

HOW SOUTH AFRICA BECAME INTERESTED IN NUTRITION

F. W. Fox, *Research Biochemist, South African Institute for Medical Research, Johannesburg*

Until the mining industry began to develop it may be assumed that the outlook of members of the medical profession as well as those holding official positions of other kinds, regarding the influence that food might have upon health, was similar to that current in other countries. Thus the report of the Select Committee of the Cape Parliament on the Poor White question (1896) contains no hint that diet had anything to do with their depressed condition. Although the evidence must have been sufficiently glaring, much the same remark applied 12 years later when the Transvaal Indigency Commission issued their findings. If we are surprised that this was possible it is well to remember that even today the full significance of this relationship is not always recognized, or, if recognized, is certainly not always acted upon.

But a change of outlook became inevitable when it was found necessary to feed large numbers of Africans both satisfactorily and economically over many months. Scurvy began to appear at least as early as 1898 and by 1902 was so common on the gold mines that the number of cases was said to exceed that of accidents.

Although dietetic puzzles of this kind were probably confined to mine medical officials it seems that the first 2 decades of the 20th century in South Africa gave rise to some hard thinking and even a little experimentation in this field; but even then it was mainly stimulated by

contact with this single disease. Had it not been for scurvy the probability is that a wider interest in nutrition would have taken longer to develop. That the reason for the first settlements at the Cape was to provide fresh vegetables for the early voyagers to the East Indies is well known, but the recognition that this prevented the occurrence of scurvy was only dimly appreciated even by the voyagers themselves.

Probably the earliest investigation of a nutritional nature was carried out by Dr. G. A. Turner, who in 1898 was sent by the Cape Government to report on a serious outbreak of scurvy in and around Kimberley. Since he was a broadminded and observant person it seems unfortunate that a full account of his findings was not published at the time, though some reference to them appears in a lengthy paper on scurvy in 1912.¹ Reviewing its history he held definite views on the curative and indeed the preventive value of 'any succulent vegetables such as cabbage, water cress, radishes, onions, etc,' but especially scurvy grass (*Cochlearia officinalis*) and lime juice, which he stated abolished scurvy in the Royal Navy. At Kimberley he found the people suffering from the combined effects of a Native war, drought, and the ravages of rinderpest upon their cattle. 'Since scurvy is essentially a dietetic disease' he decided to pay particular attention to the food that was available, recommending the inclusion

of kaffir beer as a good antiscorbutic and suggesting that the women and children were free from scurvy because of the roots, vegetables, and small animals they included in their diet. Rejecting various current explanations he concluded that 'we must go back to the old doctrine that scurvy depends on a want of sufficient green vegetable food'.

In 1903 a commission of medical men recommended changes in the mine diets then in general use. These recommendations were subjected to a scathing attack by Dr. M. M. Klein, who a few months earlier had announced his own views on the subject. His paper must therefore be given priority to Turner's and seems to be the first substantial contribution on dietetics published in a South African medical journal.² Re-read today it is a curious document evidently written by a man who was trying to make sense out of the jumble of facts and hypotheses then available; hence it is of historical interest. Some of his remarks are shrewd and to the point, though much depends on whether he (or the Commission) was in contact with Turner's views. Joining issue with the Commission on the evils of using kiln-dried mealies which 'they practically make responsible for the great mortality prevailing among natives', he would have none of it, but wrote: 'In my opinion the monotony of the food is by far more responsible for scurvy than even this scape-goat for all diseases among Natives—the American mealies—and according to my experience the true apostles of this theory will invariably advise their kaffir beer as a specific salvation for the misery of scurvy... here we have an actively vegetating substance comparable in a certain degree to fresh vegetable food'—a view hotly disputed at the time. Klein was no mere theorist for, as medical officer to the East Rand Proprietary Mines Ltd., he had tested his ideas; he even claimed to be employing a satisfactory diet costing '3d. a day per boy, kaffir beer included'.

