TREMATODES FROM INDIAN MARINE FISHES.

PART VII.[1]—ON MONOGENETIC PARASITES OF THE FAMILY CAPSALIDAE BAIRD, 1853 (CAPSALOIDEA) FROM INDIAN REGION, WITH DESCRIPTION OF A NEW SPECIES OF THE GENUS *CAPSALA* BOSC, 1811.

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CONTENTS.

INTRODUCTION.

Adequate attention has not been paid so far to the study of this group of parasites from the Indian region. The only records of the occurrence of the parasites of this family from this area are those by Bell (1891) from Madras and Luhe (1906) and Linstow (1906) from Ceylon. This paper gives a brief review of the previous work on the group from the Indian region and description of a new species of the genus *Capsala*, collected from the Arabian Sea of Indian Ocean at Bombay.

Family CAPSALIDAE Baird, 1853.

Subfamily *CAPSALINAE* Johnston, 1929.

Genus **Capsala** Bosc., 1911.

Capsala laevis (Verrill, 1874) Johnston, 1929; Price, 1938.

(Text-fig. 1, *a* and *b*)

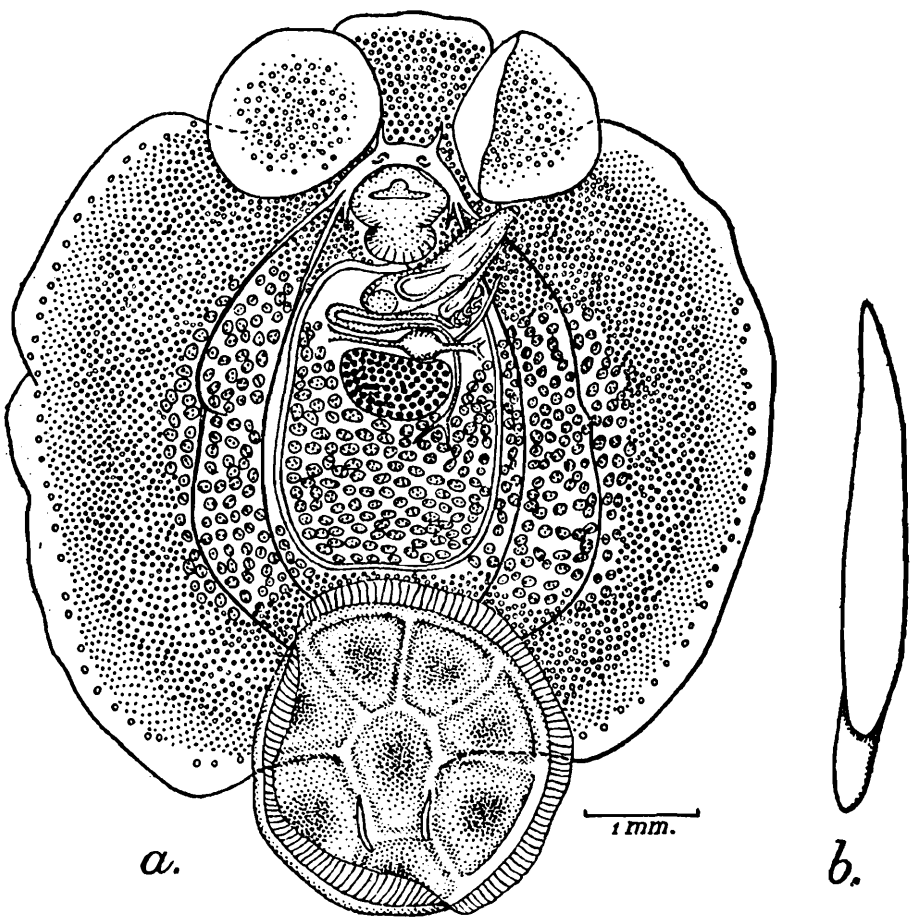
.Syn. *Tristoma laeve* Verrill, 1874.
Tristomum histiophori Bell, 1891.
Tristoma laeve var. *armata* Goto, 1899.

Bell (1891) obtained his material from the collections of Dr. F. Day. They were labelled as "parasites from *Histiophorus* (sic) *brevirostris*

[1] For Parts I-VI see Chauhan, B. S., *Proc. Ind. Acad. Sci.* XXI, pp.129-159. (1945); *Ibid.* XVII, pp. 97-117 (1943); *Ibid.* XVII, pp. 133-137 (1943); *Ibid.* XXV, pp. 160-173 (1945); *Ibid.* XXV, pp. 160-173 (1945); *Ind. Journ. Helminthol.* II, pp. 63-66. (1950); *Rec. Ind. Mus.* XLVIII, pp. 63-66 (1950).

