Notes on Helminths from Panama.

II. Rare Human Nematode Eggs in the Feces of Individuals from the Chagres River, Panama.

by

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II. RARE HUMAN NEMATODE EGGS IN THE FECES OF INDIVIDUALS FROM THE CHAGRES RIVER, PANAMA

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In a preliminary communication (Faust, 1931) brief mention was made of the finding of Capillaria (vel Hepaticola) hepatica and Gongylonema eggs during intensive routine fecal examinations of the human population of the Chagres River basin, Republic of Panama, in 1930. During this survey practically all of the individuals in five small, closely associated villages were subjected to three consecutive fecal examinations. Altogether 440 persons were included in the series. The population is negroid, having mostly migrated from Jamaica and settled in the area a generation or so ago. In addition to a high infective parasite index (3.0), including 31.8 per cent infection with Endamoeba histolytica, 42.9 per cent with Ascaris, 73.4 per cent with Necator, 44.3 per cent with Trichocephalus and 19.5 per cent with Strongyloides stercoralis, certain members of the group passed eggs in their feces which have rarely been recorded from man.

CAPILLARIA HEPATICA EGGS

In nine individuals, three from one village (Las Vegas), two each from Guabalito and Gatuncillo, and one each from Santa Rosa and Las Huecas, the original fresh fecal specimens contained typical eggs of Capillaria hepatica (vide Baylis, 1931). Interestingly enough all of these persons were related by birth or marriage and frequently visited one another. In two of the cases the eggs were relatively common; in six they were relatively few; in one they were found only after centrifugation of the specimen. It was realized that while this parasite is quite common as an hepatic infection in rats, only one authentic human case was on record, also a liver involvement (MacArthur, 1924). The question therefore arose as to how the eggs of this worm might be discharged in human feces. Subsequently fecal examination was negative for seven of the nine individuals, but in two the eggs were recovered plentifully in both gross films and concentrates. Sputum and urine of all nine were consistently negative for the eggs.

It was determined to bring one consistent “egg passers” (a young married female) to the Santo Tomas Hospital in Panama City for ob-

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1 Contribution from the Parasitology Laboratory, Department of Tropical Medicine, Tulane University, New Orleans, La., and from the Gorgas Memorial Laboratory, Republic of Panama. The material which forms the basis of this study was obtained during the summer of 1930, when the writers were guests of Dr. H. C. Clark, Director of the Gorgas Memorial Laboratory.
servation and possible treatment. On the day of admission the stool was still positive for *Capillaria hepatica* eggs. After purgation with magnesium sulphate only hookworm and *Ascaris* eggs were found. Administration of 3 cc. tetrachlorethylene resulted in the passage of 46 necators and 1 minute *Ascaris*. Subsequently 2 ounces of fresh leche de higueron produced no further discharge of worms. Examination of fluid recovered through a duodenal tube was also negative. During a subsequent ten-day period in the hospital the stools remained negative for helminth eggs. It was concluded, therefore, that this patient, and probably the other cases, were not actually parasitized by the worm, *Capillaria hepatica*, but that the eggs passed in the feces had been ingested as contaminations and discharged in an essentially unaltered condition through the intestinal tract of these individuals.

![Figure 1](image)

*Fig. 1. Eggs of Capillaria hepatica from human feces, Chagres River, Panama. a, surface view, showing symmetrical channeling; b, optional view, with morula-stage embryo inside. Camera lucida, x 1000.*

