The Incidence of Animal Parasites of the Brown Rat *(Rattus Norvegicus)* in Tippecanoe County, Indiana

Raymond M. Cable and William Hugh Headlee, Purdue University

Introduction

The common rat, in addition to being a destructive pest, is known to serve as host for a number of animal parasites which also occur in man. Perhaps all of the major groups of endoparasites may be represented by species common to both man and rats. Among the cestodes, *Hymenolepis nana* and *H. diminuta* are common parasites of both man and rodents, and the cysticercus of the pork tapeworm of man, *Taenia solium*, is occasionally reported from rats. The hydatid cyst of *Echinococcus granulosus* and the cysticercus of *Taenia hydatigena* are occasional parasites of both human beings and rodents. In addition to these, the larval stages of certain tapeworms of domestic animals parasitize the rat. *Cysticercus fasciolaris*, the larval stage of *Taenia crassicollis*, the cat tapeworm, is a cosmopolitan parasite of the rat, and the larva of *Taenia pisiformis*, the tapeworm of the dog and rabbit, is also reported occasionally from rodents.

Certain species of nematodes also find both man and rats suitable hosts. This is especially true of *Trichinella spiralis*, *Syphacia obvelata* and *Hepaticola hepatica*. The acanthocephalan, *Moniliformis moniliformis*, has also been reported from man and rats.

Most of the protozoa of rats are described as distinct species, but in certain cases perhaps the only demonstrable difference between species in man and those occurring in rats is that different hosts are involved. For example, *Endolimax ratti* is morphologically indistinguishable from *E. nana* of man. Chiang (1925) claims that *E. ratti* is a valid species since he was unable to infect rats with *E. nana*. However, Kessel (1923) had previously claimed to have infected rats with the human species. Another protozoan, *Endamoeba muris*, is very similar to the human species, *E. coli*. The importance of the rat as a reservoir host of the plague bacillus is well known and calls for no emphasis in the present discussion.

Since the rat serves as host for a number of parasites which may become established in man and domestic animals under suitable conditions, a study of the incidence of animal parasites in rats of the Lafayette region appeared desirable.

Materials and Methods

Many rats were killed in Tippecanoe County last February when the flood forced hundreds of them from their burrows along the Wabash River. The animals examined in this study had been dead for over a day when obtained, and many of them seemed to have been frozen. For this reason, the material did not afford a favorable examination for intestinal protozoa. In certain cases, however, positive diagnoses of protozoa were possible.

The blood, diaphragm, intestine, and feces of the rats were examined.

The blood examination was made by diluting a small amount of blood with normal saline and examining under the microscope. In searching for *Trichinella*, a portion of the diaphragm was compressed between glass slides and examined. Intestinal parasites were detected by slitting the intestine along its entire length and scraping out the contents into a finger bowl of normal saline and examining with a low power binocular microscope. In making the coprological examinations, a bit of fecal material was removed from the large intestine and examined microscopically for protozoa and for ova and larvae of helminths.

Observations and Discussion

The parasites noted and the incidence of infection are listed in Table I. The incidence of *Tritrichomonas* infections is lower than that usually observed, due to the unfavorable condition of the material examined. In all cases of infection with *Trypanosoma lewisi*, the parasites were very active. This resistance to unfavorable conditions is surprising, and the high incidence of this parasite is unexpected in view of known facts concerning its life-cycle. The high incidence may be due either to mass infection or to latent infections that may have been released from inhibiting factors by the lowered resistance or death of the host. In the latter case, there must have been a rapid post-mortem multiplication of the trypanosomes. When the condition of the host and activity of the parasites are considered, this seems entirely possible. Viability of the trypanosomes was determined by inoculating uninfected laboratory rats. The result was heavy infections, which were observed during a period of several weeks.

TABLE I.

INCIDENCE OF ANIMAL PARASITES OF THE BROWN RAT (RATTUS NORVEGICUS) IN TIPPECANOE COUNTY, INDIANA

Parasite	No. Inf.	% Inf.	Parasite	No. Inf.	% Inf.
Tritrichomonas muris...	6	15.0	Hymenolepis diminuta.	3	7.5
Trypanosoma lewisi.....	19	47.5	Hymenolepis nana.....	3	7.5
Endolimax ratti.....	1	2.5	Trichocephalus muris..	1	2.5
Eimeria nieschulzi.....	2	5.0	Trichinella spiralis.....	1	2.5
Cysticercus fasciolaris...	35	87.5	Nippostrongylus muris.	30	75.0
			No. of rats examined...	.....	40

The high incidence of infection of *Cysticercus fasciolaris* and the fact that usually a single cyst was found in the liver of each rat is in accord with the experimental results of Miller (1931). Since the incidence of this parasite is high, it is likely that rats are frequently exposed to infection, and, if the presence of a single cyst did not stimulate an immune reaction on the part of the host, it seems that cases of

multiple infection would be more frequent than the present observations indicate. The maximum number of cysts recovered from a single rat was five, while by experimental feeding of tapeworm eggs, it is possible to recover over 100 viable cysts in a single case (Miller, 1931).

Nippostrongylus muris is a common parasite of rats and has been used extensively in investigations concerning immunity and host-parasite relationship. This nematode was originally described as *Heligmosomum muris* by Yokogawa (1920), who found the species of common occurrence in Norwegian rats taken in Baltimore, Maryland. Lane (1923) erected the genus *Nippostrongylus*, thereby separating it from other genera of the subfamily Heligmosominae, chiefly on the basis of the asymmetrical bursa of the male.

Literature Cited

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