[2] Named in honour of my grandfather late Dr. Sir H. S. Gour, Founder, University of Sagar (M. P.), India.

Madras ". Bell described them as a new species under the name, *Tristomum histiophori* Bell, 1891. Goto in 1894, created a new species *T. ovale* and considered that probably it was identical with Bell's species. Later on (1899) he created two varieties of his species *T. ovale*; var. *armata* Goto (1899) for forms with cuticular spines on the dorsal margins



TEXT-FIG. 1.—*Capsala laevis.*—*a.* Entire worm; *b.* Haptoral hook (after Price 1939).

of the body, to which he referred Bell's species *T histiophori* and var *inermis* Goto (1899) for forms without any trace of dorsal spines to which he referred his species *T ovale* Goto, 1895. Setti (1899) independently of Goto determined that *T. laeve* and *T. ovale* were identical with *T histiophori* Bell—after examining the types of latter—(as *T laeve*). Later workers, Johnston (1929), Price (1938) and Sproston (1946) agree in regarding *T. histiophori* Bell as synonym of *T. laevis* (Verrill, 1874).

Capsala megacotyle (v. Linstow, 1906).

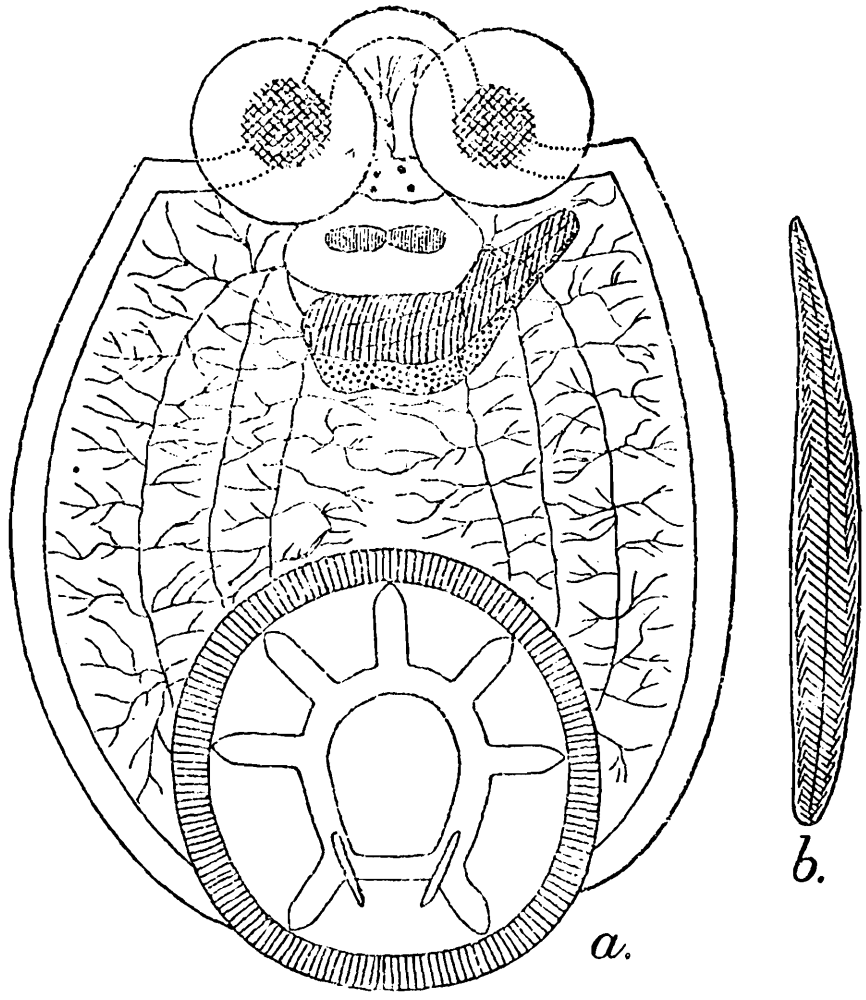
Johnston, 1929; emend. Price, 1938.

(Text-fig. 2, *a* and *b.*)

Syn. *Tristoma megacotyle* von Linstow, 1906.
Capsala megacephala Johnston, 1929—a *lapsus* for *megacotyle.*
Tristomella megacotyle Guiart, 1938.

