ON FIVE NEW SPECIES OF MONOGENETIC TREMATODES PARASITIC ON THE GILLS OF MARINE FISHES FROM THE SOUTH WEST COAST OF INDIA

by

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During the course of studies on the parasites of marine food fishes from the Indian seas, five new species of monogenetic trematodes belonging to the family Mazocraeidae PRICE, 1936 were collected. These species are described below. Collection and treatment of material was as mentioned in a previous paper (UNNITHAN, 1957 pp. 28 - 9).

Family **Mazocraeidae** PRICE, 1936
Genus **Mazocraes** HERMANN, 1782.

Mazocraës dussumerii sp. nov.

(Figs. 1 — 6)

Host:	*Dussumieria acuta* VAL.
Location:	Gills
Locality:	Trivandrum (South West Coast of India)
Date:	22.8.1954
No. of specimens:	Five

Body long, bottle shaped, divisible into an anterior narrow neck, a middle region consisting of the body proper and a posterior haptor. Type specimen (Fig. 1) 0.84 mm long and 0.168 mm broad; neck 1/5 th the total length, haptor shorter than the neck but slightly broader than the body.

Mouth a subterminal, transverse slit, with an anteriomedian projection; oral pouches crescentic, one on each side of the median line, 16 μ × 20 μ, situated behind the mouth. They are thick walled with long muscle fibres extending to the oesophageal zone. Pharynx oval, thin walled, 20 μ × 16 μ, placed behind the oral pouches and without wall glands; oesophagus long and narrow, bifurcating at the junction of the neck and body, 1.72 mm

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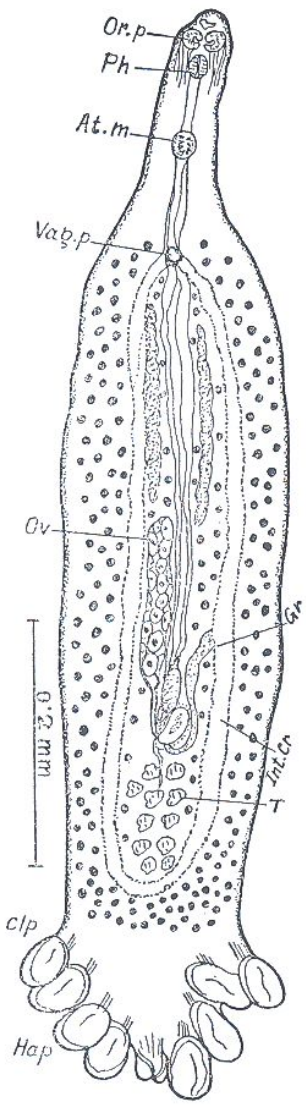

FIG. 1

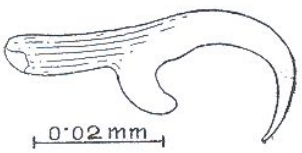

FIG. 2

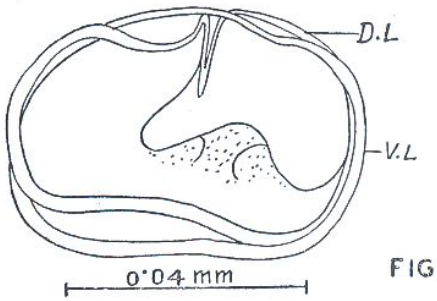

FIG. 3

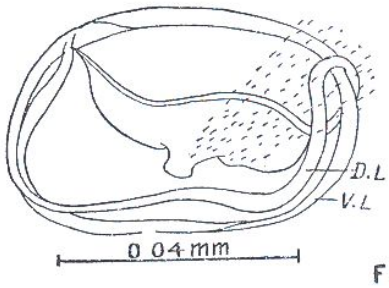

FIG. 4

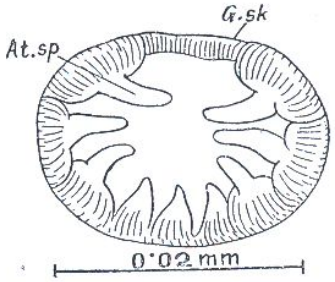

FIG. 5

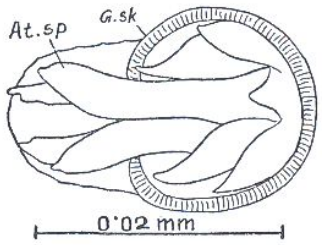

FIG. 6

Figs. 1 - 6: *Mazocraës dussumerii* sp. nov.; 1. Complete worm, dorsal view; 2. Anchor; 3. Clamp, distal right, dorsal view; 4. Clamp, ventral view; 5. Male genital pore, ventral view; 6. Male genital pore with the armature of spines.

from the anterior end. Intestinal crura with wavy outer and inner margins, confluent posteriorly behind the testes zone.

Haptor triangular, the apex forming the hind end, broader than long 147 μ × 210 μ, with a terminal lappet carrying a pair of typical sickle shaped large anchors, demarcated from body by a shallow constriction on each side and without extensions of body organs. Each anchor (Fig. 2) 40 - 44 μ long embedded in the lappet and with strong muscle fibres. Clamps 4 pairs, rectangular or oval typically mazocraeid wider than long, 32 μ × 52 μ and subsimilar, symmetrically arranged along each lateral margin and with short retractile peduncles. Clamp skeleton (Figs. 3 & 4) consists of a continuous flat and twisted band bent on itself and forming a rectangular loop moving on the spring like hinges between them and a 'U' shaped piece, which though ill-developed is visible in all the clamps; axial muscle fibres well developed along the clamp peduncle.

