

MALARIA.

BY

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*M*ALARIAL FEVER is a morbid condition due to the presence in the blood of certain animal parasites which produce pyrexia of a periodic character. This disease is prevalent all over India, and in some parts 92 per cent. of the population is affected. The following figures taken from the Annual Report of the Sanitary Commissioner with the Government of India give one an idea of the extent to which the disease exists in the Army in spite of the prophylactic measures taken:—

The average daily strength of the European Army was 68,933.

The number of admissions to Hospital for Malaria was 16,824 or 244 per thousand. If Malaria exists to such an extent under well regulated conditions what must its ravages be amongst the general population in India?

The disease is due to the presence of a protozoon in the red blood corpuscles which develops in the blood and internal organs, and is carried by the mosquito from one human being to another. This protozoon is a unicellular organism, and there are three varieties, each producing its own set of symptoms which clinically distinguishes it from the others.

These varieties are—(1) The Benign Tertian in which the "fever" comes on every other day,
(2) The Quartan "fever" every 4th day,
(3) The Sub Tertian or malignant in which the "fever" is irregular, coming on in most cases daily.

The malarial parasites in the first two varieties develop in the circulating blood, while in the 3rd variety the development of the parasites takes place in the capillaries of the internal organs; hence this variety is particularly dangerous on account of the blocking of the capillaries when an important organ like the brain is concerned.

The Malarial Parasite is carried from man to man by the mosquito, and in the mosquito it undergoes development. This development is a sexual one, while that which takes place in the human body is asexual.

The particular variety of mosquito that carries malaria belongs to the Anopheline group, and this group has many characteristics which differentiate it from the Culicine group (the common house mosquito belongs to the latter group).

To begin with the eggs.—Anopheline eggs are laid separately and they lie on the surface of the water in Vs, Ns, & Ms, or in a network; they are long, oval eggs much like a sausage in shape.

Culicine eggs are laid together side by side so that they stick together and form a raft which floats on the surface of the water.

Anopheline larvæ lie parallel to the surface in the water, while the *Culicine larvæ* lie at an angle with the surface. Their hinder end possesses a breathing tube which touches the surface.

The full grown mosquito.—*Anophelinæ* sit with their tails up in the air and their heads down on to the surface on which they are resting.

Culicinæ are "hunch backed" mosquitoes; their heads and tails point to the surface on which they are resting. As a rule their wings are not spotted.

THE AGUE FIT.

Every one is familiar with the symptoms during a fit of ague. There are usually three stages through which the patient passes. There may be some premonitory symptoms, such as headache, loss of appetite, perhaps vomiting, and if the thermometer is used a slight rise of temperature may be noted.

(1) *The cold stage* sets in with shivering; the patient complains of feeling very cold, and wishes to cover himself with all the clothes he can get hold of. The temperature during this stage is several degrees above normal. Young children may have a convulsion during this stage. This cold stage lasts about an hour.

(2) *The hot stage.* The patient after shivering begins to feel warm, the face is flushed and the pulse rapid and full; vomiting may be frequent and headache intense. The temperature may be 104 or 105. This stage lasts about three hours.

(3) *The sweating stage.*—The patient, after suffering for 2 or 3 hours breaks out into a profuse perspiration. The temperature declines rapidly and a general feeling of comfort takes the place of the distress. This stage lasts from 2 to 4 hours.

The duration of a fit of ague varies from 6 to 10 hours and usually comes on between midnight and mid-day.

The sudden onset of the fever and the three stages through which it passes distinguish malarial fever from other conditions associated with pyrexia.

PROPHYLAXIS.

(1) Our first attention should be directed to the mosquito, for if there were no "carriers" there would be no disease. The mosquito breeds very rapidly, and measures to exterminate this pest must be very thorough. The eggs are deposited on water; small collections in old tins, tubs or in the drains about a house form excellent breeding places, as here the water contains a sufficient amount of organic matter for the larvæ to live on.

Taking the Culicine eggs as an example.—These are laid in small rafts which to the naked eye are spindle shaped, and about half the size of a grain of wheat, dark brown in colour, and each raft containing about 150 to

200 eggs. Under ordinary circumstances in India these eggs hatch out in 48 hours and that portion of the egg in contact with the water bursts and liberates the minute larva which immediately swims about in the water in search of food. In cold weather this hatching may be delayed to 3 or 4 days.

If the water on which the eggs are deposited is clean, *i. e.*, if it does not contain organic matter, the larvæ die of starvation, while if it contains this the larvæ feed greedily and grow very rapidly from minute bodies to well-developed, worm-like bodies that wriggle about in the water. As these larvæ must have air to breathe they come to the surface and rest there; the breathing apparatus is near the hinder extremity and the larvæ when resting look as if they were suspended by their tails. After eating and growing for 7 to 10 days the larva then passes into a stage in which it is called a "Pupa." In this stage it looks like a small Tadpole, *i. e.*, it is a dark coloured ball with a small tail. The Pupa does not feed, but breathes and moves about in the water. The breathing tubes instead of being on the tail are now on the back, *i. e.*, on the ball of the tadpole-like body. This stage lasts about 2 days and the full grown mosquito bursts through the Pupa case, and after sitting on the case and drying itself, it flies away to live a life of its own.

If an egg raft be put into a tumbler of water and this covered with a piece of gauze the whole process of development can be watched. The precaution of putting in some dead insects when the larvæ make their appearance should not be forgotten, as these will supply the larvæ with their food.

Anopheline mosquitoes develop in the same way and our endeavours should be directed towards the breeding places. All pools of water should be cleaned out; old tins, buckets and other receptacles should be buried and not thrown about. Those collections of water that cannot be cleared out should have a small quantity of kerosine oil poured on the surface: this excludes the air and the larvæ are suffocated.

Next—Measures should be taken to prevent persons being bitten by mosquitoes. This is efficiently done by the use of mosquito curtains, and living in mosquito proof houses in malarial localities. The experiment undertaken by Doctors Sambon and Low is interesting. They lived in one of the most malarial localities in Italy for three months, occupying a mosquito proof hut, *i. e.*, a hut with wire gauze on the doors and windows fine enough to exclude the entrance of mosquitoes. They moved about freely during the day in the neighbourhood, drank the water of the place, and beyond retiring to their hut from sunset to sunrise, they observed no precautions. These Medical men did not develop malaria although the disease was rife in the peasants and others living in the locality. This would show that if one is not bitten by an infected mosquito one will not develop the disease.

(To be continued.)