ACANTHOCEPHALA OF THE GENUS *MEDIORHYNCHUS* FROM EGYPT, WITH DESCRIPTIONS OF TWO NEW SPECIES

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INTRODUCTION

The collections of Acanthocephala from Egypt made by the United States Naval Medical Research Unit No. 3 in 1953 and 1954, under the direction of Dr. Robert E. Kuntz, included a number of specimens of the genus *Mediorhynchus*. Representatives of this genus have been reported from birds in many parts of the world. In addition to the specimens from birds in the Egyptian collections, there was one collection, PE 1281A, which contained four specimens from a mammal, the gerbil *(Sekeetamys calurus = Meriones calurus)*. The writer is not aware of any previous records of this genus from mammals. However, members of certain other genera, such as *Centrorhynchus* and *Pseudoporrorchis*, have been recorded from mammals as well as birds. It is well known that there is a lower degree of host specificity in the Acanthocephala than in other groups of parasites.

In the genus *Mediorhynchus* the proboscis is divided into two regions, the anterior with hooks, and the posterior with small spines. The posterior region is broader than the anterior. The testes are located posterior to the middle of the body and there are six to eight ovoid cement glands. The eggs are without a compact covering. A comprehensive review of the genus has been given by Van Cleave (1947).

The writer wishes to express her appreciation for the technical assistance of Rosemary Gaisser and Diane Roddy, research assistants.

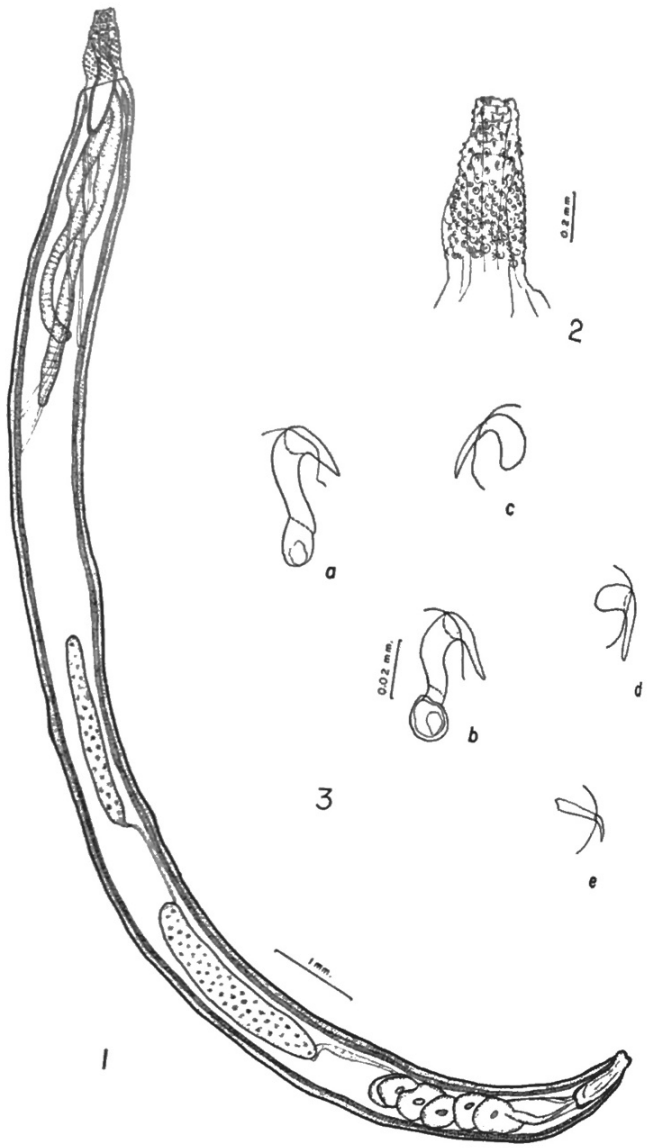
DESCRIPTION OF SPECIES

Mediorhynchus tenuis Meyer, 1931
(All measurements in millimeters)

Males (Fig. 1) 9 to 16 in length by 0.9 in maximum diameter. Females 22 to 42 in length by 1.2 in maximum diameter. Proboscis (Fig. 2) cylindrical, 0.70 in length by 0.35 in diameter at base. Anterior hooks in 14 spiral rows of 9 hooks each. Poterior spines in 24 spiral rows of 10 each. Anterior hooks (Fig. 3a,b) measure 0.05 in length. Posterior spines (Fig. 3e) measure 0.03 in length. Hard-shelled embryos about 0.05 by 0.03.