Testes consists of 11 - 12 more or less oval follicles, each 12 - 16 μ wide, arranged in two irregular postovarian intercrural rows, the posterior testes reaching the intestinal confluence. Vas deferens traceable from the middle of the body along the median line and dilating into the large seminal vesicle in the second quarter of the body, in front of the vaginal zone and narrowing again to open into the male pore. Male pore median ventral with an outer muscular rim carrying hooks; hooks consisting of three conical cuticularised posterior spines and 3 pairs of long lateral spines (Figs. 5 & 6) anterior half of the rim without spines; the pore situated 108 μ from the anterior end.

Ovary elongate spindle shaped, 90 μ × 20 μ, situated close to the inner margin of the left intestinal crus, and filled with irregular ova, each measuring 12 - 14 μ across (Fig. 17). Oviduct narrow, originating from the posterior end of the ovary and opening into the ootype. Uterus wide, ventral, arising from the base of the oötype and reaching the angle of the intestinal bifurcation; eggs not observed.

Vitellaria extend the entire length of the intestinal crura and are confluent posteriorly over the posterior confluence of the crura; follicles large irregular spherical, 16 μ in diameter; at the anterior and posterior extremities the vitellaria of either side mingle to form vitelline masses. Along the inner margin of the crura in the anterior half of the body there is a prominent compact vitelline strand on each side (Fig. 1); a similar median strand is also visible at the posterior half of the body.

Oötype small median pear shaped, situated immediately behind the ovary and bordered by small gland cells. The oötype is also connected with the receptaculum seminis by a short narrow duct. In one specimen

there is a genito-intestinal canal connecting the oötype with the right intestinal crus.

Vagina median dorsal, unarmed, situated at the intestinal bifurcation and surrounded by vitelline follicles; vaginal duct extends backwards parallel to the vas deferens and in the middle of the ovarian zone joins the seminal receptacle which in turn enters the oötype through a narrow duct.

Remarks.

M. dussumerii sp. nov. resembles *M. orientalis* CHAUHAN, 1950 in many characters but can be distinguished from the latter by the shape and structure of the oral pouches, haptor and anchors, relative position of the ovary and testes, and above all in the shape of the spines arming the male genital pore. In *M. orientalis* all the spines in the male genital pore are identical recurved hooks, while in the present species they are of two distinct types. The difference in the relative position of the ovary and testes in the two species may be due to difference in the stage of growth but such changes are usually not evident in the cuticularised structures like the anchors and the male genital spines. Moreover, in *M. dussumerii* sp. nov. the intestinal crura are posteriorly confluent and the crescentic oral pouches are quite characteristic. These two characters are unique and distinguish this species from all other species included in the family Mazocraeidae.

Mazocraës trispina sp. nov.

(Figs. 7 - 10)

Host:	*Dussumieria acuta* VAL.
Location:	Gills
Locality:	Trivandrum (South West Coast of India)
Date:	2.5.1955
No. of specimens:	One

Body mazocraeid, 1.55 mm long with a maximum width of 0.168 mm at the ovarian zone. Anterior narrow neck 294 μ long, slightly widening backwards at the intestinal bifurcation, junction of neck and body well marked; body triangular widest in front of the ovary, slightly tapering backwards to the triangular haptor and terminating in the anchored lappet, haptor region demarcated from the body by a shallow lateral constriction on each side (Fig. 7).

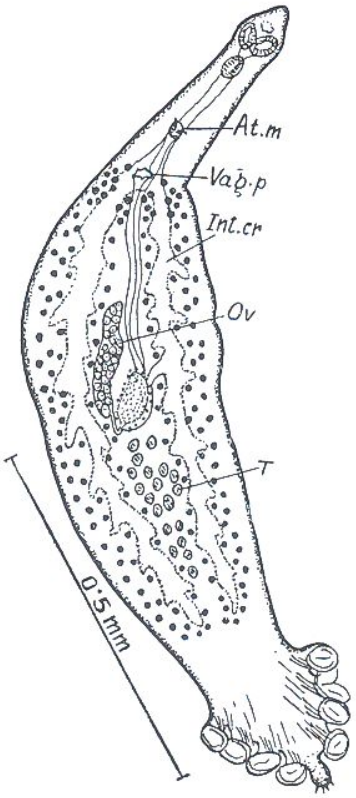

FIG. 7

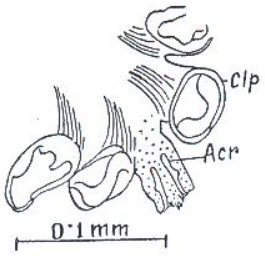

FIG. 8

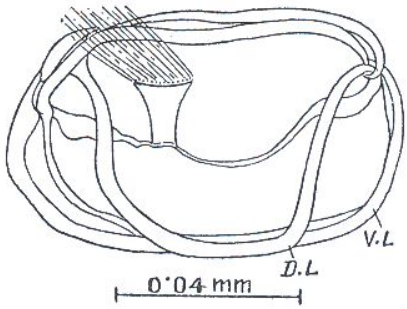

FIG. 9

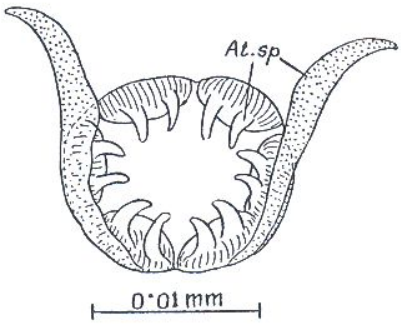

FIG. 10

Figs. 7 - 10: *Mazocraës trispina* sp. nov.; 7. Complete worm, dorsal view; 8. Hind end of the haptor with the lappet and distal clamps; 9. Clamp, ventral view; 10. Male genital pore showing the armature, ventral view.