From then onwards occasional articles about diet began to appear in the medical journals, but the vexed question of the cause and cure of scurvy dominated the picture. Some thought it was not true scurvy, while the cause was variously attributed to an organism, which was duly isolated, to potassium or to a toxin. It was an infectious disease, in which the value of lime juice (which was also disputed) was only due to the acid it contained. More disputes arose when the negative value of the acid drink *marewu* was established. Hewetson, in 1911,³ proclaimed that scurvy was no other than a septic condition of the mouth and gums which he had cured without dietary changes by instituting a frequent and compulsory tooth-brush drill! Dr. D. N. Macrae in 1912,⁴ although convinced that meat juice was a better antiscorbutic or at least as good as fresh vegetables or fruit, should be remembered for his wise remark that: 'When, in the domain of speculative or scientific thought, eminent men are divided in opinion, they usually divide the truth between them.' Even as late as 1926, when Spencer⁵ was describing a case cured by injecting orange juice, he could say that 'scurvy was much in evidence at the end of the Boer War, and for a year or two afterwards, until fresh mealie meal was to be had.'

Looking back to those days it is perhaps hard to see

why they found the problem so difficult; but is it not the common difficulty of possessing the solution and not appreciating that one does possess it? In this confusion the clear-headedness of Dr. Neil MacVicar is outstanding. He wrote two papers on scurvy, in 1906 and 1920.^{6,7} Yet even in the first he could say: 'The one theory of scurvy which seems to fit all the observed facts is that fresh food possesses an antiscorbutic power which it loses as it gets older.' In 1920 he made the observation (presumably independently of Turner) that the wild leaves eaten by the women and children in his district, but despised by the men, might well be protecting them from scurvy.

In 1911 the Government laid down a minimum diet scale for mine labourers based on the findings of the Mining Regulations Commission of the previous year; this helped somewhat to reduce, but not to abolish the incidence of the disease. Discoveries soon to be made elsewhere established its aetiology beyond further doubt and thus disposed of the previous uncertainties.

In the year in which Sir Kendal Franks laid the foundation stone of this Institute, Hopkins, Osborne, McCay, McCollum, Mendel and others either in England or America, were announcing the results of dietary experiments on animals that soon began to arouse immense interest. These discoveries, combined with the urgent food problems that arose during the First World War, brought the relationship between food and health to the fore with national survival at stake. In 1919 the Medical Research Committee published an account of some of the new knowledge about nutrition in its report *The Present State of Knowledge concerning Accessory Food Factors (Vitamines)*⁸ which, incidentally, established the antiscorbutic value of germinated cereals and legumes. Quick to recognize the probable significance of these findings for the gold mining industry, the Institute lost no time in bringing out Miss Marion Delf to examine local food-stuffs for the accessory factors by means of a new technique in which guinea-pigs were used. In 1921 the report of her work, carried out in the previous year, was published.⁹ Here at least was conclusive evidence, even roughly quantitative in nature, that certain local foods, including the much disputed kaffir beer, possessed protective properties against scurvy; furthermore they could be used to cure the disease. Again no time was lost. Within a year the Minimum Ration Scale was amended so as to contain a specified quantity of germinated beans as well as a vegetable ration. About 10 years later the somewhat cumbersome, approximate and time-consuming method of using guinea-pigs was replaced by the discovery that the antiscorbutic factor, now called vitamin C, could be estimated by a chemical method.¹⁰ In the next year or two I and my colleagues were able to extend the work of Delf by measuring the 'vitamin C' content of a number of common foods, expressing the results in milligrams per 100 ml., naturally, special attention was paid to kaffir beer.¹¹⁻¹⁴

Once the extremely simple cause of scurvy had been established and the relative value of different kinds of antiscorbutics had been quantitatively determined the problem of its prevention, or its cure when necessary, was solved. All that remained was to ensure that adequate amounts of the protective substance, now called ascorbic

acid, were included in the diet supplied, and then actually consumed. Even this latter minor difficulty was removed a little later on when ascorbic acid became available as a tasteless, white, crystalline and inexpensive powder.

