THE HISTORY OF THE TROPICAL METABOLISM
RESEARCH UNIT — U.W.I.

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Origins of the Unit

It may be of interest on the 25th Anniversary of the University of the West Indies to give some account of the history and evolution of the Tropical Metabolism Research Unit (TMRU), which has been associated with the medical school for more than 20 years. In doing this I cannot avoid treating the subject in a rather personal way, particularly in dealing with the origins and early development of the Unit. Many things that happen are not in fact planned, but depend upon individuals and chance events.

During World War II serious nutritional problems arose in the West Indian Islands. Then, as now, they depended to a large extent on imports of food, and these were restricted by shortage of shipping and the activities of German submarines in the Atlantic and Caribbean Sea. Professor B. S. Platt, the first Professor of Human Nutrition at the London School of Hygiene and Tropical Medicine, was adviser on Nutrition to the Colonial Office, and in 1944 was asked to go out to the West Indies to advise and report on nutritional problems in the region. He was shown many children with oedema which was thought to be of nutritional origin. These children resembled the syndrome of kwashiorkor described 10 years earlier by Cicely Williams in West Africa, but they did not necessarily have all the features of classical kwashiorkor, such as red hair and dermatosis. Since it appeared that oedema developed in children who had been fed on starchy gruels low in protein and sweetened with large amounts of sugar, Platt called these cases ‘sugar babies’.

At about that time I joined Platt’s staff, and in 1945, just after the end of the European War, I was sent to the West Indies to investigate these cases in more detail. I spent 3 months in Trinidad, working in the Port-of-Spain Hospital in the paediatric ward, which was then under the charge of Dr. Pierre. The next 3 months I spent in Georgetown. While in Guyana I was asked by the Governor, Sir Charles I ethem, to make a nutritional survey of the Akowoi Indians of the Pakaraima Mountains. This was a very interesting experience. After I had made my report, the Governor offered me a post with the title of Director Aboriginal Medical Services. I was very much tempted to accept. If I had done so, there would have been no TMRU.

At the end of 1945 I moved to Jamaica and started work at the Kingston Public Hospital, with the help and support of Dr. Leila Wedderburn-Wynnter. The children’s ward was very crowded, and even if there had been space it was impossible to obtain more cots. However, Dr. Wynnter allowed me to have cribs made of canvas and wood, which were installed on the verandah, where I had about a dozen infants under my care. With Sister Honey I went all over the island,
visiting hospitals from Lucea to Port Antonio, and when we found "sugar babies" we brought them back to KPH for more detailed study.

Although it is not my purpose in this article to go into details, it may be of interest to record how one may be led into error by pre-conceived ideas. In all the places where I worked some of the malnourished children died, for reasons that were not clear. I did my own post mortem examinations and was very much impressed by the intense fatty infiltration of the liver which was found in many of these cases. In the early 1940s Himsworth in England and Gyorgy and others in the USA had published many papers on nutritional liver injury produced experimentally in animals. They showed that fatty liver in rats may progress to fibrosis and cirrhosis. In 1944 Dr. MacFarlane, with Dr. Branday, published a paper in the British Medical Journal on Juvenile Cirrhosis in Jamaica. On the basis of the animal work I supposed that this cirrhosis was the end-result of severe fatty liver in those children who survived, and I thought that I had histological evidence to demonstrate this progression. It was only later that the work of the late Dr. Katrina Rhodes, the late Professor K. R. Hill, Dr. G. Bras and Dr. K. L. Stuart showed conclusively that childhood cirrhosis in Jamaica is caused by the ingestion of senecio alkaloids in bush teas, and has nothing whatever to do with fatty liver. This was a major discovery in the early years of the new medical school.

During this period in Jamaica I stayed in the now defunct Melrose Hotel, which was near the Kingston Public Hospital. It happened that Miss Dora Iber-son, Social Welfare Adviser to the Development Organization which had been set up by the U.K. Government in Barbados, stayed at this hotel during her visits to Jamaica. This was fortunate for me, because it was through her that I made the acquaintance of Dr. (now Sir Philip) Sherlock and Dr. (now Sir Hugh) Springer, and through them learnt something of the plans being made to establish a University and Medical School in Jamaica. This was a turning point in my career because I decided then and there that I would go on to carry on my work in that University, when it came into being.

My first attempt to do this was unsuccessful. In about 1948, when the first posts were being advertised, I applied for the Chair in Physiology, since I had been trained as a Physiologist at Cambridge. Quite rightly, I was not appointed. I had no teaching experience, and I had done nothing to make up for this deficiency. When I was asked how I would organize the teaching, all I could say was that I would follow the pattern of my own University. This totally inadequate answer naturally satisfied nobody, except possibly, the Professor from Cambridge, Lord Adrian, who was a member of the Selection Board.

