Digenean Trematodes of Marine Fishes from Ghana: Family Opecoelidae

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ABSTRACT: Seven new and two previously described species of digenetic trematodes in the family Opecoelidae are reported from marine fishes from Ghana. A new genus Pedunculotrema is erected for two new species, *P. ghanensis* (type) from liognathid and *P. capecoastensis* from pomadasyid fishes. This genus is closest to *Plagioporus* Stafford, 1904, and *Pseudooplacioporus* Yamaguti, 1938, differing significantly in having the acetabulum stalked; it also is close to *Podocotyloides* Yamaguti, 1934, differing in having a postoral circular muscle ring, diagonal testes with their levels overlapping, the seminal vesicle tripartite, and the ovary opposite the anterior testis. Other new species are: *Poracanthium ghanensis* from polynemid, carangid and rhinobatid fishes; *Pseudopecoelus ghanensis* from a sciaenid fish; *Podocotyloides gerridis* from a liognathid fish. Previously described species are: *Pseudopecoelus tortugae* von Wicklen, 1946, from trichiurid and sciaenid fishes; *Helicometra fasciata* (Rudolphi, 1819) Odhner, 1902, from clid, pomacentrid, sciaenid, lutjanid, gobiid and chupeid fishes.

The trematodes of this report were killed in hot water, transferred immediately to Ladvowsky's FAA fixative for 24 hr, and then stored in 70% alcohol plus 3% glycerine; whole mounts were stained with Mayer's carmalum and mounted in permount. Specimens have been deposited in the U. S. National Museum Helminthological Collection as noted. All measurements are in microns.

**Poracanthium ghanensis** sp. n. (Figs. 1–2, 15–17)

**HOSTS:** *Galeoides decadactylus* (Bloch) (type), *Pentanemus quinquarius* (L.), threadfins (Polynemidae); *Caranx hippos* (L.), jack or horse mackerel (Carangidae); *Rhinobatus albomaculatus* Norman, white-spotted guitarfish (Rhinobatidae).

**HABITATS:** Stomach (*R. albomaculatus*); small intestine (others).

**LOCALITIES:** Cape Coast, Tema; Ghana.

**DATES:** 12 January, 3 February 1966 (*G. decadactylus*, Cape Coast); 12, 19 January 1966 (*P. quinquarius*, Cape Coast).

**SPECIMENS:** USNM Helm. Coll. No. 70663 (holotype, from *G. decadactylus*); No. 70664 (paratypes, *G. decadactylus*); No. 70665 (paratype, *P. quinquarius*); No. 70666 (paratype, *C. hippos*); No. 70667 (paratypes, *R. albomaculatus*).

**DIAGNOSIS** (based on 90 specimens, 16 adults measured): Body elongate, narrow, unspined, extremities round, with stalk bearing acetabulum, 1,870–2,420 by 190–310 at level of stalk. Forebody 310–405 long; hindbody 1,345–1,895 long; forebody–hindbody length ratio 1:3.3–5.8. Preoral space usually present, up to 10 long. Stalk variable in length depending on state of contraction or extension, projecting 158–220 from body in relaxed specimens, 120–175 wide at base, center at anterior 18–26% of body length. Oral sucker subterminal ventral, slightly longer than wide, 107–121 by 98–114. Acetabulum at distal end of stalk, transversely elongate, 100–127 by 123–149, bearing four simple digitiform papillae on anterior margin of trans-
verse slitlike opening and three on posterior. Sucker length ratio 1:0.92–1.11, width ratio 1:1.12–1.46. Prepharynx 29–51 long, pharynx 95–112 by 65–80; esophagus 99–167 long; cecal bifurcation overlapping region of acutabular stalk; ceca narrow, following contour of gonads but may slightly overlap them dorsally, uniting near posterior extremity, rectum short, anus terminal.

Testes two, smooth, longitudinally elongate, tandem, 10–138 apart, lying posterior to midbody length; anterior testis 136–165 by 109–133, lying 460–770 posterior to acutabular stalk; posterior testis 138–189 by 98–136; posttesticular space 550–750 long. Vas efferens emerging from anterodorsal part of each testis. Cirrus sac absent. Seminal vesicle intercecal, bipartite; proximal part saccular, cell lined, elongate, straight to slightly curved, 162–242 by 35–58, commencing 160–350 posterior to acutabular stalk, 190–340 anterior to ovary, distances more or less than half distance between stalk and ovary; distal part tubular, thick walled, muscular, elongate, making posterior loop after leaving proximal part, then extending anteriorly with much undulations. Pars prostatica straight, with thick cellular lining, 102–150 by 20–27, commencing short distance posterior to acutabular stalk or entirely dorsal to it. Ejaculatory duct somewhat thick walled, muscular, about same length as pars prostatica, opening into tubular genital atrium. Latter surrounded by large, very thick walled, muscular, partially spined genital lobe lying sinistrally at level of posterior part of pharynx or anterior part of esophagus; lobe 56–87 by 58–90, spines primarily covering anterior, anterolateral, anterodorsal and anteroventral parts of lobe, in thin band posterolaterally and posteriorly, longest spines anteriorly placed. Genital pore in middle of unspined posteroventral part of lobe. Posteroventral part of lobe is a large genital pit with very thick glandular walls, band of spines surrounding opening, posterior spines of genital lobe lining anterior border of opening into genital pit.

