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4-1952

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Rausch, Robert L., "Helminths from the Round-Tailed Muskrat, *Neofiber alleni nigrescens* Howell, with Descriptions of Two New Species" (1952). *Faculty Publications from the Harold W. Manter Laboratory of Parasitology*. 560.

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HELMINTHS FROM THE ROUND-TAILED MUSKRAT,  
*NEOFIBER ALLENI NIGRESCENS* HOWELL, WITH  
DESCRIPTIONS OF TWO NEW SPECIES

ROBERT RAUSCH<sup>1</sup>

The helminths parasitic in the round-tailed muskrat, a microtine rodent of very restricted geographical range, have not been investigated. Two specimens of this mammal, collected in Putnam County, Florida, were included among a collection of microtine rodents made available to the writer by Mr. W. B. Quay, Museum of Zoology, University of Michigan. Appreciation is expressed here for the opportunity to examine this valuable material.

Both the animals were infected by helminths, of which four species were represented. One harbored two species of cestodes and one species of trematode in the intestinal tract; the other showed a heavy cysticercus infection of the liver. Two species, a trematode and a cestode, are described as new. The remaining two species constitute new host records.

Several hundred small trematodes of the genus *Quinqueserialis* Skvortsov, 1935, were found in the cecum of one of the rodents. These specimens clearly represent an undescribed species:

*Quinqueserialis floridensis* n. sp.

(Figs. 1-3)

*Diagnosis:* Body oval, slightly attenuated anteriorly, with concave ventral surface; 1.2 to 1.7 mm. long by 700 to 900  $\mu$  in greatest width. Cuticular spines not observed. Ventral surface with five rows of glands; mesal row has 16 glands; paramesal rows have 16 glands; lateral rows have 13 or 14 glands. Oral sucker from 140 to 165  $\mu$  in diameter. Esophagus typical for genus. Sinuous intestinal crura pass mediad of vitellaria and testes, and terminate just below margins of latter. Excretory pore median, situated at level just posterior to ends of intestinal ceca. Lobed testes immediately posterior to vitellaria; testes measure 140 to 180  $\mu$  in greatest length. Long axis of testes transverse, oblique, or longitudinal. Seminal vesicle well developed; convolutions numerous at posterior end of cirrus sac. Cirrus sac, 310 to 430  $\mu$  long by about 75  $\mu$  in greatest width, extends from genital pore near bifurcation of intestinal ceca posteriorly to point at level of most anterior loop of uterus. Cirrus provided with numerous conical spines. Coarsely lobed ovary intercecal, situated at same level as testes. Ovary size about half that of testes. Well-developed Mehlis' gland pre-ovarian. Uterus has seven, sometimes eight, transverse loops which extend laterally beyond intestinal ceca and vitellaria, nearly reaching body margins. Metraterm strongly developed, averaging half the length of cirrus sac. Vitellaria consist of two lateral groups of 12 to 15 follicles, compactly arranged. Vitellaria situated extracellally just anterior to testes, which they approximate in size, and almost wholly posterior to transverse uterine loops. Vitelline ducts strongly developed. Ovoid eggs from 14 to 16  $\mu$  long by 8 to 10  $\mu$  wide. Polar filament not observed.

*Host:* *Neofiber alleni nigrescens* Howell.

*Habitat:* Cecum of host.

*Locality:* Putnam County, Florida.

*Type:* A slide, No. 47587, containing whole mounts of paratype material, has been deposited in the Helminthological Collection of the U. S. National Museum.

*Quinqueserialis floridensis*, the smallest species of the genus, is readily differentiated from the three previously known species [*Q. quinqueserialis* (Barker and Laughlin, 1911); *Q. hassalli* (McIntosh and McIntosh, 1934); *Q. wolgaensis*

Received for publication, November 2, 1951.

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Skvortsov, 1935]. The three previously-known species are very similar in most details of their morphology, but differ essentially in number of ventral glands, egg size, and in other, more minor, details. They have two characters in common which set them off clearly from the species described herein: (1) the vitellaria are arranged in longitudinal, mostly extracecal, lateral rows; (2) the uterine convolutions do not pass to any marked extent lateral to the intestinal ceca.