Mouth subterminal, transverse slit like and with a delicate rim; oral pouches abovate, 24 μ × 32 μ, inner margin slightly invaginated in the middle and causing lateral bulges of the base of the conical tip of the body; pharynx median, oval, 32 × 24 μ, thin walled and without pharyngeal gland cells; oesophagus long, narrow and unbranched; crura originating at the junction of the neck and body, 280 μ from the anterior end, with short wide pocket like outer branches and very few rudimentary inner branches, not confluent posteriorly, each crus terminating a short distance in front of the haptor (Fig. 7).

Haptor typically mazocraeid, broader than long, 147 × 210 μ with a terminal lappet and 4 pairs of clamps. Terminal lappet (Fig. 8) with 3 pairs of anchors arranged symmetrically, length of proximal, middle and distal pairs 40 μ, 8 μ and 12 μ respectively; blade of proximal pair sickle shaped with a knob like basal expansion projecting at right angles to the axis of the blade root broad with attached muscle fibres; clamps oval or irregularly rectangular, 32 × 42 μ — 42 × 63 μ, peduncles short with axial muscle fibres. Clamp skeleton (Fig. 9) consists of a double continuous cuticularised peripheral loop and a median 'U'-shaped loop; prominent muscle fibres pass between the body of the clamp capsule and the peduncle through a funnel shaped cuticularised structure slightly displaced to one side.

Testes mumerous, small spherical, 14 - 16 μ in diameter, in irregular post-ovarian intercrural rows, the last testis placed some distance in front of the crural extremity. Vas deferens median, longitudinal and ventral, visible from the oötype to the male genital pore, slightly widening behind the intestinal bifurcation to form the seminal vesicle. It further on narrows and joins the 'genital sucker'. Male pore median ventral and situated about 200 μ from the anterior tip of the body, at the centre of the genital sucker, 12 μ wide and armed with 2 kinds of spines: a pair of long spines with slightly curved tips, each 16 μ long and projecting outwards and about a dozen inwardly directed short conical spines borne on muscular cushions (Fig. 10). Genital sucker strengthened by circular and radial muscle fibres functioning as a 'sphinctor'.

Ovary long and tubular, 105 μ long and 42 μ broad, parallel to the intestinal crus and situated almost in the middle of the body; oviduct, short and narrow, starts from the posterior end of the ovary and joins the base of the oötype; ova small more or less spherical and uniformly distributed. Uterus ventral, visible as a thin narrow duct, eggs not observed.

Vitellaria prominent, extending from the level of the genital pore to the ends of the crura and their branches; follicles scattered, sperical, 12 μ

in diameter; anteriorly the vitellaria of the two sides meet across the median line to form a compact mass in the region of the intestinal bifurcation and posteriorly they approach each other but do not coalesce; transverse vitelline ducts not observed.

Oötype median and pear shaped, close to the hind end of the ovary and bordered by spherical gland cells, distal end bent towards the right; the genito-intestinal canal commences from the oötype and runs forwards to join the right intestinal crus.

Vagina median dorsal (Fig. 7), unarmed and without muscular thickenings, transversely placed at the intestinal bifurcation, 280 μ from the anterior end; inner margin of the vaginal pore irregularly cuspid, cusps convex, plane smooth curves; vaginal rim thin, vaginal canal parallel to vas deferens and opening into the oötype close to the oviduct.

Remarks.

Mazocraës trispina sp. nov. closely resembles *Mazocraës dussumerii* in the shape and size of the anchors and in the presence of armed male pore. But in *M. trispina* the armature of the male pore includes two long, and prominent outwardly directed spines, which are absent in *M. dussumerii*. In *M. trispina* the body is broader than the haptor, while it is narrower in *M. dussumerii*. In addition there are 3 pairs of anchors in *M. trispina*, whereas *M. dussumerii* has only one pair.

Anchovicola anchoviella gen. *et* sp. nov.

(Figs. 11 - 15)

Host:	*Anchoviella commersonii* (LACEP.)
Location:	Gills
Locality:	Trivandrum (South West Coast of India)
Date:	28.7.1954
No. of specimens:	One

Body stout 1.89 mm long and 0.504 mm broad, ends pointed and with a pronounced constriction in front of the haptor, haptor half the total length; left side of the body in the middle of the anterior half bulged accommodating the very prominent lateral vaginal pore (Fig. 11).

Mouth subterminal, irregular and transverse; oral pouches small, spherical with a deep inpushing on the inner side, 24 μ in diameter and placed obliquely on each side of the anterolateral margin of the pharynx; pharynx median ventral almost the same size as the oral pouches, devoid

