

ACANTHOCEPHALA FROM HEDGEHOGS IN EGYPT¹

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A number of acanthocephalans were collected from the hedgehogs, *Hemiechinus auritus*, *Paraechinus aethiopicus dorsalis*, and *Paraechinus a. aethiopicus*, in Egypt by the Department of Helminthology, United States Naval Medical Research Unit No. 3, and forwarded to the writers by Dr. Robert E. Kuntz. The parasites have been identified as *Moniliformis moniliformis* (Bremser 1811) Travassos, 1915, *Nephridiorhynchus major* (Bremser 1811) Meyer, 1931, and juveniles of *Pachysentis ehrenbergi* Meyer, 1931, and *Centrorhynchus globocaudatus* (Zeder, 1800). The specimens in collection PE3424A from *Paraechinus a. dorsalis* are unidentified juvenile acanthocephalans. The following descriptions extend the range of measurements and contribute additional detail to descriptions given previously. The descriptions are based on stained whole mounts.

Moniliformis moniliformis (Bremser, 1811)

(All measurements in millimeters)

Body relatively large, with external pseudosegmentation of body wall. Male 48 to 82 by 0.988 to 1.82. Females 62 to 142 by 0.86 to 2.95. Proboscis nearly cylindrical or club-shaped, 0.35 to 0.49 in length by 0.13 to 0.21 in maximum diameter. Proboscis hooks small, crescentic, in 14 slightly irregular longitudinal rows, 7 to 11 in each. Anterior hooks 0.013 to 0.026, decreasing in size posteriorly. Proboscis sheath, 0.75 to 1.05 by 0.24 to 0.35, double-walled, composed of diagonally arranged muscles in a spiral pattern. Lemnisci long and narrow, 3.25 to 8.32 in length. Testes tandem in posterior region of body. Anterior testis 2.47 to 3.9 by 0.68 to 0.81. Posterior testis 2.11 to 4.4 by 0.60 to 0.81. Cement glands 8, oval, compact. Embryos from mature females elliptical, with concentric membranes, 0.055 to 0.074 by 0.026 to 0.036. Fifteen females and 7 males were measured.

Collection: PE3745A, PE3767A

Host: *Paraechinus a. aethiopicus*

Locality: Near Gebel Elba, Sudan Adm., Egypt

No. of Specimens: PE3745A (1 female, 1 male); PE3767A (4 females)

Collection: PE1224A

Host: *Hemiechinus auritus*

Locality: El Arish, North Sinai, Egypt
No. of Specimens: 6 females and 5 males

Collection: PE1179A

Host: *Hemiechinus auritus*

Locality: Dinshawai, Minufiya Prov., Egypt
No. of Specimens: 4 females and 1 male

A thorough discussion of the taxonomy of the genus *Moniliformis* and the synonymy of *M. moniliformis* can be found in Van Cleave's (1953) monograph on the Acanthocephala of North American mammals. This species has been reported from nearly all parts of the world. Small numbers of specimens in collections and extreme individual variability in specimens due to the degree of maturity and other factors have resulted in discrepancies in measurements in different descriptions of *M. moniliformis*. Table 1 shows measurements given for *M. moniliformis* reported by Van Cleave (1953) from North America, (a) Bremser's (1811) original description of this species from Europe, (b) Grassi and Calandruccio's (1888) description of specimens from Sicily, and (c) Von Hemprich and Ehrenberg's (no date given) description of specimens from Egypt. The last three descriptions have been obtained from Meyer's (1932) monograph. Van Cleave's (1953) description is based on specimens collected in North America from rats and moles (*Rattus norvegicus*, *Rattus r. rattus*, *Scalopus aquaticus machrinus*). Bremser (Meyer (a)) reported *M. moniliformis* from mice hamsters, weasels, and other small mammals (*Microtus arvalis*, *Cricetus cricetus*, *Putorius putorius*, *Circus pygargus*, *Eliomys quercinus*, *Mus norvegicus*, *Mus rattus*, and *Canis familiaris*) in Europe. Meyer's (b) description is based on specimens from the mouse *Mus decumanus*, and the dormouse *Myoxus quercinus*, in Sicily. The specimens in the writers' collection agree more closely with Meyer's (c) description of specimens in *Meriones sinaiticus* (gerbil) and *Scarturus tetradactylus* (jerboa or earth hare) from Egypt and in the hedgehog, *Erinaceus algirus*, from Tunis. Table 2 shows measurements for the writers' collection from Egypt; Meyer's (c) description of *M. moniliformis* from Egypt; Meyer's (1932) report of descriptions of specimens of *M. erinacei* Southwell and MacFie, 1925, from the hedgehog, *Erinaceus europaeus*, in Africa; and Meyer's (1931) description of specimens of *M. kalahariensis* from *Pterocles namaqua* (sandgrouse) and the hedgehog, *Erinaceus frontalis*, in Africa.