Ovary pyriform, partially vesicular, diagonally oriented anterodextrally to posteromedianly or posterosinistrally, intercecal, may be notched posteriorly presenting appearance of lobing, 116–148 by 87–106, lying 345–530 posterior to acutabular stalk and 12–109 pre-testicular, in tandem with testes. Oviduct emerging from anterior tip of testes. Oviduct short, intercecal, coiling only between ovary and proximal part of seminal vesicle, ascending with slight undulations ventral to seminal vesicle and dorsal to acutabular stalk, gland cells along entire length. Metraterm thick walled, muscular, commencing at level of pars prostatica, opening into genital atrium close to but independent of ejaculatory duct. Seminal receptacle absent; proximal coils of uterus filled with sperm. Vitelline follicles extending from ovarian level to posterior extremity, filling posttesticular space, in lateral fields more anteriorly, may be interrupted on both sides opposite testes or be entirely uninterrupted, all variations from these extremes occurring. Vitelline reservoir dorsal, anterodorsal or anterolateral to ovary, usually longitudinally elongate but may be transversely elongate, 51–90 by 39–51. Eggs relatively few, usually collapsed, yellow, operculate, some with very small anopercular knob, 32 measuring 42–49 by 26–33.

Excretory bladder unbranched, tubular, extending anteriorly dorsal to testes, terminating dorsal to ovary; pore terminal.

Discussion: Two (in four hosts), five (in three), and eight (in two) worms, respectively, were recovered from nine G. decadactylus from Tema, and two, eight, and 13 worms, respectively, from three of 21 examined from Cape Coast. One and 25 worms, respectively, were found in two of 12 P. quinquarius from Cape Coast. One specimen was found in C. hippos from Tema. Two specimens were obtained from one R. albomaculatus from Tema; we believe this selachian to be an accidental host, having ingested the teleost harboring this trematode. The type and only species in the genus, P. furcatum (Stossich, 1883) Dollfus, 1948, was reported from mullid and soleid fishes from the Adriatic Sea at Triest and the Mediterranean Sea at Algeria. P. furcatum differs from our species in possessing a much larger sucker length ratio, a rounder pharynx, a shorter esophagus, a very short space between the acutabulum and ovary, a larger and round ovary, contiguous gonads, vitelline follicles which are confluent between the gonads, and a different distribution of spines on the genital lobe. No mention was made of a genital pit for P. furcatum. We believe that the description of a
seminal receptacle for *P. furcatum* by Dollfus (1948) is in error. In view of our description of *P. ghanensis*, the generic diagnosis given by Yamaguti (1958) needs emendation.

