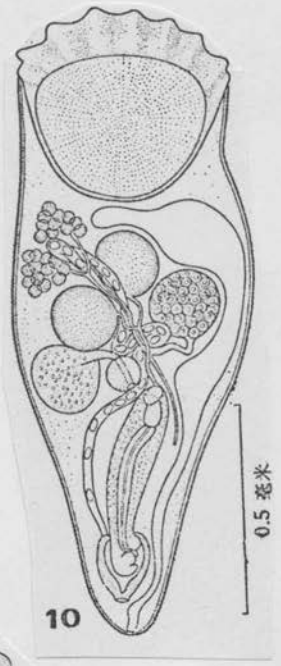
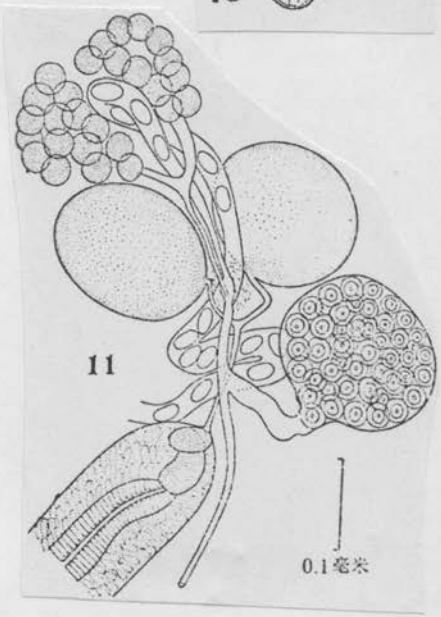
1990

Binder 022, Bucephalidae [Trematoda Taxon Notebooks]

Harold W. Manter Laboratory of Parasitology

Pseudorhipodoctyle elopichtys, Long and Lee, 1964





Figs. from Tang and Tang, 1976

Dolichoenterinae n. subfam.

Subfamily diagnosis. — Bucephalidae: Body elongate, cylindrical. Rhynchus funnel-shaped, with a semicircle of several horn-like projections anterodorsally, or weakly developed. Pharynx in anterior third of body. Intestine very long. Testes near posterior extremity. Cirrus pouch comparatively small. Ovary between two testes or opposite anterior testis. Vitellaria pretesticular. Excretory vesicle tubular, long or short.

Key to genera of Dolichoenterinae

Rhynchus funnel-shaped, with horn-like projections; testes entire; ovary intertesticular ..... *Dolichoenterum*

Rhynchus weakly developed; testes strongly lobed; ovary opposite anterior testis ..... *Paurorhynchus*

Dolichoenterum Ozaki, 1924

Generic diagnosis. — Bucephalidae: Dolichoenterinae: Body slender, cylindrical, spined. Rhynchus funnel-shaped, with a semicircle of several horn-like projections anterodorsally. Mouth opening in anterior part of body. Intestine long, tubular, reaching to near posterior extremity. Testes tandem, in posterior part of body. Cirrus pouch at posterior extremity, comparatively short. Genital pore in ventroterminal depression, into which the excretory vesicle also opens. Ovary intertesticular. Vitellaria divided into two lateral groups in front of anterior testis. Uterus winding in posterior half of body. Excretory vesicle tubular, comparatively short. Parasitic in marine fishes.

Genotype: *D. longissimum* Ozaki, 1924 (Pl. 1. Fig. 1), in *Leptocephalus myriaster, Cepola schlegeli;* larva encysted in fins and flesh of *Callionymus altivelis, Chrionema chryseres, Hoplichthys regani* and *Arnoglossus violaceus;* Japan. Also in *Leptocephalus conger;* New Zealand.

Other species:

D. lamirandi Carrère, 1937, in *Atherina mochon, A. hepsetus, Labrax lupus* (exper.); Mediterranean. Experimentally also in *Hyla arborea.* — Carrère (1937).

Dolichoenterum sp. Manter, 1934 in *Citharichthys cornutus;* Florida; *Coelorhynchus australis,* New Zealand. Very likely a juvenile of *D. longissimum.*

DOLICHOENTERUM Ozaki, 1924

Body elongate, cylindrical, spiny. Anterior end with funnel-shaped adhesive sucker; posterior end rounded. Oral aperture ventral, a little posterior to anterior end. Oral sucker absent. Pharynx present. Esophagus short. Cecum a long simple canal extending to near posterior end. Urogenital pore at the posterior end of the body. Testes two, in the posterior part of the body. Cirrus pouch muscular, at the end of the body. Ovary between the testes, median to submedian. Seminal receptacle absent. Laurer's canal present. Uterus with ascending and descending coils in the posterior half of the body. Vitellaria lateral, in the posterior half of the body. Excretory vesicle a simple tubular sac opening into the genital sinus. Type species: Dolichoenterum longissimum Ozaki, 1924

Dolichoenterum longissimum Ozaki, 1924

Body 5.33 to 13.3 mm. by 0.6 to 1.38 mm. Anterior sucker muscular, funnel-shaped, with 8 papillae on its dorsal margin. Pharynx at junction of the 1st and 2nd fourth or fifth of the body. Oral aperture on ventral surface behind the pharynx, without sucker. Prepharynx very short; esophagus short. Cecum a simple long canal, extending for a short distance in front of the esophagus and ending near the posterior end of the body. Testes lying in about middle half of the caudal third of the body. Tandem. Ovary between testes. Cirrus pouch between the hind testis and posterior end. Urogenital pore at posterior end. Sem. rec. absent. Laurer's canal present. Shell gland close behind the ovary. Uterus with ascending and descending coils in the posterior third of body. Vitellaria lateral, from the posterior testis to about middle of body. Excretory vesicle a short tube, extending from posterior testis ######## to the genital sinus into which it opens. Eggs 23–27 by 16–19 μ

Host: Intestine of Leptocephalus myriaster (Brevoort)
Locality: Takamatsu, Onomichi, Shimonoseki, Japan.

Yamaguti (1934) records this species from Muraenesox cinereus from Toyama Bay. He says the "papillae" of Ozaki are really 7 to 8 slightly recurved horn-like projections arranged in a semicircle. Composed of muscles. Yamaguti says the excretory vesicle opens to the outside very close to the genital pore but there is no true urogenital pore. Yamaguti's egg measurements 30 to 32 by 18 μ.

Yamaguti (1938) from Conger myriaster - Japan

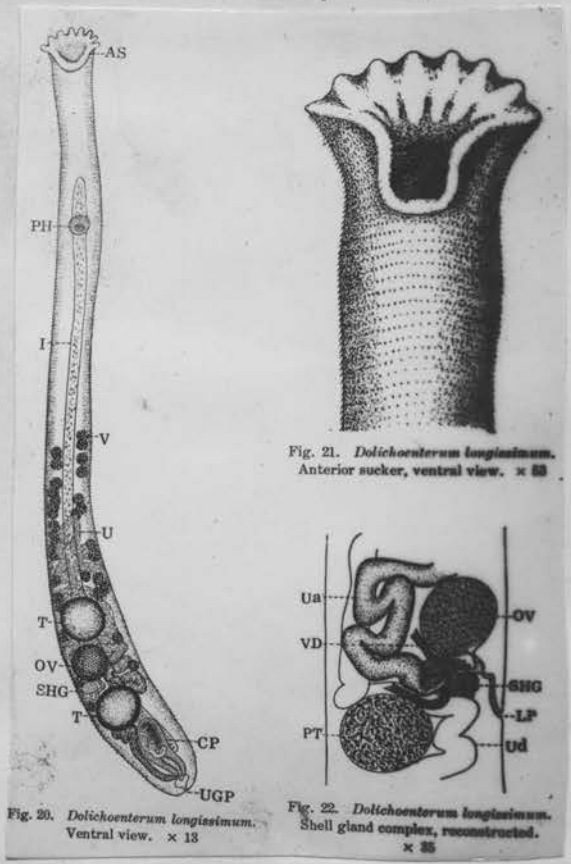


Fig. 20. *Dolichoenterum longissimum.* Ventral view. × 13

Fig. 21. *Dolichoenterum longissimum.* Anterior sucker, ventral view. × 83

Fig. 22. *Dolichoenterum longissimum.* Shell gland complex, reconstructed. × 35

4. **Dolichoenterum longissimum** Ozaki, 1924.

HOST: *Leptocephalus conger* (Linn.), conger eel; intestine.

LOCALITY: Wellington.

SPECIMEN DEPOSITED: U.S. Nat. Mus. Helminth. Collection No. 49155.

DISCUSSION: One adult and one immature specimens were collected. The large specimen measured 16·5 by 1·904 mm., thus exceeding Ozaki's upper limit for the species by more than 3 mm. This huge size is very striking when compared with the minute size of most gasterostomes. The immature specimen was 5·110 mm. long. Ozaki's specimens described and figured in Ozaki (1928) were from *Leptocephalus myriaster* in Japan. Yamaguti (1934) reported the species from the same host species and from *Muraenesox cinereus*. In 1938, Yamaguti again reports it from the conger eel (*Conger myriaster*). Ozaki's size records were 5·33 to 13·3 mm., Yamaguti's 4·5 to 9·3 mm. Yamaguti reported larvae in the stomach of *Cepola schlegeli*.

My specimen agrees well with descriptions of *D. longissimum* except in egg size which does not seem to exceed 23 by 12 to 13μ. Ozaki reports 23 to 27 by 16 to 19μ but Yamaguti thought these measurements were from eggs at an angle and reports 27 to 32 by 16 to 19μ (in balsam mounts). Considering that the eggs in my specimen were very thin-shelled and considerably collapsed, it does not seem advisable to base a new species on this difference.

A small immature specimen of a *Dolichoenterum* species was collected from the intestine of *Coelorhynchus australis*. It was practically a duplicate of my *Dolichoenterum* sp. from a deep sea fish, *Citharichthys cornutus*, at Tortugas, Florida. It is very likely a juvenile of *D. longissimum*.

FROM MANTER, 1954

Dolichoenterum longissimum Ozaki, 1924

(Fig. 2)

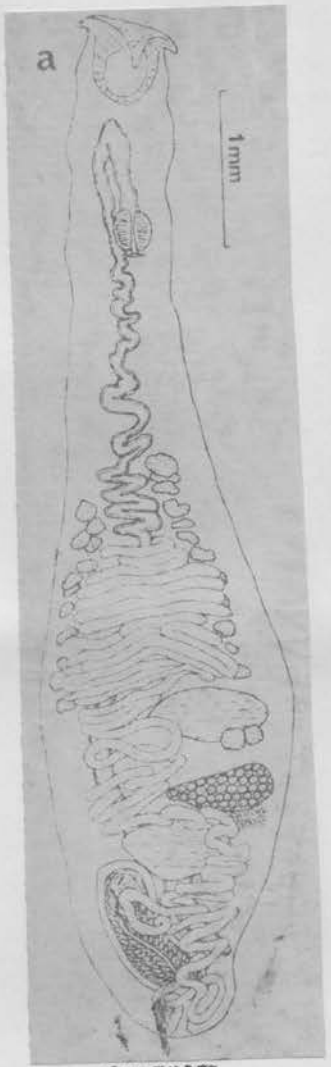
Host and locality : intestine of *Conger conger*, Stn. 7. BAY OF BISCAY

Twenty-three specimens were found, and these vary from 3·5 to 6·5 mm in length. The longer worms are less contracted and have a long narrow neck, and an elongate oval hindbody (Fig. 2a), but in the shorter contracted specimens there is little indication of a neck (Fig. 2b). Whilst, superficially, these two forms may appear distinct an examination of the internal morphology of the worms leaves no doubt that they are specifically identical. The cuticle has, imbedded in it, numerous narrow pointed spines.