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Table 1. *Moniliformis moniliformis*. Comparison of Van Cleave's (1953), (a) Bremser's (1811), (b) Grassi and Calandruccio's (1888), and (c) Von Hemprich and Ehrenberg's (no date) Descriptions for *Moniliformis moniliformis*.

	N. America Van Cleave	Europe (a)	Sicily (b)	Egypt (c)
Female: Body length	320	115-270	70-80	115
Body width	—	1	1-1.5	—
Male: Body length	145	—	40-45	—
Proboscis: Length	0.50-0.64	0.358	0.425-0.45	0.35
Width	0.15-0.24	0.125	0.176-0.19	0.125
Hooks: Rows	12-14	12	14	12(14?)
Number	10-11(9-12)	7(8)	8(7)	8
Size	0.02-0.03	—	—	—
Lemnisci: Length	4.0-7.5	—	10	—
Egg: Length	0.090-0.125	0.067	0.085	0.095-0.105
Width	0.05-0.062	0.032	0.045	0.046-0.05
Proboscis sheath: Length	—	—	—	0.75

Table 2. Comparison of Collections of *Moniliformis moniliformis* from Egypt with Meyer's (1932) (c) Description of *M. moniliformis*, *M. erinacei* Southwell and MacFie, 1925, and *M. kalahariensis* Meyer, 1931.

	Collections from Egypt	<i>M. moniliformis</i> (c)	<i>M. erinacei</i> Southwell and MacFie, 1925	<i>M. kalahariensis</i> Meyer, 1931
Female: Body length	62-142	115	110	140-150
Body width	0.86-2.95	—	1.5	2.5
Male: Body length	48-82	—	85	—
Body width	0.988-1.82	—	1.6	—
Proboscis: Length	0.35-0.49	0.35	0.4-0.5	0.85
Width	0.13-0.21	0.125	0.2	0.26
Hooks: Rows	14	12(14?)	18	14
Number	7-11	8	7(8)	10(9)
Size	0.013-0.026	—	0.03	—
Lemnisci: Length	3.25-8.32	—	7-8	—
Egg: Length	0.055-0.074	0.095-0.105	0.092	0.110
Width	0.026-0.036	0.046-0.05	0.051	0.057
Testes: Length	2.11-4.4	—	5	5
Proboscis sheath: Length	0.75-1.05	0.75	0.8	—
Width	0.24-0.35	—	0.3	—

