alkalemia lowers the ionized calcium in the blood. This latter fact is of particular importance to Queensland, as Sundstrom has shown that an alkalaeemia develops in the hot humid summer. Nye and I have shown that the gastric acidity is lowered and that achlorhydria is more common in the summer than the winter.

Milk and cheese are the best sources of calcium, and from these alone adequate amounts of calcium can be obtained. In order to obtain sufficient calcium from other sources impossible amounts have to be eaten, for example, seven loaves of bread, 16 pounds of potatoes, 40 apples, or 200 gallons of tap water per day, whereas one quart of milk or one-quarter pound of cheese will supply the daily needs of calcium.

**Nutritional Anemias.**

There is only a very slight positive balance of iron in the average diet, so that it will not take a large dietary upset to cause iron deficiency. The result of this is the development of microcytic anemia, which can be cured by the use of large doses of iron. Poor absorption, of course, also is an important factor in these cases.

Pernicious anemia is now recognized as being a conditioned deficiency disease. Normal blood formation is stimulated by hemopoietin, which is formed by the interaction of an extrinsic factor in food and an intrinsic factor in the stomach. This resulting substance is stored in the liver. Usually pernicious anemia is caused by an absence of the intrinsic factor, but a megalocytic anemia can also be brought about by the absence of the extrinsic factor.

Deficient vitamin B also may cause megalocytic anemia, and vitamin C deficiency a microcytic anemia. Copper does not seem to be of as much importance as was at first thought.

**Iodine.**

Deficient iodine intake leads to deficient thyroxin formation, with consequent development of colloid goitre. This is not of particular importance to Queensland, although there are a few areas where this deficiency occurs.

**Vitamins.**

Dr. Earnshaw has discussed the distribution and main functions of the individual vitamins. I shall just say a few words concerning some of them.

Vitamin A, the so-called anti-infective vitamin, is not in the strict sense anti-infective, but acts in an indirect way to this end. Vitamin A deficiency leads to keratinization of squamous epithelium with consequent lower resistance to bacterial invasion. Administration of vitamin A has no effect on the incidence of colds.

Two hundred patients with pneumonia were treated alternately—100 with extra vitamin A and 100 without. The death rate in the first group was 8% and in the second 13%. This is merely suggestive.

Recent experimental and clinical evidence has shown that vitamin A deficiency is related to the etiology of renal calculi. In some cases the calculi have been made to disappear by the use of additional vitamin A. A diet rich in vitamin A is recommended after operations for calculi in the renal tract.

Vitamin A, applied locally, hastens healing of wounds, and this may in part explain the rapid healing gained by using dressings soaked in crude cod liver oil.

In the treatment of chronic disease such as rheumatism and nephritis it is very important to provide a well balanced diet. Marked restriction of protein in chronic nephritis is not only not necessary, but may be harmful. The body will use its own endogenous protein if none is supplied.

Thus the provision of a well balanced diet will increase vigour and allow the enjoyment of better general health. It will prevent or at least minimize microcytic anemia.

There appears to be a necessity for the formation of some local medical body to control dietetics in institutions and also to control various health foods advertised for various purposes. Furthermore, there is a large scope for further investigation of the results of dietary irregularities in Queensland.

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**DIET AND DISEASE OF THE EYE.**

By E. O. Marks, M.D. (Dublin), Honorary Ophthalmic Surgeon, Hospital for Sick Children, Brisbane.

When considering the association of diet and disease, we must include in our review not only those diseases directly caused by deficient or improper diet, but also those whose incidence or severity may be influenced by a lowered bodily health due to imperfect diet.

While thus taking into consideration infections the incidence or progress of which may reasonably be suspected of being influenced by diet, it at once becomes essential also to take into account other possible causes of lowered resistance, such as climatic and living conditions or general hygiene, as well as other reasons for increased facility in the spread of contagion, such as flies and dust.

The diet may be only one of several concomitants, each of which must be carefully excluded before the diet can be definitely arraigned.

In the case of straightforward vitamin deficiency disease, such as scurvy or keratomalacia, the problem is comparatively simple. The disease will not occur except with a deficient diet, and a supply of the missing food factor will result in a rapid cure.