**Poracanthium Dollfus, 1948 emend.**


**TYPE SPECIES:** *P. furcatum* (Stossich, 1883) Dollfus, 1948.

**Pseudopecoelus tortugae** von Wicklen, 1946

**SYNONYM:** *Cymbephallus fimbratius* of Mantle, 1934, nec Linton, 1934.

**HOSTS:** *Trichiurus lepturus* L., horse-tail or ribbon fish (Trichiuridae); *Larimus peli* Bleeker (Sciaenidae).

**HABITAT:** Pyloric ceca.

**LOCALITY:** Cape Coast, Ghana.

**DATES:** 6, 8 December 1965 (*T. lepturus*); 8 December 1965, 7 February 1966 (*L. peli*).

**SPECIMENS:** USNM Helm. Coll. No. 70668 (from *T. lepturus*); No. 70669 (*L. peli*).

**MEASUREMENTS and some pertinent data** (based on 13 adults, six from *T. lepturus* and two from *L. peli* measured): Body 1,816–2,660 by 385–540; forebody 278–425 long, hindbody 1,498–2,070 long, forebody–hindbody length ratio 1:3.8–7.0; suckers round to somewhat longitudinally or transversely elongate, oral sucker 100–128 by 104–131, acetabulum 167–206 by 165–220, sucker length ratio 1:1.50–1.78, width ratio 1:1.26–1.94; prepharynx 12–24 long; pharynx transversely elongate, 65–77 by 77–97; esophagus 85–181 long; ceca terminating 56–175 from posterior extremity; anterior testis usually longitudinally elongate but may be transversely elongate, 158–300 by 163–260, lying 370–725 postacetabular; posterior testis usually transversely elongate but may be longitudinally elongate, 157–360 by 167–320, lying 535–980 postacetabular; posttesticular space 575–840 long; seminal vesicle commencing 198–280 postacetabular; genital pore sinistral to posterior half of pharynx; ovary dextral, round to somewhat longitudinally or transversely elongate, 103–150 by 109–140, lying 265–595 postacetabular; anterior limits of vitellaria at posterior part of acetabulum or slightly postacetabular; eggs yellow-brown, operculate, 24 measuring 46–56 by 28–36; excretory bladder conspicuously cell lined, extending anteriorly dorsal to gonads to ovarian level; excretory pore subterminal dorsal, 4–19 from posterior extremity.

**MEASUREMENTS and some pertinent data** on four adults (USNM Helm. Coll. No. 39368) collected by Siddiqi and Cable (1960) from *Apogon maculatus* (Poey) (Apogonidae) from Puerto Rico: Body 1,013–1,192 by 310–335; forebody 191–227 long, hindbody 675–844 long, forebody–hindbody length ratio 1:3.4–4.4; oral sucker slightly transversely elongate, 70–80 by 82–87; acetabulum round to slightly longitudinally or transversely elongate, 140–157 by 140–160; sucker length ratio 1:1.93–2.0, width ratio 1:1.61–1.85; prepharynx 20–22 long (in two); pharynx transversely elongate, 50–54 by 58–69; esophagus 60–77 long; ceca terminating 80–123 from posterior extremity; testes transversely elongate; anterior testis 76–108 by 114–167; lying 210–320 postacetabular; posterior testis 85–121 by 123–157, lying 312–425 postacetabular; posttesticular space 157–305 long; seminal vesicle commencing 110–121 postacetabular; genital pore sinistral, at level of posterior part of pharynx or anterior part of esophagus; ovary transversely elongate, filling intercelal space or nearly so, 47–75 by 90–131, lying 210–260 postacetabular; anterior limits of
vitellaria at posterior part of acetabulum or slightly postacetabular; eggs yellowish, operculate, 12 measuring 46–56 by 25–35; excretory bladder conspicuously cell lined, extending anteriorly dorsal to gonads to ovarian level; excretory pore dorsal, 51–90 from posterior extremity.

Discussion: Our collection consists of one, two, and eight adult worms, respectively, from three of 13 T. lepturus examined, and one each from two of 30 L. peli. We are presenting further details of this species because Manter’s (1934) description is based on a single specimen from a macrurid fish from Florida. Through the courtesy of Dr. Mary Hanson Pritchard, University of Nebraska, we were able to examine the only specimen (immature but well-developed) of *P. tortugae* in the Harold W. Manter collection. Siddiqi and Cable (1960), without description, presented an illustration of a whole mount specimen, noting that their material was in close agreement with the original description of *P. tortugae* except in body size and sucker ratio. Their specimens differ further in having a differently shaped pharynx, an ovary considerably transversely elongate and filling the interceliacal space or nearly so, and an excretory pore distinctly dorsal in position and relatively far removed from the posterior extremity. Manter’s immature specimen shows the excretory bladder also extending to the ovarian level, but the pore is just subterminal dorsal; this condition is more like that found in our specimens. The shape of the pharynx and egg size in our specimens is similar to Siddiqi and Cable’s material and unlike Manter’s. In spite of the differences cited above for the three collections, we feel that they probably represent a single species. The differences may be host influenced or may represent genetic population variations. For example, our two worms from *Larimus peli* are 1,816 and 2,220 long, respectively, and have sucker length ratios of 1:1.78 and 1:1.74 and width ratios of 1:1.94 and 1:1.78, respectively; the six measured from *T. lepturus* are 2,050–2,660 long and have sucker length ratios of 1:1.50–1.68 and width ratios of 1:1.26–1.76.

*Pseudopecoelus ghanensis* sp. n. (Figs. 3–4)

Host: *Cynoscion macrognathus* (Bleeker), large-mouth weakfish (*Sciaenidae*).

Habitat: Small intestine.

Locality: Tema, Cape Coast; Ghana.

Date: 8 December 1965 (Cape Coast).

Specimens: USNM Helm. Coll. No. 70670 (holotype); No. 70671 (paratype).