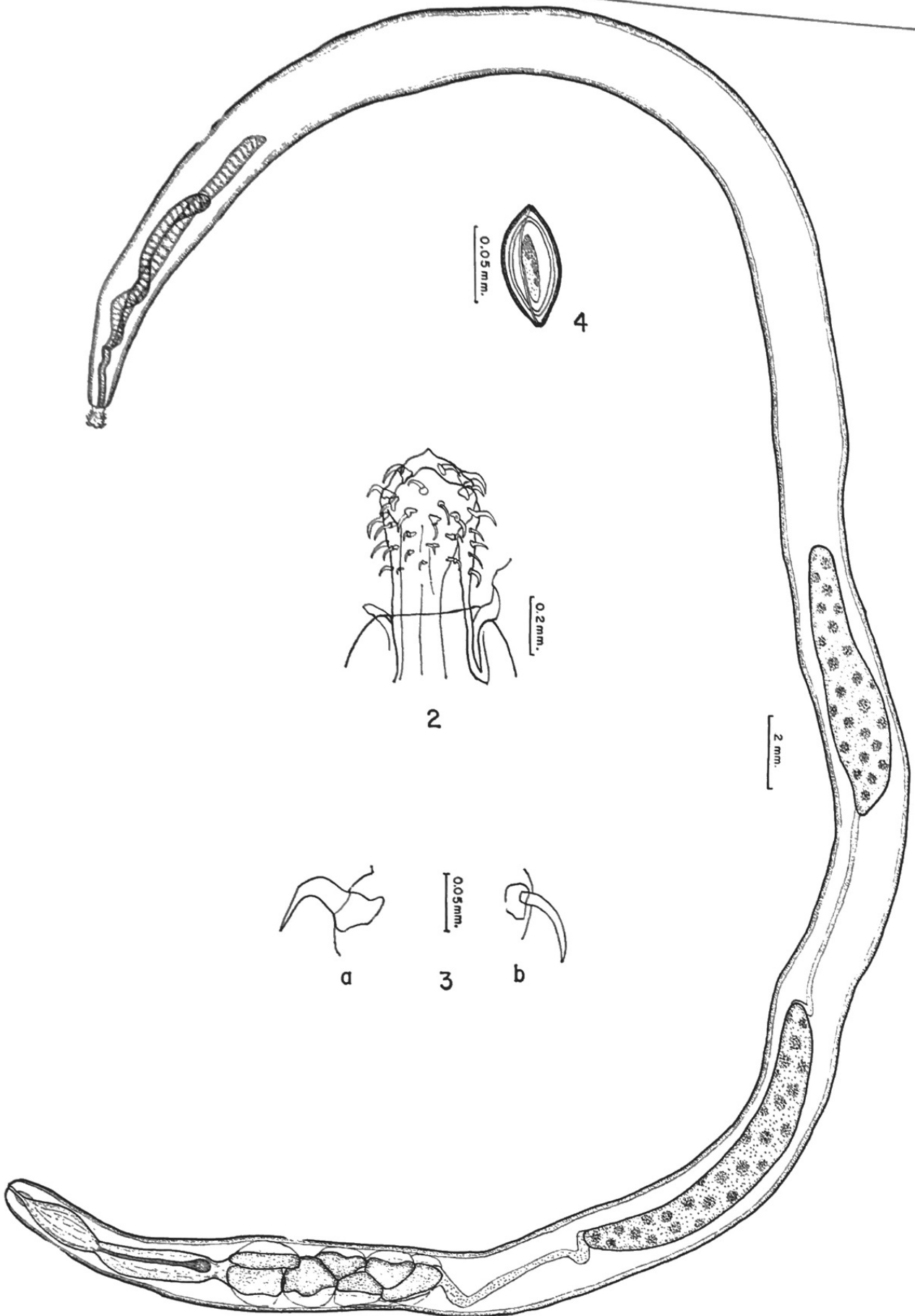
Measurements of hook size which are significant in the identification of species have been neglected in most descriptions of specimens. There is also a lack of data in the literature for egg size, proboscis sheath, lemnisci, testes, and body size.

The writers are not aware of any previous record of *M. moniliformis* from either *Hemiechinus auritus* or *Paraechinus a. aethiopicus*.

***Nephridorhynchus major* (Bremser, 1811) Meyer, 1931**
(All measurements in millimeters)
(Figures 1-4)

Body large, transversely wrinkled. Males (Fig. 1) 28 to 76 by 1.10 to 3. Females 63 to 110 by 1.36 to 3.