All specimens of *Mediorhynchus tenuis* were collected from birds of the family Turdidae in Giza Province. The following is a list of hosts:

Oenanthe isabellina (Isabelline chat). Collection nos. PE1477A, PE1534A, PE1543A, PE1566A (one male and three females, each from separate hosts).



Oenanthe hispanica melanoleuca (Spanish wheatear). Collection nos. PE1472A, PE1520A, PE1533A, PE1536A (one male and three females, each from separate hosts).

Oenanthe oenanthe oenanthe (wheatear). Collection nos. PE1519A, PE1567A (two females, one from each host).

Monticola saxatilis (rock thrush). Collection nos. PE1603A (one female), PE1908A (one male and one female).

Monticola solitarius (blue rock thrush). Collection nos. PE1601A, PE1609A (two females, one from each host).
Locality: Giza Province, Egypt

Plesiotype specimens in Parasitology Collection, Department of Zoology and Entomology, University of Tennessee, and Department of Parasitology, U. S. Naval Medical Research Center, Bethesda, Md.

[1] This investigation was supported by a grant (GB-1320) from the National Science Foundation.

Meyer (1932) reported this species from *Monticola solitarius* (rock thrush) and *Saxicola bimaculata* (chat) in Egypt. *Oenanthe isabellina, O. hispanica melanoleuca, O. oenanthe oenanthe,* and *Monticola saxatilis* represent new host records. The males of our collections included specimens somewhat larger (16 by 0.9) than those described by Meyer (12 by 0.5). Our collections included two mature females measuring 42 mm. in length; all other females were immature. Although Meyer's description included mature females, the maximum length was 33 mm. *M. kuntzi* Ward, 1960, was described from *Burhinus senegalensis* (stone curlew) in Egypt. This species shows a distinct pseudosegmentation of the body which is lacking in *M. tenuis*. Lundström (1942) described *M. murtensis* from *Oenanthe oenanthe oenanthe* in Sweden. This bird is known to migrate between Sweden and Egypt. The proboscis of *M. murtensis* is armed with 20 spiral rows of large hooks, while that of *M. tenuis* is armed with 14 to 16 spiral rows. In other respects these two species are very similar.

The low incidence of infection among other species of *Mediorhynchus* has been noted by Van Cleave (1947). The definitive bird hosts feed upon insects which serve as hosts for the developmental stages of the parasite. The birds do not feed on larger arthropods or vertebrates that might serve as reservoir hosts to concentrate the larval parasites.

Mediorhynchus taeniatus (von Linstow, 1901)
(All measurements in millimeters)

Body cylindrical with very pronounced pseudosegmentation. Males 15 to 25 in length by 0.5 to 1.0 in diameter. Females immature, 9 to 44 in length by 0.5 to 1.1 in diameter. Proboscis a truncated cone, 0.78 to 1.0 in length, 0.5 to 0.7 in diameter at base. Anterior region of proboscis armed with 6 diagonal rows of 5 hooks each. Posterior region of proboscis armed with 34 to 40 longitudinal rows of 9 to 14 spines. Anterior hooks measure 0.10 to 0.15 in length; posterior spines measure 0.02 to 0.04 in length. Proboscis sheath 1 to 1.9 in length by 0.16 to 0.4 in diameter. Lemnisci 2.6 to 4.9 in length. Testes, located in posterior region of trunk, 1 to 1.9 in length by 0.3 to 0.47. Eight oval cement glands.

