WORK AND PROBLEMS OF A MEDICAL OFFICER
PRISONER OF WAR IN THE FAR EAST

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The purpose of this paper is to discuss some aspects of the work and
problems which confronted a medical officer in the Far East during three
years and nine months captivity under the Japanese.

When the broad implications of our predicament became clear after the first
months of our imprisonment, it was seen that the medical officer's duty
would have to consist mainly of preventing disease, with adequate treatment
as an impossible ideal and, secondly, to strive for the goal of keeping men
alive until the end of the war. At times the second objective was all that
seemed possible, and the doctor (especially when the sole officer in a working
camp) had often to make decisions on matters of policy as a whole, rather than
on specific medical considerations. For example, the requirements of the
Japanese for working parties, their mood at the moment or the tact of the
medical officer were the indices for sending men out to work. The selection
of sick men who would be least damaged by hard work was often a heart-
breaking and difficult task, but one that most M.O.s had to face. At other
times, but rarely, the M.O. was able to rest men who were only mildly ill.

The fact that so many returned from captivity is a tribute above all to the
amazing adaptability of the human body and to the resilience of the human
spirit.

Any chance of reasonable relationship between captors and prisoners was
slight from the beginning. On our side there was the assumption that as
Orientals are “natives” and, by definition, inferior beings, they must be treated
only with firmness, if not contempt. On their side was an age-long resent-
ment of white domination in Asia, mingled with an admiration of Western
achievement, carefully overlaid or suppressed by their own intense nationalism. To such an unfavourable commencement was added an Oriental indifference to death or suffering, a code which deprecates the captured state as unworthy of the warrior, and a military tradition which is inhuman in the extreme, causing even the Japanese civilian to shake the head.

By no means all the Japanese could be called ill-disposed by our standards. One had to accept the idea that, however kindly a Japanese may be as an individual such is his veneration for Imperial authority, as vested supremely in the military, criticism in words or action is impious. The social pressure to which our ethics, even as soldiers, are subject, is absent in the Japanese.

Some of the blame for hard treatment and starvation may perhaps be more justly laid at the door of Japanese Administration than on the Japanese high-level policy. There is a great tendency to consider actions as carried out simply because the order has been issued. It is quite possible for Tokyo to issue orders on P.O.W. diet, etc., without creating an organization for carrying them out. Neither does the watertight nature of Japanese departments make for flexibility. "Let not your right hand know what the left hand doeth," can be carried by the Japanese to extraordinary lengths.

This account describes environmental conditions in five P.O.W. camps in Hong Kong and Japan, with a general description of clinical manifestations of disease in each, together with remarks on diet and deficiency diseases as the writer saw them.

There are serious difficulties in reaching any estimate of the vitamin intake which could be considered accurate, even if the writer had available the figures of actual amounts of food for all camps by the Japanese, for the experimental study.

(1) There were no facilities for the experimental study of vitamin values in the food provided. All such information has been obtained, after release, from tables—which show considerable divergencies. Moreover Roger and Megaw have shown beyond reasonable doubt that the conditions of storage of rice are directly related to its vitamin-B complex content. Much of the rice issued to P.O.W. was in a deplorable state, and its vitamin-B content must have varied greatly.

(2) There was a varying amount of waste in times of comparative plenty which would tend to upset calculations.

(3) Another source of doubt concerned our own farm produce, grown in Hong Kong on poor soil, freshly dug from scanty grass-land prepared without manure; possibly producing vegetables with less than normal nutrient content.

(4) Nor was the vitamin content of local produce alone in being suspect. The riboflavine content of corned beef is said in textbooks to be unimpaired, but careful assay in India during the war showed riboflavine absent.

Here then are some reasons for not pushing too far any claims to scientific accuracy of the published figures of vitamin intakes of P.O.W. However, it can be said that the amount of vitamins available to the whole camp—and therefore an indication, when correlated with vitamin-deficiency disease
incidence, of the critical level of vitamin intake—can be estimated within a margin of error whose limits cannot be precisely defined. Such errors assume greater importance when dealing with the small figures of vitamin content than with the larger ones of caloric value.

Another aspect of the matter needs consideration. Although we may secure a figure for the quantity of food representing the individual ration we must remember that this figure may not represent what each man necessarily ate. For this two main factors are responsible. First the universal craving for tobacco. Depending on the cigarette shortage a bowl of rice would be valued from one to five cigarettes, and no amount of warning nor exhortation could suppress the practice. Secondly, gambling with the contents of the Red Cross parcels was a most popular pastime with "trading" of items as a very close second, resulting often in a most unbalanced distribution. One or both of these latter habits seemed to be universal amongst the American troops. Not infrequently individual taste was the main criterion in exchange. For example, a man might perhaps get rid of most of his parcel for jam.