In the second case, when the incidence of the disease merely may be influenced by the diet, when

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1 Read at a meeting of the Queensland Branch of the British Medical Association on November 1, 1935.
the disease may occur even on a perfect diet, when other factors may be at work, and when the provision of a proper diet does not by itself effect a cure, the difficulty of apportioning the diet's share of the responsibility is very great.

So far as the eyes are concerned, we in Queensland are very fortunate that direct diet deficiency diseases are very rare. I do not, of course, know the experience of my colleagues, but of xerophthalmia or keratomalacia, the classical vitamin A deficiency disease which is an important cause of blindness in India and China, not a single case has come my way. I can recall only one case of sloughing corneal, in a syphilitic, marasmus half-caste infant on whom the exhibition of vitamins and anti-syphilitic remedies mercifully failed to prevent the sloughing also of its mortal coil. In what proportion had feeding contributed to the dissolution it was impossible to determine.

For straightforward deficiency diseases my allowance of ten minutes is more than ample. When, however, we come to consider the second class, the incidence of which may be influenced by diet, we enter onto very debatable ground, for the traversing of which ten minutes are altogether inadequate. Of such diseases trachoma is at once the most suspect and the most important, so my subsequent remarks will be restricted to that disease.

In our far inland districts trachoma is very prevalent. In the south-west, west of Thallon and Mitchell, from 7% to 10% of school children are trachomatous. The difficulty of diagnosing an early mild trachoma from the very common follicular conjunctivitis precludes exact figures.

Various ophthalmologists, and notably my good friend Dr. J. Lockhart Gibson, have suggested that trachoma or its incidence is largely influenced by diet deficiencies. It is a suggestion that is not to be lightly turned aside.

That the food and living conditions of many children in the West are far from ideal, no one would deny. However, it is not my brief portion to discuss the general question of the diet, living conditions, climate, and so on in relation to the general health of these children, but only the relationship to eye disease, especially trachoma.

That trachoma is not an actual deficiency disease is manifest for the following reasons: (i) It affects only a fraction of people on the same diet. (ii) It affects people on a good diet. (iii) It does not affect, or at least is very much less common amongst those living on similarly restricted diets in equally remote places nearer the coast. (iv) It is prevalent in other parts of the world where the diet and climate are very different from that of our inland country. (v) It is not cured by the provision of an ample diet, though this is, of course, the first essential to treatment.

I must admit that formerly the suggestion that diet had much to do with the incidence of trachoma in the west appealed to me strongly as one that would probably prove the key to the distribution of the disease, which ordinarily is not readily transmitted from one to another.

Two years ago, on behalf of the Department of Public Instruction, I examined many schools in the south-west of the State, as far out as Thargomindah and Windorah. A six weeks' tour, in which, so far as possible, I visited the homes of the trachomatous children observed at the schools, left me strongly reconverted to the old faith that the disease is an infection chiefly affecting those whose manner of living is best calculated to spread contagion and least calculated to prevent its spread.

The disease is markedly familial, and in nearly every case one or both parents showed old standing trachoma. Most, but by no means all, of the trachomatous families were living in squalid permanent camps, with no precautions to prevent the spread of the disease from one to another. Children in bed with an affectionate but affected mother or with other trachomatous children, the infrequency of washing, the use of common towels, and the lack of care about flies provide ample means for the conveyance of eye infections, even amongst those families otherwise reasonably cared for. The great majority of the badly affected families were living in very bad conditions.

While it is well recognized that in ordinary circumstances trachoma is not readily infectious, opinion has of late tended to the idea that the disease is transmitted in conjunction with an acute conjunctivitis. According to this view, a trachomatos subject with a superadded acute infection would transmit trachoma as well as the acute conjunctivitis. In the west, during the fly seasons, epidemics of acute conjunctivitis are frequent and severe, attacking especially those who take no precautions against infection.

Nearer the coast flies and dust are not nearly so bad, our coastal areas being freer perhaps from flies than most countries, and there is comparatively little acute conjunctivitis and comparatively little trachoma.

While the distribution of trachoma in Queensland is thus consistent with that of an infection, we still have to consider to what extent, if at all, it is influenced by dietary imperfections.

One cannot make a reliable record of the diet of any particular family. Since the trachomatous families are also usually the least well cared for and have the worst living conditions, one would expect that their food would on the average be worse than that of the clean and well cared for, and that their physical condition would on the whole be inferior. A lower average physical condition is thus to be expected as a concomitant of trachoma, whether or not it be a causative factor.

