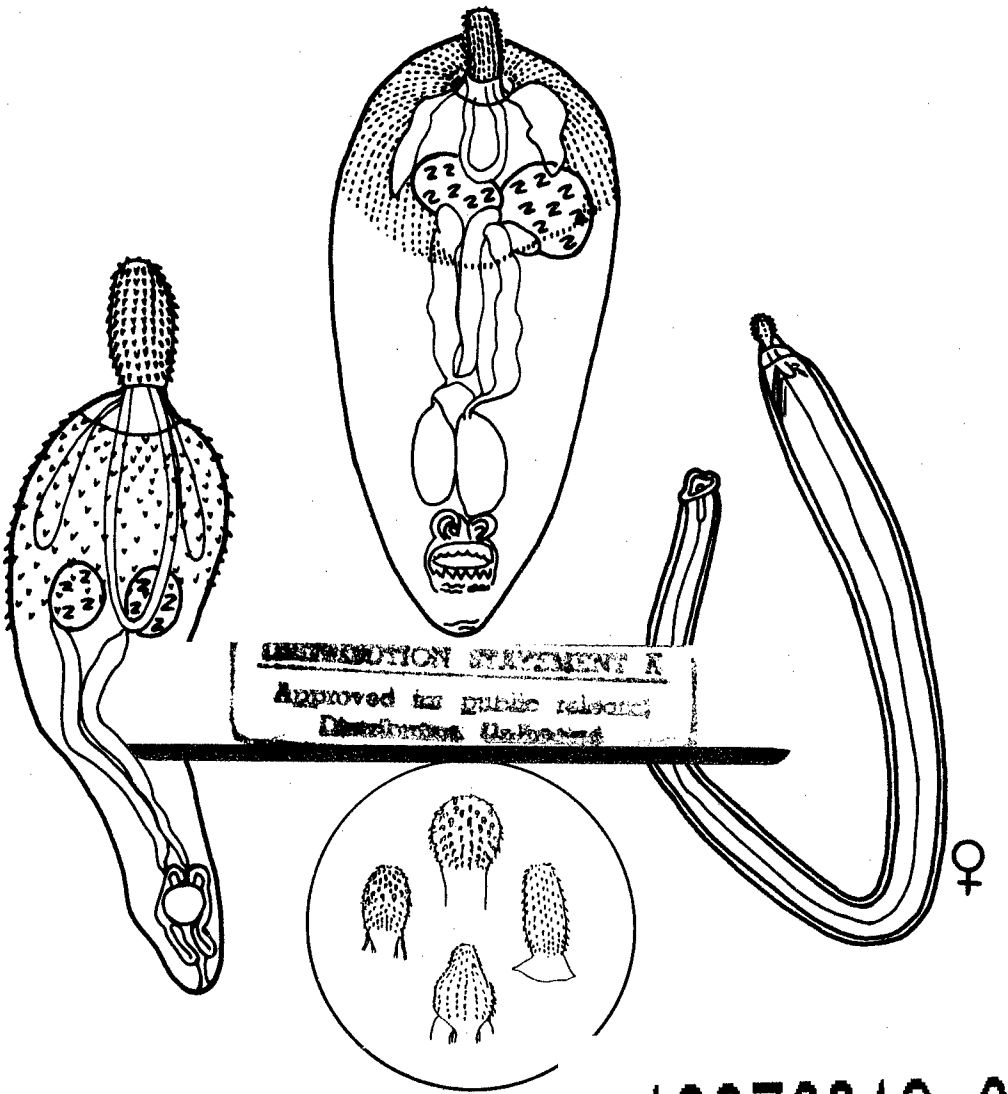
Key to Acanthocephala Reported in Waterfowl



UNITED STATES DEPARTMENT OF THE INTERIOR
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Resource Publication

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By Malcolm E. McDonald

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Contents

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by

Malcolm E. McDonald[1]

U.S. Fish and Wildlife Service
National Wildlife Health Research Center
6006 Schroeder Road
Madison, Wisconsin 53711

Introduction

This is the third part of a continuing series on helminths reported in waterfowl (McDonald 1974, 1981). Coots and moorhens (in Family Rallidae, Order Gruiformes) are included with the Anatidae of Anseriformes. The goal of these studies is complete coverage of waterfowl helminths of the world, although the original incentive—inadequate knowledge of the parasites of North American waterfowl—is less true now. World coverage is desirable because the world distribution of the family, tribes, and even many species of waterfowl often results in world distribution of parasites.

The format of this key follows that of the others in the series: a checklist of species, a general key to families and genera, a guide to identification of species, and keys to species of each genus that has more than one species reported in waterfowl. This group is the smallest of the series, with 52 species, of which 11 may be considered accidental, normally belonging in birds of other orders (two also normally mature only in marine mammals—although recorded in many birds—and one in freshwater rodents). One species is reported only from domestic waterfowl and one only experimentally from domestic ducklings, whereas six other species have been reported from both wild and domestic waterfowl. The frequency of occurrence and status of hosts in the checklist have been based on the literature. All Acanthocephala in waterfowl are found in the small intestine (usually in the posterior portion) and the large intestine.

Probosces usually are ovoid or sometimes elliptical. They may be elongate—narrow or wide, or even spherical. The proboscis may be swollen in a narrow or wide band; expansion may produce a pear-shaped (pyriform) structure, of which the narrow end may be pointed or rounded, short or long (see Acanthocephalan Anatomy). An important feature of the keys is the number of rows of hooks on the proboscis and the number of hooks in each row. As collections have increased in the number of specimens examined, they have also increased in the amount of variation recorded, so that the range in the number of hooks has increased. The hooks are always numbered from the anterior end; because the arrangement of rows generally shows no difference, it is rarely indicated. Length of a hook is indicated from the anterior tip to the posterior end; the hook is external on the proboscis, the root is internal and is given separately.

Eggs, which are routinely used to identify species in the keys, are really developing embryos. Three membranes, referred to as "shells,," are present; the middle shell in eggs of *Polymorphus* is thickest, has an elongate shape, and shows extensions at each pole of the embryo. No taxonomic significance is presently known for the fibrils on the outer surface of eggs that were recently recorded in several species; hypothetically, they might serve to entangle the eggs among the vegetation, where they are more likely to be ingested.

Intermediate hosts of Acanthocephala have been identified as crustacea of only a few orders: Amphipoda, Isopoda, and Decapoda; they are almost totally aquatic, intermediate in size, and feed on dead plant and animal remains. Several use fish as transport or paratenic hosts; one is known to use snakes and frogs as transport hosts to birds.

Many species (perhaps a majority) are distinguished by a yellow or orange color and may readily be seen with the unaided eye as orange bodies in

[1]Retired; present address: 1017 Magnolia Lane, Madison, Wis. 53713.

the intermediate host; however, at least one common acanthocephalan of waterfowl in Eurasia (*Filicollis anatis* in *Asellus communis*) appears as a white body. Several species cause a distinct change in the behavior of the intermediate host, which renders it more vulnerable to predation by the final host (Bethel and Holmes 1973, 1974, 1977; Holmes and Bethel 1972). Life cycles generally require at least 2 months for completion. The intermediate host species are preferred foods of many juvenile and adult waterfowl.

Van Cleave (1918) believed it was significant that only one species of Acanthocephala had ever been found in an individual host, and there were no records of the occurrence of more than one genus in any host species. This is no longer true. *Corynosoma* and *Polymorphus*, for example, repeatedly occur in the same bird, and several species of *Polymorphus* have been recorded for the same host (at least three are recorded in the same individual).

A few members of Acanthocephala cause considerable damage and even death in waterfowl. Two species in particular, *Polymorphus minutus* and *Filicollis anatis*, have repeatedly been cited in Europe and Asia, in domestic waterfowl as well as in wild birds (Petrochenko 1958, 1971b; McDonald 1969b; Macdonald et al. 1978); The pathogenic effects were described by Petrochenko and others (McDonald 1969b). *Polymorphus minutus* is the only species that definitely occurs in North America.

Filicollis species of Eurasia (reported also in cranes in Alaska, perhaps because of the number of cranes that cross the Bering Strait between the two continents) are particularly noteworthy. The proboscis of the female perforates the intestine wall and enlarges to form a pea-sized bulb lying against the outside of the intestine in the body cavity; the body of the worm remains within the intestinal lumen. The bulb ultimately becomes embedded in connective tissue. Excellent accounts are provided in Petrochenko (1958, 1971b) and Petrochenko and Kotelńikov (1962).

Eiders are the only wild birds in which repeated outbreaks of disease and death from Acanthocephala have been reported (Grenquist 1951, 1970; Thom and Garden 1955; Clark et al. 1958; Garden et al. 1964), but dead individual birds of other species have been recorded, and at least one lake and marsh area in the United States routinely shows heavy infections with some losses. (I observed from 1,500 to 10,000 Acanthocephala in dead swans, and noted pronounced pathological effects on their intestinal walls.) Few of the previously cited papers included detailed studies of the dead birds, and the causes of death were usually assumed. In a study of parasite numbers in eiders in Scotland in which Acanthocephala regularly occurred, Thompson (1985) commented, "In this study there is no evidence to show that *P. botulus* increased the mortality rate of eiders." Although he collected dead eiders regularly, no determination of the cause of death was attempted. An experimental study of antagonistic reactions between classes of helminths during multiple infections (Petrov and Egizbaeva 1972) showed significant reduction in the size and number of hymenolepidids when present with polymorphids in the small intestine.

As with other groups of helminths of waterfowl, the recent major references to Acanthocephala originated in Russia: Petrochenko (1958, 1971b [English translation]) and Petrochenko and Kotel'nikov (1962). Then a series of studies by Khokhlova (1966a, 1966b, 1971, and 1977) terminated in a partial update of Petrochenko (Khokhlova 1978), actually using the data of Schmidt (cited below). Studies of the biology and life histories of these forms up to that time are listed in McDonald (1969a, 1969b). The taxonomy of portions of the group has been revised by Schmidt (1972, 1973, 1975) and Schmidt and Kuntz (1967); Amin (1982) recently reviewed the entire phylum. Denny (1969) and Podesta and Holmes (1970) discussed the biology of Acanthocephala and other helminths carried by the intermediate hosts, Gammaridae, in Canada. Many papers on the same topic for Europe and Asia are included in the literature (McDonald 1969a). Kontrimavichus and Atrashkevich (1982) described parasitic systems and their position in the study of population biology of helminths. Bullock (1969) gave an excellent account of the techniques of preservation and mounting on microscope slides.

I could detect no distinct differences between *Corynosoma sudsuche* Belopol'skaya 1959 and *Corynosoma mandarinca* Oshmarin 1963, both reported from ducks of Primorsk, and I finally eliminated the second as a synonym. The same thing was true for *Corynosoma iheringi* Machado Filho 1961a, *Corynosoma longilemniscatus* Machado Filho 1961b, and *Corynosoma molfifernandesi* Machado Filho 1962a, all reduced to synonyms of *Corynosoma enriettii* Molfi and Fernandes 1953, of Brazil.

Polymorphus magnus Skrjabin 1913 has been merged with *P. minutus* Goeze 1782, following the lead of Bezubik 1957a. Bezubik showed that specimens of *P. minutus* described by Petrochenko were actually *P. contortus*; the true *P. minutus* then included *P. magnus*. Worms 2–12 mm long showed only one peak of variation in length for each sex, indicating only one species. Females 4–7 mm long more frequently possessed mature eggs than lacked them (precisely the range that Petrochenko said lacked them)—too large for *P. minutus* (actually *P. contortus*) and too young for *P. magnus*. Only researchers in England (Crompton and Harrison 1965) have followed Bezubik's lead; *P. magnus* has been recorded repeatedly since 1957, 34 times in wild ducks and 40 times in domestic ducks, mostly in Russia.

The form listed as *Polymorphus trochus* of Khokhlova is distinct from *P. trochus* Van Cleave 1945. *P. trochus* Van Cleave is almost universal in *Fulica americana*, and rarely occurs in ducks in North America, except occasionally when they are severely ill (twice in mallards). The form of the proboscis is strikingly different in the two sexes. *P. trochus* of Khokhlova has been reported repeatedly in wild ducks in Asia, but has not been recorded in the European coot. The form of the proboscis shows little difference between males and females. I have refrained from renaming this form, but a new name is necessary.

Common names of hosts (Table 1) used in this publication follow those of Scott (1977).

Table 1. *Names of hosts.*

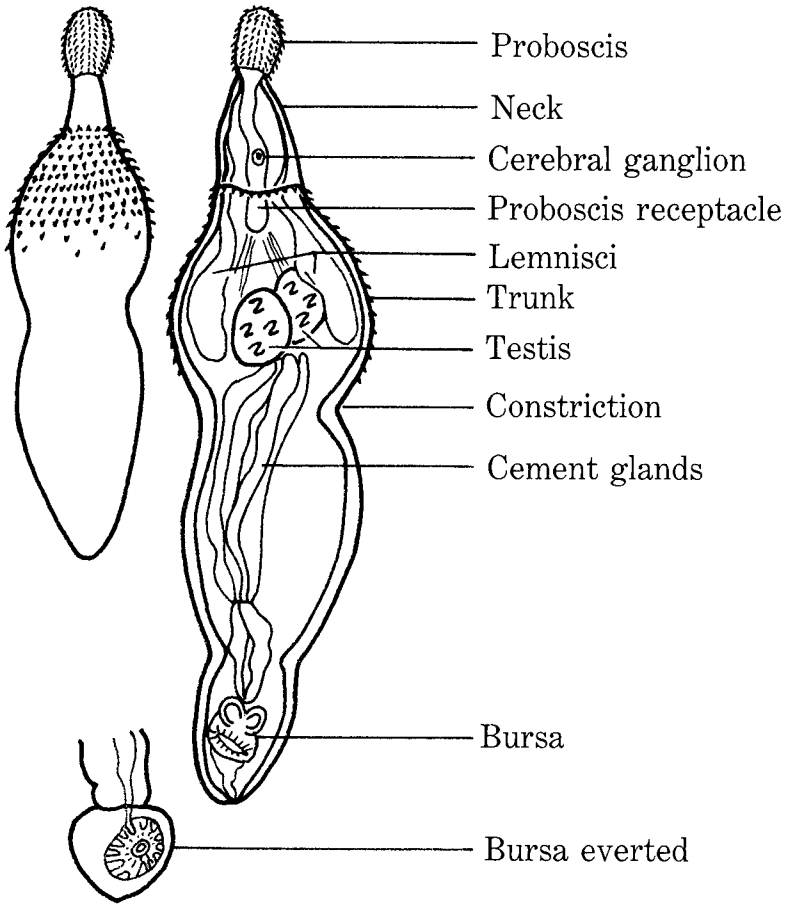
Common name	Scientific name	Common name	Scientific name
American coot	*Fulica americana* (order Gruiformes)	Long-tailed duck	*Clangula hyemalis*
Bahama pintail	*Anas bahamensis*	Loon	Genus *Gavia* (order Gaviiformes)
Bay duck	Tribe Aythyini	Mallard	*Anas platyrhynchos*
Brazilian teal	*Amazonetta brasiliensis*	Mandarin duck	*Aix galericulata*
Brown dipper	*Cinclus pallasii* (order Passeriformes)	Common moorhen	*Gallinula chloropus* (order Gruiformes)
Coot	Genus *Fulica* (order Gruiformes)	Musk duck	*Biziura lobata*
		Northern pintail	*Anas acuta*
Domestic duck	*Anas platyrhynchos* (dom.)	Common pochard	*Aythya ferina*
Domestic muscovy	*Cairina moschata* (dom.)	Puddle duck	Tribe Anatini
Eider	Tribe Somateriini	Rosybill	*Netta peposaca*
Northern gannet	*Sula bassanus* (order Pelecaniformes)	Sea duck	Genera *Melanitta, Histrionicus, Clangula*
Common goldeneye	*Bucephala clangula*	Swan	Genus *Cygnus*
Greater scaup	*Aythya marila*	Tufted duck	*Aythya fuligula*
Harlequin duck	*Histrionicus histrionicus*	Waterfowl	Family Anatidae
Hooded merganser	*Mergus cucullatus*		