Figures for the diet during the last months of captivity, together with weight and account of the men's clinical conditions at that time are available.

HONG KONG JANUARY 1942 TO APRIL 1944

The climate is subtropical with a mean rainfall of 90 inches (with a summer monsoon), and a temperature range between 45° and 90° F. There were no anopheline mosquitoes in the areas which became internment camps. One Battalion of British troops was already heavily infected with the malarial parasite, but the Canadians were free. The nutrition of both British and Canadian troops was good at the beginning of captivity.

All troops with the exception of the Canadian were acclimatized. The first camp to be described had been built eighteen months before the Asiatic war as an internment camp for refugees from Canton. The design will be described in connexion with the second camp, which was exactly similar. It had been badly damaged during the fighting and used by the Japanese as horse lines. The flush toilet system was choked and the whole area littered with refuse and excrement. This was cast into the harbour which bounded the camp on one side and the area quickly cleared. The deep trench latrines, constructed until the flush system was again working, were quite satisfactory. However, the damage had already been done. The weather was warm over a long period, and the fly eggs laid in the horse manure having become larvae and burrowed into the loose ground on which the camp was built, began to emerge as flies. The major fly nuisance came from a "controlled tip" used in peacetime and situated within 100 yards of the camp. It seemed to embody most of the features of mismanagement and is worthy of description.

(1) Houses were built practically on top of the tip.
(2) The working edge of the tip was most irregular in outline and large in extent, and for the most part projected directly into the harbour, so that particular face was never covered with earth.
(3) The covering of the tip was loose, thin and irregular. One could see
the flies emerging from the covering. The condition of the tip exposed its unsuitability in an area dependent on native labour, where European supervision may tend to be casual. It is particularly dangerous in countries where excremental diseases are rife and cholera is endemic, as Hong Kong.

The fly nuisance was of long standing. The writer had visited the camp in peacetime and had noticed the elaborate fly proofing of the kitchen and dining hall, whilst the *fons et origo* near-by remained untouched.

One was able to inspect the tip and, after many representations to the Japanese, the British civilian Public Health Department which was still functioning, was allowed to cover the tip with earth.

This made a great difference to the fly population, but an epidemic of dysentery was already under way. Sporadic cases had occurred from the beginning but, in February, there were always between 40 and 50 cases in the noisome hovel called the "dysentery hospital" which was an appropriated warehouse without any facilities.

The attacks, though smart, were not attended by any fatalities and appeared clinically to be of the bacillary type (although no means of investigation were available). The only treatment they received was magnesium sulphate, with a little bismuth carbonate after the acute phase, which seldom lasted more than two days.

The only food available was rice. When the blood and mucus had cleared from the stools, rice coarsely ground and cooked with excess of water was given to the patients. In convalescence they received a few yeast tablets daily.

The rice issued by the Japanese was supplemented by tinned food brought into the camp by our own men, and food bought from Chinese vendors (looted tinned goods). In February and March small quantities of tubers (but no potatoes) and flour were added by the Japanese.

All prisoners lost considerable weight, and there is no doubt that not only was the diet deficient in caloric value, but in all vitamin content also.

However, during the first three months, only two men presented themselves with complaints recognized as due to malnutrition.

One, in February, showed perifollicular petechial haemorrhages on both legs above and below the knee, and showed increased capillary fragility. Although his gums were normal he was considered to be an early scurvy, and he responded to ascorbic-acid therapy. There had been marked deficiency of vitamin C in the diet since the beginning of the campaign on December 8.

The second also occurred in February, in an officer who ate very little of what food there was available. He complained of great weakness and kept to his bed. Massive oedema rapidly developed, and tachycardia. He was removed to the British Military Hospital which was still functioning, where he died four days later. This was probably an example of acute beriberi, and was the only one encountered by the writer, though others had occurred a few weeks earlier in other camps.

One has felt surprise that vitamin deficiencies were not precipitated in the dysentery cases, either in the acute stage or the weeks that immediately followed, through the metabolic disturbances of the disease and the subsequent
failure of absorption. However, there is no doubt that in this manner was the basis of later deficiency diseases laid down. Observation was to show that dysentery and/or malaria almost invariably figured in the history of severe avitaminosis.