I have no records of weights and measurements, but my impression was that, except in severe cases, where the eye condition might be affecting the general well-being, there was no very marked difference between trachomatous and non-trachomatous children.

Another method of approach is geographical. Railway centres on the whole have greater facilities for fresh foods and vegetables than places far from the rail. How do they compare?
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Another method of approach is geographical. Railway centres on the whole have greater facilities for fresh foods and vegetables than places far from the rail. How do they compare?
I found schools heavily affected both on the line and off it, and schools free or lightly affected both on the line and far away from it. Thus out of 574 children examined at Charleville, only 15, or 1 in 37, were definitely affected, or doubtfully trachoma cases, whereas at Cunnamulla there were 31 in 206, or 1 in 7, while at Wyandra, midway between, there was only one doubtful case in 37. Coming east, at Morven there was not even a doubtful case in 55, but at Mitchell 14 in 152, or 1 in 11. At Langlo, 45 miles from Charleville, there was no trachoma in 12 children. At Quilpie, the western end of the line, there were 23 in 113, or 1 in 5, and at Adavale, 60 miles north from the railway, 5 in 35, or 1 in 7; but at Eromanga, 80 miles west, there were 8 in 16, or 1 in 2.

Taking an east-west line through Tallwood to Thargomindah—at Tallwood there were no cases in 25, at Thallon 4 in 26, or 1 in 6, and Dirranbandi 13 in 73, or 1 in 6; these three places are on the railway. At Nindigully one trachomatous family of 6 in 18 children, at St. George 11 (8 belonging to one family) in 150, or 1 in 14, and Bollon 3 in 47, or 1 in 16. Cunnamulla, on the line, had 1 in 7 (as previously mentioned), Eulo had 5 doubtful cases in 50. Thargomindah 12 in 52, or 1 in 4.

It cannot be too strongly emphasized that figures must not be taken rigidly when one trachomatous family can make an enormous difference by migrating to another township. Such as my figures are, they do not show a steady increase of trachoma with increasing distance from the coast and increasing aridity, nor do they show any relationship to remoteness from the railway. Thallon, Dirranbandi and Cunnamulla, on the railway, are much worse than St. George and Bollon, which are away from the line. Quilpie, on the line, is worse than Adavale, off it, but the small decadent township of Eromanga, 80 miles west of Quilpie, had the highest trachoma rate, namely, 8 out of 16.

Of 1,700 children examined in the west, 9 out of 10 had conjunctive which would compare well with the average in Brisbane, my visit being timed purposely to avoid the acute conditions of the fly season.

The impression left strongly on me was that trachoma is due, not to diet deficiency, but to hygiene deficiency, and that its elimination is to be attained by the inculation of hygienic principles and improved living conditions.

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<td><strong>Commodity</strong></td>
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<td><strong>Total calories</strong></td>
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1 Not included in total.

Meat.

Australia consumes more meat per head of population than Great Britain, Canada and the United States of America, but much less than New Zealand. The figures for 1931-1932 are respectively: Australia, 189 pounds; New Zealand, 250 pounds; Britain, 145 pounds; Canada, 154 pounds; and the United States of America, 133 pounds. Pork products are relatively consumed much more in other countries than they are in Australia and New Zealand.

The tendency of the modern nutritionist is to increase the proportion of meat in the diet. The nephritic is no longer starved of meat. His nutritional balance is just as important as that of the normal person.

The important point is that meat seems to be harmful only when it is not associated with McCollum’s protective foods—raw fruits and vegetables, eggs, milk, cheese and butter. This point can be well demonstrated by a chart showing the relationship between the incidence of degenerative disease and the percentage of protective foods in the diet. (1) (See Chart I.)

The daily total of meat and flour in the Australian diet is over sixteen ounces. This gives a high acid ash; the flour should be reduced and the acid-rich meat balanced by fruit, vegetables and milk. Shortage of alkaline ash foods leads to abnormal protein metabolism with the production of toxic by-products.

It is of interest to note that the first attempt of Minot and Murphy at improvement of pernicious anaemia patients began by increasing their meat intake. They used liver with the idea of providing a concentrated animal protein. Another interesting aspect is that for the first time in history a degenerative disease had been arrested by nutri-