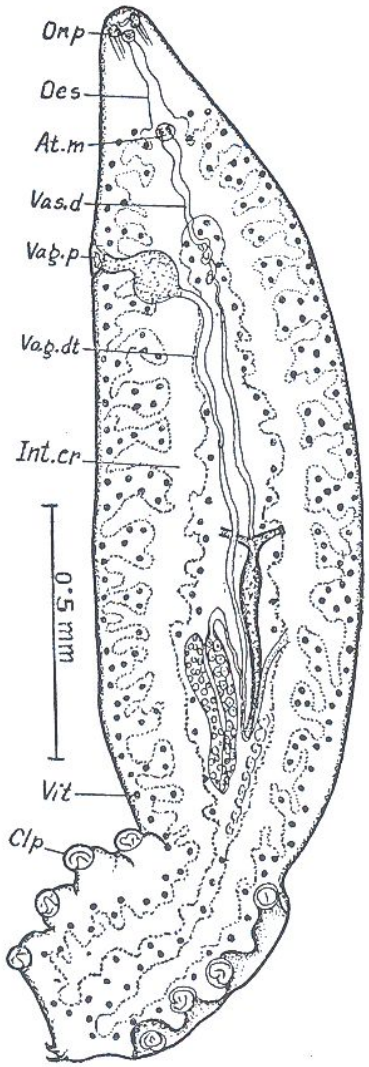

FIG. 11

FIG. 13

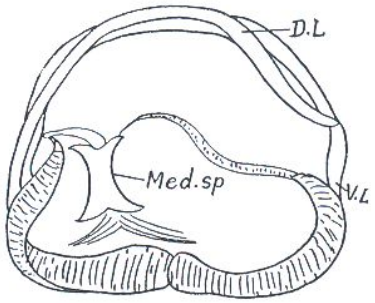

FIG. 14

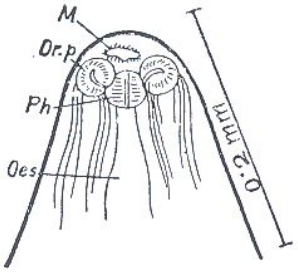

FIG. 12

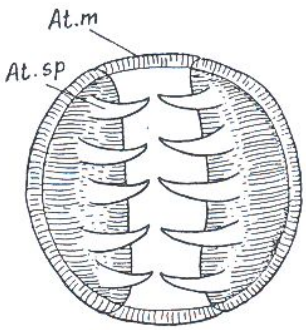

FIG. 15

Figs. 11 - 15: *Anchovicola anchoviella* gen. *et* sp. nov.; 11. Complete worm, dorsal view; 12. Anterior region, ventral view; 13. Anchor; 14. Clamp, dorsal view; 15. Male genital pore, ventral view.

of gland cells (Fig. 12); oesophagus long, anterior half narrow and unbranched, posterior half very wide and with lateral branches, bifurcates into the crura at 378 μ from the anterior end; crura with secondary branches, intercrural branches simple and short. Crura extend into the haptor and end blindly a short distance in front of the anchor region.

Haptor typically mazocraeid, 504 × 462 μ, terminal lappet very small; anchors two, much longer than the lappet; each anchor 52 μ long with a root and a prominent sickle shaped shaft with a long basal knob. Clamps four pairs, 36 × 34 μ - 40 × 44 μ, nearly symmetrical, borne on conical peduncles with axial longitudinal muscle fibres extending into the haptor; clamp structure typically mazocraeid. Base of the clamp with a horizontal fleshy rim and narrow cuticularised dorsal and ventral loops.

Testis post or slightly par ovarian intercrural and lobed, extending from the middle of the ovarian zone to almost the base of the haptor. Vas deferens median, ventral, runs forwards as a straight narrow tube, which becomes coiled in the region of the seminal vesicle and thence continues forwards as a slightly wavy narrow tube which ultimately opens into the male pore. Male pore ventral, median, situated at the junction between the unbranched and branched halves of the oesophagus, with a pair of bean shaped muscular cushions on each side carrying 5 pairs of curved cuticular spines each 12 μ long and directed inwards (Fig. 15). The male pore is 20 μ in diameter but the aperture is made narrow and rectangular by the two muscular cushions; there is no distinct penis or cirrus.

Ovary 'U' shaped, 315 × 105 μ, in the posterior half of the body proper in front of the haptoral constriction (Fig. 11). Oviduct arises from the distal end of the inner arm of the 'U', curves backwards, extends parallel to the ovary and opens into the base of the oötype close to the extremity of the vitelline duct. Uterus median ventral, arising from the base of the oötype, runs forwards along the mid ventral plane parallel to the duct. A single collapsed egg 63 μ long, apparently without filament, was observed in the mid uterine field.

Vitellaria extend from the middle of the oesophagus to the hind ends of the crura covering the crural branches also; follicles spherical, 12 μ wide and not confluent across the middle line. Transverse vitelline ducts short and narrow, situated some distance in front of the ovary, median duct long and narrow, runs backwards to join the small oötype. A genito intestinal canal connects the oötype with the right crus. Oötype small and pear shaped situated at the terminal ends of the oviduct and median vitelline duct.

Vagina unarmed and marginal on the left side, aperture oval with an elastic rim; situated slightly behind the level of the intestinal bifurcation (Fig. 11), 420 μ from the anterior end of the body. Vaginal duct narrow and horizontal, enlarging into a vesicular seminal receptacle and thence running backwards on the left side parallel to the left intestinal crus opens into the transverse vitelline ducts (?). The seminal receptacle is filled with dark staining matter like that in the median vitelline duct.

Remarks.

Anchovicola gen. nov. resembles several genera of the family Mazocraeidae. In the shape of the body and the haptor and the structure of the clamps it resembles *Mazocraës* HERMANN, 1782, but differs from it in the armature of the male pore, structure of the vagina and the position of the gonads. As in *Mazocraeoides* PRICE, 1936, the intestinal crura extend into the haptor. With *Kuhina* SPROSTON, 1945, it shows closer resemblance in the nature of the haptor, general shape of the body and many of the organ systems. But in *Kuhnia* the vagina is absent and the structure and position of the male pore is also very different. The shape of the body and haptor in *Anchovicola* and *Neomazocraes* PRICE, 1943, are almost similar, but the relative proportion and distribution of gonads differ; both have a lateral vagina, but in *Neomazocraes* there are two vaginae while there is only one in this species; but despite this difference the structure of the vagina is more or less the same though the armature of the male pore in the two species shows marked differences. *Anchovicola* also shows resemblance with *Clupeocotyle* HARGIS, 1955, in the nature of the haptor and position of the gonads but the latter can be easily distinguished by the dissimilar clamps. Thus in spite of the close similarity with several genera, *Anchovicola* shows unique characteristic features which justify its elevation to a generic status.

Diagnosis of *Anchovicola* gen. nov.