Von Linstow (1906) collected his specimens from the surface of the body of a Sword fish, *Histiophorus* sp. from Beruwala, Ceylon, on February

5, 1904 and described them as *Tristoma megacotyle.* Johnston (1929) transferred it as a valid species under the genus *Capsala* as *Capsala*



TEXT-FIG. 2.—*Capsala megacotyle.*—*a.* Entire worm ; *b.* Haptoral hook (after Linstow 1906).

megacephala which is obviously a *lapsus calami* for *C. megacotyle.* Guiar 1938) transferred it to his new genus, *Tristomella* Guiart, 1938. I is now regarded as *C. megacotyle.*

Capsala ovalis (Goto, 1894) Price, 1938 ; emend. Sproston, 1946. (Text-fig. 3 *a*, *b* and *c*.)

Tristomum ovale Goto, 1894.

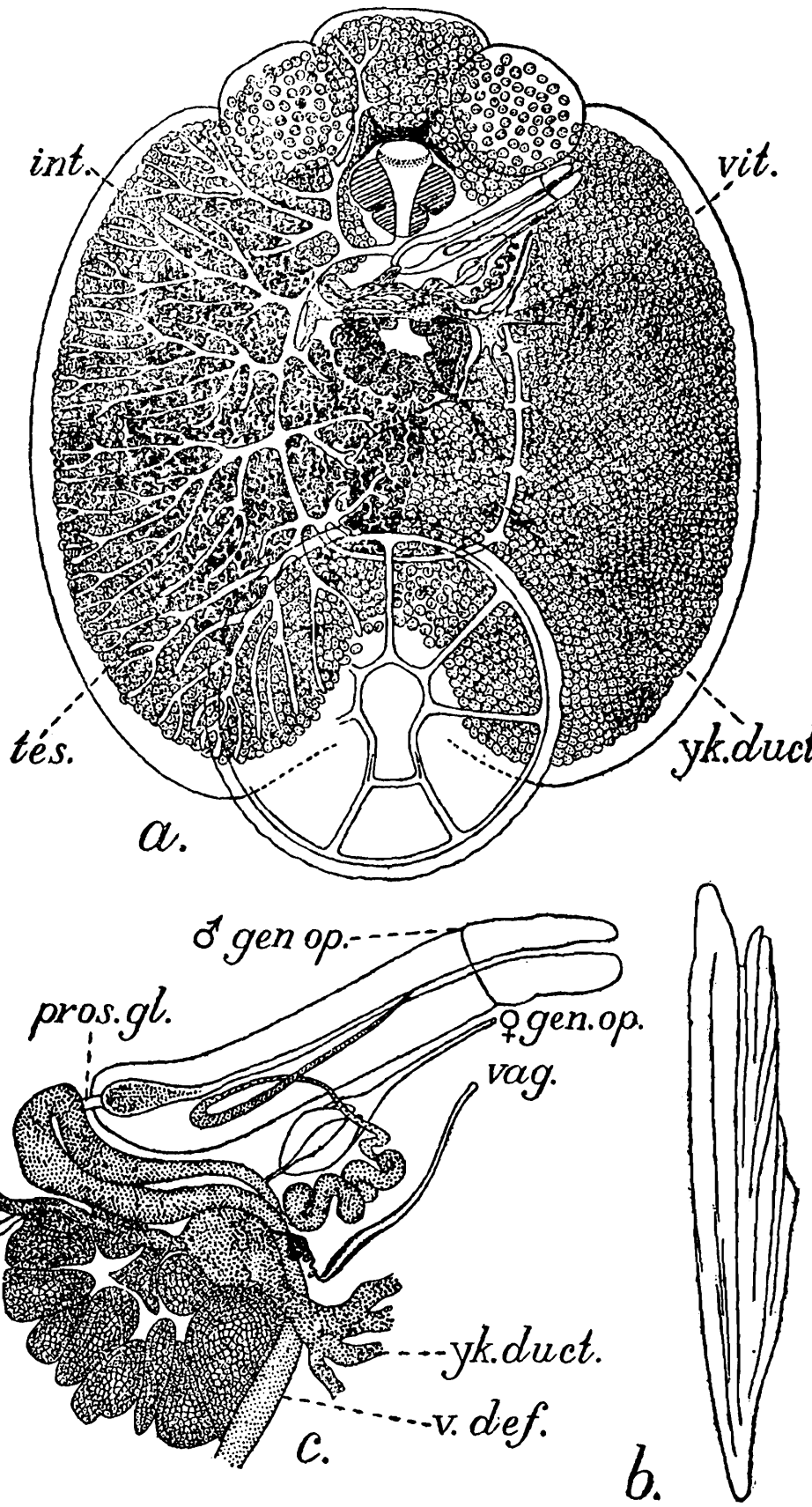
Tristoma ovale Setti, 1899.