Having failed at this point to get back to Jamaica I went to work in the Unit which had been established by the Medical Research Council under Professor Platt in The Gambia, West Africa. Here the picture of childhood malnutrition was rather different from that in the West Indies, largely, I think, because of the effects of severe endemic malaria. This was an interesting place in which to work, but it was difficult to make investigations in depth, because there was no back-up from a hospital or medical school. I returned to the U.K. after a tour of some
18 months in The Gambia, and then another chance occurred. In 1950 I was sent as a U.K. delegate to a Conference on Nutrition in Latin America at Rio de Janeiro, and obtained permission from the MRC to visit Jamaica on the way back. By that time the UCWI, as it then was, had been established, and I was put up there by Sir Thomas Taylor, its first Principal. Professor Mackay was Head of the Department of Physiology, and an arrangement was very quickly reached by which I would be given laboratory space in his Department, spend one-third of my time teaching Physiology and for the rest continue work on Childhood Malnutrition. This visit was indeed a stroke of good luck, because it would have been very difficult to come to this kind of informal arrangement by correspondence, without having seen the facilities, met the people concerned and found that I would be welcome.

This arrangement lasted for 3 years, from 1951 to 1954, and I owe a debt of gratitude to Professor Mackay, to Professor E. K. Cruickshank, then Dean, and to the late Professor K. R. Hill for making it possible. I had the good fortune to teach Physiology, and so to get to know as students, many people who now hold senior positions in the Faculty of Medicine at UWI. At the beginning of this period the University Hospital was not yet open, and I was again given hospitality by Dr. Wedderburn-Wynne at KPH, where I worked in collaboration with Dr. Katrina Rhodes. When the University Hospital came into commission, D. B. Jelliffe, the first Head of the Department of Paediatrics, generously allotted me 4 beds in the children's ward.

In 1954 I returned to the U.K. with the intention of going back to work in Professor Platt's MRC Unit in London and The Gambia. In Jamaica, although I had received help and support from many colleagues, my work had essentially been a one-man operation with one part-time technician, and I felt that I had taken the problem about as far as I could. Suddenly, while I was on leave, the idea came to me that if we were to make progress in understanding the basic metabolic changes which occur in childhood malnutrition, we needed to operate on a much more ambitious scale; we ought to have beds specifically devoted to these patients and laboratories close to the beds rather than half a mile away—in other words, a clinical research unit. This idea was put to Sir Harold Himsworth, then Secretary of the Medical Research Council, and to my great astonishment, was almost immediately approved. This, I think, was because Sir Harold took a very great personal interest in the promotion of medical research overseas. At almost exactly the same time the MRC established the Infantile Malnutrition Research Unit in Uganda under the late RFA Dean. It is interesting to note how many of the people who are active in nutritional research in the U.K. at the present time started their careers in one or other of these units. Clearly Sir Harold's far-sighted policy paid dividends in terms of development of the subject of nutrition in Britain.

From these beginnings, some chance and some purposeful, the Unit in Jamaica was born in October, 1954. It was given the name which it still has — the Tropical Metabolism Research Unit — for two reasons: to emphasize the metabolic aspects of nutrition, and to make the terms of reference wide, so that
we could work on any metabolic problems which seemed of interest in the West Indian environment.

This was the first Research Unit set up by the MRC in an overseas university. Although it was a forward-looking development one must not ignore the dangers and difficulties which it may carry with it. The danger is that a unit devoted specifically to research, with all the resources of the MRC behind it, may swamp rather than encourage the development of research in the medical school. The staff of the medical school have to bear a very heavy burden of service work as well as of teaching; it may therefore seem, and perhaps be, unfair that an outside unit, devoted entirely to research, should scoop the cream. There is, unfortunately, an idea, which I believe to be a complete fallacy, that research is in some way more meritorious than the other aspects of University activity — teaching, service and administration. Almost no one can excel at all four, and there has to be some division of labour. An MRC Unit or Group is set up to tackle a scientific problem or to develop a research field which is beyond the resources of a university at that particular time. If the study in depth of childhood malnutrition was a worthwhile scientific problem, then I think it was justifiable to establish a Unit in Jamaica 20 years ago.