Diagnosis (based on two adult worms): Body elongate, robust, unspined, with protubernance bearing acetabulum, extremities round, 1,000–2,500 by 295–575 at ovarian level. Forebody conical, 140–235 long; hindbody much wider than forebody, 735–1,720 long; forebody–hindbody length ratio 1:5.3–7.3. Oral sucker subterminal ventral, longitudinally elongate, 87–125 by 73–120; acetabulum transversely elongate, aperture a transverse slit, without papillae, 125–205 by 140–230, center at level of anterior one-seventh to one-fifth body length. Sucker length ratio 1:1.44–1.64, width ratio 1:1.92–1.93. Prepharynx 21 long (in larger specimen); pharynx nearly round, 48–68 by 56–66; esophagus 120 long (in larger specimen); cecal bifurcation dorsal to acetabulum; ceca terminating blindly 72–80 from posterior extremity.

Testes two, somewhat lobed to notched, longitudinally to transversely elongate, interceliacal but may overlap ceca dorsally, oblique, contiguous, lying in posterior part of middle third of body or extending slightly into posterior third; anterior testis sinistromedian, 140–240 by 181–

Ovary anterodextral to and contiguous with anterior testis, smooth, diagonally or transversely oval, 80–157 by 95–145, lying 167–445 postacetabular. Oviduct emerging from anteriorsmost margin of ovary. Ootype complex anteromedian to ovary and anterior testis. Uterus short, intercelcal, coiling between ovary-anterior testis and acetabulum. Metraterm thick walled, approximately same length as pars prostatica. Vitelline follicles large, round to oval in shape, usually extending from posterior part of acetabulum (or one field more posteriorly) to posterior extremity, filling posttesticular space, in lateral fields anteriorly and completely or partially surrounding ceca. Vitelline reservoir dorsomedian to ovary. Eggs yellowish, operculate, usually collapsed in mounted specimens, seven measuring 50–59 by 33–38.

Excretory bladder unbranched, tubular, extending anteriorly to ovary; pore terminal.

Discussion: From Cape Coast, a single specimen was recovered from one of 10 C. macrognathus examined. Ten small-mouth weakfish, C. brachygnathus (Bleeker) from the same area were negative. Our new species appears closest to P. scorpaenae (Manter, 1947) Overstreet, 1969, from scorpaenid fishes from Florida, P. barkeri Hanson, 1950, from holocentrid fishes from Bermuda, Bimini, Puerto Rico, Jamaica, and Curacao, P. umbrinae Manter and Van Cleave, 1951, from sciænid fishes from California, and P. manteri Sogandares and Hutton, 1959, from a sciænid fish from Florida. The latter two species differ significantly from the present form in that the seminal vesicle commences dorsal or only slightly posterior to the acetabulum, and the vitelline follicles extend preacetabularly. P. umbrinae differs further in having a lobed ovary and the forebody approximately the same length as the posttesticular space, while P. manteri has a transversely elongate oral sucker, an esophagus the same length as the pharynx, and smooth testes. P. barkeri differs in having the forebody approximately the same length as the posttesticular space, a larger sucker ratio, an esophagus shorter than the pharynx, and smooth testes. P. scorpaenae differs in having a larger sucker ratio, the pharynx as long as or longer than the oral sucker, the testes tandem, and the seminal vesicle entirely tubular and sinuous.

**Podocotyle temensis** sp. n. (Figs. 5–6)

**Host:** *Epinephelus gorènësis* (Cuvier and Valenciennes), sea perch or grouper (*Serranidae*).

**Habitat:** Small intestine.

**Locality:** Tema, Ghana.

**Date:** 18 December 1964.

**Specimens:** USNM Helm. Coll. No. 70672 (holotype); No. 70673 (paratypes).

**Diagnosis** (based on 57 adults from a single fish; 12 measured): Body elongate, narrow, unspined, extremities round, with body fold around acetabulum in ventral view, protuberant in lateral view, 2,495–3,370 long, widest at acetabular level. Forebody conical, 500–660 long; hindbody 1,620–2,400 by 435–520; forebody–hindbody length ratio 1:2.9–3.9. Oral sucker subterminal ventral, usually transversely elongate but may be round or longitudinally elongate, 155–198 by 165–192; proral space 5–15 long; acetabulum transversely elongate, without papillae, aperture a transverse slit, 295–350 by 310–375; sucker length ratio 1:1.77–2.0, width ratio 1:1.77–2.09. Prepharynx dorsal to oral sucker, 14–26 long; pharynx overlapping oral sucker dorsally, longitudinally elongate, 110–130 by 95–122; esophagus muscular, 95–135 long; cecal bifurcation 80–170 preacetabular; ceca narrow, conspicuously cell lined, terminating blindly near posterior extremity.

Sac usually slightly sigmoid shaped, commencing medially or dextrally 265–350 postacetabular, latter representing approximately 57–81 per cent of distance between acetabulum and ovary. Seminal vesicle bipartite, saccular posteriorly, tubular anteriorly, latter part with posteriorly directed loop at proximal end; saccular part 235–335 by 75–110, usually lying entirely postacetabular. Pars prostatica well developed, conspicuously cell lined, 157–220 by 27–39. Cirrus muscular, short, lying inverted. Prostate cells filling available space in cirrus sac. Genital pore sinistral, postbifurcal, ventral to cocoon or extraceccal, lying 20–75 preacetabular.