The story of the solution of the problem of scurvy has been described in some detail because, as already mentioned, it was the principal means of awakening an awareness of the important relationship between food and health. But of course other aspects of this relationship were being considered as the years went by. The main constituents required for industrial feeding, including the amount of protein, the calorie content, and, later, the vitamin A content, were all in turn matters for discussion. In 1906 Posnet¹⁵ became convinced that beri-beri was endemic on the gold mines, though this view did not survive when the disease appeared amongst labourers imported from China.

Another entirely different body of information was gradually being accumulated by the anthropologists as well as others interested in the life and customs of the Africans in their home surroundings; these studies usually included the most careful details about their diet, together with their attitudes to different types of food and their extensive knowledge of edible plants. An early example, published in 1907 for the Government of Natal, is A. T. Bryant's *Description of Native Foodstuffs and their Preparation*.¹⁶ Monica Hunter's volume dealing with all aspects of the life of the Pondos is a fine example of the contributions made by a number of anthropologists.¹⁷ Perhaps the most detailed of them all, as far as food is concerned, is Quin's *Foods and Feeding Habits of the Pedi* which appeared in 1959.¹⁸

When examining the subjects chosen for study over this period, one is impressed by the almost complete absence of papers dealing with the nutritional problems which claim so much attention today. At the moment scurvy, though still not uncommon under certain rural conditions, e.g. in the North Western Cape, is no longer a menace; instead we are faced with thousands of cases of pellagra. Surely, in a country where maize is so important a food this disease could hardly have been ignored had it been a frequent occurrence. That it did sometimes occur is evident from a few clues. Thus in 1906 Addison encountered 150 prisoners with pellagra during the rebellion in Natal, while in the following year Knight had to deal with a series of cases amongst the African population of Nqutu. There was an outbreak at the Pretoria Mental Institution during 1912-13, and in the latter year Drummond published the first of two papers on this disease, which had caused the death of one of his European patients.¹⁹ At that time little was known about the cause of pellagra, and he accepted the view held by some that it was due to the bite of an insect. In subsequent years isolated cases were reported, e.g. by Anderson, Swift and Brown, and by Orenstein. By 1925 Drummond, in his second paper,²⁰ had revised his ideas, insisting that the disease was not so uncommon in South Africa; he accepted the evidence which had accumulated in the meantime that its cause was dietetic, and strongly urged that a properly conducted survey should be undertaken at once to determine its incidence and severity in different parts of the country. Nothing seems to have been done, and in 1929

Cluver reported another outbreak in the gaols at Durban.²¹ He suggested that pellagra might become prevalent owing to the change that was taking place from home-prepared to machine-made mealie meal.

A second example refers to the condition of young children that we now call kwashiorkor. Today this is undoubtedly our most serious nutritional problem. While medical officers and others often drew attention to the high mortality rates that occurred during the early childhood of non-Europeans, these were invariably attributed to infectious, parasitic or respiratory disease. It was of course well known that dietetic practices were often most unsatisfactory, but these were the same for the children who survived. However, in 1926 Proctor, working in Kenya, decided he was seeing cases of 'infantile pellagra'²² and Kark reached the same conclusion for 34 children he studied in 1943.²³ Many other studies then began to appear in South Africa, notably those of Altman and his colleague in 1948.^{24,25}

The 10 years from 1930 to 1940 are perhaps the most significant in the history of the growth of interest in nutritional matters. 1932 saw the publication of the reports of the Native Economic Commission and the Carnegie Commission. True, the former had little to say about diet as such, but it broke new ground by showing how the available supplies of food were adversely affected by the low level of agricultural technique used by the Natives, as also the steady deterioration of the pastures arising from overstocking; these were responsible for the poor yields of cereal crops and a diminution of the once abundant supplies of milk. The latter report contained a stimulating volume by Dr. W. A. Murray, *Health Factors in the Poor White Problem*,²⁶ which clearly set forth the inter-relationships of ignorance, poor food and such diseases as malaria and bilharzia upon the unsatisfactory health, physique and economic status of these unfortunate people. These two studies did much to broaden the somewhat narrow conception of nutrition then current by proving that agricultural, social, educational and economic factors were involved as well as the strictly dietetic one. In 1936 I was given the opportunity of visiting the Ciskei and Transkei areas with an agricultural colleague. This was a most valuable experience which brought home the truth of the above conclusions.²⁷

In 1937 the report of yet a third commission appeared. It dealt with the condition of the Cape Coloureds and the authors were so shocked by what they had discovered that they called for a 'systematic nutritional survey... in order to ascertain to what extent the various sections of the population are undernourished; and how this undernourishment can be rectified.'