Checklist of Acanthocephala Reported in Waterfowl

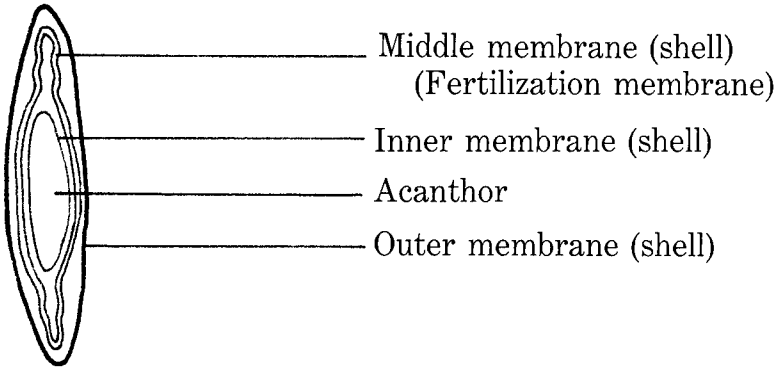
Species	Frequency of records	Status of host (wild = W)
Class Archiacanthocephala		
Family Oligacanthorthynchidae		
Neoncicola avicula (Travassos 1917)	Rare	W
ORDER PALAEACANTHOCEPHALA		
Family Echinorhynchidae		
Acanthocephalus anguillae (Müller 1789)	Accidental	W
Acanthocephalus lucii (Müller 1776)	Accidental	W
Acanthocephalus ranae (Schrank 1788)	Accidental	W
Family Centrorhynchidae		
Centrorhynchus aluconis (Müller 1780)	Accidental	W
Centrorhynchus teres (Westrumb 1821)	Accidental	W
Family Polymorphidae		
Andracantha mergi (Lundström 1942)	Infrequent	W
Andracantha phalacrocoracis (Yamaguti 1939)	Accidental	W
Arhythmorhynchus frassoni (Molin 1858)	Accidental	W
Arhythmorhynchus invaginabilis (Linstow 1902)	Accidental	W
Arhythmorhynchus teres Van Cleave 1929	Accidental	W
Corynosoma anatarium Van Cleave 1945	Rare	W
Corynosoma constrictum Van Cleave 1918	Characteristic	W
Corynosoma enriettii Molfi and Fernandes 1953	Infrequent	W, Domestic
Corynosoma peposacae (Porta 1914)	Rare	W
Corynosoma semerme (Forssell 1904)	Infrequent	W
Corynosoma strumosum (Rudolphi 1802)	Infrequent	W
Corynosoma sudsuche Belopol'skaya 1959	Rare	W
Corynosoma tunitae Weiss 1914	Rare	W
Filicollis anatis (Schrank 1788)	Characteristic	W, Domestic
Filicollis trophimenkoi Atrashkevich 1982	Infrequent	W
Hexaglandula paucihamatus (Heinze 1936)	Accidental	W
Polymorphus actuganensis Petrochenko 1949	Frequent	W
Polymorphus acutis Van Cleave and Starrett 1940	Infrequent	W
Polymorphus biziurae Johnston and Edmonds 1948	Rare	W
Polymorphus cincli Belopol'skaya 1959	Experimental	Domestic
Polymorphus contortus (Bremser 1821)	Common	W
Polymorphus corynoides Skrjabin 1913	Infrequent	W
Polymorphus cucullatus Van Cleave and Starrett 1940	Rare	W
Polymorphus diploinflatus Lundström 1942	Frequent	W, Domestic
Polymorphus kostylewi Petrochenko 1949	Infrequent	W, Domestic
Polymorphus marilis Van Cleave 1939	Frequent	W

Species	Frequency of records	Status of host (wild = W)
Polymorphus mathevossianae Petrochenko 1949	Frequent	W
Polymorphus meyeri Lundström 1942	Rare	W
Polymorphus miniatus (Linstow 1896)	Rare	W
Polymorphus minutus (Goeze 1782)	Characteristic	W, Domestic
Polymorphus obtusus Van Cleave 1918	Infrequent	W
Polymorphus paradoxus Connell and Corner 1957	Infrequent	W
Polymorphus phippsi Kostylev 1922	Frequent	W
Polymorphus pupa (Linstow 1905)	Frequent	W
Polymorphus striatus (Goeze 1782)	Frequent	W, Domestic
Polymorphus strumosoides Lundström 1942	Frequent	W
Polymorphus swartzi Schmidt 1965	Rare	W
Polymorphus trochus Van Cleave 1945	Common	W, coot
Polymorphus (*trochus* of Khokhlova 1966)	Frequent	W
Profilicollis altmani (Perry 1942)	Rare	W
Profilicollis arcticus (Van Cleave 1920)	Infrequent	W
Profilicollis botulus (Van Cleave 1916)	Frequent	W
Profilicollis formosus (Schmidt and Kuntz 1967)	Rare	Domestic
Profilicollis major (Lundström 1942)	Infrequent	W
Family Plagiorhynchidae		
Plagiorhynchus cylindraceus (Schrank 1788)	Accidental	W
Plagiorhynchus gracilis Petrochenko 1958	Infrequent	W

Acanthocephalan Anatomy

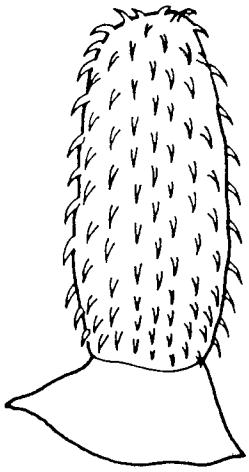


Ovum with Embryo (*Polymorphus*)

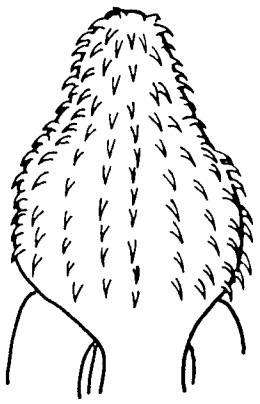


Variations of Proboscis

Cylindrical ovoid



Elongate ovoid



Pyriform

Spherical

Key to Families and Genera

(Acanthocephala Reported in Waterfowl)

1. Body (trunk) without spines 2
   Trunk with at least a few spines, usually on anterior portion of body ....(F. Polymorphidae)—5
2. Male with less than eight cement glands; proboscis sheath sac-like, with two muscular layers 3
   Male with eight cement glands, not definitely paired; proboscis sheath a single-walled sac, not stout; proboscis hooks in 5–6 transverse circles, very powerful, roots in first (apical) row of hooks bifurcated; male 12 mm long, female 400 mm long; eggs oval; accidental in waterfowl ..... (F. Oligacanthorhynchidae)—*Neoncicola*
3. Males with six cement glands, of highly variable form (Fig. 1.1); sometimes with lateral or anteriorly directed processes from main root of proboscis hooks (Fig. 1.2); accidental in waterfowl, normally in fish or amphibians .....(F. Echinorhynchidae)—*Acanthocephalus*
   Males with three very long narrow cement glands 4
4. Proboscis sheath attached near middle of proboscis wall; proboscis posterior to attachment bearing simple thornlike spines, anteriad it bears strong hooks with recurved roots (Fig. 1.3); eggs oval .....(F. Centrorhynchidae)—*Centrorhynchus*
   Proboscis sheath attached at base of cylindrical or club-shaped proboscis; proboscis hooks uniform in shape (Fig. 1.4); eggs oval .....(F. Plagiorhynchidae)—*Plagiorhynchus*
5. Anterior trunk spines in two horizontal zones, separated by small gap (Fig. 1.5)...*Andracantha*
   Anterior trunk spines in one zone 6
6. Spines not limited to anterior region of trunk, some (genital) occurring at posterior end; anterior trunk spines often extending more posteriad on ventral surface (Fig. 1.6).....*Andracantha*
   Spines limited to anterior, none at posterior end..... 7
7. Hooks on midventral surface of proboscis often distinctly larger and heavier than other hooks at corresponding level on dorsal surface; proboscis usually enlarged (swollen) near center, spindle-shaped (Fig. 1.7) .....*Corynosoma*
   Hooks of dorsal and ventral sides of proboscis similar in size (Fig. 1.8)....*Arhythmorhynchus* 8
8. Body markedly sexually dimorphic; proboscis of female spherical, with reduced hooks in star-shaped radiating rows at tip (Fig. 1.10; actually on proboscis portion of sphere formed from inflated proboscis and anterior portion of neck), sphere usually lying outside intestinal wall due to perforation, with body of worm still inside intestine; proboscis of male nearly orbicular, with 18 longitudinal rows of 10–11 hooks each, 21–31 μm long, anterior with roots; 6 compact reniform cement glands.....*Filicollis*
   Proboscis spherical to cylindrical, similar in both sexes, row of hooks extend entire length of proboscis, proboscis entirely within intestine of host 9
9. Four cement glands in male, elongate, narrow, lying parallel in one bundle; proboscis spherical to cylindrical, constriction in body usually evident 10
   Six cement glands in male, intestine-shaped, in two groups of three each (Fig. 1.11); proboscis ovoid, with eleven longitudinal rows of hooks; constriction on trunk slight (females fall into *Polymorphus* key).....*Hexaglandula*
10. Eggs oval; proboscis spherical, rarely slightly ovoid (Fig. 1.12).....*Profilicollis*
    Eggs elongate, middle shell thick, extended and narrowed at poles; proboscis ovoid, pyriform, or cylindrical (Fig. 1.9) .....*Polymorphus*

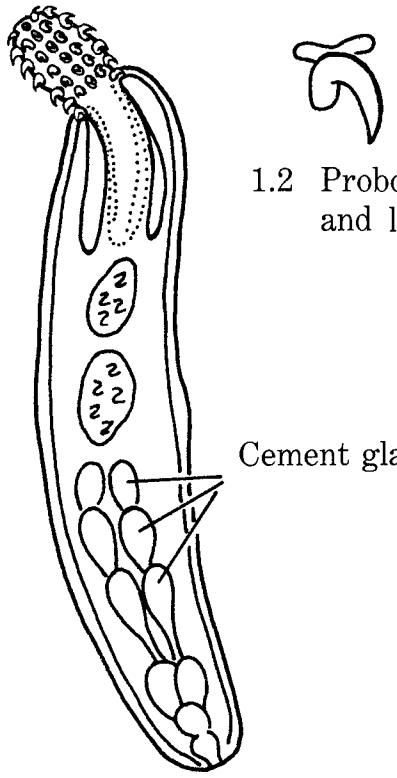
Guide to Identification of Species

(Acanthocephala Reported in Waterfowl)

Note: Includes all genera reported in waterfowl in recent literature.

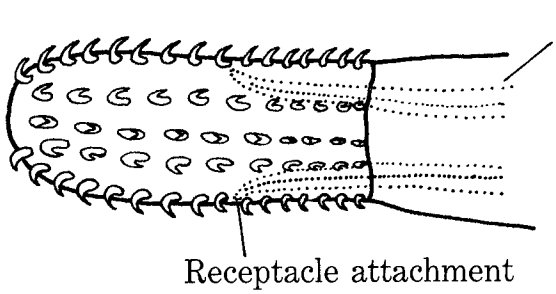
Genus	Species reported in waterfowl
Acanthocephalus	3 species in waterfowl, of perhaps 35 in genus; all accidental. See key to species.
Andracantha	2 species in waterfowl, of 3 in genus. See key to species.
Arhythmorhynchus	3 species, of perhaps 25 in genus. See key to species.
Centrorhynchus	2 species, of perhaps 60 in genus. See key to species.
Corynosoma	8 species, of perhaps 30 in genus. See key to species.
Falsifilicollis	Synonym of *Profilicollis*.
Filicollis	2 species, all in genus. See key to species.
Hexaglandula	*H. paucihamatus*, of 4 species in genus. Perhaps accidental, type host a gull. Genus perhaps belongs in *Polymorphus*; see Petrochenko 1958 or 1971b for description.
Neoncicola	*N. avicula*, of 2 in genus; rare; South America; see Petrochenko 1958 or 1971b for description, under *Prosthenorchis*.
Parafilicollis	Synonym of *Profilicollis*.
Polymorphus	24 species, of about 26 in genus. See key to species.
Profilicollis	5 species, of 8 in genus. See key to species.
Plagiorhynchus	2 species, of about 22 in genus. See key to species.

