

## THE SPECIES OF ACANTHOCEPHALA DESCRIBED SINCE 1933, II

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This paper is a continuation of a list of descriptions of species, genera and families of Acanthocephala which have appeared in the literature since 1933. The first part of the paper which appeared in an earlier issue of this journal included the Acanthocephala belonging to the order Palaeacanthocephala with the exception of the family Diplosetidae; the second part includes the Acanthocephala belonging to the family Diplosetidae and the orders Archiacanthocephala, Sphenacanthocephala, Gynacanthocephala, and Neoacanthocephala.

### DIPLOSENTIDAE Tubangui and Masilungan, 1937

The characters of the family are those of the genus, *Diplosetis* Tubangui and Masilungan, 1937.

#### DIPLOSENTIS Tubangui and Masilungan, 1937

Cuticle unarmed. Proboscis club-shaped, with simple hooks. Proboscis sheath double-walled, with brain and retinacula in front of middle. Lemnisci much coiled, enclosed in a membranous sac. Male genital organs in posterior two-thirds or three-fourths of body length. Two cement glands, elongate and tubular. Eggs with three membranes, middle with polar prolongations. Parasitic in fishes. Type species: *Diplosetis amphacanthi*.

DIPLOSENTIS AMPHACANTHI Tubangui and Masilungan, 1937. Body devoid of spines, slightly swollen anteriorly and presenting pseudoannulation due to folding of cuticle. Body wall 0.095-0.135 mm. in maximum thickness. Chief longitudinal vessels of lacunar system lateral. Males 3-7 x 0.7-1.15 mm.; females 10-18 x 0.85-1.2 mm. Proboscis club-shaped, 0.42-0.46 x 0.12-0.17 mm., with 12 longitudinal rows of 8-9 hooks each. Length of hooks 0.038-0.042 mm.; those of posterior circle 0.019-0.026 mm. Neck absent. Proboscis sheath 0.65-1.2 x 0.11-0.28 mm. Lemnisci in the form of a pair of coiled masses extending to near middle of proboscis sheath; each mass appears to be enclosed in a membranous sac. Testes subglobular to oval, in front of middle of body. Anterior testis slightly larger than posterior. Two tubular cement glands, 1.3-3 mm. long. Eggs 0.052-0.079 x 0.015-0.018 mm.

Host: *Amphacanthus oramin* (Pisces), The Philippines.

### GIGANTORHYNCHIDAE Hamann, 1892

MEDIORHYNCHUS TURNIXENA (Tubangui, 1933) n. comb. (*Empodius turnixena* Tubangui, 1933). Description based on three females. Body elongate, distinctly annulated superficially, 12.5-17.5 x 0.62-0.7 mm. Anterior part of proboscis 0.34-0.38 x 0.22-0.26 mm. with 13-14 anteroposterior rows of eighteen hooks each; length of hooks 0.055-0.065 mm. Posterior part of proboscis equal in length to anterior, 0.3-0.34 mm. in diameter, with 13-14 longitudinal rows of 12-14 small hooks. Proboscis sheath 0.5-0.65 x 0.2-0.24 mm. Lemnisci narrow, 3.8-4.05 mm. long. Uterine bell 0.5 x 0.14 mm.

Host: *Turnix ocellata* (Aves), Luzon.

*Comment:* The structure called the posterior part of the proboscis here was called the neck by Tubangui, but the generally accepted definition of the proboscis is all of the praesoma (fore body) which is provided with hooks or spines. Van Cleave (1947b) has shown that the genus *Empodius* Travassos, 1916, is a synonym of the genus *Mediorhynchus* Van Cleave, 1916.

*MEDIORHYNCHUS SIPOCOTENSIS* Tubangui, 1935. Description based on one adult male and one adult non-gravid female. Sexual dimorphism marked. Male 5.7 x 1.2 mm.; female 12.5 x 2.2 mm. Proboscis cylindrical, truncated anteriorly, 0.42 x 0.32 mm. in male; 0.52 x 0.46 in female. Proboscis hooks in 20 alternating longitudinal rows of five or six each; the hooks protrude through the centers of papilliform projections. Hooks of males 0.050-0.062 mm. long; hooks of female 0.62-0.66 mm. long. Neck (posterior region of proboscis?) with papilliform tubercles, through the centers of which small hooks protrude, arranged in 40 longitudinal rows of five or six hooks each; length of hooks 0.020 in male and 0.025-0.033 mm. in female. Proboscis sheath poorly developed, brain in middle. Lemnisci 3.9 x 0.2 mm. in male; 6.2 x 0.2 mm. in female. Eight round cement glands. Host: *Penelopides manillae* (Aves), Luzon.

*MEDIORHYNCHUS GALLINARUM* (Bhalerao, 1937) Van Cleave, 1947e (*Leiperacanthus gallinarum* Bhalerao, 1937). Male 30-50 x 1.5-2 mm.; female 65-70 x 1.9-2.5 mm. Anterior portion of proboscis subglobular, armed with 18 longitudinal rows of five hooks each; length of hooks 0.054-0.068 mm. Posterior portion of proboscis cylindrical, armed with small spines 0.025-0.030 mm. long. Bhalerao (1937) described the proboscis sheath as divided into two portions, an anterior portion having a double wall, and a posterior portion having a single wall. Van Cleave (1947e) has pointed out that the so-called anterior portion of the proboscis sheath is in reality a specialized musculature for retraction of the base of the apical segment of the proboscis within the proximal region. Van Cleave (1947e) has also pointed out that the "paraproboscideal sacs" described by Bhalerao are not peculiar to this species but have been observed in other species of *Mediorhynchus*. Lemnisci 6-7 mm. long, slightly unequal in length, the shorter with five and the longer with seven large nuclei. Male genital organs in posterior third of body length. Testes elongate, 1.8-2.5 x 0.6-0.7 mm. Cement glands consist of eight rounded nucleated cells. Cement reservoir 1.15-1.2 x 0.38-0.44 mm. Eggs 0.064-0.069 x 0.040-0.043 mm. Host: *Gallus gallus domesticus* (Aves), India, The Philippines.

*MEDIORHYNCHUS GARRULI* Yamaguti, 1939. Males 29-47 mm. x 0.8-1.3 mm.; females 55-65 x 1.8. Proboscis truncate conical, 0.27-0.4 x 0.2-0.32 mm. Proboscis hooks in 22-24 longitudinal rows of about five each. Length of hooks up to 0.040 mm. Proboscis sheath "composed of circular muscle fibers, divided into two unequal portions; the anterior portion is a little longer and broader than the posterior and inclosed in a thick capsule of fine longitudinal muscle fibers, and the posterior projects freely into the broad sheath-like ligament functioning as genital sheath posteriorly." The longitudinal muscle fibers, according to Van Cleave (1947e), represent a retractor muscle, and not a part of the proboscis sheath, in this species as well as in *M. gallinarum*. Anterior half of neck (posterior region of proboscis?) armed with simple spines arranged in 28-30 longitudinal rows of four-five each. Lemnisci of male 1.75-2.4 x 0.14-0.15 mm.; lemnisci of female 5.2 x 0.35 mm. Testes elliptical, tandem, in posterior third of body, 1.2-1.7 x 0.4-0.8 mm. Eight cement glands. Eggs 0.066-0.072 x 0.040-0.042 mm.

Host: *Garrulus glandarius japonicus* (Aves), Japan.

*MEDIORHYNCHUS MURTENSIS* Lundstrom, 1942. Description based on females only. Body smooth, lacking external pseudosegmentation. The circular muscles of the body wall are divided into bundles having a segmental arrangement. Body 32 x 1.1 mm. The anterior portion of proboscis measures 0.4 mm. in length and 0.4 mm. in breadth at the base; the posterior portion of proboscis measures 0.3 mm. in length and 0.5 mm. in breadth at the base. Anterior portion of proboscis covered with 20 spiral rows of 10-12 hooks each; posterior portion with 20 spiral rows of 10-11 spines each. Length of hooks on anterior region of proboscis 0.036-0.039 mm.; spines on posterior region 0.030-0.036 mm. in length. Proboscis sheath 1.5 mm. long. Neck 0.15 mm. long x 0.55 mm. broad at the base. Lemnisci unequal in length, 6.3 and 7.1 x 0.2 mm.

Host: *Oenanthe oenanthe oenanthe* (Aves), Sweden.