An outbreak of diphtheria which occurred two months after the writer had left this camp (in May) was probably related to the extreme degree of overcrowding which obtained. The effects of lack of ventilation were added, since during the winter months the men who were without blankets kept all the windows hermetically sealed at night. In those months the carrier rate must have been rising steeply.

The effect of defeat and hardship on the morale of men inadequately acclimatized, whose brief military career prior to the Hong Kong campaign had been eighteen months' garrison duty in the West Indies, was very dramatic. For the first month demoralization was complete. There was no open insubordination but a sullen apathy, shown particularly in disregard of personal cleanliness and appearance. No effort was made amongst themselves to lighten their burdens by co-operative effort. At this stage there were no working parties for the Japanese, and the men would spend their days lounging around the corners of huts, the only subject of conversation being food.

In late February and March when food became a little more plentiful efforts made to pull the men together began to achieve success. Books began to come in, baseball matches were arranged and camp chores were organized on a rotary system.

**Officers' Camp, Hong Kong**

This was built on the same lines and for the same purpose as the preceding camp. The design seemed excellent for the purpose and will be described.

These wooden huts lay with the long axis to the prevailing summer winds with the windows East and West so as to avoid the hot summer sun. The windows were spaced six feet apart and there were wide double doors at either end and in the middle, giving the maximum of ventilation.

The roofs sloped to a central peak, where a set of louvres ran the length of the hut. The hut width was about 16 feet—an additional breadth of 2 feet would have been desirable. Unfortunately a space of 6 feet could not be maintained between bed-heads—it averaged between 3 and 5. However, no ill-effects were noted even amongst the batmen, whose beds were almost touching.

The huts rested on a raised concrete base continuous with a level surround and ending in a semicircular drain directly beneath the eaves. This channel was wide enough to carry all the storm water and not deep enough to constitute a physical danger to walkers. There were no rain gutters, a smooth curved surface prevented stagnation and mosquito breeding. These channels eventually joined together and were responsible (together with the sandy gravel on which the camp was built) for keeping the area absolutely dry.

The latrines were of the Asiatic squatting type, with water carriage system. The elderly had difficulty in getting up and down, but amongst those who would use them properly they became very popular. However, 16 for 500 men were not enough.
The latrine-washing-shower accommodation was under one roof exactly similar in size to the living huts. There were two such units, each of three sections; a central open one with two water points, and two lateral, each divided into two portions, a washroom-cum-shower and latrines. The arrangement had two principal advantages. First the ease of construction on the standard type building, and secondly that no hut in the camp was more than 50 yards from the latrine.

The sanitation of the camp was very carefully supervised and refuse either buried or burnt in a Horsfall destructor. As a result flies did not breed in the camp and cases of excremental disease were few and sporadic. Our one small outbreak of dysentery was probably due to a dump of chicken manure which was breeding flies in the close-by camp farm, which was supervised by a non-medical officer. When this was dealt with our fly population sank again, and the outbreak with it.

At another date one case of clinical cholera, confirmed as cholera by the Japanese, who took specimens, occurred. No one else in the camp was affected, not even the patient's mess-mates, who had exactly the same food. There was no native dwelling near and it is difficult to see from whence the infection could have come, and of course the symptoms of rice-water stools, aphonia, cramps and prostration could occur from violent purging from any cause. The case was not fatal. In the absence of pyrogen-free water he was given intramuscular saline.

The medical personnel took a prominent part in camp administration, serving on all committees and wielding great influence. The canteen committee devised a scheme whereby every man in the camp could have a share in a weekly food parcel sent in from outside friends. Another committee reallocated pay from the Japanese, graduated according to rank so that each man in camp had an income. At one time all the food in the camp was issued already cooked together with the Japanese rations, but this was unpopular and canteen goods were then distributed on a hut basis. Since there was no equality of income those with higher pay had rather more canteen goods.

One case of mild diphtheria without complications occurred in March 1943. By Japanese orders the hut in which the case occurred was separated by barbed wire from the rest of the camp. Shallow trench latrines were constructed and also urinals, food was carried to the hut and the utensils were cleaned in the hut area. This isolation lasted a week. It was realized that the carrier rate was probably high and advice was given on the ventilation generally and the desirability of sleeping head to toe and of living and sleeping in the open air as far as possible. There were no further cases.

Before discussing the deficiency diseases, malaria must be mentioned again as sharing with dysentery the distinction of being the strongest predisposing source. Many officers and batmen had acquired the disease before internment, but the writer cannot recall any fresh case of malaria in this camp (partly because 90 per cent had mosquito nets), in spite of the Japanese failure to maintain antimalarial work in the colony.