The startling revelations contained in these three authoritative studies made it easy for Mrs. K. Malherbe in the same year to persuade the House of Assembly to institute such surveys. The Department of Public Health immediately began a nation-wide study of White school children²⁸ and a similar survey of African children soon followed, carried out by Kark and le Riche.²⁹

In 1938, and before the findings of these surveys were available, the South African Institute of Race Relations summoned a conference to consider the whole question of nutrition. This proved to be a landmark in the history

of the subject in South Africa because, for the first time, men working in different fields were invited to contribute papers on the issues as they saw them, as well as to discuss the views advanced by other contributors. Early in 1959 a full report of this conference was published.³⁰ At last a difficult and confusing problem was seen in perspective, while the directions in which further efforts were most required became much clearer. Thereafter progress was relatively rapid.

In 1939 the Government, on the advice of Dr. E. H. Cluver, the Secretary for Health, decided to create a National Nutrition Council, which held its inaugural meeting in the following year. This statutory body provided the machinery for the collection of relevant data, the exchange of ideas, the promotion of research as well as the application of existing knowledge. The wide field covered and the excellent work done by the Council can be judged by examining its four reports, issued in 1944, 1947, 1952 and 1960.³¹⁻³⁴

The year 1939 saw the beginning of World War II which naturally retarded the introduction of some of these developments; but it also stimulated others. Thus shipping problems created a serious shortage of wheat which led the Cabinet Food Committee, working through a Director of Food Supplies and Distribution, to prepare advanced plans for the rationing of cereals, as well as other steps to safeguard and improve the diet of the people. The lessons thus learned led in 1951 to the formation of a Department of Nutrition, followed in 1953 by the setting up, under the CSIR, of the National Nutrition Research Institute.

From 1938 onwards the number of persons engaged in some form of nutrition work, as also the facilities for such work, increased rapidly. There are now no less than 10 medical research units dealing with nutritional problems, and contributions to our knowledge are being made regularly by all the major universities. Both here and overseas it is becoming recognized that in South Africa the opportunities for work of this kind are exceptionally good, if not unique. By 1957 it became possible to start a Southern Africa Nutrition Society which now holds a well-attended annual congress.

Even from this brief review it should be clear that during the last 60 years there has been a most promising awakening to the profound importance of the relationship between food and health, as well as a recognition of the magnitude and complexity of the problems arising from this relationship.

It is now known that a satisfactory level of nutrition can be adversely affected by either under-eating or over-eating. Some idea of how widespread is the type of malnutrition from diets that are either quantitatively or qualitatively inadequate can be gained from the pilot study made in 1960 by the National Nutrition Research Institute.³⁵ Examples of the efforts now being made to deal with this aspect of the problem include: the decision of the Department of Health to make kwashiorkor a notifiable disease and to provide inexpensive supplies of dried milk for its prevention or treatment; the formation of the National Nutrition Corporation (Kupugani); and

the efforts of various manufacturers to devise and popularize cheap high-protein food mixtures.

The harmful effects that may arise from an excessive consumption of certain nutrients is a more recent insight. There is already sufficient evidence to indicate that this kind of malnutrition is far too common and that it can have serious results. Education in wiser food habits is the obvious solution.

That the health of the population of South Africa could be greatly improved and the cost of treatment, including hospitalization, greatly reduced, is now surely sufficiently obvious. It is equally obvious that the causes of the appalling amount of malnutrition that now exists include agricultural, economic, social and educational factors and that these are usually closely interrelated. If progress is to be made it is therefore essential that local conditions are realistically studied and that the temptation to oversimplify them is rigorously avoided.

