

FOUR NEW SPECIES OF TREMATODE WORMS FROM
THE MUSKRAT, *ONDATRA ZIBETHICA*, WITH A KEY
TO THE TREMATODE PARASITES OF THE MUSKRAT

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This paper contains descriptions of four apparently new species of trematodes from the American muskrat, *Ondatra zibethica*. These parasites belong to four families, representatives of two of which have not been reported previously from this host. For convenience in identifying trematodes which have been reported from the muskrat, a key to the species is appended.

Family PSILOSTOMIDAE Odhner, 1913

PSILOSTOMUM ONDATRAE, new species

Figure 1

Specific diagnosis.—*Psilostomum*: Body ovoid, 1.6 to 2 mm. long by 315μ to 961μ wide in the region of the anterior testis, flattened dorsoventrally. Cuticular spines were not found on specimens from the muskrat, but in view of the fact that the specimens showed some evidence of maceration, it is probable that they had become detached before fixation; specimens of what appear to be the same species from *Larus californicus* showed spines distributed over the entire body in alternate transverse rows. Oral sucker subterminal, 150μ to 155μ in diameter; oral aperture slitlike to oval in shape. Acetabulum transversely elongated to almost circular in shape, strongly muscular, 220μ to 300μ by 300μ to 375μ , situated 525μ to 537μ from the anterior end of the body. Prepharynx 38μ to 75μ long, the length depending on the amount of contraction of the anterior part of the body. Pharynx strongly muscular, 112μ to 127μ long by 82μ to 105μ wide. Esophagus slender, 75μ to 112μ long; intestinal ceca simple, extending to within a short distance of the posterior end of the body. The excretory system can not be followed with certainty

owing to the maturity of the specimens, but so far as can be ascertained from the examination of serial sections, it appears to correspond closely to that given by Odhner (1913) in his diagnosis of the genus; excretory pore terminal. Testes large, elongated transversely, postequatorial, and tandem in position. The anterior testis is 262μ to 375μ long by 412μ to 712μ wide and the posterior testis 262μ to 275μ long by 337μ to 750μ wide. Cirrus pouch piriform, its posterior end never extending beyond the center of the acetabulum; it contains a voluminous seminal vesicle and a long, slender, unarmed cirrus. The genital pore is situated in the median line about midway between the bifurcation of the intestine and the anterior margin of the acetabulum. Ovary ovoid, 75μ by 150μ , situated a short distance in front of the anterior testis and to the left of the median line.

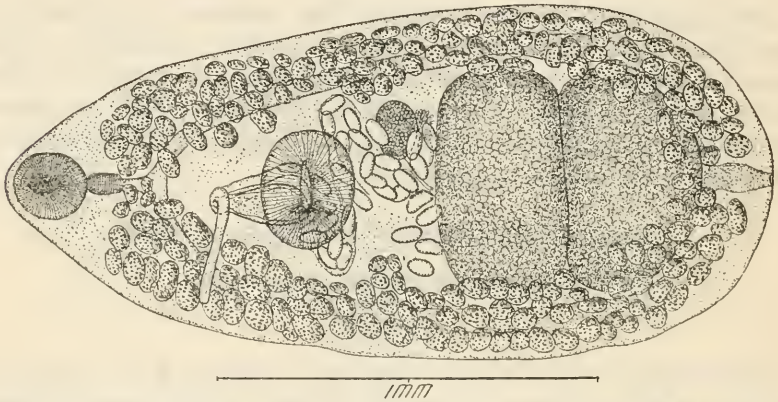


FIGURE 1.—PSILOSTOMUM ONDATRAE. VENTRAL VIEW OF SPECIMEN FROM MUSKRAT

Shell gland well developed, dorsad of ovary. Laurer's canal present. Receptaculum seminis apparently absent. The vitellaria are composed of large follicles situated laterally and forming a wreath-like mass extending from the level of the pharynx to the posterior end of the body. Uterus relatively short, consisting of irregular coils occupying the intercecal space between the anterior margin of the anterior testis and the acetabulum, and terminating in a moderately developed metraterm. The metraterm extends along the left side of the cirrus pouch and opens into the genital sinus immediately anterior to the male aperture. Eggs oval, 82μ to 90μ long by 45μ to 48μ wide, yellowish brown in color.