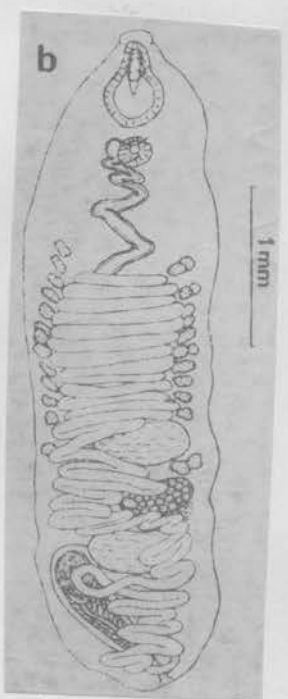
The anterior sucker is surmounted by a thick muscular hood, which in an extended condition, bears seven to eight horn-like conical projections on the dorsal and lateral rims (Figs. 2c and d). In an extended condition the sucker is 0·53–0·68 mm in diameter. When contracted the sucker becomes almost globular, and the projections are less conspicuous, and apparently less numerous in some cases, and point inwards. The sucker in this condition measures 0·32–0·44 mm in diameter. The aperture of the sucker is subterminal, with a more or less narrow extension down the ventral surface.

The contraction or expansion of the worm also affects the anterior portion of the alimentary canal. In neither whole mounts nor serial sections was evidence of an oral sucker seen. The specimens lacking a neck bear a simple mouth situated closely behind the anterior sucker. A short prepharynx runs posteriorly to the somewhat transversely-oval pharynx measuring 0·3–0·32 mm × 0·21 mm. From the pharynx the intestine runs anteriorly to a point which may or may not be nearer to the anterior sucker than the pharynx, where it turns conversely to reach the hinder end of the body. In both extended and contracted specimens the intestine follows a transversely undulating course and reaches nearly to the posterior end of the cirrus-sac. The posterior limit of the intestine is not easy to make out in whole mounts as it is often obscured by the eggs in the uterus.

A sinus occurs at the posterior margin of the worm, normally in the median line, though contraction has, in some cases, displaced the opening to the left of the median line. Into it open the ducts of the male and female systems and of the excretory vesicle. The opening of the sinus does not appear to be surrounded by a sphincter. The elongate cirrus-sac, which, due to contraction, lies at an acute angle to the median line, measures 0·95 × 0·23–0·28 mm and possesses a fairly thick muscular wall. It contains an oval seminal vesicle, 0·38–0·43 mm × 0·23–0·25 mm, which occupies the anterior portion of the cirrus-sac. The pars prostatica passes out of the middle region of the seminal vesicle, and runs to near the posterior extremity of the cirrus-sac where it unites with a short muscular cirrus. The testes are transversely elongate, well separated one behind the other, and are situated in the middle region of the hinder half of the body. They are 0·56–0·84 mm × 0·22–0·41 mm. The ovary is also transversely elongate measuring 0·53–0·82 mm × 0·23–0·34 mm, and lies a little to the left of the median line between the testes. Directly behind it lies a large diffuse Mehlis' gland. Laurer's canal opens dorsally at the level of the posterior testis. There appears to be no receptaculum seminis. Sperm is accumulated in the initial slings of the uterus, which is long and coiled, running to a position some way anterior to the anterior testis before it turns and passes posteriorly, with many tightly-packed transverse slings. It passes into the posterior region of the body, where it opens into the base of the genital sinus near the cirrus-sac, via a short muscular metraterm. There are numerous small eggs, many of which are collapsed, but measuring 21–27 μm × 12–18 μm when not collapsed. The vitelline follicles lie in two lateral groups, with about 12–16 follicles in each group, extending from about the level of the anterior testis to a position anterior to the foremost extent of the uterus. A few follicles also occur scattered between the testes.



EXTENDED



CONTRACTED

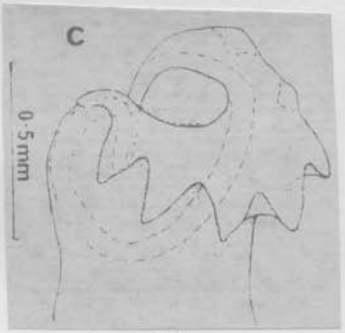
-OVER-

The excretory vesicle opens into the genital sinus, and runs forward to a position just posterior to the posterior testis.

Dolichoenterum longissimum was originally described from *Conger myriaster* in Japanese waters. It has been found a number of times since in the same waters in *C. myriaster* (Ozaki 1928 ; Yamaguti 1938 ; Machida *et al.* 1970) and in *Muraenesox cinereus* (Yamaguti 1934). Prior to the present record, it has also been found in *Conger conger* in New Zealand waters (Manter 1954) and in two localities off the western coast of Scotland (Williams 1960).

Ozaki (1928) and Yamaguti (1934) disagree on the presence of a so-called 'urogenital' pore, that is, the common opening of the genital sinus and the excretory vesicle. Yamaguti states that Ozaki's figure 23 is misleading, and suggests that the 'genital sinus' is no more than a slight depression. Ozaki's figure, however, seems to accurately represent the condition in the present material. It would seem that the depth of the genital sinus is influenced somewhat by the contraction of the body.

Another feature which varies with the condition of the worm is the number and configuration of the projections surmounting the anterior sucker. Such a difference is, according to Tendeiro (1955), a major factor in separating *D. manteri* Tendeiro, 1955 (with only five projections) from *D. longissimum*. Tendeiro found a single specimen of *D. manteri* in *C. conger* from the Algarve coast of Portugal, and considered it distinct for a number of other reasons. The only one of these that appears to be a valid differentiating feature is the length of the intestine, which in *D. manteri* is said to extend only a little behind the middle region of the body. As Tendeiro had but one specimen it may have been that, as is the case in many of my specimens, it was not possible to trace the full extent of the intestine. If this were found to be so, then it seems probable that *D. manteri* should be considered a synonym of *D. longissimum*.



LATERAL

LONGITUDINAL SECTION

FROM BRAY, 1973

Dolichoenterum longissimum Ozaki, 1924

(Fig. 2)

Host and locality : intestine of *Conger conger*, Stn. 7. Bay of Biscay

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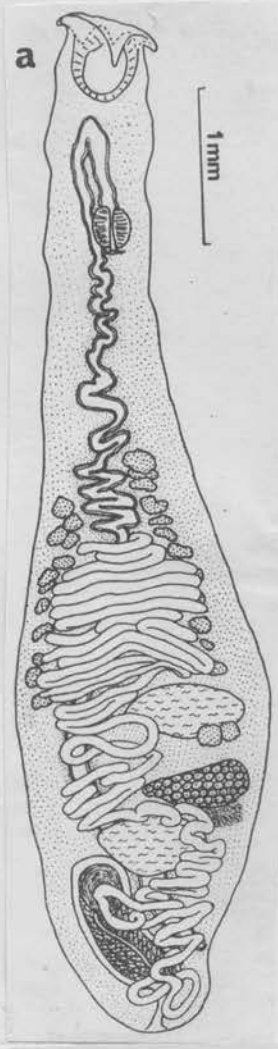

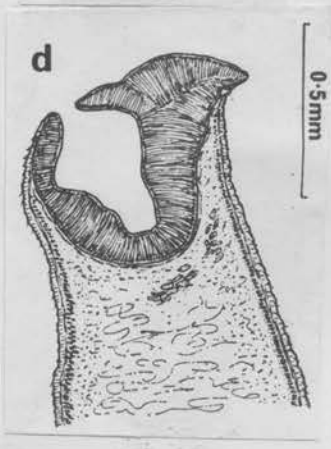

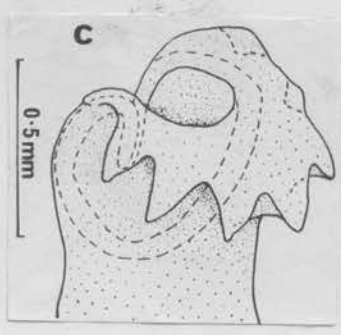

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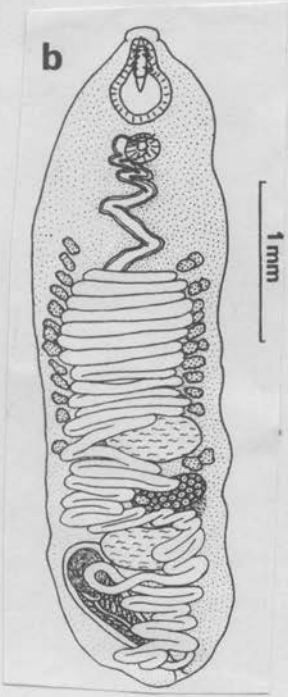


FROM BRAY, 1973

9. *Dolichoenterum congeri* n. sp. Yam. 1970

(Figs. 9 and 319)

HABITAT: Intestine of *Conger marginatus*; Hawaii.

HOLOTYPE: U. S. Nat. Mus. Helm. Coll., No. 63537.

DESCRIPTION (based on six gravid specimens and several immature ones): Body very long, cylindrical, tapered in postpharyngeal region, 5.0-16.5 mm* in length, with maximum width of 0.6-1.3 mm in testicular region. Cuticle thick, spined densely in anterior part, but sparsely at posterior extremity which is broadly rounded or truncate. Rhynchus 0.15-0.4 × 0.21-0.5 mm, with circular pit at apex and a semicircular row of eight conical papillae, blunt-pointed posteriorly. Mouth about middle of anterior third of body, with its opening bordered by circular lamellar muscles; prepharynx distinct, provided with longitudinal muscle fibers; pharynx inverted bowl-shaped, 0.13-0.17 × 0.15-0.19 mm. Esophagus about 0.3 mm long in the type 15 mm long, with thick walls of inner longitudinal and outer circular muscles, directed obliquely forward; intestine extending forward a short distance beyond anterior end of esophagus, terminating near posterior extremity at level of cirrus pouch.

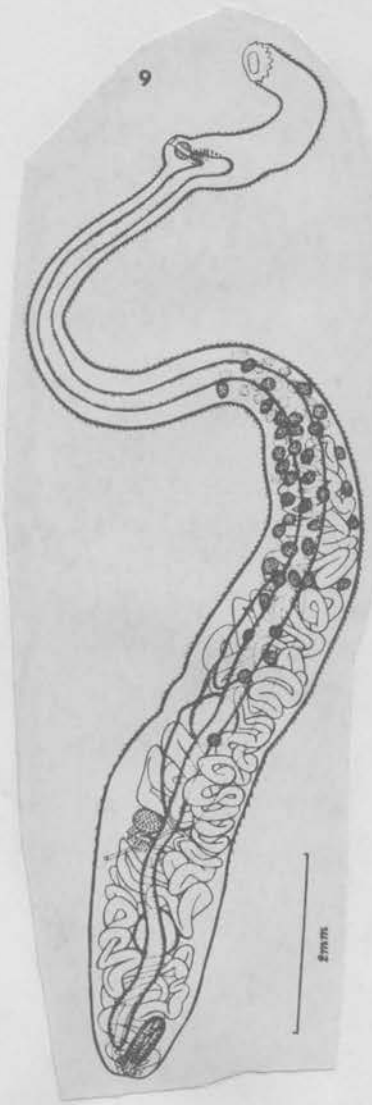
Testes oval, 0.34-0.5 × 0.31-0.52 mm, in posterior third of body, well separated by ovary and uterus. Cirrus pouch subcylindrical, 0.52-0.7 × 0.14-0.26 mm, with very thick wall (30-50 μ) of coarse longitudinal muscles except at each end, well apart from posterior testis in mature specimens; seminal vesicle 0.12-0.25 × 0.08-0.13 mm; pars prostatica nearly straight; genital lobe crooked, massive, occupying entire genital atrium. Genital atrium about 80 μ in diameter in the type, opening into terminal depression of body along with excretory pore.

