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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

NORTH AMERICAN MONOGENETIC TREMATODES
IX. THE FAMILIES MAZOCRAEIDAE AND
PLECTANOCOTYLIDAE*

BY EMMETT W. PRICE

Jacksonville State College, Jacksonville, Alabama

This paper is a continuation of the series dealing with the North American monogenetic trematodes and of a general revision of the Monogenea. The purpose and organization of this installment are the same as for previous sections (Price, 1937, 1938, 1939a, 1939b, 1942, 1943a, 1943b, and 1961).

The present installment deals primarily with the Mazocraeidae. The inclusion of the Plectanocotylidae is largely for convenience; it is a small group the relationships of which are not too well established. Sproston (1946) regarded it as a subfamily of the family Discocotylidae, whereas Bychowsky (1957) considered it as a family of the suborder Discocotylina. The present writer cannot agree with either of these viewpoints, and regards Phillocotylidae as a more or less intermediate group with its greatest affinities with the Mazocraeidae of the suborder Mazocracraeina Bychowsky.

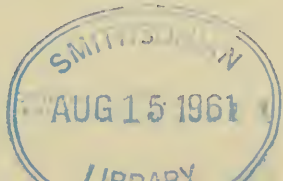
Family Mazocraeidae Price, 1936

Synonyms: Octocotylidae Monticelli, 1888; Octobothriidae Monticelli, 1888, in part; Octobothriidae Taschenberg, 1879, in part; Hexacotylidae Monticelli, 1903; Mazocriidae Southwell and Kirshner, 1937, in part; Pleurocotylidae Monticelli, 1903; Grubeidae Poche, 1926.

Diagnosis: Body elongate to clavate. Prohaptors in form of two well-developed suckers opening into oral cavity; opisthohaptor bearing four pairs of clamps (except in *Grubea*) of a special sort; middle and ventral

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loop elements fused to form inverted U-shaped pieces, dorsal loop elements incomplete, and center piece more or less scoop-shaped, usually weakly cuticularized; anchors usually two to three pairs, unequal and dissimilar, outer pair larger than others, on terminal lappet. Genital aperture armed with hooks of two types, a pair of larger, outwardly directed laterals, and several pairs of smaller, medially directed inner hooks arranged in two, either transverse or vertical, rows or in a circle. Testes either follicular or as a lobed mass. Ovary U-shaped, with proximal and distal limbs directed anteriorly. Vagina, when present, single and opening on mid-dorsal surface, or, rarely, Y-shaped and opening laterally.

Type genus: Mazocraes Hermann, 1782.

This family consists of a number of more or less heterogeneous species which may be grouped into five reasonably well-defined groups; these groups are regarded as worthy of subfamily rank and may be separated by the following key:

KEY TO SUBFAMILIES OF MAZOCRAEIDAE

- 1.—Opisthaptor asymmetrical, with four large clamps on right side and a single small clamp corresponding to most distal of large clamps on left side; inner hooks of genital corona arranged in a circle Grubeinae new subfamily
Opisthaptor symmetrical, with four pairs of clamps; inner hooks of genital corona in two either transverse or vertical rows ... 2
- 2.—Inner hooks of genital corona in two transverse rows Mazocraeinae new subfamily
Inner hooks of genital corona in two vertical rows 3
- 3.—Vagina double Neomazocraeinae new subfamily
Vagina, if and when present, single 4
- 4.—Opisthaptor embracing area of gonads, either of testes or of both ovary and testes Mazocraeoidinae new subfamily
Opisthaptor terminal, not involving area of gonads 5
- 5.—With large ventral, sucker-like depression posterior to genital aperture; hook-bearing lappet of opisthaptor divided into two cone-like lobes Clupecotylineae new subfamily
Without ventral, sucker-like depression posterior to genital aperture; hook-bearing lappet of opisthaptor not divided
..... Kuhninae new subfamily

Mazocraeinae, new subfamily

Synonyms: Octocotylineae Braun, 1893; Octobothriidae Monticelli, 1903.

Diagnosis: Opisthaptor terminal, more or less triangular; clamps four pairs, equal or unequal in size; anchors two or three pairs, dissimilar. Genital corona with two kinds of hooks, one pair of laterals with outwardly directed tips and several pairs of inner hooks arranged in two transverse rows, with medially directed tips. Vagina present or (?) absent, opening dorsally. Other characters as for family.

Type genus: *Mazocraes* Hermann, 1782.

As presently conceived, this subfamily contains three genera, one of questionable validity, which may be separated as follows:

KEY TO GENERA OF MAZOCRAEINAE

- 1.—Opisthoptoral clamps not uniform, anterior pair larger than others *Pseudanthocotyloides* Price
- Opisthohaptoral clamps uniform in size 2
- 2.—Opisthohaptor with terminal lappet bearing two pairs of minute suckers in addition to anchors *Ophicotyle* Beneden and Hesse
- Opisthohaptor without suckers on terminal, hook-bearing lappet *Mazocraes* Hermann

Genus *Mazocraes* Hermann, 1782

Synonyms: *Octobothrium* Leuckart, 1827; *Octostoma* Kuhn, 1829, not Otto, 1823; *Octocotyle* Diesing, 1850; *Octoplectanum* Diesing, 1858; *Octobothrium* (*Octocotyle*) Saint-Remy, 1891; *Glossocotyle* Beneden and Hesse, 1863.¹

Diagnosis: Opisthohaptor lobe-like, bearing four pairs of clamps of the mazocraeid type, and with terminal lappet bearing two or three pairs of dissimilar anchors, outermost or large anchors with bifid roots and recurved tips. Genital corona with two lateral large hooks and an anterior and posterior transverse row of about four hooks each. Testis deeply lobed or divided into indistinct follicles, postovarial. Ovary U-shaped, pretesticular Vitelline follicles extending into opisthohaptor. Vagina present, opening dorsally in median line posterior to intestinal bifurcation. Eggs usually with filament at each pole.

Type species: *Mazocraes alosae* Hermann, 1782, from *Clupea alosa*, *Alosa finta*, *Caspialosa kessleri*, *C. kessleri volgensis*, and *C. caspia*.

Included species: *Mazocraes harengi* (Beneden and Hesse, 1863) Nicoll, 1915, from *Clupea harengus*; *M. heterocotyle* (Beneden, 1870) Sproston, 1946 (sp. inq.), from *C. sprattus*; *M. pilchardi* (Beneden and Hesse, 1863) Sproston, 1946, from *C. pilchardus*; *M. tripathii* n. n., from *M. orientalis* Tripathi, 1959, not Chauhan, 1950,² from *Dussumiera acuta*; *M. vilelai* Tendeiro and Valdez, 1955, from "*Alosa alosa*"; and *M. gonialosae* Tripathi, 1959, from *Gonialosa manmina*.

None of the species listed above has, so far, been reported from North American hosts.

¹ See discussion of *Mazocraes* and *Glossocotyle* by Sproston (1946).

² The new name *Mazocraes tripathii* is here proposed for the species described by Tripathi (1959) as *M. orientalis* Chauhan, 1950. The description and figures given by Chauhan (1950) for his *M. orientalis* are not detailed but assuming the correctness of the arrangement of the genital hooks it must be referred to the genus *Kuhnia*, and becomes *K. orientalis* (Chauhan, 1950) new combination. The species reported as *M. orientalis* Chauhan is, according to the arrangement of the genital hooks, a species of *Mazocraes* and *M. orientalis* Tripathi, not Chauhan, becomes a homonym of *M. orientalis* Chauhan (= *Kuhnia orientalis* Chauhan).

Genus *Ophicotyle* Beneden and Hesse, 1863

Diagnosis: Opisthohaptor elongate, bearing four pairs of equal clamps and with a terminal lappet provided with two pairs of minute suckers and two pairs of anchors. Genital hooks as in *Mazocraes*.

Type species: *Ophicotyle fintae* Beneden and Hesse, 1863, from *Alosa fintae*.

This genus is closely related to *Mazocraes* Hermann and is represented by only the type species; it is of questionable validity. The minute accessory suckers on the terminal lappet of the opisthohaptor may eventually be shown to be artifacts in which case the genus should be suppressed as a synonym of *Mazocraes*.

Genus *Pseudanthocotyloides* Price, 1959

Diagnosis: Anterior pair of opisthohaptoral clamps much larger than posterior three pairs. Vagina (?) absent. Egg with filament at posterior pole. Genital hooks and other characters as in *Mazocraes*.

Type species: *Pseudanthocotyloides banghami* Price, 1959.

Inasmuch as the type and only species of this genus was originally described briefly in abstract (Price, 1959), a more detailed account is given below.