MEDIORHYNCHUS COLINI Webster, 1948a. "Diagnosis: Characters of the genus: Male unknown. Females 24 to 31 mm. long by 0.6 to 1.0 mm. wide. Body slender, ribbon-shaped. Pseudosegmentation slight. Cuticular vascular ducts prominent. Proboscis conical, 288 microns wide at base and 292 microns long, bearing 84 hooks, each 31 to 35 microns long (including the root) and arranged in twelve spiral rows of 7 hooks each. Counted in longitudinal rows, there are twenty-four rows of alternately 3 and 4 hooks. Spines on posterior part of proboscis 26 to 28 microns long, arranged in about forty longitudinal rows of 3 spines each.

"Proboscis receptacle a double-walled muscular sac 1.08 to 1.25 mm. long by 274 microns wide; both walls thicker dorsally than ventrally. Some of inverter muscle fibers of proboscis emerge from receptacle at posterior margin of outer sac. Retractor muscles of proboscis inserted with proboscis receptacle at boundary between hooks and spines. Lemnisci 3.48 to 3.56 mm. long, each with 8 or 9 nuclei. Ovoid brain in center of anterior part of proboscis receptacle.

"Nearly-mature eggs, in body cavity, with granular outer shell, 29 to 36 microns by 18 to 21 microns."

Host: *Colinus virginianus texanus* (Aves), Texas.

GIGANTORHYNCHUS LUTZI Machado Filho, 1941a. Males 35-60 x 0.75 mm.; females 130-200 x 1-2.5 mm. Body moniliform, each false segment measuring about 0.4 x 0.4 mm. and showing conspicuous lateral expansions. Proboscis 1.7 x 0.7 mm.; apical hooks in two alternating circles of about six hooks each. Hooks of one circle 0.210 mm. in length; hooks of the other circle 0.180 mm. in length. Remainder of proboscis covered with small spines projecting from cuticular folds; length of spines 0.048 mm. Lemnisci 2.595 x 0.255 mm. Testes 5.75-6.04 x 0.75-0.9 mm. Eight spherical to elliptical cement glands. Copulatory bursa with eight digitiform processes. Eggs elliptical, 0.115 x 0.064 mm.

Host: *Caluromys philander* (Mammalia), Brazil.

#### HETERACANTHORHYNCHUS Lundstrom, 1942

Body without spines, long, narrow, almost uniform in breadth. Lacunar system composed of two longitudinal canals, a large dorsal and a ventral, united by numerous fine lateral canals. Proboscis elongate, somewhat swollen in the middle. Proboscis hooks chiefly in longitudinal rows; however, an indication of a spiral arrangement is present in the basal region. Alternating hooks and spines present in each row. Neck about the same length as proboscis, broader at the base than at the distal end. Proboscis sheath very long, uniform in diameter, inserted slightly behind the base of the proboscis, composed of two muscular layers. Lemnisci sac-like. Genital opening terminal. Adults in intestine of birds. In order to include this genus in the family Gigantorhynchidae, a slight change must be made in the description of the family. The statement that the anterior section of the proboscis is provided with large hooks with roots, posterior section with small hooks without roots is to be changed to the following: Anterior section of proboscis with hooks, posterior section either with spines only or with alternating hooks and spines.

Genotype: *Heteracanthorhynchus vancleavei* Lundstrom, 1942.

HETERACANTHORHYNCHUS VANCELEVEI Lundstrom, 1942. Adult female 42 x 1.2 mm. Proboscis 0.9 x 0.33 mm., slightly swollen in the middle. The hooks are simply constructed, the most anterior hooks being the longest. In each row hooks and spines alternating, each row terminating with spines; in a few rows, however, the last one is a hook with a manubrium. The transition from the longitudinal to the spiral arrangement begins with about the sixteenth hook. Hooks in 24 longitudinal rows. In each row there are 11-12 anterior hooks, then two-three spines, then three hooks, then two-three spines (+1 hook), making a total of 20-22 in each row. Length of hooks and spines 0.030-0.060 mm. Neck 1.2 mm. long, 0.4 mm. broad at the base. Proboscis sheath 2.9 x 0.2 mm. Lemnisci 2.4-2.6 x 0.4 mm.

Type host: *Tringa hypoleucos* (Aves), Sweden.

## OLIGACANTHORHYNCHIDAE Meyer, 1931

OLIGACANTHORHYNCHUS THUMBI (juvenile) Haffner, 1939. Juvenile forms 2.5-10 mm. long; smaller specimens egg-shaped, larger specimens elongate. Chief longitudinal lacunar vessels dorsal and ventral. Giant nuclei of the subcuticula in small numbers at both sides of the longitudinal vessels. Proboscis globular, inverted, with 36 hooks arranged in six transverse or six lacotropic spiral rows of six hooks each, all with arrow-like points. Hooks of the second transverse row largest. Lemnisci cylindrical, with a total of 12 nuclei in both (six in each or seven in one and five in the other). Testes ellipsoid. Eight cement glands arranged in four pairs. Paired protonephridial organs present in both sexes.

Host: *Solenodon paradoxus* (Pisces) in the peritoneum, connective tissue, and body wall, Haiti.

NEPHRIDIORHYNCHUS PALAWANENSIS Tubangui and Masilungan, 1938. Adult worms very elongate, distinctly pseudosegmented except near extreme anterior and posterior ends. Males 190-280 mm. x 2.2 mm.; females 210-360 x 2.3-2.6 mm. Proboscis subspherical, 0.47-0.5 x 0.4-0.42 mm., armed with 48 hooks arranged in eight anteroposterior rows of six each, or six spiral rows of eight hooks each. Hooks with prominent subterminal barbs except those of last two posterior rows. Length of hooks 0.075-0.105 mm. Neck slightly shorter than proboscis with a pair of large lateral papillae near its junction with proboscis. Proboscis with an apical papilla. Proboscis sheath double-walled, 1.5-1.6 x 0.5-0.58 mm. Lemnisci 6.5-11 mm. long, each with a central canal and five large oval nuclei. Testes elongate, 5 x 0.45 mm., separated by a distance of 4.5-6.5 mm. Number of cement glands could not be determined. Cement reservoir 4.8 x 1.2 mm. Eggs 0.068-0.072 x 0.047-0.053 mm.; outer shell pierced by numerous radial canal-like structures. Protonephridial organs appear as oval granular masses, one on each side of anterior extremity of uterine bell of adult female.

Host: *Manis javanica* (Mammalia), the Philippines.

TRAVASSOSIA TUMIDA Van Cleave, 1947c. Body wall very thin, musculature weak, females 100-238 mm. x 3-6 mm., males 75-115 x 1.5-2 mm. Proboscis short, approaching globular, in females 0.230-0.312 mm. in length and breadth, in males 0.210-0.289 mm. in length and breadth. Proboscis hooks in six spiral rows of six each, each hook provided with one or more root processes. Anterior hooks 0.10-0.13 mm. long; second hooks in each series up to 0.15 mm. long; basal hooks 0.045-0.065 mm. long. Lemnisci very long, cylindrical, with a central canal; usually much looped; length up to 15 mm. with diameter of 0.13-0.175 mm.; nuclei of lemnisci few in number. Testes each about 5 mm. long, far apart. Eight cement glands. Eggs 0.090-0.098 x 0.040-0.048 mm. Host: *Didelphis virginiana virginiana* (Mammalia), Oklahoma.

PROSTHENORCHIS CONFUSUS Machado, 1950. Males 20-30 x 1.5-3 mm. Females 25-30 x 2-3 mm. Body shows pronounced pseudosegmentation. Six circles of six hooks each. Length of hooks 0.054-0.113 mm. Lemnisci 8 mm. long. Proboscis sheath 1.87 mm. in length. Testes 3.01-3.02 x 0.38-0.39 mm. Eggs 0.078 x 0.052 mm.

Host: *Cebus* sp. (Mammalia), Brazil.

PROSTHENORCHIS SEPTEMSERIALIS Machado, 1950. Females 20-25 x 2-3 mm. Proboscis 0.585 x 0.664 mm. Seven circles of seven hooks each. Length of hooks 0.054-0.168 mm. Proboscis sheath 1.178 mm. in length. Lemnisci 7.068 mm. in length. Eggs 0.075 x 0.042 mm.

Host: *Mystax ursulus* (Mammalia), Brazil.

PROSTHENORCHIS JUXTATESTICULARIS Machado, 1950. Males 20-30 x 2-3 mm. Females 25-35 x 2-3 mm. Proboscis 0.570 x 0.620 mm. Six rows of six hooks each. Length of hooks 0.025-0.184 mm. Proboscis sheath 1.162 mm. in length. Lemnisci 8.2 mm. long. Testes 3.7-3.9 x 1.36-1.49 mm. Eggs 0.071 x 0.042 mm. Host: *Callithrix leucocephala* (Mammalia), Brazil.

