

**TREMATODA,
CESTODA AND ACANTHOCEPHALA**

BY

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The present report deals with a small consignment of parasitic worms belonging to these three groups obtained during the hydrobiological survey of Lake Tanganyika, 1946-1947. Dr. V. VAN STRAELEN, Président du Comité de Coordination pour les Recherches hydrobiologiques au lac Tanganika, has kindly entrusted the writer with the determination of this material.

Though small, the collection is of much interest, including as it does one species of Trematoda which appears to be new to science, and five species of Cestoda, one of which has been hitherto little known morphologically. Moreover, further light is thrown on the distribution of a recently-described Acanthocephalan in East Africa.

TREMATODA.

FAMILY ACANTHOSTOMATIDÆ.

Cladocystis tanganyikæ n. sp.

(Fig. 1.)

Two specimens of the form here described were found amongst the « résidus de fixations des poissons ». The fishes were taken in a small bay south of Cape Tembwe (Stn. 68), 15-16.I.1947, and apparently included *Lamprichthys tanganicus* and several species of CICHLIDÆ. Unfortunately, it is not yet possible to state which of the fishes collected is the definitive host.

The body is flattened and somewhat pyriform in outline, each specimen having the unusual shape shown in figure 1. It is 2.5 mm in length and 1 mm in maximum width. The cuticle is thin and provided with rows of extremely small spines, which are very closely set anteriorly. These spines gradually increase in size and diminish in number towards the posterior end of the body, and finally disappear in the region of the ovary.

The oral sucker is subterminal and roundish in outline, measuring 0.28-0.35 mm in diameter. The ventral sucker is smaller, having a diameter of 0.2 mm. It is situated at about the junction of the first and second thirds of the total length of the body. In one specimen the ventral sucker is disposed in the

normal manner and appears circular in outline, but in the other specimen the sucker is retracted, so that in optical view it appears cup-shaped. In both examples the inner margin of the sucker appears to be slightly crenulated. A short prepharynx opens into a well-developed pharynx, which measures 0.2 mm in length and 0.12 mm in width. The œsophagus is about as long as the pharynx

