a short period of a little over twenty years. It was in 1918 that Lt.-Col. R. McCarrison (as he then was) commenced work in Coonoor on Beriberi Enquiry under the auspices of the Indian Research Fund Association. It had to stop in 1920 when McCarrison was invalided to England. Two years later when he returned to India, the Deficiency Diseases Enquiry was resumed with the generous support of the Indian Research Fund Association. But in a short time it was "axed" as a measure of retrenchment. There were thus two breaks in a short period. Undaunted, Col. McCarrison returned to the charge and in 1925, obtained further assistance from the Indian Research Fund Association. The enquiry this time bore the more comprehensive title of Nutrition Research; Col. McCarrison became its first Director. This attempt was destined to be more fruitful. The Pasteur Institute Association of Southern India had very kindly placed a part of the Pasteur Institute building at the disposal of the Indian Research Fund Association. The Government of Madras loaned the vacant buildings of an old jam factory for use as laboratories and animal house. It is in these two buildings that the Nutrition Research Laboratories have been housed right from the beginning. From a small beginning thus made over twenty years ago the Institution has gradually expanded and has reached its present state. To McCarrison, therefore, India owes a deep debt of gratitude for, it was his genius and foresight, coupled with an immense capacity for hard work, which rendered it possible for the Indian Research Fund Association to build up a first class scientific institution in India devoted to Nutrition Research. For nearly ten years since its inception it remained the only place in India where investigations in nutritional science were being carried out. It seems, however, that the work at the Nutrition Research Laboratories acted as a stimulus to other workers in this country for to-day we find a number of active centres of nutrition research all over India.

Major-Gen. Sir R. McCarrison, I.M.S., retired in 1935 and was succeeded by Dr. W. R. Aykroyd who was well known for his nutrition work on behalf of the Health Organisation of the League of Nations. Dr. Aykroyd guided the destinies of the Nutrition Research Laboratories for the next ten years at the end of which he resigned to take up the post of the Director of Nutrition in the Food and Agriculture Organisation of the U.N.O. in Washington. It is felt that no better tribute to these two men can be rendered than the putting on record an ap-

preciation of their scientific work which has made the Nutrition Research Laboratories what they are to-day.

Almost every educated person in India to-day knows the differences in the physique and health conditions of the people in different parts of India. McCarrison was the first, however, to grasp the scientific significance of the fact. He proved by well-designed experiments that the relative nutritive values of various provincial dietaries was the cause of these differences. He was moreover convinced that at the root of ill-health and diseases in India lay the widespread malnutrition of the people. With the idea of scientifically investigating this aspect in connection with specific diseases that McCarrison undertook studies on goitre and urinary calculus.

From a study of the earlier published work and on the basis of his own observations on human beings and experimental animals McCarrison reached the following conclusions.

The thyroid gland grows more rapidly in early life of the individual than the body as a whole. Its weight, in relation to the total body weight, reaches a maximum at puberty in both sexes and declines thereafter. The gland is more susceptible to dietary influences during the phase of rapid growth. The enlargement of the thyroid under unfavourable conditions may be small and physiological or, on the other hand, may be abnormally great when the condition is called a goitre, the influencing factors being described as goitrogenic. The dietary goitrogenic influences which are the most important may exist either during (a) childhood, (b) adolescence and/or (c) throughout the whole span of life. "In the last event the stigmata of goitre—i.e., congenital goitre, cretinism, deaf-mutism and varying grades of physical and psychic degeneration—appear in the new-born of the species" (McCarrison). Among the goitrogenic influences were (1) excess of fats, fatty acids and lime, (2) deficiencies of vitamins A, C, iodine, etc., and (3) goitrogenic substances present in foodstuffs, such as cabbage, groundnuts, maize, etc. The occurrence or otherwise of goitre depended upon the interplay of these three factors.

The work on goitre has been published in an *Indian Medical Research Memoir*, No. 23, March 1932, entitled "The Life-line of the Thyroid Gland: A Contribution to the Study of Goitre".

McCarrison's work on Urinary Calculi was equally productive of interesting results. It was concluded from hospital statistics collected for the years 1926-28, that in India the incidence of urinary calculus was 1 per 10,000 although it was not uniform throughout India. The "stone area" covers what is known as the wheat

belt, i.e., Sind, North-West Frontier Province, Punjab, and western parts of the United Provinces. In Bombay, Madras, Hyderabad and Mysore, the disease was rarely encountered. There was one interesting observation in this connection and it was that in Manipur in Assam, in the midst of the rice-eating population, the incidence of the stone was again found to be high.