PROSTHENORCHIS PINTOI Machado, 1950. Males 30 x 5 mm. Females 50 x 10 mm. Proboscis 0.498 x 0.464 mm. Five circles of six hooks each. Length of

hooks 0.063-0.168 mm. Proboscis sheath 1.328 mm. long. Lemnisci 2.46 mm. long. Testes 4.92-4.98 x 1.0-1.02 mm. Eggs 0.096-0.105 x 0.050-0.054 mm.  
Host: *Conepatus suffocans* (Mammalia), Brazil.

PROSTHENORCHIS RUGOSUS Machado, 1953. Males 25 x 2.5 mm. Females 32 x 3 mm. Proboscis 0.564 x 0.694 mm. Hooks in seven circles of six each. Length of hooks 0.059-0.168 mm. Proboscis sheath 1.245 mm. in length. Lemnisci 4.648 mm. long. Testes 1.57-1.67 x 0.66-0.69 mm.  
Host: *Cebus (azarae) cay* (Mammalia), Brazil.

PROSTHENORCHIS PROCYONIS Machado, 1950. Males 20-30 x 2-3 mm. Females 25-35 x 2-3 mm. Proboscis 0.697 x 0.716 mm. Hooks in seven circles of six each. Length of hooks 0.05-0.189 mm. Proboscis sheath 1.377 mm. long. Lemnisci 3.64 mm. long. Testes 3.018-3.154 x 1.07-1.24 mm. Eggs 0.071 x 0.042 mm.  
Host: *Procyon cancrivorus* (Mammalia), Brazil.

PROSTHENORCHIS POTOSI Machado, 1950. Males 25-35 x 2-3.5 mm. Females 30-40 x 2.5-4 mm. Body shows marked pseudosegmentation. Proboscis 0.464 x 0.547 mm. Hooks in five circles of six each. Length of hooks 0.084-0.184 mm. Proboscis sheath 1.26 mm. in length. Lemnisci 8.9 mm. long. Testes 3.9-4.3 x 1.045 mm. Eggs 0.078 x 0.046 mm.  
Host: *Potos flavus* (Mammalia), Brazil.

PROSTHENORCHIS GETHI Machado, 1950. Males 10-15 x 1-2.5 mm. Females 15-25 x 1.5-3 mm. Proboscis 0.583-0.794 mm. Hooks in seven circles of six each. Length of hooks 0.058-0.210 mm. Proboscis sheath 1.079 mm. long. Lemnisci 3.48 mm. long. Testes 1.04-1.05 x 0.57-0.58 mm. Eggs 0.084 x 0.054 mm.  
Host: *Tayra barbara* (Mammalia), Brazil.

PROSTHENORCHIS LEMURI Machado, 1950. Females 45 x 3 mm. A collar-like structure consisting of 20-25 longitudinal folds surrounds the anterior region of the trunk. Seven circles of six hooks each. Lemnisci 7.5 mm. long. Eggs 0.060 x 0.042 mm.  
Host: *Lemur fulvus* (Mammalia), Madagascar.

PROSTHENORCHIS DOLLFUSI Machado, 1950. Females 50 x 4 mm. Hooks in eight circles of six each. Lemnisci 6 mm. in length. Eggs 0.08 x 0.05 mm.  
Host: *Lemur fulvus* (Mammalia), Madagascar.

PROSTHENORCHIS TRAVASSOSI Machado, 1950. Males 35-40 x 2.5-3.5 mm. Females 40-50 x 3.5-5 mm. Proboscis 0.58 x 0.66 mm. Hooks in six circles of six each. Length of hooks 0.031-0.168 mm. Proboscis sheath 1.294 mm. long. Lemnisci 5.7 mm. long. Testes 4.5-4.8 x 1.0-1.29 mm. Eggs 0.071 x 0.048 mm.  
Host: *Cebus frontatus* (Mammalia), Brazil.

PROSTHENORCHIS FREITASI Machado, 1950. Males 35 x 2.5 mm. Females 40 x 3 mm. Proboscis 0.415 x 0.431 mm. Hooks in six circles of six each. Length of hooks 0.029-0.121 mm. Proboscis sheath 1.298 mm. long. Lemnisci 3.9 mm. long. Testes 0.913-0.979 x 0.41-0.46 mm. Eggs 0.067 x 0.033 mm.  
Host: *Cebus* sp. (Mammalia), Brazil.

PROSTHENORCHIS LENTI Machado, 1950. Males 15-20 x 1.5-2 mm. Females 20-25 x 2-2.5 mm. Proboscis 0.63 x 0.66 mm. Hooks in eight circles of six each. Length of hooks 0.033-0.184 mm. Proboscis sheath 1.328 mm. long. Lemnisci 3.15 mm. long. Testes 1.7-1.8 x 0.51-0.54 mm.  
Host: *Callithrix geoffroyi* (Mammalia), Brazil.

#### MONILIFORMIDAE Van Cleave, 1924

MONILIFORMIS SPIRADENTATIS McLeod, 1933. Males 35-110 x 0.73-1.2 mm.; females 45-190 x 0.73-2 mm. Proboscis relatively short, subcylindrical, 0.4-0.42 x 0.16 mm. Proboscis hooks in eight spiral rows of 14-17 hooks each; length of hooks 0.031-0.036 mm. Proboscis sheath double-walled. Lemnisci narrow, contorted, about one seventh the length of the body. Testes in posterior part of body, 1.3-1.6 x 0.58-0.61 mm. Eight cement glands, 0.8-0.84 mm. in length. Eggs spindle-shaped, 0.059-0.065 x 0.020-0.022 mm.  
Type host: *Citellus tridecemlineatus* (Mammalia), Canada.

## PACHYSENTIDAE Meyer, 1931

ONCICOLA TRAVASSOSI Witenberg, 1938. Body spindle-shaped. Male 13 mm. long; female 16 mm. long. The anterior extremity bears a subconical collar consisting of several rings, the anteriormost ring the smallest. Proboscis globular, 0.5 mm. in diameter. The first three hooks possess peculiarly shaped roots; each root is composed of two parts separated by an indentation. Length of hooks 0.07-0.18 mm. Lemnisci reach middle of body. Cement glands, probably eight in number, are pressed together behind the testes in a mass in which separate glands could not be distinguished.

Host: *Felis bubastis* (Mammalia), Palestine.

ONCICOLA MICRACANTHA Machado, 1949. Males 9 x 2-2.5 mm. Females 13 x 3-4 mm. Proboscis 0.38 x 0.415 mm. Six circles of six hooks each. Largest hooks 0.12 mm. long. Proboscis sheath 0.913 mm. long. Lemnisci 3.322 mm. in length. Testes elliptical, 0.713-0.923 x 0.249-0.298 mm. Eight pyriform cement glands.

Host: *Conepatus suffocans* (Mammalia), Brazil.

## APORORHYNCHIDAE Shipley, 1899

APORORHYNCHUS AMPHISTOMI Byrd and Denton, 1949. Males 1.43 x 0.58 mm. in maximum width at collar; trunk constricting to 0.39 mm. wide just behind collar. Females 2.13 x 0.83 mm. in maximum width at collar; trunk constricting to 0.63 mm. just behind collar. Proboscis of male 0.36 mm. long by 0.44 mm. wide; of females 0.44 by 0.74 mm. Hooks very fine with portion of shank and tip exposed in bottom of depression, but failing to reach outer margin of proboscis wall, arranged in 40 spiral rows with about 20 spines in each row. Testes ovoid, 0.25-0.26 x 0.21-0.22 mm. Mass of cement glands 0.25 x 0.13 mm. Eggs 0.048-0.064 x 0.020-0.030 mm.

Hosts: *Wilsonia canadensis*, *Compsathylypis americana* (Aves), Virginia, Georgia.

## PALLISENTIDAE Van Cleave, 1928

PALLISENTIS NAGPURENSIS (Bhalerao 1931) Baylis, 1933 (*Farzandia nagpurensis* Bhalerao, 1931). Body 2.4-19 x 0.43-0.9 mm. Proboscis 0.35 x 0.30 mm. Four circles of eight or ten hooks each. Anterior hooks 0.076 mm. in length, basal hooks 0.030 mm. Body spines in anterior portion of body arranged in 12-14 close-set circles with 20-24 in each, spines having length of 0.03-0.05 mm. Remainder of body provided with widely separated rings of spines, 8-14 in each, having length of 0.04-0.063 mm. Eggs 0.116-0.214 x 0.083-0.115 mm.

Host: *Ophiocephalus striatus* (Pisces), India.

