

THE TYPE OF MALARIAL FEVER
PREVALENT IN
THE WESTERN PACIFIC ISLANDS.

By

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1. INTRODUCTION.

That type of Malarial Fever which prevails in the Western Pacific Islands presents certain features which do not appear to have been noted in other localities. I propose, therefore, to attempt to describe that disease as it occurs in that part of the world, drawing my facts from personal observation, made during three years while attached as Medical Officer to the Staff of the Melanesian Mission. During that period I visited nearly all of the numerous islands of Melanesia, under which name are included the New Hebrides Group, the Banks Group, the Torres Islands, the Santa Cruz Group and the Solomon Group. My experience extends more particularly to Santa Cruz, where I made a stay of several months on two separate occasions. And it also embraces Norfolk Island where are situated the Head Quarters of the Mission, and where there is a large school for Melanesians of both sexes.

With the exception of Norfolk Island, Malarial fever is endemic in the above mentioned places. In Norfolk Island it only occurs in native Melanesians who are taken there to school, and in Europeans who have visited or resided in Melanesia. I do not know of a single island in Melanesia which is free from it, though undoubtedly some localities are more unhealthy than others. Norfolk Island is not included in Melanesia, being outside the

Tropics and more than 400 miles distant from the nearest of the New Hebrides.

2. CAUSATION.

Of the nature of the specific poison which gives rise to malarial fever, I do not propose to speak. Investigation on this interesting subject was difficult, if not impossible, in such remote localities, owing to the complete absence of appliances with which to work. I confine myself to the consideration of how this poison enters the body. It is usually stated that it does so through the lungs owing to the patient breathing a malarial atmosphere, but I believe that in these islands at any rate, it is in the great majority of cases due to drinking impure water. Ague occurs in all the natives who drink indiscriminately from any pool or stream. In my own case, during one period of residence in Santa Cruz, I drank water carelessly, without attending to whether it had been boiled or not, and I suffered continuously from attacks of ague. During my second stay there I was careful only to drink water which had been previously boiled, and I was absolutely free from it. Further, the Mission schooner was on one occasion supplied with water from a malarious locality, and her crew, after drinking this water for some time, were one and all attacked with ague. The malarious miasma of which one reads as arising from water in other countries, does not appear to occur in these islands, at any rate not to the same extent. I

lived on the banks of a considerable stream at the sea level for some weeks, and did not suffer as long as the water I drank was boiled. In some islands there is absolutely no water except what collects in the holes and crevices of the coral on the sea shore during the rains, and so there is no marshy place or body of water from which a miasma could arise. Yet ague is prevalent.

But in support of the theory of malarial poison entering the body by the air, I may mention that if a clearing be made in the bush and the undergrowth, and the soil disturbed, the people working in the clearing are peculiarly liable to ague. Quite recently I visited the island of Tulagi, in the Solomon Group, where the Deputy-Commissioner of the English Government had established himself. He had made a large clearing in the virgin bush and various cuttings and excavations in connection with the building of his house, and he found that he and his workmen suffered a great deal from ague while this work was in progress. The same thing occurs in clearings which have been made for the purpose of planting coffee or other crops. These facts may be taken as showing that the malarial miasma may arise from the soil, though apparently not from water.

All Europeans wholly or partially resident in the Melanesian islands are liable to ague. Even sailors who cruise among the islands and never go ashore may not escape, as they get water from the islands. A curious feature is that the malarial poison may remain latent while the patient is in the tropics, and may only appear when