The role of diet in the production of stone was experimentally investigated in the laboratory rat. The stones produced in the urinary tract of the rat on different diets were removed and analysed. These stones were found to be either phosphate stones or calcium stones. In the former case they consisted of magnesium ammonium phosphate and in the latter of calcium carbonate or calcium hydroxide or both. The human stones (removed at operation) were found to consist of a mixture of uric acid or urates, calcium oxalate, calcium phosphate and sometimes magnesium ammonium phosphate. The absence of uric acid or urates in stones in the rat was due to the uricolytic metabolic activity in the rat, which, however, is absent in human beings.

The composition of urinary calculi in cattle was found to be similar to the calcium carbonate stone produced in the rat. The deficiency of vitamin A and imbalance between calcium and phosphorus was shown to be effective in producing stone in rats. The same influences were responsible for stone-formation in cattle. It is true that the mechanism of stone-formation is not fully known even now, but the experiments of McCarrison showed beyond doubt the part played by faulty diets. Further work on this problem is obviously needed.

Although the two main investigations occupied much of McCarrison's attention his wide interest led him to explore other fields such as (a) the effect of dietary deficiency on the histopathology of the gastro-intestinal tract, (b) relation of rice to beriberi in India, (c) Lathyrism, (d) nutritive value of Indian foodstuffs, etc.

Dr. Aykroyd's interests lay in the field of applied nutrition. Immediately on assuming charge he commenced systematic study of the dietary habits of population groups and their relation with the prevalence of diseases which could be traced to malnutrition. His pioneer work on nutrition surveys in India was soon followed up by workers in other parts of India, so that by 1940 sufficient material existed to provide a fairly comprehensive although far from complete picture of Indian dietary habits. The information was compiled and published by Aykroyd as a *Note on the Results of Diet Surveys in India*.

In the meantime the Indian foodstuffs were being subjected to analyses in the Laboratories and in 1938 appeared a booklet, popularly known as *Health Bulletin*, No. 23. It contained valuable information on the nutritive value of hundreds of common and uncommon Indian foodstuffs. The researches on (a) the pathogenesis of experimentally produced deficiency diseases, (b) the physiological function of vitamins, (c) insect nutrition and (d) clinical research in diseases of chronic malnutrition

were also pursued with great vigour by Aykroyd and his associates leading to some interesting results.

A Nutrition Clinic, started at the Stanley Hospital, Madras, with the co-operation of the Surgeon-General with the Government of Madras and the Hospital authorities, has proved a great success. The work done there during the last four years has brought to light important facts concerning chronic diarrhoeas of nutritional origin, the etiology of phrynoderma, skin manifestations of vitamin deficiencies and the burning feet syndrome.

Phrynoderma or follicular hyperkeratosis has come to be accepted as being due to vitamin A deficiency. Aykroyd doubted this, however, and recent studies at the Nutrition Clinic have brought to light what might be called reliable evidence to show that phrynoderma is associated not with vitamin A deficiency but with the deficiency of one or more members of vitamin B₆ complex and unsaturated fatty acids.

Burning feet syndrome is a peculiar clinical condition. It had been observed to occur among the poorer population groups in the Nilgiris nearly ten years ago. It actually came into prominence, however, when reports were published at the end of World War II from prisoner-of-war camps in the Far East. In these cases, yeast, yeast extracts or foodstuffs containing vitamin B proved to be effective. Recently at the Nutrition Clinic, Stanley Hospital, several cases of this type were investigated and the therapeutic trials brought out the fact that pantothenic acid had a marked curative effect. Burning feet syndrome thus appears to be a condition due to a deficiency of one of the minor members of the B complex.

During the war years Aykroyd was called upon to advise Provincial and Central Governments and the Indian Army on matters connected with nutrition. He was a member of the Famine Enquiry Commission which was appointed after the Bengal Famine disaster to go into the whole question of (a) causes of famines and means of preventing their recurrence, (b) possibility of improving the diet of the people and quality and yield of food crops and (c) improvements in the food administrative machinery. Aykroyd's wide knowledge of nutrition conditions in India and abroad and his earlier work with the League of Nations must have stood him in good stead in this last of his important tasks in India.

The war did not spare the Nutrition Research Laboratories. On account of its unique position, the advisory work at the Laboratories increased enormously encroaching upon the normal research activities. In other ways too the Nutrition Research Laboratories suffered a great deal. Some members of the staff joined the army, others left for more attractive posts. At that time it was found difficult to fill the vacancies. Further, the supplies of chemicals and apparatus could not be obtained during war years. It is a wonder that in spite of all these difficulties the Laboratories did maintain the output of scientific work not far below the peace-time level.