ACANTHOSENTIS HOLOSPINUS Sen, 1938. Males 0.9-2.4 x 0.2-0.4 mm.; females 1.6-9.4 x 0.2-0.7 mm. Anterior half of body encircled by 38 rows of rose-thorn like spines, 34 in each row. Four dorsal and two ventral body nuclei. Proboscis cylindrical, 0.1 x 0.05 mm.; proboscis hooks in three circles of six hooks each. Lemnisci narrow, slightly longer than proboscis sheath.

Host: *Barbus stigma* (Pisces), Calcutta.

ACANTHOSENTIS DATTAI Podder, 1938. Males 1.34-3.34 x 0.24-0.42 mm.; females 1.67-9.46 x 0.44-0.9 mm. Entire body provided with regular circlets of rose-thorn like spines which may be absent in the posterior region of mature specimens. The absence of spines may be due to the growth and subsequent shedding of the cuticle. Two ventral and four to six dorsal subcuticular nuclei. Proboscis cylindrical, 0.12 x 0.055 mm.; proboscis hooks in three circles of six hooks each. Anterior hooks 0.050 mm. long; middle, 0.030 mm.; basal, 0.026 mm. Proboscis sheath 0.42 x 0.12 mm. Lemnisci 0.68 x 0.055 mm. and 0.59 x 0.055 mm. Anterior testis 0.48 x 0.31 mm.; posterior 0.29 x 0.275 mm. Cement gland 0.35 x 0.26 mm.; cement reservoir 0.13 x 0.12 mm. Eggs spindle-shaped.

Hosts: *Barbus ticto*, *B. stigma* (Pisces), Calcutta.

ACANTHOSENTIS SIRICARI Podder, 1941. Males 3.11-4.76 x 0.48-0.67 mm.; females 2.94-11.89 x 0.39-1.01 mm. Anterior half of body armed with circular rows of curved spines. Five dorsal and two ventral subcuticular nuclei. Pro-

boscis globular, 0.13 x 0.11 mm., with three circles of six hooks each. Anterior hooks 0.055 mm. long; middle, 0.048 mm.; basal, 0.018 mm. Proboscis sheath 0.26 x 0.15 mm. Lemnisci 0.92 x 0.1 mm. and 1.93 x 0.16 mm.; three nuclei in the short and two in the long lemniscus. Cement gland contains six-eight nuclei.  
Host: *Rashora elanga* (Pisces), India.

#### QUADRIGYRIDAE Van Cleave, 1920

##### HEMIGYRUS Achmerov and Achmerova, 1941

Proboscis small, oval, bearing but few hooks. Anterior quarter of body unevenly armed. Large hypodermal nuclei.

*HEMIGYRUS INTERMEDIUS* Achmerov and Achmerova, 1941. Description based on one female. Body 9 x 0.6 mm. Proboscis small, cylindrical, armed with 18 hooks in five transverse rows. Length of hooks 0.035-0.060 mm. In a longitudinal optical section 11 body spines 0.014-0.015 mm. in length may be counted dorsally, and 21 spines 0.009-0.010 mm. ventrally. Four ventral and eight dorsal giant nuclei in hypoderm. Proboscis sheath 0.430 x 0.150 mm. Lemnisci 1.495 x 0.045 mm.

Host: *Carassius auratus m. gibelio* (Pisces), Amur river, Asia.

*QUADRIGYRUS BRASILIENSIS* Machado, 1941b. Males 10-15 x 0.6-1.3 mm. Females 13-25 x 1-2 mm. Proboscis 0.375 x 0.480 mm. Four circles of five hooks each. First circle of hooks 0.136 mm. long; second 0.106 mm.; third 0.030 mm.; fourth, 0.024 mm. Anterior region of body provided with three circles of 12 spines each. Proboscis sheath 0.45-0.75 x 0.15-0.185 mm. Lemnisci 0.95-1.215 mm. long. Testes 0.975-1.38 x 0.75-0.9 mm. Cement gland 2.625 x 0.9 mm.

Hosts: *Hoplerythrinus unitaeniatus*, *Hoplias malabaricus* (Pisces), Brazil.

##### RAOSENTIS Datta, 1946

"Generic diagnosis. With the characters of the family Quadrigyridae; worms of small size parasitic as adult in the alimentary tract of fishes. Proboscis slightly elongated or globular with four circles of hooks, six in the first two circles very long and stout and seven in the next two circles small and slender. Some space devoid of spines, present between the second and third circles of proboscis hooks. Anterior region of the body provided with 17 rows of close-set rose-thorn-like spines. Proboscis sheath composed of a single layer of muscles. Central nerve ganglion situated near the posterior end of proboscis-sheath. Subcuticular nuclei in pairs, four or five pairs on the dorsal and one or two on the ventral side."

*RAOSENTIS PODDERI* Datta, 1946. Males 0.67-2.37 x 0.27-0.53 mm.; females 1.31-2.53 x 0.42-0.64 mm. Proboscis 0.14-0.25 x 0.11-0.18 mm. Proboscis hooks of first circle 0.085-0.115 mm.; those of second circle 0.070-0.095 mm.; those of third circle 0.025-0.035 mm.; those of fourth circle 0.025-0.030 mm. Proboscis-sheath 0.16-0.37 x 0.05-0.14 mm. Lemnisci 0.28-0.60 x 0.05-0.07 mm. Anterior testis 0.506 x 0.242 mm.; posterior testis 0.460 x 0.184 mm. Cement gland 0.184 mm. Eggs 0.050 x 0.020 mm.

Host: *Mystus cavasius* (Pisces), India.

#### NEOECHINORHYNCHIDAE Van Cleave, 1919

*NEOECHINORHYNCHUS OCTONUCLEATUS* Tubangui, 1933. Description based on one female. Body 9.09 x 1.09 mm. Subcuticula with six giant nuclei in mid-dorsal line and two in mid-ventral line. Proboscis armed with three circles of six hooks each. Anterior hooks 0.088-0.091 mm. long; basal hooks 0.035-0.038 mm. Proboscis sheath 0.9 x 0.3 mm. Lemnisci about twice as long as proboscis sheath.

Host: Fresh-water fish, Luzon.

*NEOECHINORHYNCHUS* sp. Dinnik, 1933. The writer has not seen the description of this species.

Host: *Varicorhinus capoeta sevangi* (Pisces) Lake Sevan, Armenia.

*NEOECHINORHYNCHUS ZACCONIS* Yamaguti, 1935. Description based on a single male. Body 1.43 x 0.37 mm. Proboscis 0.066 x 0.048 mm., armed with three

circles of six hooks each. Anterior hooks 0.024 mm. long, middle 0.018 mm., posterior 0.012 mm. Proboscis sheath 0.2 x 0.07 mm. Lemnisci equal in size, 0.54 x 0.05 mm. Anterior testis 0.31 x 0.25 mm., posterior 0.21 x 0.24 mm. Syncytial cement gland 0.16 x 0.14 mm.

Host: *Zacco platypus* (Pisces), Japan.

*NEOECHINORHYNCHUS HUTCHINSONI* Datta, 1936. Body cylindrical with tapering ends; peculiar depression about the middle of the body in males. Males 7.8-8.2 x 0.8-1 mm.; female 18.9 x 1.3 mm. Proboscis broader than long, 0.077-1 x 0.099-0.110 mm., with three circles of six hooks each. Anterior hooks 0.050 mm. long; middle, 0.037 mm.; posterior, 0.035 mm. Five dorsal and two ventral subcuticular nuclei. Lemnisci filamentous, slightly unequal in length. Proboscis sheath 0.264 x 0.099 mm. Eggs 0.154 x 0.055 mm.

Host: *Diptychus maculatus* (Pisces), North India.

*NEOECHINORHYNCHUS VENUSTUS* Lynch, 1936. *Males.* Adult males 2.5-6.4 mm. in length, averaging about 5.2 mm. About 9.5-15.5 times longer than broad. Proboscis 0.093-0.143 mm. long x 0.108-0.145 mm. broad. Anterior hooks 0.040-0.057 mm. long; middle, 0.045-0.055 mm.; posterior 0.029-0.038 mm. Proboscis receptacle 0.210-0.335 x 0.090-0.120 mm. Binucleate lemniscus 23-42%, uninucleate lemniscus 16-30% of body length. Anterior testis 0.63-1.35 x 0.16-0.33 mm.; posterior testis 0.725-1.08 x 0.18-0.37 mm. Cement gland 1.02-1.6 x 0.19-0.3 mm.

