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February 2021

## Binder 004, Acanthostomidae [Trematoda Taxon Notebooks]

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## ACANTHOSTOMIDAE Poche, 1926

Family diagnosis. — Body elongate, usually slender. Eye-spots usually present. Circumoral coronet of spines present or absent. Oral sucker relatively well developed. Pharynx present. Ceca long, exceptionally short. Acetabulum usually small. Testes two, chiefly inter- or extracecal, exceptionally postcecal, in hindbody. Vesicula seminalis tubular, occasionally bipartite. Cirrus pouch absent. Gonotyls may be present. Genital pore pre-acetabular. Ovary lobed or not, pretesticular. Receptaculum seminis present. Vitellaria acinous, dendritic or forming bunches, in hindbody, usually lateral, occasionally median, or submedian. Uterus usually not extending into posttesticular region; eggs small. Excretory vesicle Y-shaped; arms very long, extending into forebody. Usually parasitic in marine teleosts, occasionally in reptiles.

Type genus: *Acanthostomum* Looss, 1899.

## Key to subfamilies of Acanthostomidae

- |   |                       |
|---|-----------------------|
| 1. Circumoral crown of spines present .....   | 2                     |
| Circumoral crown of spines absent .....   | 7                     |
| 2. Uterus extending to posterior extremity .....  | 3                     |
| Uterus not extending to posterior extremity .....   | 4                     |
| 3. Ceca unequal; prepharynx short; acetabulum close to anterior extremity; vitellaria anterior to ovary ...   | Anisoclaudiinae       |
| Ceca equal, reaching posterior extremity; prepharynx very long; acetabulum well apart from anterior extremity; vitellaria anterior and posterior to ovary                       | Pseudoacanthostominae |
| 4. Prepharynx more or less long, esophagus short .....  | 5                     |
| Prepharynx very short or practically absent, esophagus long   | 6                     |
| 5. Vitellaria largely in ovariostesticular zone; uterus inter- and extracecal .....   | Brientrematinae       |
| Vitellaria anterior to ovary and testes; uterus confined to intercecal field; ceca usually opening outside at posterior extremity .....   | Acanthostominae       |
| 6. Esophagus unusually long, bifurcating far behind acetabulum; ceca very short; vitellaria between cecal ends and testes which are juxtaposed at the posterior extremity ..... | Telogasterinae        |
| Esophagus bifurcating well anterior to acetabulum; ceca reaching to near posterior extremity; vitellaria extending along anterior portion of ceca .....                         | Anoiktostomatinae     |
| 7. Vitellaria divided by ovarian complex into two (an anterior and a posterior) median groups .....   | Isocoeliinae          |
| Vitellaria lateral, in fore- or hindbody .....  | Anisocoeliinae        |

All the known acanthostomid genera from reptiles belong to the subfamily Acanthostominae.

Acanthostominae Poche, 1926

*Diagnosis* (emended from that of Brooks 1980).—Body elongate, eyespotted or not. Oral sucker terminal, *with terminal or subterminal mouth*, surrounded by uninterrupted single row of spines *or lacking spines*. Prepharynx and esophagus present and variable in length *or lacking*. Ceca extending to near posterior end of body. Acetabulum median, embedded in parenchyma or enclosed in body fold. Preacetabular pit present. Postacetabular pit present or lacking. Testes 2, intercal, tandem or oblique, in hindbody. Seminal vesicle present. Cirrus sac lacking. Gonotyl present or lacking. Genital pore immediately preacetabular, not in preacetabular pit. Ovary spherical or subspherical, pretesticular in hindbody. Seminal receptacle and Laurer's canal present. Vitellaria follicular, in lateral fields in hindbody. Uterus postacetabular, usually not extending postovarially. Eggs embryonated, not filamented. Excretory vesicle Y- or V-shaped, with post- *or pre-* acetabular bifurcation. Parasites of estuarine and freshwater fishes and reptilians. Pantropical. Type-genus: *Acanthostomum* Looss, 1899.

*Inclusion of all cladistic information in classifications produces long unwieldy classifications.*—Do attempts to preserve all the information in a cladogram necessarily produce long unwieldy classifications? In order to examine this question, we formulated a complete classification of the acanthostomes according to the convention of phyletic sequencing (see Wiley 1979) in which every taxon is considered the sister-group of all taxa of equivalent position below it. That classification: —————>

This classification is only 16 lines longer than a classification listing only genera and their included species, and only 6 lines longer than a classification using subgeneric designations. Thus, a fully-resolved cladistic classification need not be substantially longer than a less informative syncretistic scheme.

This report demonstrates the utility of a cladistic classification scheme as a general reference system for helminth systematics. Theoretical claims in support of the stability, consistency, predictivity, information content, and applicability of Hennigian systematics are upheld in this practical demonstration. We strongly

*Brooks and Caira, 1982*

Subfamily Acanthostominae

Genus *Timoniella*

Subgenus 1

- species *praeterita*
- species *imbutiformis*

Subgenus 2

- species *incognita*
- species *scyphocephala*
- species *unami*
- species *loossi*

Genus *Gymnatrema*

- species *gymnarchi*
- species *pambanense*

Genus *Proctocaecum*

Subgenus 1

Infrasubgenus 1

- species *coronarium*
- species *vicinum*

Infrasubgenus 2

- species *productum*
- species *gonotyl*

Subgenus 2

Infrasubgenus 1

- species *nicolli*

Infrasubgenus 2

- species *atae sedis mutabilis*
- species *elongatum sedis mutabilis*
- species *crocodili sedis mutabilis*

Genus *Caimanicola*

- species *caballeroi*
- species *pavidus*
- species *marajoara*
- species *brauni*

Genus *Acanthostomum*

Subgenus 1

- species *absconditum*
- species *knobus*
- species *niloticum*
- species *spiniceps*

Subgenus 2

Infrasubgenus 1

- species *gnerii*
- species *minimum*
- species *astorquii*

Infrasubgenus 2

- species *americanum*
- species *megacetabulum*

Genus *Atrophecaecum*

Subgenus 1

- species *indicum*
- species *slusarskii*

Subgenus 2

- species *pakistanense*

Subgenus 3

- species *proctophorum*
- species *asymmetricum*

Subgenus 4

- species *simhai*
- species *burminis*
- species *lobacetabulare*
- species *cerberi*
- species *marinum*

## Acanthostominae Nicoll, 1914

Subfamily diagnosis. — Acanthostomidae: Body subcylindrical, long, occasionally lageniform, spinose. Circumoral crown of spines present. Prepharynx very long, pharynx about midway between suckers. Esophagus short, ceca usually opening outside at posterior extremity. Testes tandem or diagonal, at posterior extremity. Ovary median or submedian, pretesticular. Vitellaria in lateral fields anterior to ovary and testes. Uterine coils confined to intercecal field between ovary and acetabulum. Excretory vesicle Y-shaped, bifurcating behind acetabulum.

## Key to genera of Acanthostominae from reptiles

- Body lageniform; "vesicula seminal não evidenciada" . . . *Caimanicola*  
 Body slender, subcylindrical; seminal vesicle strongly developed,  
 winding . . . . . *Acanthostomum*

## Acanthostomidae Poche

(Synonym: Acanthochasmiidae Nicoll)

Spined digenea with oral and ventral sucker, unbranched ceca. Excretory vesicle Y-shaped and unbranched, with long stem and branches reaching about to the pharynx. Genital pore median in front of ventral sucker, with weakly developed copulatory organs, without cirrus sac. Testes at least in part lying behind ovary. Uterus lies behind ventral sucker. Vitellaria weakly and moderately developed. Uterus coiling through a large part of the body, with numerous small eggs. In fish.

Genera: Acanthostomum Looss

(Synonym: Acanthochasmus Looss)

Anisocoelium Luhe

Anisocladium Looss

(Synonym: Anisogaster Looss)

Isocoelium Ozaki

Anoikostoma Stossich

Aphallus ~~Schnitz~~ Poche

Gymnophallus Odhner

Gymnophalloides Fujita

(The above is from Fuhrmann: in Handbuch)

Chatterji (1933) gives the following key to subfamilies:

1. Cirrus sac absent ..... Acanthostominae  
 Cirrus sac present.....2

2. Genital pore close in front  
 of ventral sucker ..... Anoictostominae  
 Nicoll

Genital pore far in front of  
 ventral sucker, near oral  
 sucker ..... Maseniinae  
 Chatterji

Mueller & Van Cleave (1932:125) consider in the Heterophyinae

Caecincola Marshall & Gilbert; in the Neochasmiinae: Allacanthochasmus  
 Van C.

Cable & Hunninen (1942) doubt the validity  
 of separating Acanthostomidae and  
Cryptogonimidae.

Acanthochasmus Loos, 1900  
Syn: Acanthostomum Loos, 1899:577

*Acanthostomidae*

Medium sized forms with powerfull bodies but little narrowed anteriorly. The entire anterior end is formed by the opening of the large funnel-shaped oral sucker; the free edge of which possesses a crown of spines. Cuticula with the exception of the extreme posterior end closely set with narrow spines which begin to become smaller in front of the mid-body. Digestive system and excretory system as in Stephanostomum. Genital pore in front of acetabulum; special copulatory organs lacking. Genital glands close together in extreme end of body; hindmost are testes obliquely behind one another; in front of these is the ovary on the side of the hind testes. Laurer's canal and seminal recpt. are present the latter often covered, inserted between the ovary and the testes. Vitellaria well developed, outside ceca. Coils of uterus numerous, reaching between the ceca and from the ovary to the acetabulum, Eggs very numerous and small. 20 by 16  $\mu$ . Parasites of reptiles and fishes.

Type: A. spiniceps Loos

Others: A. abscondites Loos, 1901 *Bagrus bayad*, *B. docmac*  
A. praeteritus " " *Labrax lupus*, *Dentex vulgaris*  
A. imbutiformis (Molin) 1859, partim )  
A. scyphocephalus Braum 1901 from *Chelys fembriata*  
A. productus Odhner 1902 Nile crocodile / Brazil  
A. vicinus " " " " " " " "  
A. burminis Bhalerao, 1926 " " " " " " " "  
A. coronarium (Cobbold, 1861 ) *Tropidonotus piscator*  
A. diploporus Stunkard, 1931 *Parasit.*

*Alligator mississippiensis*

18:4-13

Acanthostomum Loos, 1899

Syn: Acanthochasmus, 1901

Type: A. spiniceps (Loos, 1896) Loos, 1899



Gattung *Acanthochasmus*.

Die seiner Zeit von mir gegebene Diagnose dieser Gattung war auf persönliche Kenntnis allein des typischen Vertreters derselben, des *A. spiniceps* Lss. gegründet; nachdem ich jetzt Gelegenheit gehabt, einige weitere ihrer Angehörigen aus eigener Anschauung kennen zu lernen, ist es mir möglich, die für die Gattung wichtigen Merkmale etwas schärfer zu präzisieren. Ich werde sie in der folgenden allgemeinen Gattungsbeschreibung durch den Druck hervorheben.

Der Körper ist beinahe ebenso zart und hinfällig, wie bei der Gattung *Stephanochasmus*; seiner Form nach ist er plumper und dicker, der Halsteil weit weniger beweglich als bei dieser, auch erscheint das Vorderende stets abgerundet, bei gestrecktem Halse sogar kolbig verdickt infolge der bedeutenden Größe des Mundsaugnapfes. Hinterkörper nach dem Ende wenig oder gar nicht verjüngt, abgerundet. Haut des Vorderkörpers dicht mit schmalen Schuppen besetzt, die vom Bauchsaugnapfe an allmählich spärlicher und zugleich stachelähnlich werden und erst in unmittelbarer Nähe des Hinterendes ganz aufhören. Mundsaugnapf stets auffallend groß, im Leben kugelig, im Tode trichterförmig mit gerade nach vorn gerichteter, weiter Oeffnung. Sein freier Rand mit einem einfachen Kranze starker Stacheln umgeben. Bauchsaugnapf dem Mundsaugnapfe stark genähert, kleiner als dieser, meist etwas länger als dick und mit seiner Oeffnung schräg nach vorn zeigend. Darm wie bei der Gattung *Stephanochasmus*; seine beiden Schenkel endigen nahe dem Hinterende stets auf gleicher Höhe. Exkretionsorgan ebenfalls wie bei der genannten Gattung; die blinden Enden der beiden Schenkel gewöhnlich stark erweitert. Genitalöffnung dicht vor dem Bauchsaugnapfe; Genitalsinus ebenfalls schlauchförmig, aber kurz; besondere Begattungsorgane fehlen. Samenblase ziemlich lang, frei im Parenchym, Pars prostatica desgleichen. Hoden im äußersten Hinterende, dicht hintereinander, median oder leicht seitlich. Keimstock vor ihnen, stets seitlich. Lauer'scher Kanal und Receptaculum seminis vorhanden, letzteres ansehnlich groß, birn- oder sackförmig. Dotterstöcke mäßig entwickelt, in den Seiten der hinteren Körperhälfte. Querer Dottergang mit kleinem Receptaculum vitelli hinter oder über (i. e. dorsal von) dem Keimstock. Uterus stark entwickelt, seine Schlingen bei starker Füllung die Darmschenkel nach außen ein wenig überschreitend. Eier zahlreich und sehr klein, in der Länge zwischen 0,03 und 0,04 mm schwankend.

Als Typus dieser Gattung hatte ich *A. spiniceps* Lss. bestimmt. Der Vollständigkeit halber sowie aus einem weiteren Grunde gebe ich hier nochmals die Hauptcharaktere desselben an.

*Acanthostomum* Looss, 1899<sup>1)</sup>  
 nec *Acanthostoma* Kriechbaumer, 1894  
 syn. *Acanthochasmus* Looss, 1900  
*Atrophecaecum* Bhalerao, 1940

Generic diagnosis. — Acanthostomidae, Acanthostominae. Body medium-sized, long, slender subcylindrical, spinulate. Oral sucker terminal, finger-bowl- to funnel-shaped, with a crown of spines. Prepharynx long, pharynx about midway between two suckers. Esophagus short, bifurcating a little in front of acetabulum, caeca opening outside at posterior extremity. Acetabulum comparatively small in anterior half of body. Testes tandem, or somewhat diagonal, intercecal, at posterior extremity. Vesicula seminalis tubular, winding behind acetabulum to copulatory organ. Genital pore immediately in front of acetabulum. Ovary submedian or practically median, pretesticular. Receptaculum seminis between ovary and anterior testis. Uterus coiled from side to side in intercecal field between ovary and acetabulum, eggs small, very numerous. Vitellaria extending in lateral fields from behind seminal vesicle to pre-ovarian level or ovariotesticular zone. Excretory vesicle Y-shaped, bifurcating behind acetabulum, arms reaching to near oral sucker. Intestinal parasites of reptiles and fishes.

Genotype: *A. spiniceps* (Looss, 1896) Looss, 1899 (Pl. 18, Fig. 227), in *Bagrus bayad*; Egypt. Also in *Bagrus filamentosus* and *Chrysichthys furcatus*, Egypt; *Mullus barbatus ponticus*; Black Sea.

Other species from fish hosts:

- A. absconditum* (Looss, 1901) in *Bagrus bayad*, *B. docmac*, Triest.
- A. guerni* Szidat, 1954, in *Rhamdia quelen*; Argentina.
- A. gymnarchi* Dollfus, 1950, in *Gymnarchus niloticus*; Haut-Nil.
- A. imbutiforme* (Mol., 1859) in *Labrax lupus*, Batavia.
- A. inermis* Stossich, 1905, in *Dentex vulgaris*, Triest.
- A. minimum* Stunkard, 1938, in *Rhamdia guatemalensis*; Yucatan.
- A. praeteritum* (Looss, 1901) in *Labrax lupus*, *Chrysopirys aurata*, *Corvina nigra*; Triest and Egyptian coast.