he returns to a temperate climate. Or, although he may suffer at the time, yet a marked exacerbation occurs under the influence of a cooler climate. This is almost invariably the case with the English Missionaries, who under the system of the Mission reside part of the year at Norfolk Island, and part in one or other group of the Melanesian islands. While living in the islands they imbibe the malarial fever and it affects them more or less during their stay there. But it is on their return to Norfolk Island that the full effects are felt and the attacks of ague increase both in frequency and severity. This also holds good in the case of natives. The attacks of ague to which they are subject at Norfolk Island are invariably more severe than those from which they suffer in their own homes. In their case this is probably due to the change of climate, of diet, and to the fact that they wear clothes to which they are unaccustomed in their native state. But in the case of Europeans this does not hold good, for they are returning to their normal conditions of existence. It is not that they are exposed to any great fall of temperature and so catch cold, for Norfolk Island, though outside the tropics, is practically sub-tropical, for the thermometer never falls below 50° Fahrenheit. I confess that I am unable to arrive at any satisfactory conclusion as to the cause of this apparent anomaly.

3. TYPE.

The type of malaria which has come under my obser-

vation is mainly intermittent. The remittent type, although it occurs, is distinctly rare. Consequently malaria in Melanesia does not represent the deadly and fatal features which occur in other malarious localities, such as West Africa or tropical America.

But a more noticeable feature is its great irregularity. There is a complete absence of the regular periodicity which is the most marked feature of ague observed elsewhere. In no case have I observed the quotidian, tertian or quartan types which are spoken of in all textbooks. One may suffer from an attack of ague today and again to-morrow or next week or in six months or a year, but one never knows when an attack is coming until its actual onset has begun. In my own case I have tried in vain to establish any periodicity in the attacks from which I suffered. A patient on one occasion informed me that he suffered from ague regularly every second day, but when he came under my care I was unable to satisfy myself that this regularity of attack actually did occur. Nor does any periodicity exist in the case of natives who are subject to the complaint.

There is, in addition, great variety in the nature of the attack in individual cases. This is noticed even by laymen, and it has often been remarked to me that no one has ague in the same way. In one case the first stage may be so slight as almost to escape notice, and the second and third prolonged and severe. In another the first stage may be severe while the second is slight, and the third not well marked. In many cases no stage is

distinct but all are blended in one. This is popularly known as blind ague. The malarial poison seems to seize upon that system or organ which may be the weak spot in each individual constitution, so that in one case symptoms of digestive disturbance are most prominent, in another nervous symptoms, and in a third cardiac; and so on. And thus each individual idiosyncrasy modifies the action of the poison.

Amongst the natives each individual is more or less saturated with ague poison. The malarial diathesis is in many cases most marked. The natives speak of the disease as "the coldness" and each individual from time to time lies down with an attack, which in due course passes off, and the patient gets up to resume his ordinary avocation as if nothing had happened. There is universal enlargement of the spleen, especially noticed in children. I estimate that at least 75% of the population have enlarged spleens. My colleague, Dr Welchman, of the Solomon Islands, puts the percentage still higher. Any slight illness or derangement of the digestive or respiratory systems brings on an attack. This is especially noticeable among the black school-boys and girls at Norfolk, who indulge in a surfeit of fruit of any description, or who may be the subjects of a slight cold.

4. CLINICAL HISTORY.

A. Intermittent Type.

(1) In the case of natives. I will describe an ordinary attack as it occurs in a boy at Norfolk Island.

He does not rise some morning, or he lies down again after he has once got up. He complains of headache and sometimes of pains in his back and limbs. His pulse is about 80 or 90, but he is not hot or feverish. Presently he complains of nausea and may vomit, but this symptom is not so common as in the case of Europeans. Then in a little while he says he is cold, he collects all his own blankets, and as many more as he can lay hands upon, and he lights a fire and lies in front of it. His teeth chatter, his limbs twitch and he shivers violently. His pulse now becomes faster - from 100 to 120, and his temperature will be found to be high, perhaps 103° - 104° , and continues to rise, although he says he is cold and his extremities are cold to the touch. This goes on for from a half to two hours, but I have usually found that the first stage in natives is comparatively short. Then a change comes on. The shivering ceases, he becomes comfortably warm, then hot, and then extremely feverish. His temperature now attains its maximum, and may be anything from 104° - 106° or even higher, accompanied by a full, bounding pulse which varies with the temperature up to 140 beats per minute. His thirst is excessive and the nausea may continue, but usually passes off. This stage usually continues about 2 hours. At length sweating begins, at first moderate, but rapidly becoming profuse. Temperature and pulse fall together, and in a short time the patient goes off to sleep, to awake next morning comparatively well, and, unless expressly forbidden, will go about his duties as usual. Many variations

from this ordinary type occur, but it is rare in natives to see it any worse than what I have described.