*Females.* Adult females 7.75-12.75 x 0.55-1 mm. Proboscis 0.112-0.137 mm. long x 0.110-0.147 mm. wide. Anterior hooks 0.045-0.057 mm. long; middle, 0.049-0.057 mm.; posterior, 0.035-0.041 mm. Proboscis receptacle 0.250-0.320 x 0.085-0.125 mm. Binucleate lemniscus 12-28%, uninucleate lemniscus 9.5-14.5% of body length. Shelled embryos 0.065-0.072 x 0.029-0.038 mm.

Host: *Catostomus macrocheilus* (Pisces), Washington.

*NEOECHINORHYNCHUS CRISTATUS* Lynch, 1936. *Males.* Length 2.55-3.55 mm.; breadth 0.3-0.4 mm. Proboscis 0.095-0.127 mm. long x 0.070-0.097 mm. in diameter. Anterior hooks 0.045-0.051 mm. long; middle, 0.026-0.033 mm.; posterior, 0.023-0.026 mm. Proboscis receptacle 0.205-0.288 x 0.060-0.085 mm. Binucleate lemniscus 31-64%, uninucleate lemniscus 21-38% of body length. Anterior testis 0.390-0.585 mm. x 0.155-0.250 mm.; posterior testis 0.365-0.560 x 0.175-0.230 mm. Cement gland 0.425-0.800 x 0.140-0.250 mm.

*Females.* Length 3.85-8.75 mm.; diameter 0.32-0.7 mm. Proboscis 0.087-0.108 mm. x 0.073-0.087 mm. Anterior hooks 0.045-0.059 mm. in length; middle hooks 0.029-0.038 mm.; posterior hooks 0.024-0.032 mm. Binucleate lemniscus 23-35%; uninucleate lemniscus 12-22% of body length. Shelled embryos 0.051-0.060 x 0.020-0.026 mm.

Host: *Catostomus macrocheilus* (Pisces), Washington.

*NEOECHINORHYNCHUS CHILKAENSIS* Podder, 1937a. *Males* 4.2-7.8 x 0.2-1.03 mm. *Females* 5-18.7 x 0.31-1.08 mm. Proboscis globular, 0.12 x 0.11 mm. Anterior hooks 0.070 mm. long; middle hooks 0.030 mm.; posterior hooks 0.027 mm. Proboscis sheath 0.46 x 0.14 mm. Lemnisci 1.85 x 0.11 and 1.6 x 0.11 mm. Eggs 0.023 mm. in length.

Host: *Mugil cephalus* (Pisces), India.

*NEOECHINORHYNCHUS TOPSEYI* Podder, 1937b. *Males* 1.3-28.5 x 0.17-1.1 mm.; *females* 7-69 x 0.5-1.5 mm. Proboscis 0.15 x 0.14 mm. Anterior hooks 0.095 mm. long; middle hooks 0.025 mm.; basal hooks 0.024 mm. Proboscis sheath 0.41 x 0.132 mm. Lemnisci 0.99 x 0.066 and 0.836 x 0.066 mm. Anterior testis 4.86 x 0.22 mm.; posterior testis 4.27 x 0.22 mm. Cement gland 1.1 x 0.154 mm.

Host: *Polynemus heptadactylus* (Pisces), Calcutta, India.

*NEOECHINORHYNCHUS COILIAE* Yamaguti, 1939. *Males* 6-9 x 0.32-1 mm.; *females* 14-15.5 x 1.5 mm. Proboscis 0.055-0.090 x 0.065-0.090 mm. Anterior and middle hooks 0.045-0.060 mm. long; posterior 0.027-0.036 mm. Neck 0.16-0.2 mm. long. Proboscis sheath 0.3-0.5 x 0.09-0.125 mm. Lemnisci 1.2-1.7 x 0.08-0.15 mm. in male, 1.8-2.4 x 0.075-0.14 mm. in female. Testes elliptical, directly tandem, the anterior 0.8-2.4 x 0.17-0.8 mm. in middle third of body, the posterior 0.75-1.75 x 0.2-0.7 mm. Cement gland 0.6-1.3 x 0.35-0.6 mm. Eggs about 0.033 x 0.012 mm.

Host: *Coilia mystus* (Pisces), Japan.



**NEOECHINORHYNCHUS JOHNII** Yamaguti, 1939. Description based on four females. Body 40-63 x 0.95-1.1 mm.; trunk markedly attenuated anteriorly. Proboscis rounded, 0.11-0.12 mm. in diameter. Anterior hooks 0.090-0.100 mm. long; middle and posterior hooks 0.021-0.024 mm. Neck 0.17-0.25 mm. long x 0.11-0.13 mm. broad at base. Proboscis sheath 0.4-0.52 x 0.09-0.14 mm. Lemnisci 2.5-3.8 x 0.1-0.11 mm. Vulva thick-walled, folded inside, with a very wide subterminal aperture. Eggs about 0.033 x 0.018 mm.

Host: *Johnius goma* (Pisces), Japan.

**NEOECHINORHYNCHUS TYLOSURI** Yamaguti, 1939. *Male*. Body 16-42 x 0.8-1.5 mm. Proboscis 0.1-0.125 x 0.12-0.16 mm., truncate in front. Anterior hooks 0.063-0.069 mm. long; middle hooks 0.030 mm.; posterior hooks 0.030-0.035 mm. Proboscis sheath 0.2-0.35 x 0.1-0.16 mm. Lemnisci unequal in length, 3-4.2 x 0.1-0.21 mm. and 4.15-7.2 x 0.138-0.27 mm. Anterior testis 1.4-5.5 x 0.4-0.67 mm., posterior 1.9-8 x 0.17-0.6 mm. Cement gland 2-8.8 x 0.14-0.88 mm., containing 22 elongate nuclei.

*Female*. Body 21-70 x 0.55-2 mm. Proboscis up to 0.16 x 0.15 mm. Anterior hooks 0.075 mm. long; middle and posterior hooks 0.035 mm. Proboscis sheath 0.27-0.46 x 0.15-0.17 mm. Lemnisci unequal, 3.2-5.4 x 0.088-0.13 mm. and 4.6-9.5 x 0.13-0.18 mm. Eggs 0.030-0.033 x 0.015-0.018 mm.

Host: *Tylosurus schismatorhynchus* (Pisces), Japan.

**NEOECHINORHYNCHUS SAGINATUS** Van Cleave and Bangham, 1949. Males 8 x 0.7-1.4 mm. Females up to 20 mm. in length x 1.25-2.1 mm. Proboscis 0.105-0.119 x 0.079-0.132 mm. Terminal hooks 0.058-0.067 mm. long; middle 0.031-0.038 mm.; basal 0.027-0.032 mm. Male genital organs occupy posterior half of body. Eggs 0.044-0.046 x 0.016-0.020 mm.

Host: *Semotilus atromaculatus atromaculatus* (Pisces), Wisconsin.

**NEOECHINORHYNCHUS TUMIDUS** Van Cleave and Bangham, 1949. Males 3-5 x 0.7-1.5 mm. Females 4-12 x 0.87-2.5 mm. in maximum diameter. Body of female with distinct inflation in anterior region. Proboscis 0.119-0.172 x 0.158-0.210 mm. Terminal hooks 0.069-0.084 mm. long; middle 0.067-0.079 mm.; basal 0.040-0.053 mm. Eggs 0.036-0.040 x 0.016-0.019 mm.

Host: *Leucichthys ariedi* (Pisces), Wisconsin and Canada.

**NEOECHINORHYNCHUS DORYPHORUS** Van Cleave and Bangham, 1949. Body size 4.38-6.4 x 0.289-0.577 mm. Proboscis 0.096-0.120 x 0.093-0.132 mm. Anterior series of hooks distributed as two dorsal, two ventral and two highly modified lateral hooks. Ventral and dorsal hooks of approximately same size, 0.061-0.072 mm. Lateral hooks conspicuously larger, up to 0.132 mm., middle hooks 0.029-0.032 mm.; basal hooks 0.026-0.032 mm. Eggs 0.048-0.052 x 0.014-0.016 mm., with small rounded polar prolongations of middle membrane.

Host: *Jordanella floridae* (Pisces), Florida.

**NEOECHINORHYNCHUS STRIGOSUS** Van Cleave, 1949b. Males 3.7-5.5 x 0.346 mm. Proboscis of male 0.105 mm. long x 0.146 mm. wide. Females 9-14.1 x 0.5-0.7 mm. Proboscis of female 0.105-0.146 x 0.132-0.158 mm. Hooks, anterior, 0.058 mm. long, middle 0.041 mm., basal 0.029-0.038 mm. Genital organs of male occupying about 0.6 of length of trunk. Testes may undergo histolytical break-down leading to monorchid condition or loss of distinct testes. Embryos 0.053-0.072 x 0.026-0.031 mm.