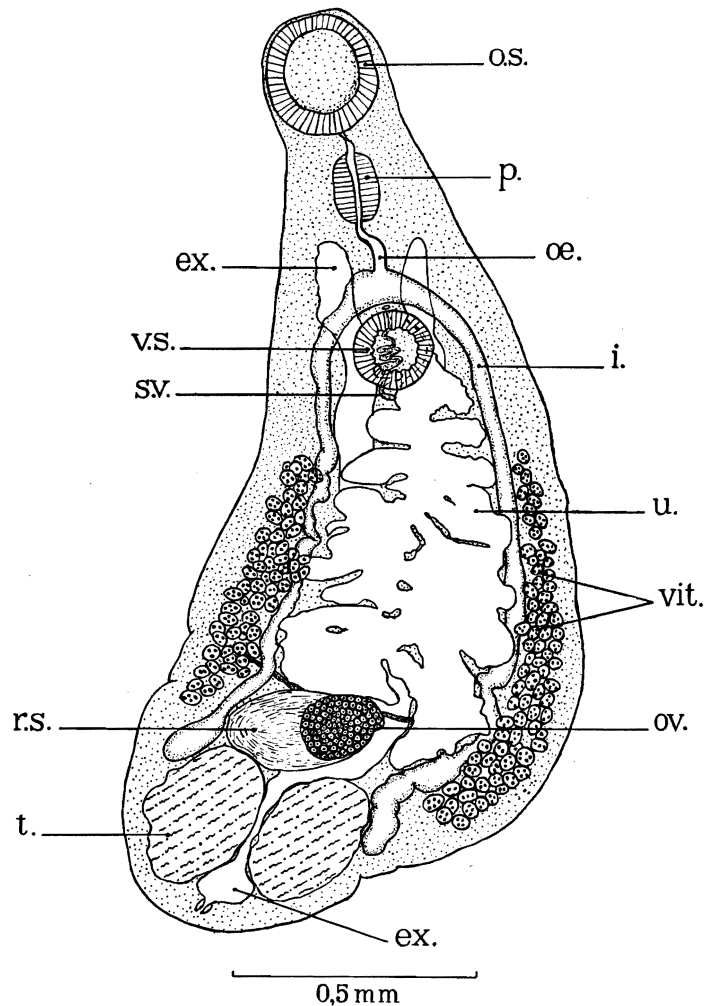


FIG. 1. — *Cladocystis tanganyikæ* n. sp.

Ventral view.

ex. = excretory vesicle; *i.* = intestinal caecum; *œ.* = œsophagus; *o.s.* = oral sucker; *ov.* = ovary; *p.* = pharynx; *r.s.* = receptaculum seminis; *s.v.* = seminal vesicle; *t.* = testis; *u.* = uterus; *vit.* = vitellaria; *v.s.* = ventral sucker.

and somewhat bent, presumably owing to contraction of the body. It is lined with a relatively thick cuticle. The intestinal bifurcation occurs immediately in front of the ventral sucker, and the intestinal caeca extend posteriorly as far as the testes. In whole preparations it has not been possible to make out the excretory vesicle in its entirety, as it is partially hidden by the uterus. It appears, however, to be Y-shaped, the main stem extending anteriorly between the testes and along the left side of the ovary, with the limbs reaching to the region of the

pharynx. The opening of the vesicle is dorsally subterminal at the posterior end of the body and appears to be provided with a sphincter.

The genital pore is median, situated between the intesinal bifurcation and the anterior margin of the ventral sucker. A cirrus-sac is absent, and the coiled seminal vesicle lies mainly dorsally to the ventral sucker. The testes lie symmetrically opposite each other in the posterior region of the body, more or less between the ends of the intesinal caeca. They are compact bodies, very slightly lobed on their lateral margins, and measure 0.3-0.36 mm in length and 0.24-0.25 mm in width.

The ovary lies in the median line, almost immediately in front of the testes. It is transversely oval, measuring 0.22-0.25 × 0.13-0.18 mm. Dorsally to the ovary there is a very much larger receptaculum seminis. The vitelline glands are composed of numerous rounded follicles, situated laterally to the intestinal caeca. They extend from about the middle region of the body to near the posterior ends of the caeca. From near the hinder region of the follicles, the two vitelline ducts cross the body to open into a relatively large vitelline reservoir, situated dorsally to the ovary. The uterus is well developed and almost fills the area between the intestinal caeca, anteriorly to the ovary. The eggs are operculate and measure 0.025-0.028 × 0.017 mm.

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The genus *Cladocystis* POCHÉ, 1926, contained hitherto two species, *C. trifolium* (BRAUN, 1901) and *C. intestinalis* VAZ, 1932, both of which occur in the Characid fish *Salminus maxillosus* in Brazil. *C. trifolium* was, however, originally recorded from the œsophagus of a heron (*Ardea coicoides*) in Brazil, and had evidently been ingested with a fish swallowed by the bird.

The new form from Lake Tanganyika bears a considerable resemblance to both these species, but appears to differ from them in certain characters. From *C. trifolium* it differs mainly in the ratio of the diameter of the oral sucker to that of the ventral sucker and in the absence of a trilobed ovary, and from *C. intestinalis* principally in the size of the eggs and in the anterior extent of the vitelline follicles.