Body mazocraeid, haptor distinct and symmetrical, clamps mazocraeid and similar; lappet small, anchors one pair, large; oesophagus branched, intestinal crura extending into the haptor; male pore armed with identical spines; vagina single marginal behind the male pore; ovary 'U' shaped situated in the posterior half of the body; testis long tubular with constrictions, par or post ovarian and intercrural. Parasitic on Anchovies.

Type species *Anchovicola anchoviella* gen. *et* sp. nov.

Generic name *Anchovicola* signifies that the new species inhabits the gills of *Anchoviella*; the specific name is the name of the host.

Heterocotyle thrissoclissae gen. *et* sp. nov.

(Figs. 16 - 21)

Host:	*Thrissocles malabaricus* BLOCH
Location:	Gills
Locality:	Trivandrum (South West Coast of India)
Date:	26.7.1955 & 10.9.1955
No. of specimens:	Several

Body long and narrow, tapering towards the two ends. Haptoral region more than ⅓ rd the total length; type specimen 1.104 mm long with a maximum width of 0.189 mm across the proximal level of the haptor (Fig. 16).

Mouth large and subterminal, surrounded by a cluster of small spherical gland cells, each 4 - 6 μ in diameter; oral pouches spherical or oval, fibrous and thin walled, 32 × 28 μ - 36 × 32 μ, placed immediately behind the cluster of gland cells and in some specimens slightly asymmetrically placed. Pharynx larger than the oral pouches, 40 × 32 μ - 44 × 36 μ; oral pouches and pharynx with long muscle fibres extending backwards. Oesophagus long and wide, without lateral branches, bifurcating into the intestinal crura at about 0.315 mm from the anterior end; crura wide and long with rudimentary knob like lateral branches and vesicular dilatations at or near the posterior extremity, the left crus reaching the level of the third clamp and the right reaching the hind margin of the second, but not confluent.

Haptor including the lappet 0.462 mm × 0.252 mm with 4 pairs of clamps; clamps (Figs. 17 & 18) dissimilar in size, shape and relative position depending on the stage of growth. First right clamp largest (Fig. 17) roughly rectangular or elongate oval, 126 × 63 μ, typically mazocraeid, the lips of the capsule strengthened by a broad muscular rim, sclerites narrower than the rim. Unlike the typical mazocraeid structure, the two sclerites instead of forming continuous dorsal and ventral loops, are broken, into horizontal halves remotely resembling the jaw pattern of Microcotylids; median spring apparatus present but rudimentary. Clamp peduncle short but extensible. The first left clamp shifted backwards, smaller than the corresponding right and squarish, 84 × 63 μ, structurally