Hosts: *Ictiobus bubalus* (Pisces), Tennessee, *Catostomus commersonnii*, *Moxostoma aureolum* (Pisces), Wisconsin.

**NEOECHINORHYNCHUS DISTRACTUS** Van Cleave, 1949b. Males 5.9-7.3 x 0.35-0.38 mm. Females 8.4-19.6 x 0.38-0.67 mm. Proboscis elongate, globular, 0.14-0.176 x 0.120-0.164 mm. Anterior hooks 0.059 mm. in length, middle hooks 0.041 mm., basal hooks 0.023-0.029 mm. The two lemnisci in the same individual extremely diverse in size. In males the long lemniscus ends far anterior to the anterior testis. Testes long, cylindrical, with ends somewhat pointed, much narrower than the width of the body.

Host: *Ictiobus* sp. (Pisces), Mississippi.

**OCTOSPINIFER TOROSUS** Van Cleave and Haderlie, 1950. Males 3.5-6.3 x 0.5-0.8 mm. Females 5-9.6 x 0.5-0.89 mm. Proboscis ovoid, 0.120-0.158 x 0.158-0.198 mm. in females; 0.120-0.146 x 0.158-0.184 mm. in males. Proboscis armed with

three circles of eight hooks each. Anterior hooks 0.035-0.044 mm. long, middle 0.038-0.044 mm., basal 0.035-0.041 mm. Hooks of terminal circle only have prominent root-processes. Lemnisci very unequal in length. Eggs 0.032-0.041 x 0.016-0.019 mm.

Host: *Catostomus occidentalis* Ayres (Pisces), California.

EOSENTIS DEVDEVI Datta, 1936. Body fusiform, superficially annulated. Males 2.29-3.3 x 0.73-1.08 mm.; females 2.97-7.59 x 0.62-1.27 mm. Nine nuclei in mid-dorsal and two in mid-ventral line. Proboscis globular, 0.132 x 0.099 mm. Anterior hooks 0.090 mm. long; middle, 0.045 mm.; posterior, 0.040 mm. Proboscis sheath 0.264 x 0.132 mm. Lemnisci filamentous, each containing three nuclei, 1.87 x 0.132 mm. and 1.78 x 0.132 mm. Anterior testis 0.704 x 0.44 mm.; posterior 0.616 x 0.44 mm. Eggs 0.020 x 0.005 mm.

Host: *Schizothorax planifrons* (Pisces), North India.

EOSENTIS YALEI Datta, 1936. Description based on one male and three females; all specimens in poor condition. Male 5.39 x 0.88 mm. Females 5-8 x 0.99-1.1 mm. Eight nuclei in mid-dorsal and one in mid-ventral line. Proboscis 0.132 x 0.11 mm. Anterior hooks 0.080 mm. long; middle, 0.040 mm.; posterior, 0.040 mm. Proboscis sheath 0.24 x 0.13 mm.

Host: *Schizothorax esocinus* (Pisces), North India.

EOSENTIS FORMOSANUS Harada, 1938. Males 8.5-10.4 x 1.6 mm.; females 12.5-13 x 1.6 mm. Eight nuclei in mid-dorsal and one in mid-ventral line. Proboscis globular; anterior hooks 0.070 mm. long; middle, 0.040 mm.; posterior 0.028 mm. Proboscis sheath 0.37 x 0.125 mm. Lemnisci 2.2 x 0.3 mm., each containing two giant nuclei. Cement gland pear-shaped, with five giant nuclei. Eggs 0.048 x 0.012 mm.

Host: *Zacco temmincki* (Pisces), Formosa.

#### ATACTORHYNCHUS Chandler, 1935

"*Generic diagnosis.* Body small, stout, ventrally curved, with greatest diameter behind middle. Proboscis very small, armed with about eight diagonally transverse rows of hooks, about eight in number in anterior rows, about twice as many and half as large in posterior rows, the arrangement strikingly irregular. Hooks U-shaped, with large rod-shaped roots and slender spines, only tips of which project through cuticle. Proboscis sac about twice as long as proboscis. Retractor muscles of proboscis sac attached behind middle of body. Lemnisci very long and large, extending about to middle of body, one containing one nucleus, the other two. Testes large, subglobular, contiguous; syncytial cement gland in contact with testes. Well-developed cement reservoir and seminal vesicle, the latter with two ducts.

"*Type species.*—*Atactorhynchus verecundus*, new species."

ATACTORHYNCHUS VERECUNDUS Chandler, 1935. Males up to 4.5 x 0.6 mm.; females up to 6.5 x 0.63 mm. Proboscis nearly cylindrical, slightly expanded distally, about 0.15 x 0.06 mm. Hooks arranged irregularly in about eight diagonally transverse rows, the first four or five with about eight hooks each, the last two or three with more hooks, last row having about 16. Hooks at anterior end of proboscis 0.018-0.019 mm. long; hooks of posterior row 0.009-0.010 mm. Proboscis sac about twice as long as proboscis. Lemnisci about half length of body in males. Testes in posterior half of body, 0.300-0.400 mm. long and about two thirds as wide. Syncytial cement gland. Eggs 0.027-0.030 x 0.012-0.013 mm.

Host: *Cyprinodon variegatus* (Pisces), Galveston Bay, Texas.

#### EOCOLLIS Van Cleave, 1947a

"With the characteristics of the class (originally order) Eoacanthocephala as diagnosed by Van Cleave, 1936 and of the family Neoechinorhynchidae as outlined by Van Cleave, 1919. Anterior body extremity prolonged into a narrow, cylindrical, false neck which in the region immediately posterior to the proboscis is usually inflated into a trunk bulb or a series of irregular excrescences. Proboscis short, cylindrical to globular, armed with three circles of six hooks each. The six giant subcuticular nuclei distinctive of the family

are all restricted to the trunk region posterior to the trunk bulb and false neck. Body proper somewhat swollen posterior to the false neck with the single ventral and anterior one of the dorsal giant nuclei in the enlarged portion. Trunk tapering fairly rapidly toward posterior extremity. Lemnisci relatively long, narrow, approximately cylindrical, extending from base of praesoma through the trunk bulb and false neck into the cavity of the trunk; one with two giant nuclei and the other with one.

"Genotype: *Eocollis arcanus* n. sp."

*Eocollis arcanus* Van Cleave, 1947a. Females up to 13 mm. long with body bulb 0.24-1.58 mm. long; false neck 0.24-1.26 mm. and trunk bulb 0.24-1.58 mm. in length; false neck 0.12-0.5 mm. in diameter; maximum trunk diameter about 2 mm. Males up to 8 x 1.34 mm. In some individuals, instead of a single, uniformly expanded trunk bulb, the false neck may bear one or a few irregularly lobed expansions at the base of the proboscis; in a few the bulb is lacking. Proboscis globular or very short, cylindrical, 0.076-0.117 mm. long x 0.094-0.192 mm. in diameter. Proboscis sheath 0.08-0.21 x 0.05-0.067 mm.; brain at base. Proboscis armed with three circles of six hooks each. Anterior hooks 0.047-0.059 mm. long; middle hooks 0.023 mm. long; basal hooks 0.012 mm. The two contiguous testes are very diverse in size and shape. In the allotype male the anterior testis is ellipsoidal, 0.75 x 0.53 mm.; the posterior testis is much elongated, 1.48 x 0.46 mm. Cement gland syncytial, with eight giant nuclei, 1.73 x 0.44 mm. in allotype male. Cement reservoir pyriform, 0.35 x 0.24 mm. Embryos 0.041-0.047 x 0.010 mm.

Hosts: *Lepomis macrochirus*, *Pomoxis nigro-maculatus* (Pisces), Illinois.

#### PAULISENTIS Van Cleave and Bangham, 1949

"With the characters of the family Neoechinorhynchidae. Proboscis small, shortly cylindrical, provided with relatively weak hooks arranged, not in perfect circles and longitudinal rows but as six diagonal rows of five hooks each. Body wall relatively thick. Musculature of male bursa poorly developed. Parasitic in the intestine of fresh-water fishes. Development unknown.

Type species: *Paulisentis fractus*, n. sp."

*PAULISENTIS FRACTUS* Van Cleave and Bangham, 1949. Males 1.4-2.86 x 0.41-0.62 mm. Females 2.3-4 x 0.6-0.8 mm. Proboscis 0.093-0.105 mm. in width x 0.089-0.120 mm. in length. Hooks near tip 0.024-0.027 mm. long; in middle 0.019-0.027 mm.; at base 0.011-0.016 mm. Male genital organs occupy most of the length of the trunk. Eggs 0.035-0.038 x 0.011-0.014 mm.