When the University appointed me to an Honorary Chair in 1956, this was a great help to collaboration between the new Unit and the UWI. This made clear to the MRC that the Unit was welcome, and it enabled me to participate in University and Faculty affairs. I believe that many of the developments described in the next section of this paper were influenced, at least in part, by this.

Staff

The scientific staff of the TMRU in 1954 were all expatriates — Dr. Joan Stephen, who still works with me in London, Dr. Verity Wills, now Mrs. A. D. Scott, and Dr. Roger Smith, now Director of the Medical Unit at the Nuffield Orthopaedic Hospital, Oxford. We were soon joined by Dr. J. S. Garrow, who acted as Deputy Director from 1961 to 1965, when I was working in the U.K. The MRC, being a British Government organization, normally expected to employ people from the U.K. However, it soon became clear that it was essential for us to recruit West Indians to the scientific staff, for a number of reasons. First, it was part of our responsibility to contribute to the development of research in the region, and the most effective way of doing this was to provide at least a few West Indian graduates with an opportunity for a research career. Secondly, in the long run, the opportunities for gaining new scientific knowledge in the Caribbean region could only be exploited fully by drawing on the abilities of the people on the spot. Thirdly, from the more limited point of view of the Unit, without West Indians in career posts we would never be able to maintain continuity. In the 1950s, with the break-up of the Empire and the changing pattern of life in Britain, fewer doctors and scientists from the U.K. were prepared to spend a life-time working overseas. In general we found that people would come for one tour of 2—3 years, which was just long enough for them to do some useful work; then, for reasons of family or career they elected to return to Britain and
we had to start all over again. In a way this was good, because it meant that a relatively large number of medical scientists in the U.K. gained experience of work in Jamaica; as I have mentioned above, many of them are still active in nutrition or related fields. However, this constant change of staff made it difficult for the Unit to tackle long-term problems, and it therefore seemed essential to have a back-bone of West Indians to maintain continuity. In 1974 all this may seem too obvious to be worth saying, but in the late 1950s several years before Independence, this was not so. Moreover, from the point of view of the MRC in London the recruitment of West Indian scientists to work in the West Indies represented a completely new departure, producing many administrative problems and difficulties over terms of service. This was nothing to do with nationality; there would have been no problem if they had been engaged to work in MRC establishments in Britain.

The need to develop in this way was accepted in London, and Dr. David Picou joined the staff in 1957, followed in 1961 by Dr. George Alleyne. Over the years that followed these two were an immense source of strength to the Unit. With Picou now Director of the Unit and Alleyne Professor of Medicine, it seems that the two objectives of continuity and close co-ordination with the UWI have been achieved.

Research Policy

The main objective of the work of the TMRU over the last 20 years has been to get a better understanding of the metabolic changes which occur in malnourished children. There is no need to stress here the importance of protein-energy malnutrition, which WHO considers to be the commonest of all diseases in the world as a whole. Many people have been surprised to find that it still occurs in Jamaica. Twenty years ago the mortality, even in hospital, was quite high, and many of these children, dehydrated and oedematous at the same time, often with intensely fatty livers, presented a difficult clinical challenge. In such cases almost all aspects of metabolism — of protein, carbohydrate, fat and electrolytes — may be deranged.

Early studies were concerned with the capacity of the child to absorb and retain nitrogen and with rates of albumin synthesis and breakdown. This led us into a new and difficult field which Dr. Picou is still pursuing in Jamaica and I in London — the development of methods for measuring the overall rate of protein synthesis in the body. Much effort was devoted to finding ways of measuring body composition — i.e., total protein, fat and water, so that it would be possible to quantify the extent of depletion.

Many children have hypoglycaemia, and therefore a good deal of attention has been given to studies on carbohydrate metabolism, the capacity for gluconeogenesis, insulin output and cortisol production. We believe that liver failure is one of the reasons why these children die, and some progress has been made in identifying the mechanism of the fatty infiltration which gave rise to the name 'fatty liver disease'. Disturbances of electrolyte and water balance are usually found in severe cases, and these have been investigated in some detail, particular-
ly the problem of potassium depletion. The first evidence of magnesium deficiency in malnourished children was published by workers in the TMRU and the Department of Paediatrics. Studies were made on cardiac and renal function, to get more light on the mechanism of oedema, and on temperature regulations because of the tendency to hypothermia. Diarrhoea is often a prominent part of the syndrome, leading to severe dehydration; therefore it was necessary to investigate intestinal function and the capacity for absorbing water, electrolytes and sugars.

We undoubtedly have a better understanding than we had 20 years ago of the biochemical and pathological effects of malnutrition, and the mortality of severe cases has been greatly reduced. Perhaps the work at the TMRU has contributed something to this.