PRICE (1940), in his classification of the superfamily Opisthorchioidea, places the genus *Cladocystis* in the Opisthorchiinae, a subfamily of the Opisthorchiidae. It appears to be implicit in this classification that the anterior extent of the Y-shaped excretory vesicle is the main feature by which the family Opisthorchiidae may be distinguished from the family Acanthostomatidae. In the Opisthorchiidae the limbs of the vesicle are short, extending only as far as the ovary, whilst in the Acanthostomatidae the limbs reach to about the level of the pharynx. In the species described above, as well as in *Cladocystis trifolium*, the Y-shaped excretory vesicle extends well into the anterior region of the body. Thus, if the classification of PRICE be accepted, the genus *Cladocystis* POCHÉ, 1926, should be transferred to the family Acanthostomatidae. Of the genera ascribed to this family by PRICE, *Cladocystis* appears to be closely related to *œsophagicola* YAMAGUTI, 1933.

CESTODA.FAMILY **CARYOPHYLLÆIDÆ.****Monobothrioides cunningtoni** FUHRMANN & BAER, 1925.

A few examples of this species were obtained from the type-host, *Auchenoglanis occidentalis*, in the delta of the R. Malagarassi (Stn. 147), 26.II.1947.

? Lytocestoides sp.

Two immature and somewhat contracted specimens of a Caryophyllæid were obtained from *Parectodus* sp. near Albertville (Stn. 103), 3.II.1947. Of the genital organs in these specimens it has been possible to determine only the vitelline follicles and the testes. The distribution of these structures is very similar to that occurring in *Lytocestoides* BAYLIS, 1928, and therefore the present specimens are tentatively assigned to this genus.

FAMILY **PROTEOCEPHALIDÆ.****Proteocephalus beauchampi** FUHRMANN & BAER, 1925.

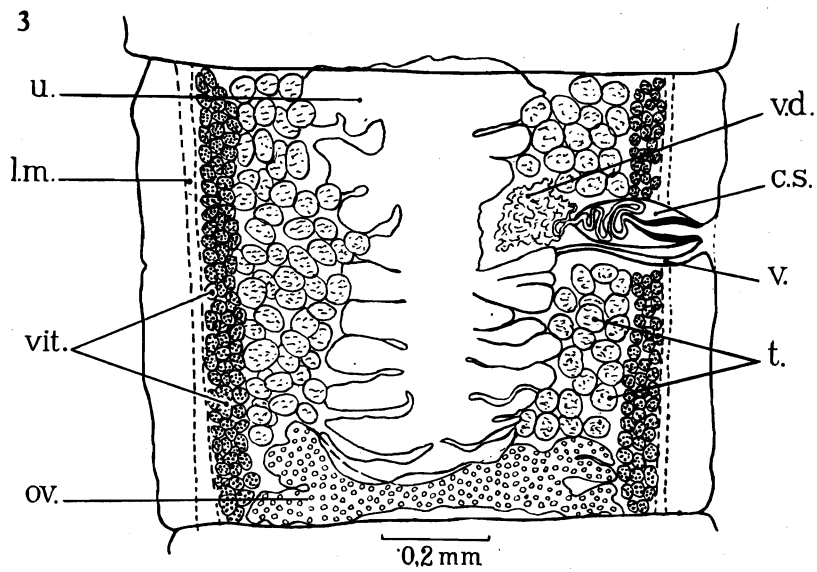
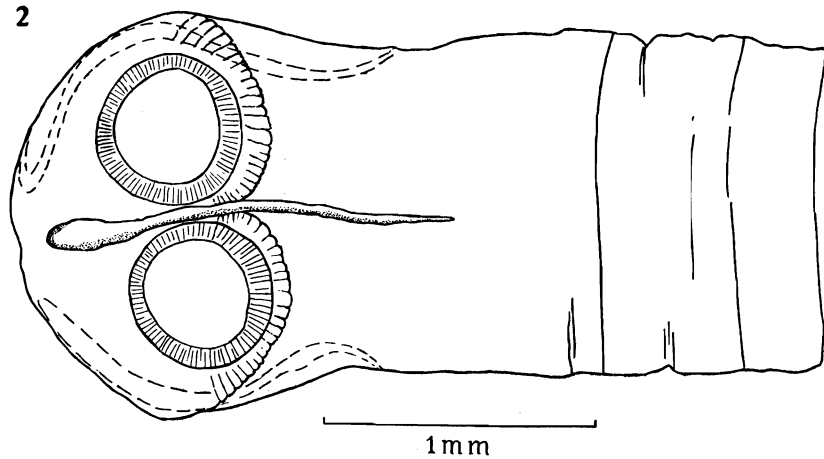
(Figs. 2 & 3.)