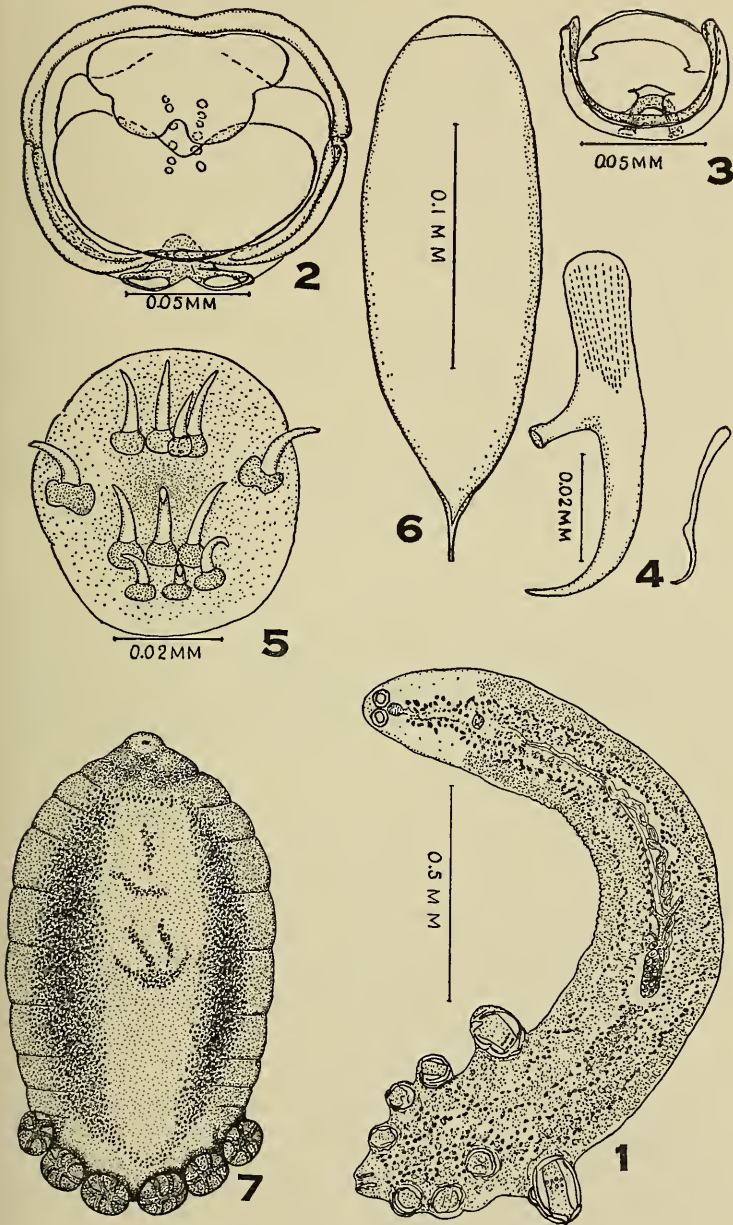
Pseudanthocotyloides banghami Price, 1959

Figs. 1-6

Description: Body elongate to clavate, 1.4 to 3.5 mm long by 0.3 to 0.5 mm wide. Prohaptoral suckers circular, 0.040 to 0.060 mm in diameter. Opisthohaptor consisting of four pairs of mazocraeid clamps, occupying approximately 0.5 mm of total body length; clamps of anterior pair largest, 0.12 to 0.14, second pair 0.08 to 0.09, third pair 0.07, and fourth and most distal pair 0.06 mm in diameter, respectively; opisthohaptoral anchors two pairs, outer 0.060 to 0.068 mm long, inner pair 0.020 to 0.024 mm long, and a flask-shaped intermediate hook guard about 0.010 mm long between large and small anchors. Pharynx oval, about 0.060 mm long by 0.036 to 0.040 mm wide; esophagus about 0.45 mm long in extended specimens, heavily pigmented; intestinal branches extending into opisthohaptor to about level of distal pair of clamps, provided with short medial and longer lateral, branched, heavily pigmented diverticula. Genital aperture about 0.12 mm distal to base of pharynx; genital corona consisting of a pair of lateral hooks each about 0.014 mm long and two transverse rows of inner hooks each about 0.014 mm long; hooks of anterior transverse row four in number, staggered, those of poste-

FIGS. 1-6. *Pseudanthocotyloides banghami*. 1.—holotype, ventral view; 2.—opisthohaptoral clamp of anterior pair; 3.—clamp of posterior pair; 4.—opisthohaptoral anchors; 5.—genital corona; 6.—egg.

FIG. 7. *Plectanocotyle elliptica*. Complete worm, ventral view. From Diesing, 1858.



rior row six in number, actually two alternating rows of three hooks each. Testicular arrangement not ascertainable because obscured by vitelline follicles; vas deferens convoluted, in median field. Ovary U-shaped, with left limb about twice as long as right, in equatorial zone; genito-intestinal canal opening into right intestinal branch about level of distal pole of ovary; vitelline follicles extending from about level of genital aperture to level of distal pair of opisthohaptoral clamps, obscuring greater part of internal organs. Vagina not observed. Uterus thick-walled. Egg oval, about 0.2 mm long by 0.07 mm wide, with long, slender filament at posterior pole.

Host: *Dorosoma cepedianum*.

Location: Gills.

Distribution: United States (Reelfoot and Norris lakes, Tennessee, and Guntersville Lake, Alabama).

Specimens: USNM Helm. Coll. no. 37716 (holotype), 37717-37718 (paratypes) and 37719.

The above description is based on a study of eight specimens, as follows: five collected in 1938 at Norris Lake, Tennessee, and two collected in 1939 at Reelfoot Lake, Tennessee, by Ralph G. Bangham, and one from a gizzard shad caught in 1959 at Guntersville, Alabama, by Harold S. Strickland.

Kuhniinae, new subfamily

Diagnosis: Opisthohaptor terminal, cordate or linguiform, bearing four pairs of equal or unequal clamps of mazocraeid type and two pairs of anchors; outermost anchors relatively large. Hooks of genital corona of two types, one pair of outwardly directed laterals each arising from a reniform muscular pad, and two vertical rows of smaller inwardly directed hooks. Vagina present or (?) absent. Other characters as given for family.

Type genus: *Kuhnia* Sproston, 1945.

Three genera are included in this subfamily and may be separated by the following key:

KEY TO GENERA OF KUHNIINAE

- 1.—Genital hooks of vertical rows of two types .. *Paramazocraes* Tripathi
Genital hooks of vertical rows of one type .. 2
- 2.—Opisthohaptoral clamps of anterior pair larger than those of other pairs *Pseudanthocotyle* Bychowsky and Nagibina
Opisthohaptoral clamps of uniform size *Kuhnia* Sproston

Genus *Kuhnia* Sproston, 1945

Synonyms: *Octobothrium* Leuckart, 1827, in part; *Octocotyle* Diesing, 1850, in part; *Octoplectanum* Diesing, 1858, in part; *Mazocraes* Hermann, 1782, in part.

Diagnosis: Opisthohaptor cordate to linguiform, bearing four pairs of more or less equal-sized clamps of mazocraeid type, and with two, sometimes three, pairs of anchors. Median hooks of genital corona of

one kind, arranged in vertical rows. Vitelline follicles rarely entering opisthohaptoral area. Vagina absent.

Type species: Kuhnia scombri (Kuhn, 1829) Sproston, 1945, from *Scomber scombrus*, *S. japonicus*, and *S. kanagunta*.

*Included species:*³ *Kuhnia brevoortia* Hargis, 1955, from *Brevoortia partonus*; *K. macracantha* (Meserve, 1938) Sproston, 1946, from unidentified species of mackerel; *K. minor* (Goto, 1894) Sproston, 1946, from *Scomber japonicus* (= *S. colias*); *K. indica* Tripathi, 1959, from *Cybbium guttatus*; *K. orientalis* (Chauhan, 1950) new combination, from *Dussumeria* sp.; *K. singaporensis* new species, from "Ikan Trubot"; *K. sprostonae* new name (synonym: *K. minor* Sproston, 1945, not Goto, 1894),⁴ from *Scomber scombrus*; and *K. thunni* (Ishii, in Ishii and Sawada, 1938) Sproston, 1946 (synonym: *Dactylocotyle minor* Ishii, 1936),⁵ from *Thunnus orientalis*.

In addition to a consideration of *K. scombri* and *K. brevoortia*, the only members of the genus so far reported from American hosts, a description of an apparently new exotic species is included.