Capsala ovale Price, 1938.

Syn. *Tristomum laeve* var. *inermis* Goto, 1899.

Von Linstow (1906) described a new species of the genus *Tristomum* as *T. megacotyle*, from the surface of the body of a sword fish, *Histiophorus* sp. from Ceylon. At the end of his description he states that " a similar, though much larger species, also living upon *Histiophorus*, is *Tristomum laeve* Verrill=*T ovale*, Goto ; the length of this species amounts to 13 mm. and its breadth 12 mm., the diameter of the anterior suckers equals to 1/7 of the body length ; the rays of the caudal sucker

are narrow, its margin unstriated and the rods are expanded and irregularly laciriate at the roots".



TEXT-FIG. 3.—*Capsala ovalis.*—*a.* Entire worm (ventral view), testes represented only on one side. *b.* Haptoral hook×70 diam. *c.* Central portion of the genital organs viewed as a transparent object from the ventral side×29 diam (after Goto, 1894).

Key to lettering : *int.*, intestine ; *pros. gl.*, prostate gland ; *tes.*, testis ; *vag.*, vagina *v. def.*, vas deferens ; *vit.*, vitellaria ; *yk. duct.*, yolk duct ; ♂ *gen. op.*, male genital opening ; ♀ *gen. op.*, female genital opening.

"(Cf. S. Goto, Studies on the Ectoparasitic Trematodes of Japan *Journ. Coll. Science, Japan*, VIII, part 1, Tokyo, 1894, pp. 241-244.)"

Species *Tristoma ovale* was created by Goto in 1894. However, in 1899, after examination of the type material he regarded *T. ovale* and *T histiophori* as synonymous to *T laevis* but created two varieties of the species, *T. laeve* Verrill, var. *armata* Goto, 1899 for forms with cuticular spines on the dorsal margins of the body, *e.g.* those of Verrill and Bell and var. *inermis* Goto, 1899 for forms with total absence of dorsal spines and regarded his species *T ovale* Goto, 1894, as synonymous with the later. Price (1938) considers that the varietal differences are of specific rank and reinstates *T. ovale* as distinct from *Capsala laevis*. Sproston (1946) emends the name to *C. ovalis* on grounds of grammatical agreement in consultation with Dr. H. A. Baylis.

In view of the reinstatement of the species *C. ovalis* by Price (1938 as valid species, it is difficult to say whether the specimens with which Linstow (1906) was dealing were *Capsala laevis* or *Capsala ovalis*. However, since Linstow's forms were similar to *C. megacotyle* and *C. laevis* it appears that most probably his material was *C. ovalis* (Goto, 1894) Price, 1938.

C. ovalis (Goto, 1894) appears to be an interesting form in that it has pharynx constricted, body is without marginal dorsal spines, ovary is much lobed and the testes are irregular in shape and are of more or less lobed nature.