(2) In the case of Europeans, speaking generally, the symptoms are more marked than in natives. When one has already suffered from several attacks of ague, one can always tell when an attack is coming on. One feels languid and inclined to sit or lie down, and even sometimes sleepy. If at this stage one can take some quinine and a warm drink, and go to sleep, it very often serves to ward off the impending attack. Failing that the patient complains of headache and yawns continuously, stretches himself and says he is thirsty. But though he is glad to drink, he has an absolute repugnance for food, and more particularly for anything of a fatty nature. The very thought of eating makes him feel sick. Presently he remarks how chilly he is and asks for a fire, gets a thick overcoat, or if he knows what is coming, generally goes straight to bed. Now he begins to shiver and soon becomes very sick, vomiting constantly and profusely until he has thrown off all the contents of his stomach and even then continues to retch in a most distressing way. This symptom, which is barely mentioned in the textbooks to which I have had access, is a most marked feature. I have seen patients, utterly exhausted by the vomiting alone, without taking the fever into account. It continues frequently into the hot stage and sometimes, but rarely, into the final stage. The first stage goes on for from 1 - 2 hours, during which time the temperature is rising up to 102° - 103° , and the pulse is proportion-

ately quickened.

The second stage is ushered in by the patient becoming much more comfortable. He stops shivering and gets warm. But he is consumed with an unquenchable thirst, which he appeases only to vomit more violently than before. He speedily becomes intensely hot and his temperature is now 104° , but rarely higher. I never saw a white man's temperature go up as high as a black man's in an attack of ague. The second stage is often very short, it may be only one hour in length, but it is usually from 2 - 3 hours, though it may be prolonged for 6 - 8 hours.

Finally the third stage begins. The skin of the face becomes moist, and the other parts follow suit. Then a sweat breaks out, at first slight, but quickly becoming copious. The patient's pyjamas and blankets, and even the mattress on which he is lying, become soaked with perspiration and have to be changed, but notwithstanding the discomfort thus caused, the patient feels languid and weary and utterly unable to do anything but lie still. The temperature rapidly falls, taking the pulse with it. When at length the sweating ceases, it leaves him completely washed out. He, however, is now able to take some nourishment of a light character, and goes off to sleep, to awake feeling perfectly well except for the weakness which the attack has caused. This third stage is often greatly prolonged and may last 12 hours in severe cases.

B. Remittent Type

This type does not often occur as simple malaria, but is more frequently seen when ague complicates an acute disease such as pneumonia, bronchitis or phthisis. When it occurs alone its onset is similar in the main to the intermittent variety, but the hot stage is greatly prolonged, it may be for 24 hours. Sweating may occur and the temperature fall, but it does not reach the normal and next day, or even in a few hours a rise again takes place. This, unless checked, may go on until the patient's strength is utterly exhausted and death ensues. But such a result is extremely rare within my experience.

5. COMPLICATIONS AND SEQUELAE.

(1) Alimentary System. Some comparatively trifling stomachic derangement is often the exciting cause of an ague fit. I have seen this very well marked in the case of boys who have stuffed themselves with guavas or other fruit, or who, as these Melanesian boys are fond of doing, have caught a large number of fish and freely indulged. The boy complains of abdominal pain and his temperature flies up to 105° or more in a most alarming way. Until I grasped the true meaning of the very high temperature, I was frequently startled and puzzled to account for it in the absence of other symptoms. Constipation is not unfrequently the exciting cause of an ague fit.