Hosts.—*Ondatra zibethica* and *Larus californicus*.

Location.—Liver of muskrat (according to label); proventriculus of gull.

Distribution.—Kirkfield, Ontario, and Klamath Falls, Oreg.

Type specimens.—U.S.N.M. Helm. Coll. No. 29749; paratypes No. 29750.

The above description is based entirely upon specimens collected from a muskrat and forwarded to the Zoological Division of the Bureau of Animal Industry for identification by Dr. Ronald G. Law, Experimental Fur Farm, Kirkfield, Ontario, on August 3, 1928. Specimens of what appear to be this form (U.S.N.M. No. 29221) were collected from a California gull (*Larus californicus*) by Dr. E. B. Cram, August 8, 1929, at Klamath Falls, Oreg. The specimens from the gull were located in the glands of the proventriculus, but aside from a slightly more cylindrical shape they appear to be specifically identical with the form from the muskrat. The slight difference in shape may be accounted for in part by the location of the worms in their respective hosts and in part by the methods employed in the fixation of the two lots of specimens. All essential measurements of the specimens from the gull intergrade with those of specimens from the muskrat to such an extent that it is unlikely that they represent separate species. The only species of the genus which resembles *Psilostomum ondatrae* sufficiently to warrant comparison is *P. varium*, a species described by Linton (1928) from the loon, *Gavia immer*. *P. ondatrae* may be differentiated from *P. varium* on the size and position of the testes, extent of the vitellaria, and on the position of the genital pore. In *P. varium* the testes are smaller and situated more anteriorly than in *P. ondatrae*; the vitellaria are distinctly separated in the preacetabular portion of the body in the former species, while in the latter these glands meet in the median line immediately caudad of the pharynx; the genital pore is located at the intestinal bifurcation in *P. varium* and about midway between the anterior margin of the acetabulum and the intestinal bifurcation in *P. ondatrae*.

Family ECHINOSTOMIDAE Looss, 1902

Subfamily ECHINOCHASMINAE Odhner, 1910

ECHINOCHASMUS SCHWARTZI, new species

Figure 2

Specific diagnosis.—*Echinochasmus*: Body spindle-shaped in outline, 1.5 to 2.1 mm. long by 449μ to 620μ wide in the region of the anterior testis. Cuticular spines are present in the anterior part of the body. These spines are scalelike and arranged in alternating, transverse rows; the rows anterior to the acetabulum are close together, while posterior to the acetabulum the rows are progressively farther apart and the number of spines decreases; spines finally disappear near the level of the posterior margin of the posterior testis. In specimens from the muskrat most of the cuticular spines were missing owing to the fact that the worms had been dead for several hours

before fixation. Oral sucker subterminal, 93μ wide, surrounded by a well-defined reniform collar, 248μ to 279μ wide. The collar bears 22 spines arranged in a single row which is interrupted dorsally by a space as wide as the oral sucker. Four of these spines, two on each ventral lobe, are slightly more aboral than the others; the more median of these spines is 37μ to 41μ long by 11μ wide at the base, while the others are from 44μ to 51μ long by 11μ to 15μ wide at their bases. Acetabulum circular, 170μ to 186μ in diameter, situated 542μ to 775μ from the anterior end of the body. Prepharynx 46μ to 93μ long, the length depending on the amount of contraction of the anterior part of the body. Pharynx muscular, 108μ to 155μ long by 93μ to 108μ wide. Esophagus 124μ to 248μ long; intestinal ceca simple and extending to near the posterior end of the body. Genital pore situated immediately caudad of intestinal bifurcation. Cirrus pouch poorly developed, somewhat piriform in shape, extending caudad to