Host: *Scotilus atromaculatus atromaculatus* (Pisces), Ohio.

#### TENUISENTIDAE Van Cleave, 1936b

With the characters of the genus *Tenuisentis* Van Cleave, 1936.

#### TENUISENTIS Van Cleave, 1936b

"*Generic diagnosis.* Eoacanthocephala as defined by Van Cleave in a paper in press. Body long, slender, devoid of spines, with a slight enlargement of anterior extremity. Longitudinal canals of lacunar system chiefly dorsal and ventral but somewhat irregular in posterior region. Body wall with a few giant nuclei, chiefly dorsal and ventral in location but posteriorly at least some are lateral in position. Proboscis very long, slightly clavate, with numerous hooks. Receptacle with a single very thick muscular wall. Cement gland of male a much elongated syncytial mass. Ligament sacs of female distinctly separated, the uterine bell in direct communication with the ventral. Parasitic as adults in fishes; so far known only from the region of the Nile in Africa.

Genotype: *Tenuisentis niloticus* (Meyer, 1932, p. 54) (= *Rhadinorhynchus niloticus*)."

The following list is an alphabetical arrangement of the hosts (left), with their acanthocephalan parasites (right), as reported in this paper. The asterisks indicate juvenile parasites found in the mesenteries or viscera of the host.

## PISCES

Alaieops plinthus	<i>Hypoechinorhynchus alaieops</i>
Amphacanthus oramin	<i>Diplosetis amphacanthi</i>
Barbus stigma	<i>Acanthosentis holospinus</i>
Barbus stigma	<i>A. dattai</i>
Barbus ticto	<i>Acanthosentis dattai</i>
Brachymystax lenok	<i>Echinorhynchus lenok</i>
Bricon hilarii	<i>Echinorhynchus gracilis</i>
Caranx mertensi	<i>Nipporhynchus carangis</i>
Carassius auratus m. gibelio	<i>Hemigyrus intermedius</i>
Catostomus commersonnii	<i>Neoechinorhynchus strigosus</i>
Catostomus macrocheilus	<i>Neoechinorhynchus venustus</i>
Catostomus macrocheilus	<i>N. cristatus</i>
Catostomus occidentalis	<i>Octospinifer torosus</i>
Coilia mystus	<i>Neoechinorhynchus coiliae</i>
Cottus quadricornis	<i>Acanthocephalus</i> sp.
Cottus pollux	<i>Echinorhynchus cotti</i>
Cratinus agassizii	<i>Gorgorhynchus lepidus</i>
Cyprinodon variegatus	<i>Atactorhynchus verecundus</i>
Diptychus maculatus	<i>Neoechinorhynchus hutchinsoni</i>
Ditrema temmincki	<i>Nipporhynchus ditrematis</i>
Epinephelus akaara	<i>Rhadinorhynchus epinepheli</i>
Erythroculter erythropterus	<i>Echinorhynchoides dogieli</i>
Gadus callarias	<i>Acanthocephalus</i> sp.
Hemibarbus lobeo	<i>Acanthocephalus parallelotestis</i>
Hemibarbus lobeo	<i>Echinorhynchoides dogieli</i>
Hemirhamphus intermedius	<i>Micracanthorhynchina hemirhamphi</i>
Hexagrammos otakii	<i>Acanthocephaloides japonicus</i>
Hoplerythrinus unitaeniatus	<i>Quadrigyus brasiliensis</i>
Hoplias malabaricus	<i>Quadrigyus brasiliensis</i>
Ictiobus bubalus	<i>Neoechinorhynchus strigosus</i>
Ictiobus sp.	<i>Neoechinorhynchus distractus</i>
Johnius goma	<i>Neoechinorhynchus johnii</i>
Jordanella floridae	<i>Neoechinorhynchus doryphorus</i>
Kyphosus elegans	<i>Filisoma bucerium</i>
Kyphosus sectatrix	<i>Filisoma fidum</i>
Lepidopsetta bilineata	<i>Echinorhynchus lageniformis</i>
Lepomis macrochirus	<i>Eocollis arcanus</i>
Leucichthys artedi	<i>Neoechinorhynchus tumidus</i>
Leuciscus waleckii	<i>Bolborhynchus exiguus</i>
Liocassis ressuriensis	<i>Paracanthocephalus curtus</i>
Lotella phycis	<i>Echinorhynchus lotellae</i>
Lotella phycis	<i>E. dissimilis</i>
Lutianus russelli	<i>Longicollum alemniscus</i>
Menticirrhus americanus	<i>Illiosentis furcatus</i>
Menticirrhus undulatus	<i>Illiosentis cetratus</i>
Microcanthus strigatus	<i>Filisoma microcanthi</i>
Misgurnus fossilis	<i>Tenuiproboscis misgurni</i>
Moxostoma aureolum	<i>Neoechinorhynchus strigosus</i>
Mugil cephalus	<i>Neoechinorhynchus chilkaensis</i>
Mylinae sp.	<i>Echinorhynchus gomezi</i>
Mylosoma paraguayensis	<i>Echinorhynchus salobrensis</i>
Mystus cavasius	<i>Raosentis podderi</i>
Nemachilus kashmirensis	<i>Pomphorhynchus kashmirensis</i>
Neobythites macropus	<i>Acanthocephaloides rhinoplagusiae</i>
Ophiocephalus striatus	<i>Pallisentis nagpurensis</i>
Pagrosomus unicolor	<i>Longicollum pagrosomi</i>
Pangasius pangasius	<i>Mehrarhynchus prashadi</i>
Parabramis pekimensis	<i>Pseudorhadinorhynchus markewitchi</i>
Paralabrax humeralis	<i>Gorgorhynchus clavatus</i>
Paralichthys lethostigmus	<i>*Arhythmorhynchus duocinctus</i>

Parasilurus asotus	.....	<i>Acanthocephalus minor</i>
Parasilurus asotus	.....	<i>Paracanthocephalus tenuirostris</i>
Peltorhamphus novae-zelandiae	.....	<i>Rhadinorhynchus peltorhamphi</i>
Percottus glehni	.....	<i>Paracanthocephalus curtus</i>
Platichthys stellatus	.....	<i>Echinorhynchus lageniformis</i>
Plotosus anguillaris	.....	<i>Heterosentis plotosi</i>
Polynemus heptadactylus	.....	<i>Neoechinorhynchus topseyi</i>
Pomadasya hasta	.....	<i>Acanthocephalus hastae</i>
Pomoxis nigro-maculatus	.....	<i>Eocollis arcamisi</i>
Pseudaspius leptocephalus	.....	<i>Pseudorhadinorhynchus markewitchi</i>
Pseudaspius leptocephalus	.....	<i>P. pseudaspii</i>
Pseudaspius leptocephalus	.....	<i>Paracanthocephalus tenuirostris</i>
Rasbora elanga	.....	<i>Acanthosentis sircari</i>
Rhinoplagusia japonica	.....	<i>Acanthocephaloides rhinoplagusiae</i>
Roncador stearnsi	.....	<i>Illiosentis cetratus</i>
Salmo ischchan	.....	<i>Echinorhynchus sevani</i>
Salvelinus malma	.....	<i>Rhadinorhynchoides maiyagawai</i>
Scatophagus argus	.....	<i>Filisoma rialinum</i>
Scatophagus argus	.....	<i>Longicollum alemniscus</i>
Schizopygopsis stoliczkae	.....	<i>Acanthocephalus kashmirensis</i>
Schizothorax esocinus	.....	<i>Eosentis yalei</i>
Schizothorax planifrons	.....	<i>Eosentis devdevi</i>
Scomber pelamys	.....	<i>Rhadinorhynchus meyeri</i>
Sebastichthys oblongus	.....	<i>Pomphorhynchus sebastichthydis</i>
Semotilus atromaculatus atromaculatus	.....	<i>Neoechinorhynchus tunidus</i>
Semotilus atromaculatus atromaculatus	.....	<i>Paulisentis fractus</i>
Solenodon paradoxus	.....	<i>*Oligacanthorhynchus Thumbi</i>
Sparus berda	.....	<i>Acanthocephalus hastae</i>
Sparus maculocephalus	.....	<i>Longicollum alemniscus</i>
Spheroides sp.	.....	<i>Arhythmacanthus fusiformis</i>
Teuthis fuscescens	.....	<i>Nipporhynchus aspinosus</i>
Teuthis fuscescens	.....	<i>Acanthocephaloides japonicus</i>
Thunnus thynnus	.....	<i>Bolbosoma thunni</i>
Trachurus declivis	.....	<i>Acanthocephalus hastae</i>
Trachurus japonicus	.....	<i>Nipporhynchus trachuri</i>
Trachurus japonicus	.....	<i>N. nudus</i>
Tylosurus scyriatorhynchus	.....	<i>Neoechinorhynchus tylosuri</i>
Varicorhinus capoeta sevangi	.....	<i>Neoechinorhynchus sp.</i>
Umbrina roncador	.....	<i>Illiosentis cetratus</i>
Xesurus scalprum	.....	<i>Nipporhynchus aspinosus</i>
Zacco platypus	.....	<i>Neoechinorhynchus zacconis</i>
Zacco temmincki	.....	<i>Micracanthorhynchina dakusuiensis</i>
Zacco temmincki	.....	<i>Eosentis formosanus</i>
Zacco sp.	.....	<i>Micracanthorhynchina molomurai</i>
Zanclorhynchus spmifer	.....	<i>Echinorhynchus zanclorhynchi</i>
Zoarces viviparus	.....	<i>Acanthocephalus sp.</i>