In the problem of avitaminosis one must not take too seriously the specific
assignment of symptoms to any one particular deficiency, common as it is in the literature. Various authors on a basis of experiment have ascribed nutritional amblyopia to vitamin-A deficiency (now discredited), thiamin and nicotinic-acid deficiency.

Stannus (Lumleian Lecture 1944) considers that a "capillary synergia" due to hyporiboflavinosis causes retrobulbar optic neuropathy. One's doubts on the ultimate value of this tendency are strengthened on reading "The peripheral neuritis in pellagra cannot be relieved by nicotinic acid though it can be by thiamin" (Lewy, Spies, and Areng, 1940).

It is as well to emphasize here that nutritional deficiencies encountered clinically and not experimentally are invariably multiple. As Lombroso said of pellagra "There is no disease, only the diseased."

Improvement but not cure was the writer's experience in general following therapy with a single dietary supplement. Experience stresses the need for comprehensive dietary therapy.

The General Headquarters (India) Medical Research Organization investigated some neurological syndromes in Indian repatriated P.s.o.W. without throwing much light on the aetiology. Those cases presenting marked pellagrous or hyporiboflavinotic conditions received the appropriate vitamin and those where peripheral neuritis was prominent, thiamin—all in addition to a rich diet. Results varied. All showed some degree of recovery, which might have been due to the rich diet alone. The amount of recovery appeared to depend more on the duration of the lesion, its intensity and on its site than on the specific therapy. Cord lesions, for example, were least affected, as one would expect.

Nutritional-deficiency conditions in the officers' camp were not severe in degree.

It is impossible to estimate with any degree of accuracy the caloric, protein, carbohydrate, fat, or vitamin content of the diet in the camp for the period under review, since canteen distribution under the circumstances already detailed could not be uniform and because, though additional food in the form of a share in weekly food parcels was indeed available to everyone, the quantity varied greatly. It is, however, fair to say that the caloric value was not grossly deficient (between 1,800 and 2,500 calories a day), but that protein was low, fats almost non-existent, vitamin A was low until the farm was producing in the spring of 1943, and the diet was certainly inadequate in the B-group vitamin.

Our supply of vitamin preparations was small and mostly smuggled into the camp from outside civilian sources. Thiamin was so low that it was reserved for retinopathies and special cases. We had a little nicotinic acid, but not enough for the larger oral doses, so it was administered intramuscularly in buffered solution. The Japanese sent in some Red Cross supplies of vitamin-A caramels. There was no riboflavin but small supplies of peanut butter reached us from outside sources.

A certain amount of night blindness (due perhaps to vitamin-A deficiency), was present, and was most marked in a group of officers transferred from a bad camp in February 1943. So marked was it in one victim that he had to strike a match once during the night to assure himself that he had not gone blind.
Some degree of peripheral neuritis was almost universal in the camp which showed a loss of pain sensibility below the knees and paraesthesia. Calf muscles were uniformly tender to pressure but neuritic pain was less common. Only 2 cases showed further neurological symptoms, one with loss of vibration sense and light touch below the knees and wasting of the peronei on one leg and some degree of foot drop. He had consistently disregarded medical advice on his diet. The other, in the summer of 1943, developed an ataxic gait and a milder ataxia in his arms, in addition to showing the symptoms of peripheral neuritis detailed above. He had had repeated attacks of malaria, but was not unique in this, so there must have been other undetected factors which determined the cord involvement.

He improved considerably over a long period under thiamin, nicotinic acid, peanut butter and occasional eggs. Neither case showed a retinopathy.

Disturbance in the water balance of the body was common amongst prisoners. One may recall the common ascription of oedema in beriberi to changes in the capillary wall. Marked polyuria was uniformly present, due to the great fluid intake. In addition to the large water content of the rice, about 20 ounces of soup and 30 ounces of tea were taken daily. Nocturnal polyuria was sometimes more pronounced than diurnal, particularly in the elderly. Presumably they were able at night to excrete the fluid which had collected in their tissues during the day. In this connexion, though a slight oedema of the feet and legs developed in the majority during the day and had gone by the morning, many cases showed an oedema of the face in the morning which disappeared during the day. There is also the possibility of some hormonal (pituitary) disturbance, presumably as a result of the diet. That 4 young men out of the population of 500 developed a gynecomastia makes an endocrine imbalance an obvious guess.