During recovery very rapid ‘catch-up’ growth occurs, presumably under endocrine control, and therefore studies have been made of insulin and growth hormone levels during this phase. An important contribution to the management of these cases — and indirectly to their prevention — was the demonstration of the very large energy requirement for growth. Previously attention had been concentrated on the needs of the child for protein rather than energy.

As far as possible the Unit has attempted to follow up the children after discharge from hospital. The rates of recurrence and of death have been very low. Two detailed studies have been made of children who had been malnourished several years previously; one was a study of their physical growth, and the other, by a group from New York and London, of their mental and behavioural as well as physical development.

In addition to all this work on severely malnourished children, a good deal has been done on problems related to the prevention of malnutrition. Examples are measurements of the protein requirements of infants by nitrogen balance; a comparison of the nutritive value of cow’s milk and human milk; balance studies on various forms of vegetable protein; and measurements of iron absorption from local foods because of the high prevalence of iron deficiency anaemia in young children.

For those who are interested, much of the work of the Unit over the years has been summarized in two fairly recent reviews (Alleyne, Flores, Picou and Waterlow, 1972; Waterlow and Alleyne, 1971).

Two questions may very properly be asked in relation to this programme of clinical and scientific work. The first is: what is the point of such detailed studies when we know that malnutrition is easily preventable? I think the answer is that food is almost certain to be in short supply for a long time to come. Our knowledge of man’s nutrient requirements is very crude and it is difficult to distinguish between adaptations consistent with health and the early stages of breakdown. Therefore rational policy for prevention can only be based on a better understanding of how the body works. Admittedly the severely malnourished children who come to hospital represent only the ‘tip of the iceberg’ of childhood malnutrition. Obviously it is necessary to treat these cases to the best of our ability and to investigate them, but it also happens very often in medicine that the best
way to find methods of preventing disease is to work back from the grossly abnormal to the mild and marginal stages.

The second and related question is whether it is appropriate, given the conditions in the Caribbean, for the TMRU to concentrate as much as it has done on rather fundamental studies of malnutrition, requiring complex and expensive instruments. This is a difficult question. However, many people may say that no distinction should be drawn between basic and applied research, the practicing scientist feels that there usually is some kind of a distinction, even though one cannot define it exactly. The Advisory Committee on Medical Research of PAHO has debated for many years the desirable balance between basic and applied research in Latin America and the Caribbean (see ‘Health Research in Latin America’, PAHO Scientific Publication No. 275, Washington D.C., 1973). I may summarize as follows my own view, which necessarily shaped the policy of the TMRU up to 1970: What we are concerned with first and foremost is the development of what is sometimes called a scientific culture and a body of scientific experience in the region. For this purpose I think that the scientist should on the whole concentrate on ‘local’ problems. The practical solution of these problems is, of course, important, particularly when the community is paying for the support of science. But in addition such problems — for example, in the West Indies malnutrition rather than the biochemistry of cancer — provide a better opportunity for new and original thought. In this way a healthy scientific climate is built up, which is not just an imitation of that in other countries. If this is to happen, it is important that the scientist, within the limits of available resources, should be able to follow where his problem leads. A practical problem, if it is more than just the application of existing knowledge, always raises new theoretical questions. Most of the basic branches of modern biology, e.g., immunology, endocrinology, genetics — have arisen from practical problems in medicine or agriculture. In this sense there is no division between basic and applied science. This has been the philosophy underlying the research strategy of the TMRU. We must try to get new knowledge, and we must help to solve the problems of the community. These two objectives go hand in hand and must be prosecuted together.

Contribution to Local Problems

The TMRU has sometimes been criticized on the grounds that it has paid too little attention to the application of scientific knowledge to local problems. For example, in the 1950s and 1960s attempts were being made in many countries to prevent protein malnutrition in children by developing a protein-rich weaning food from local resources, but we did not try to produce a Jamaican weaning food at the TMRU. This general policy was a deliberate one, for which I must take responsibility. The primary purpose of an MRC unit, paid for by the British taxpayer, was to contribute to medical science as a whole, although it is true that in the last few years the MRC has put more emphasis on the service role. Every government has a responsibility to promote research in its own country, and the application of research to its own problems. In the context of the Caribbean
countries, which, when the Unit was set up, were soon to become independent, it would be no solution for us to tackle the practical problems which are properly the concern of government. On the other hand, it would be wrong for a unit concerned with medical research to remain entirely aloof from these matters, out of touch with reality.