Fig. 1. Acanthocephalan Genera

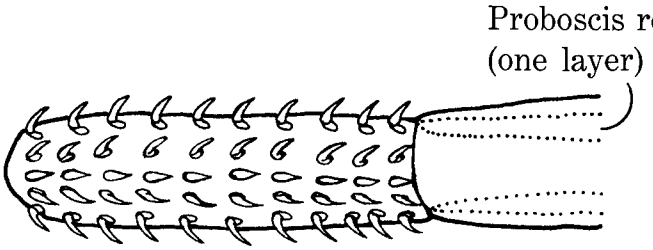


1.1 *Acanthocephalus*

1.2 Proboscis hook with root and lateral processes

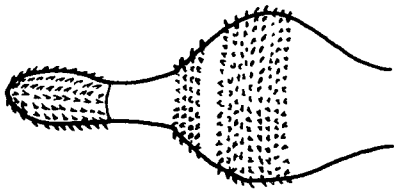


1.3 *Centrorhynchus*

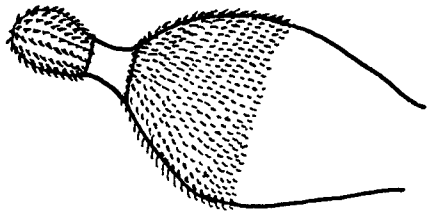


1.4 *Plagiorhynchus*

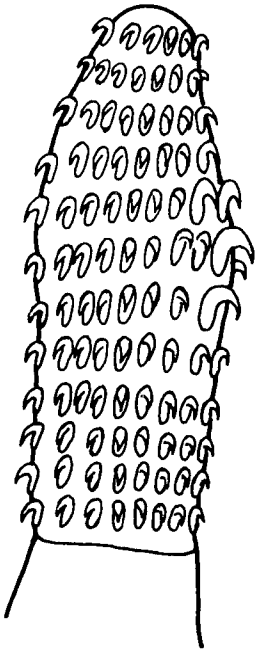
1.5 Posterior end, with hooks



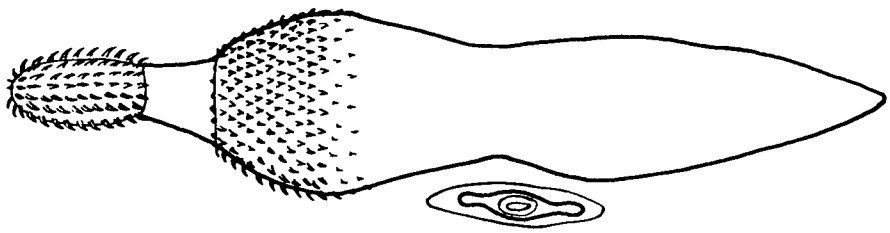
1.6 *Andracantha*



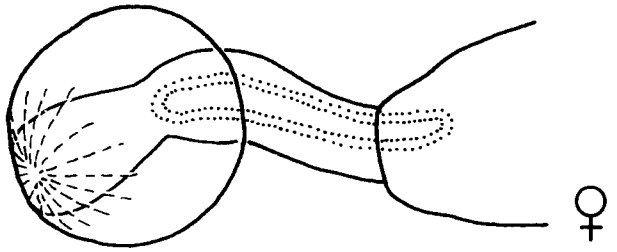
1.7 *Corynosoma*



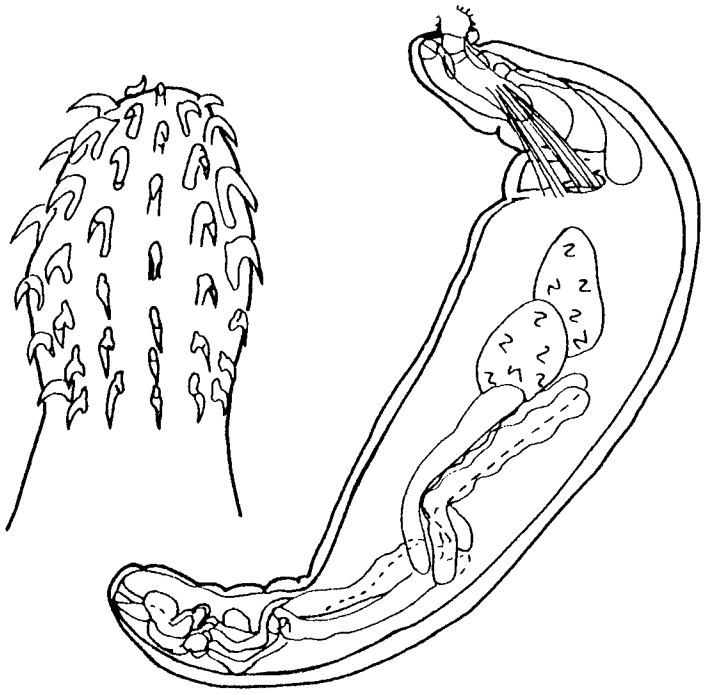
1.8 *Arhythmorhynchus*



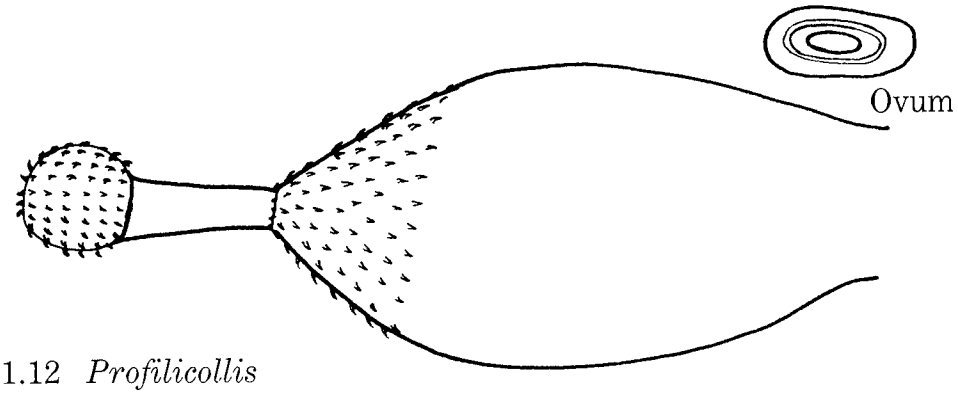
1.9 *Polymorphus* Ovum



1.10 *Filicollis* proboscis



1.11 *Hexaglandula*



1.12 *Profilicollis*

Keys to Species

Genus *Acanthocephalus*

Note: Infections obtained by ingestion of freshwater isopod Crustacea.

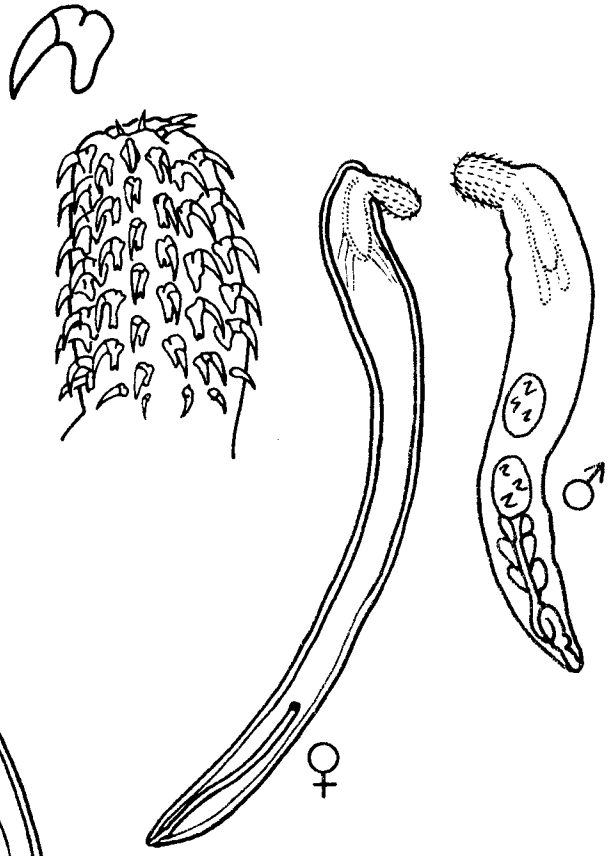
1. Proboscis hooks with two lateral processes at top of roots; hooks in 10 longitudinal rows, with 6–7 hooks in each row; proboscis club-shaped, width about 1/3 of length (Fig. 2.1); accidental, normally in fish; North America, Eurasia ..... *A. anguillae*
   Proboscis hooks without lateral processes on roots 2

2. Female 8–17 mm long, male 5–12 mm long, cylindrical; proboscis hooks in 12–16 longitudinal rows of 7–9 hooks each; proboscis 500–700 μm long, 250–300 μm wide; lemnisci about 1,600 μm long (Fig. 2.2); accidental, normally in fish; Europe ..... *A. lucii*
   Female 20–60 mm long, male 5–12 mm long, cylindrical; proboscis hooks mostly in 16 (12–20) longitudinal rows, with 4–6 hooks in each row; proboscis 450–500 μm long, 300 μm wide; lemnisci 600–800 μm long (Fig. 2.3); accidental, normally in Amphibia; North America, Europe ..... *A. ranae*

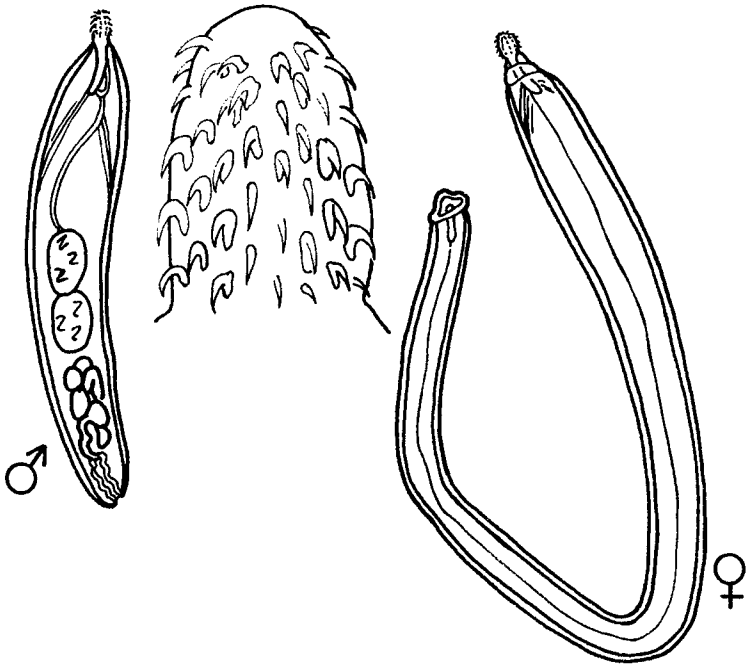
Descriptions: Petrochenko 1956, 1971a.

Fig. 2. Genus *Acanthocephalus*

2.1 *A. anguillae*



2.2 *A. lucii*



2.3 *A. ranae*

Genus *Andracantha*

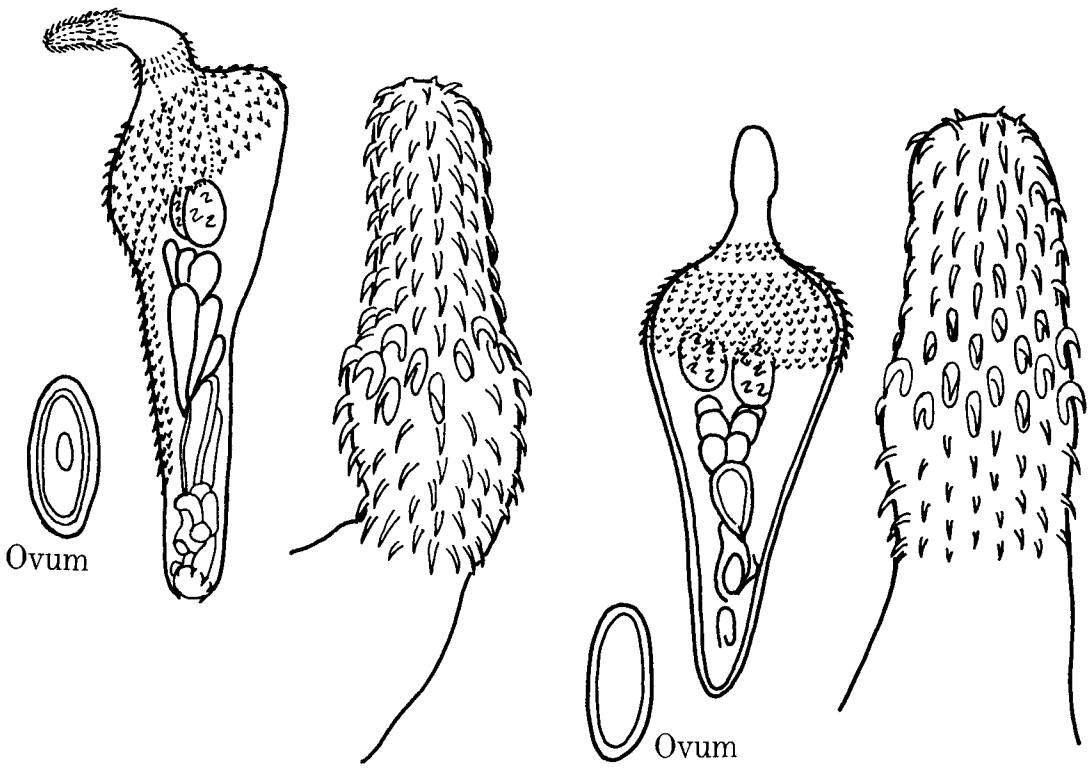
Note: Source of infections unknown; probably marine.

1. Posterior field of trunk spines continues down ventral side nearly to posterior tip; female 4.6–6 mm long, male 4–4.25 mm long; proboscis hooks in 16–19 longitudinal rows with 10–14 in each row, hooks increase in size to 9th hook (with roots), last 5 without roots; 9th hook 66 μm long in male, 105 μm long in female; 8 cement glands, arranged irregularly; male without genital spines, often absent also in female; eggs 88–96 μm by 42–50 μm, oval (Fig. 3.1); infrequent, in fish-eating birds; North America, Asia ..... *A. phalacrocoracis*

   Posterior field of trunk spines does not continue down ventral side; male 3–4 mm long, female 4.7–4.9 mm long; proboscis with 15–17 longitudinal rows of hooks, with 9–10 in each row, first 7 hooks increase in size to 60 μm long in male, 70 μm long in female, with roots, rest without roots; often without genital spines; 6 cement glands, in pairs; eggs 44–50 μm by 16–24 μm, oval (Fig. 3.2); infrequent, in fish-eating birds; North America, Eurasia ..... *A. mergi*

Descriptions: Schmidt 1975.

Fig. 3. Genus *Andracantha*



3.1 *A. phalacrocoracis*

3.2 *A. mergi*

Genus *Arhythmorhynchus*

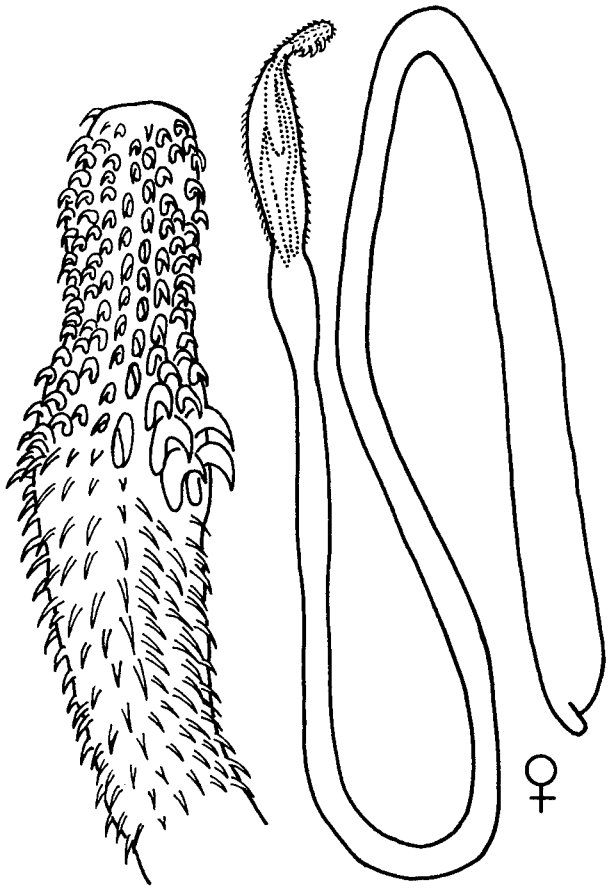
Note: One species obtained by ingestion of marine decapod Crustacea; fish serve as transport hosts.

1. Hooks of midventral side of proboscis 2–3 times larger than the rest; anterior body ovate, 2.3–2.6 mm long, separated by constriction from remaining 6/7 of body, posterior end widened; neck very short; proboscis with 18 longitudinal rows of 20 hooks each; body 30–80 mm long (Fig. 4.1); accidental in mergansers, normally in other aquatic birds; Eurasia, Africa, Australia ..... *A. frassoni*
   Hooks of midventral side of proboscis only slightly enlarged 2

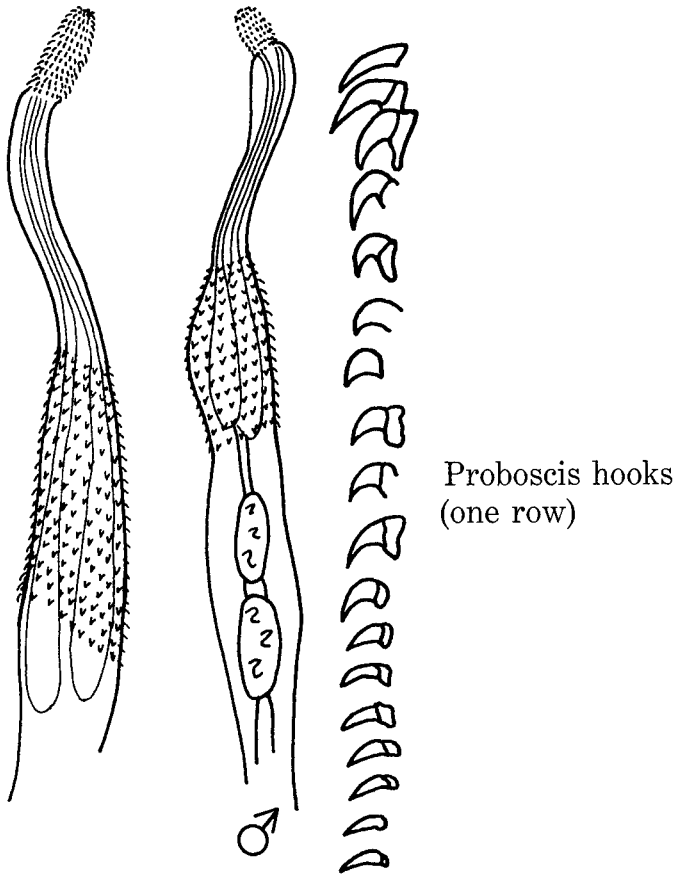
2. Proboscis with 22–24 longitudinal rows of 18–19 hooks each; neck long; hooks at least 45–51 μm long; lemnisci long, reach beyond armed trunk; body 8–35 mm long (Fig. 4.2); accidental in mergansers, normally in shorebirds; Europe, North America ..... *A. invaginabilis*
   Proboscis with 18 longitudinal rows of 14–16 hooks each, hooks usually 60 μm long; accidental in mergansers, normally in shorebirds and gulls; Eurasia, South America ..... *A. teres*

Descriptions: Petrochenko 1958, 1971b.