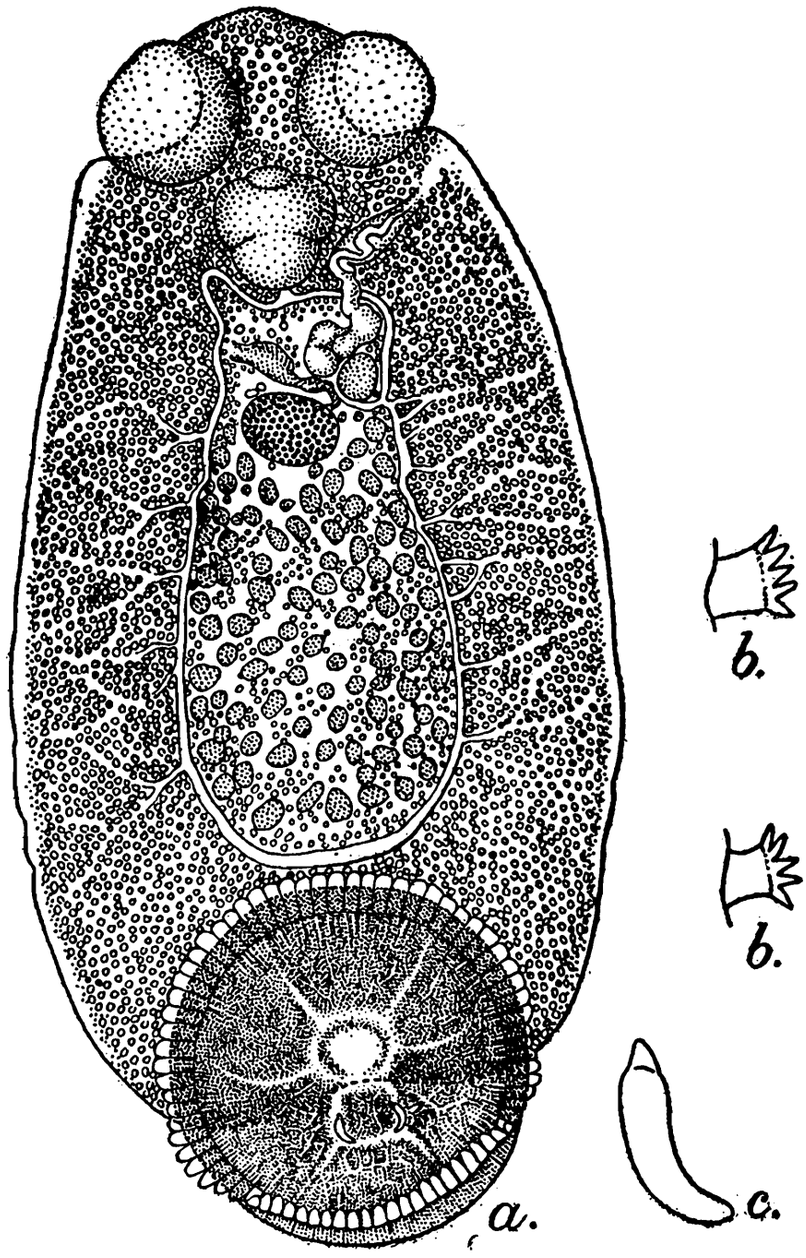
Capsala gouri, *sp. nov.*

(Text-fig. 4 *a*, *b*, and *c*. & Text-fig. 5 *a* and b).

Four specimens of different sizes of this worm were collected by Prof. and Mrs. Rangnekar from the operculum of the fish *Thynnus thunnina* C. V in the winter season, in 1947.

Description.—Body of the parasite is elongately oval, slightly tapering anteriorly, with anterior border being convex. Anterior lobe of body is divided from the median by a slight constriction where the anterior suckers are attached. Ventral papillae appear to be absent. The type specimen measures 3·30 mm. in length and 1·55 mm. in width (maximum) which is in the region of posterior third of the body. Measurements of other paratype specimens are as given in the chart below. Lateral margins are entire with a single row of dorsal marginal chitinous spines. They are not crown-shaped but simple 5-6 cuspid. Anterior suckers are circular or slightly oval measuring *0·4 mm.*, about one eighth of body length. Posterior sucker is circular, projecting beyond the body by about one third of its length and is about one third of body length. It is provided with marginal striated membrane. Its internal surface is divided into areas by six main ridges, the posterior septa probably having slight tendency for sub-division towards the lips. Ventral surface of the haptor is covered with papillae. The haptor has one pair of gourd shaped hooks, tapering posteriorly, probably with a slight tendency for recurving at the border end for muscle attachment. No marginal