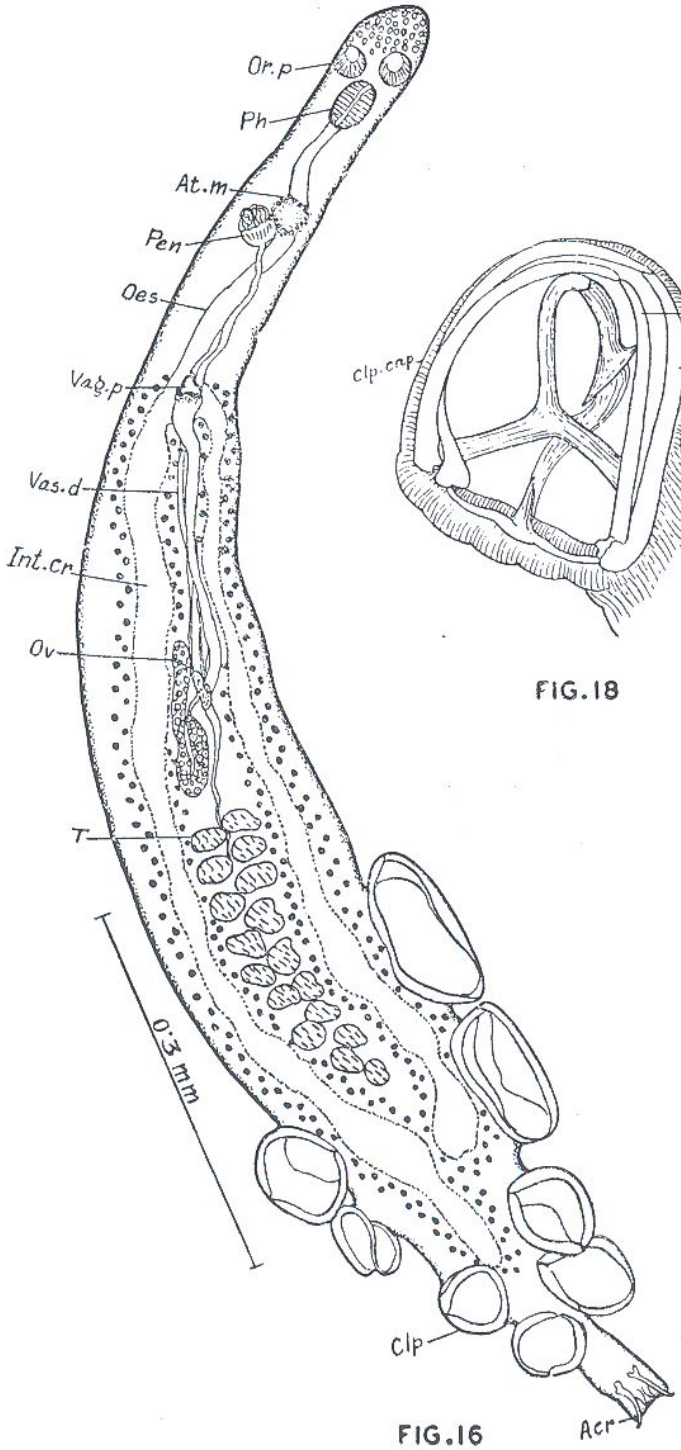

FIG. 16

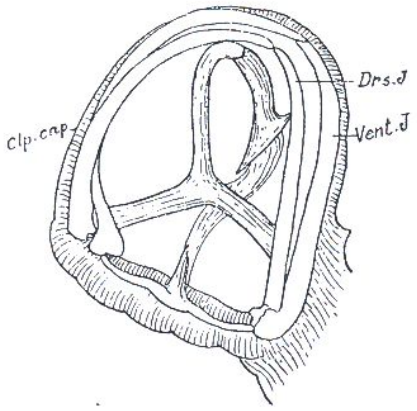

FIG. 18

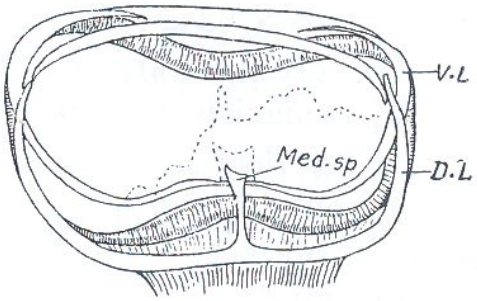

FIG. 17

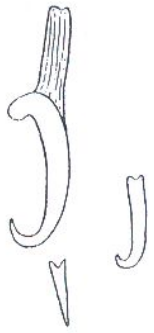

FIG. 19

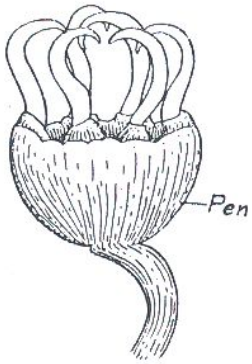

FIG. 20

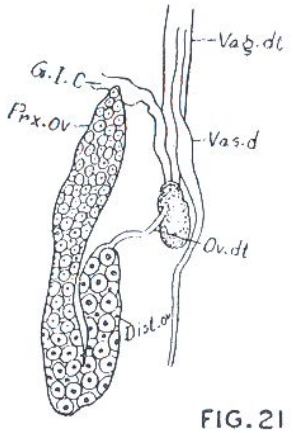

FIG. 21

Figs. 15 - 21: *Heterocotyle thrissoclissae* gen. *et* sp. nov.; 16. Complete worm, dorsal view; 17. Largest proximal clamp, dorsal view; 18. Distal second clamp of the left side, dorsal view; 19. Anchors; 20. Penis with its armature of spines; 21. Ovarian region, dorsal view.

undifferentiated from the succeeding ones. The second right clamp long and narrow, 105 × 63 μ, similar to the first but smaller, the corresponding clamp of the left side very small, 73 × 63 μ, sclerites disarticulated. Third right clamp squarish, 63 × 63 μ, differing from the second in size and shape, sclerites clearly broken into jaw moities and with a median spring having horizontal hinge bar as in Microcotylidae, but still retaining the tendon as in Mazocraeids; the last clamp is more or less similar to the preceding clamp but smaller, 63 × 42 μ, the corresponding left clamp still smaller, 52 × 40 μ. Size and shape of terminal lappet varies during growth. It is armed with 3 pairs of anchors (Fig. 19), proximal pair large and sickle shaped, 48 μ long and the other two pairs smaller, one hook like and 12 μ long, the other spine like 8 μ long. In the type specimen the lappet is a rectangular projection of the haptor carrying the 3 pairs of anchors.

Testes many, spherical or transversely oval, 16 - 20 μ wide, arranged in one or two longitudinal, post-ovarian inter-crural rows, the posterior testes extending into the haptor. The number and extent of the testes vary according to the sex phase. Vas deferens arises from the anterior border of the testes and running forwards along the median line enlarges into a vesicular dilatation in the angle of the intestinal bifurcation. In front of the dilatations it narrows again as a wavy duct which opens into the penis bulb. Penis bulb cuplike and muscular, 16 × 24 μ, with six vertical hook like spines (Fig. 20) each 20 μ long and borne on cushion like bases. Penis situated 210 μ from the anterior end and close to the posterior rim of the male pore but slightly shifted to the left. Male pore unarmed, median ventral and surrounded by gland cells and situated 189 μ from the anterior end of the body.

Ovary almost 'U' shaped pre-testicular, intercrural and parallel to the left intestinal crus, outer limb longer; large oval or spherical ova, 8 - 10 μ in diameter are present in the base of the shorter arm of the 'U' (Fig. 21). Oviduct short and narrow originating from the distal end of the ovary and opening into the oötype; uterus median arising from the anterior end of the oötype and traceable to the level of the intestinal bifurcation; eggs not observed.

Vitellaria covering the entire length of the crura (Fig. 16) and its branches from the region of intestinal bifurcation to the terminal ends of the crura; in some specimens scattered follicles are seen adhering to the outer margin of the posterior half of the oesophagus; transverse or median vitelline ducts are not observed; but a longitudinal strand of

thickly packed vitelline follicles are seen in some specimens in the intercrural field between the ovary and intestinal bifurcation; this strand may probably represent the vitelline tract. Vitelline follicles small, spherical, about 8 μ in diameter.

Oötype oval or pear shaped, median, situated close to the shorter limb of the ovary and surrounded by a row of gland cells; genito-intestinal canal (Fig. 21) present, posterior half narrower than anterior, starts from the anterior left corner of the oötype and is traceable up to the proximal end of the ovary. In some specimens it joins the longitudinal vitelline strand.

Vagina median dorsal (Fig. 16) unarmed and without gland cells surrounding it, situated in the angle of the intestinal bifurcation. A vaginal duct is present, but it is traceable only up to the anterior end of the ovary.