Fig. 4. Genus *Arhythmorhynchus*



4.1 *A. frassoni*



4.2 *A. invaginabilis*

Genus *Centrorhynchus*

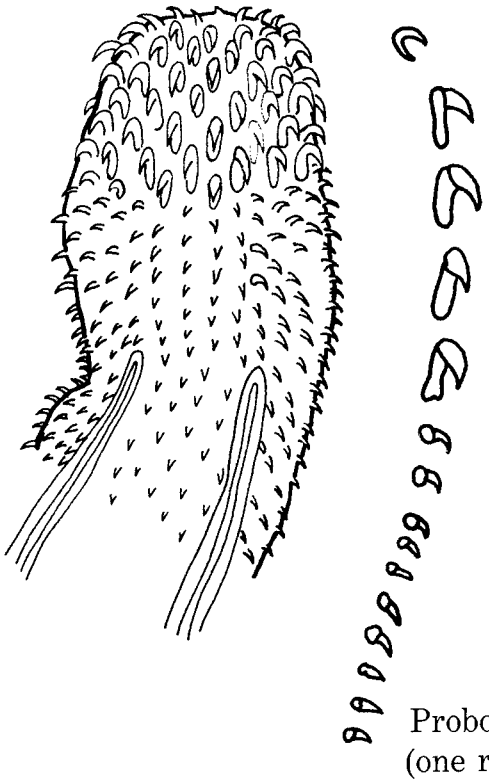
Note: Source of infections unknown; genus mostly in terrestrial birds. *Corynosoma aluconis* in snakes and amphibians as transport hosts.

1. Body 6–45 mm long (male 6–25 mm, female 11–45 mm); proboscis 1,000–1,500 μm long, with 30–32 longitudinal rows of 15 (16–18 reported) hooks each; anterior 6–7 hooks with well-developed roots (hooks and roots both 55 μm long), posterior hooks spinelike without roots (Fig. 5.1); accidental in mergansers, normally in birds of prey; Eurasia ..... *C. aluconis*

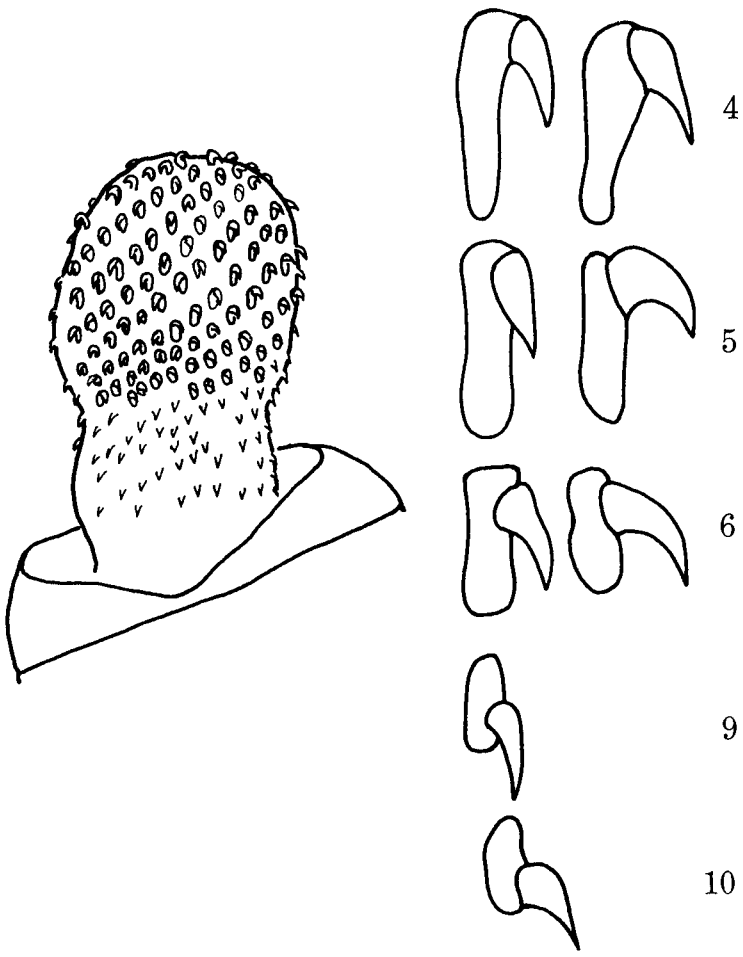
   Body 14–20 mm long; proboscis 650–700 μm by 400 μm, cylindrical or anterior portion nearly orbicular, narrowed toward base, with 32–34 longitudinal rows of 11–12 hooks each, anterior 5–6 hooks large (36–38 μm long, roots 48–58 μm long), posterior 5–6 hooks spinelike, numbers 6–10 with anterior process of root (Fig. 5.2); accidental in pochards, normally in corvid passerine birds; Europe ..... *C. teres*

Descriptions: Petrochenko 1958, 1971b.

Fig. 5. Genus *Centrorhynchus*



5.1 *C. aluconis*



5.2 *C. teres*

Genus *Corynosoma*

Note: Infections obtained by ingestion of freshwater (one species) or marine (two species) amphipod and isopod Crustacea, or by ingestion of marine fish serving as transport hosts (two species).

1. Triangular shape, showing spines facing 1 mm, on slant 2
   Anterior end slanted to ventral side, to middle or beyond 3

2. Triangular shape, front 1 mm wide; body 5 mm long; spines in anterior part not extending as far as middle area; genital spines around genital pore at posterior end; with 18 longitudinal rows of 10 hooks each (Fig. 6.1); North America, North Africa; in eiders (and northern gannet) ..... *C. tunitae*
   Forebody swollen, posterior tapered 4

3. Body 5–7 mm long, occasionally 9 mm; anterior part inflated, about 1/4–1/3 of entire trunk, spines extend on ventral side to middle area; genital spines around posterior tip in male; proboscis with 18 longitudinal rows of 10–11 hooks each; largest hooks numbers 6 and 7, or numbers 7 and 8, 64–80 μm long, root longer than hook; lemnisci broad and flat, shorter than proboscis sheath; testes oval, more or less opposite; cement glands 6, pyriform, two groups of three, elongate; eggs 79–101 μm long by 19 μm wide (Fig. 6.2); accidental, normally in marine mammals, frequent in marine fish-eating birds but rarely mature; coasts of North America, northern Europe ..... *C. strumosum*
   Trunk spines extend ventrally to posterior end, mixing with genital spines; body small, 3 mm long; anterior part enlarged, inflated, proboscis cylindrical with slight swelling at 2/3 of length, with 22–24 longitudinal rows of hooks of 12–13 hooks each; largest hooks numbers 7–9, with recurved roots, about 67 μm long, ending with 4–5 hooks without roots; testes round, one behind the other; lemnisci slightly shorter than proboscis sheath; eggs 79–101 μm long by 16–29 μm wide (Fig. 6.3); accidental, normally in marine mammals (Pinnipedia), common in fish-eating birds, but rarely mature ..... *C. semerme*

4. Forebody swollen, posterior tapered; spines sparse around posterior end of body; body 3.9–5.2 mm long; forebody covered with hooks; proboscis about 550 μm long, with 16 longitudinal rows of 12 hooks each; largest hooks in middle of proboscis, number 7, 64 μm long; hooks toward anterior end are larger, become smaller toward rear; testes oval, side by side; lemnisci shorter than proboscis sheath; 6 cement glands, in two groups of three; eggs 68 μm long by 25 μm wide (Fig. 6.4); in mandarin and harlequin ducks; Asia (Primorsk) ..... *C. sudsuche*

5. Body swollen at forebody; constricted below forebody 6
   Forebody not swollen, body not constricted 7

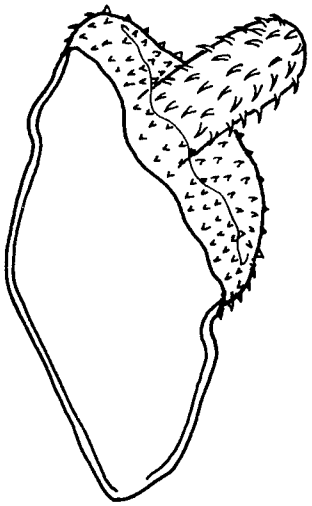
6. Forebody swollen, strong constriction below forebody; body 2.28–6.0 mm long; proboscis cylindrical, swollen below middle, largest hooks at about swollen area, 41–47 μm long, other hooks 30–41 μm long at tip and 35–41 μm long at base of proboscis; testes oval, overlapping about 1/3; eggs 80–108 μm long by 12–16 μm wide (Fig. 6.5); common in ducks; North America .. .. *C. constrictum*
   Body elongate, broadening anteriorly, slight constriction; body 8–11 mm long; body club-shaped, widened forward, anterior part with strong conical spines; males with spines present sparingly at posterior end; proboscis 340–430 μm long, with 14–18 longitudinal rows of 12–14 hooks each; largest hooks number 4; lemnisci cylindrical, about twice as long as proboscis sheath; eggs 64–68 μm long by 17–18 μm wide; rare, in rosybills; South America (Brazil, Argentina) .... *C. peposacae*

7. Body relatively small, 4.2–8.6 mm long; with small number of cuticular spines irregularly scattered in both sexes at genital pores; proboscis about 550 μm long and 280–290 μm in diameter, armed with 14 longitudinal rows of 8 or 9 hooks each; largest hooks about 88 μm long about at the middle of the proboscis, hooks near the base about 47–59 μm long, those near the tip 59–82 μm long; eggs 100–112 μm long by 20–23 μm wide (Fig. 6.6); in ducks; North America (U.S.) ..... *C. anatarium*

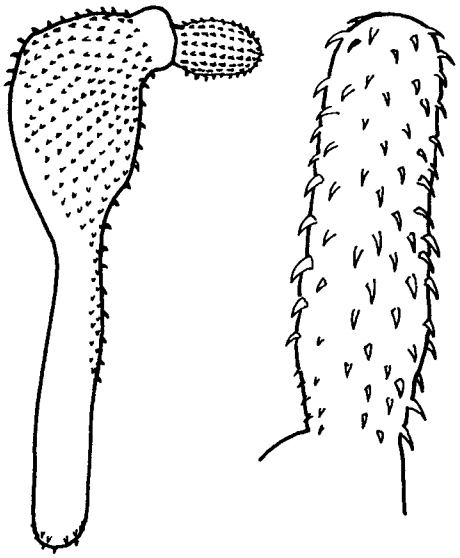
   Body fairly small, middle section large, one worm with forebody bent over at anterior; proboscis with 20 longitudinal rows, with hooks in 8 rows each; hooks in three belts, swollen below the middle; largest hooks numbers 4 and 5, 46 μm long (roots 56 μm long); lemnisci long, sinuous, about 3 times the length of proboscis sheath; testes oval, about 1/3 overlapping; eggs 90–100 μm long by 19–21 μm wide (Fig. 6.7); rare, in domestic muscovys, Bahama pintails, and Brazilian teals; South America (Brazil) ..... *C. enriettii*

Descriptions: Petrochenko 1958, 1971b; Belopol'skaya 1959; Machado Filho 1961a, 1961b, 1962; Schmidt 1965b; Oshmarin 1963; Bourgeois and Threlfall 1982.