Kuhnia scombri (Kuhn, 1829) Sproston, 1945

Figs. 8-14

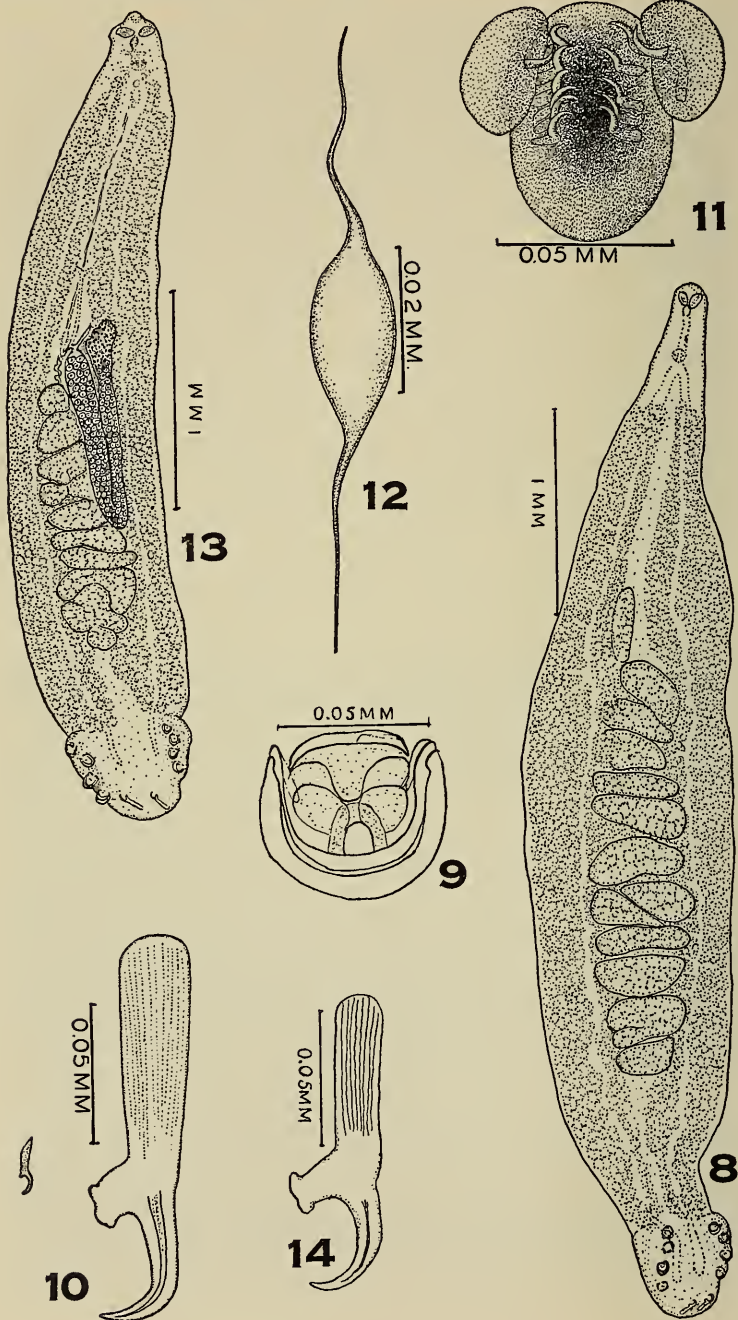
Synonyms: Octostoma scombri Kuhn, 1929; *Octobothrium scombri* (Kuhn, 1829) Nordmann, 1832; *Octocotyle scombri* (Kuhn, 1829) Bene-

³ *Kuhnia otolithis*, which was described by Yamaguti (1953), has been transferred by Hargis (1955) to the genus *Tagia* Sproston which he placed in the family Discocotylidae, since the type of opisthohaptoral clamps and the type and arrangement of the genital hooks eliminated it from the genus *Kuhnia*. Tripathi (1959) was in agreement with Hargis in eliminating this species from the genus *Kuhnia*, but believed that it "belongs to Diclidophoridae as suggested by its genital coronet and the asymmetrical advanced clamp structure."

Kuhnia brami (Parona and Perugia, 1896) Sproston, 1946 has been shown by Bychowsky (1957) to belong to the genus *Winkenthughesia* Price and, accordingly, is referable to the family Gastrocotylidae.

⁴ *Kuhnia minor* (Goto) of Sproston (1945) which she reported from *Scomber scombrus* in the English Channel area, on the basis of shape of the large anchors, cannot be the same as the species described by Goto (1894) under that name from *Scomber colias* (= *S. japonicus*). The large anchors described and figured by Sproston for the species which she regarded as *K. minor* are "Slender and wholly solid with thin U-shaped hook and spur about midlength. The shaft is ridged." The corresponding anchors of Goto's species have short, wide shafts which are not ridged. There are also differences in the number and arrangement of the hooks of the genital corona. In view of these differences, the writer proposes for *Kuhnia minor*, Sproston, 1945 (not Goto) the name *Kuhnia sprostonae* new name.

⁵ *Kuhnia thunni* (Ishii, in Ishii and Sawada, 1938) Sproston, 1946, is properly allocated to *Kuhnia* Sproston. The writer (Price, 1943) noted that "*Dactylocotyle minor* Ishii (1936) renamed *D. thunni* Ishii, in Ishii and Sawada (1938), does not belong to the genus *Dactylocotyle* (= *Diclidophora*) but is a species of *Mazocraes*." This statement was based on an examination of a paratype specimen kindly supplied by Prof. Ishii. The specimen was not in the best of condition, but was sufficiently good to show its generic affinities. Figs. 15-18 of Ishii's specimen are included herein for comparison with other species of *Kuhnia*. The allocation of this species to *Mazocraes* was made before Sproston (1945) had established the genus *Kuhnia*.



den and Hesse, 1864; *O. truncata* Diesing, 1850; *O. major* Goto, 1894; *Octoplectanum truncatum* (Diesing, 1850) Diesing, 1858; *Kuhnia major* Yamaguti, 1953.

Description: Body lanceolate, 3.5 to 4.9 mm long by 0.68 to 1 mm wide. Prohaptor suckers 0.057 to 0.068 mm wide. Opisthaptor linguiform, 0.43 to 0.51 mm long by 0.30 to 0.51 mm wide, set off from body proper by slight constriction, bearing four pairs of clamps arranged in two more or less parallel rows and with two pairs of anchors near tip; clamps of mazocraeid type, 0.057 to 0.064 mm wide; lateral anchors 0.095 to 0.1 mm long, median anchors about 0.020 mm long. Oral aperture slightly subterminal; pharynx oval, 0.057 mm long by 0.040 mm wide; esophagus about 0.3 to 0.5 mm long; intestinal branches with numerous median and longer, branched lateral diverticula, terminating at or near level of most distal pair of opisthaptor clamps. Genital aperture median, 0.20 to 0.60 mm from anterior end of body. Genital corona consisting of five to six pairs of inner hooks arranged in two vertical rows, and a pair of somewhat larger lateral hooks which arise from kidney-shaped pads; inner hooks about 0.018 mm long, outer or lateral hooks about 0.030 mm long. Testes about 10 to 12 in number, median and largely postovarial. Ovary U-shaped, occupying anteriormost portion of testicular field. Genito-intestinal canal opening into right intestinal limb about level of proximal end of ovary. Vitelline follicles numerous, extending from shortly posterior to genital aperture to anterior margin of opisthaptor. Eggs about 0.28 mm long by 0.18 mm wide, with polar prolongations about 0.32 mm long.

Hosts: *Scomber scombrus* and *Pomatomus saltatrix*.

Location: Gills.

Distribution: Europe, Asia and North America (Canada; United States: Baltimore, Maryland; Woods Hole, Massachusetts; Newport, Rhode Island; and New York, New York).

Specimens: USNM Helm. Coll. no. 35615 (four specimens, *Scomber scombrus*, Baltimore, Maryland, 10 May 1909); 35616 (one specimen, *S. scombrus*, New York Aquarium, 1911); 35617 (one specimen, *Pomatomus saltatrix*, New York Aquarium, 2 April 1912); 35618 (four specimens, *S. scombrus*, Woods Hole, Massachusetts, 23 July 1920); 35619 (one specimen, *S. scombrus*, New York Aquarium, 17 June 1915); 35620 (four specimens, *S. scombrus*, Baltimore, Maryland, 30 April 1927); and 35621 (six specimens, *S. scombrus*, Baltimore, Maryland, 10 October 1927). All of these specimens were collected by G. A. MacCallum.

Most of the specimens available were not in the best of condition,

FIGS. 8-14. *Kuhnia scombri*. 8.—complete worm, male phase; 9.—opisthaptor clamp; 10.—opisthaptor anchors; 11.—genital corona; 12.—egg; 13.—complete worm, dorsal view—British specimen supplied by Hon. Miriam Rothschild; 14.—large opisthaptor anchor from British specimen.

showing evidence of considerable abuse in technique of preserving and staining. All of the specimens were in or approaching the male sex phase, as described by Sproston (1945), since the ovary showed varying degrees of atrophy. In general the specimens agreed in all essentials with those described by Parona and Perugia (1889), Goto (1894, 1899), Layman (1930), and Sproston (1945).

Kuhnia brevoortia Hargis, 1955

Fig. 19

Description: See Hargis (1955).

Host: *Brevoortia patronus*.

Location: Gills.

Distribution: United States (Alligator Harbor, Florida).