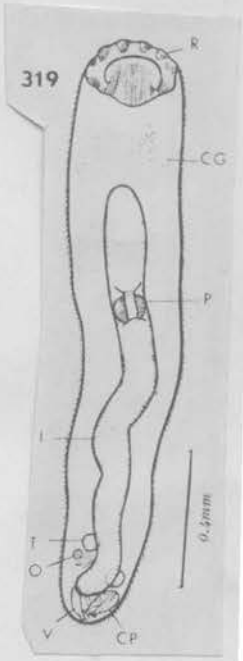
Ovary oval, 0.24-0.28 × 0.25-0.37 mm, situated on the right of median line about middle of posterior third of body, with shell gland immediately behind. Laurer's canal opening dextrodorsally posterior to ovary. Uterus ascending, then descending, occupying all available space of posterior half of body, turning back on itself a short distance posterior to anterior extent of vitellaria. Eggs oval, 28-30 × 21-26 μ in life. Vitelline follicles ovoid, 52-64 in number, confluent anteriorly, extending forward from level of anterior testis to beyond equatorial level.

For the metacercaria of this species see Fig. 319.

DISCUSSION: This species differs from the most closely related *Dolichoenterum microcotylum* Manter et Pritchard, 1960 from Hawaiian *Conger cinereus* in the ovary and testes being wider apart from each other as well as from the cirrus pouch, in the anterior extent of the vitellaria, and in the larger size of the body and eggs. In *D. microcotylum* which is not represented in our collection the eggs are 20-23 μ by 12-17 μ, so that the range of variations is entirely separate from that of the present species. This difference alone is sufficient to distinguish the two species. In *D. magnum* Yamaguti, 1959 from Japanese *Conger conger* the body is 16-20 mm long, and the eggs are 18-20 μ by 11-13 μ.

* All measurements were taken from gravid specimens.





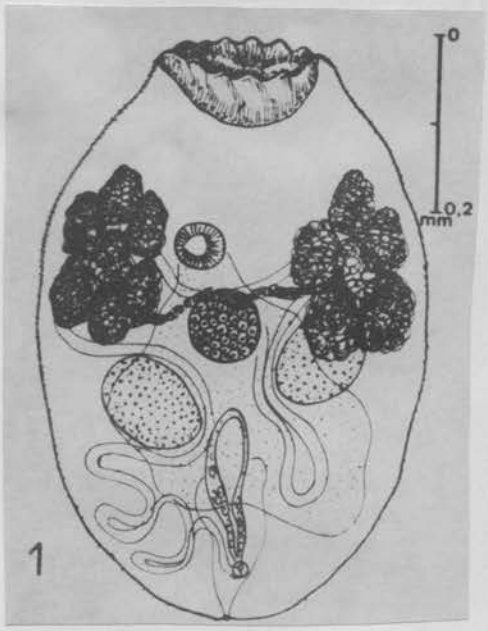
Bucephallidae

DOLICHOENTERUM LAMIRANDI CARRÈRE, 1937

(Planche I)

CARRÈRE (1937) a decrit, sous ce nom, en Camargue, une larve hebergee, dans le foie, par *Atherina mochon*, à raison de plusieurs centaines de sujets chez le même poisson, ou par *A. hepsetus* (foie) du golfe de Marseille, mais en moins grande abondance.

Nous n'avons personnellement retrouvé cette forme que chez deux des athérines de l'étang du Vaccarès, à raison de quelques individus localisés également dans le foie, l'une en mars 1959, l'autre en mars 1960, alors qu'en 1955 et 1956 des individus plus nombreux ne nous en avaient fourni aucun exemplaire ; l'espèce avait peut-être échappé à nos premiers examens, mais il faut se souvenir que le début de 1956 avait été très rigoureux, ce qui n'est sans doute pas allé sans compromettre de nombreux cycles ; de toutes façons, il faut convenir qu'elle s'est maintenue en Camargue malgré l'énorme difference qui existe dans les taux d'infestation entre les observations de CARRÈRE et les nôtres, différence pour laquelle on peut invoquer, comme d'ailleurs dans les cas des autres formes larvaires des athérines, des variations dans les conditions d'habitat spéciales au Vaccarès, modifiant par contrecoup les possibilités d'existence normalement offertes aux Trématodes (voir p. 189). Nos observations positives datant, toutes deux de mars, on serait également tenté d'invoquer l'influence de la saison ; mais, d'une part les dates d'observations de CARRÈRE ne sont pas précisées, d'autre part les nôtres sont en trop petit nombre pour être dans ce domaine prises en considération.



EGGS OMITTED

MORPHOLOGIE DE L'ADULTE

Le développement expérimental réussi par CARRÈRE chez *Labrax lupus* (1937) après ingestion de foie d'athérines, n'a pu être repris en raison notamment du trop petit nombre de larves dont nous avons pu disposer ; le début de développement realise par cet auteur chez *Hyla arborea* représente un aspect interessant des possibilités d'expérimentation qu'offrent ces batraciens pour des larves de Trématodes dont les adultes sont parasites de poissons. La comparaison des mesures faites chez des métacercaires d'une part et des exemplaires, jeunes mais ovigères, rapidement obtenus, ne montre que de très faibles différences de taille, la morphologie de la métacercaire préfigurant ainsi fort bien celle de l'adulte.

Nous avons retrouvé dans l'intestin de plusieurs *Labrax* pêchés au Grau de la Dent (lot 39) des individus de cette intéressante espèce, dont voici une description sommaire :

corps de forme ovale, mesurant 630 × 420 µ ;

cuticule épineuse sur toute sa surface, mais surtout postérieurement ;

cellules glandulaires petites, serrées les unes contre les autres, chromophiles et à orientation générale longitudinale ;

l'organe adhésif, de 155 × 70 µ environ, montre, antérieurement, une couronne de petits mammelons ;

le pharynx, situé à peu près au niveau du tiers antérieur et un peu latéralement sur la droite, a un diamètre de 55 µ ; les limites du cæcum digestif sont difficiles à préciser ;

les testicules, de 12 × 80 µ environ, sont disposés légèrement en oblique, le gauche étant un peu plus antérieur que le droit ;

l'ovaire, de 85 µ de diamètre environ, est situé entre les testicules ;

l'utérus décrit un certain nombre de circonvolutions : une première boucle se fait à gauche et en arrière, puis il remonte en passant entre ovaire et testicule gauche en le dépassant un peu, contourne très postérieurement le pharynx, s'étale à droite sur plusieurs boucles atteignant le niveau du pharynx, puis, passant entre testicules et vitellogènes droits, remplit tout l'espace à droite de la poche du cirre ; le métraterme, non musculeux, aboutit au pore genital sub-terminal ;

les œufs, jaunes et nombreux, mesurent 22 × 12 µ ;

les vitellogènes, latéraux et médians, sont constitués par des grappes de 6 à 7 follicules ;

la poche du cirre, droite et allongée, mesure 200 × 40 µ ; elle contient, sous une membrane bien définie, une vésicule séminale ovoïde prolongée par un canal éjaculateur légèrement sinueux entouré des cellules prostatiques.

Nous n'avons pu observer ni la vessie excrétrice, ni le détail de la partie initiale du complexe femelle : oviducte, vitelloducte, canal de Laurer et glande de Mehlis.

Can't be *Dolichoenterum*.
See Manter + Pritchard, 1968
"species incertis"

-OVER-

MORPHOLOGIE DE LA METACERCAIRE

Les kystes sont installés profondément dans le foie ; la paroi est très mince en relation intime avec la cuticule de la larve.

La forme du corps de la métacercaire est très globuleuse, de 510 à 430 µ ;

les épines cuticulaires sont beaucoup plus grandes et serrées dans la région antérieure que sur le reste de la surface du corps ;

l' « haptor » caractéristique des Gasterostomes est bien développé, il mesure 100 µ environ et porte sur son bord antérieur une série régulière d'une dizaine de mammelons très arrondis formant couronne ;

le pharynx, au centre duquel se trouve l'orifice buccal, est un peu latéral au niveau du tiers antérieur ; il mesure 50 µ de diamètre et donne directement accès à un intestin monocaecal mais suffisamment élargi pour remplir pratiquement toute la partie postérieure du corps ;

les organes du système génital sont très avancés dans leur développement :

- les ébauches testiculaires, arrondies et symétriques par rapport à l'axe du corps, mesurent 80 × 100 µ et sont au niveau du tiers postérieur ;
- l'ébauche ovarienne, sphérique, de 50 µ, est située entre les testicules ;
- la poche du cirre, contenant cirre, cellules prostatiques et petite vésicule séminale, s'allonge dans l'axe du corps jusqu'au pore génital qui est presque terminal ;
- on peut suivre quelques boucles de l'ébauche utérine ;
- dans la partie médiane du corps, il y a latéralement deux amas cellulaires chromophiles qui représentent les futures glandes vitellogènes lesquelles sont réunies par un vitelloducte transverse, d'aspect granuleux, parfaitement visible entre pharynx et testicules ;

le pore urinaire est tout à fait postérieur ; la vessie est tubulaire et de très petite taille.

L'assimilation de ces exemplaires à la forme décrite par CARRERI ne peut être mise en doute. Regrettant que la description originale ne soit pas accompagnée d'une illustration, nous tentons de combler ici cette lacune.

DISCUSSION

L'attribution de ces exemplaires adultes à l'espèce sommairement décrite par CARRÈRE ne peut, dans ces conditions, faire de doute, malgré de très légères différences morphologiques ; leur récolte (la première depuis la description-princeps) est donc intéressante à souligner puisqu'elle nous permet de donner ici une figure, élément d'une meilleure étude morphologique.

La rapide discussion systématique fournie par CARRÈRE se soutient sans difficulté ; parmi les *Gasterostomata*, seul le genre *Dolichoenterum* OZAKI, 1924, montre en même temps les deux caractères :

- cæcum dirigé postérieurement,
- ovaire situé entre les testicules.

La morphologie générale de *lamirandi*, très différente de celle de l'espèce type (notamment l'aspect globuleux, la position symétrique des testicules et l'extension du cæcum), ne saurait justifier un éloignement des deux espèces, mais, sans doute, serait-il nécessaire d'émender les diagnoses du genre et de la sous-famille données par YAMAGUTI (1958), en particulier en ce qui concerne la position des testicules et la forme du corps.