Host: Chlamydotis undulata (houbara or bustard)

Collection no. PE3487A (about 250 specimens)

Locality: Near Salum, West Desert, Egypt

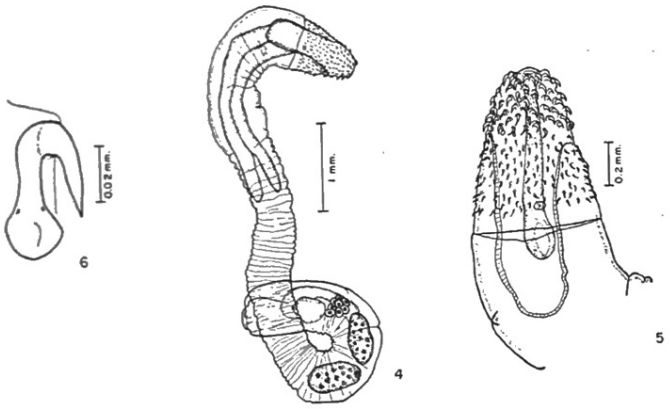
Plesiotype specimens in Parasitology Collection, Department of Zoology and Entomology, University of Tennessee, and Department of Parasitology, U. S. Naval Medical Research Center, Bethesda, Md.

The size of specimens, as given by Meyer (1932), is about equal for males and females, 90 to 115 in length by 2.5 to 3 in diameter. The specimens in the present collection are immature and much smaller, but can be recognized as *M. taeniatus* on the basis of the proboscis hook number and arrangement. Africa is the only locality from which this parasite is reported. It has been reported (Meyer, 1932) from *Numida ptilorhyncha, N. rickwae, Otis tarda, O. macqueenii* (= *Chlamydotis undulata*), *Oedicnemus crepitans* and *Choriotis arabs*. Dollfus (1951) reported this species from *Chlamydotis undulata* in Morocco. It appears that Egypt is a new locality record for this species.

Meyer (1932) placed this species in the genus *Empodius*. According to Meyer, the proboscis sheath of *Empodius* is divided into two parts, while the sheath of *Mediorhynchus* is a single sac. Van Cleave (1947) has pointed out that Meyer mistakenly interpreted a portion of the musculature for retraction of the neck as a part of the proboscis sheath, and, in Van Cleave's opinion, there was no sound morphological basis for erection of a new genus. Apparently Yamaguti (1963) disagrees with Van Cleave, since he has proposed the genus *Empodisma* to replace *Empodius*.

Mediorhynchus leptis n. sp.
(All measurements in millimeters)

Description: With the characteristics of the genus *Mediorhynchus*. Body cylindrical, slightly swollen in anterior region. Pseudosegmentation present except in anterior swollen region. Males (Fig. 4) 6 to 8 by 0.52 to 0.65 in maximum diameter. Female 6 in length



by 0.7 in maximum diameter. Proboscis (Fig. 5) in form of truncated cone, 0.57 to 0.77 in length by 0.5 to 0.75 in diameter at base. Large hooks on anterior region of proboscis in 18 spiral rows of 6 hooks each. Spines on posterior region of proboscis in 26 spiral rows of 11 spines each. Large hooks (Fig. 6) 0.03 to 0.045 in length, with roots slightly longer. Spines on posterior region 0.01 to 0.015 in length. Proboscis sheath 0.62 to 0.72 by 0.34. Lemnisci 2.6 in length. Testes located in posterior part of body, 0.57 to 0.62 by 0.26 to 0.3. Eight cement glands, each measuring 0.1 in diameter. Females are immature and do not contain ensheathed embryos.