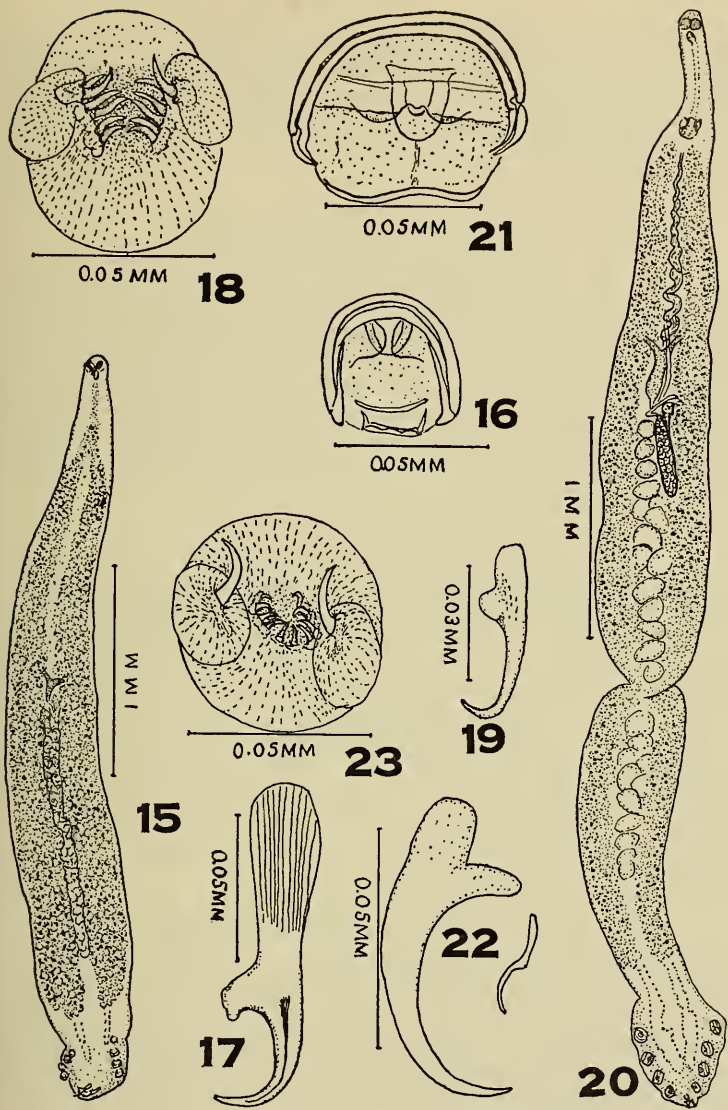
Specimen: USNM Helm. Coll. no. 37491 (holotype).

The description given by Hargis (1955a) is adequate except for the number of spines in the genital corona. An examination of the holotype specimen shows that there are twelve inner hooks or spines instead of eleven as given by Hargis. The arrangement of these hooks is similar to that described for *K. minor* (Goto), and for the species described later on in this paper as *K. singaporensis*, in that the two vertical rows converge posteriorly to form a semicircle. The large opisthohaptoral anchors are probably similar to those of the above mentioned species rather than to those of the other species of *Kuhnia*, but this cannot be determined with certainty because they are not in a position to be observed laterally.

Kuhnia singaporensis, new species

Figs. 20-23

Description: Body elongate, slender, 3.25 to 5 mm long by 0.4 to 0.5 mm wide. Prohaptoral suckers cup-like, about 0.050 mm in diameter. Opisthohaptor somewhat triangular, 0.4 to 0.5 mm long by 0.3 to 0.5 mm wide, bearing four pairs of mazocraeid-type clamps in convergent rows; clamps of anterior three pairs 0.054 to 0.060 mm long by 0.072 to 0.080 mm wide, those of posterior pair slightly smaller, 0.050 to 0.055 mm long by 0.063 to 0.070 mm wide; anchors two pairs, those of outer pair about 0.045 to 0.050 mm long with long, curved blade and short, solid roots and those of inner pair about 0.014 to 0.018 mm long. Oral aperture subterminal; pharynx oval, 0.023 mm long by 0.018 mm wide; esophagus about 0.6 mm long; intestine apparently as in other species, terminating at about level of third pair of opisthohaptoral clamps. Genital aperture immediately anterior to esophageal bifurcation. Genital corona consisting of five pairs of inner hooks arranged in converging vertical rows, forming an ill-defined semicircle, and a larger pair with outwardly directed tips; hooks of inner circle about 0.018 mm long, those of outer pair about 0.024 mm long, including roots. Vas deferens convoluted and distended with sperm. Testes indistinctly follicular, about 20 or more, extending in median field from level of anterior pole of ovary to about one-fifth of body length from posterior end. Ovary U-shaped, to right of median



FIGS. 15-18. *Kuhnia thunni*. 15.—complete worm, ventral view; 16.—opisthohaptoral clamp; 17.—large opisthohaptoral anchor; 18.—genital corona.

FIG. 19. *Kuhnia brevoortia*. Large opisthohaptoral anchor.

FIGS. 20-23. *Kuhnia singaporensis*. 20.—complete worm, twisted specimen; 21.—opisthohaptoral clamp; 22.—opisthohaptoral anchors; 23.—genital corona.

line. Genito-intestinal canal opening into right intestinal branch about level of anterior tip of ovary. Vitelline reservoir Y-shaped, preovarial; vitelline follicles extending from esophageal bifurcation to a short distance anterior to opisthohaptor. No eggs present.

Host: "Ikan Trubot."

Location: Gills.

Distribution: Asia (Singapore).

Specimens: USNM Helm. Coll. no. 36302 (syntypes).

This species is based on three specimens on a slide from the collection of the late G. A. MacCallum. They were presumably collected by his son, the late W. G. MacCallum, at Singapore, 20 July 1916. *Kuhnia singaporensis* resembles *K. minor* (Goto) and *K. brevoortia* Hargis more closely than any of the other species of the genus. It differs from *K. minor* particularly in having the opisthohaptor distinctly set off from the body and in not having the vitellaria extending into the haptoral area; in this respect it resembles *K. brevoortia*. The large anchors, on the other hand, are of the same type as those of *K. minor*, and different from those of the other species except possibly *K. brevoortia*.

Genus *Paramazocraes* Tripathi, 1959

Diagnosis: Opisthohaptor with clamps unequal in size, of mazocraeid type, with long, thin terminal lappet bearing three pairs of anchors. Genital corona with a pair of lateral hooks and four pairs of inner hooks, the latter dissimilar and in vertical rows, anterior two pairs sickle-like and posterior two pairs palmate. Vitelline follicles entering opisthohaptor. Vagina single, opening dorsally and medially.

Type species: *Paramazocraes thrissocles* Tripathi, 1959, from *Thrissocles mystax*.

Included species: *Paramazocraes phasae* Tripathi, 1959, from *Setipinna phasa*.

Both species of *Paramazocraes* are parasites of Indian fishes and will not be considered further in this paper.

Genus *Pseudanthocotyle* Bychowsky and Nagibina, 1954

Synonym: *Indomazocraes* Tripathi, 1959.

Diagnosis: Opisthohaptor with unequal clamps, anterior pair much larger than posterior three pairs, all of mazocraeid type, and with three pairs of anchors, those of outer pair much larger than inner pairs. Genital corona similar to that of *Kuhnia*. Vitelline follicles not entering opisthohaptor. Vagina apparently absent.

Type species: *Pseudanthocotyle pavlovskiyi* Bychowsky and Nagibina, 1954, from *Scomber canagurta*.

Included species: *Pseudanthocotyle jagannath* (Tripathi, 1959) new combination (synonym: *Indomazocraes jagannath* Tripathi, 1959), from *Rastrelliger kanagurata*.

As no representative of this genus has been reported from North American hosts, it will not be considered further.

esmarkii (T. Scott, 1901) new combination,⁶ from *Gadus esmarkii* Niels. Of these, *M. georgei*, *M. hargisi*, *M. olentangiensis*, *M. opisthonema* and *M. tennesseensis* occur on North American hosts.