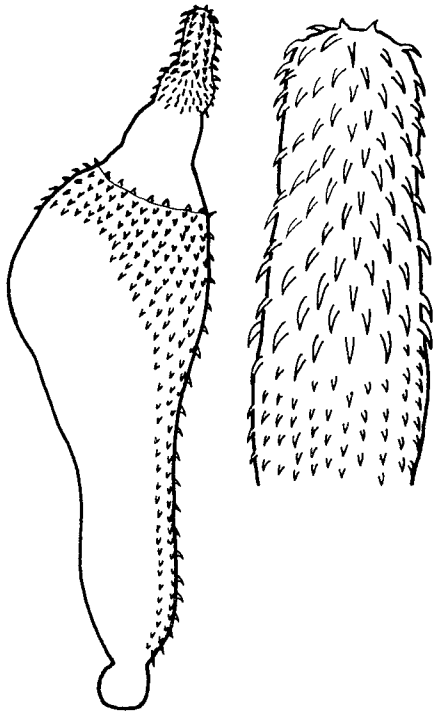
Fig. 6. Genus *Corynosoma*



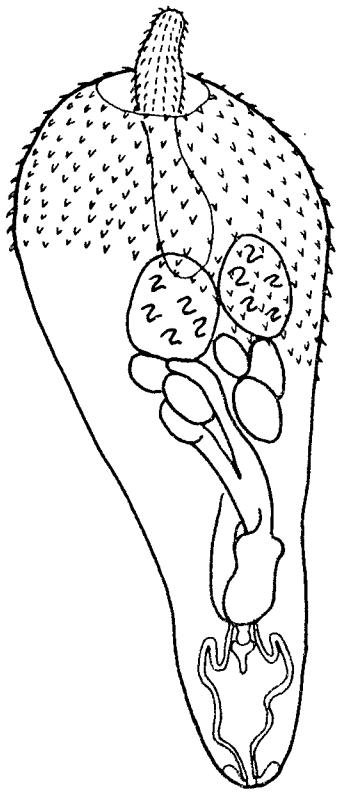
6.1 *C. tunitae*



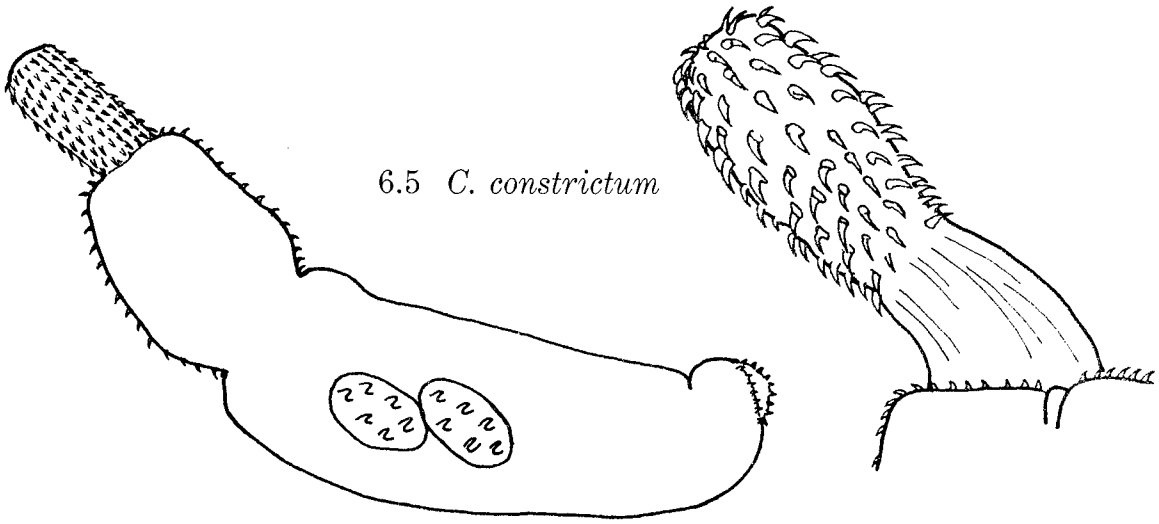
6.2 *C. strumosum*



6.3 *C. semerme*

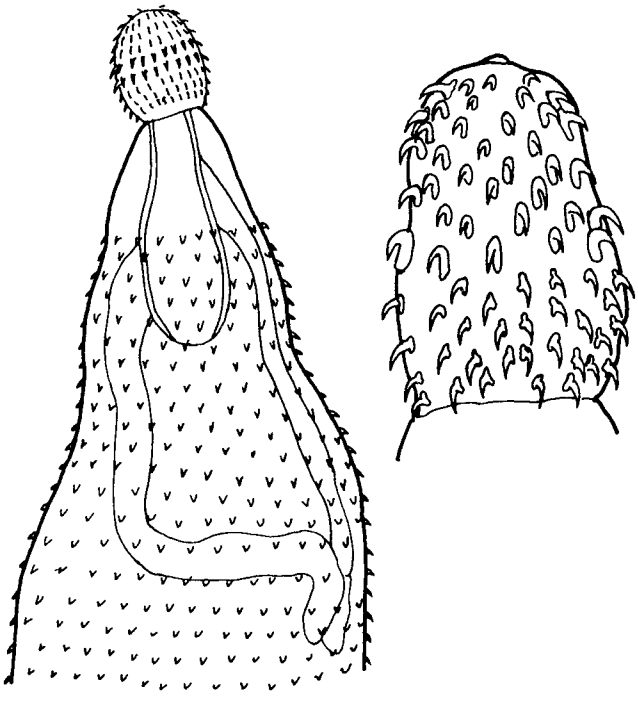


6.4 *C. sudsuche*



6.5 *C. constrictum*

6.6 *C. anatarium*



6.7 *C. enriettii*

Genus *Filicollis*

Family Polymorphidae

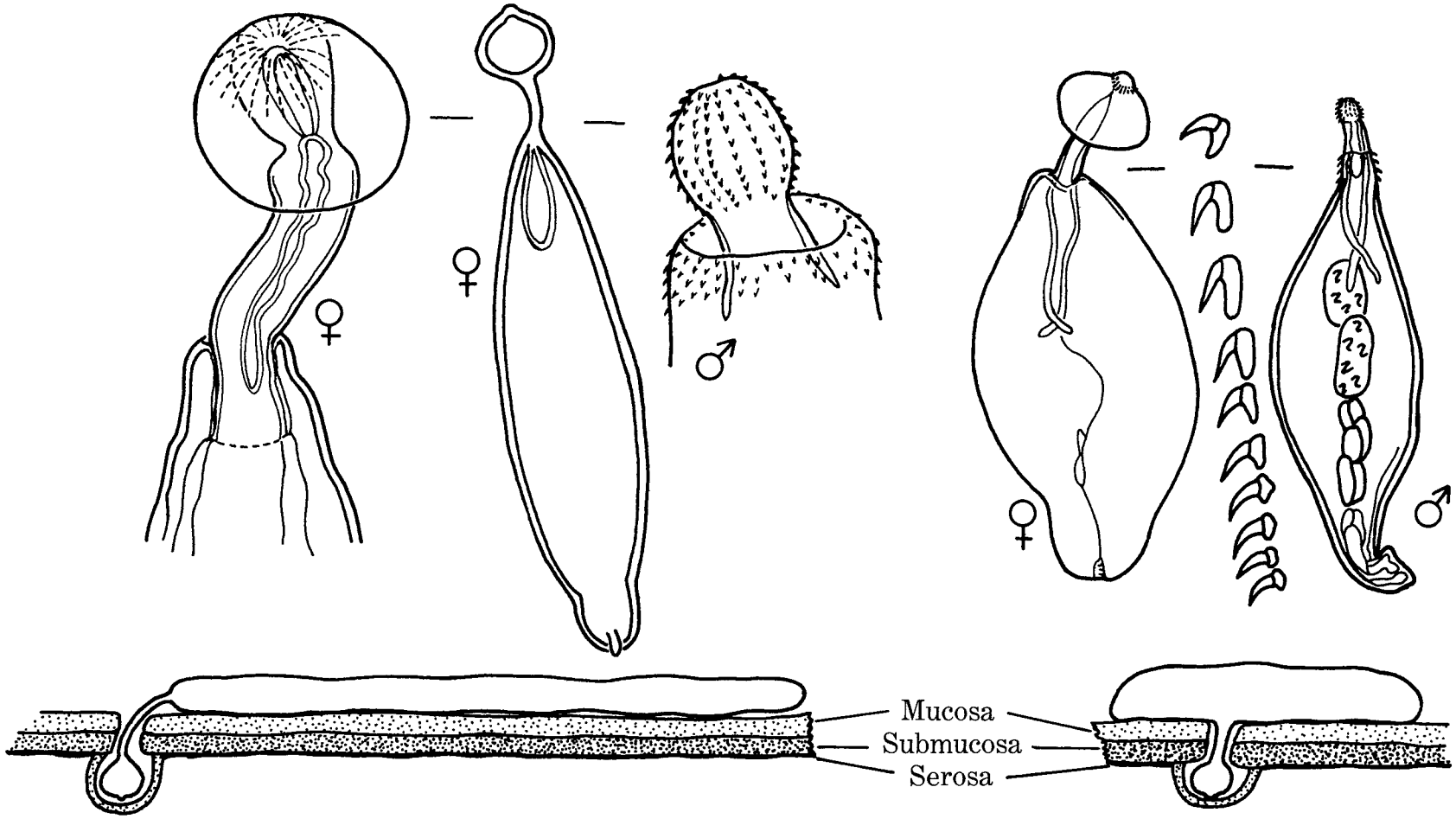
Note: Infections obtained by ingestion of freshwater isopod Crustacea. Salamanders serve experimentally as transport hosts in one species (*F. trophimenkoi*).

1. Proboscis hooks in male up to 41 μm long, reduced in female; body 7.6–12 mm long in male, 24.9–36.4 mm long in female, long, fusiform in female; eggs 58–71.8 μm long by 17–22.2 μm wide, oval, without projection of middle shell; mature female cylindrical, band-shaped, with bulb at anterior end, outside intestine (Fig. 7.1); characteristic, in all waterfowl, typically in northern pintails and other puddle ducks; Eurasia ..... *F. anatis*

   Proboscis larger, hooks up to 48 μm long in male, reduced in female; body 6–7.4 mm long in male, 14.3–21 mm long in female (reported 2/3 as large as *F. anatis*); eggs 84–118 μm by 25.6–39.3 μm, with surface covered by fine fibrils (reported 1.5 times larger than *F. anatis*), middle shell weakly projecting at poles; mature female flat-ovate, tablet-shaped with bulb on ventral side posterior of anterior end (bulb 2.275–3.212 mm diameter; Fig. 7.2); infrequent, in long-tailed ducks, greater scaups, and eiders; Asia (Chukotka) ..... *F. trophimenkoi*

Descriptions: Petrochenko 1958, 1971b; Atrashkevich 1982.

Fig. 7. Genus *Filicollis*



Female in situ in intestine of host

7.1 *F. anatis*

7.2 *F. trophimenkoi*

Genus *Polymorphus*

Family Polymorphidae

Note: Infections obtained by ingestion of freshwater (seven species) or marine (one species) amphipod Crustacea. One species also uses fish as transport hosts.

1. Proboscis markedly sexually dimorphic, strongly inflated pear-shaped in female, ovoid without inflation in male; in female posterior of proboscis 380–560 μm long, 310–490 μm in diameter, anterior end nipplelike, 100–175 μm in diameter; in male proboscis 385–560 μm long, 210 μm in diameter, elliptic; with 20 longitudinal rows of hooks, alternately 11 and 12 hooks each, largest 46–53 μm long (numbers 3 and 4; Fig. 8.1); infrequent or accidental in puddle ducks, common and normal in American coots; North America ..... *P. trochus* Van Cleave
   Proboscis not sexually dimorphic, same in both sexes 2

2. Eggs wide-oval, inner shell without elongate polar prolongations 3
   Eggs elongate, middle shell particularly spindle-shaped, with polar prolongations often enlarged at tips (not mentioned further) 5

3. Proboscis cylindrical, slightly swollen in rear 1/4; proboscis hooks in 21–22 longitudinal rows of hooks, with 9–11 hooks in each, first 5 hooks large, with roots, largest about 90 μm long, remainder small; body 6.2–18 mm long (shape of eggs indicates species of genus *Profilicollis*, but shape of proboscis is not indicative; Fig. 8.2); rare, in musk ducks; Australia ..... *P. biziurae*
   Proboscis wide-ovoid, almost spherical in appearance 4

4. Eggs oblong, 66–80 μm long by 19–23 μm wide, with very slight, short polar projections of middle shell; proboscis nearly spherical, with 14–16 longitudinal rows of hooks, 7–10 hooks in each row, hooks 66–73 μm long, with roots 66–79 μm long; testes long-oval, tandem but slightly overlapping; body 8–16 mm long, cylindrical (Fig. 8.3; eggs do not quite fit any genus); infrequent, in hooded mergansers, ducks, and loons; North America, Asia ..... *P. obtusus*
   Eggs elongate, 124–148 μm long by 34–40 μm wide, with short wide prolongations of poles of middle shell; proboscis with 18–20 longitudinal rows of hooks, 7–8 hooks in each row; largest hooks 93–108 μm long (numbers 4 and 5), roots 108–130 μm long; testes oval, tandem; body cylindrical, 13–25 mm long (Fig. 8.4; eggs not quite matching others of genus); infrequent, in eiders; Arctic Asia ..... *P. pupa*

5. Proboscis with 6 hooks in each row 6
   Proboscis with more than 6 hooks in each row 8

6. Body 8–8.5 mm long, thick in middle, constriction at anterior and posterior 1/5; small spines on trunk; proboscis with 12 longitudinal rows of hooks, with 6 hooks in each row, size unknown; lemnisci club-shaped, 1.1–2 mm long; testes long-oval, tandem, but overlapping 1/2; cement gland in two groups of three each, groups tandem but slightly overlapping, intestiniform; eggs 94–96 μm long by 22–26 μm wide (Fig. 8.5); accidental, normally in gulls; Europe (USSR) ..... *Hexaglandula paucihamatus*
   Proboscis with 16 or 17 longitudinal rows of hooks 7

7. Proboscis ovoid, 470–700 μm long, with 16 longitudinal rows of hooks; 6 hooks in each row; largest hook 71.4 μm long (number 3); forebody with spines extending more posteriad on ventral side; body 15 mm long (female); eggs 118–132 μm long by 22–25 μm wide; frequent, in eiders; Arctic Eurasia ..... *P. phippsi*

Proboscis almost as broad as long, 300 μm long by 300 μm wide in male, 400 μm long by 300 μm wide in female; with 16–17 longitudinal rows of hooks; 6 hooks in each, largest hooks 63–69 μm long (number 3); lemnisci club-shaped; body elongate, 7–14 mm long; eggs 96–108 μm long by 18 μm wide; rare, in mallards and tufted ducks; Europe ..... *P. meyeri*

8. Body less than 6 mm long 9
   Body more than 6 mm long 18

9. Each longitudinal row of proboscis hooks with 7 (to 8 or 9) hooks 10
   Each longitudinal row of proboscis hooks with 8 (to 9 or 10) hooks 12
   Each longitudinal row of proboscis hooks with 9 (to 10) hooks 13
   Each longitudinal row of proboscis hooks with 10 (to 11 or 12) hooks 14

10. Proboscis ovoid, slightly swollen, with 20 longitudinal rows of hooks (occasionally 18 or 22 rows), with 7 or 8 hooks in each row; largest hooks 40 μm long (number 6), root 52 μm long; first 4 hooks large, with long roots, remainder small; testes round to oval, opposite; body 1.83–3.8 mm long; eggs 105–112 μm long by 19–20 μm wide, surface covered by network of fine fibrils in loops (Fig. 8.6); frequent in ducks, particularly in northern pintails; Arctic Asia ..... *P.* sp. (*P. trochus* of Khokhlova)
    Body short, plump 11

11. Body short, 4.6–7.8 mm long; proboscis ovoid, with 14 longitudinal rows of hooks, 7–9 hooks in each row; largest hooks 69 μm long (number 3); lemnisci about 1⅓ the length of proboscis sheath; testes round, oblique to each other; eggs 90–105 μm long by 18 μm wide, surface covered with fine fibrils (Fig. 8.7); frequent, particularly in scoters; Eurasia ..... *P. diploinflatus*
    Body short, plump, strongly bent over, 1–2.8 mm long; proboscis with 15–18 longitudinal rows, each with 6–8 hooks, 3–4 with roots, 40–47 μm long; testes oval; lemnisci club-shaped, short; eggs 80–130 μm long by 15–19 μm wide; common, in puddle ducks; North America, Europe ..... *P. contortus*

12. Body 5.5–10.5 mm long; constriction rather evident, in middle of body; neck conical, twice as long as proboscis; proboscis ellipsoid, with 17–18 (rarely 16) longitudinal rows of hooks, 9 (rarely 8) hooks in each row; largest hooks 63–86 μm long (number 4); lemnisci about twice as long as proboscis sheath; testes oval, opposite or oblique; eggs 102–123 μm long by 19–21 μm wide (Fig. 8.8); infrequent in ducks, normally in aquatic rodents; North America (Canada) ..... *P. paradoxus*
    Body 2–12.5 mm long, constriction evident; proboscis ovoid, slightly swollen; with 16 (sometimes 18, 20, or 22) longitudinal rows of hooks, 8–10 hooks in each row; largest hooks 67–79 μm long (number 4); first 4 with strong hooks and roots, remainder much reduced; lemnisci longer than proboscis sheath; testes oval, oblique to each other; eggs 73–149 μm long by 17–23 μm wide (Fig. 8.9); characteristic and common in Eurasia, infrequent in North America .... *P. minutus*

13. Body 3.85–4.33 mm long, spindle-shaped, length of sexes identical; proboscis long-oval, swollen, with 12 longitudinal rows of hooks, 9–10 hooks in each row; largest hooks 53–71 μm long (number 5); long roots on first hooks, last four with reduced roots; lemnisci equal length of proboscis sheath; testes round, opposite; eggs 125 μm long by 17.8 μm wide (Fig. 8.10); infrequent, in puddle ducks and sea ducks; Asia ..... *P. kostylewi*
    Body 2.87 mm long; proboscis cylindrical, with 12–14 longitudinal rows of hooks, 9–10 hooks in each row; largest hooks 64 μm long (number 2); lemnisci shorter than proboscis sheath; testes round, oblique to each other; eggs 107–124 μm long by 21–22 μm wide (Fig. 8.11); experimental in domestic ducklings, normally in brown dippers in stream; Asia ..... *P. cincli*

14. Body short, swollen at anterior, 3.5–5.5 mm long, pear-shaped; spines on forebody extend 3 times as far ventrally as dorsally; proboscis wide cylindric, with 16–18 longitudinal rows of hooks, 9–11 hooks in each row; largest hooks 40–52 μm long, about middle of proboscis on swollen area; lemnisci about the length of proboscis sheath; testes round, opposite; eggs 102–111 μm long by 18–21 μm wide (Fig. 8.12); infrequent, in sea ducks; Eurasia ..... *P. strumosoides*
Additional forms with 10 (to 11 or 12) hooks in each row 15

15. Body elongate, forebody long, swollen, spiny; body 4.75 mm long (female); constriction below forebody at 1/3 of the length; proboscis cylindrical, inflated 2/3 from anterior end; with 18 longitudinal rows of hooks, 10–11 hooks in each row; longest hooks 60 μm long (numbers 5–6), last 3 hooks without roots; lemnisci club-shaped, slightly longer than proboscis sheath; eggs 78–86 μm long by 15–16 μm wide (Fig. 8.13); infrequent, in common goldeneyes; North America (Alaska) ..... *P. swartzi*
Body 3 mm long, anterior swollen, tapered to rear; proboscis club-shaped, with 10 longitudinal rows of hooks, 10–12 hooks in each row; anterior hooks with roots, size unknown; testes large, oval; eggs 88–96 μm long by 14.8 μm wide (Fig. 8.14); infrequent, in mallards and long-tailed ducks; Asia ..... *P. corynoides*