Ovary distinctly 4-lobed, sometimes 5-lobed, dextromedian, pretesticular, usually contiguous with anterior testis, overlapping level of latter 5–60, transversely elongate, 150–205 by 180–245, lying 380–470 postacetabular. Ootype complex anterodorsal to ovary. Seminal receptacle dorsolateral to ovary, extending anteriorly almost to level of proximal end of cirrus sac, 205–275 by 65–93. Laurer’s canal present. Uterus relatively short, between ovary and acetabulum, may overlap ceca ventrally, ventral to seminal receptacle and cirrus sac. Metraterm muscular, commencing dorsal to anterior part of acetabulum, surrounded by mass of gland cells. Vitelline follicles large, smooth, anterior extent 90–190 postacetabular, posttesticularly usually separated into two fields by excretory bladder, dorsal, lateral and ventral to ceca anteriorly, uninterrupted, intrude into intertesticular space but not confluent. Vitelline reservoir median, anterodorsal to ovary. Eggs large, yellow-brown, operculate, some with knob at anopercular end, 20 uncollapsed eggs measuring 60–67 by 36–45.

Excretory bladder cell lined, unbranched, tubular, anterior end round, extending anteriorly to ovarian level or slightly preovarian, sinistrodorsal to posterior testis, intertesticular, dextrodorsal to anterior testis, dorsal to ovary, posteriorly narrowing abruptly to duct opening terminally or subterminal ventral.

Discussion: In having the testes separated by the excretory bladder our new species is similar to three other species previously included in the genus *Podocotyle* (Dujardin, 1845) but now allocated to the new genus *Allopodocotyle* by Pritchard (1966a), namely, *A. tamame* (Yamaguti, 1942), *A. serrani* (Yamaguti, 1952), and *A. plectopomi* (Manter, 1963). Species of *Allopodocotyle* are differentiated from those of *Podocotyle* in having a smooth rather than lobed ovary. Our form appears closest to *A. serrani*, resembling it further in the postacetabular extent of the cirrus sac, postbifurcal genital pore, and distribution of the vitellaria. However, it differs further in having a narrower body, longer esophagus, testes more nearly tandem, seminal vesicle with a loop (rather than being straight), and distinct pars prostatica. In addition to the intertesticular passage of the excretory bladder, *P. temensis* differs from the 17 species allocated to *Podocotyle* by Pritchard (1966a) in having a postbifurcal genital pore. 

*Podocotyloides chloroscombri* sp. n. (Figs. 7–8, 18)

Host: *Chloroscombrus chrysuras* (L.), bumper (Carangidae).

Habitat: Small intestine.

Locality: Cape Coast, Ghana.

Date: 16 December 1965.


Diagnosis (based on single specimen from one of 28 fish examined; mounted in sinistrolateral view so that measurements are length by depth): Body elongate, slender, anterior extremity round, tapering to blunt point posteriorly, unspined, with acetalbular stalk, 2,575 by 190. Forebody 410 long, hindbody 2,015 long. Oral sucker nearly terminal, 111 by 104; acetalbulum 105 by 85, retracted into stalk, latter 225 by 150 wide; sucker length ratio 1.0:0.95. Prepharynx 15 long; pharynx relatively large, anterior end truncate, posterior end round, 85 by 65; esophagus 90 long; cecal bifurcation just anterior to acetalbular stalk; ceca narrow, terminating blindly near posterior extremity.

Gonads tandem, from midbody length posteriorly, anterior testis 46 postovarian, testes 40 apart. Testes two, slightly lobed, intercecal, extending from dorsal to ventral body surfaces; anterior testis 190 by 143, lying 860 posterior to acetalbular stalk; posterior testis 222 by 167, lying 1,090 posterior to acetalbular stalk; posttesticular space 725 long. Cirrus sac commencing 250 posterior to acetalbular stalk or two-fifths distance between stalk and ovary; bipartite, proximal part saccular (222 by 94) and...
lying entirely posterior to stalk, narrowing abruptly to longer tubular distal part, latter with loop at its proximal end but sinuous anteriorly. Seminal vesicle filling cirrus sac, devoid of sperm at base. Cirrus sac protruded through genital pore. Genital pore at sinistral part of pharynx.