Type host: Falco tinnunculus (falcon)
Collection no. PE1629A (I female, 3 males)

Locality: Zawiet Abu Musallam, Giza Province, Egypt

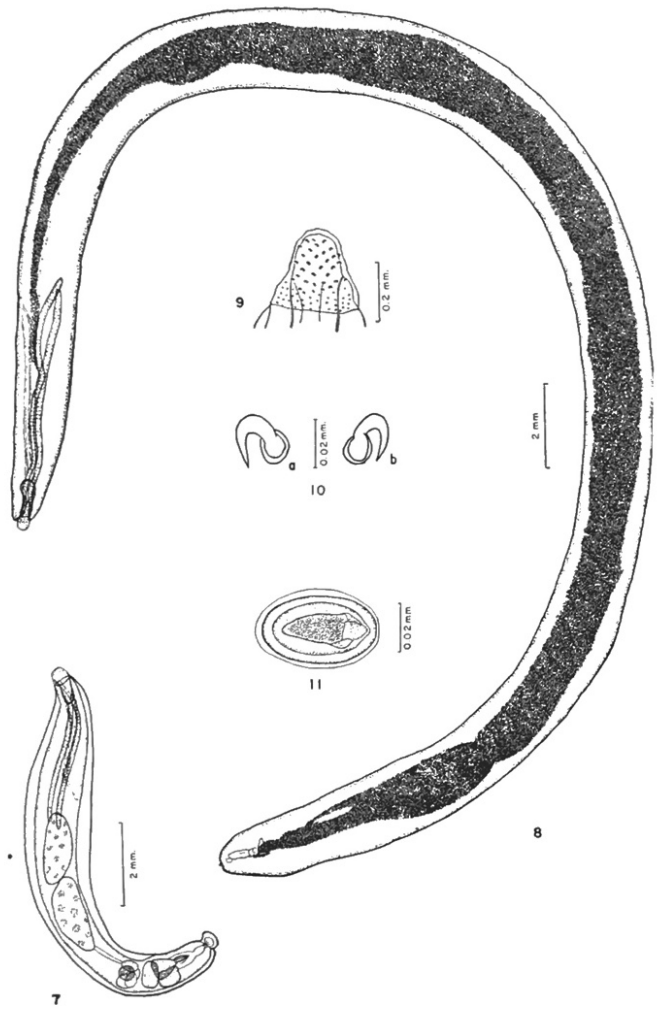
Type material: Holotype male in U. S. N. M. Coll. No. 60709. Paratypes in Parasitology Collection, Depart-

ment of Zoology and Entomology, University of Tennessee.

Petrotschenko (1958) described *M. armenicum* from *Falco tinnunculus* and *Sturnus caucasicus* in Armenia. In this species the hooks are arranged in 9 spiral rows of 9 hooks each, and the posterior spines are in 14 rows of 10 hooks each. The new species differs from *M. tenuis* in the smaller body size, proboscis shape, and arrangement of proboscis hooks in 18 rather than 14 spiral rows. The new species differs from *M. kuntzi* in the smaller body size, proboscis shape, and arrangement of proboscis hooks.

Mediorhynchus conirostris n. sp.
(All measurements in millimeters)

Description: With the characteristics of the genus *Mediorhynchus*. Body uniformly cylindrical. Pseudosegmentation not marked. Male (Fig. 7) 11 by 1.5 in diameter. Females (Fig. 8) 32 to 40 in length by 1.8 in diameter. Proboscis (Fig. 9) in form of truncated cone, 0.35 to 0.46 in length by 0.32 to 0.52 in diameter



at base. Large hooks (Fig. 10a, b) on anterior region of proboscis in 12 diagonal rows of 6 hooks each. Spines on posterior region of proboscis in 30 longitudinal rows of 4 hooks each. Length of large hooks (including root) 0.025 to 0.035. Length of spines 0.015. Proboscis sheath 0.53 to 0.74 in length by 0.18 to 0.26 in diameter. Lemnisci 4 to 5.2 in length. Testes in middle of body, 1.68 by 0.8. Eight cement glands, about 0.3 in diameter. The cement glands represented in the drawing are of unequal size due to the fact that the specimen had been injured. Hard-helled embryos (Fig. 11) 0.05 by 0.028.