BEAUCHAMP (1914) described, under the name of *Proteocephalus sulcatus* (KLAPTOCZ), some fragmentary material of a Cestode from a Siluroid, *Chrysichthys* sp., at Kilewa Bay, Lake Tanganyika. FUHRMANN and BAER (1925) re-examined this material and considered it to be referable to a new species, which they called *Proteocephalus beauchampi*.

In the present collection several complete specimens and some fragments, apparently belonging to *P. beauchampi*, were obtained from *Chrysichthys brachynema*, caught near the mouth of the Grande Ruzizi river at the northern end of the lake (Stn. 273), 3.V.1947. It seems desirable to utilize this material to give some further account of the morphology of this species.

Complete specimens, possessing fully-gravid segments, measure up to 135 mm in length and 3 mm in maximum width, while a fragment of strobila consisting entirely of segments containing eggs is 140 mm in length and 3 mm in width. In various regions of the strobila the segments differ considerably in shape. Those in the anterior region are trapezoid, the length being much less than the width. By degrees, the segments become squarish, and posteriorly they are distinctly longer than broad. The hindermost segment possesses a rounded posterior margin. The largest segment usually occurs in the middle region of the strobila, where it measures up to 2 mm in length and 3 mm in width. The longest complete specimen in the present material consists of about 280 segments, of which about the hinder 150 contain eggs. Rudiments of genital organs begin to be recognisable very soon after segmentation of the strobila appears.

The scolex is somewhat pyramidal in shape, and its surface is divided by four deep longitudinal furrows into quadrants, each of which bears a well-developed sucker. It is unarmed and measures up to 2 mm across, and is sometimes sharply delimited from the neck. The suckers are sunk in the substance of the



Proteocephalus beauchampi FUHRMANN & BAER, 1925.

FIG. 2. — Scolex.

FIG. 3. — Mature segment.

c.s. = cirrus-sac; *l.m.* = longitudinal muscle-fibres; *ov.* = ovary; *t.* = testes; *u.* = uterus; *v.* = vagina; *v.d.* = vas deferens; *vit.* = vitellaria.

scolex and have an outside diameter of 0.4-0.5 mm. There is no indication of a fifth sucker or of any apical glands. In a figure given by FUHRMANN and BAER, the scolex appears to be united to the strobila by four cushion-like structures. These structures do not occur in the present material, and they are most probably merely artifacts of the neck brought about by contraction. The neck or

unsegmented anterior portion of the strobila measures 0.9-2 mm in length and 0.7-1 mm in width. In contracted specimens, however, segmentation appears to begin almost immediately behind the scolex.

The cuticle is thin, while the subcuticular layer of cells is relatively wide. The musculature of the strobila is moderately developed. The main longitudinal muscles, although occupying about one-third of the thickness of the cortical parenchyme, do not appear to be arranged in distinct bundles. As usual, in close apposition to the vitelline follicles there are two longitudinal excretory canals on each side. The ventral canals are much wider than the dorsal and apparently bear numerous branches, but no transverse vessels uniting the main canals have been detected.