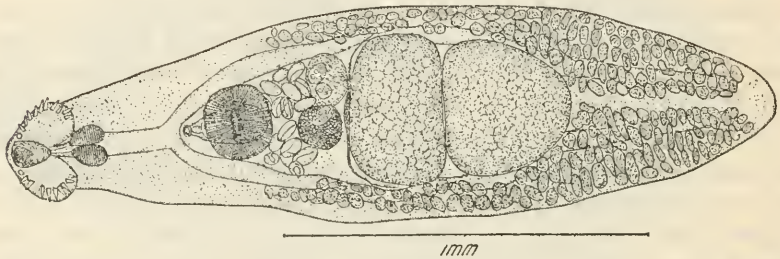


FIGURE 2.—ECHINOCHASMUS SCHWARTZI. VENTRAL VIEW OF SPECIMEN FROM MUSKRAT

near the posterior margin of the acetabulum, and containing a large seminal vesicle showing a distinct constriction near its anterior end, a poorly defined prostate, and a short ductus ejaculatorius. Testes largely postequatorial and tandem in position; the anterior testis is almost rectangular in shape, 155μ to 279μ long by 310μ to 434μ wide; the posterior testis is irregular to almost spherical in outline, 186μ to 310μ long by 263μ to 372μ wide. Ovary ovoid, 108μ to 124μ by 124μ to 170μ , situated slightly to the right of the median line and with its long axis diagonal to the long axis of the body. The vitellaria are composed of large follicles distributed as in the other members of the genus; the follicles extend anteriorly to the level of the posterior margin of the acetabulum or slightly beyond, but never farther forward than the anterior margin of the acetabulum. Uterus short, consisting of a few irregular coils almost filling the intercecal space between the anterior testis and acetabulum, and containing from 4 to 40 eggs. Eggs oval, 68μ long by 45μ wide, with yellowish brown, thin shells.

Hosts.—*Ondatra zibethica* and *Canis familiaris*.

Location.—Small intestine.

Distribution.—United States (Maryland and District of Columbia).

Type specimens.—U.S.N.M. Helm. Coll. No. 29733; paratypes No. 29754.

Two lots of specimens of this species were available for study. The first of these (U.S.N.M. No. 27779) was collected June 1, 1927, by Dr. B. Schwartz, of the Zoological Division, from the small intestine of a dog. The second lot of specimens was collected by Dr. G. Dikmans, February 28, 1930, from muskrat viscera sent to the Zoological Division by Dr. J. E. Shillinger, of the Bureau of Biological Survey, the animals having been caught near Cambridge, Md.

The above description is based on specimens from both sources, the two being regarded as identical since the specimens do not show the slightest difference which might suggest the possibility of the two forms being distinct species.

The genus *Echinochasmus* was proposed by Dietz (1909) to contain three species, *Echinochasmus coaxatus* Dietz, *E. euryporus* (Looss), and *E. beleocephalus* (v. Linstow). Since then the following species have been added: *E. liliputanus* (Looss), *E. africanus* (Stiles), and *E. bursicola* (Creplin) (= *E. cloacinum* Braun) by Odhner (1910); *E. oligacanthus* Lühe (Syn. *E. euryporum* Looss, 1899, not *E. euryporum* Looss, 1896), and *E. perfoliatus* (v. Rátz) by Dietz (1910); *E. prosthovitellatus* by Nicoll (1914); *E. tenuicollis* by Johnston (1917); *E. amphibolus* by Kotlán (1922); *E. botauri* by Baer (1922); *E. elongatus* by Miki (1923); *E. corvus* by Bhalerao (1926); *E. hortense* Goto by Asada (1926); *E. japonicus* by Tanabe (1926); and *E. dietzevi* by Isaichikov (1927).

Lühe (1909) proposed the genus *Episthmium* with *E. africanum* (Stiles) as type and added *E. bursicola* (Creplin). The principal character which Lühe used for the separation of this genus from *Echinochasmus* was the extension of the vitellaria beyond the acetabulum, these glands extending anteriorly as far as the pharynx and uniting in the median line in *Episthmium*, while in *Echinochasmus* they rarely extend as far forward as the anterior margin of the acetabulum. Odhner (1910) refused to recognize Lühe's genus and placed it as a synonym of *Echinochasmus*. Travassos (1923) recognizes the genus *Episthmium* as valid and adds to it two new species, *E. proximum* and *E. oscar*. Bhalerao (1926) concurs in Odhner's action on the grounds that the extension of the vitellaria "is not a very good point of difference" although he later, in the same paper, recognizes that the extension of the vitellaria is a character of generic value. So far as the writer's experience goes, the distribution of the vitellaria appears to be a character of generic value, at

least among the echinostomes, and accordingly recognizes the genus *Episthmium* Lühe. The following species should, therefore, be included in this genus: *E. africanus* (Stiles), *E. bursicola* (Creplin), *E. prosthovitelatus* (Nicoll), *E. proximum* Travassos, *E. oscar* Travassos, and *E. corvus* (Bhalerao). On the basis of extent and distribution of the vitelline follicles, these four species form a very definite and recognizable group.