Representatives from reptiles:

- A. atae* Tubangui et Masiluñgan, 1936, in *Crocodilus porosus*; Philippines.
- A. burminis* (Bhalerao, 1926), syn. *Atrophecaecum burminis* (Bhalerao) in *Tropidonotus piscator*; Rangoon.
- A. coronarium* (Cobbold, 1861) Looss, 1899, syn. *Anoiklostoma coronarium* (C.) Stoss., 1899, in *Alligator mississippiensis* and *Crocodilus acutus*; N. America.
- A. crocodili* Yamaguti, 1954 (Pl. 52, Fig. 632) in *Crocodilus porosus*; Celebes.
- A. diploporum* (Stunkard, 1931) in *Alligator mississippiensis*; U.S.A.
- A. elongatum* Tubangui et Masiluñgan, 1936, in *Crocodilus porosus*; Philippines.
- A. gonotyl* (Dollfus, 1950) (Pl. 54, Fig. 658), in *Crocodilus niloticus*; Belgian Congo.
- A. indicum* Sinha, 1942, in crocodile; India.
- A. productum* (Odhner, 1902) in Nile crocodile; Sudan.
- A. quaesitum* (Nicoll, 1918) in *Crocodilus johnstoni*; Australia.
- A. scyphocephalum* (Braun, 1899) (Pl. 53, Fig. 652), syn. *Monostomum testudinis* Braun, 1899, in *Testudo matemata*; Brazil.
- A. vicinum* (Odhner, 1902) in *Crocodilus niloticus*; Sudan.

<sup>1)</sup> *Gymnastoma* Morosov in Shirjabin, 1955, placed in Dientrematidae, may be regarded as a subgenus of *Acanthostomum* because of posterior extent of vitellaria, other general characters agreeing with this genus.



ACANTHOSTOMUM (DISCUSSION)

The presence of anal pores has lately attracted the attention for their taxonomic importance. Stunkard (1931) stated "Since schemes of classification are arbitrary and somewhat graphic means of representing phylogenetic relations, it appears that the presence or absence of secondary connections between the alimentary tract and the exterior is not a character of great taxonomic importance in digenetic trematodes," but later the same writer (1938) stated "While it appears almost incredible that so accurate an observer as Looss overlooked anal openings in the species studied by him, the discovery of two species of the genus *Acanthostomum* in which these structures occur suggests that their presence may be of generic characters."

The writer believes that anal pores have taxonomic specific value but not of generic value.

Morosov (1955) erected the genus *Gymnatotrema* for the species *Acanthostomum gymnarchi* in view of the fact that the vitelline glands extend to the posterior extremity. Several writers do not agree with Morosov, but Yamaguti (1958) proposed that *Gymnatotrema* may be regarded as a subgenus of *Acanthostomum*.

The genus *Acanthostomum* was erected by Looss (1899) to include *A. spiniceps* (Looss 1896) and *A. coronarium* (Cobbold, 1861). Looss (1900) changed the name to *Acanthochasmus* on the grounds that *Acanthostomum* was pre-occupied by a Hymenopteran genus. This view of Looss was accepted by other workers, among them is Dollfus (1950) who used the name *Acanthochasmus*, but other writers favoured the return to the name *Acanthostomum*. Dawes, 1946 and Yamaguti, 1958 used the name *Acanthostomum*.

Bhalerao (1940) erected the genus *Atrophocaecum* for his species *Acanthostomum burminis* Bhalerao, 1926, on the basis of the much reduced size of one of the gut caeca and the presence of anal pores. Morosov (1955) transferred *A. diploporum* Stunkard, 1931, and *A. minimum* Stunkard, 1938, to *Atrophocaecum* due to the presence of anal pores which is unjustifiable as some other species of the genus *Acanthostomum* possess anal pores. However, this distinction of Bhalerao was disregarded by Dollfus (1950) and Yamaguti (1958) who included the species of *Atrophocaecum* in *Acanthostomum*.

Simha (1958) erected the genus *Haplocaecum* for his species *H. asymmetricum* characterised by the general characters of the genus *Acanthostomum* but differs in the complete atrophy of the right caecum, and the presence of the left caecum only which ends blindly.

Looss (1901) divided the species of the genus *Acanthostomum* into two groups, the *Spiniceps* group and the *Imbutiformis* group, and this view was accepted by Odhner (1902) and Stossich (1905). The *Spiniceps* group was characterised by the broader posterior part of the body, the tight coiling of the seminal vesicle, the position of the receptaculum seminis posterior to the ovary and the extension of the uterine coils as far posteriorly as the level of the ovary or the anterior testis. The *Imbutiformis* group was characterised by the posterior part of the body being not broad, the loose coiling of the seminal vesicle which may follow a wavy course, the position of the receptaculum seminis in front of the ovary and the uterine coils extending posteriorly as far as the posterior testis.

Dollfus (1950) did not agree with this division and the writer thinks that he is justified; a division on this basis is not practicable since the characters concerned do not always occur in these combinations, for example it is difficult to attach *A. gymnarchi* to either of the two groups, as the seminal vesicle is loosely coiled while the receptaculum seminis is posterior to the ovary.

It is obvious that the genera *Acanthostomum*, *Atrophocaecum*, *Gymnatotrema* and *Haplocaecum* are very closely related to each other, and the differences between them are not enough to justify their separation into different genera. Consequently they should be regarded as synonyms, and to produce a scheme for the classification of the genus the writer proposes to reduce the four genera to subgenera of the genus *Acanthostomum*. The characters involved in the separation of the subgenera are the extent of the vitellaria and the intestinal caeca. Here is a proposed key to the subgenera.

1. The vitellaria extend in two lateral fields from behind the seminal vesicle to pre-ovarian level or ovitesticular zone.....2  
 The vitellaria extend from the level of the posterior third to the posterior extremity of the body...*GYMNATOTREMA* Yamaguti, 1958
2. The two intestinal caeca are equal in thickness.....  
 ..... *ACANTHOSTOMUM* n. subgen.  
 The right caecum is atrophied in thickness.....  
 ..... *ATROPHOCAECUM* n. subgen.  
 The right caecum is completely atrophied and only the left caecum remains .....*HAPLOCAECUM* n. subgen.

The subgenus *Gymnatotrema* Yamaguti, 1958 contains the sp. *A. gymnarchi* (Dollfus, 1950) "type for the subgenus".

The subgenus *Atrophocaecum* n. subgen. contains the sp. *A. burminis* Bhalerao, 1936 "type for the subgenus" and *A. simhai* (Simha, 1957), (*Atrophocaecum indicum* becomes *Acanthostomum indicum* which in turn becomes a homonym of *A. indicum* Sinha, 1942, hence a new name *A. simhai* is proposed for Simha's species).

The subgenus *Haplocaecum* n. subgen. contains *A. asymmetricum* (Simha, 1958) "type for the subgenus".

The subgenus *Acanthostomum* n. subgen. contains the species; *A. absconditum* (Looss, 1901); *A. atae* Tubangui and Masilungan, 1936; *A. caballeroi* Pelarez y Cruz, 1953; *A. coronarium* (Cobbold, 1861); *A. crocodili* Yamaguti, 1954; *A. diploporum* (Stunkard, 1931); *A. elongatum* Tubangui and Masilungan, 1936; *A. gnerii*

Szidat, 1954; *A. gonotyl* (Dollfus, 1950); *A. imbutiforme* (Mabin, 1859); *A. indicum* Sinha, 1942; *A. marajoarum* (de Freitas and Lent, 1938); *A. minimum* Stunkard, 1938; *A. praeterium* (Looss, 1901); *A. productum* (Odhner, 1902); *A. quasitum* (Nicoll, 1918); *A. scyphocephalum* (Braun, 1901), *A. spiniceps* (Looss, 1896) "type for the subgenus" and *A. vicinum* (Odhner, 1902).

Thomas (1958) described *A. bagri* from the intestine of *Bagrus docmac* from Ghana. In his description the only difference he mentions between *A. bagri* and *A. absconditum* (Looss, 1901) from the same host in Egypt and the Sudan, is that the pharynx is larger. Examining the type specimen of *A. bagri* deposited in the British Museum (Natural History) and comparing them with specimens of *A. absconditum*, the writer failed to find any differences of significance, and consequently *A. bagri* Thomas, 1958, should be considered as a synonym of *A. absconditum* (Looss, 1901).

The genus *Acanthostomum* Looss, 1899, was placed in the family Acanthostomidae by Poche (1926) and in the subfamily Acanthostominae by Nicoll (1914).

ACANTHOSTOME DIGENEANS FROM THE AMERICAN  
ALLIGATOR IN THE SOUTHEASTERN UNITED STATES

Daniel R. Brooks and Robin M. Overstreet

Two species of Acanthostomidae Poche, 1926 reportedly parasitize the American alligator, *Alligator mississippiensis* Daudin. Cobbold briefly described (1861) and subsequently figured (1864) *Distomum coronarium* from an alligator of unreported origin which died in the London Zoo, and Stunkard (1931) described *Acanthochasmus diploporous* from three hosts also of unreported origin. Lists by Hughes, Higginbotham, and Clary (1941, 1942) included both species of *Acanthostomum* Looss, 1899, but apparently no additional records exist. Nasir (1975) considered *A. coronarium*, *A. diploporum*, and several other species junior synonyms of the Old World *A. imbutiforme* (Molin, 1859) Morozov, 1955. We accept *A. coronarium* and *A. diploporum* as synonymous, but as distinct from *A. imbutiforme*. Based on new collections from Florida, Mississippi, and Louisiana, we herein provide descriptive and geographical data for three acanthostomes infecting the alligator, one of which is new. Morphological information provided for the known species supplements the original descriptions and allows differentiation from and comparisons with subsequently described species.

## Discussion

Characteristics of terminal genitalia and adjacent structures have been omitted from most descriptions and differ among the three species we described. In each, the acetabulum is embedded within the ventral surface and presumably eversible through a round tegumental opening. Each species also has a distinct preacetabular transverse pit formed from invaginated tegument and associated with glandular cells (Figs. 7-11). The pit in *A. coronarium* contains a nucleated muscular gonotyl, that in *A. pavidum* harbors a continuum of tegumental spines, and that of *A. loossi* lacks structures except for a few tegumental spines in the anterior portion of some specimens. In none of the three does the genital pore empty into either the acetabular cavity or the transverse pit. The male duct distal to the pars prostatica joins the metraterm to form an elongated tubular genital atrium (= hermaphroditic duct) that typically follows the anterior border of the acetabulum before exiting immediately anterior to the tegumental lip covering the sucker. A short distance posterior to the acetabula of *A. coronarium* and *A. pavidum* occurs a postacetabular pit also formed as an invagination of the tegument and associated with glandular cells.

The above features show both similarities and differences with members of the closely related cryptogonimids as well as with the heterophyids and other families. Witenberg (1929) termed the genital sac of heterophyids which usually included an acetabulum and gonotyl as the ventrogenital sac. Since that time, confusion has persisted as to what constitutes the sac and the gonotyl. Cable et al. (1960) and Pearson (1973) helped clarify most of the problems; they assumed that an acetabulum had to be present in a ventrogenital sac, and both described and discussed the gonotyl. Cable et al. termed an invagination lacking a sucker but possessing a genital pore in *Opisthovarium elongatum* Cable, Connor, and Balling, 1960 as a genital sac. Pearson considered a cavity well anterior to the ventral sucker and genital pore in *Galactosomum sinuilactis* Pearson, 1973 as a ventral pit. Even though the term preacetabular pit has been recognized for a similar nonhomologous structure in hemiurids, we use that term here. We also prefer to use postacetabular pit for the posterior cavity rather than Cain's (1966)

term pseudogonotyl. Groschaff and Baruš (1970) reported a postacetabular pit as a pseudogonotyl in three acanthostomes, but they considered the preacetabular pit a gonotyl. What we consider a gonotyl in our specimens (Figs. 8, 14, 16) is restricted to *A. coronarium*. That muscular organ possessed nuclei as do the gonotyls of *Heterophyes* Cobbold, 1886 and some cryptogonimids but not those of haplorchines (Pearson, 1973). In the heterophyids, the tubular genital atrium either extends into the gonotyl or empties at its base. On the other hand, the tubular atrium seldom, if ever, pierces the gonotyl in cryptogonimids; it usually opens at the anterior border of the acetabulum rather than slightly separated from it as in acanthostomes. Mueller and Van Cleave (1932) illustrated the gonotyl for a variety of cryptogonimid genera; however, we prefer to consider some of those illustrated homologous structures that are neither papillalike nor within a cavity as muscular pads.

Without having observed acanthostomes in copula, we must speculate on a method of copulation. Quite possibly the preacetabular pit of one member of a mating pair everts and inserts into the recessed pit of the other. Perhaps with the additional aid of an everted postacetabular pit, sensory papillae about the motile acetabulum, and glandular products from the pits, head-to-head copulation should result in alignment assuring close apposition of genital pores and mutual insemination.

Variation among the pits in the three, in addition to the different positions along the intestine inhabited by those species, could inhibit interspecific copulation of those sympatric digeneans. We know that *A. coronarium* everts a powerful gonotyl (Figs. 14-17), *A. pavidum* has spines in the preacetabular pit, and *A. loossi* is both the smallest and only species without a postacetabular pit.

Various authors have repeatedly subdivided the acanthostomes, the most recent efforts being those of Issa (1963) and Khalil (1963). Based on modifications in the structure of the intestinal ceca, egg-size, vitelline configuration, number of oral spines, and body shape, those authors' allocations acted primarily as a matter of convenience, and neither of the workers presented phylogenetic or zoogeographic data supporting a given classification scheme. Without such analyses, one of which is being prepared by the senior author, we prefer to temporarily place the three species reported in this study in *Acanthostomum*.

## ACANTHOSTOMUM Looss, 1899

synonym: Acanthochasmus Looss, 1900  
Caimanicola Frietas & Lent, 1938 (acc. to Price, 1940)

Medium-sized with powerful body only a little narrowed anteriorly. Anterior end formed by the opening of the large funnel-shaped oral sucker, the free end of which has a crown of spines. Cuticula spined. Digestive system and excretory system as in Stephanostomum. Genital pore preacetabular. Special copulatory organs lacking i.e. no cirrus sac. Genital organs close together in extreme posterior end of body; testes postovarian, obliquely behind one another. Laurer's canal and seminal receptacle present, the latter often enclosed, between ovary and testes. Vitellaria well developed outside ceca. Uterus coiled between ovary and acetabulum. Eggs numerous and small, 20 by 16 u.

Parasites of reptiles and fishes.