Mazocraeoides georgei Price, 1936

Figs. 24-27

Description: Body clavate to oval, 1.5 to 2.2 mm long by 0.34 to 0.76 mm wide. Prohaptor in form of a pair of suckers, 0.026 to 0.030 mm, opening into oral cavity. Opisthohaptor consisting of four pairs of clamps, ventrolateral, sessile or slightly pedunculated, occupying zone of testis and ovary, and of a small terminal lappet bearing three pairs of anchors. Clamps of open mazocraeid type, about 0.040 mm in length and width. Anchors of outer pair 0.060 to 0.065 mm long, those of intermediate pair about 0.012 mm long, and those of inner pair about 0.015 mm long. Oral aperture slightly subterminal; pharynx oval, 0.050 to 0.053 mm long by 0.026 to 0.030 mm wide; remainder of digestive system obscured by vitelline follicles. Genital aperture 0.14 to 0.21 mm from anterior end. Genital corona consisting of five to six pairs of inner hooks arranged in two vertical rows and one pair of lateral hooks, each situated on a reniform pad; hooks of inner rows about 0.009 to 0.010 mm long, outer hooks 0.010 to 0.014 mm long. Testis elongate, deeply lobed, in posterior third of body. Ovary U-shaped, to right of testis. Genito-intestinal canal strongly developed, curving around proximal tip of ovary and entering right intestinal limb near level of distal pole of ovary. Vitelline reservoir somewhat triangular to Y-shaped, lying largely in zone of proximal portion of ovary. Vaginal aperture dorsal, median, about 0.3 to 0.4 mm from anterior end. Vitelline follicles dense, extending from a short distance distal to genital aperture to posterior end of body, almost completely obscuring internal structures in most specimens. Egg about 0.23 mm by 0.068 mm, with polar prolongations of variable lengths.

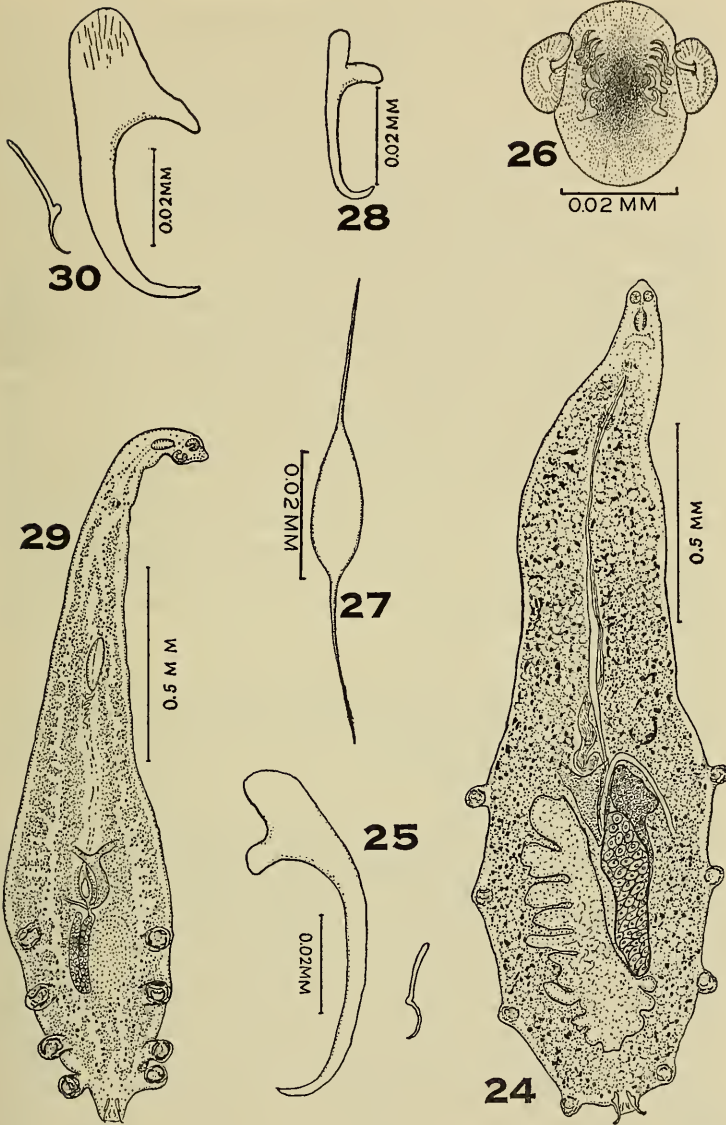
Hosts: *Pomolobus pseudoharengus*, *P. mediocris*, and *Clupea harengus*.

Location: Gills.

Distribution: United States (Woods Hole, Massachusetts).

Specimens: USNM Helm. Coll. no. 8159 (nine specimens, *Pomolobus pseudoharengus*, 11 August 1908); 35079 (nine specimens, *P. pseudoharengus*, 29 July 1913); 35623 (syntypes) (seven specimens, *P. pseudoharengus*, 7 July 1913); 35624 (five specimens, *P. pseudoharengus*, 30

⁶ The inclusion of *M. esmarkii* in the genus *Mazocraeoides* is questionable, since it was reported from a host other than that customarily parasitized by species of *Mazocraeidae*. The species in question was briefly described as *Octobothrium* (?) *esmarkii* by T. Scott (1901) from "the gills of a specimen of *Gadus esmarkii* Nilss., captured about sixty miles to the southeastward of Sumburgh Head, Shetland." The size given—scarcely 4 mm in length and about 2 mm in width—is considerably greater than for other species of *Mazocraeoides*. In spite of its host relationship, the brief description and figure seem to indicate its inclusion in this genus. It can hardly belong in the genus *Diclidophora*, in spite of its host, as Sproston (1946) suggests.



FIGS. 24-27. *Mazocraeoides georgei*. 24.—complete worm, dorsal view; 25.—opisthohaptor anchors; 26.—genital corona; 27.—egg.

FIG. 28. *Mazocraeoides opisthonema*. Large opisthohaptor anchor.

FIGS. 29-30. *Mazocraeoides olentangiensis*. 29.—complete specimen, greatly extended; 30.—opisthohaptor anchors.

July 1912); 35625 (one specimen, *Clupea harengus*, 27 July 1913); 35626 (one specimen, *P. pseudoharengus*, 13 July 1922); and 35627 (nine specimens, *C. harengus*, 15 July 1924). Of these, those listed as 8159 were collected by Edwin Linton and all others were by G. A. MacCallum. The record from the hickory shad, *P. mediocris*, is based on Linton's (1940) record of one specimen having been collected from this host at Woods Hole, Massachusetts, 20 August 1910.

Most of the specimens available, with the exception of nos. 8159 and 35623, were in rather poor condition, having been excessively flattened or otherwise mistreated during preservation.

This species was originally described (Price, 1936) briefly as the type of a monotypic genus and the characters given were largely generic. Linton (1940) redescribed the species in greater detail and, subsequently, Hargis (1955a) gave a description of it based on a part of the original specimens (USNM Helm. Coll. no. 35623) from the MacCallum Collection (not Linton's as stated). This description was as accurate as the condition of the specimens would permit except for the number of hooks in the genital corona. He stated that there were "three pairs of dorsally curved spines" but actually there are five to six pairs. Hargis also pointed out that the eggs were variable in shape, some with filaments at both ends, others with none. This statement is correct. However, it appears reasonably obvious from a study of the eggs that those without filaments were abnormally developed, the filaments being represented by small, button-like knobs at the poles.

***Mazocraeoides hargisi*, new species**

Synonym: *Mazocraeoides georgei*, of Hargis, 1955, not Price, 1936.

Description: See Hargis (1955).

Host: *Brevoortia patronus*.

Location: Gills.

Distribution: United States (Alligator Harbor, Florida).

Hargis (1955) gave two descriptions of *Mazocraeoides georgei* Price, one based on specimens from the MacCallum collection and the other on material which he collected from Gulf Menhaden in Florida. In the paper mentioned, and also later, Hargis (1955b, 1959) pointed out that the specimens differed noticeably and consistently from those from *Promolobus* spp. However, "he did not wish to mix the two groups because specific separation might later be necessary." While the present writer has not been able to secure Hargis' material for study, a comparison of his description with specimens of *M. georgei* from the MacCallum collection showed that the two forms are unquestionably similar. However, since the measurements, particularly of the anchors and other hard parts, show considerable differences, in addition to differences in hosts, it seems preferable to regard the form from *Brevoortia patronus* as distinct from *M. georgei* and propose for it the name *Mazocraeoides hargisi* new species.

Mazocraeoides opisthonema Hargis, 1955

Fig. 28

Description: See Hargis (1955).

Host: *Opisthonema oglinum*.

Location: Gills.

Distribution: United States (Tampa Bay, Florida).

Specimen: USNM Helm. Coll. no. 37490 (holotype).

The description of this species as given by Hargis (1955b) appears to be as accurate as the condition of the specimen permits. An examination of the holotype specimen showed it to be somewhat mutilated, apparently due to excessive pressure during mounting, and was not well stained differentially. Aside from the features mentioned by Hargis, the small size of the opisthohaptor anchors appears to be distinctive.

Mazocraeoides olentangiensis Sroufe, 1958

Figs. 29–30

Synonyms: *Mazocraeoides similis* Price, 1959; (?) *Mazocraes cepedianum* Kimpel, 1938 (nomen nudum).

Description: See Sroufe (1958).

Host: *Dorosoma cepedianum*.

Location: Gills.

Distribution: United States (Ohio, Tennessee, Alabama and (?) Illinois).

Specimens: USNM Helm. Coll. nos. 38339 (holotype) and 38340 (paratypes)—collected by Stanley A. Sroufe, Jr., from Olentangy River near Columbus, Ohio; 37711 and 37712—collected by Ralph G. Bangham from Norris and Reelfoot Lakes, Tennessee, respectively; and 37713—collected by E. W. Price from Tennessee River at Guntersville, Alabama.