*Q. floridensis* can be differentiated most readily on the basis of these characters, since in this species the vitellaria consist of two lateral bodies largely posterior to the uterine coils. In this species, moreover, the uterine coils are peculiar in that they extend laterally well beyond the lateral margins of the intestinal ceca and vitellaria and, in fact, in some specimens practically are in contact with the lateral body-margins of the worm. *Q. floridensis* is differentiated further on the basis of ventral gland numbers, and on egg size.

The trematodes of the genus *Quinqueserialis* are typically parasitic in the cecum of microtine rodents. *Q. quinqueserialis* is commonly observed in the muskrat; *Q. hassalli* occurs, usually in relatively small numbers, in the cecum of *Microtus* spp. (vide McIntosh and McIntosh, 1934; Harwood, 1939; Rausch and Tiner, 1949; Kuns and Rausch, 1950). *Q. wolgaensis* was also collected from the cecum of a vole, *Arvicola terrestris* (L.) by Skvortsov (1935). Whether *Q. floridensis* n. sp. occurs in other microtine hosts remains to be seen.

A single cestode of the genus *Cittotaenia* Riehm was removed from the small intestine of one of the rodents. Although gravid and late pre-gravid segments were absent, the strobila measured 65 mm. in length, and 3 mm. in greatest width. In the absence of completely developed eggs, one often cannot assign cestodes of this group with certainty to a given species. However, a study of the morphology of this worm fails to disclose any character which is incompatible with its assignment to the species *C. praecoquis* Stiles, 1895.

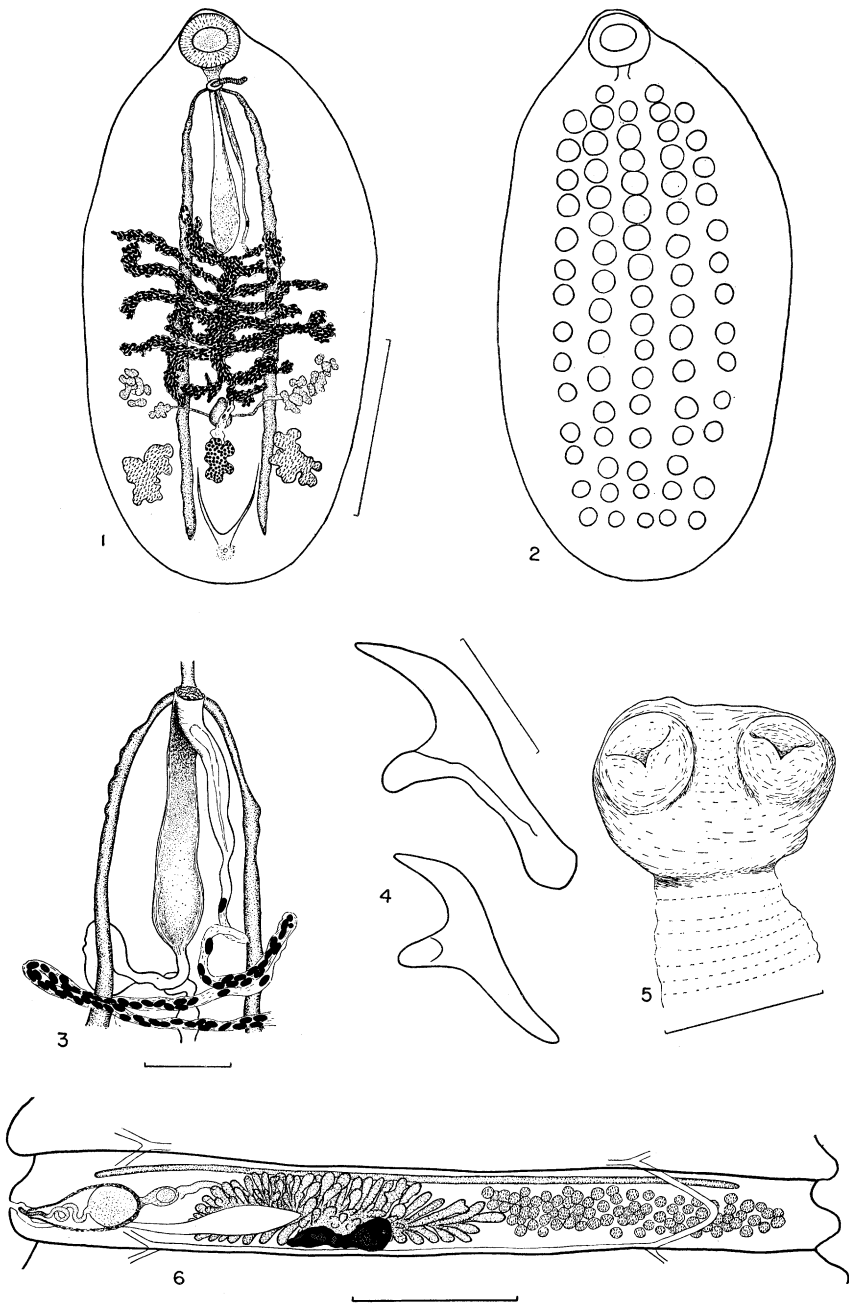
*C. megasacca* was described by Smith (1951) from a pocket gopher (*Thomomys*) from Wyoming. The comparison of the *Neofiber* cestode with specimens of *C. megasacca*, collected by the writer from a pocket gopher, *Thomomys talpoides tenellus* Goldman, from northern Wyoming, has disclosed clear-cut differences. The occurrence of *C. praecoquis* as a parasite in *Neofiber* constitutes a new host record, and considerably increases the known geographical range of this helminth.