16. Each longitudinal row of proboscis hooks with 11 (and 12) alternating or total present 17

17. Body 2.63–4.46 mm long; anterior swollen, no constriction, tapering to rear; with 20 longitudinal rows of hooks on proboscis, 11 and 12 hooks alternating in rows, largest hooks 49 μm long (numbers 7 or 8), first 7 or 8 hooks well developed, with roots, remaining 4 without roots; testes round, opposite; lemnisci shorter than proboscis sheath; eggs 102–109 μm long by 17.8–23 μm wide (Fig. 8.15); frequent, in puddle ducks and sea ducks; Arctic Asia ..... *P. mathevossianae*
Body plump toward rear, tapered anteriorly, 4–6.5 mm long; neck very long, tapered; proboscis with 16 longitudinal rows of hooks, with 11–12 hooks in each row; largest hooks 40–45 μm long at tip, remainder 32–42 μm long; lemnisci more than twice the length of proboscis sheath; testes oval, tandem, but overlapping (Fig. 8.16); infrequent, in ducks; North America, Asia ..... *P. acutis*

18. Body with evident constriction 19
No constriction present 20

19. Forebody spiny, with constriction before end of spiny area; body 10.3 mm long, uniform width; proboscis long-oval, with 16 (sometimes up to 18) longitudinal rows of hooks, with 7 (sometimes 6) hooks in each row; rare, in *Anas* sp.; Magellan Straits, South America ..... *P. miniatus*
Body 10.26–12.49 mm long; body with anterior constriction at about 1/3 the length of spiny area; proboscis long-oval, with 18 longitudinal rows of hooks, with 8 hooks in each row; largest hooks at anterior (numbers 1–4; 71–75.6 μm long), second 4 hooks smaller; neck long; lemnisci longer than proboscis sheath; body 10.26–12.49 mm long; eggs 107–120 μm long by 18 μm wide (Fig. 8.17); frequent, in puddle ducks; Asia ..... *P. actuganensis*

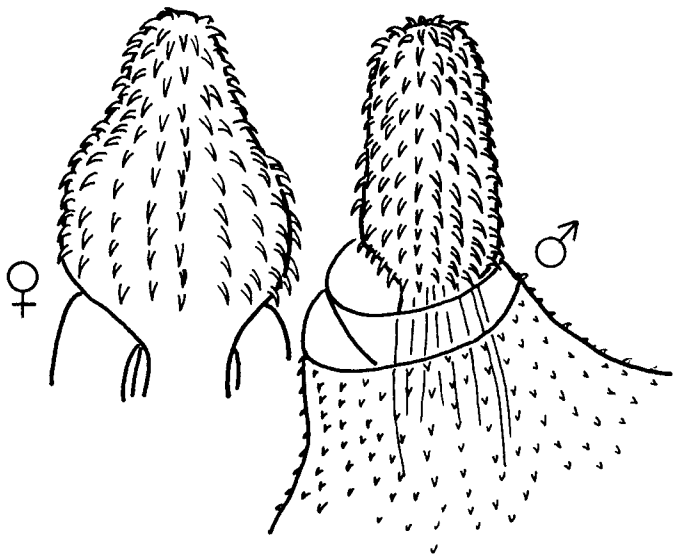
20. Body 6–15 mm long, swollen in forebody, tapered toward rear; proboscis with 16 longitudinal rows of hooks, with 12–16 hooks in each row; largest hooks in middle of rows; eggs 95–99 μm long by 27 μm wide (Fig. 8.18); frequent, in ducks and swans; Europe ..... *P. striatus*
Body cylindrical, long 21

21. Body 10–13 mm long; proboscis ovoid, swollen below middle; with 22 longitudinal rows of hooks, 12 hooks in each row; largest hooks at tip, 73–85 μm long; lemnisci twice as long as proboscis sheath; testes long-oval, tandem, slightly overlapping (Fig. 8.19); rare, in hooded mergansers; North America ..... *P. cucullatus*

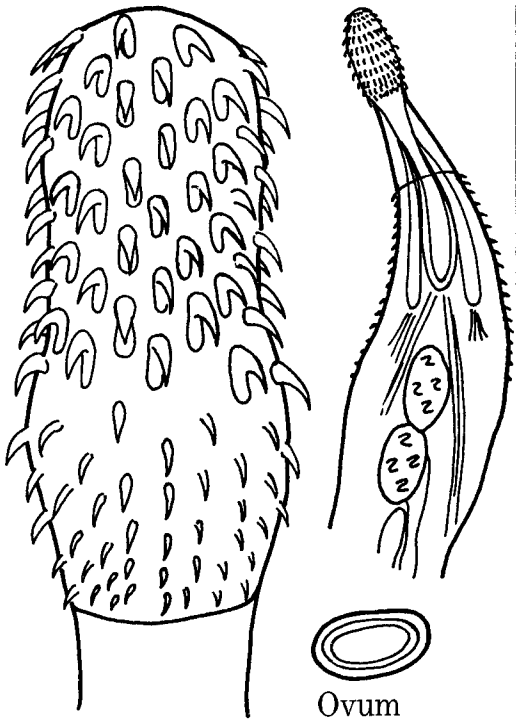
Body 8–14 mm long, cylindrical; proboscis long-ovoid; with 16–17 longitudinal rows of hooks, 7–8 hooks in each row; longest hooks in middle, 57–66 μm long; lemnisci twice as long as proboscis sheath; testes oval, tandem; eggs 102–120 μm long by 12–17 μm wide (Fig. 8.20); frequent, in aythyine ducks; North America, Asia ..... *P. marilis*

Descriptions: Petrochenko 1958, 1971b; Johnston and Edmonds 1948; Bezubik 1957a, 1957b; Connell and Corner 1957; Schmidt 1965a; Khokhlova 1966a, 1966b, 1971, 1977; Denny 1969; Podesta and Holmes 1970; Bourgeois and Threlfall 1982.

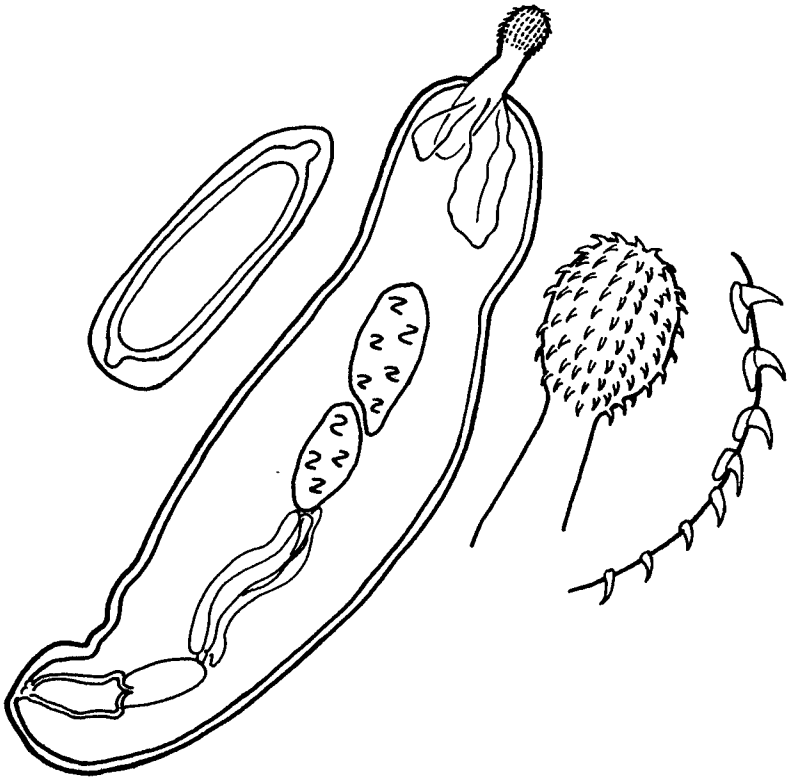
Fig. 8. Genus *Polymorphus*



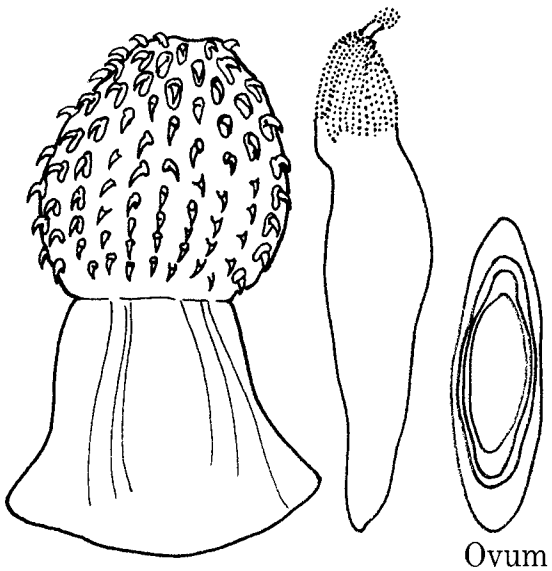
8.1 *P. trochus*



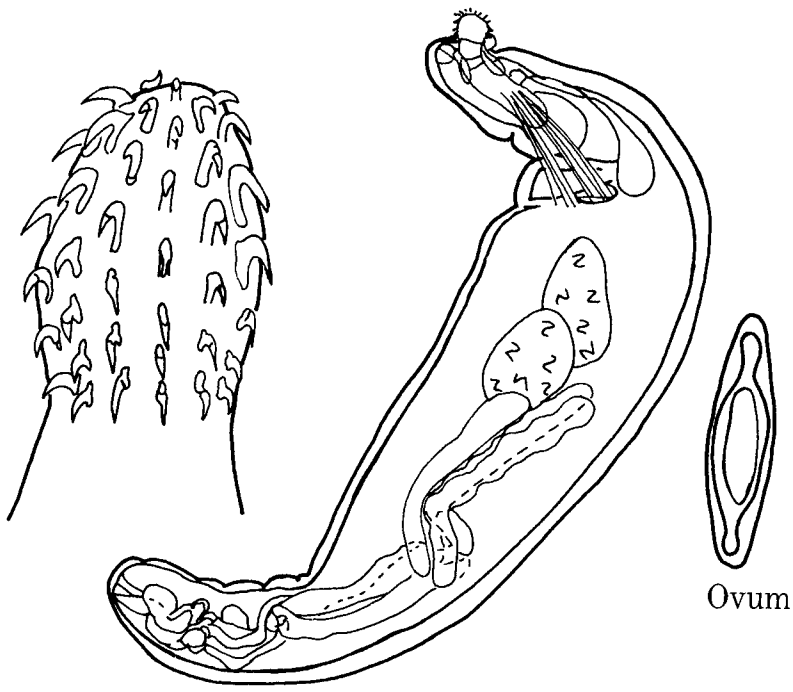
8.2 *P. biziurae*



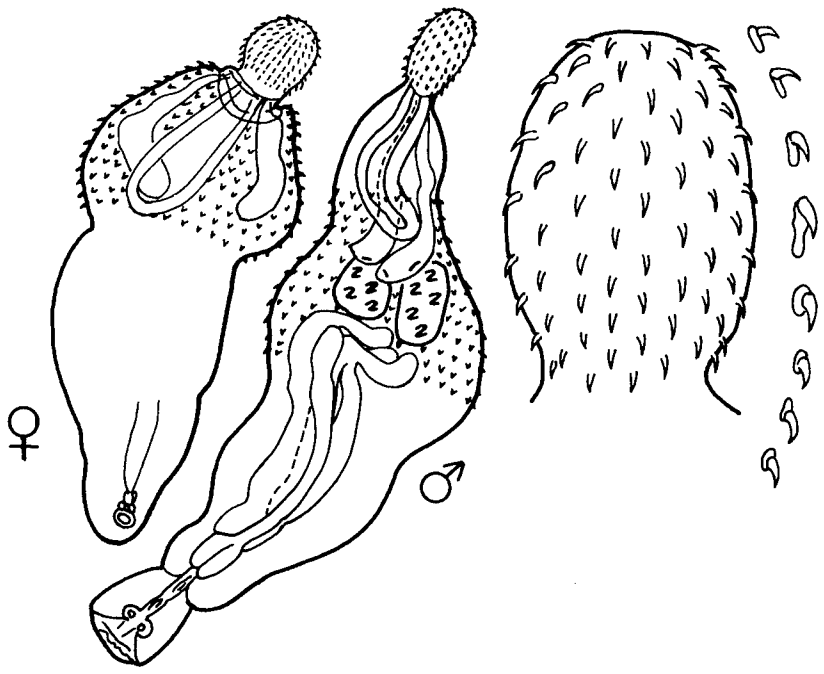
8.3 *P. obtusus*



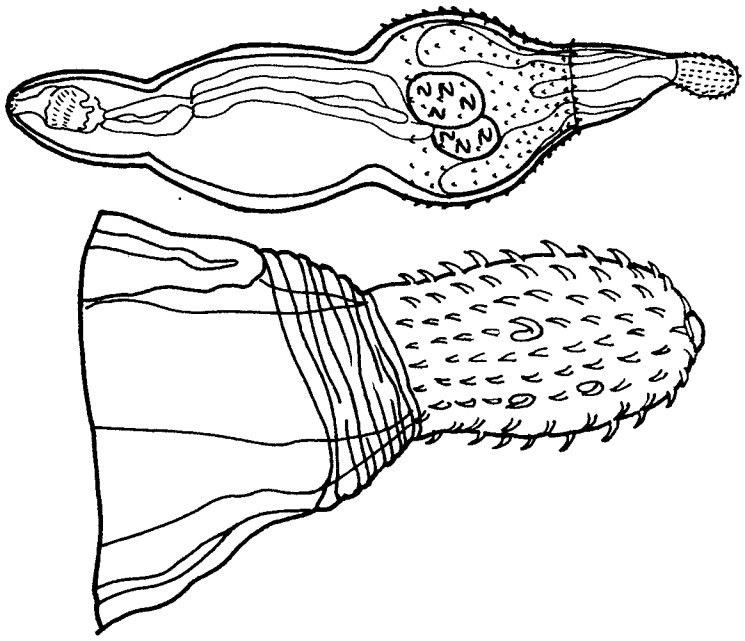
8.4 *P. pupa*



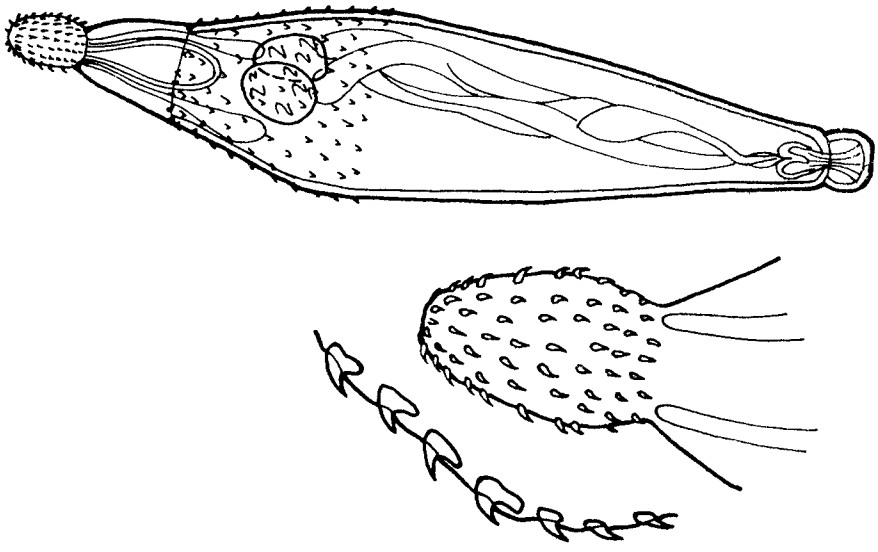
8.5 *Hexaglandula paucihamatus*



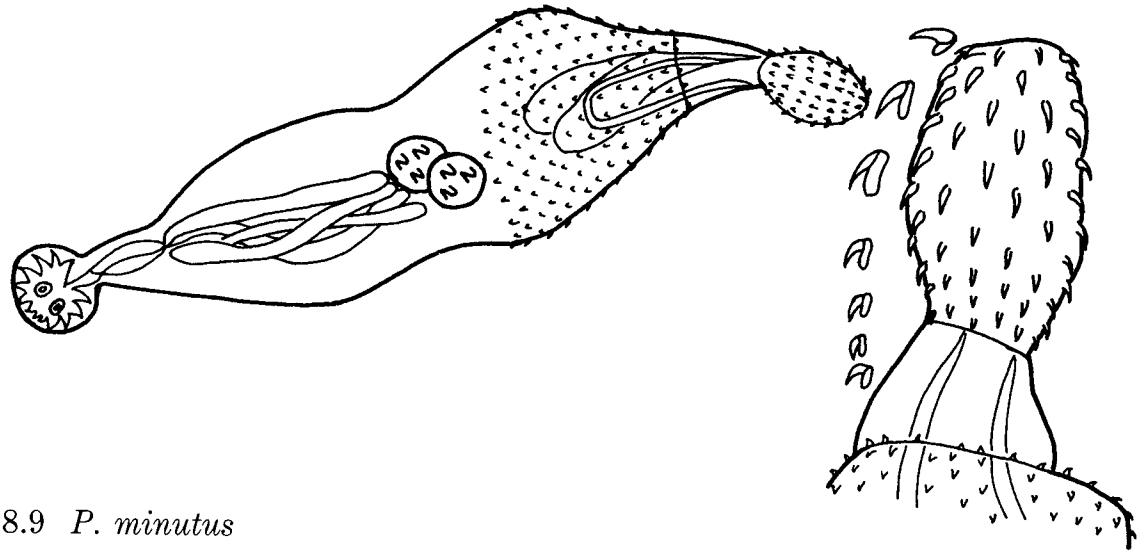
8.6 *P.* sp. (*P. trochus* of Khokhlova)