The alimentary system is in almost all cases the first to feel the onset of the malarial attack. There is

epigastric uneasiness, nausea and vomiting, which, as I have already pointed out, is more intense in this form of malaria than is described in the textbooks. The bowels are usually constipated. The liver is invariably more or less affected by the malarial poison. It is enlarged in long standing cases, and after an attack of ague the patient may complain of a feeling of soreness and heaviness in the region of the liver and in the back and shoulders. I have not seen a marked case of jaundice resulting from ague, but the stools are often light coloured from the absence of bile. In the case of Melanesians, however, the colour of their skin may mask the jaundice.

(2) Haemopoietic System. The spleen may be said to be enlarged in all cases of ague during and after the attack. It is chronically enlarged in most natives, sometimes enormously so, and this tendency to marked enlargement appears to run in families. I had a patient at Santa Cruz whose spleen filled up the whole of his abdomen except the right iliac region, and his enormous and distended belly was a marked contrast to his limbs which were small and shrivelled. His relations were subject to a similar condition, and the natives remarked that all his people had big bellies. I once saw a case of acute enlargement of the spleen in a young girl, a native of Santa Cruz. She was subject to ague, but there was no ague attack in connection with this splenic enlargement. The spleen was very tender with acute pain on even gentle palpation. The condition lasted a week, but finally yielded to treatment by quinine and opium.

A very marked characteristic of this type of malaria is the constant enlargement of the lymphatic glands. I have not seen this mentioned in any textbook on the subject. In any case after two or three attacks of ague you will find enlargement of the glands under the jaw, in the neck, and posterior triangle, in the axillae, the inguinal region, the popliteal space, and may be elsewhere. This enlargement may yield to treatment with arsenic or quinine, but more frequently becomes chronic, especially in the natives. These glands very often become inflamed and suppurate, forming an abscess, so that surgical interference is necessary. This condition is very common, even more common than scrofulous glands in Great Britain. In no class of case is one more frequently called upon to give relief. I have seen three distinct abscesses in the same axilla at the same time, due to three separate glands having become inflamed and having suppurated. This surely points to extreme virulence in the malarial poison.

The blood of patients who suffer from repeated attacks becomes very impoverished, and anaemia is sometimes very marked.

(3) The Circulatory System is not apparently much affected except by the febrile condition in the first and second stages of the attack, whereby the rapidity of the heart's action is much increased. Valvular lesions of the heart are fairly common among natives who suffer from ague, but I have not been able to make out any definite relation between the two conditions. It is always ex-

tremely difficult to obtain any reliable family history from natives, and as rheumatism is also very common, it is more likely that the cardiac lesions arise from that source.

(4) Respiratory System. Here as in the Alimentary System, a slight derangement such as an ordinary cold, suffices to cause the temperature to rise to alarming heights. Acute affections of the lungs in a malarial subject are always complicated by ague. And in such a case there is a marked tendency for the ague to assume a remittent type. This was well seen in a case of pneumonia which was under my care at Norfolk Island. The patient was a girl aged about 15 or 16, a native of the Solomon Islands, The temperature kept very high with daily remissions, but never reached the normal for ten days, and even then continued to rise above normal at various times in the 24 hours. The only drug which would reduce it was antifebrin. Quinine appeared to lose its effect. The patient finally recovered and is now married and living in her own island. Where cases of phthisis are complicated by ague they are more rapid in their progress than they otherwise would be.

(5) Integumentary System. The condition of the skin is varied according to the stage of the attack. In the first stage it is cold to the touch and in the condition known as goose-quill. In the second stage it is hot and dry, and in the third stage moist and sweating copiously. In persons who suffer repeatedly from ague the skin acquires a peculiar lemon-coloured tint. That

is, of course, in the case of Europeans. Ague has a marked effect upon the hair, turning it grey in quite young men.

(6) Urinary System. The secretion of urine is increased in the first stage of the ague attack, but diminished in the second and third stages. That passed in the latter stages presents the usual features of febrile urine, being very highly coloured, and depositing urates on cooling. Albuminuria is sometimes present in malarial subjects, but I have not found it to be of constant or even frequent occurrence.