Found along with the specimen of *C. praecoquis*, in both the stomach and duodenum of the host, were several specimens of a cestode of the genus *Paranoplocephala* Luehe. Since these cestodes differ significantly from other members of the genus, they are described herewith as a new species. The following description is based mainly on two entire specimens:

*Paranoplocephala neofibrinus* n. sp.

(Figs. 5-6)

*Diagnosis:* Strobila length 55 to 56 mm.; greatest width, attained in region of early gravid segments (in last one-fourth of strobila), 5 mm. Strobila, consisting of 180 to 190 segments, strongly attenuated anteriorly. Segments, in mature region, much wider than long (ratio of length to width about 1:10); length becomes greater in gravid segments, of which the terminal ones have a ratio of about 1:3. Scolex, distinctly set off from neck, has diameter of 600 to 750  $\mu$ . Suckers round; 250 to 290  $\mu$  in diameter. Excretory canals not enlarged. Genital pores unilateral, dextral, situated near middle of segmental margin. Genital ducts dorsal to longitudinal excretory canals. Subspherical testes, about 50 to 60  $\mu$  in diameter in mature segments, extend



EXPLANATION OF PLATE

(All figures drawn with aid of projector.)

- FIG. 1. *Quinqueserialis floridensis* n. sp.; ventral view, ventral glands omitted. Scale has a value of 500  $\mu$ .  
 FIG. 2. *Q. floridensis* n. sp.; ventral view, showing distribution of glands.  
 FIG. 3. *Q. floridensis* n. sp.; details of terminal portions of genital ducts. Scale has a value of 100  $\mu$ .  
 FIG. 4. Rostellar hooks of *Taenia ?lyncis* Skinker, 1935. Scale has a value of 100  $\mu$ .  
 FIG. 5. *Paranoplocephala neofibrinus* n. sp.; scolex. Scale has a value of 500  $\mu$ .  
 FIG. 6. *P. neofibrinus* n. sp.; mature segment, ventral view. Scale has a value of 500  $\mu$ .

from aporal edge of ovary to well beyond aporal longitudinal excretory canals. Testes, extending through nearly entire length of segment, number about 100; exact count not possible because of their overlapping and close apposition. Ovoid to pyriform cirrus sac prominent, extending across longitudinal excretory canals on poral side; cirrus sac measures from 360 to 380  $\mu$  in length by 130 to 136  $\mu$  in greatest width in mature segments. Heavily-spined cirrus looped in distal portion of cirrus sac. Large internal seminal vesicle occupies about one-half of cirrus sac. External seminal vesicle well developed. Vagina opens postero-ventral to cirrus sac opening; it may extend somewhat posterior to latter in course of passage medially toward ovary. Seminal receptacle very large in late mature segments, extending aporally beyond middle of ovary. Vitelline gland elongate, variable in shape, situated at base of ovary near middle. Highly-lobed ovary situated almost entirely in poral half of segment, extending in mature segments through entire segmental length. Uterus tubular, extending laterally beyond longitudinal excretory canals; uterine sacculations gradually enlarge, filling entire gravid segment. Eggs measure 38 to 43  $\mu$  long by 32 to 43  $\mu$  wide (av. 41 by 37  $\mu$ ). Pyriform apparatus well developed.

*Host*: *Neofiber alleni nigrescens* Howell.