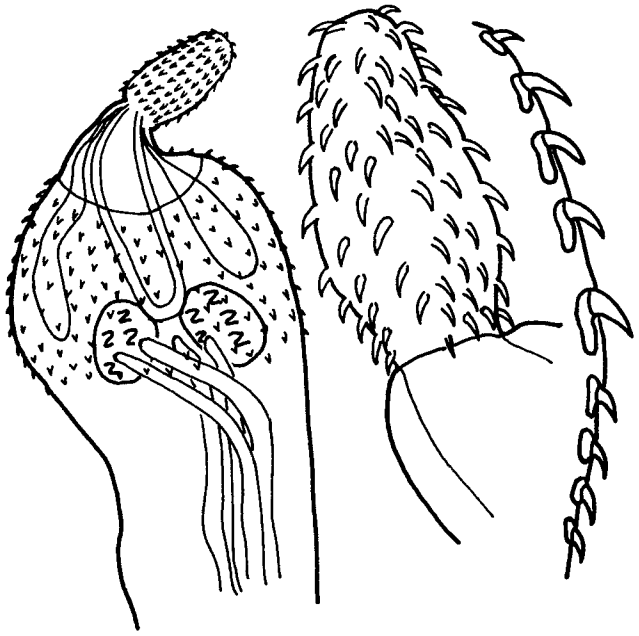
8.7 *P. diploinflatus*



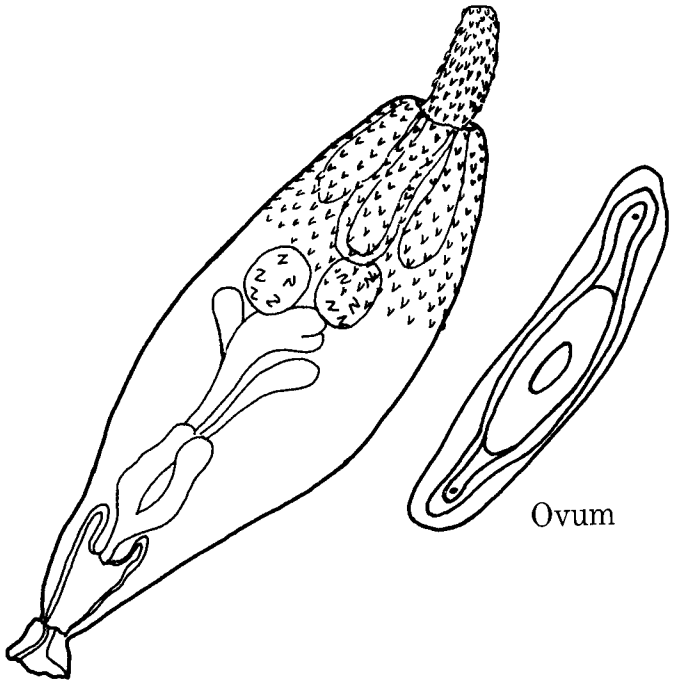
8.8 *P. paradoxus*



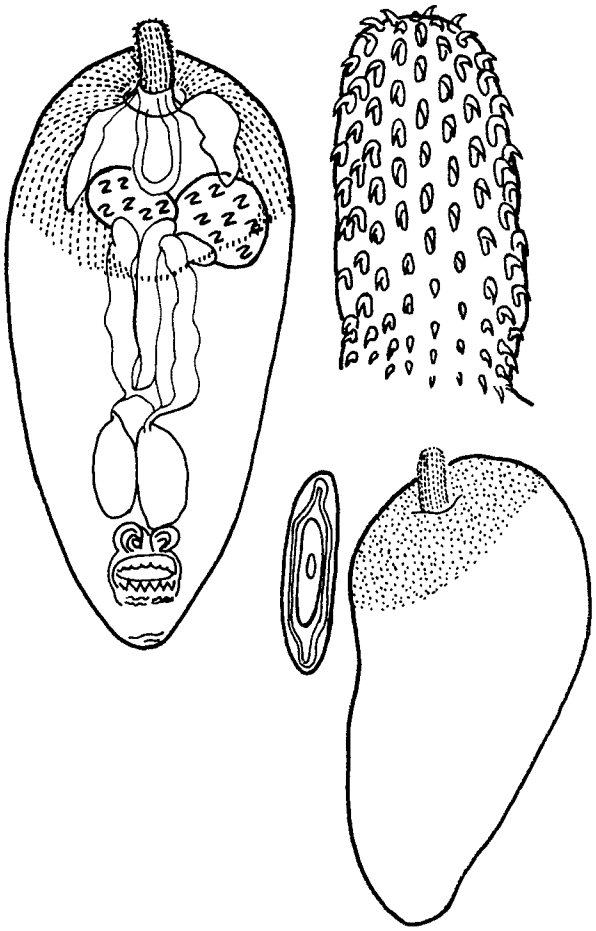
8.9 *P. minutus*



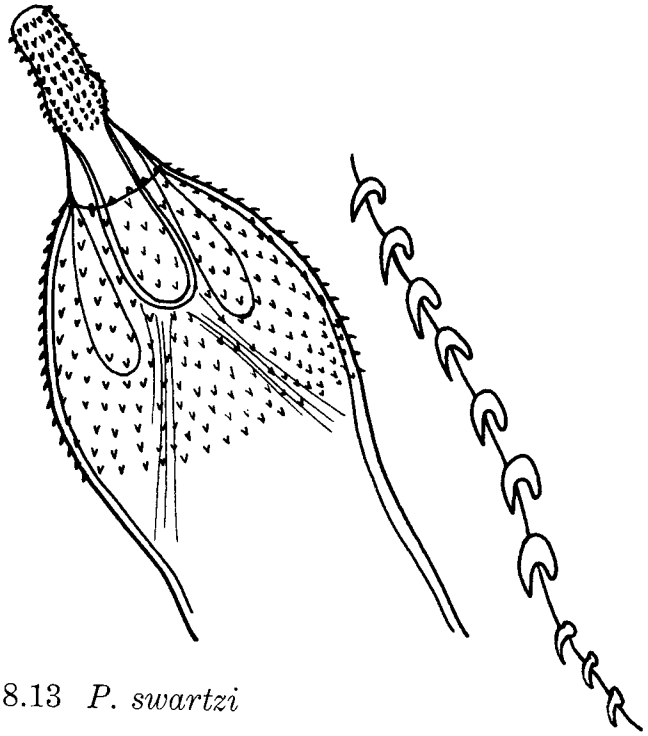
8.10 *P. kostylewi*



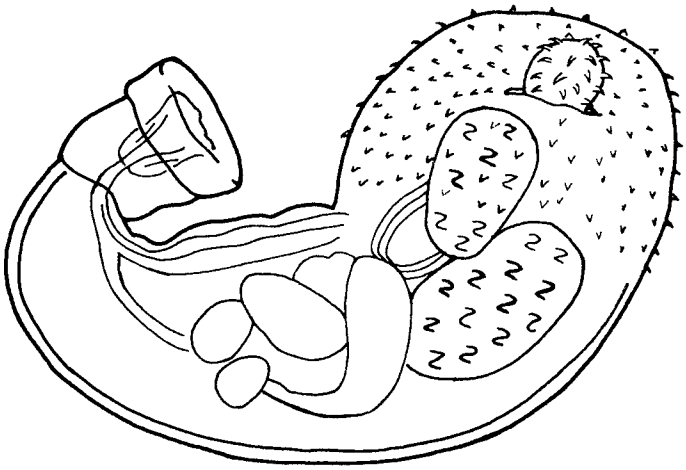
8.11 *P. cincli*



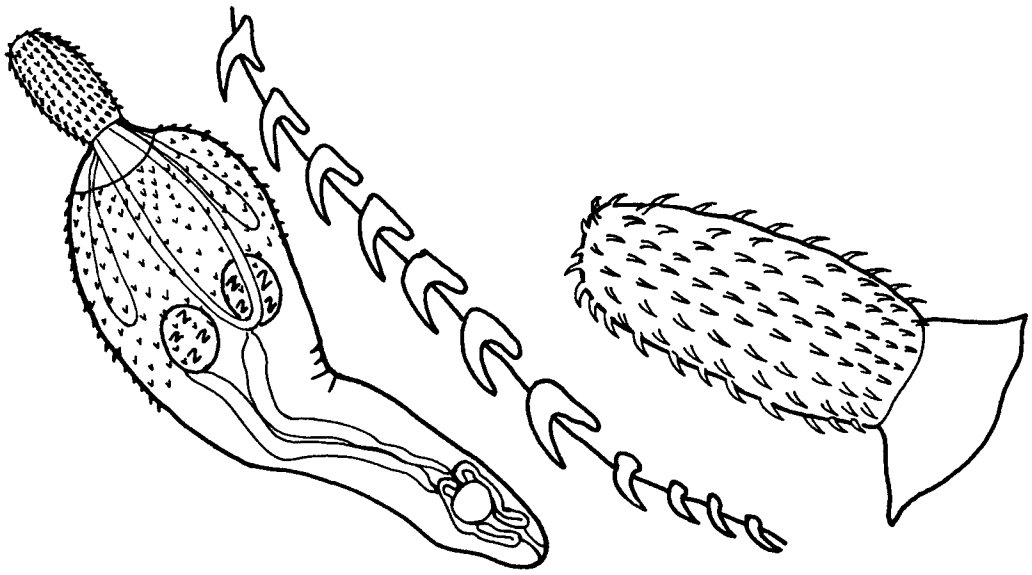
8.12 *P. strumosoides*



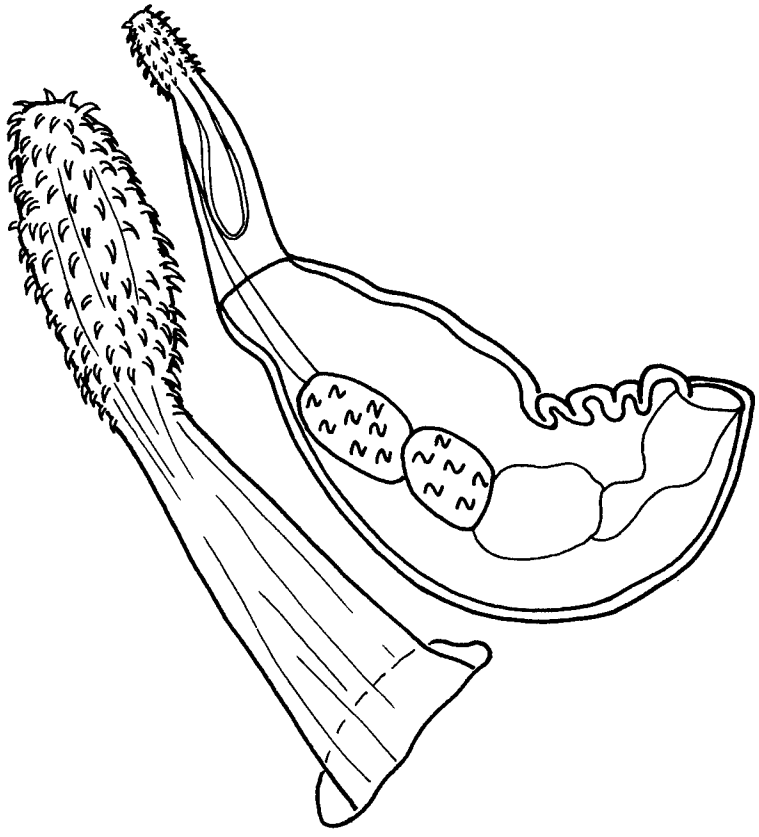
8.13 *P. swartzi*



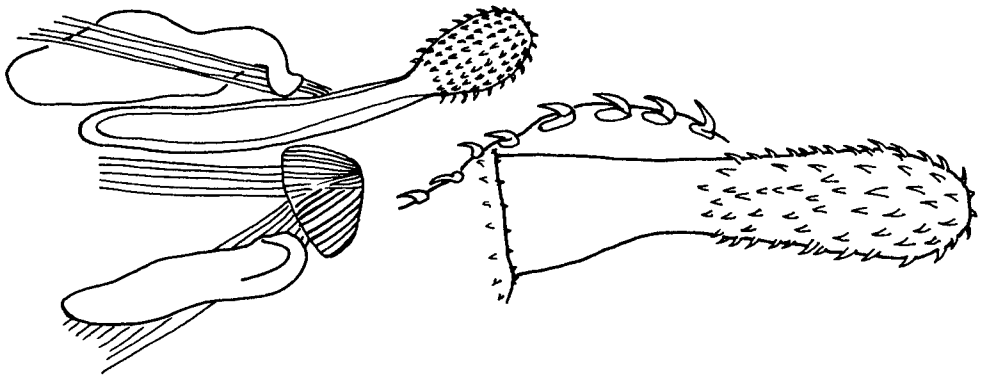
8.14 *P. corynoides*



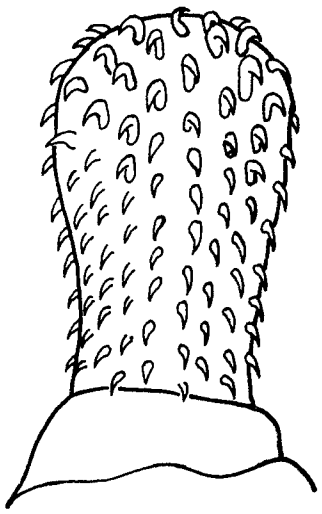
8.15 *P. mathevossianae*



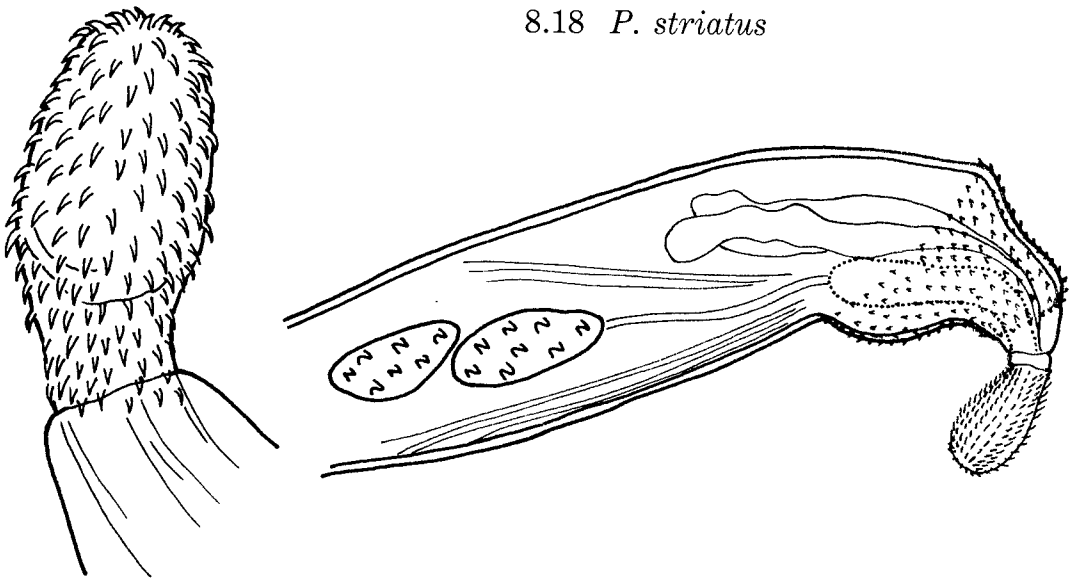
8.16 *P. acutis*



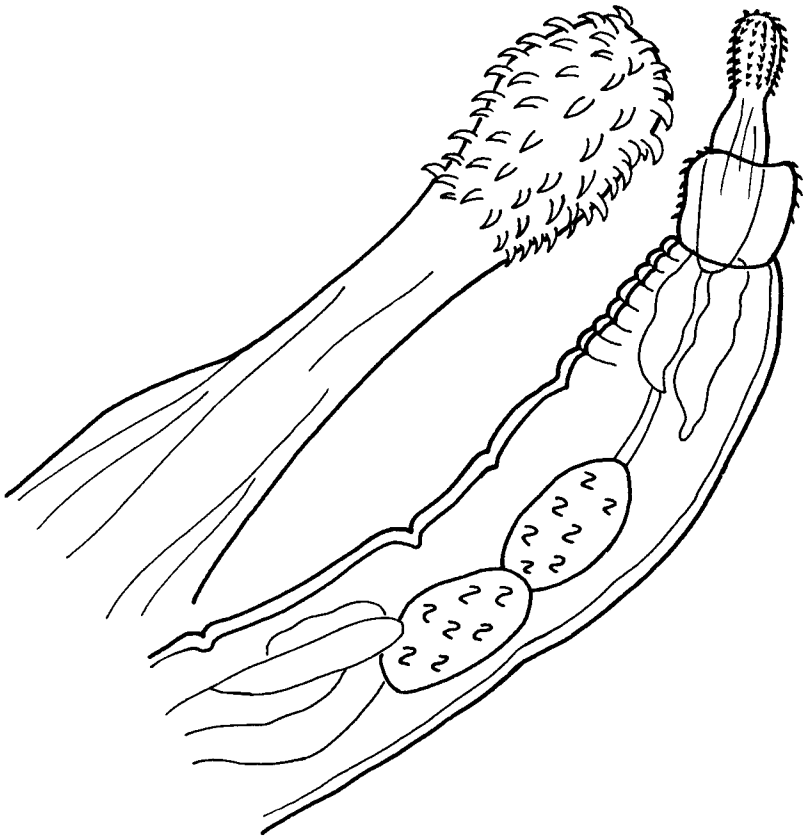
8.17 *P. actuganensis*



8.18 *P. striatus*



8.19 *P. cucullatus*



8.20 *P. marilis*

Genus *Profilicollis*

Note: Infections obtained by ingestion of decapod Crustacea, one in a freshwater species and three in marine forms.

See also *Polymorphus biziurae*, a species whose proboscis is ovate or cylindrical, but whose eggs are oval, without polar prolongations of the middle membrane, and whose intermediate host may be a freshwater decapod crustacean.

1. Proboscis with over 20 longitudinal rows of hooks 2
   Proboscis with 20 or fewer (12 to 20) longitudinal rows of hooks 3

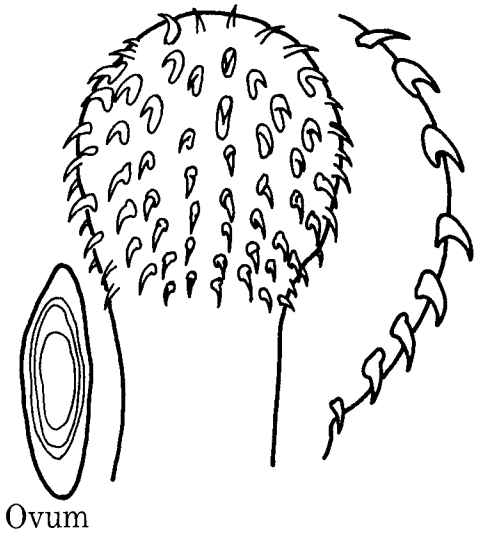
2. Proboscis with 22 longitudinal rows of hooks, 7–8 in each row; largest hooks are first 3, 89–118 μm long; eggs 126–155 μm by 30–41 μm, elliptical (Fig. 9.1); infrequent, in eiders; North America ..... *P. arcticus*
   Proboscis with 25–30 longitudinal rows of hooks, 9–12 in each row; largest hooks (before middle) 50–70 μm long; eggs 60–70 μm by 22–30 μm, oval (Fig. 9.2); rare, in eiders; North America ..... *P. altmani*

3. Proboscis with 16–20 longitudinal rows of hooks 4
   Proboscis with 12–15 longitudinal rows of 7–9 hooks each; 2nd and 3rd hooks 95–117 μm long; lemnisci very long, flat, 5–5.2 mm long; eggs 62–65 μm by 23 μm (Fig. 9.3); infrequent, in domestic ducks; Taiwan ..... *P. formosus*

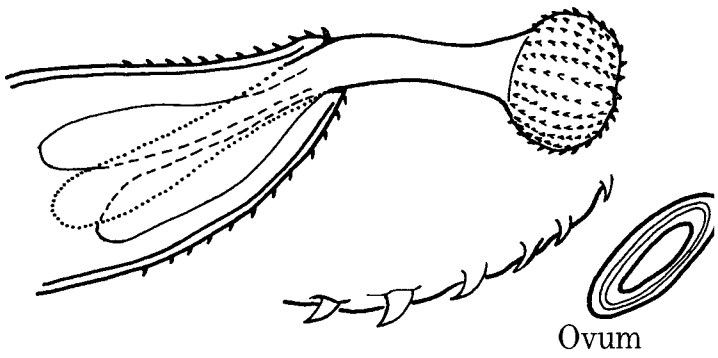
4. Proboscis with 16–18 longitudinal rows of 7–8 hooks in each; largest proboscis hooks (3rd in rows) 80–96 μm long; lemnisci perhaps lanceolate, 1.38–3.66 mm long; eggs 68–108 μm by 28–40 μm (Fig. 9.4); frequent, in eiders and other sea ducks; North America, Eurasia ..... *P. botulus*
