RECENT EXPERIMENTS ON THE LIFE-HISTORY OF ASCARIS LUMBRICOIDES.

BY

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RANSOM and FOSTER have published a preliminary account of experiments on this subject, in the *Journal of Agricultural Research* of November 19th, 1917. They found that a repetition of my experiments on the feeding of rats and mice with ripe ascaris eggs gave results agreeing very closely with those recorded by me in the *BRITISH MEDICAL JOURNAL* of July 1st, October 7th, and December 2nd, 1916, and in *Parasitology* of February, 1917. In addition to these experiments they made further attempts to infect pigs with *Ascaris suilla*, but with negative results. Their experiments were conducted on pigs several months old, and they suggest that the failure of these and of other experiments may have been due to the animals employed being past the age of greatest susceptibility to infection. It may be well to explain that in this experimental work the pig may be substituted for man, and that any facts proved regarding the development of *Ascaris suilla* in the pig may be assumed to hold true for the development of *Ascaris lumbricoides* in man.

In an experiment conducted in September, 1917, ripe eggs were administered to a pig two weeks old. This animal died seven days thereafter, and ascaris larvae measuring from 0.7 to 1.2 mm. were found in the lungs, trachea and pharynx. This experiment agrees with those published by me in the *Indian Medical Gazette* of August, 1917, and in *Parasitology* of January, 1918.¹

Ransom and Foster also found an ascaris larva in a fragment of the lung of a pig aged six weeks that had died from unknown causes, and in the intestine of which they also found numerous immature ascarids, the largest about 50 mm. in length. They state that guinea-pigs are susceptible to pulmonary infection with ascaris larvae.

Summing up our present knowledge of the larval development of this worm, it has now been established that the ripe eggs of ascaris will hatch in the intestine of man, the pig, rat, mouse, and guinea-pig, that the larvae enter the blood stream of the host, pass through the liver and heart to the lungs, there migrate from the capillaries into the alveoli, and thence through the bronchi and trachea to the pharynx. They reach the lungs and trachea between the sixth and eighth days after infection. Further, in the mouse the larvae then migrate down the alimentary canal and are passed alive but not active in the faeces from the tenth to the sixteenth day.

I have recently been able to perform three additional experiments on young pigs. Two of these, A and B, were four days old at the commencement of the experiment, the third, C, was aged two months and ten days. To both A and B a dose of about 22,000 ripe eggs of *Ascaris suilla* was administered, to C about 50,000. The embryos in these eggs were moving actively, and the cultures were tested on rats and proved infective, larvae being subsequently found in the lungs. A and B suffered from ascaris pneumonia on the eighth day after infection; C showed no sign of pulmonary trouble.

Pig A was killed on the fourteenth day, and young forms of ascaris, measuring between 2.5 and 3.8 mm., were found in great number in the small intestine and caecum. Their heads had lost the appearance of the larval head and had taken on the adult head character. Pig B was killed on the nineteenth day, and although there can be no doubt that on the eighth day the lungs contained thousands of active larvae, not a single worm was found in the stomach, small intestine, caecum, or colon. The nature of the faeces found in the colon proved that the pig was not suffering from diarrhoea due to excessive infection, which might have accounted for the disappearance of the worms. Pig C was killed thirty-one days after infection, and again no worms were found in the intestine.

These experiments are puzzling. In the case of A the increase in size of the worms to 3.8 mm., when the largest larva found in the intestine of mice measures 2.37 mm. and in the lung of the pig 1.5 mm., and the assumption of the adult head character amount almost to proof of the theory of direct development without an intermediate host. The disappearance of the worms in B five days later may or may not have been accidental. Further experiments

are required on direct infection and on the possibility of the infection of the definitive host by the larvae passed in the faeces of mice.

Pulmonary Ascariasis in Man.

Lutz,² in recording the experiment performed in Brazil in 1887, in which he administered ascaris eggs to a woman aged 32, states that the woman suffered during the first few days from acid dyspepsia, followed by unusually severe bronchitis, with slight remittent fever. This confirms the observation of Mosler,³ and proves that the passage of the larvae through the lungs, even of adult man, may give rise to pulmonary symptoms. Thirty-five worms were passed by this woman under anthelmintic treatment, and about ninety-six eggs had been administered to her in doses of about twelve at a time throughout the course of a month.

My thanks are due to Dr. Keatinge, Director of the School of Medicine, Cairo; to Mr. Branch, Chief Veterinary Inspector to the Egyptian Ministry of the Interior; and to Mr. Casdagli, for the means of carrying out the above experiments.

REFERENCES.

¹ BRITISH MEDICAL JOURNAL, 1918, i, p. 266. ² *Centralbl. f. Bakt. und Parasitol.*, 1888, p. 425. ³ Leuckart, *Menschliche Parasiten*, II, pt. 1, p. 222.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

LUMBAR PUNCTURE IN ECLAMPSIA.

I do not know to what extent lumbar puncture has been tried in cases of eclampsia, but a note on a case in which I used it with apparently satisfactory results in Belfast Union Maternity Hospital may be of interest.

The patient, a primipara, had had fourteen fits, which were increasing in severity, the first being six hours before puncture. She was comatose between the fits. Eighty cubic centimetres of cerebro-spinal fluid were withdrawn, the puncture being made above the last lumbar vertebra. Subsequently she had five fits, decreasing in severity. The puncture was performed at 1.30 p.m., and she spoke a few words in reply to a question about 6 p.m., and drank a little during the evening. The last fit was about 7 p.m. Natural dilatation was waited for, a little chloroform was given, and forceps were used for final delivery, which took place eighteen hours after the puncture. The fetus was stillborn; it had evidently been dead for some time, the cord being green. The albumin disappeared from the urine in a few days, but headache persisted for about the same time. She was discharged from hospital quite well a fortnight later. The fluid came with a little rush at first, and afterwards about one drop per second. It was clear and limpid, specific gravity 1008, very slightly alkaline; albumin was present, but no globulin. Fehling's solution was slightly reduced, giving a reddish-yellow deposit.

The usual routine treatment was carried out from the start—namely, washing out the stomach and bowel, mist, alba being left in stomach. The contents of stomach were a dirty green. Morphine gr. $\frac{1}{4}$ and atropine gr. $\frac{3}{8}$ were injected. Normal saline was injected into the rectum, and, as she was full-blooded and cyanosed, 15 oz. of blood were withdrawn from the arm. Linseed poultices were applied over the renal area.

It cannot, of course, be said how far the other treatment was responsible for the improvement in this case, but the fits were becoming more severe and the coma was deepening before the puncture, and afterwards the fits were less severe and the general condition of the patient seemed distinctly improved. Her condition looked very grave, and I decided to try the withdrawal of some spinal fluid experimentally as an alternative to Caesarean section or leaving her to the sedative treatment alone.

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It is reported that a deposit of pitchblende showing a high percentage of radio-active substance has been discovered on the Kingswood Estate, Buckfastleigh, Devon.

J. C. CASTRO (*Siglo Medico*, 1918, p. 690) states that beriberi occurs much more frequently in Spain than is generally believed. It is particularly prevalent in Avila, Estremadura, and Hurdos. He records a case seen by him at Barquillo (Avila) in a man whose diet consisted almost entirely of potatoes. Rapid cure followed a change of residence and the use of a diet more varied and richer in vitamins.