La répartition géographique du genre se trouve être ainsi très discontinue, *longissimum* OZAKI, 1924, et *magnum* YAMAGUTI, 1959, ayant été respectivement cités du Japon et de la Nouvelle-Zélande, et du Japon, et *lamirandi* CARRÈRE, 1937, de Camargue et du golfe de Marseille. Selon YAMAGUTI (1959) la description de *manteri* TENDEIRO (chez le congre, au Portugal) n'est pas valable.

From REBECQ, 1964

3. *Dolichoenterum magnum* n. sp.

(Pl. XX, Fig. 2) Yamaguti, 1959

Habitat: Small intestine of *Conger conger* LINNÉ.

Material: Three gravid specimens fixed under cover glass pressure, stained and mounted as usual, 16–20×1.4–2.0 mm.

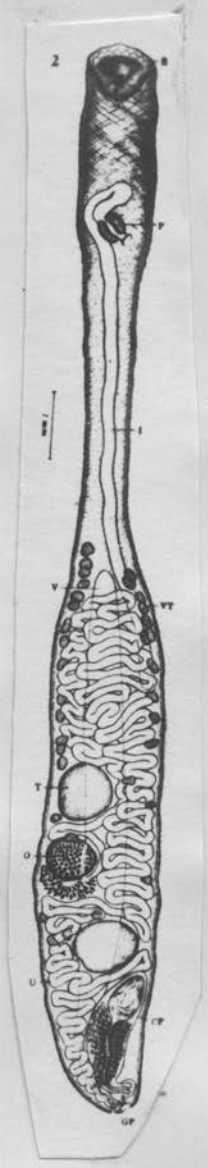
Locality and date: Shinmaiko, Aquarium of Tokyo University; May 13, 1958.

Body elongate, more or less attenuated in region between mouth and anterior end of uterus, truncate in front and blunt-pointed behind. Cuticle densely beset all over with scale-like spines. In addition to the longitudinal subcuticular musculature which extends throughout the body, there are diagonal muscle fibers which are particularly well developed in the region between the rhynchus and the mouth opening. Rhynchus terminal, with wide ventral opening and a dorsal half-crown of 8 blunt conical muscular protuberances, 0.7–1.0×0.9–1.1 mm. Mouth opening midventrally at a distance of 2.7–4.0 mm from anterior extremity, leading into pharynx by way of a vestibule. Pharynx muscular, 0.3–0.35×0.37–0.4 mm; intestine at first ascending a short distance, then turning back on itself to descend in the median field to near middle of body where it is shifted dorsolaterad by the uterus and terminates short of the anterior testis.

Testes rounded, wide apart in posterior third of body, the anterior (0.8×0.7–1.0 mm on the right at about anterior end of posterior third of body, the posterior (0.6–0.9 ×0.85–1.2 mm) slightly to left of median line in front of base of cirrus pouch. Cirrus pouch fusiform, strongly muscular, 1.5–1.7×0.5 mm, at posterior extremity. Seminal vesicle large, oval, 0.6–0.7×0.36–0.4 mm, at base of cirrus pouch; prostatic complex occupying rest of cirrus pouch. A large genital lobe projecting into genital atrium, which opens midventrally at the posterior end of the body.

Ovary rounded, 0.5–0.75×0.6–0.7 mm, situated behind anterior testis, from which it is separated by a uterine coil. Shell gland complex immediately postovarian. Uterus thrown into very close transverse coils, reaching to midregion of body, where it turns backward and occupies all available space between other genital organs and body wall, finally it runs down alongside the cirrus pouch and opens into the genital atrium; eggs elliptical, 18–20×11–13μ. Vitelline follicles extend along each side of body at irregular intervals; right ones 20–22 in number, from equatorial zone to level of posterior testis; left ones 14–17 in number, less extensive than right ones, terminating at level of ovary or shell gland. Excretory vesicle tubular, wide, reaching to midregion of body, slightly beyond anterior end of uterus; pore dorsoterminal.

This species is characterized by its enormous size, to which the specific name refers. It differs from *D. longissimum* OZAKI, 1924, from the related fish host, in the posterior extent of the cecum and in the much smaller size of the eggs, in addition to the difference in body size. The description by TENDEIRO of *Dolichoenterum manteri* from a Portuguese conger eel was not available.



DOLICHOENTERUM MANTERI N. SP.

Tendeiro, 1954

Hospedeiro: ***Conger conger*** **(L.), o safio ou congro.**

Localização: **Intestino.**

Frequência: **Um único espécime em cerca de 40 safios examinados.**

Referência, material e origem: **Missão de Biologia Marítima da Junta de Investigações do Ultramar, Parasitologia, registo B-6 (um exemplar recolhido pelo Dr. Vasco Valdez, em 1/8/954, a bordo do arrastão «Basílio», de um safio pescado, em 31/7/954, na costa do Algarve, entre Albufeira e o Cabo Carvoeiro, a 60 braças).**

Diagnose específica: Corpo de tamanho médio (1), espinuloso, ciliudróide, mais estreito à frente e alargado posteriormente. Extremidade anterior ocupada por uma ventosa rodeada quase por completo por uma pala membraniforme e com processos papilares pouco desenvolvidos. Boca abrindo-se no terço anterior. Intestino comprido e tubuliforme, não atingindo os testículos. Gónadas ocupando a metade posterior do corpo. Ovário globuloso, situado entre os dois testículos. Útero comprido e extremamente flexuoso. Testículos ovóides, separados entre si por uma distância inferior aos respectivos diâmetros maiores. Orifício genital próximo da extremidade posterior. Vitelógenos laterais, foliculares, dispondo-se desde o meio do corpo até o nível do testículo posterior.

Morfologia *(figs. 1 a 4):* Corpo alongado, espinuloso, cilindróide, medindo no holotipo, após montagem, 11,62 mm. de comprimento por 1,81 mm. de largura máxima; metade anterior mais estreita, apenas ocupada pelo aparelho digestivo, nos seus dois terços posteriores; metade posterior bastante ampla e engrossada, contendo os órgãos reprodutores.

Ventosa anterior terminal, tão comprida como larga, tendo 0,77 mm. de diâmetro longitudinal por 0,77 mm. de diâmetro transversal, rodeada quase completamente por uma pala membraniforme, provida de cinco papilas obsoletas.

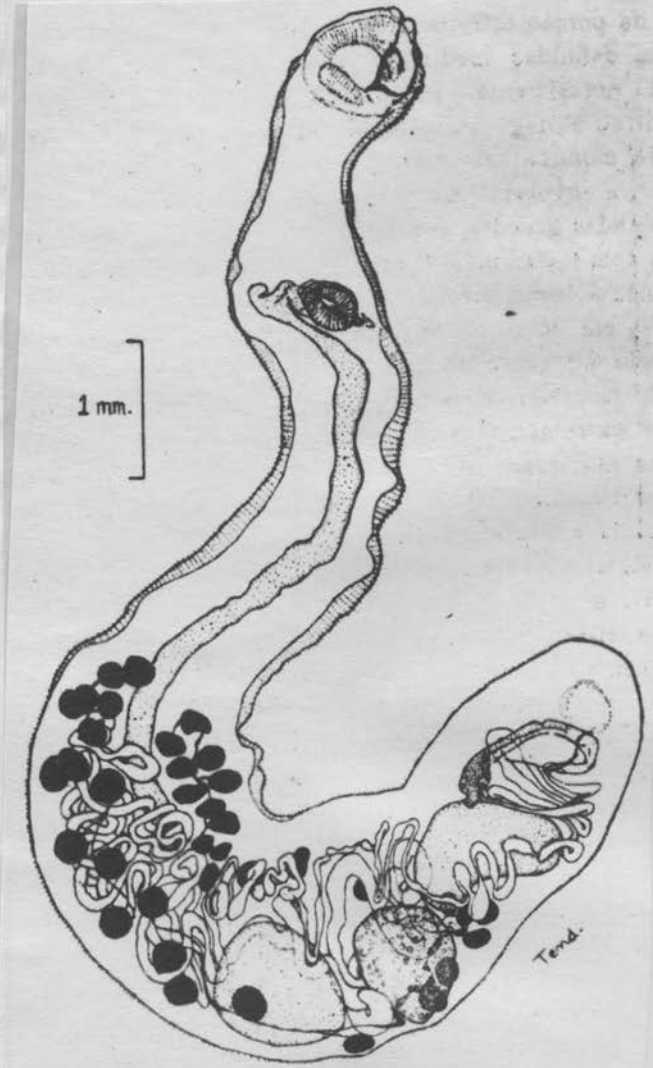


Fig. 1 – *Dolichoenterum manteri* n. sp
Aspecto lateral direito (Original)

Boca estreita e alongada, abrindo-se na porção anterior do corpo, a 2,58 mm. da extremidade cefálica (ou seja a 1/4,5 ou 22,20 % do comprimento total), na reunião do terço anterior com o terço médio da porção estreitada do corpo. Faringe com fibras musculares bem definidas, medindo 0,42 mm. × 0,33 mm. Esófago curto, dirigido dorsalmente. Intestino comprido, tubuliforme, formando a seguir ao esófago um cotovelo agudo e dirigindo-se depois para trás, de modo a terminar um pouco para a frente do testículo anterior, e envolvido, na porção final, pelas ansas do útero.

Gónadas grandes, contíguas, colocadas em série. Ovário globuloso, com 0,90 mm. × 0,74 mm., situado entre os dois testículos, um pouco sobre a direita. Glândulas vitelógenas foliculares, dispondo-se em dois grupos laterais, compreendendo 19 folículos de cada lado no espécime estudado, do meio do corpo ao nível do testículo posterior, mais numerosas à frente. Útero bastante comprido e extremamente flexuoso, com as ansas anteriores estendendo-se até quase ao plano equatorial, à altura dos primeiros folículos vitelinos. Ovos numerosíssimos, ovais, muito pequenos, medindo 17 a 20μ × 9 a 12,5μ.

Testículos ovóides, maiores do que o ovário, colocados num plano um pouco para a esquerda deste e separados um do outro por uma distância inferior aos respectivos diâmetros maiores; no nosso exemplar, o testículo anterior mediu 1,04 mm. × 0,85 mm., e o posterior 1,17 mm. × 0,60 mm., sendo a distância intertesticular igual a 0,84 mm. Bolsa do cirro dispondo-se até a parte média do testículo posterior. Seio genital abrindo-se a curta distância da extremidade posterior do corpo, e recebendo também a abertura da vesícula excretora.

Discussão: O parasita em estudo integra-se quase por completo na descrição original do género *Dolichoenterum*, que se caracteriza, segundo Ozaki (1928), pelos seguintes elementos: «Corpo alongado, cilíndrico, espinuloso Extremidade anterior com uma ventosa adesiva em forma de funil; extremidade posterior arredondada. Abertura oral ventral, um pouco posterior à extremidade anterior. Ventosa bucal ausente Faringe presente. Esófago curto. Ceco em forma de um canal simples e comprido, estendendo-se até próximo da extremidade posterior. Poro urogenital na extremidade posterior do corpo. Bolsa do cirro muscular,

S. R.
MINISTÉRIO DO ULTRAMAR
JUNTA DAS MISSÕES GEOGRÁFICAS
E DE
INVESTIGAÇÕES DO ULTRAMAR
CENTRO DE ZOOLOGIA
LISBOA - PORTUGAL

Lisbonne, le 31 Mai 1955

Dr. H. W. Manter
Department of Zoology
The University of Nebraska
Lincoln, U. S. A.