Proboscis (Fig. 2) short, anterior part rounded, 0.32 to 0.56 in length by 0.208 to 0.44 in maximum diameter. Proboscis hooks (Fig. 3) in 6 to 7 spiral rows, 7 in each. Largest anterior hooks (Fig. 3a) measuring 0.074 to 0.126. Posterior hooks (Fig. 3b) are smaller, 0.052 to 0.07. Proboscis sheath 1.04 to 1.8 by 0.31 to 0.60. Lemnisci 4.68 to 12.2. Testes in posterior region of body. Anterior testis 3.5 to 9 by 0.52 to 1.92. Posterior testis 3.5 to 9 by 0.5 to 1.3. Cement glands 8, oval, 0.29 to 1.18 by 0.59 to 1.56. Embryos (Fig. 4) from mature females, 0.04 to 0.09 by 0.02 to 0.05. Fifteen males and 18 females were measured.



EXPLANATION OF FIGURES

Figures 1-4, *Nephridiorhynchus major* (Bremser, 1811) Meyer, 1931

- 1. Adult male
- 2. Proboscis
- 3. Proboscis hooks
 - a. large hook from anterior region
 - b. hook from posterior region
- 4. Hard-shelled embryo

Host: *Hemiechinus auritus* (hedgehog)

Collection

Number	No. of Specimens	Locality
PE3209A	3 females; 2 males	El Daba, W. Desert, Egypt
PE3191A	7 females; 5 males	Mersa Matruh, W. Desert, Egypt
PE1887A	5 females; 2 males	Berg El Arab, W. Desert, Egypt
PE2540	4 females; 6 males	40 kilo S.W. Alexandria, W. Desert
PE3148A	1 female;	Berg El Arab, W. Desert, Egypt

Plesiotype specimens in Parasitology Collection, Department of Zoology and Entomology, University of Tennessee.

The length of the female specimens given in Meyer's (1932) description is 38 to 125, while the female specimens in the writers' collection vary from 63 to 110. The male specimens described by Meyer are 40 to 75, while those in the writers' collection are 28 to 76. The number of hooks given by Meyer is 6 laetotropic spiral rows of 8 hooks each. The writers' specimens have 6 to 7 spirals of 7 hooks each. Meyer's account does not include hook size. The measurements given for the oval embryos agree essentially with those of the writers' specimens. The specimens described by Meyer were reported from hedgehogs (*Erinaceus europaeus*, *Erinaceus auritus*) in Europe and Egypt. *Erinaceus auritus* is considered a synonym of *Hemiechinus auritus*. This species has been reported from the hedgehogs *Hemiechinus libycus* in Egypt and *Aethechinus algirus* in Morocco (Dollfus 1951).

***Pachysentis ehrenbergi* (Meyer, 1931)**

(All measurements in millimeters)

All specimens juveniles, 3.22 to 4.16 by 0.87 to 1.04. Proboscis (Fig. 5) nearly globular, 0.42 to 0.60 in length by 0.45 to 0.68 in width. Proboscis hooks in 12 to 14 spiral rows, 8 to 9 hooks in each. Anterior hooks large, 0.078 to 0.086. Posterior hooks smaller, measuring 0.052 to 0.062. Proboscis sheath 0.79 to 1.0 by 0.37 to 0.52.

Collection number: PE1786A (30 juveniles in collection)

Host: *Hemiechinus auritus* (hedgehog)

Locality: Faran Oasis, S. Sinai, Egypt

Plesiotype specimens in Parasitology Collection, Department of Zoology and Entomology, University of Tennessee.

The proboscis sheath given by Meyer (1932) is 1.3 in length which is slightly larger than that of the writers' specimens. The proboscis reported by Meyer is globular, measuring 0.8 in length by 0.9 in width. Adults of *Pachysentis ehrenbergi* have been described by Meyer (1931) from *Canis vulpecula* in Egypt. Juveniles have been described from *Naja haje* in Egypt (Yamaguti 1963). *Hemiechinus auritus* appears to be a new host record for juveniles of this species.