Remarks.

The unique type of distribution of polymorphic assemblage of clamps differing in shape and size though not in the intimate structure, the presence of a cluster of preoral gland cells and the structure of the male intromitent organ distinguishes this species from all others included in the family. These characters preclude the possibility of accommodating this species in any of the known genera of the family. Hence the new genus *Heterocotyle* has been created to accommodate the new species.

Generic diagnosis of *Heterocotyle* gen. nov.

Mazocraeidae; haptor asymmetrical and distinct from the body; clamps unequal, proximal clamp of one side larger than the rest; of the remaining clamps a few resemble the large clamp while others different; terminal lappet with anchors present; preoral cluster of gland cells present; pharynx larger than oral pouches; intestinal crura and vitellaria enter the haptor; male pore median ventral situated midway between pharynx and intestinal bifurcation or in the mid-oesophageal zone; penis cup-like armed with curved hooks; vagina median dorsal in the angle of the intestinal bifurcation, unarmed; ovary 'U' shaped and pretesticular; testes many, post-ovarian. Parasitic on Dussumierid fishes.

Type species *Heterocotyle thrissoclissae* gen. *et* sp. nov.

Generic name *Heterocotyle* signifies the different types of clamps and the specific name *thrissoclissae* is derived from the name of the host.

Scomberocola eyela gen. *et* sp. nov.

(Figs. 22 - 27)

Host:	*Rastrelliger kanagurta* (CUV.)
Location:	Gills
Locality:	Trivandrum & Vizhinjam (South West Coast of India)
Date:	Different dates between 1954 and 1957
No. of specimens:	Several

Body fusiform, narrowing towards anterior end, haptor triangular, 1/6 th the total length of body and not clearly demarcated from the body proper (Fig. 22) ; neck constriction absent. Type specimen 1.328 mm long and 0.315 mm broad in front of the ovarian zone, base of haptor slightly broader than body.

Mouth subterminal, irregular and transverse; oral pouches spherical, 20 μ in diameter or oval, 20 × 28 μ, situated laterally on each side of median line immediately behind the mouth. Pharynx spherical, 20 μ in diameter, with an inner lining of small gland cells, placed behind the oral pouches; oesophagus long (about 1/5 th the total length) narrow and without lateral branches, bifurcates into intestinal crura at about 0.294 mm from the anterior end of the body. Crura wide and wavy, with a few short simple outer branches. Each crus terminates posteriorly in a bulb like dilatation in front of the proximal level of the haptor (Fig. 22).

Haptor triangular, 0.504 mm broad at the base and 0.294 mm long with four clamps on each side. Proximal pair of clamps (Fig. 23) comparatively large and prominent symmetrical and sucker like occupying the proximal corners of the haptor and measuring 63 × 126 μ. Distal three pairs (Fig. 24) identical, simple pedunculate with axial muscle fibres and their sclerites joined by a horizontal membraneous septum, each clamp squarish, 24 × 24 μ. Clamp skeleton similar to that of *Kuhnia* and *Mazocraes,* but in this species the median channel through which the muscle fibres enter the clamp is more or less ring shaped as in species of Diclidophoridae. Terminal lappet demarcated by a shallow basal constriction, armed with a pair of large typical anchors each 52 μ long. In some of the specimens an additional pair of simple spines each 12 μ long are noticed behind this large anchors. The small clamps are joined by a horizontal apron and from each clamp axial muscle fibres pass into the body of the haptor.