Odhner (1910) proposed the genus *Heterechinostomum* with *H. mordax* (Looss) as type, and to this genus Stunkard and Haviland (1924) added a second species, *H. magnovatum*. The principal character which Odhner used for separating this genus from *Echinochasmus* was the cirrus pouch which he writes is almost entirely or completely (?) atrophied ("fast gänzlich oder völlig (?) rückgebildet") in *Echinochasmus* and rather weakly developed ("ziemlich schwach entwickelt") in *Heterechinostomum*. The writer does not believe that it is possible to distinguish between "fast gänzlich * * * rückgebildet" and "ziemlich schwach entwickelt," at least not with sufficient certainty to be able to use such a character for the separation of the two genera. *Heterechinostomum* is, therefore, regarded as a synonym of *Echinochasmus*, the two species, *H. mordax* (Looss) and *H. magnovatum* Stunkard and Haviland, becoming *Echinochasmus mordax* (Looss) and *E. magnovatus* (Stunkard and Haviland) respectively.

Echinochasmus tenuicollis Johnston, on the basis of the number and distribution of collar spines and the deeply lobed condition of the testes, can not be retained in the genus *Echinochasmus*, but should be included in the genus *Paryphostomum* Dietz; *E. tenuicollis*, therefore, becomes *P. tenuicollis* (Johnston).

Monilifer pitangi Lutz is transferred to the genus *Echinochasmus* on the basis of the distribution of the vitellaria, the name therefore becoming *Echinochasmus pitangi* (Lutz). Bhalerao (1926) recognized that this species could not be retained in the genus *Monilifer* (= *Stephanoprora*), but he failed to make the new combination with the generic and specific names.

According to the writer's conception, the following species may be included in the genus *Echinochasmus*¹: *E. coxatus* Dietz, *E. euryporus* (Looss), *E. beleocephalus* (v. Linstow), *E. lilipitanus* (Looss), *E. oligacanthus* Lühe (in Dietz), *E. perfoliatus* (v. Rátz), *E. amphibolus* Kótlán, *E. botauri* Baer, *E. mordax* (Looss), *E. magnovatus* (Stunkard and Haviland), *E. hortense* Goto (in Asada), *E. japonicus* Tanabe, *E. dietzevi* Isaischikov, *E. pitangi* (Lutz), and *E. schwartzi*, new species.

¹ The writer reserves judgment on *E. elongatus* Miki, as no description of this species is available. It is included here on the basis of an abstract published in the Jap. Journ. Zool., vol. 1, p. 89, 1925.

The species of *Echinochasmus*, *E. schwartzi*, described in this paper is clearly separated from all the above species except *E. oligacanthus*, *E. mordax*, and *E. pitangi* on the basis of the number of collar spines. *E. schwartzi* may be differentiated from *E. oligacanthus* on the size and arrangement of the collar spines and on the comparative size of the suckers. In *E. schwartzi* the collar spines are distinctly smaller than those of *E. oligacanthus*; the row of spines is interrupted dorsally by a space as wide as the oral sucker in the former while in the latter this interruption is very slight. The size ratio of oral sucker to acetabulum is about 1:2 in *E. schwartzi* and more than 1:4 in *E. oligacanthus*. It may be differentiated from *E. mordax* by its shorter anterior body length and by the position of the cirrus pouch which in *E. mordax* lies largely preacetabular, while in *E. schwartzi* the posterior end of the cirrus pouch almost reaches the posterior border of the acetabulum. In addition, the collar spines and eggs of *E. mordax* are considerably larger in proportion to the body size than those of *E. schwartzi*. It is rather difficult to differentiate *E. schwartzi* from *E. pitangi* owing to the extremely meager description of the worm as given by Lutz (1924). Aside from the length, 2.4 to 3.4 mm., the characters given for *E. pitangi* might apply equally to any of the other species of the genus and even to species of some of the other genera. So far as one can judge from the figure of *E. pitangi*, it may be distinguished from *E. schwartzi* in the more posterior position of the testes in the former and in the size of the eggs as compared with the size of the ovary. The eggs as shown in Lutz's figure are longer than the diameter of the ovary and about two-thirds as wide, while in *E. schwartzi* the eggs have no such large size in comparison with the size of the ovary.