Cher Docteur Manter

Je viens de recevoir vos articles "Trematoda of the Gulf of Mexico" et "Parasitic helminths", que j'ai beaucoup apreciés.

Une nouvelle observation de Dolichoenterum manteri ne m'a pas laissé apercevoir, outre le pharynx, quelque autre formation musculaire qu'on peut regarder comme une ventouse orale. Je vous remets une foto de la partie correspondante du parasite - qui montre très exactement la morphologie de la partie antérieure de l'appareil digéstif, bien qu'une autre de la préparation totale. Je pense qu'elles vous seront de quelque utilité.

Avec mes plus vifs remerciements, veuillez recevoir, cher Prof. Manter, mes salutations les plus distinguées.

João Tendeiro

João Tendeiro
Centro de Zoologia
Rua da Junqueira, 14
Lisboa, Portugal

Family Bucephalidae

Dolichoenterum microtylum n.sp. Manter & Pritchard, 1960
(Figs. 1–4)

Host: *Conger cinereus* Ruppell, conger eel, locally known as puhi uha (slippery eel) and puhi ula (red eel); 12 specimens (2 mature, 9 immature, and posterior half of a mature specimen) in 3 of 37 hosts examined.

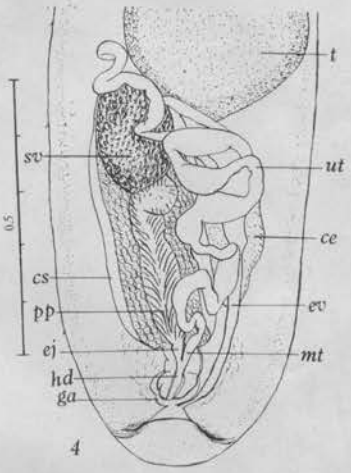
Location: Intestine.

Holotype: U. S. Natl. Mus. Helm. Coll., No. 39156.

Description: Body long and slender; length 3.979 to 6.570 by 0.504 to 0.548 greatest width; all reproductive organs in posterior half of body which is wider and more cylindrical than the anterior half; both ends truncate; body spines numerous anteriorly, disappearing posteriorly. Anterior sucker cup-like, 0.168 to 0.219 wide by 0.146 to 0.153 long; dorsal side with 8 papillae. Mouth about 1/6 to 1/5 body length from anterior end, surrounded by a weakly developed but distinct oral sucker, 0.033 long by 0.025 deep; prepharynx 0.032 to 0.058 long; pharynx ovoid or pyriform, 0.136 to 0.153 long by 0.128 to 0.131 wide; esophagus somewhat shorter than prepharynx; cecum with short anterior appendix, very long, almost straight, extending past gonads to near posterior end of body.

Testes tandem, separated by ovary, subequal, 0.307 to 0.382 by 0.219 to 0.295 wide. Cirrus sac thick-walled except at each end where its wall thins, 0.496 to 0.548 by 0.167 to 0.212, overlapping posterior testis slightly. Seminal vesicle ovoid, in anterior third of cirrus sac; pars prostatica straight or nearly so; ejaculatory duct short, leading into hermaphroditic duct of genital papilla; genital atrium shallow, opening into terminal depression of body into which excretory pore also opens.

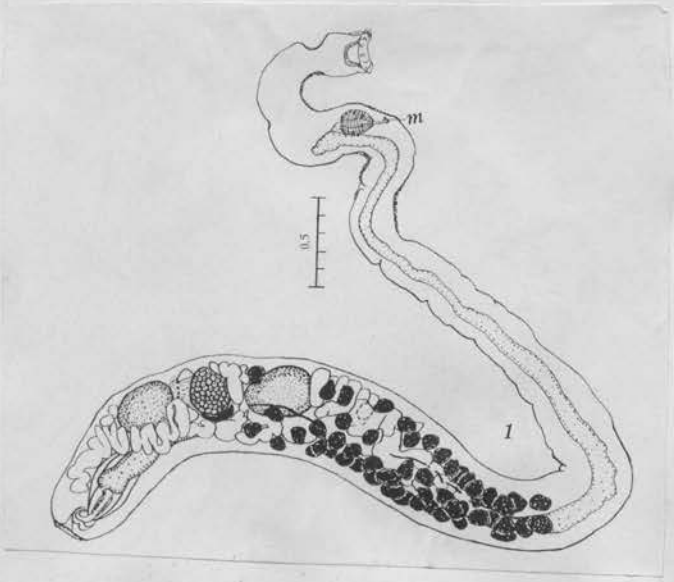
Ovary intertesticular, wider than long, 0.190 to 0.204 by 0.256 to 0.263; Mehlis' gland and Laurer's canal immediately postovarian; uterus coils anteriorly about 1 mm. then posteriorly; metraterm short, joining ejaculatory duct near base of genital papilla; eggs yellowish, thin-shelled, 20 to 23 by 12 to 17 microns; vitelline follicles rounded to ovoid, extending from anterior testis to near midbody, confluent anterior to anterior testis, 55 to 57 follicles in 2 specimens, 70 in another. Excretory vesicle extending to anterior end of cirrus sac.

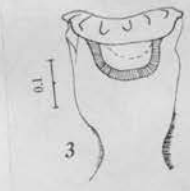


Discussion: Four species of *Dolichoenterum* have been named: *D. longissimum* Ozaki, 1924, from conger eels of Japan and New Zealand; *D. lamirandi* Carrère, 1937, experimentally in *Hyla arborea; D. manteri* Tendeiro, 1954, from the conger eel, coast of Portugal; and *D. magnum* Yamaguti, 1959, from the conger eel of Japan. No figure of *D. lamirandi* was given but its description indicates an ovoid body, testes side by side, and intertesticular ovary. This body shape and arrangement of gonads is very different from *Dolichoenterum,* and the species probably belongs in another genus. We consider it a *species incertus.*

D. microcotylum differs from all other gasterostomes in possessing an oral sucker which, however, was not visible in immature specimens. Its occurrence supports the view that the pharynx-like structure of gasterostomes is truly a pharynx. The name microcotylum (minute sucker) refers to this oral sucker.

D. microcotylum differs from *D. longissimum* in more anterior mouth, more numerous and confluent vitelline follicles. *D. manteri* has only 5 anterior papillae, a shorter cecum reaching only slightly beyond midbody, and larger gonads closer together. *D. magnum* appears to differ chiefly from *D. manteri* only in having 8 anterior papillae. The 5 papillae of the single specimen of *D. manteri* were indistinct and 8 may prove to be present as in other species of the genus. Tendeiro has indicated (in correspondence) that *D. manteri* also has an inconspicuous oral sucker.





– OVER

Dolichoenterum microcotylum Manter and Pritchard, 1960

(Fig. 13)

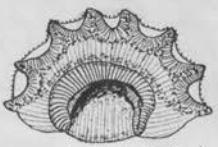
Host: Conger cinereus marginata Val., white eel, puhi-uha (Congridae); 45 specimens (including 16 adult, 8 very young adults with few eggs, 13 immature, and 8 broken specimens) from five of six hosts. HAWAII

Location: Intestine.

Discussion: Mature and young adult specimens vary from 9.787 to 21.886 long by 0.463 to 1.295 wide; immature specimens, 4.124 to 13.228 long by 0.389 to 0.685 wide. Eggs vary from 19 to 32 long by 16 to 24 wide, but in only four specimens does the egg size vary more than 4 μ (up to 7 μ). The cecum extends to mid-cirrus sac or more posteriorly. Vitelline follicles vary from 48 to 70, usually 50 to 60. Between 11 and 23% of body length is anterior to the pharynx in adult and young adult specimens (20 to 30% and up to 40% in immature specimens); 42 to 65% of body length is anterior to the vitellaria. The "papillae" or projections on the rhynchus (Fig. 13) are conspicuous.

In only one of our specimens do we find a well-developed oral sucker such as was described for *D. microcotylum*. Since it occurs in a specimen 18.871 long, the sucker is proportionately larger, but otherwise as originally reported. Five specimens possess an identifiable oral sucker. Except for the oral sucker, there seems to be nothing to separate these specimens from the others. Although the species is named for the oral sucker, it now seems apparent that it may or may not be present.

D. microcotylum differs from the closely related *D. longissimum* Ozaki, 1924, in more numerous vitelline follicles (48 to 70 compared with 31 to 40), the more slender anterior part of the body, and somewhat wider eggs. The oral sucker seems to be an individual variation.



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FROM PRITCHARD, 1963

Heterobucephalopsis ~~gen. nov~~. Gu and Shen, 1983

Generic diagnosis Bucephalidae, Bucephalinae. Body elongate, tongue shaped, spinose. Rhynchus sucker-shaped, without appendages. Pharynx pre-equaterial and median. Caecal sac tubular, directed posteriorly. Testes oblique, in posterior half of body. Cirrus sac small. Seminal vesicle in level of posterior testis. Ovary inter-testicular. Seminal receptacle present. Vitellaria in two rows of follicles, lateral to genital organs. Uterine coils filling midbody reaching to pharynx anteriorly. Excretory system V-shaped with short excretory vesicle. Intestinal parasite of marine teleost.

Type species *Heterobucephalopsis gymnothoracis* gen. nov et sp. nov.

GU and Shen, 1983

Heterobucephalopsis gymnothoracis ~~gen. nov. et sp. nov.~~ (fig. 4)

Three species were obtained from the intestine of a *Gymnothorax undulatus* (Lecepede).

This species is characterized by the position of the ovary which lie between testes, the postion of the pharynx, the shape of the caecal sac, the distribution of the vitellaria and the position of the uterine coils. It seems to be a new genus and Heterobucephalopsis is suggested.

Xisha Islands, Guangdong Province, CHINA

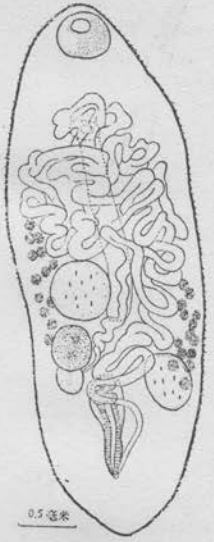


图 4 裸胸鳝异似牛首吸虫(新属、新种)
Heterobucephalopsis gymnothoracis gen. nov. et sp. nov. 的腹面图

Neobucephalopsis Dayal, 1948

Generic diagnosis. — Bucephalidae, Prosorhynchinae: Body small, subcylindrical, spinose. Rhynchus sucker-like, without tentacular appendages. Mouth opening in midregion of body. Intestine saccular, level with pharynx. Testes tandem, partly overlapping each other, immediately behind intestine. Cirrus pouch curved, subcylindrical, reaching to anterior testis or not. Genital pore ventroterminal. Ovary anterior to intestine; shell gland postovarian. Receptaculum seminis present. Uterus ascending to rhynchus or not; eggs very small, thin-shelled. Vitelline follicles forming a compact mass on each side of body between rhynchus and ovary. Excretory vesicle tubular, reaching as far as anterior testis; pore terminal. Intestinal parasites of fishes.

Genotype: *N. bagarius* Dayal, 1948 (Pl. 33, Fig. 431), in *Bagarius yarrellii;* India.