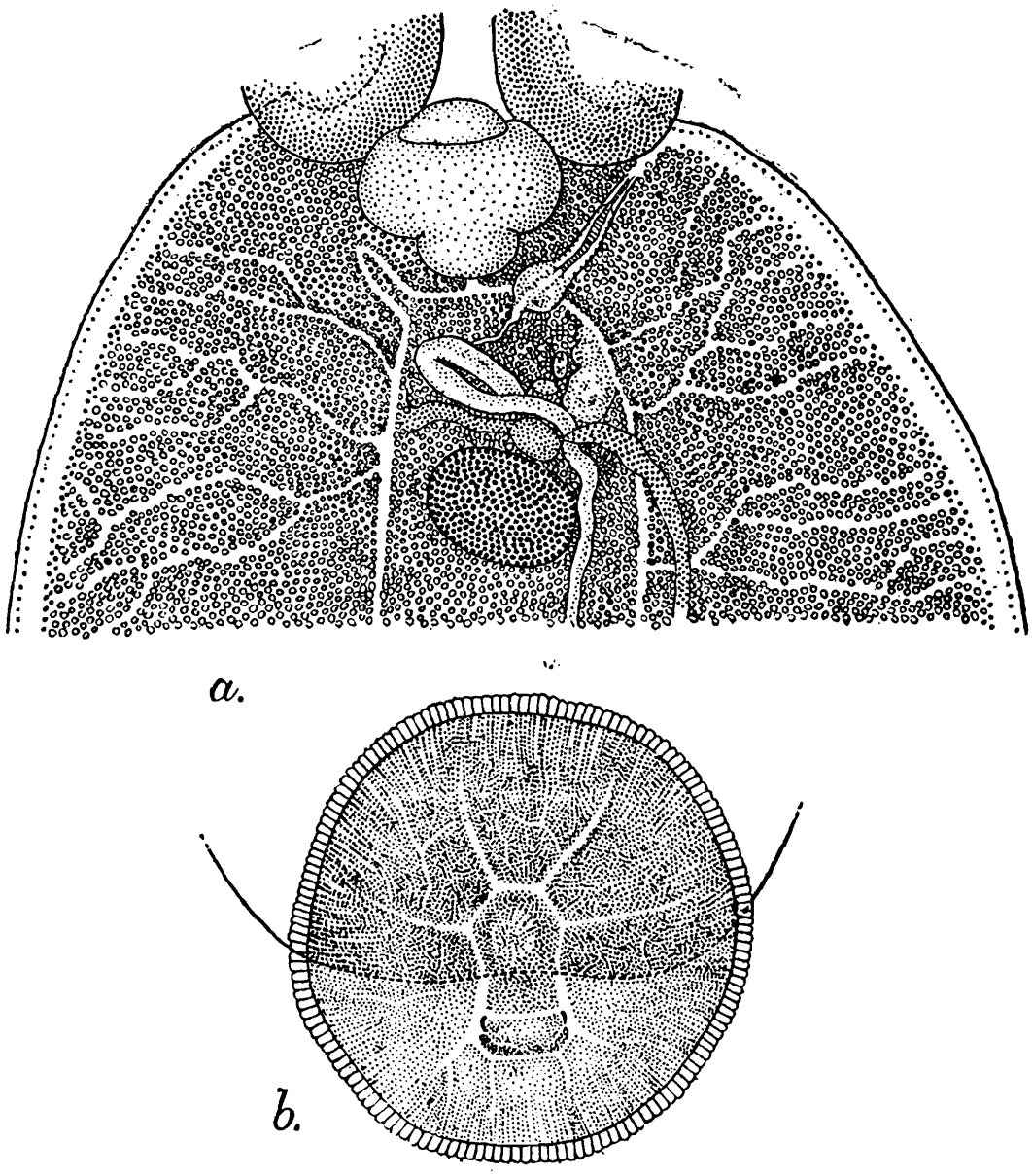
hooklets were observed. Mouth is of moderate size, situated in between and at the plane of the hinder end of the anterior suckers. Pharynx is divided by a constriction into two parts. Oesophagus is very short. Intestinal crura are continuous with each other behind, a little in front of the posterior sucker with numerous dendritic branches on the outer-side. There is common genital opening on the left side of the pharynx, near the posterior end of the left anterior sucker. Cirrus pouch is club shaped with its base lying laterally on the left side of the pharynx.



TEXT-FIG 4.—*Capsala gouri*, sp. nov. *a*. Entire worm, ventral view × 50 ; *b*. Dorsal marginal spines × 600 ; *c*. Haptoral hook × 300.

Penis is long and thick. Ovary is median and is situated at the hinder end of the anterior third of the body. It is oval and compact without any lobes. Oviduct is coiled, arising at the front end of the ovary in the median line, proceeding forward into the ootype. Uterus is not very long. It opens into the genital atrium near its bottom. No eggs were observed. Vitellaria are mostly confined to the lateral margins and

anterior lobe of the body but a few scattered ones are found in the central testicular region also. Yolk ducts are paired. Yolk reservoir is small. Vaginal opening is situated a little behind the common genital opening. Vaginal canal proceeds as usual backwards and forwards the



TEXT-FIG 5.—*Capsala gouri*, sp. nov. *a*. Anterior portion, enlarged, showing genital organs, ×50 ; *b*. Haptor showing haptoral rays ×30.

median line after forming a globular receptaculam seminis, which opens with the yolk reservoir. Testes are small, globular, many in number, confined to the mid region between the intestinal crura and do not extend anteriorly beyond the level of the ovary.

Measurements in millimetres.

	Total length of body including haptor.	Length of body proper excluding projecting portion of haptor.	Maximum breadth of body.	Diameter of haptor.
Specimen No. 1	ca. 7·25	6·05	4·01	3·35
Specimen No. 2 ..	6·65	5·40	3·50	2·35
Specimen No. 3 ..	3·30	2·90	1·65	0·93
Specimen No. 4	2·85	2·50	1·55	0·90
$\frac{\text{Length of body proper}}{\text{Diameter of haptor}}$	(1) 1·8; (2) 2·3; (3) 3·1; (4) 2·8.			