REFERENCES

1. Turner, G. A. (1912): *Transv. Med. J.*, **7**, 41.
2. Klein, M. M. (1905): *S.Afr. Med. Rec.*, **3**, 25.
3. Hewetson, W. M. (1911): *Transv. Med. J.*, **6**, 207.
4. Macrae, D. M. (1912): *S.Afr. Med. Rec.*, **10**, 339.
5. Spencer, H. A. (1926): *Ibid.*, **24**, 386.
6. MacVicar, N. (1906): *Ibid.*, **4**, 101.
7. *Idem* (1920): *Ibid.*, **17**, 284.
8. Medical Research Committee: (1919): *The Present State of Knowledge concerning Accessory Food Factors (Vitamines)*. Spec. Rep. Ser., no. 38. London: His Majesty's Stationery Office.
9. Delf, E. M. (1921): *Studies in Experimental Scurvy*. Pub. S.Afr. Inst. Med. Res., no. 14. Johannesburg: S.A.I.M.R.
10. Birch, T. W., Harris, L. J. and Ray, S. W. (1933): *Biochem. J.*, **27**, 500.
11. Fox, F. W. (1936): *S.Afr. Med. J.*, **10**, 25.
12. Levy, L. F. and Fox, F. W. (1935): *Ibid.*, **9**, 181.
13. Fox, F. W. (1936): *Proc. Transv. Mine Med. Offrs' Assoc.*, **15**, 59.
14. Fox, F. W. and Stone, W. (1938): *S.Afr. J. Med. Sci.*, **3**, 7.
15. Posnet, W. G. T. (1906): *Transv. Med. J.*, **1**, 308.
16. Bryant, A. T. (1907): *A Description of Native Foodstuffs and their Preparation*. Pietermaritzburg: Government of Natal.
17. Hunter, M. (1936): *Reaction of Conquest: Effects of Contact with Europeans on the Pondo of South Africa*. London: Oxford University Press.
18. Quin, P. J. (1959): *Foods and Feeding Habits of the Pedi*. Johannesburg: Witwatersrand University Press.
19. Drummond, J. (1913): *S.Afr. Med. Rec.*, **11**, 416.
20. *Idem* (1925): *Ibid.*, **23**, 413.
21. Cluver, E. H. (1929): *Brit. Med. J.*, **2**, 751.
22. Proctor, R. A. W. (1926): *E.Afr. Med. J.*, **3**, 284.
23. Kark, S. L. (1943): *S.Afr. J. Med. Sci.*, **8**, 106.
24. Altman, A. (1948): *Clin. Proc.*, **7**, 32.
25. Altman, A. and Murray, J. F. (1948): *S.Afr. J. Med. Sci.*, **13**, 91.
26. Murray, W. A. (1932): *Carnegie Commission Report*, vol. 4. Stellenbosch: Carnegie Corporation.
27. Fox, F. W. and Back, D. (1937): Report to the Transvaal Chamber of Mines. Unpublished.
28. Department of Health (1940): *Report on the Nutritional Condition of European School Children in the Union of South Africa*. Pretoria: Government Printers.
29. Kark, S. J. and le Riche, H. (1944): *S.Afr. Med. J.*, **18**, 100.
30. South African Institute of Race Relations (1939): *Race Relations*, **6**, no. 1.
31. Department of Health (1944): *First Report on the Activities of the National Nutrition Council*. U.G. no. 13. Pretoria: Government Printers.
32. *Idem* (1947): *Second Report on the Activities of the National Nutrition Council*. U.G. no. 24. Pretoria: Government Printers.
33. *Idem* (1952): *Third Report on the Activities of the National Nutrition Council*. U.G. no. 24. Pretoria: Government Printers.
34. *Idem* (1960): *Fourth Report on the Activities of the National Nutrition Council*. Pretoria: Government Printers.
35. Potgieter, J. F. and Fellingham, S. A. (1962): *CSIR Research Report*, no. 190. Pretoria: Council for Scientific and Industrial Research.