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Figure 5, *Pachysentis ehrenbergi* Meyer, 1931
5. Proboscis

***Centrorhynchus globocaudatus* (Zeder, 1800)**

(All measurements in millimeters)

All specimens juveniles, 2.34 to 2.6 by 0.62 to 0.73. Proboscis (Fig. 6) nearly cylindrical, 1.01 to 1.07 in length by 0.38 to 0.39 in diameter at widest point; anterior part of proboscis distinctly swollen at base and about 2/3 as long as posterior part. Proboscis hooks in 26 to 28 longitudinal rows, 20 to 22 in each. The first 4 or 5 hooks in each row large, 0.052 to 0.060 long, with heavy roots. Posterior to these large hooks are 4 or 5 smaller hooks, 0.036 to 0.039 in length, with small roots. Posterior to these on the posterior part of the proboscis are 11 to 12 spines, 0.042 to 0.044 long, without roots. Proboscis sheath 0.95 to 1.08 by 0.19 to 0.27.

Collection number: PE1180 (4 specimens in collection)

Host: *Hemiechinus auritus* (hedgehog)

Locality: El Amiriya, El Tahreer Prov., Egypt

Plesiotype specimens in Parasitology Collection, Department of Zoology and Entomology, University of Tennessee.

Adults of *Centrorhynchus globocaudatus* have been reported from predatory birds (*Athena noctua*, *Tyto alba*, *Buteo logopus*, *B. buteo*, *Circus cyaneus*, *Aquila pomarina*, *Milvus milvus*, *Falco columbarius*, and *Glauucidium*) in Europe and Africa. Small mammals such as hedgehogs and rats may serve as second intermediate hosts for the parasite. The writers are not aware of any previous record of juveniles of *C. globocaudatus* from the hedgehog, *Hemiechinus auritus*.

SUMMARY

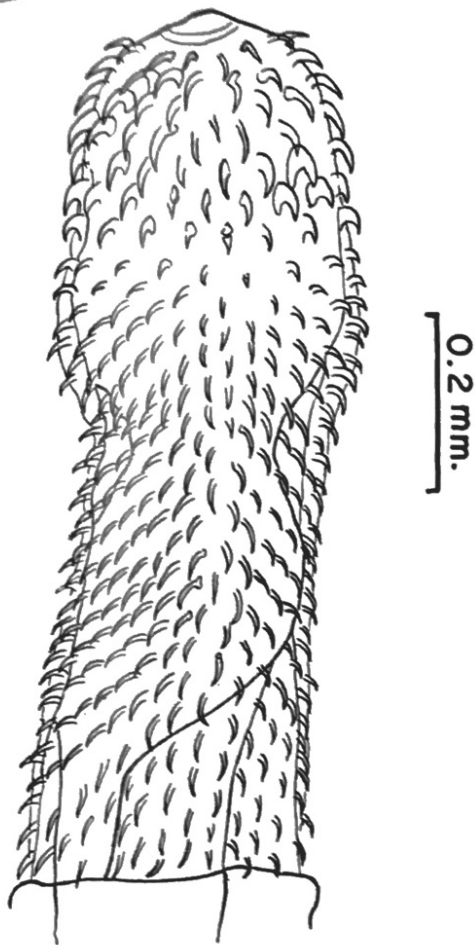
Four genera, *Moniliformis*, *Nephridiorhynchus*, *Pachysentis*, and *Centrorhynchus*, are reported from hedgehogs of Egypt. *Moniliformis moniliformis* is reported from *Hemiechinus auritus* and *Paraechinus a. aethiopicus*. *Nephridiorhynchus major*, *Pachysentis ehrenbergi*, and *Centrorhynchus globocaudatus* are reported from *Hemiechinus auritus*. Comparisons are made between the writers' specimens and published measurements. The specimens are described and additional details of morphology are given.

Hemiechinus auritus and *Paraechinus a. aethiopicus* are new host records for *Moniliformis moniliformis*.

Hemiechinus auritus appears to be a new host record for juveniles of *Pachysentis ehrenbergi* and *Centrorhynchus globocaudatus*.

LITERATURE CITED

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Figure 6, *Centrorhynchus globocaudatus* (Zeder, 1800)
6. Proboscis