The source of the contamination was the next subject of inquiry. The persons who passed the eggs vigorously denied that they ever ate rats, uncooked, or cooked, but admitted that rats commonly infested their huts. No other animals were kept in the homes of these families except dogs and cats. There remained three possible explanations: (1) rats parasitized with *C. hepatica* had died and decayed in or near their homes and had contaminated food or drink of the individuals; (2) dogs or cats had eaten parasitized rats and the feces of these animals had contaminated food or drink of the “positive” persons; or (3) the persons who passed the eggs had eaten livers of dogs infected with *C. hepatica* (Wright, 1930). The latter two hypotheses seem the more likely explanation. Unfortunately opportunity to test these hypotheses by autopsy of village dogs and cats was refused. Since the preliminary
publication, (l.c.) Vogel (1932), has recorded the presence of *C. hepatica* eggs in the feces of a young male in French Guinea. This investigator believed that the eggs were merely *en transit* through the human intestine and had been derived from an infection in the livers of wild rats, which he found commonly to harbor the parasite in that area. Likewise, Sandground (1933) has reported the passage of this type of egg in the feces of a native woman at Mt. Silinda, Southern Rhodesia, in which vicinity field mice are usually heavily infected with the worm.

Most of the eggs seen by us were in the blastula stage (Fig. 1, a, b), although a few were as immature as the two-cell stage. They measured

Fig. 2. Photomicrograph of *Capillaria hepatica* in liver section of infected rat. ×1000. (Original.)

55–59 µ by 27–30 µ. The majority appeared to be viable, but attempt to induce further embryonation by culturing them on moist sand, moist charcoal or moist blotting paper, with and without weak formalin solution, were all negative. That these eggs were actually those of *Capillaria hepatica* can be readily determined by comparison of the camera lucida sketches (Fig. 1, a, b) with a photomicrograph of eggs of this species in a section of a rat's liver (Fig. 2). On the basis of Baylis' description (1926) of the egg of the related species, *C. gastrica*, which lacks the striated or channeled sculpturing of the outer shell so characteristic of *C. hepatica* eggs, the eggs found by us cannot be confused
with those of species inhabiting the stomach. It is clear, however, that the Chagres River "infections" were not actual infections but were merely contaminations, and that the only authentic record of human infection by this nematode is the one reported by MacArthur (l.c.).

GONGYLONEMA EGGS

In one adult male, resident of the village of Gatuncillo, examined during the 1930 survey, eggs identical with those of Gongylonema pulchrum were recovered from the feces once out of three examinations. These eggs (Fig. 3) measured $51.2 \times 27.2 \mu$, were light lemon-colored,

![Fig. 3. Egg of Gongylonema from human feces, Chagres River, Panama. Camera lucida, $\times 1000$.]

had a thick, regular oval shell, which was quite refractive, and possessed a thin wrinkled outer membrane. Within the shell there was a tightly coiled, mature or nearly mature, rhabditiform larva. In view of the fact that the eggs were found in only one of three fecal examinations, and in the absence of any physical signs or clinical evidence of Gongylonema or other spiruroid infection in the individual examined, it is logical to believe that this was probably not a human infection but a contamination of the digestive tract.

Supporting this view is the following epidemiological evidence. The village in which the man lived was the only one in the Chagres River group where pigs were tolerated. The house in which he lived was built over a pigsty and he himself tended the pigs. Feces of these pigs contained eggs identical in character to those recovered from the man. Cockroaches were very abundant around the house and might be easily eaten as food. While the person examined was probably not actually infected, as indicated by the evidence, conditions in the immediate vicinity were favorable for human infection.

COMMENT

The more recent helminthological literature, particularly that from Asia, has indicated the relatively common confusion between true and
false helminthiases, especially distomiasises, including data on *Fasciola* and *Dicrocoelium* eggs in human stools acquired from consumption of infected sheep and goat livers (Strom, 1927, Curran and Feng, 1930, Tarassoff, 1932, *et al.*), as well as the eggs of a fish trematode in human stools after consumption of infected fish (Tubangui and Francisco, 1930). In pseudo-infections, where the diet of the patient was controlled, the eggs of the fluke ceased to appear. One of us (E. C. F.) once found a spiruroid egg in the feces of a Chinese medical student; repeated subsequent examinations proved negative. Likewise *Ascaris lumbricoides* eggs are not uncommonly found in the feces of coprophagous dogs. In order that the literature may not be burdened with pseudo-helminth records inseparable from actual infections, it is important to check each suspected case and to determine its real status.

**Literature Cited**


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