Other species:

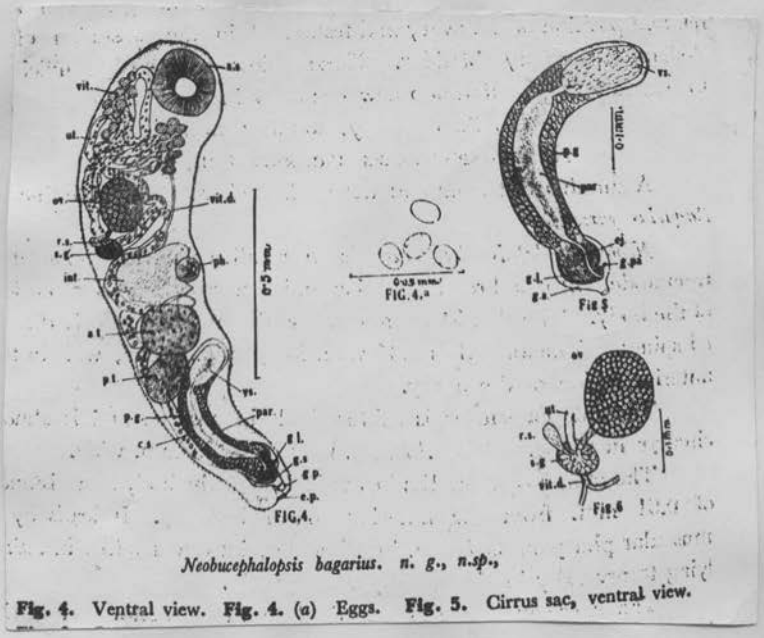
N. eutropiichthis Gupta, 1954, in *Eutropiichthys vacha;* Lucknow.
N. gauhatiensis Gupta, 1954, in *Pseudeutropius garua;* Assam.
N. pseudeutropei Gupta, 1954, in *Pseudeutropius garua;* Lucknow.

NEOBUCEPHALOPSIS Dayal,1948

A genus like Bucephalopsis except that a seminal receptacle is present. The ovary is separated from the testes by the intestine much as in B.fusiformis

Type species : N.bagarius Dayal,1948
from a fish, Bagarius yarrellii near Lucknow

The trematode should be : ## N.bagarii



Neobucephalopsis bagarius. n. g., n.sp.,

Fig. 4. Ventral view. **Fig. 4.** (a) Eggs. **Fig. 5.** Cirrus sac, ventral view.

NEOBUCEPHALOPSIS BAGARIUS ~~N. G., N.SP.~~ DAYAL, 1948

A number of trematodes were collected from the intestine of *Bagarius yarrellii*.

Neobucephalopsis bagarius is a small cylindrical, elongated trematode with a broad anterior and a narrow posterior portion of the body. The skin is covered over with small backwardly directed spines. The animal is 1.34 mm. long by 0.32 mm, wide in the anterior region of the ovary.

The anterior sucker is subterminal in position and is almost circular in shape. It is 0.17 mm. long by 0.175 mm. wide.

The mouth opening lies in the middle of the body at a distance of 0.61 mm. from the anterior end of the body. It leads by a muscular pharynx, 0.07 mm. in diameter, into a sac-like intestine lying transversely in the middle of the body.

The excretory pore is terminal at the posterior end of the body and leads into a tubular excretory bladder extending as far as the anterior testis.

The genital pore is ventral in position and lies in front of the excretory pore.

The two testes lie one behind the other posterior to the intestine. The anterior testis is larger than the posterior and is 0.13 mm. long by 0.16 mm. wide. The posterior testis is partly covered over by the anterior testis and is 0.15 mm. long by 0.1 mm. wide.

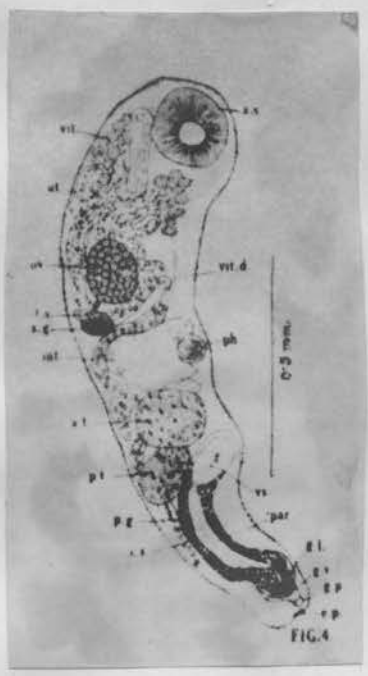


FIG. 4

The cirrus sac is a large crescentic organ extending upto the anterior testis. It is 0.51 mm. long by 0.08 mm. broad. The organs present within the cirrus sac are, vesicula seminalis, pars prostatica, prostate glands, ejaculatory duct and genital lobe. The vesicula seminalis is 0.14 mm. long by 0.07 mm. wide and opens by a narrow duct into a long tubular pars prostatica surrounded by prostate gland cells. The pars prostatica is 0.24 mm. long by 0·04 mm. wide. The ejaculatory duct opens into the genital sinus on the left side in the posterior region of the genital lobe, almost dividing the latter into two parts. The genital lobe is broad and muscular and occupies nearly the whole of the genital sinus. A small genital papilla projects into the genital sinus on the left side anterior to the opening of the male duct.

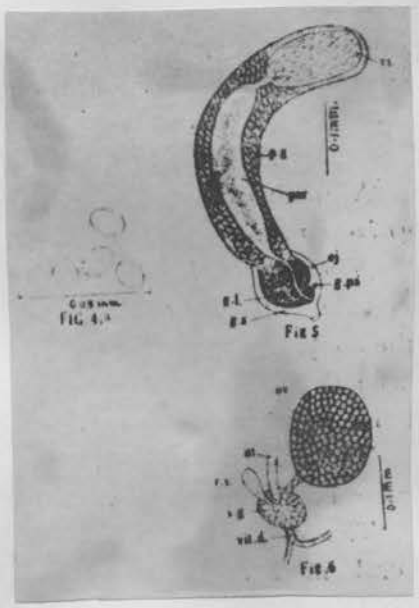


FIG. 5

FIG. 6

The ovary lies anterior to intestine at a distance of 0.41 mm. from the anterior end of the body. It is oval in shape and is 0.14 mm. long by 0.12 mm. wide. From its posterior side arises the oviduct which opens at the ootype. The shell gland cells surrounding the ootype form a compact oval mass about 0.05 mm. by 0.07 mm. in size. The vitelline glands consist of large rounded or oval follicles forming a compact mass on each side of the body behind the anterior sucker. They are from 10—13 on each side of the body. Each gland measures 0.02—0.03 mm. in diameter. The two vitelline ducts unite on the right side of the ootype before opening into it. A receptaculum seminis, about 0.05 mm. long by 0.02 mm. wide, is present on the right side of the ootype.

The uterus arises from the ventral side of the ♂otype and runs forwards upto the anterior sucker. It then bends and runs backwards to the posterior end of the body, where it opens into the genital sinus. During its course it forms irregular coils. The eggs are oval and thin shelled. They measure 0.01—0.02 mm. in length by 0.009—0.01 mm. in breadth.

Remarks.—The new form, *Neobucephalopsis bagarius*, resembles the genus *Bucephalopsis* in the structure of the anterior sucker and the relative position of the genital organs, but differs from it chiefly in *the presence of a distinct receptaculum seminis* and in having eggs with thin shell. The receptaculum seminis, so far as I am aware, is absent in all the known species of *Bucephalopsis*, and this difference together with the general topography and the relative size of organs appear sufficient to warrant the erection of a new genus for this form.

GENERIC DIAGNOSIS OF NEOBUCEPHALOPSIS DAYAL 1948

Bucephalinae :—Body small to medium size or sub-cylindrical, dorsoventrally flattened with a broader anterior and narrower posterior end; integument smooth or with scale like spines; anterior sucker is sub-terminal in position and circular or oval in shape; muscular pharynx, circular or oval, lying nearly in the middle of the body either anterior or posterior to or in level with the ovary; oesophagus small, and slender; intestine sac-like lying in the middle or a little anterior to the middle of the body; testes oval, posterior to Intestine, lying obliquely one behind the other; genital pore ventral in position at the posterior end of the body; cirrus sac a cylindrical organ with vesicula seminalis, pars prostatica, prostate gland cells, ejaculatory duct and genital lobe ; ovary in the anterior, middle or posterior half of the body; receptaculum

seminis, Laurer's canal present; vitelline glands consist of large rounded or oval follicles of varying number on either side of the body behind the anterior sucker; uterus transversely coiled, between the anterior sucker and genital pore; excretory bladder tubular or sac-like extending as far as the anterior sucker. Parasites of fresh-water fishes.

Type species:—*Neobucephalopsis bagarius* Dayal, 1948.

Key to the species of the genus *Neobucephalopsis* Dayal, 1948.

1. Testes on either side of the cirrus sac	... *N. gauhatiensis* n. sp.
Testes on one side of the cirrus sac.	... 2.
2. Ovary larger than testes	... *N. eutroplichthis* n.sp.,
Ovary smaller than testes	... 3.
3. Cirrus sac extending upto anterior testis, and ovary anterior to intestine	... *N. bagarius*.
Cirrus sac not extending upto anterior testis, and ovary in level with pharynx	... *N. pseudeutropei* n. sp.

From: Gupta, 1953

Genus Neobucephalopsis Dayal, 1948

Neobucephalopsis eutropiichthis n. sp. (Gupta, 1953

(Figs. 1-2)

Two specimens of this form were collected from the intestine of a fresh water fish, *Eutropiichthys vachà* (Ham.) from the river Gomti at Lucknow in the month of April, 1951.

The forms are large dorsoventrally flattened with broad anterior end and narrow posterior end. The body is devoid of spines and measures 4.5-5.42 mm. in length and 1.58-1.72 mm. in maximum breadth, which is a little anterior to the intestine. The type specimen measures 5.42 mm. in length and 1.72 mm. in maximum breadth.

The anterior sucker is oval in shape and measures 0.6 mm. in length by 0.66 mm. in breadth. The mouth opening lies at a distance of 2.41 mm. from the anterior end of the body. It opens into a well developed oval pharynx measuring 0.23 mm. in length by 0.28 mm. in breadth. The latter opens through a small oesophagus about 0.14 mm. in length, into a large sac-like intestine, 0.86 mm. in length by 0.39 mm. in breadth, which lies a little to the left of the median line.

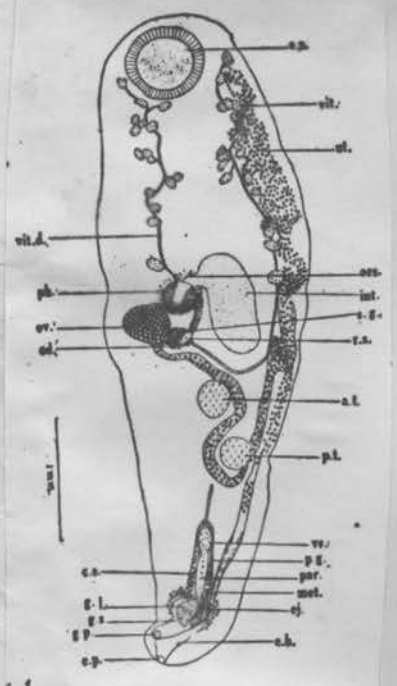
The excretory pore is terminal and lies at the posterior end of the body. It leads into a sac like excretory bladder extending as far as the anterior sucker.