The genital pores are irregularly alternating and situated at about the anterior third or, less frequently, near the middle of the segment. The cirrus-sac is variable in shape, but often appears to be flask-shaped, varying in length from 0.24 mm to 0.3 mm and in maximum width from 0.07 mm to 0.12 mm. It possesses a rather thin wall enclosing a stout unarmed muscular cirrus and a coiled ejaculatory duct. According to FUHRMANN and BAER, the cirrus-sac lies posteriorly, never anteriorly, to the vagina, whilst BEAUCHAMP indicates that it may occur either anteriorly or posteriorly to the vagina in a single specimen. In the present material the position of the cirrus-sac in relation to the vagina agrees with BEAUCHAMP's observation. The vas deferens is very intricately coiled before passing into the cirrus-sac.

The genital organs lie in the medullary parenchyme. There are between 75 and 105 testes, which in dorso-ventral view appear more or less rounded, measuring 0.05-0.075 mm in diameter, but which in sagittal view appear oval, measuring 0.11-0.14 × 0.05-0.075 mm. These are arranged on either side of the uterus and may be confluent in the anterior region of the segment, more especially when eggs are not present in the uterus. The ovary is situated in the posterior end of the segment and composed of two main lateral masses of elongate follicles. When the uterus is fully distended with eggs, the ovary tends to appear transversely elongate. The vitellaria occupy two longitudinal bands situated laterally to the genital glands. Each band consists of two or three rows of follicles. The uterus appears firstly as a median longitudinal tube, which soon becomes filled with eggs. When fully developed, it is a large saccular organ, with from 8-14 lateral pockets on each side. The eggs may be spherical or pyriform and measure about 15 μ in diameter. When pyriform, the egg possesses a short thick prolongation at its narrow end. The oncospheres measure about 11 μ in diameter and their hooks about 4 μ in length.

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The present form appears to be closely related to *Proteocephalus sulcatus* (KLAPTOCZ, 1906), a species originally described from *Polypterus endlicheri* and *Clarotes laticeps* in the White Nile. It differs from KLAPTOCZ's description of *P. sulcatus* in the much smaller number of testes and in the position of the vagina in relation to the cirrus-sac.

In the British Museum (Natural History) there are some specimens of *P. sulcatus*, determined by Dr. W. N. F. WOODLAND, from *Clarotes laticeps* which appear to agree with *P. beauchampi* in both the characters mentioned above. KLAPTOCZ pointed out that the scolex of the form found in *Polypterus endlicheri* differed from that of the form found in *Clarotes laticeps*, but as there appeared to be intermediate gradations between the two types of scolices the two forms were considered to belong to the same species. LA RUE (1914) however, is of the opinion that KLAPTOCZ possibly confused two distinct species of very similar appearance, this possibility being supported by the fact that the hosts belong to two very widely separated families.

From this discussion it seems that the form described by KLAPTOCZ from *Clarotes laticeps* may possibly be identical with *Proteocephalus beauchampi*, and that an examination of the type-material of *P. sulcatus*, or of further material from *Polypterus endlicheri*, is necessary before *P. beauchampi* and *P. sulcatus* may, without doubt, be regarded as distinct species.

FAMILY DILEPIDIDÆ.

Choanotænia riccii FUHRMANN & BAER, 1944.

Numerous examples, agreeing very well with the original description of this species, were obtained from the intestine of *Sphenorhynchus abdimii* at Lovu Bay (Stn. 197), 26.III.1947.

FAMILY HYMENOLEPIDIDÆ.

Hymenolepis multiformis (CREPLIN, 1829).

A number of specimens, unfortunately without scolices, which probably belong to this species, occurred in the intestine of *Sphenorhynchus abdimii* at Lovu Bay (Stn. 197), 26.III.1947.

ACANTHOCEPHALA.

FAMILY NEOECHINORHYNCHIDÆ.

Acanthosentis tilapiæ BAYLIS, 1948.

A few specimens, with proboscides retracted, which are provisionally referred to this species, were obtained from the intestine of *Tilapia tanganicæ* taken in Tembwe Bay (Stn. 112), 7.II.1947. *Acanthosentis tilapiæ* was originally described from *Tilapia lidole* in Lake Nyasa, East Africa.

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