(7) Nervous System. That there is marked disturbance of the heat regulating mechanism is evidenced by the variations in the body temperature during the three stages of the fever. Delirium is occasionally present during the second stage of the attack, but is not common in my experience. The headache may be very severe in the first and second stages, especially above the orbits. This is known as brow-ague. It is at times so intense as to eclipse all the other phenomena of the attack, the patient being unable to raise his head without crying out, and photophobia is also sometimes present.

Neuralgia is a very common sequel to ague, especially in those persons who are run down by successive attacks. It is occasionally persistent but usually yields to quinine. Sleeplessness also is apt to follow on an attack more particularly in that class of case known as blind ague, to which I have already referred.

6. TREATMENT.

A. Prophylactic. I have already stated that every European residing in these islands of Melanesia is liable to malarial attacks. But with care this liability may be diminished to a very considerable extent. Great care should be exercised in the selection of a site for a dwelling-house. It should not be built at the sea level under ordinary circumstances, but an elevation of from 100 to 200 feet is desirable. Ague is to a large extent induced by low living and insufficient food, a sudden change from European diet to native food and by a change of environment generally. Therefore it is desirable to live in as comfortable a style as is possible. The food is necessarily mainly tinned, but native fruits and vegetables may be made use of with advantage. All drinking water should be boiled before use. I would insist on this point as most essential. Alcohol, especially spirits, should be avoided, but I consider a light lager beer is very beneficial. I have found it very advantageous to have a fire in one's bedroom every night as that dries the air, and does not increase the heat. And sleeping as one does in the tropics in the airiest of garments, it renders one less likely to get a chill.

Quinine is most valuable as a preventive and should be taken by any one liable to ague who may be wet or over-fatigued. The difficulty is to know when an attack of ague is coming on, owing to its great irregularity, but those who have experienced many attacks can nearly always make a diagnosis in time to ward it off. I have found gr. 5

ample and do not consider larger doses to be necessary except in exceptional cases.

B. Remedial. When the attack has come on efforts should be made to make the patient as comfortable as possible, In the first stage he should be put to bed, and the sheets should be removed from the bed and extra blankets piled upon it. If necessary, hot water bottles may be used. Give him hot drinks - hot tea is very grateful, and a hot whiskey and water will do no harm. The vomiting should be controlled by Bromide of Potassium gr. 5 - 10, and failing that an excellent and successful remedy is a neutralised solution of Bicarbonate of Soda and Tartaric acid. It acts like magic in most cases. Ice is useful to suck, if it can be procured, but it seldom is.

In the second stage warm drinks should be given to relieve the thirst and induce perspiration. A dose of salts is useful at this stage, especially in natives who are often very constipated. If the sweating be delayed or insufficient to lower the temperature, antipyrine may be exhibited with advantage and also quinine and anti-febrin. In this case large doses of quinine may be necessary. A hot bath may be useful to induce sweating, and if the temperature remains persistently high, it may be necessary to put the patient in a cold pack.

In the third stage when perspiration is well established, little need be done except to guard against the risk of a chill, and to see that the patient's bed

clothes are changed as they become wet and cold. Some light, nourishing food should be given before the patient drops off to sleep, which he will soon do as a general rule.

The resulting weakness is best treated with quinine, iron and arsenic, or a combination of all three. When the patient is anaemic and suffers from very frequent, though not necessarily severe attacks, it is very effectual to give a powerful dose of iron and quinine once a day in the early morning, giving as much as 12 drops of the strong Liquor Ferri perchloridæ, and 5 grains of the sulphate of quinine in an ounce of water.

The various complications and sequelae call for such treatment as may be indicated. It is usually only necessary to see that the patient has a light nourishing diet, and that his bowels are well open. When glandular enlargement has gone on to suppuration, it will be necessary to open the abscess and evacuate the pus.

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