Type species: A. spiniceps (Looss, 1896) Looss, 1899  
Bagrus, Egypt; Mullus, Black Sea.

see Price 1940  
 Dollfus 1950

## From Fishes:

1. A. spiniceps (Looss, 1896) Looss, 1899 TYPE SPECIES  
Bagrus, Egypt  
Mullus, Black Sea
2. A. absconditum (Looss, 1901)  
Bagrus bayad, B. domac, Triest
3. A. bagrii Thomas, 1958  
Bagrus, Ghana
4. A. gnerii Szidat, 1954  
Rhambdia quelen, Argentina
5. A. gymnarchi Dollfus, 1950  
Gymnarchus niloticus, Upper Nile
6. A. imbutiformis (Molin, 1859, partim)  
Labrax lupus Triest and Egyptian coast  
Dentex vulgaris
7. A. inerme Stossich, 1905  
Dentex vulgaris, Triest
8. A. minimum Stunkard, 1938  
Rhambdia guatemalensis, Yucatan
9. A. praeteritum (Looss, 1901)  
Labrax lupus Triest and Egyptian coast  
Chrysophrys aurata  
Corvina niger

From Turtles:

1. A. brauni <sup>Ni</sup> Mane-Garzon & Gil, 1961  
Phrynops geoffroyana hillarii, Uruguay
2. A. scyphocephalum (Braun, 1899) Pelaez & Cruz, 1953  
Chelys fimbriata :: Testudo matemata? Brazil  
Phrynops geoffroyana hillarii, Uruguay

From Snakes:

1. A. burminis (Bhalerao, 1926) <sup>to Atrophecaecum</sup>  
Tropidonotus piscator, water snake, India
2. A. pakistanensis Coil & Kuntz, 1960  
Hydrophis cyanocinctus, water snake, East Pakistan
3. A. (Atrophecaecum) hindusthanensis Baugh, 1956 <sup>actually named in Atrophecaecum</sup>

From Crocodiles and Alligators:

1. A. acuti Caballero & Brenes, 1959  
Crocodylus acutus acutus, Costa Rica
2. A. americanus Pérez Viguera, 1956  
Crocodylus acutus acutus, Cuba
3. A. atae Tubangui & Masilungan, 1936  
Crocodylus porosus, Philippines
4. A. caballeroi Pelaez & Cruz, 1953  
Caiman
5. A. coronarium (Cobbold, 1861) Looss, 1899  
syn. Anoiktostoma c. (C.) Stossich, 1899  
alligator, North America
6. A. crocodili Yamaguti, 1954  
Crocodylus porosus, Celebes
7. A. diploporum (Stunkard, 1931) Stunkard, 1938  
alligator, U.S.A.
8. A. elongatum Tubangui & Masilungan, 1936  
Crocodylus porosus, Philippines
9. A. gonotyl (Dollfus, 1950)  
Crocodylus niloticus, Belgian Congo

From Crocodiles and Alligators:

10. A. indicum Sinha, 1942  
crocodile, India
11. A. marajoarum (Frietas & Lent, 1938) Price, 1940  
syn. Caimanicola m. F & L.  
Cayman sclerops Gray
12. A. productum Odhner, 1902  
crocodile, Sudan
13. A. quaesitum (Nicoll, 1918)  
Crocodylus johnstoni, Australia
14. A. vicinum (Odhner, 1902)  
Crocodylus niloticus, Sudan

## ACANTHOSTOMUM

TABLA II From: Pelaez &amp; Cruz, 1953

## FORMAS ADULTAS

Especies	Huéspedes	Localidades
<i>A. coronarium</i> (Cobbold, 1861)	<i>Alligator mississippiensis</i>	Estados Unidos de Norteamérica.
<i>A. spiniceps</i> (Looss, 1896) *	<i>Bagrus bayad</i> , <i>B. filamentosus</i> y <i>Chrysichthys furcatus</i>	Ríos Nilo y Níger (África)
<i>A. scyphocephalum</i> (Braun, 1899)	<i>Chelys limbriata</i>	Brasil
<i>A. imbutiformis</i> (Molin, 1859, partim) (Looss, 1901)	<i>Anarhinchus lupus</i> , <i>Dentex vulgaris</i> y <i>Morone labrax</i>	Trieste, costa egipcia e Inglaterra.
<i>A. absconditus</i> (Looss, 1901)	<i>Bagrus bayad</i> y <i>B. filamentosus</i>	Río Nilo (Cairo)
<i>A. praeteritum</i> (Looss, 1901)	<i>Morone labrax</i> , <i>Chrysophrys aurata</i> y <i>Corvina nigra</i>	Trieste y costa egipcia
<i>A. productus</i> (Odhner, 1902)	<i>Crocodilus niloticus</i>	Alto Nilo (Sudán)
<i>A. vicinus</i> (Odhner, 1902)	<i>Crocodilus niloticus</i>	Alto Nilo (Sudán)
<i>A. quaesitum</i> (Nicoll, 1918) **	<i>Crocodilus johnstoni</i>	Norte de Queensland (Australia)
<i>A. Burminis</i> (Bhalrao, 1926) ***	<i>Tropidonotus piscator</i>	Rangoon y Lucknow (India)
<i>A. diploporus</i> (Stunkard, 1931)	<i>Alligator mississippiensis</i>	Estados Unidos de Norteamérica.
<i>A. elongatum</i> Tubangui y Masilunigan, 1936	<i>Crocodilus porosus</i>	Palawan (Filipinas)
<i>A. atae</i> Tubangui y Masilunigan, 1936	<i>Crocodilus porosus</i>	Palawan (Filipinas)
<i>A. minimum</i> Stunkard, 1938	<i>Rhamdia guatemalensis</i>	Yucatán (México)
<i>A. marajoara</i> (Freitas y Lent, 1938) ****	<i>Caiman sclerops</i>	Isla de Marajó (Brasil)
<i>A. indicum</i> Sinha, 1942	"cocodrilo"	Río Tehri (India)
<i>A. gonotyl</i> (Brien y Dollfus, 1950)	<i>Crocodilus niloticus</i>	Bukama y Maka (Congo Belga)
<i>A. gymnarchi</i> (Brien y Dollfus, 1950)	<i>Gymnarchus niloticus</i>	Omdurman (Sudán)
<i>A. caballeroi</i> nov. sp.	<i>Crocodilus acutus acutus</i>	Río Verde, Oaxaca. (Istmo de Tehuantepec, México)
<i>A. unami</i> nov. sp.	<i>Crocodilus acutus acutus</i>	Río Verde, Oaxaca. (Istmo de Tehuantepec, México)

## FORMAS JOVENES

<i>A. imbutiformis</i> (Molin, 1889, partim)	<i>Atherina mochon</i> y <i>A. hepsetus</i>	Camargue
<i>A. floridensis</i> (Mc Coy, 1929)	En 12 especies de teleosteos, experimentalmente	Tortugas (Florida)
<i>A. coronandus</i> (Rotschild, 1938)	<i>Gobius ruthensparri</i>	Plymouth (Inglaterra)

\* Genotipo.

\*\* ¿Nomen nudum?

\*\*\* Ahora genotipo de *Atrophecaecum Bhalerao, 1940.*\*\*\*\* Tipo del género *Caimanicola* Freitas y Lent, 1938.

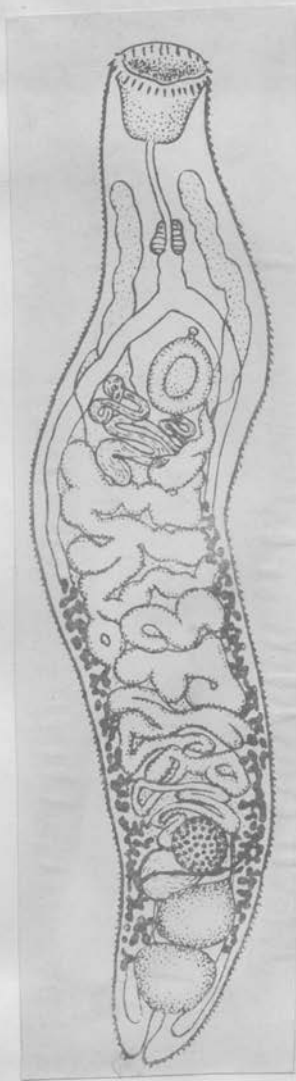


Especies	Longitud total en mm.	Ancha máxima en mm.	Relación promedio de los diámetros mayores de las ventosas	Posición de los folículos vitelógenos más posteriores	Relación promedio entre la longitud de la zona posterior carente de vitelógenos y la total del cuerpo	Número de espinas de la corona anterior	Dimensiones de los haenelios y a + reuterios en micras
<i>Acanthostomum</i>							
<i>A. coronarium</i> (Cobbold, 1861)	12-14					24	14 long.
<i>A. spiniceps</i> (Looss, 1896)	7-9	0.7	1: 1.65	Borde posterior del último testículo	1: 15.6	29 (26-32)	29 × 13
<i>A. scyphocephalum</i> (Brann, 1899)	2.3-3.0	0.20-0.25	1: 2.81	Nivel unión de los testículos	1: 7.7	24 (22-30)	20-28 × 11
<i>A. absconditus</i> (Looss, 1901)	4	0.3	1: 1.75	Borde posterior del primer testículo	1: 5.6	19 (18-22)	40 × 17
<i>A. productus</i> (Odhner, 1902)	3-5	0.23-0.27	1: 1.47	Nivel del receptáculo seminal	1: 4.0	23	34-35 × 11-15
<i>A. diploporus</i> (Stunkard, 1931)	2.6-3.3	0.14-0.21	1: 1.13	Borde anterior del último testículo	1: 10.0	24	20-28 × 11-13
<i>A. atae</i> Tubangui y Masiluñgan, 1936	4.1-5.5	0.17-0.32	1: 1.58	Nivel medio del primer testículo	1: 6.7	25-26	30.7-34.5 × 15.3-17.2
<i>A. indicum</i> Sinha, 1942	6.20-7.33	0.32	1: 1.66	Borde anterior del ovario	1: 6.2	22	32.0-34.0 × 14.5-16.0
<i>A. gonoiyl</i> (Brien y Dollfus, 1950)	2.029-04.59	0.320-0.438	1: 1.84	Borde anterior del primer testículo	1: 5.9	23	23-34 × 11-17
<i>A. caballeroi</i> nov. sp.	3.634-7.000	0.190-0.361	1: 1.47	Nivel medio del ovario, aproximadamente	1: 6.4	20	26.6-30.4 × 13.3-15.2

From: Pelaez & Cruz, 1953.

\* Para la confección de este cuadro utilizamos exclusivamente los datos obtenidos de las descripciones originales y de las figuras que las acompañan.

Acanthostomum spiniceps (Looss, 1896) Looss, 1899



AFTER LOOSS, 1901  
FROM MOROSOV, 1955  
IN SKRJABIN, VOL. 10

*Acanthostomum spiniceps* (Looss, 1896) Looss, 1899  
Synonyms: *Distomum spiniceps* Looss, 1896;  
*Acanthochasmus spiniceps* (Looss, 1896) Looss,  
1900.

Host: *Bagrus bayad* (Bagridae).

Habitat: Small intestine.

Locality: Giza Fish Market, Giza Province,  
Egypt.

Date: 27 September 1952.

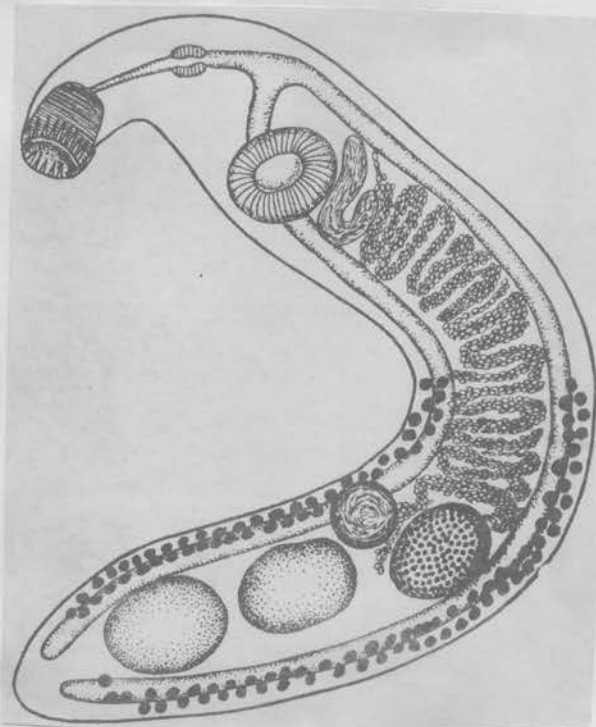
Specimens deposited: USNM Helm. Coll., No.  
59823 (one slide with two mature, and one with  
one mature and three immature worms).

*Acanthostomum spiniceps*, the type species  
of the genus *Acanthostomum* Looss, 1899, was  
described by Looss (1896) from three speci-  
mens obtained from *Bagrus bayad* from the  
Nile at Cairo. Looss (1901) redescribed this  
form from additional specimens collected from  
*B. bayad* and *B. doemac*. His worms measured  
between 7 and 9 mm in length. Dollfus (1932)  
briefly described *A. spiniceps* from *Bagrus fila-*  
*mentosus* and *Chrysichthys furcatus* from the  
River Niger in West Africa. His specimens  
ranged between 1.8 to 3 mm in length. Dollfus  
(1950) reviewed the genus *Acanthostomum*  
(syn. *Acanthochasmus* Looss, 1900). Morozov  
(1955) reviewed the family Acanthostomidae.  
For *A. spiniceps* he summarized the data from  
Looss's work. Literature was cited on the  
recording of this parasite from the Black Sea  
by Pogorel'tseva in 1952, but the host was  
not listed; Yamaguti (1958) listed *Mulhus*  
*barbatus ponticus* as the host. Morozov in-  
cluded one illustration by Looss and another  
by Pogorel'tseva.

Our study was based on 26 worms, 13 ma-  
ture and 13 immature. Most of the mature  
specimens were mounted in lateral view so  
that when specifying depth in measurement  
reference is to dorsoventral extent.

Description: Mean measurements (with minima  
and maxima in parentheses) of seven whole mount  
mature adults: body length 3,324 (2,756 to  
4,055), depth at anterior testis 429 (330 to 540);  
oral sucker, length 338 (290 to 375), depth 371  
(335 to 410); 10 circumoral spines, length 49  
(41 to 53), width 24 (22 to 26); acetabulum,  
length 231 (205 to 260), depth 256 (230 to 295);  
preacetabular body length 1,144 (945 to 1,360);  
postacetabular body length 2,014 (1,730 to 2,400);  
pharynx, length 116 (85 to 133), depth 173 (155  
to 206); prepharyngeal body length 646 (554 to  
725); prepharynx, length 308 (254 to 350); an-  
terior testis, length 283 (215 to 345), depth 334  
(260 to 395); distance from acetabulum to anterior  
testis 1,401 (1,185 to 1,775); posterior testis,  
length 340 (275 to 415), depth 350 (285 to 420);  
distance from acetabulum to posterior testis 1,574  
(1,390 to 1,865); posttesticular body length 100  
(40 to 150); ovary, length 256 (210 to 275),  
depth 243 (190 to 290); distance from acetabulum  
to ovary 1,224 (1,060 to 1,590); seminal recep-  
tacle (in five worms), length 233 (206 to 250),  
depth 202 (145 to 250); 17 older intrauterine eggs,  
length 26 (25 to 28), width 15 (13 to 16).

In two mature specimens oral sucker completely  
retracted into body, slightly overlapping pharynx.  
Three worms with 29, 30, and 31 circumoral spines,  
respectively. When circumoral spines lost, scars  
visible where formerly imbedded. Anal opening  
of each cecum visible in some specimens, particu-  
larly younger forms. Ovary overlapping anterior  
testis, latter overlapping posterior testis.



From MOROSOV, 1955 IN SERJABIN VOL. 10  
AFTER POGOREL'TSEVA, 1952

Acanthochasmus spiniceps (Looss, 1896) Looss, 1899

*Acanthochasmus spiniceps* Lss.<sup>1)</sup>. Länge der erwachsenen Exemplare 7—9 mm; größte Breite ca. 1 mm. Mundsaugnapf bei konservierten Tieren an seiner Oeffnung bis 0,7 mm weit und 0,5—0,6 mm tief; Bauchsaugnapf ca. 0,42 mm im Querdurchmesser, seine Länge etwas größer. Samenblase nur ein kurzes Stück über den Bauchsaugnapf

nach hinten hinausragend, dafür aber in sehr starke Querschlingen gelegt. Receptaculum seminis zwischen Keimstock und vorderem Hoden, stets hinter oder höchstens neben dem Keimstock gelegen; alle Keimdrüsen dicht aneinander gelagert. Dotterstöcke ungefähr vom Hinterrande des hinteren Hodens an nach vorn bis nahe an das Hinterende der Samenblase heranreichend. Eier 0,029 mm lang und 0,013 mm dick.

Bei den 3 zuerst von mir gefundenen und der ersten Beschreibung der Art zu Grunde gelegten Individuen betrug die Zahl der Kopfstacheln, soweit sie noch zu konstatieren war, 26. Bei einem dieser Exemplare, das ich als Dauerpräparat noch besitze, ist 26 sicher auch die volle Zahl der Kopfstacheln, da sie alle gleich weit von einander abstehen und nirgends eine größere Lücke zwischen je zweien sich zeigt, aus welcher eventuell ein Stachel ausgefallen sein könnte. Um nun ein gewisses Urteil darüber zu erlangen, ob und wie weit die Zahl der Kopfstacheln als diagnostisches Merkmal für die Unterscheidung der verschiedenen *Acanthochasmus*-Arten verwendbar ist, habe ich in jüngster Zeit noch weiteres Vergleichsmaterial von *A. spiniceps* gesammelt, und die Kopfstacheln bei 100 erwachsenen und vollkommen frischen Individuen gezählt. Diese Zählung hat folgendes Resultat ergeben: Es fanden sich 26 Stacheln kein mal, 27 Stacheln 8mal, 28 Stacheln 34mal, 29 Stacheln 35mal, 30 Stacheln 18mal, 31 Stacheln 4mal und 32 Stacheln 1mal. Demnach kann die Stachelzahl immerhin in ziemlich weiten Grenzen schwanken; die beiden äußersten Werte von 26 und 32 kommen jedoch nur sehr selten (etwa 1 Proz. der Fälle) vor; auch die beiden nächsten Zahlen 27 und 31 sind verhältnismäßig noch recht selten, so daß man im großen und ganzen wohl sagen kann, die Stachelzahl des *A. spiniceps* schwankt zwischen 28 und 30, wobei die Mittelzahl 29 am häufigsten beobachtet wird.