It is not thought that the oedema in this camp was due to an hypoproteinæmia. Abelin and Rhyon report a case where normal protein blood chemistry was maintained on a diet of 1,600–1,800 calories a day, with a daily protein intake of 30–40 grammes, and T.T. Sohen does not mention oedema in his 1943 study of 11,338 Chinese soldiers, whose sole protein was derived from 993 grammes rice daily. Though this was considerably greater than our rice ration we had protein supplement denied to the Chinese. Moderate work did not seem to play a part in the inception nor degree of oedema which was not particularly evident in either the farm workers or batmen.

In this camp cases of "electric feet" did not go to the extreme length of pain and distress experienced in other camps. There were some complaints of burning and shooting pains in the feet, legs, worse at night, and a fairly common experience, which the writer shared was that the feet became so tender that to step on a stone unless wearing a thick shoe, was a very painful experience. The skin of the foot became soft and had the pink flesh of a baby. The one severe case of "electric feet" we had, a transfer from another camp, presented a marked atrophic skin and a dusty flush from the accompanying hyperæmia.

Although other observers have reported improvement with thiamin this case responded only to nicotinic acid, thiamin having been tried without effect.
From the first few months of captivity tongues became progressively cleaner and smoother, but, in the early summer of 1943, there was an outbreak of sore mouths, the incidence being higher amongst the gardeners and more energetic batmen.

The features varied, some tongues showed patches of swollen papillae, others were uniformly smooth and shiny. All were very red and fissured, a few were swollen, and some showed ulcers in the fissures. The degree of pain which brought them to the M.I. Room varied from a mild to a severe burning on smoking or eating. An abnormal appearance of the tongue until the end of captivity was the rule among prisoners, though the writer cannot recall complaints of symptoms after this outbreak. One was frequently astonished that such raw, smooth, and fissured tongues, noticed as part of a routine examination for some other cause at a later date, should have caused no pain. Seen frequently in this outbreak was an associated angular stomatitis. One or two had excessive salivation and one a denuded shiny surface to the upper and lower lips, their angry red colours due to underlying dilated vessels. An occasional association was a very painful sore throat which made swallowing difficult. Examination showed dilated vessels below the mucous membrane of soft palate and pharynx. The hard palate appeared normal, sharply separated, by its posterior edge from the crimson soft palate.

There was no striking correspondence between the sore mouths epidemic and the cases of scrotal itching which shortly preceded it. This was also found more often amongst the harder workers. An eczematous condition developed in the worst cases, presumably due to scratching.

The results of what little therapy we could use on these conditions bears out observations on the interrelationship of vitamins. The one case which responded to thiamin has some bearing on Sure and Ford’s work in 1942, demonstrating that in cases of thiamin deficiency there is a pronounced disturbance of riboflavin metabolism. A borderline case of hyporiboflavinosis may be made manifest by thiamin deficiency, and thiamin therapy may prevent the symptoms of insufficient riboflavin intake.

One or two cases of sore mouths responded to nicotinic acid, but the majority were unaffected. The worsening of symptoms of the hyporiboflavinotic element said to occur when nicotinic acid is exhibited (due to its vasodilator action) was not noted. The camp-made yeast seemed to have no effect, but peanut butter brought about improvement to mouths and scrotum though supplies were neither large nor lasting enough for adequate treatment. After an initially acute phase the cases did not get progressively worse, and settled down into being a part of the general picture of ill-health.

One Portuguese (dark-skinned) victim showed in addition the dusky discoloration and brown pigmentation of pellagra, but no bulbous formation. It cleared up with treatment, but as commonly observed with pellagrins in the Orient, the rash recurred in the spring of the following year.

An almost universal skin condition was a smooth scaliness, best likened to crazy paving and most common on the legs. Some showed what was thought to be an extension of this process, a thick dry and roughened scaliness at the
axillary folds and other areas likely to be rubbed with clothes such as thighs and forearms. At the apices of these rough irregularities there were minute quantities of brown pigment as the projections of the top of a potato pie might be burnt in the oven.

From the fifth month and for the following year skin ulceration played a prominent part in camp life. The largest was the size of half a crown, and they were always below the knee, commonly around the ankle and never on the foot where oedema would be controlled by the shoe and the skin protected from injury. A bite or scratch would be the commonest beginning, followed by the signs of inflammation, and considerable pain and oedema, together with a haemorrhagic vesicle which burst about the third day leaving an ulcer. In the chronic state the ulcer had either a clean or a wash-leather base; a serpiginous outline and always a punched-out appearance. Under ordinary conditions one would have thought of syphilis immediately. Presumably a combination of infection and devitalized tissue was responsible. The only two successful dressings we found were iodoform and sulphanilamide powder, applied as early as possible.