We tried to solve this dilemma by participation rather than direct action. In the 1950s the Government of Jamaica had a Nutrition Advisory Committee, of which the late Dr. W. E. McCulloch was chairman, and Professor Cruickshank and I were members. The Committee persuaded the Ministry of Health to set up and finance an Applied Nutrition Team. The scientific work of this team was under the general direction of the Nutrition Committee, and the team was based at the TMRU. The original members of this team were: Dr. K. L. Standard, Miss Helen Fox and Mr. C. B. Mendes. Dr. Standard carried out nutritional surveys in Jamaica, the results of which were published in the West Indian Medical Journal, and which formed the basis for a doctoral thesis Miss Fox, who was seconded by the Government of Jamaica, began work in the Unit studying local legumes as a basis for a protein-rich food. Later she went to London to take an M.Sc. in Nutrition under Professor Platt. Mr. Mendes also worked in the Unit on some biochemical aspects of experimental protein malnutrition in animals, and for this work obtained the Ph.D. of the University of London.

Later, responsibility for the Applied Nutrition Team was taken over by the Scientific Research Council of Jamaica, which was set up by Mr. Norman Manley when he was Prime Minister and which had its own laboratories. This was an entirely appropriate development. Since I was a member of the Council, a link was maintained between the Unit and the applied work. A few years ago a comprehensive report on the state of nutrition in Jamaica was produced for the Scientific Research Council. The greater part of the work in preparing this report was done by Dr. Ann Ashworth of the TMRU. (Ashworth and Waterlow, 1974).

Training was another way in which the Unit could contribute, and this clearly had to be at the post-graduate level. We tried always to have at least one student in the Unit working for a higher degree, and were able to obtain Fellowships, first from the Colonial Office, while it existed, and later from the Wellcome Trust. Among UWI graduates who obtained an M.D. or Ph.D. in the TMRU, apart from those already mentioned, are: Dr. Murchison Wilson, Dr. Harry Chan, Dr. Herbert Ho Ping Kong, and Dr. Wendell Wilson. In 1970 the University agreed to the establishment of an M.Sc. Course in Human Nutrition which, unlike other M.Sc. Courses was to be a joint effort of several departments, e.g., Biochemistry, Social Sciences, Social and Preventive Medicine, the Caribbean Food and Nutrition Institute. The TMRU which took the lead in setting up this Course, has been responsible for organizing it, and provides the space for the students. The Course clearly fills a need, since several Caribbean Governments have been supporting students to take it.

Inevitably, any local impact that the TMRU might have was mainly in Jamaica. However, since it operated as part of a regional university, it was clearly desirable that its activities should be extended more widely throughout the
Caribbean. An opportunity to do this arose in 1956 when the Secretary of State for the Colonies, on the stimulus of Sir Harold Himsworth, established the Standing Advisory Committee for Medical Research in the British Caribbean (SAC). This body has proved remarkably enduring, in spite of political changes in the region. In 1971, the original constitution being long out of date, the SAC evolved into the Commonwealth Caribbean Medical Research Council (CCMRC). The activities of the SAC and CCMRC in organizing an annual scientific meeting and trying to promote research throughout the region need no description here. From the beginning until the present day the TMRU has provided the scientific secretariat and the office facilities for the SAC and its successor. The amount of work and time involved has been considerable, and is always increasing. Other regional medical research councils, e.g., in East Africa and in West Africa while they existed, have had full-time administrators and scientific secretaries. To do this job in addition to their work seemed to be one way in which the TMRU could contribute to the promotion of research throughout the region.

The TMRU after 1970

In October, 1970, when I left the Unit to take up my present post, the TMRU became formally part of the University of the West Indies, and Dr. David Picou was appointed Director. This is the first overseas MRC Unit in which this transition has been made. Although the Unit is no longer administered from London, the cost of the core staff and their running expenses have so far been borne in full by the British Government. This core staff has been supplemented by other research workers from the West Indies, Britain and the U.S.A. with Fellowships and grants of various kinds. Under the new regime the Unit has been very successful in obtaining outside support. A close link has also been maintained with the Department of Human Nutrition at the London School of Hygiene and Tropical Medicine, with members of staff being seconded to the Unit, and students from Britain being given facilities to do research projects there.

The work which the Unit has been doing in its new form shows that it is maintaining and developing its position as a centre for scientific research and training. At the same time, quite rightly, it is becoming more closely involved in the dissemination of knowledge and the application of its work. So, for the time being, the story ends, thirty years after the visit to Jamaica by Professor Platt which started it off.

REFERENCES


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