*Acanthochasmus spiniceps* bewohnt ausschließlich den Anfangsdarm von *Bagrus bayad* und *docmac* (bei diesem letzteren meinen Erfahrungen nach weniger häufig); bei einem großen, relativ stark besetzten Individuum des erstgenannten Wirtes z. B., dessen Darm eine Gesamtlänge von 43 cm besaß, waren es nur die ersten 11 cm, die einige 30 Exemplare des Wurmes beherbergten. Bei einer Anzahl der untersuchten Fische fiel es mir nun auf, daß von ca. 15 cm an bis gegen 10 cm vom Ende des Darmes entfernt nochmals kleine Gruppen von Würmern auftraten, die zwar durchgängig merklich kleiner waren, als die weiter vorn lebenden Individuen, bei Lupenvergrößerung aber durch



Fig. 7. *Acanthochasmus spiniceps* Lss. aus *Bagrus bayad* und *docmac*. Vergr. ca. 18.

aus den inneren Bau des *A. spiniceps* zeigten. Erst eine genauere mikroskopische Analyse bewies, worauf ihr so scharf umschriebener Wohnsitz bereits hindeutete, daß hier eine eigene, von *A. spiniceps* verschiedene Art vorliegt. Diese zweite Art habe ich in *Bagrus docmac* (besonders jüngerer Exemplare desselben) häufiger, und vielfach auch allein angetroffen; einzelne Individuen finden sich hier bereits von ungefähr der Mitte des Darmes an, niemals jedoch in der unmittelbaren Nähe des Pylorus.

1) Vergl. hierzu: *Distomum spiniceps* in: Recherches sur la faune parasitaire de l'Égypte. Mém. Inst. égyptien. T. III. 1886. p. 114. Pl. VIII. Fig. 79 u. 80.

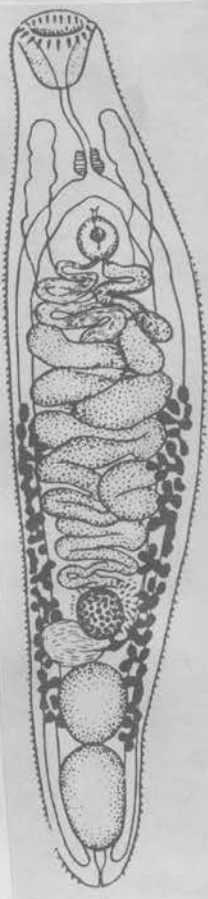
Acanthostomum absconditum (Looss, 1901) Poche, 1926

*Acanthochasmus absconditus* n. sp. Die Maximallänge meiner (voll erwachsenen) Individuen beträgt ca. 4 mm, ihre größte Breite gegen  $\frac{3}{4}$  mm. Der innere Bau entspricht durchaus demjenigen der vorigen Art. Mundsaugnapf im Leben wölkugelig, bei konservierten Tieren tief trichterförmig, im Eingang ungefähr 0,3 mm weit und bei ausgedehnten Individuen gelegentlich bis zu 0,5 mm tief. Er kann vollkommen in den Körper zurückgezogen werden, so daß er fast an den Bauchsaugnapf anstößt. Sein Rand ist mit einem Kranze von normalerweise 19 Stacheln umgeben; unter den gegenwärtig in meinem Besitze befindlichen 71 Individuen der Art fand ich 18 Stacheln einmal, 19 Stacheln 55mal, 20 Stacheln 9mal, 21 Stacheln einmal und 22 Stacheln 2mal. Die Schwankungen in der Stachelzahl bewegen sich also in ähnlichen Grenzen, wie bei der vorigen Art. Bauchsaugnapf auffallend klein, nur 0,17 mm im Durchmesser haltend. Genitalöffnung und Samenblase wie bei der vorigen Art; Keimdrüsen lockerer gelagert, nicht selten der Reihe nach median hintereinander, das große Receptaculum seminis dann zwischen Keimstock und vorderem

Hoden; Dotterstöcke am Hinterende des vorderen Hodens beginnend, vorn ein Stück hinter dem blinden Ende der Samenblase aufhörend. Hier merklich größer als die von *A. spiniceps*, 0,04 mm lang und 0,017 mm dick. Der Wohnort wurde bereits oben angegeben.

Ein weiterer, seit langem bekannter Angehöriger der Gattung ist das „*Distomum imbutiforme*“ Molin. Ich habe dasselbe bei einer Anzahl Fischspecies des Triester Hafens ziemlich häufig angetroffen; ein genauerer Vergleich des von mir gesammelten Materiales hat mich aber überzeugt, daß in demselben 2 einander zwar sehr ähnliche, aber doch deutlich verschiedene Species vorhanden sind. Aus den von der Art zur Zeit vorhandenen Beschreibungen Molin's<sup>1)</sup> und Stossich's<sup>2)</sup> ist mit Sicherheit nicht zu entnehmen, auf welche von beiden Species sie sich beziehen. Die Zahl der Kopfstacheln wird von beiden Autoren übereinstimmend als 16 angegeben; als Wohnort nennt Molin den Dünndarm, Stossich den hinteren Teil dieses letzteren und das Rectum; er glaubt außerdem an, daß die Würmer für das bloße Auge unter der Form weißer Plättchen mit einem intensiven schwarzen Fleck in der Mitte

erscheinen. Dieser letztere Charakter paßt in der That auf eine der beiden Arten; der von Stossich genannte Wohnort aber und die Stachelzahl für die andere. Da diese letztere nun, soweit ich aus eigener Erfahrung sagen kann, die ungleich häufigere ist, so reserviere ich ihr den älteren Namen, wohingegen die erstere dann als nova species zu betrachten ist. Beide Formen ähneln sich, wie gesagt, in ihrem inneren Baue ziemlich beträchtlich, was besonders bei der mikroskopischen Untersuchung zum Ausdruck kommt; für das bloße Auge hingegen sind beide ziemlich leicht zu trennen, einerseits durch ihren verschiedenen Wohnort, und andererseits dadurch, daß der mit Eiern gefüllte Uterus bei dem einen als intensiv schwarzer, bei der anderen nur als bräunlichgelber Fleck erscheint. Diese letztere ist es, welche ich betrachte als



AFTER LOOSS, 1901  
FROM MOROSOV, 1955  
[N. SKRJABIN, VOL. 10]



Fig. 8. *Acanthochasmus absconditus* n. sp. aus *Bugrus bayad* und *mac.* Vergr. ca. 18.

*Acanthostomum absconditum* (Looss, 1901)

Poche, 1926

*Synonyms:* *Acanthochasmus absconditus* Looss, 1901; *Acanthostomum bagri* Thomas, 1958.

*Host:* *Bagrus bayad* (Bagridae).

*Habitat:* Small intestine.

*Locality:* Giza Fish Market, Giza Province, Egypt.

*Dates:* 27 September 1952 and 10 January 1953.

*Specimens deposited:* USNM Helm. Coll., No. 59823 (two slides with one worm each).

This parasite was first described by Looss (1901) from *Bagrus bayad* and *B. docmac* from the Nile at Cairo. His specimens were up to 4 mm in length. Thomas (1958) described *A. bagri* from *Bagrus docmac* from the River Volta, Ghana. The only characteristic given for separation from *A. absconditum* was "in having a pharynx appreciably larger than the ventral sucker." In our opinion the size of the pharynx can be quite variable, and, therefore, unreliable when used as the sole factor for separation of species. We declare *A. bagri* a synonym of *A. absconditum*. Thomas's paper listed the circumoral spines as being 0.5 to 0.6 mm long; this is a typographical error and probably should be 0.05 to 0.06. Additionally, he failed to distinguish *A. bagri* from *A. minimum* Stunkard, 1938. Our collection consisted of five adult worms from one and two from a second *B. bayad*.

*Description:* Mean measurements (with minima and maxima in parentheses) of six whole mount adults: body, length 3,228 (2,468 to 4,074), width at anterior testis 441 (350 to 500); oral sucker (in five worms) 322 (230 to 410) by 300 (225 to 330); ten circumoral spines (in four worms) 49 (46 to 55) by 23 (21 to 27); acetabulum 156 (133 to 173) by 153 (133 to 170); postacetabular body length 2,414 (1,705 to 2,929); pharynx (in five worms) 126 (111 to 155) by 163 (121 to 185); prepharyngeal body length (in three worms) 542 (435 to 605); prepharynx, length (in three worms) 278 (205 to 300); anterior testis 317 (232 to 385) by 341 (206 to 400); distance from acetabulum to anterior testis 1,668 (1,125 to 1,970); posterior testis 364 (290 to 450) by 346 (203 to 405); distance from acetabulum to posterior testis 1,927 (1,585 to 2,310); posttesticular body length 122 (65 to 186); ovary 209 (194 to 220) by 196 (179 to 215); distance from acetabulum to ovary 1,475 (975 to 1,750); seminal receptacle (in five worms) 196 (172 to 222) by 193 (126 to 237); 18 older intrauterine eggs 40 (35 to 43) by 17 (14 to 19).

In two specimens oral sucker completely retracted into body, overlapping acetabulum, with anterior margin of former respectively situated 160 and 185  $\mu$  posterior to anterior tip of body. Five worms with 19 circumoral spines, one with 18; 18 of 19 spines missing in one worm but scars where formerly imbedded visible. Anal opening of each cecum noted.

FROM FISCHTHAL AND KUNTZ, 1963

SYN. *Acanthostomum bagri* n. sp. (Fig. 6). THOMAS, 1958

DESCRIPTION: Body elongated; subcylindrical; truncate at anterior end; tapering towards posterior extremity; 1.52 to 2.83 long; 0.44 to 0.62 broad. Body surface armed with spines between anterior extremity and posterior level of vesicula seminalis. Oral sucker subterminal; basin shaped; muscular; 0.26 to 0.35 long; 0.24 to 0.32 broad; with a crown of nineteen, short, backwardly pointing conical spines; 0.5 to 0.6 long; 0.017 to 0.02 broad; arranged in a single circlelet outside oral opening. Ventral sucker median; in anterior third of body; 0.11 to 0.13 long; 0.14 to 0.16 broad. Opening of oral cavity leading into prepharynx; 0.05 to 0.18 long; pharynx; large; ovoid; closer to oral than ventral sucker; 0.16 to 0.19 long; 0.10 to 0.17 broad; oesophagus short; bifurcating a short distance in front of ventral sucker; gut caeca posterolaterally directed; opening to outside laterally near posterior extremity. Excretory vesicle Y-shaped; bifurcating behind vesicula seminalis; main stem in median line; pore terminal. Genital atrium median; shallow; a little in front of ventral sucker. Testes; paired; compact; compressed oval; intercaecal; tandem; in posterior region of body; 0.09 to 0.19 from posterior end; almost equal in size; 0.12 to 0.25 by 0.14 to 0.35; intertesticular space narrow or absent. Vasa efferentia; short; arising from antero-dorsal margin of testes; uniting in median line to form a long, sinuous vas deferens. Vesicula seminalis large; much coiled; behind ventral sucker; sperm duct undifferentiated; joining metraterm dorsally to form short, muscular, hermaphrodite duct; prostatic cells present outside hermaphrodite duct. Ovary spherical or oval; 0.10 by 0.15 to 0.15 by 0.14; pretesticular; its posterior margin overlapping receptaculum seminis which lies between ovary and anterior testis. Oviduct short; arising from inner dorsal surface of ovary; directed to left of ovary to form ootype after receiving short duct from receptaculum seminis and median vitelline duct; Mehlis's gland poorly developed. Laurer's canal short; arising from oviduct near point of entry of receptaculum seminis; directed posteriorly behind receptaculum seminis to open dorsally in median field. Uterus emerging ventrally from ootype; occupying most of intercaecal space in front of gonads as far forward as vesicula seminalis; distal part of uterus weakly muscular. Eggs operculate; oval; 0.035 to 0.040 long; 0.015 broad. Vitelline follicles numerous; in two lateral groups along margin of body; extending from intertesticular region to mid-body; transverse yolk duct beneath ovary and anterior portion of receptaculum seminis; enlarging to form vitelline reservoir from which median yolk duct arises.

HOST: *Bagrus docmac* (Forsk.).

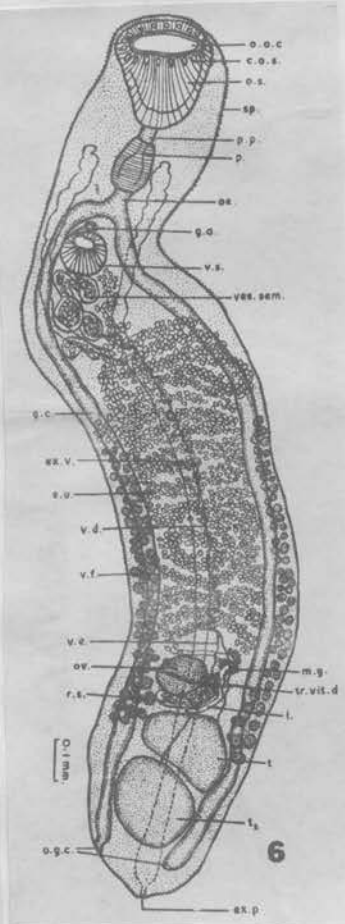
LOCATION IN HOST: intestine.

LOCALITY: Tributary of River Volta, near Lawra, Northern Region of Ghana.

TYPES: Holotype in British Museum (Natural History) London.

DISCUSSION: The genus *Acanthostomum*, erected by Looss (1899) to include *A. spiniceps* (Looss, 1896), was placed in the family Acanthostomatidae by Poehle (1926) and in the subfamily Acanthostomatinae by Nicoll (1914). Twenty-one species in addition to *A. bagri* have been included in the genus *Acanthostomum*. They are as follows: *A. absconditum* (Looss, 1901), *A. atae* Tubangui et Masilungan, 1936. *A. burminis* (Bhalerao, 1926), *A. caballeroi*\* Pelarez y Cruz, 1953, *A. coronarium* (Cobbold, 1861), *A. crocodili* Yamaguti, 1954, *A. diploporum* (Stunkard, 1931), *A. elongatum* Tubangui et Masilungan, 1936, *A. gnerii* Szidat, 1954, *A. gonotyl* (Dollfus, 1950), *A. gymnarchi* (Dollfus, 1950), *A. imbutiforme* (Molin, 1859), *A. indicum* Sinha, 1942, *A. marajoarum* (de Freitas et Lent, 1938), *A. minimum* Stunkard, 1938, *A. praeterium* (Looss, 1901), *A. productum* (Odhner, 1902), *A. quasitum* (Nicoll, 1918) sp. inquir., *A. scyphocephalum* (Braun, 1901), *A. spiniceps* (Looss, 1896) Looss 1899, *A. vicinum* (Odhner, 1902).

One of the above species, namely, *A. quasitum*, is a species inquirenda and there have been attempts at removing certain other species to newly erected genera. Thus Bhalerao (1940) transferred *A. burminis* (Bhalerao, 1926) to the genus *Atrophecaecum* on the basis of the much reduced size of



\*Neither the type material nor detailed description of this form was available for study.

one of the gut caeca. This distinction was disregarded by Dollfus (1950) and he included *A. burminis* in the genus *Acanthochasmus* Looss, 1901 (= *Acanthostomum*, Looss, 1899). Morosov (1955), on the other hand, has included two other species, namely *A. diploporum* (Stunkard, 1931) and *A. minimum* Stunkard, 1938, in the genus *Atrophecaecum* and has also erected another genus *Gymnatrema*, to include *A. gymnarchi* (Dollfus, 1950) in view of the fact that the vitelline glands extend to the posterior extremity in this species. It is doubtful whether the differences described by Bhalerao (1940) and Morosov (1955) justify generic separation and in the present paper the species concerned are retained in the genus *Acanthostomum*. *A. bagri* can be distinguished from all known *Acanthostomum* species by a consideration of the following morphological features:

In possessing fewer than twenty circumoral spines it differs from all other species with the exception of *A. absconditum*, *A. imbutiforme*, *A. minimum* and *A. praeterium*; in having a pharynx appreciably larger than the ventral sucker it differs from all other species with the exception of *A. atae*, *A. burminis*, *A. coronarium*, *A. crocodili*, *A. diploporum*, *A. gnerii*, *A. gymnarchi*, *A. marajoarum*, *A. minimum* and *A. scyphocephalum*.