The camp was in the hottest area in Hong Kong but although many men had their hair clipped off and wore no hats there were no cases of heat exhaustion or heat stroke, however low our salt intake was. Neither was there a single example of prickly-heat—a peacetime scourge in the colony. Probably more important than our reduced metabolism was our lack of clothes, permitting free ventilation and evaporation (the normal summer wear being a pair of shorts or a G string).

Identification of the cause of the diarrhoea so prevalent in captivity was not easy. The effects of malnutrition (traditionally nicotinic-acid lack) in causing atrophy of the gastro-intestinal mucous membrane was seen at post-mortem examinations in other camps, and doubtless played its part.

Without a microscope one could only guess at the prevalence of intestinal parasites. That amebiasis was present was virtually certain from at least two long-standing cases of dyspepsia, and intermittent diarrhoea in which blood was eventually detected, and who responded to emetine.

The writer feels that a large number of cases was due to a carbohydrate dyspepsia. Where undigested starch reaches the cæcum and ascending colon it is attacked by bacteria with the formation of CO₂ and organic acids, whose irritation causes diarrhoea (Hurst, 1938). The diarrhoea is frothy with escaping CO₂ and was very commonly seen.

Symptoms referable to the eyes began to attract attention in the autumn of 1942, and an eye clinic was established by an I.M.S. Officer at which the writer assisted. The history of every case was recorded with special reference to previous illness, dietary peculiarity and any access to additional food. We were lucky in having test types, and each case had his near and distant vision together with his near point noted. Where failure of distant vision (not due to refractory error) was present a chart of the visual fields was prepared. A perimeter was constructed, but as the changes were found to be central or para-central a Bjerrum screen was considered better for the purpose, and replaced
the perimeter. Examination of several symptomless controls revealed a striking constriction of visual fields for green and red. All retinopathy cases were subjected to ophthalmoscopy. Unfortunately all the notes, together with the charts of all the fields taken, were destroyed by the Japanese.

The conditions presented were night blindness (already mentioned), corneal ulcer, conjunctivitis, increase in refractory errors, "ciliary atonia" and mild and severe cases of retinopathy. Space does not allow discussion of all of these, but the number of corneal ulcers was not large enough to constitute a camp disease, and there appeared to be an increase in existing errors of refraction, estimated by an inmate of the camp experienced in refraction, who had an ingenious method of doing it.

The term "ciliary atonia" was coined for a condition in which the essential was the blurring of print after reading for a variable period yet without any impairment of distant vision. Subjective symptoms were, or might be pain in the eyeballs, headache, lacrimation and discomfort after close work. It appeared about the same time as the retinopathy, and sometimes in the same patient. The response to thiamin therapy was marked, but untreated the condition varied considerably from time to time in the same man. Thiamin was given to the first few cases only, because supplies were small and the condition did not promise (in theory) lasting damage. There was no indication that untreated "ciliary atonia" progressed to retinopathy.

Nutritional retinopathy was viewed with some alarm. From autumn 1942 to April 1944 the writer saw some 120 cases. Each October–March period brought a crop of fresh cases without any outstanding dietary change to explain it, nor were the last series of cases in worse shape than the first. Features which emerged from the history were the frequency of an antecedent malaria, dysentery or war wound which had suppurated, and that moderate exercise did not predispose. In fact only one batman showed the condition and none of the gardeners.

The proportion of older men to the young amongst the sufferers was not greater than that obtaining in the camp as a whole, but the lesions in the elder seemed more severe and developed more quickly than in the young.

The subjective symptoms were similar to those of ciliary atonia but in addition photophobia was usually present (and persisted as long as the process was active). Two or three complained of double vision. Some would say the print became grey and ran together and the worst cases said that the centre of a long word appeared to be missing.

The signs were two, failure of distant vision and the presence of central or paracentral scotomata. In mild cases visual acuity might fall to six-ninths (6/9) or even six-eighteenths (6/18), remaining stationary, fluctuating for a period and then return slowly to 6/6 in both eyes. The time taken varying from a few weeks to a few months. Of these some cases showed scotomata. All were small and relative, that is the red or green spots appeared greyish-white. The vision in severe cases might be down to 6/36 or 6/60 when first seen or, more rarely, deteriorate to that level within a few days. Recovery was slower than in the milder cases and more limited in extent. Scotomata were always
present, the larger they were the more impaired the vision; and were either relative, or, fortunately very rarely, absolute, when the spot was not appreciated at all in the scotomatous area. A scotoma was not observed to develop in a case under treatment. Ophthalmoscopic findings did not correspond with the severity of the symptoms. There was physiological cupping in all cases, somewhat tortuous vessels and constriction of the vein where the arterioles crossed them. The temporal pallor reported by some in 1945 was not observed. The discs appeared hyperæmic, and the general picture was that of hypertension.