Discussion.—There are three genera in the subfamily Capsalinae; *Capsala* Bosc, 1811; *Tristoma* Cuvier, 1817 and *Capsaloides* Price, 1938. Out of these the genus *Capsala* is distinguished from the other two in having the pharynx constricted and the testes usually, if not always, extending laterally to intestinal crura. In the other two genera, the pharynx is without a constriction and testes are confined to the inter-intestinal field. Of the other two, the genus *Capsaloides* is characterised by having the posterior rays of the haptor bifid distally, haptoral hooks being with clawed tips and the dorsal marginal spines being crown-shaped in a single longitudinal row. In *Tristoma*, the posterior rays of haptor are not bifid distally, haptoral hooks are without clawed tips and the dorsal marginal spines, when present, are not crown-shaped. They are in numerous short rows.

The new species *C. gouri* is unique in having combination of some characters of all the three genera of the subfamily. It resembles *Capsala* in having the pharynx distinctly constricted and also in the shape of the anchors. It agrees with *Capsaloides* and *Tristoma* in having the testes entirely between the intestinal crura. It further resembles *Capsaloides* in probably having the posterior rays of haptor bifid distally and in having the dorsal marginal spines in a definite single longitudinal row. It resembles *Tristomum* in having anchors without clawed tips.

Price (1938) gave a list of 16 species as valid species of the genus *viz. Capsala martinieri* (Bosc, 1811), type species; *C. biparasitica* (Goto, 1894); *C. foliacea* (Goto, 1894); *C. interrupta* (Monticelli, 1891); *C katsuwonia* (Ishii, 1936); *C. laevis* (Verrill, 1875) Johnston, 1929, *C. lintoni* Price, 1938; *C. maccallumi* Price, 1939; *C. magrona* (Ishii, 1936); *C. megacotyle* (Linstow, 1906); *C. nozawae* (Goto, 1874); *C. onchidiocotyle* (Setti, 1899); *C. ovale* (Goto, 1894); *C. pelamydis* (Taschenberg, 1878); *C. peoyi* (Vigueras, 1935) and *C. squali* (E. Blanchard, 1847). Sproston (1946), after her studies brought in five more, under the genus, as valid species, *viz., C. cephala* (Risso, 1826) St. Remy, 1898; *C. cutanea* (Guiart, 1938) Sproston, 1946; *C. grimaldii* (Guiart, 1938) Sproston 1946; *C. molae* (E. Blanchard, 1847) Johnston, 1929; *C. thynni* (Guiart, 1938) Sproston, 1946. She also emended the specific names of the following three species in consultation with Dr. H. A. Baylis on grammatical grounds *viz. C. katsuwonia, C. magrona* and *C. ovale* to *C. katsuwoni, C. magronum* and *C. ovalis* respectively.

Out of these 21 valid species under the genus, the following three are recorded from the Indian region *viz. C. megacotyle, C. laevis* and *C. ovalis.*

The new species *C. gouri* differs from *C. megacotyle* in the relative shape, ratio of the anterior and posterior suckers to the body length, number of ribs on the posterior sucker and shape of cuticular rods on the posterior sucker. Specimens of *C. lævis* of Linstow, 1906, appear to differ from the new species in the ratio of the suckers and in the nature of the margin of the posterior sucker being unstriated, the rods being expanded and irregularly laciniate at the roots and in the shape of bars. *C. histiophori* Bell (syn. to *C. lœve*) differs from the new species in that its posterior sucker projects by about one third of its diameter beyond

the margin of body and the parallel rows of chitinous corpuscles are absent.

The new species is particularly characterised in having a constricted pharynx, testes being confined within the intestinal crura, posterior sucker being with striated fringe, the posterior pairs of ribs on the posterior sucker having a tendency for bifurcation and in the shape of the anchors being simple curved rods and the marginal spines being in a definite longitudinal row with typical shape of *Capsala* spines.

Subfamily *BENEDENIINAE* Johnston, 1931.