La presente descripción se ha realizado con siete ejemplares completos y con dos incompletos, arreglados en preparaciones totales fijadas; estos ejemplares, son pequeños, de cuerpo muy plano y los bordes laterales paralelos; el extremo anterior es ancho, truncado el posterior también ancho pero ligeramente terminado en punta, decir, cónico y miden de 2.429 a 3.040 mm. de largo por 0.298 a

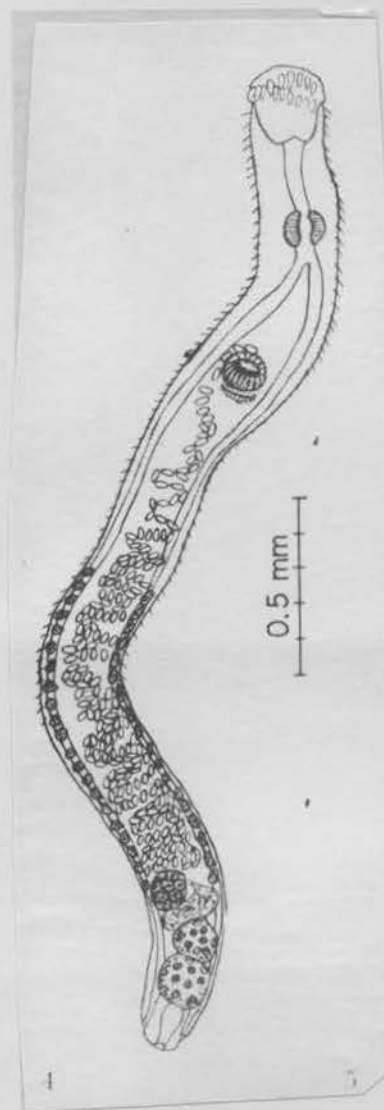
0.372 mm. de ancho. El extremo anterior, alrededor de la boca, lleva una corona sencilla de ganchos grandes, los cuales tienen la forma cónica, son en número de 21 a 25 y miden de 0.033 a 0.041 mm. de largo por 0.008 a 0.012 mm. de ancho a nivel de su base; las espinas cuticulares son pequeñas, se extienden desde el extremo anterior hasta el nivel del ovario y miden 0.008 mm. de largo por 0.001 a 0.004 mm. de ancho.

La ventosa oral es subterminal, grande, musculosa, en forma de un cono y mide de 0.146 a 0.166 mm. de largo por 0.170 a 0.171 mm. de ancho; el acetábulo es menor que la ventosa oral, de borde circular, está situado por detrás de la bifurcación intestinal y mide 0.116 mm. de diámetro anteroposterior por 0.116 a 0.125 mm. de diámetro transversal; la relación entre los diámetros de las dos ventosas es,  $1:1.2 \times 1:1$  a  $1:1 \times 1:1$ .

La boca es muy amplia, completamente circular y sus diámetros miden  $0.125 \times 0.125$  mm. a  $0.158 \times 0.158$  mm. existe una prefaringe larga y ancha la cual mide 0.146 mm. de largo por 0.079 a 0.104 mm. de ancho; la faringe tiene la forma de tonel o bien es cilíndrica, es fuertemente musculosa y mide de 0.104 a 0.108 mm. de largo por 0.112 a 0.116 mm. de ancho; el esófago en animales que presentan la porción anterior del cuerpo muy contraída, mide 0.091 mm. de largo en tanto que cuando está extendida mide 0.333 mm. de largo por 0.042 a 0.108 mm. de ancho respectivamente; los ciegos intestinales son dos tubos que se extienden dorsolateralmente hasta el extremo posterior del cuerpo, sitio en que se abren al exterior mediante un poro anal y miden de 0.042 a 0.071 mm. de ancho a nivel de su porción más amplia.

El poro reproductor está situado por delante del borde anterior del acetábulo y por detrás de la bifurcación intestinal; el gonotilo es un surco oblongo que se encuentra por detrás del acetábulo y mide de 0.025 a 0.029 mm. de largo por 0.121 a 0.125 mm. de ancho. Los testículos son dos cuerpos generalmente esféricos, grandes, de contorno liso, que están situados cerca del extremo posterior del cuerpo, uno detrás del otro, con bordes tangentes y miden, el anterior de 0.125 a 0.141 mm. de diámetro anteroposterior por 0.166 a 0.170 mm. de diámetro transversal y el posterior de 0.150 a 0.158 mm. de diámetro anteroposterior por 0.158 mm. de diámetro transversal; los conductos eferentes no fueron observados y la vesícula seminal, en forma de cordón, muy enrollado, que se extiende desde por detrás del acetábulo hasta el poro reproductor, pasando por el lado izquierdo del acetábulo y mide de 0.042 a 0.062 mm. de ancho.

El ovario es un cuerpo casi esférico, de contorno liso, menor en tamaño que los testículos, está situado sobre el lado derecho pretesticular y mide de 0.133 a 0.160 mm. de diámetro anteroposterior por 0.121 a 0.125 mm. de diámetro transversal; la glándula de Mehlis se encuentra situada sobre la línea media del cuerpo, a la altura del borde izquierdo del ovario, se halla constituida de células escasas con grandes núcleos; el receptáculo seminal es un cuerpo grande, piriforme, que está situado entre el ovario y el testículo anterior y mide de 0.150 a 0.250 mm. de largo por 0.066 a 0.108 mm. de ancho; el útero se encuentra formado por numerosas y cortas asas transversales que llenan toda el área intercecal, desde el ovario hasta el borde posterior del acetábulo; los huevecillos son ovoides, operculados, de cáscara lisa y amarillenta y miden de 0.023 a 0.025 mm. de largo por 0.012 mm. de ancho.



Las glándulas vitelógenas están formadas por gruesos folículos que se extienden en una franja lateral a cada lado del cuerpo, es decir, en las áreas extracecales y cecales, desde muy por detrás del borde posterior del acetábulo hasta el borde posterior del ovario. El poro excretor es terminal y se abre en el borde del cuerpo.

Hospedador: *Crocodylus acutus acutus* Cuvier.

Localización: Intestino delgado.

Localidad: Los Chiles de Grecia, Alajuela, Costa Rica, Centroamérica.

Ejemplares: Colecciones Helmintológicas del Instituto de Biología. No. 216-16 y en la del Laboratorio de Helmintología de la Facultad de Microbiología de la Universidad de Costa Rica, Centroamérica.

Discusión: Hasta el momento se han citado diez especies de *Acanthostomum* Looss, 1899 en las Américas; dos en peces: *A. minimum* Stunkard, 1938 en *Rhambdia guatemalensis* (Günther) de Yucatán, México; y *A. gnerii* Szidat, 1954 en *Rhambdia rogersi* (Regan) de Rosario, Argentina y de San José, Costa Rica, Centroamérica. Una en tortuga, *A. scyphocephalum* (Braun, 1901) de *Chelys fimbriata* (Schneider) del Brasil. Siete en crocodilianus: *A. coronarium* (Cobbold, 1861) en *Alligator mississippiensis* (Daudin) de EE. UU.; *A. scyphocephalum* (Braun, 1901) en *Caiman fuscus* (Cope) de Panamá, Centroamérica; *A. diploporus* (Stunkard, 1931) en *Alligator mississippiensis* (Daudin) de EE. UU.; *A. marajoara* (Freitas y Lent, 1938) en *Caiman sclerops* Gray del Brasil; *A.*

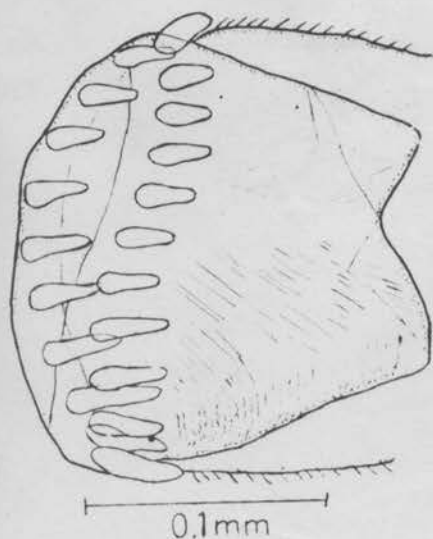


Fig. a.

CABALLERO y BRENES M.: HELMINTOS DE COSTA RICA. VII 177

*caballeroi* Peláez y Cruz, 1953 en *Crocodylus acutus acutus* Cuvier de Oaxaca, México; *A. unami* Peláez y Cruz, 1953 en *Crocodylus acutus acutus* Cuvier, de Oaxaca, México; *A. loossi* Pérez Viguera, 1956 en *Crocodylus acutus acutus* Cuvier, de Matanzas, Isla de Cuba,

Antillas y *A. americanus* Pérez Viguera, 1956 en *Crocodylus acutus acutus* Cuvier, de Matanzas, Isla de Cuba, Antillas.

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AN. INST. BIOL. MEX., XXIX, 1958

La nueva especie que se instituye en este trabajo presenta caracteres diferenciales específicos muy claros con las otras especies citadas en el párrafo anterior, pues la extensión de las glándulas vitelógenas y el arreglo de los órganos reproductores, así como la configuración uterina de nuestros ejemplares difieren de aquellas especies, no obstante que el número de ganchos peribucales coincide con algunas de ellas.

Por el análisis de la descripción y de la figura que da Pérez Viguera de su especie *Acanthostomum loossi*, creemos que ésta corresponda a *A. scyphocephalum* (Braun, 1901); además encontramos que tal vez, la especie *A. unami* Peláez y Cruz, 1953 pueda referirse también a la especie de Braun.

En los ejemplares de la especie de Braun, redescritos por Caballero y que proceden de los crocodilos de Panamá, hemos observado que hay una variabilidad en la extensión de las vitelógenas y en el mayor o menor desarrollo uterino, pero siempre con algunas asas uterinas entre el ovario y el testículo anterior.



Fig. c.

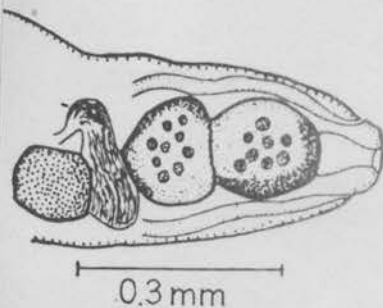


Fig. b.

Fig. a. a. esquema de la extremidad cefálica de *Acanthostomum acuti* n. sp.; b. esquema de un complejo ovario-testicular y c. esquema del gonotilo con la venosa (Fig. a y c. por el dibujador).

4. *Atrophecoecum acuti* (Caballero et Brennes, 1959) comb. n. (Fig. 4.)Host: *Crocodylus rhombifer*

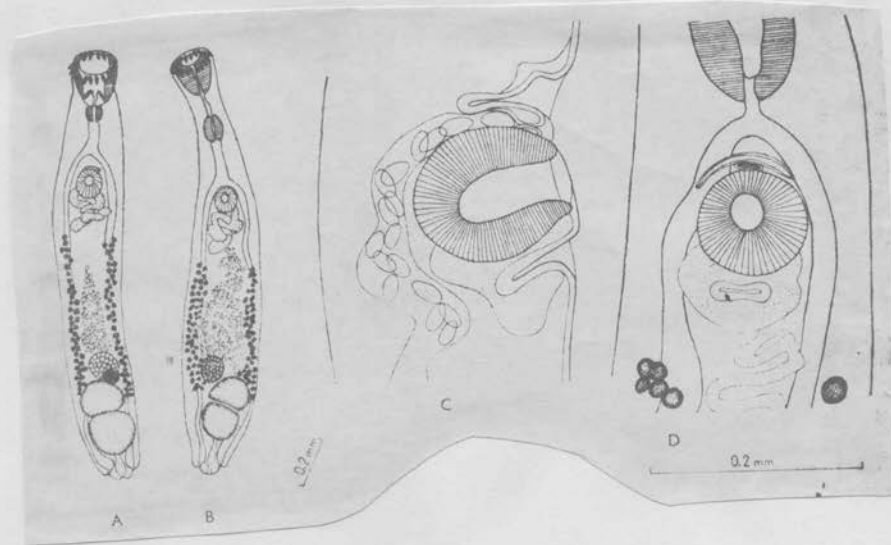
Location: small intestine

This species was found in 6 of 21 examined hosts of all ages (4, 4, 5, 12, 24 and 35 specimens)

Description: Body elongated, fusiform. Cuticle in anterior portion up about two thirds of body length armed with long spines. Body length 3.9—2.09 mm, maximum width sometimes in the region of sucker, more often in the region of ovary 0.26—0.39 mm. Oral sucker variable in shape, conical, sometimes with a concave bottom (when prepharynx is in contraction), measuring 0.148—0.229 × 0.148—0.200 mm. Around the buccal cavity a crown of 20 conical spines measuring 0.038—0.046 × 0.012 to 0.015 mm. The spines of some specimens are slightly bent at the narrower end (Fig. 4F). Prepharynx measures 0.014—0.111 mm in length. When contracted it may influence, in our opinion, the shape of the lower portion of oral sucker. Pharynx muscular, well developed, measuring 0.096—0.118 × 0.074—0.126 mm. Oesophagus measures 0.029—0.185 × 0.051—0.074 mm and opens into two intestinal branches terminating at the posterior end of body in a short narrowing in the cuticular bend. Acetabulum in the first half of body under bifurcation of the intestine, measuring 0.111—0.126 × 0.096—0.126 mm. Vesicula seminalis postacetabular, sac-shaped on the outside, with tubular anterior portion. Gonotyl small, slit-shaped, preacetabular, its width smaller than that of acetabulum (Fig. 4D). Pseudogonotyl present. Stellaria formed by small follicles in the region of intestinal branches between posterior margin of vesicula seminalis and the anterior testis. Ovary pretesticular, immediately by the anterior testis, sometimes alongside the longitudinal axis of body. It is of smooth outline, oval to spherical, measuring 0.111—0.170 × 0.096—0.155 mm. Vesicula seminalis between ovary and anterior testis, measuring 0.086—0.148 × 0.081—0.126 mm. Testes tandem, oval, of smooth outline. Anterior testis measures 0.103 to 0.177 × 0.111—0.222 mm, posterior 0.126—0.207 × 0.133—0.222 mm.

Uterus coiled in intercaecal area between anterior testis and vesicula seminalis, opening preacetabularly. Eggs measure 0.026—0.030 × 0.014 to 0.015 mm.

From GROSCHAFT & BARUS, 1970



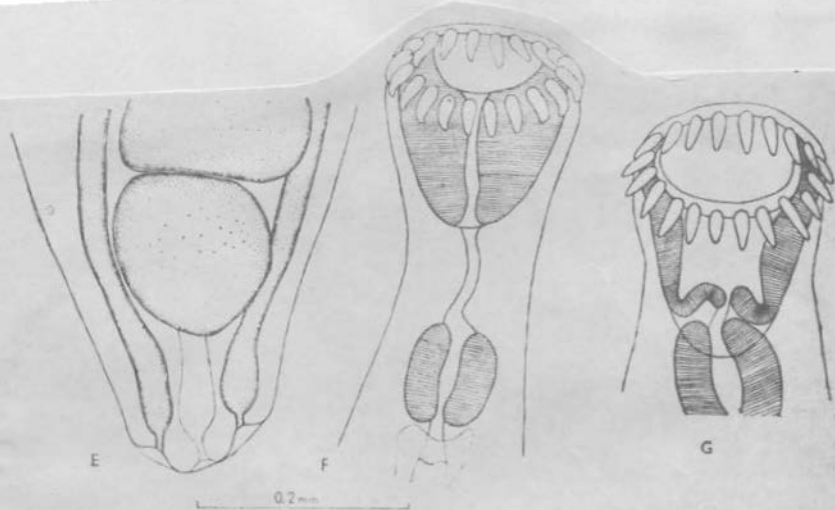


Fig. 4. *Atrophecoecum acuti* (Caballero et Brenes, 1959) comb. n. A, B — overall view; C — detail of acetabular zone (lateral view); D — detail of acetabular zone (ventral view); E — posterior portion of body; F — anterior portion (prepharynx in normal position); G — anterior portion (prepharynx drawn inward). Orig.