The genital pore lies at the posterior end of the body, 0.17 mm. in front of the excretory pore.

The two oval testes lie obliquely one behind the other in the posterior half of the body, posterior to intestine and anterior to cirrus sac. The anterior testis is larger than the posterior and measures 0.32 mm. in length by 0.26 mm. in breadth. It is situated at a distance of 3.06 mm. from the anterior end of the body. The posterior testis lies at a distance of 0.2 mm. behind the anterior testis and measures 0.25 mm. in diameter. The cirrus sac is a long cylindrical organ measuring 1.11 mm. in length by 0.29 mm. in breadth. It lies medially in the posterior region of the body approximately 1/6th the length of the entire body. The vesicula seminalis is tubular and lies at the anterior end of the cirrus

sac. It measures 0.22 mm. in length by 0.12 mm. in breadth. It opens into a tubular pars prostatica, 0.4 mm. in length by 0.11 mm. in breadth. Prostate gland cells fill up nearly the whole space round the pars prostatica. The ejaculatory duct opens into the genital sinus in the middle of the genital lobe, on the left side almost dividing the latter into two parts. The genital lobe is muscular and spoon-shaped and occupies a large space of the genital sinus. The genital sinus is surrounded by small gland cells.

The ovary is situated in the middle, anterior to testes on the right side at a distance of 2.4 mm. from the anterior end of the body. It is larger than the testes and oval in shape. It lies generally just behind the pharynx, but in some forms it is in level with the pharynx. It



measures 0.34 mm. in length by 0.38 mm. in breadth. From its posterior side arises the oviduct which opens at the oötype. The [illegible]chlis (shell) gland cells surrounding the oötype form a compact oval mass about 0.16 mm. in length by 0.22 mm. in breadth. The vitelline glands consist of large follicles which run longitudnally on either side in the anterior region of the body. They extend from the middle of the anterior sucker upto the anterior region of the pharynx. The follicles are rounded or oval and sometimes bilobed, their number is 15-17 on the left side and 13-18 on the right side of the body. The two vitelline ducts meet on the dorsal side of the shell gland before opening at the oötype. A receptaculum seminis, about 0.12 mm. in length by 0.07 mm. in breadth is present on the left side of the oötype. A Laurer's canal is present. The uterus arises from the dorsal side of the oötype. It runs forward upto the pharynx, where it bends and runs towards the dorsal side of the ovary and then extends upto the hind end of the posterior testis. Behind the posterior testis it again bends and runs forward on the left side of the body upto the hind end of the anterior sucker where it bends again and runs towards the posterior end of the body following a zig-zag course on the same side. At the hind end it runs on the left side of the cirrus sac to open into the genital sinus. The posterior portion of the uterus is muscular.

The eggs are oval and thin-shelled. They measure 0.02-0.025 mm. in length by 0.014-0.016 mm. in breadth.

Discussion.—The new form, *Neobucephalopsis eutropiichthis* n. sp., differs from *Neobucephalopsis bagarius*, in the larger size of the body, in the position and size of the ovary which is posterior to pharynx and larger than testes, in the extension of uterus and in the proportional size of the cirrus sac which in the new form is 1/6th the body length while in *Neobucephalopsis bagarius* it is about 1/3rd the body length and in the extension of vitelline glands which reach upto the pharynx.

These differences together with the relative position and size of organs are enough to create a new species.

(Figs. 5-6) Gupta, 1953

Only one specimen of this form was recovered from the intestine of a fresh-water fish, *Pseudeutropius garua* (Ham.) from the river Brahamputra at Gauhati (Assam) in January 1952.

It is a small elongated, dorsoventrally flattened trematode, with broader anterior and narrower posterior end of the body. The skin is smooth and devoid of spines. The specimen measures 1.47 mm. in length by 0.48 mm. in maximum breadth behind the ovary. The breadth is approximately one third the length of the body.

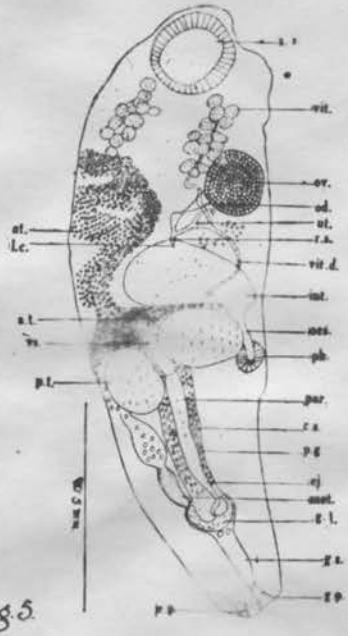


Fig.5.

Fig.6.

Fig. 5. *Neobucephalopsis gauhatiensis* n. sp., Dorsal view.
Fig. 6. *Neobucephalopsis gauhatiensis* n. sp., Eggs enlarged.

The anterior sucker is spherical in shape and measures 0.2 mm. in diameter. The mouth opening lies nearly in the middle of the body on the ventral side at a distance of 0.85 mm. from the anterior end. It opens into an oval pharynx, 0.07 mm. in length by 0.06 mm. in breadth. The latter opens through a tubular oesophagus, about 0.1 mm. in length into a sac-like intestine. The intestine is about 0.16 mm. in length by 0.32 mm. in breadth and lies medially in the middle third of the body at a distance of 0.57 mm. from the anterior end.

The excretory pore is terminal and lies at the posterior end of the body. It leads into a tubular excretory bladder extending as far as the anterior sucker.

The genital pore lies at the posterior end of the body, on the right side near the excretory pore.

The testes are large massive organs, oval in shape, lying obliquely one behind the other on either side of the cirrus sac. The anterior testis is larger than the posterior and measures 0.15 mm. in length by 0.21 mm. in breadth. It lies on the right side of the cirrus sac close to the mouth opening at a distance of 0.73 mm. from the anterior end of the body. The posterior testis lies close to the anterior testis on the left side of the cirrus sac and measures 0.165 mm. in length by 0.13 mm. in breadth. It lies at a distance of 0.85 mm. from the anterior end of the body. The cirrus sac is a long cylindrical organ measuring 0.73 mm. in

length by 0.12 mm. in breadth. It lies medially in the posterior region of the body and is approximately 1/2 the length of the entire body. The vesicula seminalis is tubular in shape and lies at the anterior end of the cirrus sac. It measures 0.11 mm. in length by 0.045 mm. in breadth. It opens into a tubular pars prostatica, 0.25 mm. in length by 0.04 mm. in breadth. A large number of prostate gland cells surround the pars prostatica. The ejaculatory duct opens into the genital sinus in the middle of the genital lobe, on the left side almost dividing the latter into two parts. The genital lobe is a muscular spoon-shaped organ lying within the genital sinus.

The ovary is an oval organ lying in the anterior third of the body at a distance of 0.35 mm. from the anterior end. It is situated on the right side of the body anterior to intestine and measures 0.16 mm. in length by 0.14 mm. in breadth. The oviduct arises from the hinder region of the ovary and runs towards the right to receive the duct of the receptaculum seminis. The receptaculum seminis is a small vesicular organ formed by the dilation of the Laurer's canal and lies on the dorsal side of the intestine. It measures 0.025 mm. in length by

0.016 mm. in breadth, The vitelline glands consist of large follicles which run longitudinally on either side in the anterior region of the body. They extend from the hind end of the anterior sucker upto the middle region of the ovary. The follicles are rounded or oval in shape and the number is 14 on the left side and 15 on the right side of the body. The two vitelline ducts from either side meet and open into the oviduct near the opening of the receptaculum seminis. The uterus arises near the opening of the vitelline duct and extends posteriorly upto the anterior region of the posterior testis. It then runs forward towards the left and extends upto the anterior region of the ovary. It then bends and runs towards the hind end of the body following a zig-zag course to open into the genital sinus on the left side. A well developed muscular metraterm is present, The genital sinus is a large sac which surrounds the genital lobe and extends to the posterior end of the body.

The eggs are oval in shape with a thin shell. They measure 0.016—0.02 mm. in length by 0.012—0.015 mm. in breadth.

Discussion.—The new form *Neobucephalopsis gauhatiensis* n. sp., differs from all the known species in the position of testes, one on either side of the cirrus sac, in the proportional size of the cirrus sac which in the new form is 1/2 the body length, in the position of pharynx which is behind the anterior testis, and in the extension of uterine coils.

(Figs. 3-4)

Three specimens of this form were recovered from the intestine of a fresh-water fish, *Pseudeutropius garua* (Ham.) in the month of February at Lucknow in 1951. Out of these specimens, only one was found to be fully mature. It is flesh coloured in the living condition and exhibits considerable movements of expansion and contraction.

It is a small dorsoventrally flattened, elongated trematode with a broad anterior and narrower posterior portion of the body. The skin is

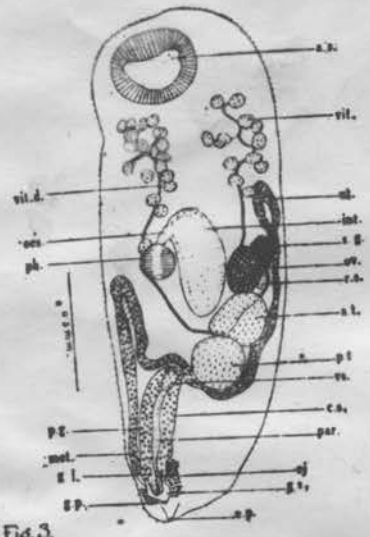


Fig.3.

Fig.4.

Fig. 3. *Neobucephalopsis Pseudeutropei* n. sp., Ventral view.
Fig. 4. *Neobucephalopsis pseudeutropei* n. sp., Eggs enlarged.

covered with small scale-like spines. The specimen measures 2.21 mm. in length by 0.77 mm, in maximum breadth between the intestine and the anterior sucker.

The anterior sucker is subterminal in position and is almost circular in shape. It measures 0.32 mm. in length by 0.36 mm. in breadth. The mouth opening lies in the middle of the body at a distance of 1.12 mm. from the anterior end of the body. It opens into a well developed pharynx, about 0.15 mm. in length by 0.14 mm. in breadth. The pharynx, is oval in shape and lies at a distance of 0.91 mm, from the anterior end of the body. It opens through a small oesophagus, about 0.1 mm. in length into a large sac-like intestine about 0.46 mm. in length by 0.21 mm. in breadth. It lies medially in the middle third of the body at a distance of 0.83 mm. from the anterior end of the body.

The excretory pore is terminal at the posterior end of the body and leads into a sac-like excretory bladder extending as far as the anterior sucker.

The genital pore is ventral in position and lies 0.08 mm. in front of the excretory pore.

The two testes lie obliquely one behind the other and are oval in shape. The anterior testis is larger than the posterior and lies close to the posterior end of the saccular intestine on the left side It measures 0.23 mm. in length by 0.24 mm. in breadth and is situated at a distance of 1.24 mm. from the anterior end of the body. The posterior testis is

partly covered over by the anterior testis and measures 0.23 mm. in diameter. The cirrus sac is a long cylindrical organ extending from the hinder end of the posterior testis to a little anterior to the posterior end of the body. It measures 0 58 mm. in length by 0.15 mm. in breadth. The vesicula seminalis is oval in shape and measures 0.09 mm. in length by 0.06 mm. in breadth and opens into a long tubular pars prostatica surrounded by prostate-gland cells. The pars prostatica measures 0.34 mm. in length by 0.33 mm in breadth. The ejaculatory duct opens into the genital sinus in the posterior region of the genital lobe, almost dividing the latter into two parts. The genital lobe is broad, muscular and occupies a greater part of the genital sinus.

