



ON THE QUESTION OF HUMAN INFECTION BY NEMATODES  
OF THE FAMILY MERMITHIDAE  
(DORYLAIMIDA: ADENOPHORA)

by

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ABSTRACT

Certain representatives of the nematode family Mermithidae (Dorylaimida: Adenophora) have been reported as accidental parasites of man. Since specific mermithids are now being released for the biological control of insects, the above reports are disturbing. The present study reviews all cases that could be found of alleged mermithid parasitism of man and discusses them in relation to nematode identification and evidence of actual parasitism. In conclusion, human infection by mermithid nematodes cannot be answered at this time and should be accepted as a fact when proven experimentally or when parasites are found developing in situ.

INTRODUCTION

Members of the Mermithidae (Dorylaimida: Adenophora) commonly parasitize insects, although spiders, crustaceans, leeches and molluscs are also attacked. Even with this extended host range, it is surprising to learn that mermithids have been also cited as parasites of man and are the only group of entomogenous nematodes to be reported as such. In their catalogue of worms reported for man, Stiles & Hassall (1926) list the mermithid, Agamomermis restiformis (Leidy) as occurring in the urethra and being passed in the urine of man. Neveu-Lemaire (1936) mentioned that A. restiformis had been found twice in man and considered these cases as accidental parasitism. In regards the same parasite, Foster (1963) stated "although physiological conditions in man differ profoundly from those found in its usual insect hosts, the parasite may establish itself and remain within the body for long periods".

Some species of mermithids are now being mass produced and used in nature as biological control agents, and others offer much potential in this direction and are likely to be used similarly in the future. As a consequence, the question of human infection becomes even more acute since with a wider distribution, could mermithids become a health hazard?

The purpose of this study is to critically review all known cases of alleged mermithid parasitism of man, including a re-examination of the original specimens when possible, and to discuss them in relation to nematode identification and evidence of actual parasitism. Two new cases are also presented.

Abbreviated title: human infection by Mermithidae

Index key words: Mermithidae, entomogenous nematodes, human parasitism, accidental parasites.

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## MATERIALS AND METHODS

Specimens and assistance for this study were received from the following persons: S. Prudhoe, Department of Zoology, British Museum of Natural History, London, who loaned the material described by Baylis (1927); L. A. Leon, Laboratorio de Parasitologia y Medicina Tropical, Quito, Ecuador, who supplied a previously unrecorded mermithid allegedly passed by a boy; W. R. Nickle, Plant Nematology Laboratory, Beltsville, Maryland, sent a previously unrecorded mermithid allegedly passed by a human; A. Morgan Golden, Plant Nematology Laboratory, Beltsville, and Gordon W. Vacura, curator, Medical Museum, Washington D.C., attempted to locate the type material of Agamomermis restiformis (Leidy); and S. L. H. Fuller, Academy of Natural Sciences, Philadelphia, Pennsylvania, attempted to locate Agamomermis hominis oris (Leidy).

All specimens were either cleared in lactophenol or processed to glycerin before examination.

## RESULTS

All cases of mermithid nematodes allegedly passed by humans that were located by the author are discussed below in chronological order. An attempt was made to examine the diagnostic characters of each specimen and confirm its identity.

1. Agamomermis hominis oris (Leidy) = Filaria hominis oris Leidy 1850. Location - Described from a single preserved specimen labelled "obtained from the mouth of a child" (Leidy, 1850). Description - Body thread-like, white, opaque; length 140 mm; greatest width 0.38 mm; head round; width at head 0.101 mm; tail obtuse, width 0.317 mm; tail bearing a spike 0.050 mm long and 0.013 mm wide at base. Comments - Although the type specimen has been lost or misplaced and is not available for study (Fuller, personal correspondence, 1973; Stiles, 1907, indicated that it probably had been destroyed), the description fits that of a mermithid. Also, Leidy (1875) later identified some mermithids collected from an apple as Mermis (= Hexamermis) acuminata and stated that they could have been the same species as A. hominis oris. He also collected a similar mermithid from codling moth larvae which explains how a child might have encountered the parasite. Stiles (1907) also reported finding mermithids from apples. Thus, although we cannot definitely reconstruct the circumstances surrounding the presence of a mermithid in a child's mouth, it is possible that it came from an insect that was ingested by the child directly or indirectly (through eating infested fruit).
2. Agamomermis restiformis (Leidy) = Filaria restiformis Leidy (1880). Location - Said to have been removed from the urethra of a man in the United States. Description - (After Leidy, 1880) (Figs 8 and 9). Vivid red in colour and very active when collected; 66 cm long, greatest width 1.5 mm; caudal end curved, bluntly rounded; lacking an anus or genital aperture. Mouth a terminal pore without lips, papillae or any kind of armature; pharynx cylindrical, opening into a straight cylindrical intestine which apparently ends in a blind pouch; body width at neck region 0.375 mm, width at beginning of intestine 0.625 mm; width at curved caudal extremity 1.5 mm; length of oesophagus 1.125 mm. The following supplementary description is taken from Stiles (1908) (Figs 7 and 10). Cuticle composed of several concentric layers, 32  $\mu$  thick on anterior portion and 48  $\mu$  thick in tail region; head bearing 6 papillae; pharynx represented by a cuticular tube, 17-26  $\mu$  in diameter, surrounded by pharyngeal tissue reaching 130  $\mu$  in diameter; pharyngeal tube meets a blind sac which is directed anteriorly; no genital organs were observed; cross sections show 6 muscle fields separated by longitudinal chordes. Comments - Unfortunately, the type specimen of A. restiformis could not be located in the Armed Forces Institute of Pathology Medical Museum. Apparently the specimen was either lost or misplaced as a result of many physical moves of the museum (Vacura, personal correspondence, 1973). Thus, any interpretations on the identity of this nematode have to be based on the published accounts of Leidy (1880) and Stiles (1908). As the latter author mentioned, the presence of 6 longitudinal chordes, cross fibres in the cuticle, cuticular lining of the pharynx and a suggestion of a blind intestinal sac are characters found in members of the Mermithidae. However, the amount of tissue surrounding the pharyngeal tube and the association of this tissue with the intestine suggests that the specimen might belong to another nematode