*Habitat*: Small intestine.

*Locality*: Putnam County, Florida.

*Type*: A slide, No. 47588, bearing an entire specimen has been deposited in the Helminthological Collection of the U. S. National Museum.

*Paranoplocephala neofibrinus* is differentiated from related species primarily on the basis of egg-size and cirrus sac-size and more detailed characteristics. Referring to the work of Rausch and Schiller (1949a) in their review of North American species of *Paranoplocephala* in *Microtus*, *P. neofibrinus* is most closely related to *P. variabilis* (Douthitt, 1915). *P. variabilis* has an aspinose cirrus, a smaller cirrus sac, and much smaller eggs (26 to 33  $\mu$  long by 20 to 26  $\mu$  wide). Grossly the two species are similar, except for the relatively much larger scolex of *P. neofibrinus*. Both also occur in the same habitat—the duodenum of the host.

After the paper by Rausch and Schiller had been published, the description of *P. kirbyi* Voge, 1948, appeared in a journal long delayed beyond scheduled date of publication. In connection with other work, the writer borrowed the type specimen of *P. kirbyi* from the U. S. National Museum, and Dr. Voge very kindly provided additional specimens from the type host, *Microtus californicus*. A careful study of this material revealed that the specimens upon which *P. kirbyi* is based were erroneously assigned to genus, and they actually represent specimens of *Andrya macrocephala* Douthitt, 1915. Such an error might readily enough occur if one misinterpreted the details of uterine formation, since this character, the most important for generic differentiation, often is obscure. That *A. macrocephala* is a very variable species has been shown by Rausch and Schiller (1949b). The morphology of the specimens upon which "*P. kirbyi*" is based will be discussed further, more appropriately, in another publication (Rausch, 1952).

Among Eurasian species of *Paranoplocephala*, *P. omphalodes* (Hermann, 1783) is the only species, on the basis of published descriptions, which *P. neofibrinus* might resemble. However, through the study of comparative material, and because of discrepancies in the published descriptions, *P. neofibrinus* is considered clearly distinct from *P. omphalodes*. Although reported by Harkema (1946) from the cotton rat (*Sigmodon*) in North Carolina, *P. omphalodes* is not known to occur in the United States. The original identification of this cestode was erroneous (cf. Harkema and Kartman, 1948; p. 185: *Andrya microti* Hanson). This earlier published record was unfortunately not clarified by Harkema and Kartman in their later publication on the parasites of the cotton rat. *P. omphalodes* was recorded from arctic Alaska by Rausch (1951); the occurrence of this species in North America will be discussed in another publication (Rausch, 1952).

One of the round-tailed muskrats examined in connection with this study showed a heavy liver infection by larval cestodes belonging to the genus *Taenia* L. Sixteen cysticerci were observed, localized on both the dorsal and ventral surfaces of the organ. The cysts measured, on the hepatic surface, 3 to 4 mm. in diameter. The cysticerci possessed from 40 to 44 rostellar hooks (Fig. 4). The large hooks measured from 220 to 244  $\mu$  in length, and the small hooks measured from 172 to 187  $\mu$  in length.

In the absence of adult cestodes for detailed morphological study, specific identification of these cysticerci can hardly be made. A review of available information on hook details of cestodes of the genus *Taenia* indicates that the hooks of these cysticerci closely resemble those of *T. lyncis* Skinker, 1935. Harkema and Kartman (1948) tentatively identified as *T. lyncis* a cysticercus from the liver of a cotton rat. Skinker (1935) recorded deer and a white-footed mouse (*Peromyscus*) as possible intermediate hosts of this cestode, but considered controlled feeding experiments necessary to establish with certainty the identity of such larvae. Joyeux (1945) also figured the hooks of *Taenia* sp. from *Felis macrura*, of Brazil. These hooks also closely resemble those of *T. lyncis*. The study of adult cestodes from Florida carnivores will be necessary to establish whether *C. lyncis* is present in that region.

#### SUMMARY

Two specimens of round-tailed muskrat, *Neofiber alleni nigrescens* Howell, were examined for helminth parasites. Four species, a trematode and three cestodes, were collected. Two of these, *Quinqueserialis floridensis* and *Paranoplocephala neofibrinus*, are described as new. *Cittotaenia praecoquis* Stiles, 1895, is recorded from this host, and larval cestodes are tentatively identified as *Taenia lyncis* Skinker, 1935.

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