The ovary is situated in the middle of the body in level with the pharynx on the left side at a distance of 1.04 mm. from the anterior end of the body. It is smaller than testes and measures 0.2 mm. in length by 0.16 mm. in breadth. From its posterior side arises the oviduct which opens at the oötype. The shell gland cells surrounding the oötype form a compact mass about 0.14 mm. in length by 0.1 mm. in breadth on the left anterior side of the ovary.

The vitelline glands consist of large rounded or oval follicles arranged longitudinally on each side of the body behind the anterior sucker. Their number is 18 on the right side and 13 on the left of the body. The two vitelline ducts meet on the dorsal side of the shell gland before opening at the oötype. A receptaculum seminis about 0.49 mm. in length by 0.4 mm. in breadth is present at the hinder end of the oötype. The uterus arises from the dorsal side of the oötype and runs forward on the left side upto a little anterior to the intestine. It then bends and runs backwards to the posterior end of the testes where it bends and runs forward upto the middle of the intestine on the right side of the body. It then bends and runs towards the posterior end of the body where it opens into the genital sinus.

The eggs are oval and thin-shelled. They measure 0.013—0 019 mm. in length by 0.013—0,015 mm. in breadth.

Discussion.—The new form *Neobucephalopsis pseudeutropei* n. sp., differs from *Neobucephalopsis bagarius*, in the larger size of the body, in the position of the ovary which is in the middle region of the intestine at the same level as the pharynx, in the position of testes which lie between the cirrus sac and the intestine, in the smaller size of the cirrus sac which in the new form is 1/4th the body length while in *Neobucephalopsis bagarius*, it is about 1/3rd the body length, in the extension of uterine coils, in the larger size of the receptaculum seminis and in the extension of vitelline glands which in the new form extend upto the pharynx.

The new form also differs from *Neobucephalopsis eutropiichthis*, in the size and position of the ovary which is smaller than testes and lies closer to the anterior testis, in the large size and position of cirrus sac, which in the new form is 1/4th the body length while in *Neobucephalopsis eutropiichthis*, it is about 1/6th the body length and extends upto the posterior testis, in the position of testes which overlap each other and lie between the anterior end of the cirrus sac and the hinder end of the ovary, in the position of shell gland cells which lie anterior to ovary, in the extension of uterine coils which do not extend beyond the anterior end of intestine and in the extension of vitelline glands.

PARABUCEPHALOPSIS Tang and Tang, ~~1976~~ 1963 (listed Yamaguti, 1971)

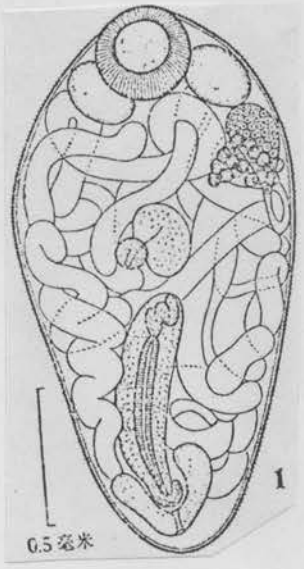
"The new genus Parabucephalopsis is distinguished from the other closely related genera in the subfamily Bucephalinae Nicoll, 1914, such as Bucephalopsis (Diesing, 1855) Nicoll, 1914; Neobucephalopsis Dayal, 1948 and Pseudobucephalopsis Long et Lee, 1964, all of which bear muscular, sucker-like head-organs, and have their ovaries lying anteriorly to or between the two testes. The new genus is characterized by the position of two testes which are parallely arranged anteriorly to the ovary. Parabucephalopsis prosthorchis is designated as type species of the genus."

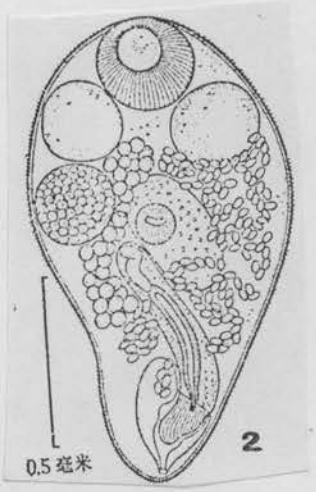
Tang and Tang, 1976 (Acta Zool. Sinica 22: 272)

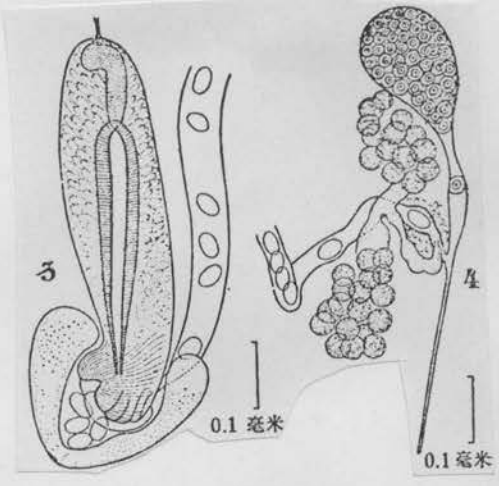
Bucephalidae

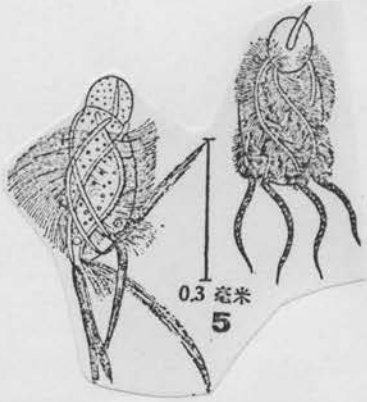
Parabucephalopsis prosthorchis Tang Chongti and Tang Zhongzhang, 1963

There are discrepancies between cycle cited by Yamaguti (1971) and cycle given by Tang and Tang (1976). Latter illustrated in life cycle notebook.





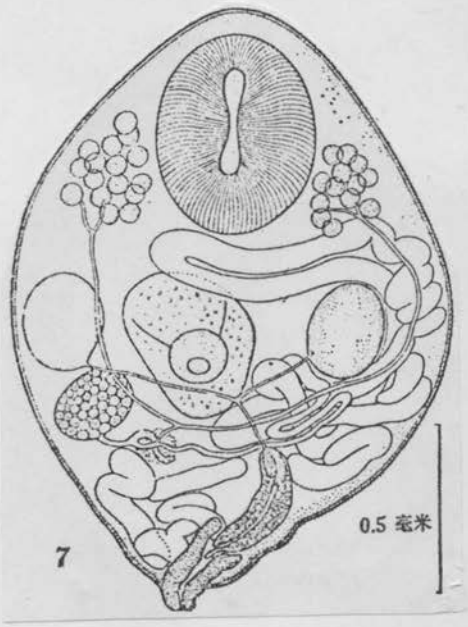




From Tang and Tang, 1976 (Chinese text, English summary)

Parabucephalopsis spheroides Tang Chongti and Tang Zhongzhang, 1963

Listed in Chinese text of Tang and Tang (1976) as "sp. nov." but in English summary as Tang and Tang, 1963



From Tang and Tang, 1976 (Chinese text, English summary)

Pararhipidocotyle gen. n.

Bucephalinae. Corpo alongado. Cutícula espinhosa. Extremidade anterior com ventosa subterminal, munida de cápuz membranoso. Bôca situada no meio do corpo. Intestino dirigido para trás. Átrio genital situado na extremidade posterior do corpo. Bôlsa do cirro alongada, com vesícula seminal, região prostática e canal ejaculador. Testículos pré-ovarianos, situados na mesma zona ou com zonas parcialmente coincidentes e campos afastados. Ovário pós-faringeano, póstesticular, situado no campo de um dos testículos. Glândula de Mehlis, espermateca e canal de Laurer não evidenciados. Útero dirigindo-se do ovário para diante, atingindo a região dos vitelinos e depois para trás até o átrio genital. Vitelinos arredondados, na zona pré-cecal, aproximadamente dispostos em arco. Poro excretor terminal. Parasitos de peixes de água doce.

From Kohn, 1970

Espécie tipo — **P. jeffersoni** sp. n.

Pararhipidocotyle gen. n., é mais próximo de **Rhipidocotyle** Diesing, 1858, do qual se afasta por apresentar o ovário situado atrás dos testículos.

Pararhipidocotyle jeffersoni sp. n.

Trematódeos alongados, com cutícula espinhosa, e extremidade posterior atenuada; medem 0,90 a 1,04 mm de comprimento por 0,22 a 0,29 mm de maior largura. Extremidade anterior com ventosa subterminal, que mede 0,11 a 0,17 mm de comprimento por 0,11 a 016, mm de largura, munida de uma pala membranosa que forma uma espécie de capuz. Bôca simples, ventral, situada no início do têrço médio do corpo ou um pouco mais para trás. Faringe muscular presente, com 0,054 a 0,063 mm de comprimento por 0,057 a 0,069 mm de largura. Esôfago presente, com 0,045 a 0,075 mm de comprimento, dirigindo-se para diante ou para trás e ligando-se ao ceco intestinal. Ceco intestinal sacular, mede 0,132 a 0,141 mm de comprimento por 0,078 a 0,087 mm de largura, dirigido para trás. Átrio genital situado na extremidade posterior do corpo. Bôlsa do cirro alongada, dirigida do poro genital para diante; mede 0,27 a 0,32 mm de comprimento por 0,060 a 0,070 mm de maior largura e encerra vesícula seminal que se liga a um canal ejaculador cercado por células prostáticas. Testículos de contôrno liso, pré-ovarianos, situados na mesma zona ou com zonas parcialmente coincidentes e com campos afastados. O testículo situado no campo ovariano mede 0,072 a 0,090 mm de comprimento por 0,045 a 0,063 mm de largura; o outro mede 0,108 a 0,180 mm por 0,063 a 0,069 mm. Ovário de contôrno liso, pós-testicular, pós-faringeano, situado no campo de um dos testículos e com zona afastada ou parcialmente coincidente com a zona do testículo oposto; mede 0,084 a 0,090 mm de comprimento por 0,060 a 0,084 mm de largura. Glândula de Mehlis, espermateca e canal de Laurer não evidenciados. Útero dirigindo-se da região do ovário para diante, alcançando a zona dos vitelinos e depois para trás, estendendo-se até o nível do átrio genital. Ovos grandes, operculados, de casca lisa; medem 0,030 a 0,042 mm de comprimento por 0,015 a 0,021 mm de largura. Vitelodutos nítidos, confluindo ao nível do ovário. Vitelinos constituídos por folículos arredondados, dispostos aproximadamente em arco no fim do têrço anterior do corpo, na zona pré-cecal. Poro excretor terminal. Vesícula excretora não estudada com detalhe.

Habitat — Intestino de **Salminus maxillosus** Cuv. & Val.

Proveniência — Cachoeira de Emas, Rio Mogi-Guaçu, Pirassununga, Estado de São Paulo.

Tipo nº 30.523 a e parátipos nos. 30.523 b-e depositados na Coleção Helmintológica do Instituto Oswaldo Cruz.

From Kohn, 1970

Bucephalidae