Family UROTREMATIDAE Poche, 1926

UROTREMA SHILLINGERI, new species

Figure 3

Specific diagnosis.—*Urotrema*: Body elongated, 2.6 mm. long by 418μ wide in the region of the ovary, slightly flattened dorso-ventrally and tapering gradually anteriorly and posteriorly. Cuticle apparently without spines; however, this point can not be determined with certainty from the material available. Oral sucker subterminal, 112μ in diameter, situated 487μ from the oral sucker. Prepharynx 37μ long; pharynx 67μ long by 90μ wide; esophagus 52μ long, bifurcating about midway between the suckers; intestinal ceca simple, extending posteriorly to within a short distance from the base of

the cirrus pouch. Testes oval, situated in the median line in the posterior third of the body, and tandem in position; the anterior testis is 172μ long by 142μ wide and the posterior 187μ long by 97μ wide, the two testes being separated by a space 120μ wide. The cirrus pouch is 202μ long by 75μ wide at its base, slightly curved, and situated at the posterior end of the body. The genital pore is subterminal, opening on the ventral surface. The ovary is slightly ovoid in shape, 150μ long by 120μ wide, and situated about 90μ caudad of the acetabulum. The shell gland is poorly defined, situated caudad and slightly to the left of the ovary. The uterus is long, running caudally from the shell gland in irregular transverse loops, passing to the right around the anterior testis and to the left around the posterior testis, and terminating in a short metraterm which opens at the genital pore. The vitellaria are situated laterally and composed of small follicles extending from a short distance



FIGURE 3.—*UROTREMA SHILLINGERI*. VENTRAL VIEW

caudad of the ovary to about the level of the anterior margin of the acetabulum. Eggs oval, 22μ long by 15μ wide, brown in color.

Host.—*Ondatra zibethica*.

Location.—Small intestine.

Distribution.—United States (Maryland).

Type specimen.—U.S.N.M. Helm Coll. No. 29725.

The above description is based upon a single mature specimen collected by Dr. G. Dikmans from the small intestine of a muskrat, the animal having been trapped near Cambridge, Md., and the viscera sent to the Zoological Division by Dr. J. E. Shillinger, of the Bureau of Biological Survey. The specimen was dead when collected and showed some evidence of maceration, consequently certain details, such as the presence or absence of cuticular spines and the course of the excretory system, could not be determined.

This species differs from *Urotrema scabridum* Braun, the only other species of the genus, in body size, relative size of the suckers, distribution of the vitellaria, distance between testes, and the size of the eggs. *U. shillingeri* is much smaller than *U. scabridum* and the oral sucker is distinctly smaller than the acetabulum in the former, while in the latter species the suckers are about equal in size; the testes are approximated in *U. scabridum*, while in *U. shill-*

ingeri they are separated by a distinct space; the vitellaria extend from a short distance cephalad of the anterior testis to the level of the posterior margin of the acetabulum in *U. scabridum*, whereas in *U. shillingeri* these glands extend from a short distance caudad of the ovary to the level of the anterior margin of the acetabulum. The eggs are similar in both species, but those of *U. shillingeri* are somewhat longer than those of *U. scabridum*.

Urotrema scabridum was originally described by Braun (1900) as a parasite of Brazilian bats, and this species or a closely related form has been collected by the writer from bats in Texas. This fact, coupled with the fact that only a single specimen of *U. shillingeri* was found in a large number of viscera examined, suggests that the occurrence of this species in the muskrat is only accidental, and that its normal host is some insectivorous mammal such as a bat.