AMPHIBIA

Bufo formosus	.....	<i>Acanthocephalus sinensis</i>
Bufo formosus	.....	<i>A. elongatus</i>
Eurycea tynerensis	.....	<i>Acanthocephalus van-cleevei</i>
Rana cyanophlyctis	.....	<i>*Pomphorhynchus dubiosus</i>
Rana nigromaculata	.....	<i>Acanthocephalus sinensis</i>
Rana temporaria ornativentris	.....	<i>*Porrorchis oti</i>

REPTILIA

Naja hannah	.....	<i>Centrorhynchus reptans</i>
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AVES

Anas platyrhynchos platyrhynchos	.....	<i>Polymorphus acutis</i>
Anas platyrhynchos platyrhynchos	.....	<i>P. meyeri</i>
Anas platyrhynchos platyrhynchos	.....	<i>P. diploinflatus</i>

Anthus spinoletta littoralis	<i>Arhythmorhynchus invaginabilis suecicus</i>
Aphriza virgata	<i>Arhythmorhynchus comptus</i>
Asio otus otus	<i>Centrorhynchus elongatus</i>
Bubo bubo tenuipes	<i>Centrorhynchus bubonis</i>
Bucephala clangula clangula	<i>Polymorphus major</i>
Bucephala clangula clangula	<i>P. strunosoides</i>
Butastur indicus	<i>Centrorhynchus insularis</i>
Capella solitaria	<i>Polymorphus capellae</i>
Centropus sinensis intermedius	<i>Pseudoporrorchis houdemeri</i>
Centropus viridis	<i>Pseudoporrorchis centropusi</i>
Charadrius dubius	<i>Prosthorhynchus charadrii</i>
Colinus virginianus texanus	<i>Mediorhynchus colini</i>
Circus aeruginosus texanus	<i>Centrorhynchus narcisae</i>
Compothylypis americana	<i>Apororhynchus amphistomi</i>
Crocethia alba	<i>Polymorphus texensis</i>
Erolia alpina pacifica	<i>Arhythmorhynchus comptus</i>
Erolia alpina sakhalina	<i>Polymorphus eroliae</i>
Eroliaptilocnemis conesi	<i>Arhythmorhynchus comptus</i>
Fulica americana	<i>Polymorphus trochus</i>
Gallus gallus domesticus	<i>Mediorhynchus gallinarum</i>
Garrulus glandarius japonicus	<i>Mediorhynchus garruli</i>
Haematopus o. ostralegus	<i>Plagiorhynchus odhneri</i>
Haliastur intermedius	<i>Centrorhynchus insularis</i>
Hypotaenidia philippensis	<i>Oligoterhynchus malayensis</i>
Larus argentatus cachinnans	<i>Arhythmorhynchus anser</i>
Larus argentatus smithsonianus	<i>Polymorphus kenti</i>
Larus glaucoides	<i>Polymorphus pauciamatus</i>
Limnobaenus fuscus	<i>Prosthorhynchus limnobaeni</i>
Lophodytes cucullatus	<i>Polymorphus cucullatus</i>
Merula pallida	<i>Porrorchis ogatai</i>
Microcarbo melanoleucus	<i>Corynosoma clavatus</i>
Melanitta deglandi	<i>Polymorphus altmani</i>
Melanitta perspicillata	<i>Polymorphus altmani</i>
Nycticorax nycticorax	<i>Polymorphus frontospinosus</i>
Nycticorax nycticorax hoactli	<i>Arhythmorhynchus duocinctus</i>
Nyroca marila	<i>Polymorphus marilis</i>
Oenanthe oenanthe oenanthe	<i>Mediorhynchus nurtensis</i>
Otus bakkamoena semitorques	<i>Centrorhynchus elongatus</i>
Otus bakkamoena semitorques	<i>Porrorchis oti</i>
Penelopides manillae	<i>Mediorhynchus sapocotensis</i>
Phalacrocorax pelagicus pelagicus	<i>Corynosoma phalacrocoracis</i>
Phalacrocorax ater	<i>Corynosoma clavatus</i>
Phalacrocorax auritus floridanus	<i>Corynosoma gravida</i>
Phalacrocorax neglectus	<i>Corynosoma turbidum</i>
Phalacrocorax varius	<i>Corynosoma clavatus</i>
Pitta atricapilla	<i>Prosthorhynchus pittarum</i>
Somateria mollissima mollissima	<i>Polymorphus sp.</i>
Spatula clypeata	<i>Polymorphus sp.</i>
Spilornis bacha	<i>Centrorhynchus insularis</i>
Strix varia varia	<i>Centrorhynchus conspectus</i>
Strix aluco aluco	<i>Centrorhynchus olssoni</i>
Tringa hypoleucos	<i>Heteracanthorhynchus vanclavei</i>
Turdus cardis cardis	<i>Centrorhynchus turdi</i>
Turdus merula merula	<i>Centrorhynchus scanensis</i>
Turdus merula merula	<i>Prosthorhynchus genitopapillatus</i>
Turdus migratorius propinquus	<i>Lueheia adlueheia</i>
Turnix ocellata	<i>Mediorhynchus turnixena</i>
Upupa epops	<i>Prosthorhynchus upupae</i>
Urocissa melanocephala occipitalis	<i>Centrorhynchus maryapae</i>
Wilsonia conadensis	<i>Apororhynchus amphistomi</i>

## MAMMALIA

Arctocephalus forsteri	.....	<i>Corynosoma australe</i>
Balaenoptera rostrata	.....	<i>Bolbosoma nipponicum</i>
Callithrix geoffroyi	.....	<i>Prosthenorchis travassosi</i>
Callithrix leucocephala	.....	<i>Prosthenorchis juxtatesticularis</i>
Caluromys philander	.....	<i>Gigantorhynchus lutzi</i>
Cebus (azarae) cay	.....	<i>Prosthenorchis rugosus</i>
Cebus frontatus	.....	<i>Prosthenorchis travassosi</i>
Cebus sp.	.....	<i>Prosthenorchis confusus</i>
Cebus sp.	.....	<i>P. freitasi</i>
Citellus tridecemlineatus	.....	<i>Moniliformis spiradentatis</i>
Conepatus suffocans	.....	<i>Prosthenorchis pintoii</i>
Conepatus suffocans	.....	<i>Oncicola micracantha</i>
Delphinus delphis	.....	<i>Corynosoma cetaceum</i>
Didelphis virginiana virginiana	.....	<i>Travassosia tumida</i>
Felis bubastis	.....	<i>Oncicola travassosi</i>
Felis minutus javanicus	.....	<i>Pseudoprororchis teliger</i>
Herpestes javanicus	.....	<i>Pseudoprororchis teliger</i>
Lemur fulvus	.....	<i>Prosthenorchis lemuri</i>
Lemur fulvus	.....	<i>P. dollfusi</i>
Manis javanica	.....	<i>Nephridiorhynchus palawanensis</i>
Mystax ursulus	.....	<i>Prosthenorchis septemserialis</i>
Phoca hispida	.....	<i>Corynosoma wegeneri</i>
Potos flavus	.....	<i>Prosthenorchis potosi</i>
Procyon cancrivora	.....	<i>Prosthorhynchus wrichi</i>
Procyon cancrivora	.....	<i>Prosthenorchis procyonis</i>
Tayra barbara	.....	<i>Prosthenorchis gethi</i>
Tursiops truncatus	.....	<i>Corynosoma cetaceum</i>
Zalophus californianus	.....	<i>Corynosoma obtuscens</i>

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