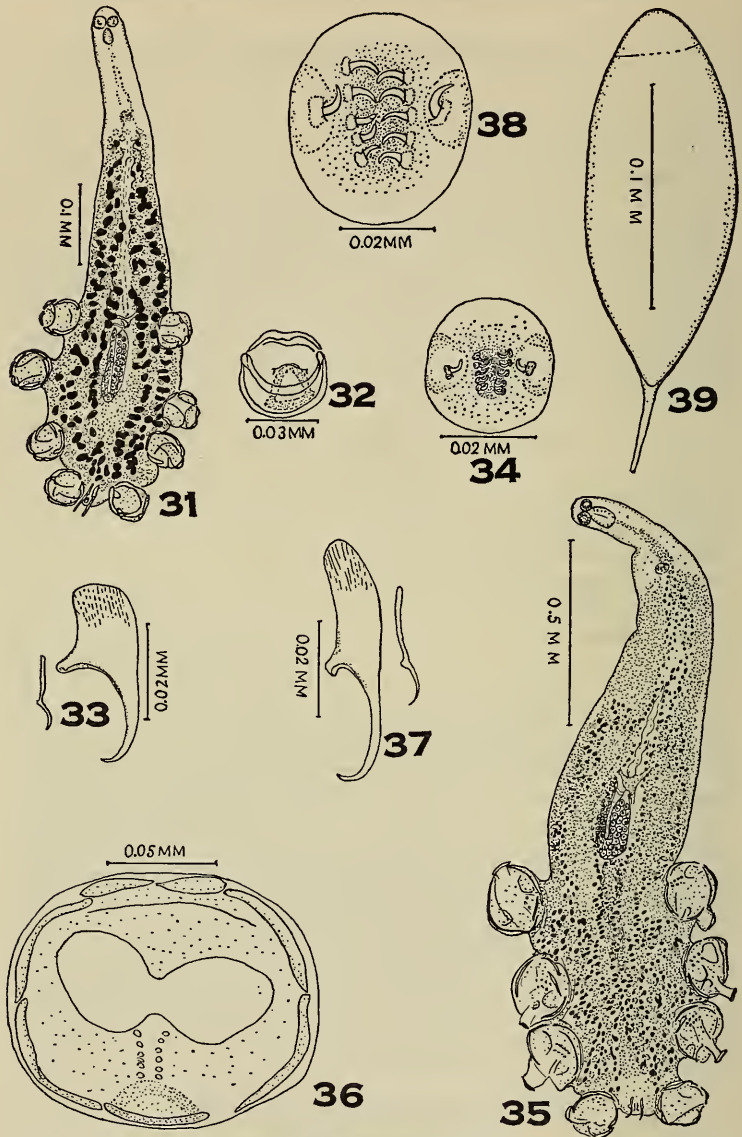
A study of the specimens listed above shows that Sroufe's (1958) description is adequate and need not be repeated here. The species, aside from host relationship and other differences listed by Sroufe, may easily be distinguished from *Mazocraeoides georgei* in the absence of a vaginal opening and in the morphology of the large anchors.

The inclusion in the synonymy of *Mazocraes capedianum* Kimpel (1938) is questionable since there are at present at least four species of mazocraeids known from that host. However, since *M. olentangiensis* is the species commonly found on that host, it appears more than likely this was the form Kimpel had before him.

Mazocraeoides tennesseensis, new species

Figs. 31–34

Description: Body clavate, 0.38 to 0.67 mm long by 0.1 to 0.3 mm wide in haptor region. Prohaptor suckers circular, about 0.016 mm in diameter. Opisthohaptor consisting of four pairs of open type mazo-craeid clamps, situated along body margins and embracing greater portion of posterior half of body, and two pairs of terminal anchors; clamps



FIGS. 31-34. *Mazocraeoides tenesseensis*. 31.—complete worm, ventral view; 32.—opisthohaptoral clamp; 33.—opisthohaptoral anchors; 34.—genital corona.

FIGS. 35-39. *Pseudomazocraeoides megalocotyle*. 35.—complete worm, ventral view; 36.—opisthohaptoral clamp; 37.—opisthohaptoral anchors; 38.—genital corona; 39.—egg.

approximately uniform, about 0.040 to 0.048 mm wide; outer anchors 0.040 to 0.044 mm long, inner about 0.018 to 0.020 mm long. Pharynx oval, about 0.020 mm long by 0.016 mm wide. Esophagus about 0.16 mm long; intestine similar to that of other mazocraeids, containing numerous large masses of dark granules. Genital aperture prefurcal, about 0.13 mm from anterior end of body. Genital corona consisting of two vertical rows of inner hooks, five to each row, and a pair of outer hooks; inner hooks about 0.005 to 0.006 mm long, outer hooks about 0.010 mm long. Testis apparently unlobed, posterolateral to ovary. Ovary U-shaped, occupying zone roughly representing that of the anterior two pairs of opisthohaptoral clamps. Genito-intestinal canal present, opening into right intestinal branch slightly anterior to level of ovarian poles. Vitelline reservoir Y-shaped, preovarial. Vitelline follicles extending from slightly distal to genital aperture to posterior end of body. Vagina not observed. Egg oval, 0.170 to 0.175 mm long by 0.065 to 0.075 mm wide, provided with relatively long posterior filament.

Host: *Dorosoma cepedianum*.

Location: Gills.

Distribution: United States (Reelfoot Lake, Tennessee).

Specimens: USNM Helm. Coll. no. 37714 (syntypes).

The above description is based on 16 specimens collected in 1941 from gizzard shad caught in Reelfoot Lake by Ralph G. Bangham. This species is distinct from all other members of the genus in the relatively large opisthohaptoral clamps in comparison with body size, in size and shape of anchors, and in the heavily pigmented intestinal tract.

***Pseudomazocraeoides*, new genus**

Synonym: *Mazocraeoides* Price, 1936, in part.

Diagnosis: Opisthohaptoral clamps relatively large, open, of mazocraeid type, embracing zone of testes only. Vagina (?) absent.

Type species: *Pseudomazocraeoides megalocotyle* (Price, 1959) new combination.

Pseudomazocraeoides megalocotyle (Price, 1959)

Figs. 35-39

Synonym: *Mazocraeoides megalocotyle* Price, 1959.

Description: Body clavate, 1.6 to 1.75 mm long by 0.34 to 0.40 mm wide in opisthohaptoral region. Prohaptoral suckers circular, about 0.040 mm in diameter. Opisthohaptor consisting of four pairs of relatively large, slightly pedunculate, open, mazocraeid clamps situated along margins of body and occupying greater part of posterior third of body length; anterior three pairs of clamps 0.16 by 0.14 mm and posterior pair 0.12 mm in diameter; anchors consisting of an outer pair about 0.040 mm long and an inner pair about 0.020 mm long, situated on an indistinct lappet between posterior pair of clamps. Pharynx oval, about 0.070 mm long by 0.040 mm wide. Esophagus long, about one-third or more of total body length, heavily pigmented; intestine with numerous median

and lateral, heavily pigmented diverticula, extending to level of posterior pair of opisthohaptoral clamps. Genital aperture about 0.20 to 0.28 mm from anterior end of body. Genital corona of *Kuhnia* type, consisting of two vertical rows of five inwardly directed hooks each and a pair of lateral, outwardly curved, hooks; inner hooks about 0.012 mm long; outer hooks about 0.015 mm long. Testis apparently deeply lobed, median, in opisthohaptoral zone. Ovary U-shaped, in median field slightly anterior to level of proximal pair of opisthohaptoral clamps. Genito-intestinal canal opening into right intestinal limb at or near level of proximal pole of ovary. Vitelline reservoir Y-shaped, immediately pre-ovarial. Vitelline follicles numerous, extending from slightly distal to genital aperture almost to posterior end of body. Vagina not observed. Eggs not present in specimens available.

Host: Dorosoma cepedianum.

Location: Gills.

Distribution: United States (Reelfoot Lake, Tennessee).

Specimens: USNM Helm. Coll. no. 37715 (syntypes).

Clupecotylinae, new subfamily

Diagnosis: Opisthohaptor with four pairs of pedunculate, dorsoventrally reversed, mazocraeid clamps; terminal lappet bifid, each portion bearing an anchor. Esophagus about one-half length of body, with lateral diverticula. Intestine diverticulate, confluent distally. Genital corona of *Kuhnia* type. Oval, crater-like structure of unknown function on ventral side near anterior end of body.

Type genus: Clupecotyle Hargis, 1955.