Note: Our specimens correspond in their general morphology with the original description of Caballero and Brenes (1959), but they differ in the number of peribucaal spines. In our specimens, there are constant 20 spines while in the original description their number ranges from 21 to 25. However, in the attached figure showing the anterior portion of body of the species the authors drew distinctly 20 pericaudal spines only. There are no detailed data on the variability of number of peribucaal spines of the species of the genera *Acanthostomum* and *Atrophecoecum*. In our opinion the small difference in number of spines is not a sufficient character to differentiate the form found in *C. rhombifer* from that found in *C. acutus*.

*Acanthostomum (Atrophecaecum) alii* sp. n. KARYAKARTE, 1967**Description**

(based on 20 specimens collected from type host)

Body cylindrical, anterior end truncated, armed with spines 4 long extending from anterior end to just past anterior limit of vitelline field; 2.46 to 3.15 mm long by 320 to 460 wide. Oral sucker terminal, 160 to 250 long by 150 to 190 wide; with 25 to 27 cephalic spines in a single row, measuring 19 to 21 long by 3 to 4 wide. Ventral sucker 95 to 108 in diameter; dividing body in 1:7. Prepharynx extremely reduced. Pharynx vase-shaped measuring 90 to 130 long by 90 to 150 wide. Esophagus absent. Right cecum much reduced in width, left cecum well developed; each cecum opening to the exterior laterally 120 from posterior end.

Testes tandem, somewhat irregular, situated in last quarter of body 90 to 150 long by 130 to 170 wide. Cirrus sac absent. Seminal vesicle with ovoid, saccular portion lying posterior to ventral sucker in anterior third of body and tubular anterior portion extending to median, preacetabular genital pore. Anterior fourth of duct becoming muscular ejaculatory duct; hermaphroditic duct absent.

Ovary pretesticular, rounded, 70 to 90 in diameter. Seminal receptacle between ovary and

anterior testis, 120 to 140 wide by 40 to 50 long. Laurer's canal small but conspicuous. Uterus preovarian, convoluted, opening separately at common genital pore. Eggs operculate, 28 to 35 long by 12 to 17 wide. Vitellaria lateral, follicular, overlapping ceca, extending from somewhat posterior to level of saccular portion of seminal vesicle to slightly anterior to ovary.

Excretory pore terminal; stem of excretory vesicle (Fig. 2) long, reaching to anterior end of seminal vesicle, two small limbs extending to base of oral sucker.

*Host:* *Elaphe helena* (Daudin, 1803).

*Location:* Intestine.

*Locality:* Aurangabad, Maharashtra, India.

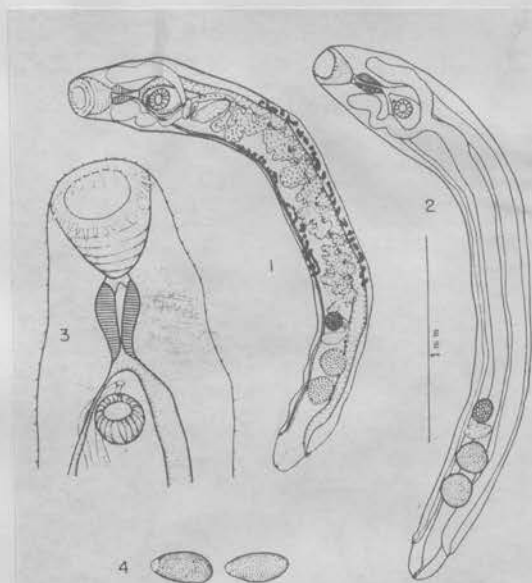
*Type specimens:* Holotype and 18 paratypes deposited in the Zoological Museum of the Marathwada University, Aurangabad. One paratype, USNM Helm. Coll. No. 61699.

**DISCUSSION**

The long stem of the excretory vesicle in this species very clearly indicates the affinity of *Atrophecaecum* with *Acanthostomum* and confirms the subgeneric status of *Atrophecaecum*. In addition to the two species already in the subgenus A. (*A.*) *alii* also in many ways resembles *A. (Acanthostomum) pakistanensis* Coil and Kuntz, 1960, from a water snake, *Hydrophis cyanocinctus* (Daudin, 1803), in East Pakistan.

The present species is distinguished from *A.*

(*Atrophecaecum*) *burminis* by the long, rather than short, stem of the excretory vesicle, the smaller eggs (28 to 35 by 12 to 17 as compared with 42 to 60 by 17 to 27), the absence of the esophagus, the reduced prepharynx, and the more elongated pharynx.



FIGURES 1-4. *Acanthostomum (Atrophecaecum) alii* sp. n. from an Indian snake, *Elaphe helena*. 1. Ventral view of holotype. 2. Excretory system, from a paratype specimen. 3. Anterior end of holotype. 4. Eggs, from holotype.

The most important difference between *A. (A.) alii* and *A. (Atrophecaecum) hindusthanensis* is the absence of a hermaphroditic duct in the former. Other differences include the absence of an esophagus, a shorter prepharynx, proportionately smaller testes, and the distribution of body spines in *A. (A.) alii*.

*A. (A.) alii* bears considerable resemblance to *A. (Acanthostomum) pakistanensis*, but the latter species has a hermaphroditic duct, smaller eggs, a shorter forebody, and does not have an atrophied right cecum. In addition, the host is different and the body much larger.

*Acanthochasmus burminis* Bhalerao, 1926, was described from the water snake, *Tropidonotus piscator* (Schneider, 1799) from Burma, and subsequently reported from the same host at Lucknow by Thapar and Ali (1929) and at Nagpur by Bhalerao (1936). Accepting the validity of *Acanthostomum* Looss, 1899, Bhalerao (1936) transferred his species to that genus, but later (1940) he described in detail the atrophied right cecum and named the genus *Atrophecaecum* with *A. burminis* as type species. Baugh (1957) described a second species, *Atrophecaecum hindusthanensis*, from an unidentifiable snake in Banaras, India, and emended the generic diagnosis.

Neither Dollfus (1950) nor Yamaguti (1958) accepted the validity of the genus *Atrophecaecum* and Yamaguti transferred the species *A. burminis* back to *Acanthostomum*. At the same time, Simha (1958) described a third species of *Atrophecaecum*, *A. indicum*, from *Tropidonotus piscator* at Hyderabad. Khalil (1963) discussed the systematic position of the closely related genera, *Gymnatrema* Morosov, 1955, *Atrophecaecum* Bhalerao, 1940, *Haplocaecum* Simha, 1958, and *Acanthostomum* Looss, 1899, and concluded that all four are subgenera of *Acanthostomum*. The author agrees with this arrangement.

In the subgenus *Atrophecaecum*, Khalil (1963) included only *A. (A.) burminis* and *A. (A.) simhai* Khalil, 1963 (a new name for *Atrophecaecum indicum* Simha, 1958, which became a junior homonym of *Acanthostomum indicum* Sinha, 1942). Neither Simha (1958) nor Khalil (1963) were aware of *Atrophecaecum hindusthanensis* Baugh, 1957, from which *A. (A.) simhai* Khalil, 1963 cannot be separated. *A. (A.) simhai* Khalil, 1963 (= *Atrophecaecum indicum* Simha, 1958; = *Acanthostomum indicum* (Sinha, 1958) nec Sinha, 1942) is here considered a synonym of *Acanthostomum (Atrophecaecum) hindusthanensis* Baugh, 1958.

Following is the description of a third species in the subgenus *Atrophecaecum* collected from the snake *Elaphe helena* at Aurangabad, India. All the measurements are in microns unless otherwise indicated.

*Acanthochasmus americanus* ~~n. sp.~~ Perez Viguera, 1956

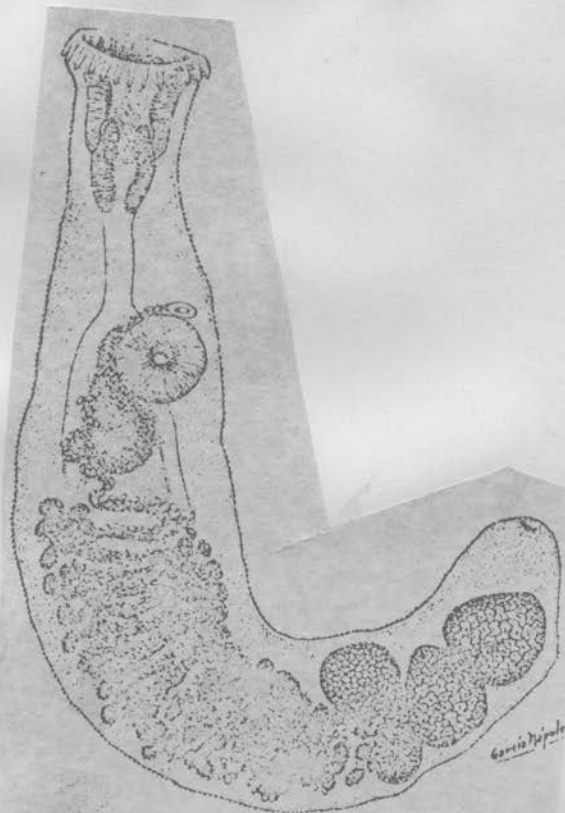
(Fig. No. 51)

Esta especie fué recolectada conjuntamente con la anterior del intestino del *Crocodylus acutus* capturado en la Ciénaga de Zapata (Prov. de Matanzas).

Se diferencia del *Acanthochasmus loossi* n. sp. en que la *pharynx* se encuentra a continuación de la ventosa oral, el *receptaculum seminis* está entre el *ovarium* y el testículo anterior y en que los folículos vitelógenos son mucho más grandes, así como que las espinas periorales son 20.

*Descripción.* — El cuerpo es pequeño, truncado en su extremo anterior y ligeramente redondeado en el posterior, de 2.09 mm. de largo por 0.48 mm. de ancho. Cutícula delgada, cubierta de espinas en sus dos tercios anteriores, son espinas pequeñas que se hacen raras y desaparecen hacia el tercio posterior del cuerpo. Ventosa oral terminal, musculosa, infundibuliforme, de 190 micras de largo por 250 micras de ancho máximo, con un borde en forma de un rodete circular provisto de 20 espinas dispuestas en una corona no interrumpida, en una sola fila, cada espina mide aproximadamente 46.8 micras de largo por 10.8 micras de grueso. *Acetabulum* globuloso, de 170 micras de diámetro, bastante musculoso, colocado a nivel de la bifurcación esofágica, por detrás del poro genital. *Pre-pharynx* muy corta, *pharynx* musculosa, gruesa, situada inmediatamente a continuación de la ventosa oral, mide 150 micras de largo por 95 micras en su diámetro transversal máximo, el *oesophagus* es largo y grueso, mide aproximadamente 190 micras de largo, se bifurca por delante del *acetabulum* y termina en dos intestinos ciegos que llegan hasta cerca del extremo caudal del verme.

El sistema reproductor lo forman dos testículos colocados en la parte posterior del cuerpo, uno delante del otro, son globulosos y mide cada uno unas 195 micras de diámetro. El *ovarium* es esférico, pre-testicular, de 160 micras de diámetro, el *receptaculum seminis* se encuentra entre el testículo anterior y el *ovarium*. La vesícula seminal se encuentra detrás del *acetabulum*, es grande y ondulada. El poro genital descueloca inmediatamente por delante del *acetabulum* y por detrás de la bifurcación esofágica. No se observó *gonotyl*. El *uterus* describe numerosas asas transversales que ocupan el espacio entre el *ovarium* y el borde posterior de la vesícula seminal. Las glándulas vitelinas forman folículos grandes, que llegan a medir 60 por 36 micras y se encuentran distribuidos por ambos lados del cuerpo, en una banda formada de 3 ó 4 folículos, la cual se extiende desde el borde anterior del *ovarium* hasta las proximidades del borde posterior de la vesícula seminal. Los huevos son elípticos, amarillos, operculados, embrionados, de 25 a 28 por 14 a 16 micras.

Fig. 51 - *Acanthochasmus americanus* de *Crocodylus acutus*

3. *Atrophecoecum americanum* (Pérez Vigueras, 1956) comb. n. (Fig. 3.)

Host: *C. rhombifer* *rocodylus* Cuba

Location: intestine

A total of 9 trematodes were recovered in one *C. rhombifer* 31 months old. We have found some characteristic features on the basis of which we have transferred this species to the genus *Atrophecoecum* Bhalerao, 1940.

Description: Body of all specimens elongated, U-shaped. Cuticle armed with spines up to the level of anterior testis. Body length 1.79–2.96 mm, width 0.421–0.546 mm. Terminal oral sucker bell-shaped, measuring 0.222–0.273 mm in length and 0.177–0.244 mm in width. Bottom of oral sucker slightly concave. Around the buccal cavity an uninterrupted row

	Our measurements	Pérez and Cruz (1953)
Body length	1.67–3.30	5.312
Body width	0.249–0.327	0.481
Oral sucker	0.133–0.163 × 0.140–0.192	0.232 × 0.285
Ventral sucker	0.096–0.126 × 0.103–0.133	0.190 × 0.213
Pharynx	0.081–0.103 × 0.089–0.118	0.175 × 0.190
Prepharynx	0.096–0.185 × 0.022–0.044	0.122 × 0.049
Oesophagus	0.214–0.311 × 0.044–0.089	0 or short
Receptaculum seminis	0.081–0.199 × 0.066–0.126	0.182 × 0.106
Testis I	0.111–0.192 × 0.140–0.244	0.299 × 0.299
Testis II	0.118–0.237 × 0.140–0.251	0.347 × 0.313
Ovary	0.096–0.177 × 0.089–0.185	0.236 × 0.205
Eggs	0.026–0.030 × 0.013–0.017	0.030 × 0.015
Distance between oral sucker and ventral sucker	0.651–0.806	1.162
Spines	0.023–0.030 × 0.013–0.019	0.038 × 0.019
Number of hooks	20	20

of 20 straight spines, 0.055–0.057 mm long and 0.012–0.019 mm wide. Prepharynx, often drawn into oral sucker, measures 0.074–0.118 mm in length. Pharynx muscular, 0.133–0.163 mm long, 0.123–0.148 mm wide. Oesophagus distinct, measuring 0.096–0.222 mm in length, according to the contraction of the worm. It bifurcates preacetabularly in two intestinal branches terminating at posterior extremity on both sides of excretory pore. Acetabulum circular, measuring 0.155–0.185 × 0.163–0.177 mm, situated 0.44–0.66 mm from the anterior extremity. Testes of smooth outline, irregular, oval-shaped, in the posterior portion of the trematode. Anterior testis measures 0.163–0.222 × 0.237–0.259 mm, posterior 0.207–0.281 × 0.185–0.244 mm. Vesicula seminalis postacetabular, with a sac-shaped basal part, running in a tube spiral distal part. Ovary spherical, pretesticular, measuring 0.155–0.222 × 0.148–0.207 mm. Between ovary and anterior testis a relatively large receptaculum seminis, measuring 0.133–0.259 × 0.111–0.222 mm. Vitellaria comparatively large, distributed along both sides of body from anterior testis up to vesicula seminalis. Vitelline follicles of oval to spherical shape. Uterus occupies the entire intercaecal middle region of body between ovary and acetabulum. Eggs measure 0.027–0.030 × 0.015–0.017 mm. Genital pore anterior to acetabulum. Pseudogonotyl well visible in most trematodes, measuring from the ventral view 0.030–0.044 × 0.118 mm. Its depths from the lateralis view is 0.074–0.088 mm.

We have placed our specimens in the species *A. americanus* (Pérez Vigueras, 1956), because they are most similar to it as to their arrangement, size and especially the shape of body and character of vitellaria. They differ only in the length of peribucaal spines. We are transferring this species of the genus *Atrophecoecum* Bhalerao, 1940, as it has a distinct pseudogonotyl and the intestinal branches terminate in two anal openings. Pérez Vigueras (1956) reported in his original description that no gonotyl had been observed. He mentioned the blind termination of intestinal branches at the posterior extremity, but he did not show it in the attached drawing, as it was the case of the species *Acanthostomum loossi* described in the same paper.