When once cured or stabilized there seemed no evident tendency to relapse though this might have been masked in severe cases by the maintenance doses of thiamin they received. This was in line with observations on the deficiency diseases as a whole where, if the patient survived, the lesion did not progress beyond a certain point, and acute symptoms would die down.

With signs of mild peripheral neuritis so common in the camp a convincing correlation between the retinopathy and beriberi was difficult to demonstrate though we felt the connexion was there, visualizing a neuritis of the ganglion-cell layer of the retina. However, neither of our severe cases of beriberi showed a retinopathy. The retinopathy preceded by many months the nicotinic-riboflavin type deficiency, and neither nicotinic-acid therapy (40 mg. intramuscularly) nor vitamin A in fairly large doses produced any effect over long periods. The measures we relied on were intramuscular and dietary supplements. We found the most economical dosage to achieve results was 2,500 units of thiamin on alternate days. Higher and more frequent dosage did not appear to achieve better results in the short period (of necessity) under trial, and a fall in efficiency was seen with dosage of less than 2,000 units.

Thiamin relieved the subjective symptoms speedily with the exception of the photophobia which seemed to persist. Whilst in the mild cases visual acuity returned with treatment to 6/6, and the severe ones were improved, there was no corresponding change in the size of either the relative or absolute scotomata.

Our second weapon of attack on the conditions was an increased diet. When in season tomatoes were given to all cases. All eggs from the farm were devoted to hospital and eye cases, and all severe cases and many mild cases sometimes had one a day. To those who gave us most concern we were able to give ½ pint of milk a day at some periods. All cases were advised to wear dark glasses.

During February 1943 some four months after the condition became recognized and in a time of relative and temporary plenty, we were able to carry out a small experiment. Six cases of varying severity were chosen and a further six whose condition paralleled the first series as closely as our material permitted, were used as controls. Both groups were given 2,500 units of thiamin every other day. The control group fed on camp rations and whatever canteen supplements they had been accustomed to buying, and the group under trial were given a riceless diet of about 3,000 calories a day, consisting of bread (white flour and atta), 2 eggs and ½ pint of milk daily, bully beef and a liberal supply of fresh vegetables. General conditions limited the trial to a fortnight but the results were interesting. Both groups showed improvement, but the cases on "normal" diet showed a quite definite improvement over the controls in distant vision. Scotomata, however, in both groups were unaffected.
Several questions arise from this small experiment—and one may add others from a consideration of the condition as we saw it. Subsequent perusal of some of the literature has not thrown much light on the subject.

(1) Is the condition due to a substance in rice? (Modern opinion seems to be against this).

(2) Had the experimental diet been continued indefinitely would the scotomata (being “caught early”) have cleared up completely?

(3) Did the fact that with the experimental diet a greater degree of recovery was noted though both groups were receiving thiamin mean that: (a) The effect of a combination of naturally occurring vitamins is superior to the administration of the one synthetic vitamin—which does not mean that vitamin-B shortage is not primarily at fault; (b) Is another factor than B, lack, known or unknown in the diet responsible? Stannus says that hyporiboflavinosis can cause the condition (Lumleian Lectures 1944), but cases of retinopathy occurred considerably before the symptoms of hyporiboflavinosis, nor was there any evidence of connexion between the two.

However, we did find that thiamin improved distant vision (in mild cases even to normal), which, since we could exclude refractory errors, meant that the retinal condition responded. Whether the partial response in the severe cases was due to inadequate dosage or irreversibility of the process it is impossible to say in the present state of knowledge. One must bear in mind that we did not prove that improvement did not occur without thiamin and also the possibility that the improvement with thiamin was another example of the interrelationship of vitamins.

Special weight should be given to the views of Kagawa, who in 1938 wrote of the condition amongst the Japanese whose diet resembled in type the P.o.W. He says that it is nearly always found in association with mild chronic beriberi especially where there have been many attacks. He considers it a form of beriberi curable with thiamin, if not chronic.

JAPAN

Observations on medical conditions in Hong Kong were involuntarily concluded by the writer’s removal to Japan. The last fifteen months were spent in four different camps and only salient points will be mentioned here.

The same methods of conservancy were used in all camps. A concrete pit was sunk for several feet. Covering it was a wooden platform with openings covered by hinged lids. The urinals drained into the pit.