Ovary smooth, elongate, filling ventral half of body depth, 150 by 87, lying 635 posterior to acetalabular stalk. Oviduct emerging from anterior margin of ovary. Seminal receptacle dorsal, Mehlis’ gland anterodorsal to ovary. Uterus containing 61 eggs in single file, extensively coiled between Mehlis’ gland and cirrus sac, remainder sinuous in ascent to genital pore. Metraterm short, thick walled, without muscular sphincter. Vitelline follicles large, round to oval in shape, extending from 165 posterior to acetalabular stalk to posterior extremity, overlapping level of base of cirrus sac, completely interrupted at levels of both testes but only dorsally, ventrally and sinistrally at ovary, confluent medially dorsal to cirrus sac, uterus, and between gonads, filling posttesticular space. Vitelline reservoir dorsal to ovary. Eggs yellow-brown, operculate, eight measuring 48–56 by 29–36.

Excretory bladder unbranched, tubular, extending anteriorly to ovary; pore terminal.

DISCUSSION: Pritchard (1966a) emended the genus Podocotyloides Yamaguti, 1934, and recognized five species therein from Indo-Pacific fishes; she (1966b) described a sixth species from Hawaii. Our new species appears closest to P. parupenei (Manter, 1963) Pritchard, 1966 (syn. Podocotyle p. M.) from a mulid fish from Fiji. The latter differs in having the acetalabulum twice as large as the oral sucker, an acetalabular protubercance rather than a stalk, a very short esophagus (27–32 long), a unipartite cirrus sac, and considerably larger eggs (72–88 by 38–57).

**Pedunculotrema** gen. n.


**Type species:** *Pedunculotrema ghanensis* sp. n.

DISCUSSION: This new genus appears closest to Plagioporus Stafford, 1904, and *Pseudoplagioporus* Yamaguti, 1938, but differs significantly in having the acetalabulum stalked. It also appears close to *Podocotyloides* Yamaguti, 1934, as emended by Pritchard (1966a), but differs significantly in having a postoral muscle ring, diagonal testes with their levels overlapping, the seminal vesicle tripartite, and the ovary opposite the anterior testis. The name *Pedunculotrema* is from *pedunculus*, stalk, and *trema*, hole, referring to the presence of a stalk bearing the acetalabulum.

**Pedunculotrema ghanensis** sp. n.  
(Figs. 9–10, 19)

**Host:** Gerres melanopterus Bleeker, mojarra (*Liognathidae*).

**Habitat:** Small intestine.

**Locality:** Cape Coast, Ghana.

**Date:** 12 January 1966.

**Specimens:** USNM Helm. Coll. No. 70675 (holotype); No. 70676 (paratype).

**Diagnosis** (based on three adults from one of two fish examined; one worm mounted in ventral view and two in lateral view so that measurements are length by width by depth): Body elongate, narrow, unspined, extremities round, with body fold around acetalabulum in ventral view, with short stalk bearing acetalabulum in lateral view, 1,176–1,411 long, widest at acetalabular level. Forebody conical, 197–242
long; hindbody 860–1,035 by 185 by 111; forebody–hindbody length ratio 1:4.3–4.4. Oral sucker subterminal ventral, nearly round, 76–100 by 82 by 104; acetabulum nearly round, aperture a transverse slit, without papillae, 121–134 by 129 by 128. Sucker length ratio 1:1.34–1.39, width ratio 1:1.57. Postoral circular muscle ring narrow. Prepharynx 17–24 long; pharynx round to longitudinally elongate, 61–87 by 58 by 68; esophagus 53–73 long; cecal bifurcation at anterior margin of acetabulum; ceca terminating blindly 84–127 from posterior extremity.


Excretory bladder unbranched, tubular, extending anteriorly to ovary-anterior testis level; pore terminal.

**Pedunculotrema capecoastensis** sp. n. (Figs. 11–12, 20)

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**Host:** Pomadasys jubelini (Cuvier and Valenciennes), burro (Pomadasyidae).

**Habitat:** Small intestine.

**Locality:** Cape Coast, Ghana.

**Date:** 25 March 1966.

**Specimens:** USNM Helm. Coll. No. 70677 (holotype); No. 70678 (paratypes).

**Diagnosis** (based on five adults from one of seven fish examined; measurements are length by width by depth): Body elongate, narrow, unspined, anterior extremity nearly truncate, posterior round, with body fold around acetabulum in ventral view, with stalk (190–218 long, 145–190 wide) bearing acetabulum in lateral view, 830–1,075 long, widest at acetabulum level. Forebody narrowing slightly anteriorly, 165–220 long; hindbody 602–674 by 200–220 by 215–245; forebody–hindbody length ratio 1:3.1–3.8. Oral sucker terminal or nearly so, transversely elongate, truncate posteriorly, 73–102 by 93 by 91–105; acetabulum longitudinally elongate, aperture a transverse slit, without papillae, 145–160 by 151 by 134–150. Sucker length ratio 1:1.54–2.19. Postoral circular muscle ring narrow. Prepharynx short, up to 15 long; pharynx longer than oral sucker, oval, 92–126 by 75 by 70–78; esophagus short, up to 21 long; cecal bifurcation at acetabulum level or slightly preacetabular; ceca terminating blindly 53–108 from posterior extremity.