This subfamily contains two genera which may be separated as follows:

KEY TO GENERA OF CLUPECOTYLINAE

- 1.—Opisthohaptoral clamps about equal in size *Clupecotyle* Hargis
Opisthohaptoral clamps unequal in size *Neoclupcotyle* new genus

Genus *Clupecotyle* Hargis, 1955

Diagnosis: Opisthohaptor provided with four pairs of pedunculate clamps of equal size. Vitelline follicles entering opisthohaptor. Other characters as for subfamily.

Type species: Clupecotyle brevoortia Hargis, 1955, from *Brevoortia patronus* and *B. tyrannus*.

Included species: Clupecotyle lintoni (Koratha, 1955) Hargis, 1959, from *Brevoortia gunteri*.

Clupecotyle brevoortia Hargis, 1955

Figs. 40–41

Synonym: Dactylocotyle sp. Linton, 1901.

Description: The description given by Hargis (1955) appears to be adequate and need not be repeated here.

Hosts: Brevoortia patronus and *B. tyrannus*.

Location: Gills.

Distribution: United States (Alligator Harbor, Florida; Woods Hole, Massachusetts; and Beaufort, North Carolina).

Specimens: USNM Helm. Coll. nos. 37492 (holotype) and 51569.

Four specimens of what appears to be this species were found in the collection of the late H. B. Ward (USNM no. 51569). These had been collected 1 July 1916 from *Brevoortia tyrannus* by A. R. Cooper at Woods Hole, Massachusetts. A comparison of these with the holotype and with Hargis' description indicated that they were identical. Cooper's specimens were on the whole slightly larger than those from Florida—2.7 to 4.7 mm long by 0.60 to 0.85 mm wide; anchors 0.057 to 0.066 mm long; egg 0.285 long by 0.067 mm wide and polar filaments about 0.20 mm long—but otherwise showed no significant differences. No connections with any structure that might be regarded as a vagina were observed with the oval ventral structure that Hargis reported as possibly being a vaginal aperture. The function of this structure is unknown, but the possibility that it may serve as a haptor or adhesive structure is suggested.

The occurrence of this parasite on *Brevoortia tyrannus* makes it almost certain that the specimen reported from that host by Linton (1905) from Beaufort, North Carolina, as *Dactylocotyle* sp. was *C. brevoortia* rather than *C. lintoni* Koratha, assuming that these species are actually distinct.

Clupecotyle lintoni (Koratha, 1955) Hargis, 1959

Fig. 42

Synonym: *Diclidophora lintoni* Koratha, 1955.

Description: See Koratha (1955).

Host: *Brevoortia gunteri*.

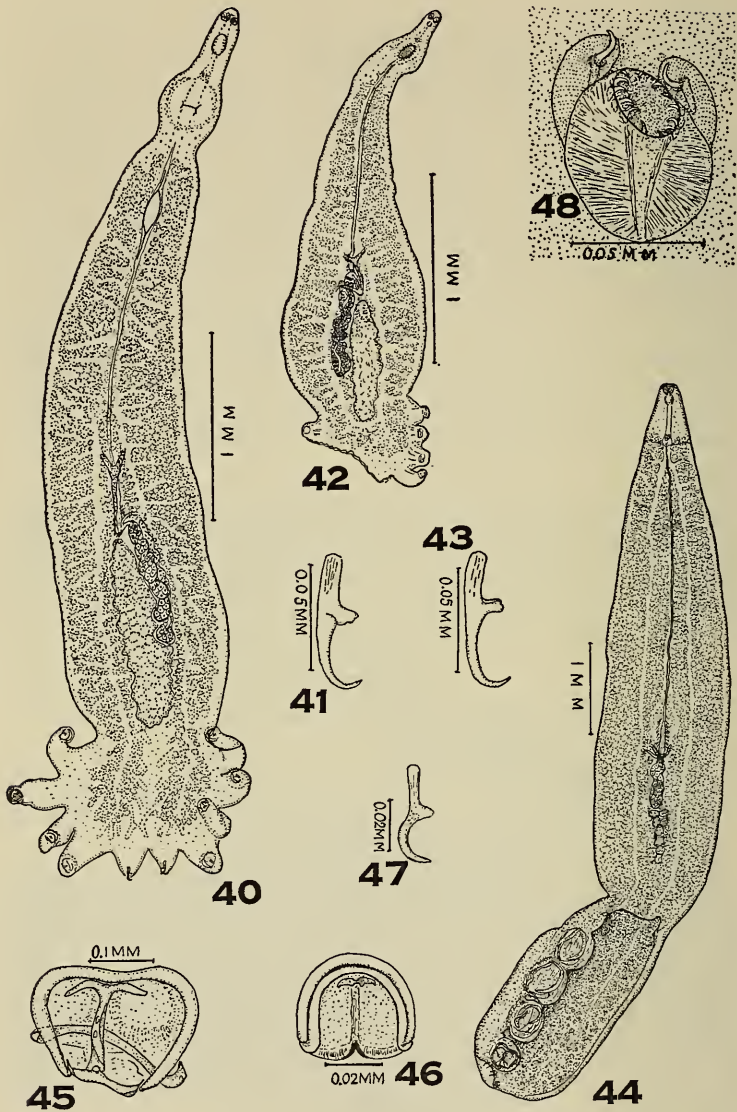
Location: Gills.

Distribution: United States (Port Aransas, Texas).

Specimen: USNM Helm. Coll. no. 54759 (holotype).

A study of the holotype shows that the description given by Koratha (1955) is about as complete as the condition of the specimen permits. In addition to mutilation of the opisthohaptor, the specimen is broken into three parts. It has the appearance of having been allowed to dry, causing it to become brittle and interfering with its ability to stain properly. The hooks of the genital coronet could not be made out with certainty but they appear similar to those of *C. brevoortia* Hargis. The structure near the genital aperture, which Koratha thought was "probably an egg," is the sucker-like ventral depression that Hargis regarded as the vaginal aperture in *C. brevoortia*.

There is little reason to believe that *C. lintoni* is distinct from *C. brevoortia* other than its somewhat smaller size and host. It is probable when an adequate study can be made from additional and better specimens that *C. lintoni* will be found to be a synonym of *C. brevoortia*, as Hargis (1959) suspects.



FIGS. 40-41. *Clupecotyle brevoortia*. 40.—complete worm, dorsal view, from *Brevoortia tyrannus*; 41.—opisthohaptoral anchor.

FIG. 42. *Clupecotyle lintoni*. Holotype, ventral view.

FIG. 43. *Neoclupcotyle megaconfibula*, opisthohaptoral anchor.

FIGS. 44-48. *Grubea pneumatophori*. 44.—holotype, ventral view;

Neoclupecotyle, new genus

Diagnosis: Anterior two pairs of opisthohaptoral clamps much larger than posterior two pairs. Vitelline follicles not extending into opisthohaptor. Other characters as for subfamily.

Type species: *Neoclupecotyle megaconfibula* (Hargis, 1955) new combination.

This genus differs from *Clupecotyle* mainly in the marked disparity in the size of the opisthohaptoral clamps. The validity of this character may be questioned by some workers but it can hardly be an aberrancy as Hargis (1955a) suggested, especially since the genera *Pseudanthocotyle* Bychowsky and Nagibina, 1954 (Kuhninae), *Pseudanthocotyloides* Price, 1960 (Mazocraeinae) and *Anthocotyle* Beneden and Hesse, 1863 (Anthocotylidae) were based largely on comparable characters. So far the genus contains only the type species.

Neoclupecotyle megaconfibula (Hargis, 1955)

Fig. 43

Synonym: *Clupecotyle megaconfibula* Hargis, 1955.

Description: The description given by Hargis (1955) is adequate and need not be repeated.

Host: *Brevoortia patronus*.

Location: Gills.

Distribution: United States (Alligator Harbor, Florida).

Specimen: USNM Helm. Coll. no. 37493 (holotype).

Grubeinae, new subfamily

Synonym: *Pleurocotylinae* Monticelli, 1903.

Diagnosis: Opisthohaptor asymmetrical, scoop-shaped, with four modified mazocraeid clamps in a vertical row along right margin and a single minute clamp on left side, comparable in position to most posterior of right clamps; terminal lappet armed with two pairs of dissimilar anchors. Genital corona consisting of a circle of inner hooks and a pair of lateral, outwardly curved hooks. Other characters as in Mazocraeidae.

Type genus: *Grubea* Diesing, 1858.

Genus *Grubea* Diesing, 1858

Synonyms: *Pleurocotyle* Gervais and Beneden, 1859; *Pleurocotylus* Gervais and Beneden, 1859.

Diagnosis: Characters of subfamily.

Type species: *Grubea cochlear* Diesing, 1858, from *Scomber scombrus* and *S. colias*.

Included species: *Grubea pneumatophori* new species from *Pneumatophorus grex*.

45.—large clamp from right side of opisthohaptor; 46.—small clamp from left side of opisthohaptor; 47.—large opisthohaptoral anchor; 48.—genital corona.

***Grubea pneumatophori*, new species**

Figs. 44-48

Synonym: Pleurocotyle scombri, of Linton, 1940, not Gervais and Beneden, 1859.