For the first week the stench from the latrines was appalling but as the pit began to fill with urine a faecal crust formed, underneath which anaerobic action took place, turning the pit into a septic tank, and the odour lost its intolerable quality. As the tank became full the liquor was baled out, and by the order of the Japanese used as manure within and without the camps. These allotments became the “murmurous haunts of flies on summer’s eve” and throughout the days as well. They bred in their thousands in the latrines and swarmed all over the camp. Doubtless some of the diarrhoea was due initially to the change-over from rice to rice and barley mixture, as the Japanese assured us, but one wonders how much excremental disease was spread by flies. American sources
report 40 per cent of their repatriated Ps.o.W. as suffering from amebiasis. It was remarkable that the Japanese, who pride themselves on their hygiene consciousness, paid so little attention to the fly problem and strongly denied connexion between flies and diarrhoea.

Taken on the whole a worsening of diet with widespread diarrhoea and consequent failures of absorption, combined with gross overwork in factories and mines and following on two and a half years' depreciation did not precipitate a widespread attack of acute symptoms. The writer came across no fresh scrotal or oral symptoms, no return of acute "electric feet." In general it looked as if the prisoners had become adapted to the nutritional level of the Oriental coolie, with general ill-health and only occasionally dramatic symptoms (such as 2 cases of cord involvement and 2 severe retinopathies after six months of these conditions), to call attention to their starvation.

In the Ps.o.W. "Hospital" at Shinagawa, two things stood out, one being the excellent manner in which emaciated men stood up to surgery and the rarity of infection in spite of the most primitive conditions of working, and the other the comparatively good state of the open phthisis cases. Men whose X-rays showed marked infiltration and cavitation had neither raised temperature nor pulse, and a normal or slightly increased blood sedimentation rate. One might imagine that starving the patient had also the effect of starving the tubercle bacillus.

At Shinagawa one had the opportunity of seeing several post-mortems on men dying of malnutrition. There were few macroscopic changes but two cases showed gross fatty changes in the liver, which the pathologist said was a common finding.

All revealed a striking atrophy of the mucous membrane of the whole gastrointestinal tract. The rugae were missing, the surface was smooth and the whole wall greatly thinned. Here, then, was one factor in the ever-prevalent diarrhoea.

**THE LAST SIX MONTHS**

All that the space available allows is to consider the effect of heavy work on the prisoners on a known diet, the two yardsticks being the clinical condition and their weights.

In the first three months the men were engaged in light work; this period followed on a year when Red Cross parcels and pilfering from Japanese supplies were available. Calorie value was about 2,000 a day and obtained from barley and rice almost entirely. The men looked reasonably well fed, and the only signs of malnutrition were "raw" tongues (but symptomless), and the universal occurrence of areas of anaesthesia below the knee, of varying extent and intensity. The average weight was 138 lb.

One has more data for the second period of three months. The men worked ten hours a day seven days a week and heavy work in a copper mine. Diet consisted of rice, barley, small quantities of beans, flour, green vegetables and pumpkin.

The Committee of Food and Nutrition, National Research Council of U.S.A. (1941) lays down as an optimum standard:
On these figures the diet was deficient in the B group of vitamins and in caloric value.

Some authorities, considering the B group and especially thiamin as catalysts in the transformation of energy, calculate the minimum requirements of thiamin as 0.025 mgm. of thiamin per 100 non-fat calories. On this basis the thiamin needed for our non-fatty diet of 2,300 calories would be 0.575 mgm.—very slightly more than our actual intake.

On this diet there was a slight increase in beriberi as shown by an increase in oedema of the ankles and some men complained of paraesthesia. The feet of many men became a little more tender but there was no outbreak of “electric feet” and no acute mouth symptoms, in spite of the low value of riboflavin and nicotinic acid, and the very prevalent diarrhoea which must have interfered with absorption. Noticeable features were the physical exhaustion of the men and a fall in their weights. At the beginning of the last three months the average weight was 138 lb. and at the end of the period it was 132 lb.

At the end of the war men began to put on weight rapidly as food was dropped by U.S. parachutes.

The writer saw many of the prisoners two months after release. Features then observed were a prevalent tachycardia and persistent slight oedema of the ankles; many men showed more oedema than they exhibited during the period of their captivity.

Summary

In this article an attempt has been made to describe environmental conditions as they affected the life of the prisoners of war together with a brief account of the clinical conditions found amongst them.

Any conclusions put forward on this subject of aetiology have been tentative, and a complexity of nutritional disorders has been indicated. The scarcity in treatment of comprehensive dietary therapy has been stressed.