

## BILHARZIA.

The incubation period of Bilharzia is between one and two months, *i.e.*, after being infected through the skin and the larvae conveyed to the liver, a period of one or two months elapses before the adult worms are mature; they then make their way via the portal vein and its tributaries, against the stream, to the bladder or rectum in order to deposit their ova under the mucous membrane of these organs. The ova are eliminated in the urine and fæces which are perhaps ejected into water.

Briefly the cycle which follows is this:—

### VARIETIES OF BILHARZIA WORMS IN AFRICA.

1. There is the *Schistosoma* which has man for its definite host, of which there are two species: the vesical with its terminal spine ova, and the rectal with its lateral spine ova. The latter has not been found in patients who belong to Likoma; it has been found in the hospital of the Universities Mission on this island situated on Lake Nyasa, but always in people from the mainland, both east and west.

The 2nd and 3rd do not concern us; one requires cattle for the host and the other a bird. Dr. Christopherson thinks a duck. One interesting fact is that the Bilharzia of South Africa is entirely of the terminal spine variety, so Rectal Bilharzia is not met with as a rule there.

In regard to biological facts the Bilharzia worm is a typical di-genetic trematode worm.

Di-genetic—undergoing two cycles of development—with a sexual cycle in the portal system of the definite host, man, and an asexual cycle in the digestive organ of the intermediate host which is a fresh-water snail.

A trematode is a sucking worm usually flat with an oral and a ventral sucker and a primitive alimentary canal.

Briefly the cycle of the worm is this. Given a suitable temperature and ample dilution of the urine or fæces, the ovum hatches into a larva called the miracidium which swims about in search of the intermediate host, the fresh-water snail, which, if it comes across it within 24 hours, it penetrates, making its way to the digestive gland; it then becomes a smooth walled sac, known as the sporocyst; this buds and forms daughter cysts; these increase and occupy the interstitial tissue of the digestive gland, and the snail grows in bulk and changes colour from purple-brown to yellow-ochre, and an infected snail is yellow-ochre in colour.

The larvae or cercariae develop from the interior of the daughter cysts, and the snail discharges these into the water or puddle that it is inhabiting. The larvae possess a body with two suckers and a tail with a biped end.

By a process of looping and swimming the larvae or cercariae reach the human host, generally while he is bathing or immersed in the water, and gain entrance either through the skin or mucous membrane of the mouth; they avoid the sweat glands and hair follicles. They then shed their tails and the body passes by the veins via the lungs to the human liver, where they become adult Bilharzia worms and the cycle commences again.

Bilharzia is not merely a local disease, the symptoms of which are due to the mechanical irritation of the ova acting as foreign bodies. It produces a definite degree of eosinophilia. It affects the general health of the individual and the whole nation adversely—physically, morally (soldiers), and economically. It has been spreading fast in Egypt and the Sudan, and 10 per cent. of the deaths in Egypt are due to Bilharzia and its complications.

*Method of Examination.*—The urine should stand for half an hour, and the sediment be taken up in an ordinary glass pipette. For hatching observations 1–10th c.c. of urine deposit is taken, and diluted with 10 c.c. of water at about 130 Fah.; naturally it hatches in a puddle or pool in the sun in the tropics.

Dr. Christopherson, consultant to the Tropical Diseases clinic, Ministry of Pensions, a Bart.'s man, did his spade work, and made his name experimenting on the worms and ova at Khartoum where he was Director of the Khartoum and Omdurman Hospitals. He began the treatment of Bilharzia with antimony tartrate injections in 1917. It had been tried in Trypano Somiasis as far back as 1906. He established his theory that these injections cure the individual and also are prophylactic, as the patient ceases to be a Bilharzia carrier, which means that we have in antimony a practical means of eliminating Bilharzia as an endemic disease on this island and in Nyasaland where Dr. Wigan estimated a few years ago that 86 per cent. of the people suffer from it.

The injection kills the parent worm in the liver and sterilizes the ova in the bladder or rectum as the case may be. According to Dr. Christopherson's observations the deposited ova may disappear early, but that does not determine the dose. Ova continue to be eliminated in batches for one or two years after the parent worms have died, *i.e.*, after a completed course, but these ova will be found to be sterile, and by continually examining the ova the dose is determined.

It is interesting to note that the drug appears in the blood stream as antimony tartrate and not as a complex derivative of antimony, as is the case when tartar emetic is given by mouth, the lethal dose of which is very small grains;  $\frac{1}{3}$ th is the B.P. dose.

The diagnosis made—care should be taken if there is a large quantity of albumen in the patient's urine to find out if this is due to blood or to renal disturbance—the drug may, and should, be used in complicated cases, but with more care and more observation than can be given in the treatment of out-patients.

*Method.*—Preparing the skin—if veins are very small and difficult it facilitates matters to use alcohol instead of iodine.

Children are difficult to inject, and it is not always easy to find veins in adults; immersing the limb in hot water and "hanging it down" may help; also stroking the veins towards the tourniquet will help to bring them into prominence.

A sterile syringe in carbolic 1 in 20 and always washed after use in clean sterile water is all that is needed, and great stress is laid on boiling the solution in a glass flask always before use, and if necessary filtering it through a sterile filter. The watch glass or gallipot, or whatever the solution is placed in, in order to draw it up, must be sterile. Small needles are best and of course sharp platinum for choice, but expensive.

It is best not to give an injection just before a meal, the ideal time is two or three hours before food is taken. It is important that the patient should be kept quiet for half an hour after, not necessarily in the recumbent position.

When the dose is  $1\frac{1}{2}$  to 2 grains, a cough immediately after, even before the patient is off the table, indicates that the drug is already in the pulmonary circulation. If severe the subsequent dose may have to be reduced. Sips of water are given.

The parent worms in the portal veins do not require much protection. The ovum with its chitinous shell is more resisting, but the miracidium hatched in a puddle requires to be able to resist all manner of adverse conditions whilst it is searching for the mollusc in order that it may fulfil its destiny. It is therefore the most hard of the three.

An ovum is not a loose foreign body and may take months to come away after the patient is cured.

Every patient cured of Bilharzia ceases to be a carrier, so this helps very materially to check the amount of Bilharzia in the country, and is no mean contribution to the welfare of the community.

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