Testes two, smooth, diagonal, longitudinally elongate, contiguous, sometimes overlapping, overlapping ceca ventrally, extending posteriorly from midlength of hindbody; anterior testis sinistromedian, 165–184 by 131 by 105–140, lying 170–234 postacetabular; posterior testis median, 181–247 by 122 by 105–169, lying 270–380 postacetabular; posttesticular space 98–160 long. Cirrus sac bipartite, anterior part tubular, sinuous, latter part with posterior loop or simple shallow...
U-shaped bend at acetabular level or just postacetabular, commencing 117–238 postacetabular. Seminal vesicle tripartite; saccular part of cirrus sac containing two saccular parts of seminal vesicle, posterior sac 123–169 by 38–41 by 34–39; remainder of seminal vesicle tubular, sinuous. Pars prostatica relatively long, lying dorsal to acetabulum, may extend preacetubularly. Cirrus muscular, shorter than pars prostatica. Genital pore sinistral to posterior part of pharynx or anterior part of esophagus.

Ovary smooth, dextral to and contiguous with anterior testis, usually separated from posterior testis but may be contiguous with it, longitudinally elongate, 70–87 by 53–56 by 68–75, lying 185–270 postacetabular, 15–70 posterior to level of anterior margin of anterior testis. Ootype complex dorsomedian to ovary and anterior testis. Seminal receptacle large, dorsal or dorsomedian to ovary, may overlap anterior testis dorsally, longitudinally elongate, 70–133 by 48 by 59–63. Uterus relatively short, entirely preovarian to slightly overlapping latter, may overlap anterior part of anterior testis. Metraterm short, slightly muscular. Vitelline follicles large, smooth, commencing 20–123 postacetabular, filling posttesticular space, lateral anteriorly, confluent dorsally throughout length of fields. Eggs large, yellow-brown, operculate, partially collapsed, six measuring 53–59 by 29–33.

Excretory bladder unbranched, tubular, extending anteriorly to ovary-anterior testis level; pore subterminal dorsal.

DISCUSSION: This new species differs from *P. ghanensis* in the shape of the oral sucker, relative size of the pharynx, and the anterior limits of the vitellaria being postacetabular.

**Plagioporus gerridis** sp. n.  
(Figs. 13–14)

**Host:** *Gerres nigri* Günther, mojarra (*Lio- gmorthidae*).  
**Habitat:** Small intestine.

**LOCALITY:** Cape Coast, Ghana.  
**DATE:** 17 February 1966.  
**SPECIMENS:** USNM Helm. Coll. No. 70679 (holotype); No. 70680 (paratypes).

**DIAGNOSIS** (based on seven adults from one of three fish examined; five measured): Body elongate, robust, unspined, extremities round, with body fold anterior to acetabulum in some but absent in others, 550–815 by 177–300 at gonadal level. Forebody conical, 148–195 long; hindbody 290–460 long; forebody–hindbody length ratio 1:1.7–2.4. Oral sucker subterminal ventral, nearly round, 73–94 by 70–87; acetabulum tending to be flat at anterior, posterior and lateral surfaces, corners round, aperture a transverse slit, muscle fibers extending from surface of acetabulum onto body proper, 110–160 by 116–160. Sucker length ratio 1:1.51–1.88, width ratio 1:1.66–1.90. Postoral circular muscle ring narrow. Prepharynx 12 long (in one); pharynx nearly round, 53–58 by 48–58; esophagus 30–63 long; cecal bifurcation just anterior or dorsal to acetabulum; ceca terminating posttesticularly near posterior extremity.

Testes two, smooth, diagonal, contiguous, sometimes overlapping slightly, overlapping ceca ventrally, in anterior to middle two-thirds of hindbody. Anterior testis sinistromedian, round to longitudinally elongate, 123–145 by 102–133, overlapping acetabulum up to 18 to lying up to 89 postacetabular; posterior testis median, round to longitudinally or transversely elongate, 114–161 by 111–160, lying 53–182 postacetabular; posttesticular space 90–140 long. Cirrus sac sinuous, usually with dextral U-shaped bend dorsal to acetabulum, commencing 31–121 postacetabular, usually median between ovary and anterior testis, sometimes ventrolateral to ovary, overlapping gonads ventrally at its position. Seminal vesicle bipartite; posterior part saccular, overlapping posterior part of acetabulum, 87–141 by 27–60; anterior part tubular, sinuous. Pars prostatica relatively long, commencing dorsal to anterior part of...
acetabulum or entirely preacetabular. Cirrus muscular, shorter than pars prostatic except when protruded through genital pore. Latter sinistral, at level of pharynx or anterior part of esophagus.

