A CASE OF DEPOSITION OF THE EGGS OF *HEPATICOLA HEPATICA* IN THE HUMAN LIVER.

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WITH A NOTE ON THE IDENTITY OF THE EGGS.

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In September, 1923, an autopsy was performed on a British soldier aged 20, with a total service of four years, the last three of which were in India.

The clinical symptoms were chiefly those of a septic pneumonia and in view of the post-mortem findings death from pyemia was returned.

Extracts from post-mortem findings:

"A large number of superficial abscesses widely scattered in both lungs immediately beneath the pleura—on section of the lungs the abscesses were seen to be typically wedge shaped."

"Liver-weight seventy-eight ounces. On section an abscess (size three inches by two inches) was found in the right lobe which discharged thick creamy pus: the abscess had a sponge-like appearance due to the fusion of numerous points of suppuration."

No pathological changes were noted in any other organ or tissue.
Sections of the lung and liver were cut for microscopical examination.
No evidence of infection with tubercle or *Entamaba histolytica* was found in these tissues, and there had been no history of such infection.
Deposition of Eggs of *Hepaticola Hepatica* in the Human Liver

In the liver in proximity to the abscess were found masses of eggs which have been identified by Lieutenant-Colonel W. P. MacArthur as those of *Hepaticola hepatica*.

No corresponding condition was found in the sections of the lung. A staphylococcus was isolated from the pus of both liver and lung.

The pathological sequence in this case would appear to be nematode infection, deposition of eggs in the liver, suppuration *in situ*, secondary infection of the lungs, i.e., a condition of pyæmia resulting in death.

We are indebted to Major J. A. Cruickshank, I.M.S., of the Pasteur Institute, Coonoor, for the provision of facilities for the examination of tissues, and to Lieutenant-Colonel A. W. Gibson, R.A.M.C., the Officer Commanding, British Station Hospital, Wellington, Madras, for permission to publish the above notes.

**Note by Brevet Lieutenant-Colonel W. P. MacArthur, R.A.M.C.**

The liver sections forwarded by Major Dive show a heavy deposition of trichurine eggs which lie mainly in the interstitial tissue between the lobules, a few being actually intralobular. The masses of eggs have become encysted by the formation of a definite fibrous tissue wall. The liver tissue in contact with this is undergoing pressure atrophy and disintegration. There is no small round-celled infiltration, nor other sign of acute inflammation. Consequently the abscesses described by Major Dive must have resulted from some secondary infection to which the damaged condition of the liver would render it particularly susceptible.

Many of the eggs have collapsed, but favourable specimens showing recognizable characters can be found. The outer shell is radially striate and closely applied to the inner shell. There is a terminal opercular plug at either pole. The eggs have a familial resemblance to those of *Trichuris trichiura*, but differ in very obvious respects. In shape and structure they are indistinguishable from those of *Hepaticola hepatica* (Bancroft, 1893) Hall, 1916. Further, as regards size, ten of the more perfect eggs in the liver sections gave an average measurement of 55.2 µ by 30.3 µ, and ten eggs similarly selected in sections of rat liver infected with *Hepaticola hepatica* averaged 55.4 µ by 29 µ.

Consequently I have diagnosed the infection as due to this Nematode.

There are no worms in the sections examined, but these do not include the portions of the lesions most likely to contain worms, or their remnants, if these should still persist.¹

*Hepaticola hepatica* belongs to the family Trichinellidae, which includes the whip-worm of man, *Trichuris trichiura*, and another occasional human parasite, *Trichinella spiralis*.

*Hepaticola hepatica* is normally a parasite of rats, and was first described by Bancroft (1893) under the name *Trichocephalus hepaticus*.

¹ See postscriptum.
Fig. 1.—Section of human liver, showing eggs of *Hepaticola hepatica*. × 60.

Fig. 2.—Section of rat liver, showing eggs of *H. hepatica*. × 60.

Fig. 3.—(Drawn with camera lucida.) A—Three eggs of *H. hepatica* in section of human liver; B—Three eggs of *H. hepatica* in section of rat liver; C—Complete *H. hepatica* egg in scraping of the liver from which the section shown in B was prepared. (For dimensions of eggs, see text.)

Fig. 4.—Transverse section of *H. hepatica* in human liver. 
(See postscript.) × 100.

Hall (1916) created the genus *Hepaticola* for this species, but Railliet (1916) regarded Hall's genus as only doubtfully distinct from the genus *Eucoleus* Dujardin, 1845, several species of which parasitize the lungs of various animals. However, the generic validity of *Hepaticola* appears to be generally accepted at present.

Rats can be infected experimentally by the ingestion of ripe eggs, and this presumably constitutes the natural mode of infection.

The eggs hatch in the intestinal canal, especially in the cecum, and the larvae penetrate the wall of the gut. After an interval varying from a few days to a fortnight, larvae are found in the liver, the migration having taken place mainly by the blood-stream. Fülleborn (1924) observed that occasionally larvae may be found in the lungs. After maturation the females deposit large numbers of eggs in the liver tissue, and finally the adult worms die and are absorbed. According to Bancroft (1893) this takes two to three weeks. Severe infections cause an intense reaction in the liver, and many animals perish as a result. In mild cases the liver recovers itself and presents a normal appearance except for the presence of eggs and some resultant cirrhosis.

The means by which the eggs leave the body of the host is uncertain. Bancroft failed to find any evidence of passage through the bile ducts, but Hall (1916) quotes Railliet as stating that he found eggs in the feces of infected rats, an observation which requires to be confirmed. The eggs require some weeks' exposure to oxygen in order to mature, and the contained embryos may remain alive for at any rate two years and five months. Consequently it seems possible that infection may be transmitted by the ingestion of eggs liberated from the host's body in the natural process of disintegration after death.

In connexion with the curious development of this parasite it is interesting to note that the whip-worm of man, *Trichuris trichiura*, has been shown by Fülleborn (1923) to infect the intestine directly, there being no migration of the larvae in the process of development.

As mentioned above, the rat is the normal host of *Hepaticola hepatica*, and infection has been recorded in several species of these rodents.

Nicoll (1911) described eggs somewhat resembling those of *Trichuris* or *Trichosoma* in the liver of a hare. The case has since been recorded as a possible infection with *H. hepatica*. In a close scrutiny of many hundreds of eggs of this species I could find none with a close resemblance to Nicoll's figures.

The present instance is the first recorded occurrence of *Hepaticola hepatica* in man.

Professor R. T. Leiper, F.R.S., very kindly provided the infected material used for the rat liver preparations illustrating this note. I am also much indebted to Lieutenant-Colonel H. E. R. James, R.A.M.C.(Ret.), for making the drawings reproduced in fig. 3.

*Postscriptum.*—In order to search further for the presence of worms,
4 Deposition of Eggs of Hepaticola Hepatica in the Human Liver

I asked for some material from the periphery of the liver lesion. Since writing the foregoing note this has arrived and has been found to contain pieces of several mature female worms. Unfortunately the tissue was prepared originally for sectioning for histological purposes which makes a satisfactory examination of the worms extremely difficult. The characters discernible up to the present, however, are confirmatory of the identification recorded above. (See fig. 4, which shows sections of the worms in the liver.)—W. P. MacA.

REFERENCES.