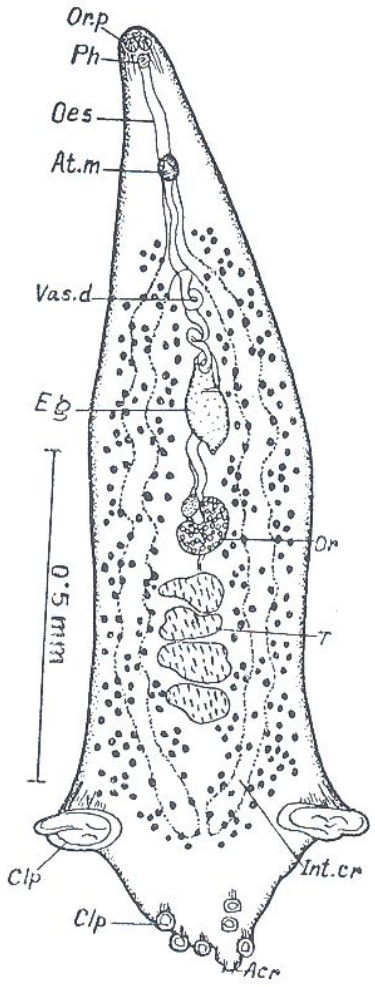

FIG. 22

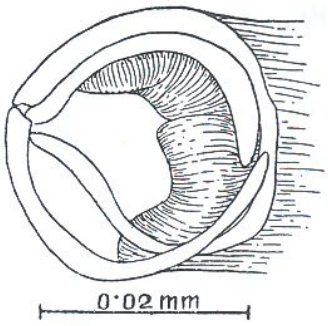

FIG. 24

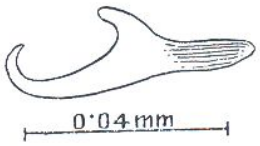

FIG. 25

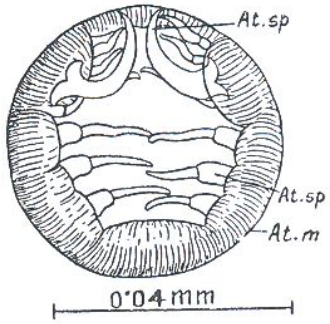

FIG. 26

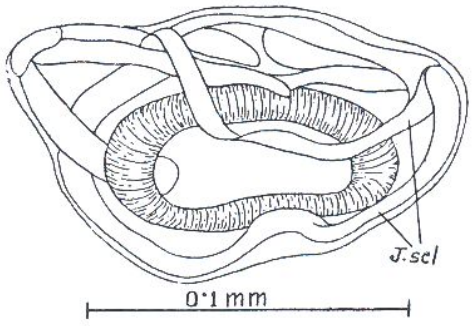

FIG. 23

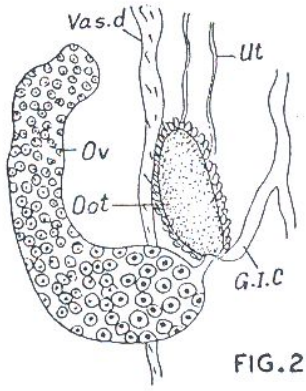

FIG. 27

Figs. 22 - 27: *Scomberocola eyela* gen. *et* sp. nov.; 22. Complete worm, dorsal view; 23. Clamp, large proximal, dorsal view; 24. Small clamp, dorsal view; 25. Anchor; 26. Male genital pore, ventral view; 27. Ovarian region with associated organs, ventral view.

Testes intercrural, four in number, irregularly rectangular or oval, 80 × 32 μ - 40 × 100 μ, arranged in a longitudinal row behind the ovary, last testis smallest and placed slightly anterior to the crural dilatations. Vas deferens median longitudinal and straight; in some of the specimens however, the part of the vas deferens immediately behind the intestinal bifurcation is closely coiled like a spring. Male pore ventral circular, sucker like 40 μ in diameter armed with a pair of hooks and 6 pairs of spines; hooks large 52 μ long, curved forwards and with bifid roots, behind these hooks are three pairs of slender spines each 12 μ long symmetrically arranged and directed transversely across the pore with their tips crossing those of the opposite side (Fig. 26). In front of these there are 3 pairs of spines each 10 μ long and directed obliquely forwards. The male pore situated 0.16 mm from the anterior end, almost in the middle of the oesophageal zone and its inner edge is cuspid with muscular cushion from which arise the spines and hooks. Penis and cirrus not observed, and the vas deferens opens directly(?) into the male pore.

Ovary 'L' shaped (Fig. 27) slightly curved with the posterior part somewhat enlarged, 140 × 40 μ, situated in the middle of the body or in some cases slightly displaced to one side. The relative size of the testes and ovary is seen to depend on the sex phase of the animal. The ovary or the testes is larger depending on which one of them is sexually dominant at that time; ova in the distal part of the ovary largest. Oviduct very short and narrow originates from the distal end of the ovary and opens into the base of the oötype; uterus median ventral runs forwards parallel to the male duct from the anterior margin of the oötype. A non-filamented elongate oval egg with a plug like process, probably the remnant of a filament, is present in some specimens. The conical cup like operculum of the egg is partly detached 48 × 24 μ and the egg is 140 × 60 μ.

Vitellaria cover the entire length of the crura and its branches (Fig. 22) from the intestinal bifurcation to the extreme ends of the terminal crural dilatations but are not confluent across posteriorly, though a median cluster of follicles are noticed between the ends of the crura and the base of the haptor; transverse and median vitelline ducts not observed; vitelline follicles irregularly spherical 8 - 12 μ in diameter and arranged in small irregular clusters. Oötype pear shaped situated close to the enlarged hind end of the ovary; genito-intestinal canal originates from the base of the oötype, runs obliquely forwards and opens into the right intestinal crus.

A vaginal pore as a permanent structure may be said to be absent. However, in most of the specimens a small irregularly transverse oval aperture is noticed to the left margin of the body slightly posterior to

the level of intestinal bifurcation. It is quite possible that this aperture represents the vagina, especially in view of the fact that a short duct can be traced from this pore to the posterior level of the coiled portion of the male duct. But in many other specimens the position of this pore is different, it is more anterior, on the right margin near the level of the male pore and in few other specimens any trace of such an aperture is absent. Hence is it possible that the vaginal aperture observed in many specimens are temporary formations? It is also possible that this structure may change its place of origin in different individuals of this species.

Remarks.

Scomberocola gen. nov. resembles *Mazocraës* HERMANN, 1782, and allied genera in the shape of the body and the structure of the clamps but could be easily distinguished by the characteristic large pair of sucker like clamps at the proximal corners of the haptor and the 3 pairs of small simple clamps behind it. Such a combination of characteristic dissimilar clamps has not hitherto been observed in the family. The large clamps are clearly more advanced while the small ones are typically mazocraeid. The presence of the large pair of clamps in this genus suggests that it should occupy a place between the families Mazocraeidae and Diclidophoridae. The size and number of the testes is characteristic of this species.

Generic diagnosis of *Scomberocola* gen. nov.

Mazocraeidae, haptor well defined with four pairs of clamps; proximal pair large and sucker like, others small and simple, connected by a horizontal apron, anchored terminal lappet present; testes few, post-ovarian, intercaecal, sometimes larger than the ovary; ovary in the middle of the body; male pore median ventral situated at the mid oesophageal zone, armed with different types of hooks and spines; vagina absent (?) if present only temporary; parasitic on Scombroid fishes.

Type species *Scomberocola eyela* gen. *et* sp. nov.

Generic name *Scomberocola:* inhabiting Scombroid fishes, *eyela:* Malayalam name of the host in Kerala.

Summary

Five new species (including two new genera) of monogenetic trematodes belonging to the family Mazocraeidae are described. All except

Scomberocola eyela gen. *et* sp. n. are parasitic on Indian clupeoid fishes while *Scomberocola eyela* is a common gill associate of the Indian mackeral *Rastrelliger kanagurta.*

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