Ovary smooth, dextral to anterior testis, usually separated from anterior testis by uterus but may be contiguous with it, contiguous with posterior testis, usually longitudinally elongate, 77–109 by 58–121, lying 5–78 postacetabular, anterior margin 8–25 posterior to anterior margin of anterior testis in six worms and 11 anterior in one. Ootype complex anterodorsal to but may be contiguous with it, contiguous with uterus. Esophagus. Porc terminal.

Large, yellow-brown, operculate, partially 


Discussion: In having the ovary opposite the anterior testis our species appears closest to Plagioporus triangulogenitalis Belouss, 1958, from a cyprinid fish, and P. glomeratus Röltman, 1963, from cyprinid, salmonid and thymallid fishes; both species are from the maritime region of eastern Siberia. In the key to the subgenus Plagioporus (Stafford, 1904) given by Skrjabin and Koval (1958) our form keyed to P. (P.) calotomi (Yamaguti, 1934) Yamaguti, 1938, from scard fishes from Japan. Our new species differs significantly from the three species listed above in the postacetabular extension of the cirrus sac, the presence of a bipartite seminal vesicle, and the vitellaria being confluent dorsally throughout the length of the fields.

Helicometra fasciata (Rudolphi, 1819) Odhner, 1902

Hosts: Labrisomus nuchipinnis (Quoy and Gaimard), hairy blenny (Clinidae); Glyphisodon saxatilis (L.), sergeant-majors (Pomacentridae); Larimus peli Bleeker (Sciaenidae); Lutjanus modestus Bleeker, red snapper (Lutjanidae); Bathygobius soporator (Cuvier and Valenciennes), goby or mapo (Gobiidae); Ilisha melanota Derscheid, long-finned herring (Clupeidae).

Habitats: Small intestine, pyloric ceca. LOCALITIES: Cape Coast, Elmina, Tema; Ghana.

Dates: 11 January (B. soporator, Elmina), 19 January, 7 February 1966 (four of five infected L. peli, Cape Coast).

Specimens: USNM Helm. Coll. No. 70681 (from L. nuchipinnis); No. 70682 (G. saxatilis); No. 70683 (L. peli); No. 70684 (L. modestus); No. 70685 (B. soporator); No. 70686 (I. melanota).

Discussion: The four infected (with one, one, two and three worms, respectively) Larimus peli of the 30 examined from Cape Coast were the only hosts to harbor worms in the pyloric ceca (none in the small intestine); the flukes were pinkish in color, and were readily visible through the cecum wall. Four L. nuchipinnis harbored one, three, five and eight worms, respectively; one G. saxatilis with one worm; one L. peli from Tema with five worms; one L. modestus with six worms; two B. soporator of four examined with three and 12 worms, respectively; and one I. melanota with one worm. This species has a wide distribution, having been recorded from the Mediterranean, North Atlantic, South-West Africa, Mexican Pacific, Japan, Caribbean, Tasmania, and New Caledonia.

Literature Cited


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**Abstract:** *Tetramorium simillimum*, a new intermediate host for the poultry tapeworm, *Raillietina tetragona*, is reported from India. Mature cysticercoids ranging in number from 1–13 were found in 4.8% of the ants examined. Measurements of live cysticercoids differed from those previously reported. Cysticercoids administered to 1-day-old and 15-day-old White Leghorn chickens matured in 73.7% of the birds. The prepatent period of 12–18 days and the number of worms developing varied with the host's age and the infecting dose.

**Materials and Methods**

From July 1968 to February 1969, collections were made from the vicinity of 19 poultry houses in Trivandrum, Kerala. Seven species of ants were identified: *Tetramorium simillimum* (F. Smith), *Monomorium destructor* (Jerdon), *Solenopsis geminata* (Fabricius), *Pheidologeton* sp., *Pheidole* sp., *Paratrechina longicornis* (Laireille), and *Triglyphothrix striatidens* (Emery). Ants were dissected under magnification and cysticercoids recovered were transferred to physiological saline. Identification was based on larval morphology, and confirmed by recovery of adult worms after feeding cysticercoids to clean chickens.

Sixty-seven one-day-old and 15-day-old White Leghorn chickens were brought to the Laboratory from the local Government Poultry Farm. They were wing-banded and kept in brooders under parasite-free conditions. Twenty-eight one-day-old chicks received one cysticercoid each and one 10 cysticercoids. Twenty-two 15-day-old chickens received one cysticercoid each, five 10 cysticercoids each and one 5 cysticercoids. Five one-day and five 15-day-old birds were kept as controls. Cysticercoids

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