Family NOTOCOTYLIDAE Lühe, 1909

Subfamily NOTOCOTYLINAE Kossack, 1911

PARAMONOSTOMUM PSEUDALVEATUM, new species

Figure 4

Specific diagnosis.—*Paramonostomum*: Body ovoid, 387μ to 496μ long by 310μ to 341μ wide, slightly attenuated anteriorly and rounded posteriorly; the dorsal surface is convex and the ventral concave. Cuticle smooth and apparently without spines. Oral sucker 38μ to 52μ in diameter, terminal. Esophagus 10μ to 15μ long; intestinal ceca simple, the terminal portions passing between the testes. Testes oval, 113μ to 120μ long by 53μ to 57μ wide, with slightly undulating margins, situated extracellally and opposite each other at the posterior end of the body. The vas deferens extends forward in the median line and expands anteriorly to form a convoluted seminal vesicle which lies free in the parenchyma at the base of the cirrus pouch and to the right of the median line. Cirrus pouch piriform, 74μ to 97μ long by 37μ to 60μ wide near its base, containing a well-developed prostate and an unarmed cirrus. The genital pore is situated at the posterior margin of the oral sucker. The ovary is irregular in outline, 75μ to 90μ long by 67μ to 97μ

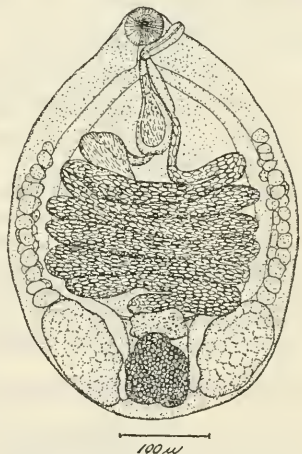


FIGURE 4.—PARAMONOSTOMUM PSEUDALVEATUM. VENTRAL VIEW

wide, situated between the testes and separated from them by the terminal portions of the ceca. Shell gland well developed, lying immediately in front of the ovary. The uterus runs forward in regular transverse coils and terminates in a poorly defined metraterm which is about one-half the length of the cirrus pouch. The vitellaria are extracecal and extend from the anterior margin of the testes to the level of the base of the cirrus pouch. Eggs slightly asymmetrical, 18μ to 20μ long by 10μ wide, provided with a filament at each pole.

Host.—*Ondatra zibethica*.

Location.—Large intestine.

Distribution.—United States (Maryland).

Type specimens.—U.S.N.M. Helm. Coll. No. 29726; paratypes No. 29727.

Specimens of this species were collected by Dr. G. Dikmans from the same host viscera in which the two preceding species, *Echinochasmus schwartzi* and *Urotrema shillingeri*, were found.

In addition to the one species described here, the genus *Paramonostomum* contains three species, *P. alveatum* Mehlis (in Creplin, 1846), *P. ionorne* Travassos, 1921, and *P. echinum* Harrah, 1922. Of these species, *P. pseudalveatum* resembles *P. alveatum* more closely than it does either of the other species. It differs from *P. alveatum* chiefly in its smaller size and in the extent of the vitellaria, which in *P. alveatum* extend anteriorly to about the equator of the body while in *P. pseudalveatum* they extend to the level of the base of the cirrus pouch.

The following table gives the essential measurements and other characters of the species that have been included in the genus:

	<i>P. alveatum</i> (from Lühe, 1909)	<i>P. ionorne</i> (from Travassos, 1921)	<i>P. echinum</i> (from Harrah, 1922)	<i>P. pseudalveatum</i> , new species
Length.....	0.6 to 1 mm.....	3.2 mm.....	2 to 2.5 mm.....	387 μ to 496 μ .
Width.....	400 μ to 700 μ	1.5 mm.....	600 μ to 700 μ	310 μ to 341 μ .
Spines.....	(?).....	Absent.....	Present in anterior half of body.	Absent.
Diameter of oral sucker.	50 μ by 90 μ	210 μ	102 μ to 125 μ	38 μ to 52 μ .
Testes.....	Lobed, almost as wide as long.	Lobed, 500 μ to 520 μ by 210 μ .	Lobed, elongated..	Not lobed, 113 μ to 120 μ by 53 μ to 57 μ .
Extent of vitel- laria.	To equator of body...	To base of cirrus pouch.	To beginning of second body third.	To base of cirrus pouch.
Egg.....	18 μ to 21 μ by 8 μ to 10 μ ..	19 μ by 12 μ	20 μ by 10 μ	18 μ to 20 μ by 10 μ .
Hosts.....	<i>Anas</i> sp., <i>Anser</i> sp., <i>Branta</i> sp., <i>Cygnus</i> sp., <i>Nyroca</i> sp., <i>Oide- mia</i> sp., <i>Somateria</i> sp.	<i>Chionis alba</i> , <i>Lornornis</i> <i>maritima</i> , <i>Limno- pandalis</i> <i>rythirhyn- chus</i> .	<i>Ondatra zibethica</i> ..	<i>Ondatra zibethica</i> .

KEY TO THE TREMATODE PARASITES OF THE MUSKRAT

1. Body provided with two suckers-----2.
Body provided with one sucker-----11.
2. Acetabulum at posterior end-----*Wardius zibethicus*.²
Acetabulum preequatorial-----3.
3. Body divided into two regions, the anterior region being flattened and
concave and the posterior cylindrical-----*Hemistomum craterum*.
Body not divided into two regions-----4.
4. Anterior end of body provided with a collar bearing one to two rows of
spines-----5.
Anterior end of body not provided with collar-----9.
5. Collar bearing 22 spines arranged in a single, dorsally interrupted row.
Echinochasmus schwartzi.
Collar bearing more than 22 spines arranged in a double, dorsally uninter-
rupted row-----6.
6. Eggs few in number; cirrus pouch extending to middle of acetabulum.
Echinoparyphium contiguum.
Eggs numerous; cirrus pouch entirely preacetabular-----7.
7. Length 4.2 to 6.9 mm.; 37 to 41 collar spines, 31 to 33 on rim and 2 to 5 on
each ventral lobe-----*Echinostomum callawayensis*.
Length more than 7 mm-----8.
8. Length 22 to 30 mm.; 35 collar spines, 25 on rim and 5 smaller ones on each
ventral lobe-----*Echinostomum coalitum*.
Length 9.4 to 12.4 mm.; 37 collar spines, 27 on rim and 5 on each ventral
lobe-----*Echinostomum armigerum*.
9. Genital pore situated at posterior end of body-----*Urotrema shillingeri*.
Genital pore preacetabular-----10.
10. Cirrus pouch slender and curved, extending caudad of acetabulum; uterus
passing between testes-----*Plagiorchis proximus*.
Cirrus pouch piriform, not extending caudad of acetabulum; uterus
pretesticular-----*Psilostomum ondatrae*.
11. Ventral surface provided with longitudinal rows of glands-----14.
Ventral surface not provided with longitudinal rows of glands-----12.³
12. Genital pore postequatorial and lateral in position; uterine coils anterior
to cirrus pouch-----*Nudacotyle novicia*.
Genital pore preequatorial and median in position; uterine coils caudad
of cirrus pouch-----13.
13. Body oval, less than 500 μ long; cuticle smooth.
Paramonostomum pseudalveatum.
Body elongate, 2 to 2.5 mm. long; cuticle provided with spines on ventral
surface of anterior half of body-----*Paramonostomum echinum*.
14. Ventral surface provided with 3 longitudinal rows of nonprotrusible
glands-----*Catatropis filamentis*.
Ventral surface provided with 3 to 5 rows of protrusible glands-----15.
15. With three rows of glands-----*Notocotyle urbanensis*.
With five rows of glands-----*Notocotyle quinqueseriale*.

²Leidy (1888) reported what he thought to be *Cladorchis subtriquetrus* from the muskrat, but gave no description of the parasite. Barker (1915) regards this as possibly being *Wardius zibethicus*.

³Leidy (1858) described a trematode as *Monostomum affine* from the gall bladder of a muskrat, but in view of the fact that the description is of such a nature as to make the species unrecognizable, it is omitted here.

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