Type host: Sekeetamys calurus (= *Meriones calurus*) (gerbil)

Collection no. PE1281A (3 females, 1 male)

Locality: Sinai, Egypt

Type material: Holotype male and allotype female in U. S. N. M. Coll. No. 60710. Paratypes in Parasitology Collection, Department of Zoology and Entomology, University of Tennessee.

This species is characterized by the distinctive cone-shaped proboscis with the posterior region relatively very broad. The proboscis is also relatively smaller than that of other species. The proboscis hooks are very small in comparison with those of other species. The maximum proboscis length of *Mediorhynchus conirostris* is 0.46 as compared with 0.70 in *M. tenuis* and 0.77 in *M. leptis*. The largest hooks of *M. conirostris* measure 0.035 in length while those of *M. tenuis* are 0.05 in length and those of *M. leptis* are 0.045 in length.

This appears to be the first record of a member of the genus *Mediorhynchus* from a mammal. The host, *Sekeetamys calurus*, is a gerbil or sand rat inhabiting deserts and rocky slopes. According to Walker (1964) the diet of gerbils consists of roots, nuts, grass, and insects. Hence the occurrence of *Mediorhynchus conirostris* in the gerbil is probably due to the ingestion of beetles or other insects. The life cycle of *Mediorhynchus grandis*, a aparasite of grackles and meadowlarks, has been studied by Moore (1962). He found that grasshoppers, crickets, and beetles could serve as intermediate hosts. Another acanthocephalan, *Moniliformis merionis*, was reported from several species of *Meriones* in Iran by Golvan and Theodorides (1960). They observed the development of larval acanthocephalans in the beetle, *Blaps*. Since the host specificity of the Acanthocephala is not marked, as in other groups of helminth parasites, it is not surprising to find members of the same genus occurring in mammals and birds having similar feeding habits.

Summary

Four species of the genus *Mediorhynchus* are reported from Egypt, *M. tenuis* from *Oenanthe* and *Monticola* (chats and thrushes), *M. taeniatus* from *Chlamydotis undulata* (bustard), *M. leptis* from *Falco tinnunculus* (falcon), and *M. conirostris* from *Skeetamys calurus* (gerbil). *M. leptis* and *M. conirostris* represent new species, and the occurrence of *M. conirostris* in the gerbil appears to be the first record of a member of the genus *Mediorhynchus* in a mammalian host.

Oenanthe isabellina, *O. hispanica melanoleuca*, *O. oenanthe oenanthe* and *Monticola saxatilis* are new host records for *Mediorhynchus tenuis*. Egypt appears to be a new locality record for *M. taeniatus*.

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Explanation of Figures

Figures 1—3, *Mediorhynchus tenuis* Meyer, 1931
1. Adult male
2. Proboscis
3. Porobscis hooks
   a,b large hooks from anterior region
   c,d hooks from middle region
   e spine from posterior region

Figures 4—6, *Mediorhynchus leptis* n. sp.
4. Adult male
5. Proboscis
6. Proboscis hook

Figures 7—11, *Mediorhynchus conirostris* n. sp.
7. Adult male
8. Adult female
9. Proboscis
10. Proboscis hooks
11. Hard-shelled embryo

News of Tennessee Science

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Teachers. The electron microscopic facilities were provided by a $105,000 research grant awarded by the National Institute of Health, United States Public Health Service, to Dr. Gus Tomlinson, Associate Professor of Biology. Rennovation and construction cossts for basic laboratory facilities were provided by George Peabody College. The total cost of the 3-year research program, including rennovation and equipment costs, will exceed $125,000.

The new laboratory facility will permit Dr. Tomlinson to further investigate a cell specialization project which was initiated in 1964 under the auspices of the National Cancer Institute at the Eidgenossische Technische Hochschule in Zurich, Switzerland. During this time he investigated an *Acanthamoeba* whose growth prossesses resemble those of cancerous cells under certain environmental conditions. It is hoped that elucidation of the mechanism whereby this unicellular organism undergoes specialization will provide further insight into the abnormality which results in dreaded cancerous cells in higher organisms, including man.