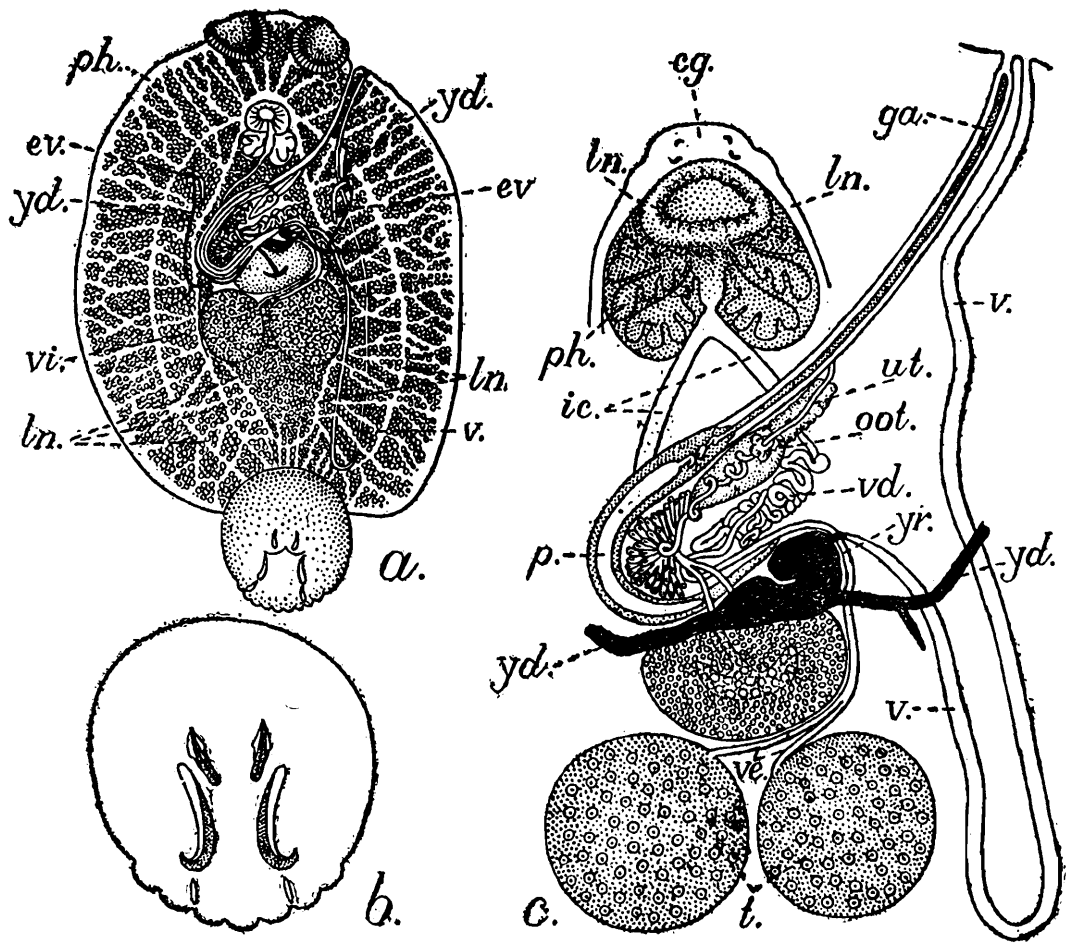
Genus **Benedenia** Diesing, 1858.

Benedenia macrocolpa (Lühe, 1906) Johnston, 1939.

(Text-fig. 6 *a*, *b*, *c*, and *d*.)

Syn. *Epibdella* (*Benedenia sensu* Montic.) *macrocolpa* Linstow, 1906.
Benedenia macrocolpa MacCallum, 1927.
Benedenia (*Benedeniella*) *macrocolpa* Johnston, 1929.
Benedenia macrocolpa Meserve, 1938.

This species was described by Lühe in 1906 as *Epibdella* (*Benedenia sensu* Montic.) *macrocolpa* from the skin of *Rhinoptera javanica* Mull.



TEXT-FIG. 6.—*Benedenia macrocolpa*. *a*. Entire worm, ventral view, *b*. Haptor with three pairs of hooks ; *c*. Genital organs, magnified. (after Linstow, 1906.)

Key to lettering : *cg*., cerebral ganglion with the two pairs of eyes ; *ev*., excretory vesicle ; *ga*., genital atrium ; *ic*., intestinal caeca ; *ln*., longitudinal nerve ; *oot*., ootypeh *ov*., ovary ; *p*., penis ; *ph*., pharynx ; *te*, testis ; *ut*., uterus ; *v*., vagina ; *ve*., vasa efferentia ; *vi*., vitellarium ; *yd*., yolk ducts ; *yr*., yolk reservoir

and Henle from Kalpitiya (3 specimens) and Dutch Bay, Ceylon (2 specimens). It is regarded at present as *Benedenia macrocolpa*.

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