From GROSCHART & BAERUS, 1970

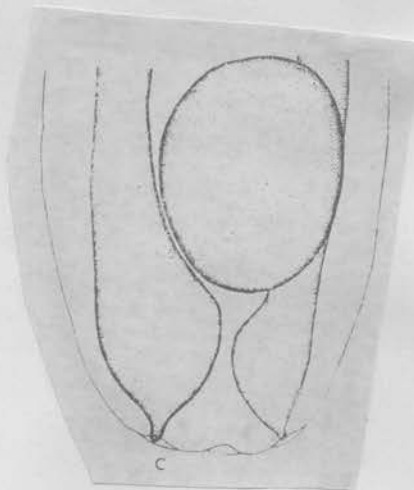
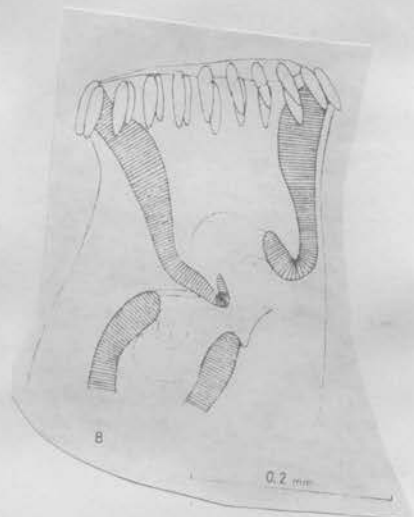


Fig. 3. *Atrophecoecum americanum* (Pérez Vigueras, 1956) comb. n. A — overall view; B — anterior portion; C — posterior portion of body. Orig.



Acanthostomum americanus Perez Vigueras, 1956

FAMILY ACANTHSTOMIDAE  
*Acanthostomum americanus* Perez, 1956  
 (Plate 1, 3)

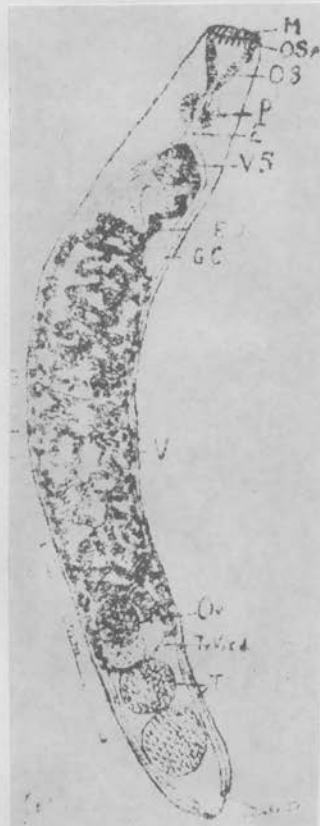
More than a hundred examples of this species were recovered from the washings of the intestines of a crocodile, *Crocodylus acutus acutus*. The original descriptions by Perez uses the name, *Acanthochasmus*, which is a synonym of *Acanthostomum* Looss 1899, the latter name having been used for one year prior to the use of *Acanthochasmus* Looss, 1900.

Perez (1956) described a species from the crocodile which appeared to be similar to the species under consideration here. Both were taken from a Central American crocodile and each has 20 spines in a corona near the anterior end. Perez gave measurements showing a length of 2.09; width 0.48; oral sucker 0.190; ovary 0.160; and testis 0.195. The averages of the ten specimens described in this paper are somewhat larger than the measurements he presented. The posterior testis is definitely larger than the anterior testis, an observation which he failed to note. The vitellaria have a definitely lateral position in these specimens, another fact unobserved by Perez. The posterior extremity of each intestinal cecum shows an anal

opening in these specimens, also unobserved by Perez.

The measurements in mm. of ten El Salvador specimens are recorded here.

**Description:** Bodies elongate with a rounded posterior end but a truncate anterior; cuticular spines small and straight; color pale with mature eggs in uterus showing up dark; length 3.83 (2.50-5.13) width 0.406 (0.305-0.472); oral sucker 0.249 (0.122-0.152) diam.; oral spines 20; spine length 0.60 (0.53-0.69); genital pore directly above ventral sucker; ventral sucker 0.167 (0.137-0.198); ovary round 0.209 (0.152-0.267) and anterior to seminal receptacle which is anterior to the anterior testis 0.232 (0.175-0.274) and the larger posterior tests 0.300 (0.198-0.427); uterus with many folds extending from a region of anterior testis to cirrus pouch; eggs 0.027 long by 0.015 wide; the intestinal ceca each end in an anal pore on both sides of the excretory pore. Deposited specimen No. 59563, U.S.N.M.



From HERBER, 1961

ACANTHOSTOMUM ATE *sp. nov.* Plate 2, fig. 1. TUBANGUI AND MASILUNGAN, 1936

Specimens of this fluke were collected from the same host in which *A. elongatum* was found. It was thought in the beginning that it represented a small variety of *A. elongatum*, but a detailed comparison between the two forms showed several specific differences, especially as to size, the number of cephalic spines, and the position of the vitellaria. As a matter of fact the trematode in question bears a closer resemblance to *A. spiniceps* (Looss, 1901) than to *A. elongatum* in the three characters mentioned. It may be distinguished from *A. spiniceps* by its smaller oral sucker, its shorter prepharynx and œsophagus, and its smaller and more anteriorly located acetabulum.

*Description.*—Body elongate, anterior end truncate, posterior end rounded, 4.1 to 5.5 millimeters in length by 0.3 to 0.5 millimeter in maximum breadth. Cuticle armed with minute spines from anterior end to level of ovary; spines thickly set anteriorly, sparser posteriorly. Oral sucker well-developed, terminal, funnel-shaped, 0.17 to 0.32 by 0.22 to 0.32 millimeter in size, provided with 25 to 26 cephalic spines arranged in a single row and measuring 50 to 58 by 13 to 14 microns. Acetabulum near junction of anterior and second fourths of body length, 0.12 to 0.18 by 0.12 to 0.19 millimeter in size. Prepharynx 0.20 to 0.30 millimeter long; pharynx 0.12 to 0.15 by 0.08 to 0.13 millimeter in size; œsophagus very short, dividing immediately into two intestinal cœca that reach to near posterior end of body.

Testes subglobular, postovarial, near posterior end of body, one immediately behind the other and touching; anterior testis 0.20 to 0.25 by 0.19 to 0.23, posterior testis 0.26 to 0.30 by 0.19 to 0.22 millimeter in size. Seminal vesicle free in parenchyma, coiled, occupying a median position between acetabulum and anterior level of vitelline glands. Common genital pore median, immediately preacetabular, leading to moderately developed genital sinus.

Ovary oval, immediately pretesticular, slightly to one side of median line, 0.24 to 0.28 by 0.17 to 0.21 millimeter in size. Receptaculum seminis large, between ovary and first testis; Laurer's canal present. Shell gland diffuse, small, to one side of median line opposite seminal receptacle. Uterus long, in transverse coils between cœca and extending from in front of ovary to acetabulum. Vitellaria in small follicles occupying lateral sides of body from junction of second and third fourths of body length to level of anterior testis. Eggs numerous, thick-shelled, yellowish, operculated, with developed miracidia, 30.7 to 34.5 by 15.3 to 17.2 microns in size.

Excretory bladder roomy, opens exteriorly through a postero-terminal excretory pore.

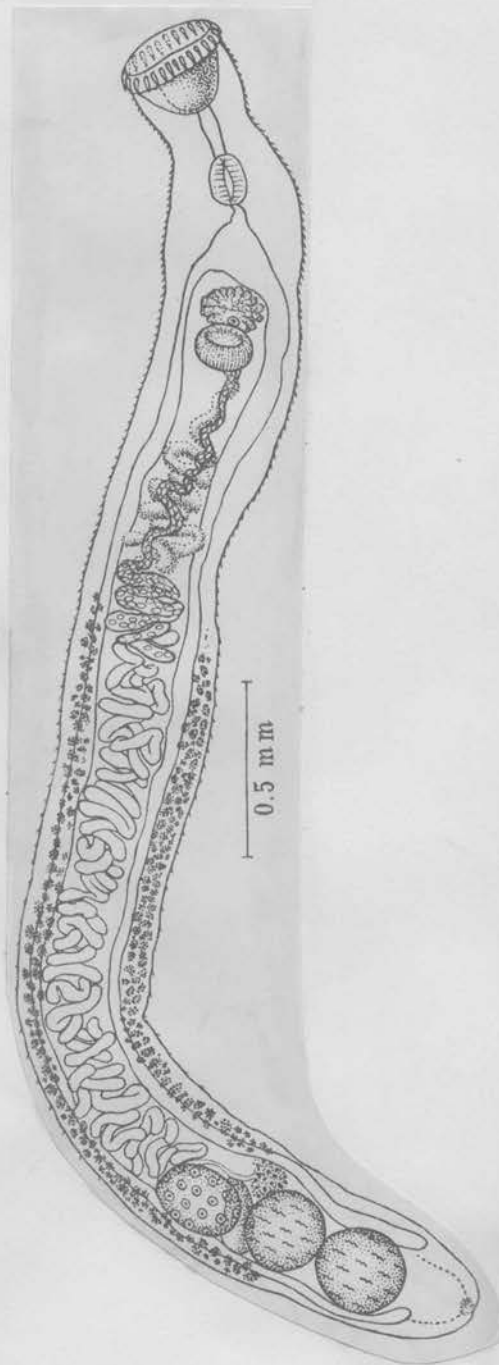
*Specific diagnosis.*—*Acanthostomum*: Body elongate, 4.1 to 5.5 by 0.3 to 0.5 millimeters in size. Cephalic spines 25 to 26 (in the large majority of cases 26) in number, 50 to 58 by 13 to 14 microns in size. Vitellaria from near junction of second and third fourth of body length to anterior testis. Eggs with developed miracidia, 30.7 to 34.5 by 15.3 to 17.2 microns in size.

*Host.*—Crocodile (*Crocodilus porosus*).

*Location.*—Intestine.

*Locality.*—Palawan.

*Type specimens.*—Philippine Bureau of Science parasitological collection, No. 500.



Cuerpo alargado, plano, que se contrae fuertemente; trunco en el extremo anterior, redondeado en el extremo posterior (Lám. IV, figs. 1 y 2). Miden en general entre 4.13 mm. y 5.22 mm. de largo, siendo algunos ejemplares más pequeños aunque maduros; el ancho máximo tomado a nivel del acetábulo es de 0.45 mm. a 0.47 mm. La cutícula está provista de robustas espinas en el extremo anterior del cuerpo, que persisten, pero más pequeñas, hasta el extremo posterior del mismo. Miden las más robustas 0.007 mm.

La ventosa oral es terminal, infundibuliforme, mide 0.31 mm. a 0.39 mm. de largo por 0.33 mm. a 0.43 mm. de ancho; en su base se dispone una corona de 23 a 24 espinas bucales, dispuestas en una sola fila, miden 0.031 mm. de largo (Lám. IV, fig. 4). La prefaringe es ancha, bien visible, mide 0.246 mm. de largo por 0.103 mm. de ancho. La faringe es globulosa, bien desarrollada y musculosa, mide 0.183 mm. de largo por 0.144 mm. de ancho. Esófago ausente. Los divertículos intestinales toman nacimiento inmediatamente por debajo de la faringe, son anchos e irregulares, alcanzando el extremo posterior del cuerpo, donde se abren al exterior mediante poros anales bien nítidos, situados a ambos lados de la vesícula excretora (Lám. IV, fig. 5).

El acetábulo es circular, situado en el tercio anterior del cuerpo, siendo más pequeño que la ventosa oral; mide 0.144 mm. a 0.205 mm. de diámetro y se encuentra a 0.146 mm. del extremo anterior del cuerpo.

Los testículos están situados en el extremo posterior del cuerpo, en tandem, intracecales, muy próximo uno de otro. Mide el anterior 0.082 mm. a 0.103 mm. de largo por 1.14 mm. a 1.22 mm. de ancho; el posterior mide 0.144 mm. a 0.164 mm. de largo por 0.123 mm. a 0.205 mm. de ancho. Los deferentes desembocan en una enorme vesícula seminal, piriforme, que mide en su porción más dilatada 0.205 mm. a 0.216 mm. de largo por 0.082 mm. a 0.164 mm. de ancho; luego de tres o cuatro ansas transversales desemboca en el poro genital, situado a nivel de la línea media, preacetabular.

El ovario, de situación pretesticular, y a la izquierda de la línea media, es grande, mayor que los testículos, mide 0.185 mm. a 0.287 mm. de largo por 0.123 mm. a 0.203 mm. de ancho; receptáculo seminal bien visible, grande, situado entre el ovario y el testículo anterior. Las glándulas vitelógenas están bien desarrolladas, formadas por folículos pequeños, de situación extracecal, cecal e intracecal, y se extienden desde el nivel del ovario hasta la base de la vesícula seminal; forma el canal vitelino común justo por encima del ovario, dando origen a un reservorio vitelino. El útero está muy desarrollado, y ocupa toda la zona comprendida entre el borde anterior del ovario y la vesícula seminal; ninguna ansa uterina se sitúa entre el borde

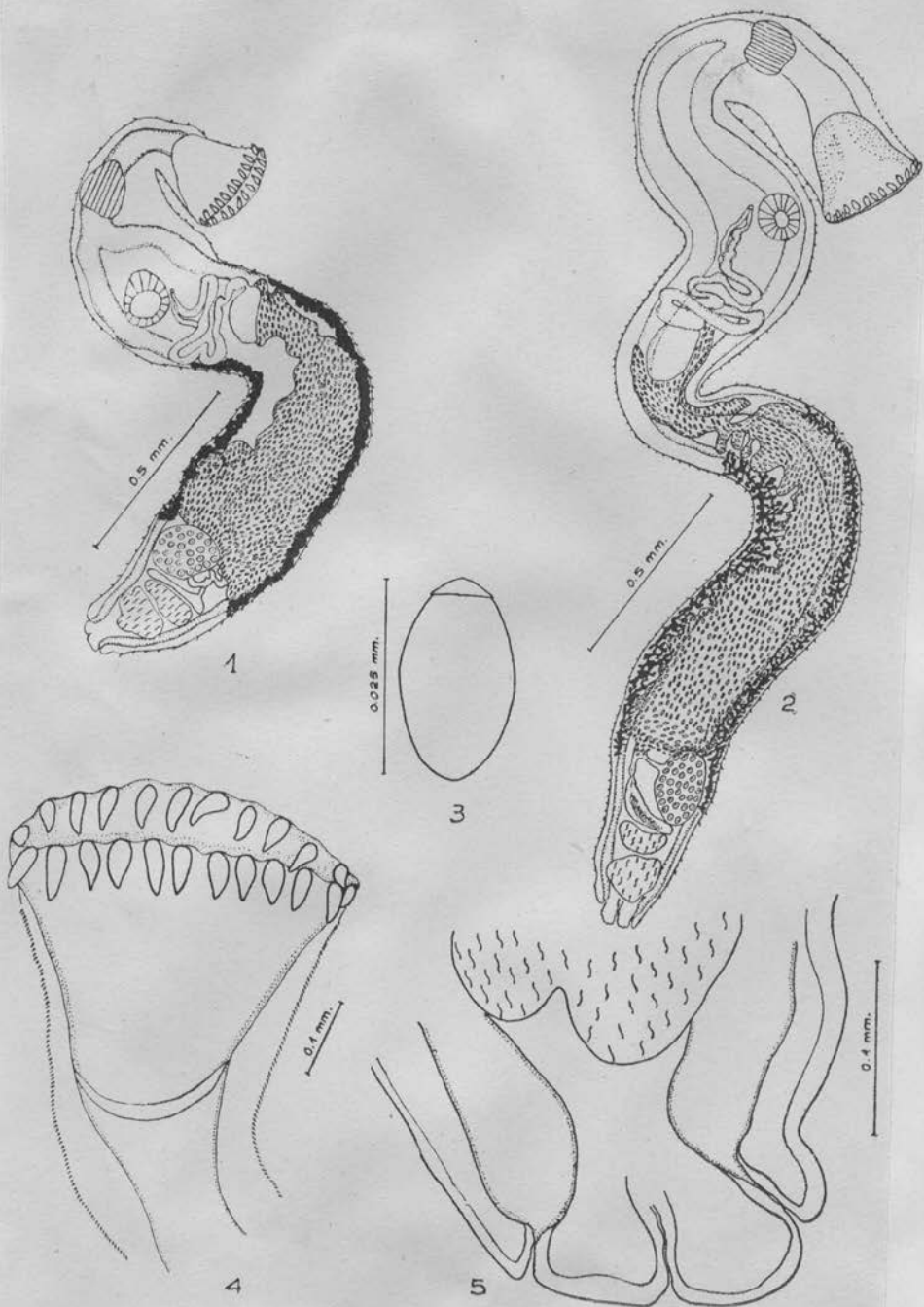
posterior del ovario y el testículo anterior; contiene gran cantidad de huevos, color amarillo pálido que miden 0.021 mm. de largo por 0.010 mm. de ancho; son operculados (Lám. IV, fig. 3).