Description: Body 8.6 mm long by 1.5 mm wide; anterior part lanceolate, separated from scoop-shaped opisthohaptoral portion by slight constriction. Prohaptoral suckers oval, 0.096 mm long by 0.056 mm wide. Opisthohaptor concave, bearing a row of four clamps on right side and a minute clamp on left side opposite most distal of large clamps; first three of large clamps somewhat larger than most distal one but distorted so that measurements would be of little value; distal large clamp about 0.43 mm wide; small left clamp about 0.044 mm wide. Terminal lappet of opisthohaptor delicate, bearing two pairs of anchors, outermost about 0.040 mm long, innermost about 0.028 mm long. Oral aperture subterminal; pharynx oval, 0.09 mm long by 0.08 mm wide; esophagus bifurcating about 0.86 mm from anterior end; intestinal branches extending almost to end of body, with short median and longer, lateral dendritic diverticula. Genital aperture about 0.6 mm from anterior end of body; genital corona consisting of a circle of 13, possibly 14, inwardly curved hooks, about 0.02 mm long on a muscular bulb-like structure and two outwardly curved hooks, about 0.02 mm long, each on a muscular pad lateral to bulb. Testes relatively few, number not ascertainable, in median field, postovarial. Ovary U-shaped, in median field. Vitelline follicles occupying almost entire body from level of genital aperture to posterior end of opisthohaptor. Vagina double, openings dorsolateral and only slightly posterior to level of genital aperture. No eggs present.

Host: Pneumatophorus grex.

Location: Gills.

Distribution: United States (Woods Hole, Massachusetts).

Specimen: USNM Helm. Coll. no. 8160 (holotype).

This species was described by Linton (1940) as *Pleurocotyle scombri* (Gervais and van Beneden) from a single specimen, collected 9 August 1908, from the gills of a chub mackerel. The specimen was in fair condition but not well stained. It had also been abused during the process of fixing so that the opisthohaptoral clamps and genital corona were somewhat distorted.

That this species may be identical with the European *G. cochlear* Diesing (= *Pleurocotyle scombri* Gervais and Beneden, = *Octobothrium scombri* Grube, not Kuhn) cannot be denied. However, there are some differences such as size of opisthohaptoral clamps, number and arrangement of genital hooks, and host that suggest that the two species are distinct. The size of the large opisthohaptoral clamps are figured by European authors as equal in size whereas in the American species the most posterior clamp is distinctly smaller than the others. The genital hooks are given by Parona and Perugia (1890) as 16 of which the

laterals are strongest. Palombi (1949) gave the number as 13 and no laterals were mentioned. In the species considered herein there are 13, possibly 14, inner hooks arranged in a circle on a conspicuous muscular bulb and one pair of laterals, each situated on a distinct pad as in other mazocraeids.

Family Plectanocotylidae Poche, 1925

Synonym: Hexacotylidae Monticelli, 1899 (not based on any corresponding genus, hence invalid).

Diagnosis: Body elongate. Prohaptor in form of two suckers opening into oral cavity. Opisthohaptor provided with three to four pairs of clamps and a terminal hook-bearing lappet; ventral loop elements not fused medially; middle loop elements either not fused medially or united by a bow-shaped piece; center piece more or less scoop-shaped, suggesting that of mazocraeids; anchors two or three pairs, unequal and dissimilar, outer pair larger. Genital corona consisting either of a sheaf of slender spines or a cuticularized sheath-like structure. Testes numerous, either postovarial or both pre- and postovarial. Ovary U-shaped, with limbs directed posteriad. Vitelline follicles extending from near genital atrium to opisthohaptor. Genito-intestinal canal present. Vagina absent.

Type genus: *Plectanocotyle* Diesing, 1850.

This family contains at present only two genera. These differ in the number of opisthohaptoral clamps and in other characters of equivalent value to those used for subfamily separation in other families. Consequently, the family Plectanocotylidae is here divided into two monogeneric subfamilies, namely Plectanocotylinae Monticelli, 1903, and Octoplectanocotylinae, new subfamily.

KEY TO SUBFAMILIES OF PLECTANOCOTYLIDAE

- 1.—Opisthohaptor with three pairs of clamps
 Plectanocotylinae Monticelli
 Opisthohaptor with four pairs of clamps
 Octoplectanocotylinae, new subfamily

Subfamily Plectanocotylinae Monticelli, 1903

Diagnosis: Opisthohaptor bearing three pairs of clamps and terminal lappet armed with two to three pairs of anchors. Genital corona consisting of a sheaf of needle-like spines. Testes postovarial.

Type genus: *Plectanocotyle* Diesing, 1850.

Genus *Plectanocotyle* Diesing, 1850

Synonyms: *Phyllocotyle* Beneden and Hesse, 1863; *Plectanophora* Diesing, 1858; *Plectanophorus* Diesing, 1858; *Platycotyle* Beneden and Hesse, 1863.

Diagnosis: Characters of subfamily.

Type species: Plectanocotyle elliptica Diesing, 1850, from *Labrax mucronatus* (= *Morone americana*).

Included species: Plectanocotyle gurnardi (Beneden and Hesse, 1863) Llewellyn, 1941 (synonyms: *P. caudata* Lebour, 1908, *P. lorenzii* Monticelli, 1899, vide Llewellyn (1941), and *Platycotyle gurnardi* Beneden and Hesse, 1863, vide Sproston (1946), from *Trigla gurnardus*, *T. lucerna* (= *T. hirundo*), *T. cuculus* (= *T. pini*), and *T. lineata*).

Earlier the writer (Price, 1936) in an abstract listed both *Phyllocotyle* Beneden and Hesse and *Plectanocotyle* Diesing as distinct genera. Because of space limitations the rationale for this action could not be given in the abstract. However, the reasoning at that time was that the description of the type of *Plectanocotyle* was inadequate for identification and that the host belonged to a different family than that of *Phyllocotyle*. The only resemblance between the two genera was the three pairs of opisthohaptoral clamps. No hook-bearing lappet was described for *Plectanocotyle*, suggesting that *P. elliptica* was based on a mutilated specimen. Since this species has not been reported again from the type, or any other host, it seems possible that either the host fish had been misidentified or the specimen had been mislabeled as to origin.

In spite of the fact that the species on which *Plectanocotyle* is based is unrecognizable, the writer is following Sproston (1946) Bychowsky (1957) and others in accepting *Plectanocotyle* and *Phyllocotyle* as possibly identical genera. He is doing so, however, only to preserve the availability of an old genus as he did in the case of *Erpocotyle* Beneden and Hesse (Hexabothriidae) and *Cyclocotyla* Otto (Diclidophoridae). In this connection, it may be noted that both of the abovementioned authorities recognized without question the validity of *Plectanocotyle* and at the same time rejected both the better characterized *Erpocotyle* and *Cyclocotyla* as unrecognizable.

Plectanocotyle elliptica Diesing, 1850

Fig. 7

Synonym: Plectanophorus ellipticus (Diesing, 1850) Diesing, 1858.

Description: The only descriptions of this species are those of Diesing (1850, 1858) or of others based on these. Diesing's (1858) description is only slightly modified from that given earlier; it is quoted here as follows:

"Corpus lata ellipticum planum. Caput corpore continuum. Os terminale prominulum. Repla sex in postico corporis margino, ventralia, serie simplici, bivalvia, valvulus convexiusculus oppositis, valvula singula fulcris duodus uniformibus apice arcuatim conniventibus et tertio intermedio brevior recto, articulatis membrana inter se juctis. Acetabula duo juxtaposita hemisphaerica infra os sita. Genitalium aperturæ . . . Porus excretorius . . . Tractus intestinalis bicruris coccus—Ovipara—Piscium marinorum ectoparasita."

"Longit. 2''; latit. 1''."

Host: Labrax mucronatus (= *Morone americana*).

Location: Gills.

Distribution: America.

This species appears not to have been collected since Koller in 1836 obtained the specimens on which Diesing based the above description. It is included here because the host from which the specimens were collected occurs only in American waters.

Octoplectanocotylineae, new subfamily

Diagnosis: Opisthohaptor with four pairs of clamps and a terminal lappet bearing two pairs of dissimilar anchors. Genital armature consisting of a striated cuticularized tube or of slender spines. Testes pre- and postovarial.

Type genus: *Octoplectanocotylya* Yamaguti, 1937.

Genus *Octoplectanocotylya* Yamaguti, 1937

Diagnosis: Characters of subfamily.

Type species: *Octoplectanocotylya trichiuri* Yamaguti, 1937, from *Trichiurus japonicus* in Japan. Tripathi (1959) reports what he regards as this species from *Trichiurus muticus* and *T. savala* in India. Assuming the correctness of Yamaguti's (1937) observation on the nature of the genital armature, Tripathi's species can hardly be the same as *O. trichiuri*.

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