   Proboscis with 16–20 longitudinal rows of 7–9 hooks each; largest proboscis hooks (3rd and 4th hooks) 105–108 μm long (root measurement); lemnisci long, widest in middle, 2.6–3.2 mm long; eggs 90–96 μm by 30–39 μm, elongated ovoid (Fig. 9.5); infrequent, in sea and bay ducks; Europe ..... *P. major*

Descriptions: Petrochenko 1958, 1971b; Schmidt and Kuntz 1967; Khokhlova 1977; Bourgeois and Threlfall 1982.

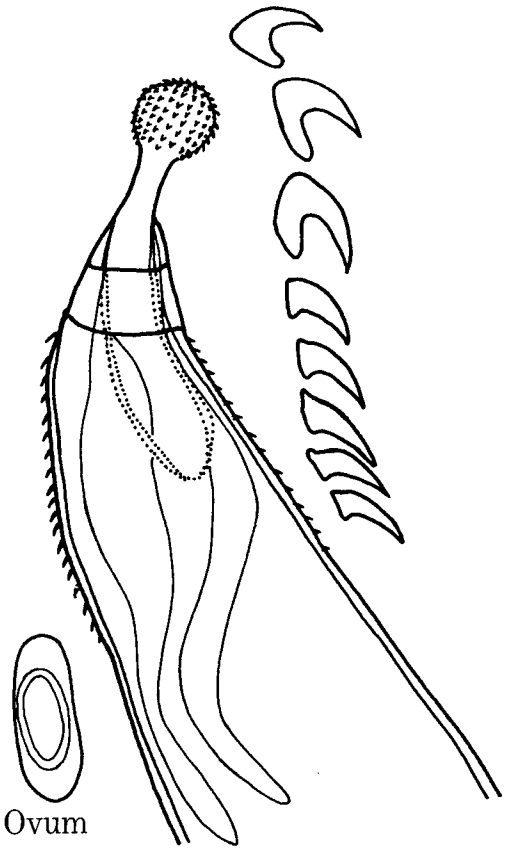
Fig. 9. Genus *Profilicollis*



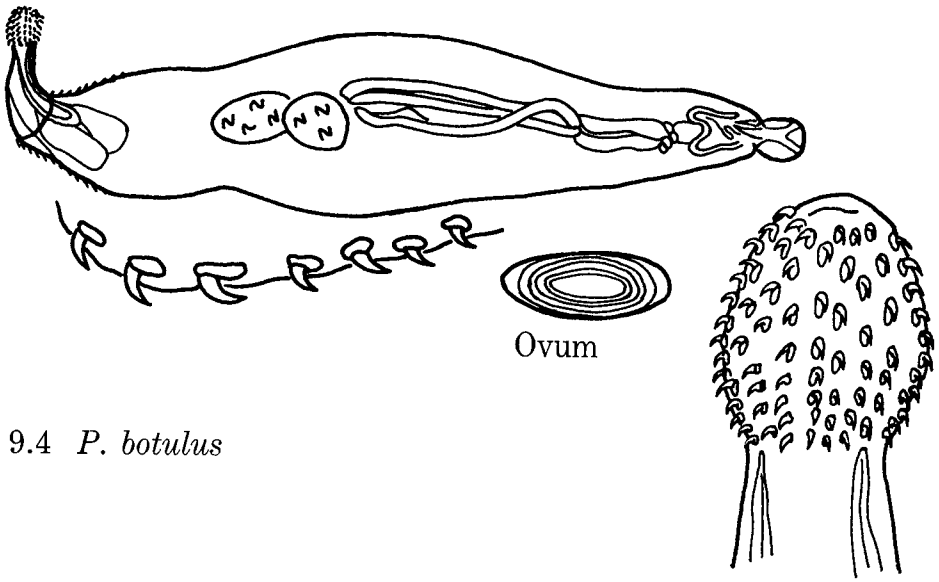
9.1 *P. arcticus*



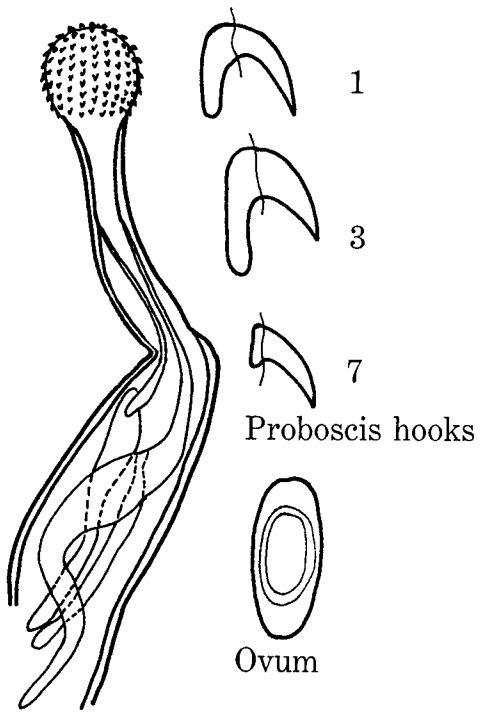
9.2 *P. altmani*



9.3 *P. formosus*



9.4 *P. botulus*



9.5 *P. major*

Genus *Plagiorhynchus*

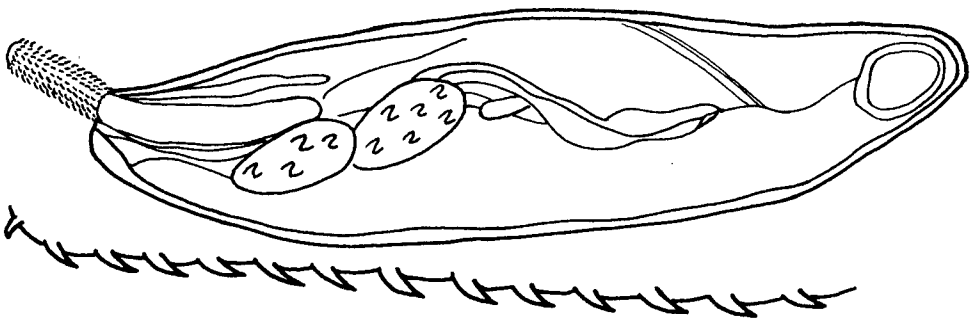
Note: Infections obtained in one species by ingestion of terrestrial isopod crustacea.

1. Proboscis with 16–18 longitudinal rows of 11–15 hooks each, hooks 71–83 μm long in first 9 rows, smaller toward posterior; proboscis cylindrical; eggs 48–60 μm by 18–29 μm, oval; body 9.5–10 mm long, elliptical (Fig. 10.1); accidental, in probably sick mallard, normally in terrestrial passerine birds; North America ..... *P. cylindraceus*

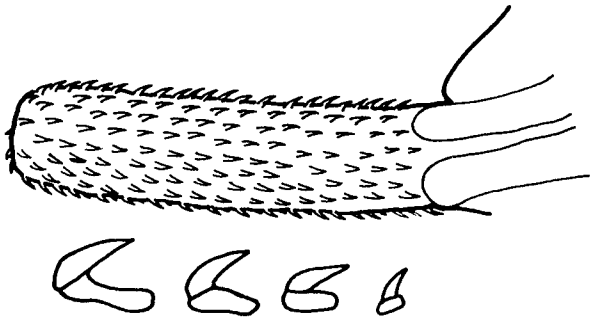
   Proboscis with 20 longitudinal rows of hooks, 16 in each row; proboscis cylindrical, hooks 64–71 μm in first 9 rows, smaller toward posterior; eggs 65 μm by 26 μm, oval; body 6–11.2 mm long, cylindrical (Fig. 10.2); rare in ducks, also in common moorhens and shorebirds; eastern Europe (USSR) ..... *P. gracilis*

Descriptions: Petrochenko 1958a, 1971b.

Fig. 10. Genus *Plagiorhynchus*



10.1 *P. cylindraceus*



Proboscis hooks

10.2 *P. gracilis*

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This key to Acanthocephala is the third in a series describing helminths found in waterfowl from throughout the world. The format includes a checklist of 52 species, a general key to families and genera, a guide to identification of species, and keys to each genus that has more than one species reported in waterfowl.

Key words: Acanthocephala, coot, *Corynosoma*, helminth, *Polymorphus*, waterfowl.

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