*Habitat:* Intestino delgado de *Phrynosops geoffroyana hillarii* Turtle  
D. & B., Río Negro, Paso de los Toros, Departamento de Tacuarembó, Uruguay. 30 ejemplares, en Colección Helmintológica del Museo de Historia Natural de Montevideo.

*Discusión:* Esta especie presenta muchas semejanzas con *Acanthostomum scyphocephalum* (BRAUN, 1901) PELÁEZ y CRUZ, 1953, pero se diferencia claramente de él por el mayor tamaño del cuerpo, por el mayor tamaño del ovario con respecto a los testículos, por ser éstos no redondeados sino ovalados, más anchos que largos, por el mayor desarrollo del útero, y porque este último no forma nunca una ansa entre el ovario y el testículo anterior. Se diferencia también fácilmente de *A. caballeroi* PELÁEZ y CRUZ, 1953, en no presentar las características espinas peribucales de esta especie, así como en tener esta especie un ovario más pequeño que los testículos.

SZIDAT describió en 1954 otra especie de este género, *Acanthostomum gnerii*, hallado en un pez de agua dulce, *Rhamdia quelen* EIGENM. & EIGENM., del Río Paraná, República Argentina; dicha especie difiere considerablemente de la nuestra, en que es de menor tamaño (1.64 mm. a 2.00 mm.), por tener los testículos más voluminosos que el ovario y los huevos más grandes.

Dedicamos esta especie al gran helmintólogo M. Braun.



*Acanthostomum brauni* n. sp.

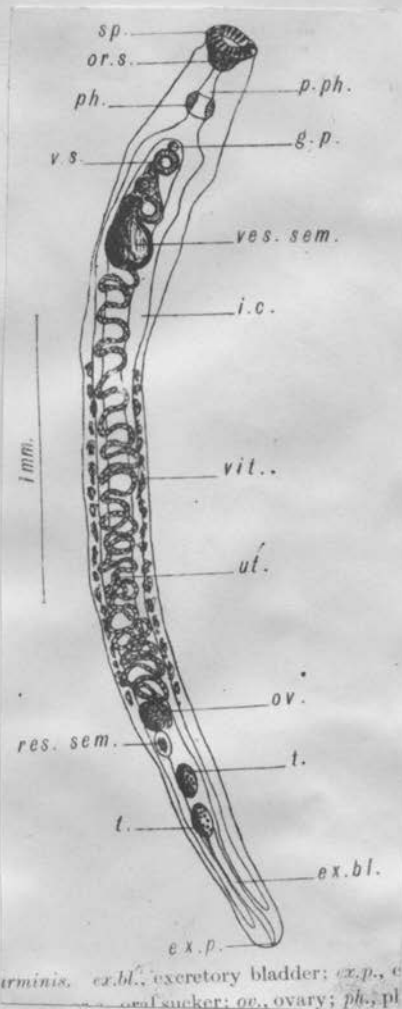
1. y 2. Cuerpo entero, vista ventral.
3. Huevo.
4. Ventosa oral.
5. Extremo posterior del cuerpo: poros anales.

Acanthostomum burminis (Bhalerao, 1926) Bhalerao, 1936

~~Acanthochoasmus~~ burminis Bhalerao, 1926

Synonym: Atrophecaecum burminis (Bhalerao, 1926) Bhalerao, 1940

Host: Tropidonotus piscator ; Rangoon



*urminis.* *ex.bl.*: excretory bladder; *ex.p.*, e  
oral sucker; *ov.*, ovary; *ph.*, pl

Ten specimens of this form were collected from the intestine of a snake, *Tropidonotus piscator*.

The body is elongated, slender, cylindrical, spatulate with a distinct constriction at the neck, 2.12-3.68 × 0.30-0.46 mm. in size. The oral sucker is terminal, large cup-shaped, 0.14-0.20 × 0.15-0.20 mm. in size. It bears a coronet of spines, usually comprising 26 spines but variable from 26-29 in number at the anterior end round the edges of the oral sucker. The prepharynx is elongated and measures 0.05-0.15 × 0.02-0.06 mm. in size. The pharynx is muscular, globular and measures 0.07-0.18 × 0.07-0.09 mm. in size. The oesophagus is very short, 0.05-0.09 mm. long, immediately dividing into two intestinal caeca extending backwards along the sides of body to a short distance in front of hind end of body. Both the caeca open to the exterior by separate ani situated at the sides of body. The ventral sucker is spherical, smaller than oral sucker, 0.09-0.12 mm. in diameter at 0.34-0.75 mm. ie about 1/6th of body length from anterior extremity. The ratio of oral to ventral sucker is nearly 5:3.

The excretory pore lies at the posterior end of body. The excretory bladder is elongated bifurcating behind acetabulum, arms reaching near oral sucker.

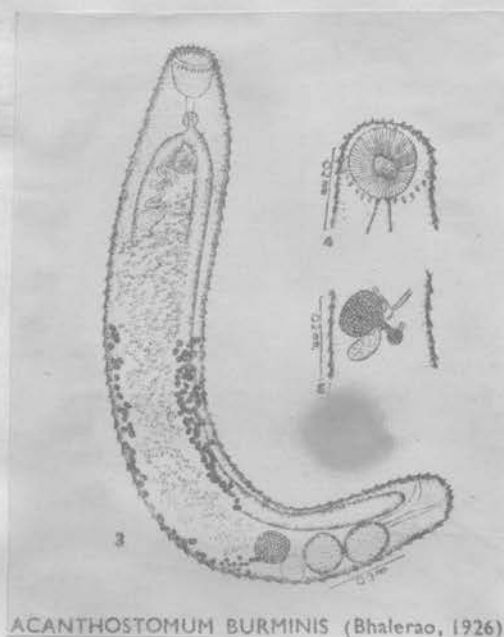
The genital pore lies immediately in front of ventral sucker at 0.315-0.640 mm. from anterior extremity.

The testes are rounded or oval, close or little apart from each other, situated one behind the other, postovarian, a little anterior to hind end of body. The anterior testis is smaller, equal or larger than posterior testis, 0.13-0.20 × 0.115-0.180 mm. in size, and lies at 0.49-0.75 mm. from caudal end. The posterior testis measures 0.17-0.30 × 0.13-0.28 mm. in size and lies at 0.32-0.59 mm. from hind end. The cirrus sac is absent. The vesicula seminalis is voluminous lying free in the parenchyma, consisting of a large basal sac-like portion, 0.08-0.23 × 0.07-0.15 mm. in size and a long coiled anterior portion, 0.315-0.640 mm. in length, opening at the genital pore.

The ovary is oval or spherical lying to the right side of median line in front of testes, 0.08-0.19 × 0.11-0.15 mm. in size at 0.61-0.97 mm. from caudal end. The oviduct arises from mid-plane of the ovary and opens at the oötype. The receptaculum seminis is oval or pear-shaped, smaller, equal or larger than ovary. It lies behind the ovary or partially overlapping it and measures 0.07-0.15 × 0.07-0.13 mm. in size. The vitellaria are small, follicular, mostly extracaecal but covering the intestinal caeca. They extend from posterior end of vesicula seminalis to a little anterior to ovary. Two vitelline ducts run transversely, unite to form a common yolk reservoir opening at the oötype. The uterus arises from the oötype, runs forward forming transverse loops between the ovary and the basal sac of the vesicula seminalis. It runs anteriorly to open at the genital pore. The eggs are elliptical or oval, non-operculated and measure 0.034-0.039 × 0.019-0.027 mm. in size.

#### DISCUSSION

The present form is referred to *Acanthostomum burminis* (Bhalerao, 1926), (Syn. *Atrophocaecum burminis* Bhalerao, 1926) recovered from *Tropidonotus piscator* at Rangon. Thapar and Ali (1929) also recorded from the type host at Lucknow. The present material differs from Bhalerao's specimens in having receptaculum seminis as large, larger or smaller than ovary and in the relative size of gonads. Another species of *Acanthostomum* recorded from India, *A. hindusthanensis* Baugh, 1956



ACANTHOSTOMUM BURMINIS (Bhalerao, 1926)

is closely related to this species. Baugh (1956) distinguished his new species from *A. burminis* in having receptaculum seminis as large or larger than ovary, in the possession of larger testes and smaller eggs. In the author's specimens the receptaculum seminis relative to ovary is a variable character and the size of testes and eggs are minor differences and are of no importance. Consequently *A. hindusthanensis* falls into synonymy of *A. burminis*. Sinha (1958) described *A. (Atrophocaecum) indicum* from *Tropidonotus piscator* at Hyderabad. On a careful comparison of the description of this species with *A. burminis* at author's disposal, it is found that both the species are identical. Accordingly *A. indicum* is a synonym of *A. burminis*.

Host : *Tropidonotus piscator* (Wall.)

Location : Intestine.

Locality : Lucknow.

*A. caballeroi* nov. sp. \* Paláez & Cruz, 1953  
(Figs. 1-16)

**Descripción.**—Cuerpo largo, cilíndrico, traslúcido, con poco parénquima y de 3.634-7.000 mm. por 0.417-0.767 mm. Su máximo diámetro se observa un poco por detrás del acetábulo, que se encuentra en la línea media de la superficie ventral a una distancia de 1/3.0-1/5.5 del extremo anterior. A partir de ese lugar y hacia adelante su diámetro va disminuyendo, hasta llegar a la ventosa oral que es terminal, fuertemente musculosa, en forma de embudo con el vértice dirigido hacia atrás. Mide 0.190-0.361 mm. de diámetro por 0.190-0.342 mm. de profundidad.

La mitad posterior es de bordes paralelos y el extremo caudal redondeado. La cutícula tiene un espesor de 0.003-0.004 mm. y está provista de pequeñas espinas de forma cónica con punta aguda y encorvada, dirigidas hacia atrás y que miden 0.0098 por 0.0033 mm. Son muy numerosas en las superficies dorsal, laterales y ventral anterior, en tanto que en la ventral posterior su número va disminuyendo progresivamente hasta ser escasas en la región distal.

En el borde del embudo que forma la ventosa anterior, se encuentran recias espinas en número de 20. De color amarillo-verdoso, están colocadas en una sola fila, son gruesas y tienen uno de sus extremos romo y otro puntiagudo y dirigido hacia atrás. Miden 0.0489-0.0608 mm. por 0.0133-0.0196 mm.

El acetábulo es semi-esférico, con su diámetro transversal ligeramente mayor que el ánteroposterior; fuertemente musculoso y retráctil, mide 0.137-0.236 mm. por 0.133-0.213 mm. La relación promedio entre los diámetros mayores de ambas ventosas es igual a 1:1.47.

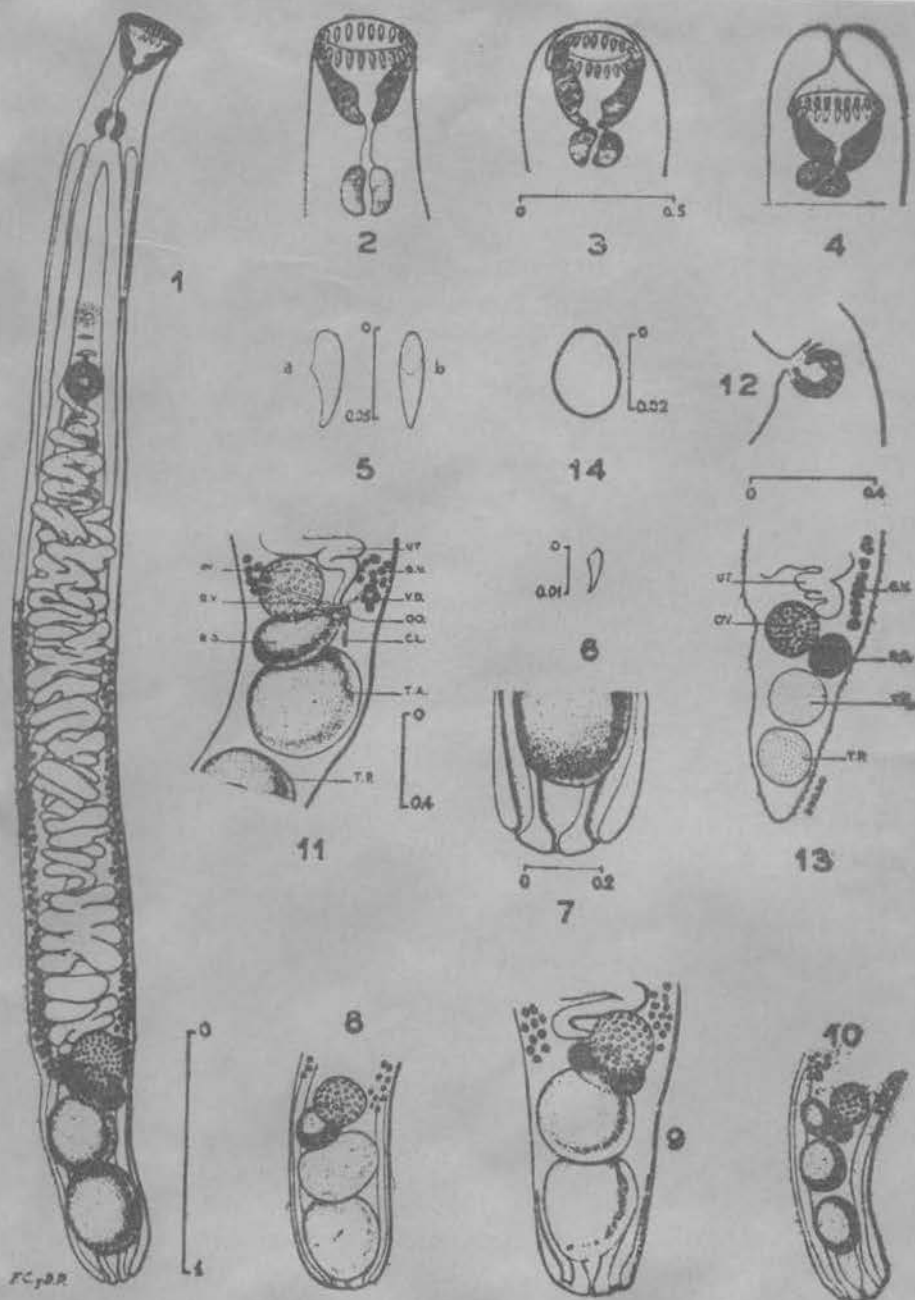
La región preacetabular es la más móvil y, dependiendo del grado de contracción o relajación que presenten los ejemplares al ser fijados, aumenta o disminuye la distancia entre la ventosa ventral y la faringe.

En el fondo de la ventosa anterior se encuentra la abertura oral que comunica con una prefaringe de paredes delgadas, no musculosa, de 0.046-0.289 mm. de longitud. La faringe es un órgano musculoso corto, elipsoidal y de paredes gruesas que mide 0.061-0.160 mm. en su eje ánteroposterior y 0.104-0.292 mm. de diámetro. El esófago corto y ancho, no musculoso, se divide en dos ramas intestinales de paredes delgadas con 0.057-0.076 mm. de ancho que, separándose, van paralelamente en los lados hasta el extremo caudal del cuerpo, donde se adelgazan un poco formando cortos rectos que se abren al exterior por poros anales, separados entre sí 0.106-0.483 mm.

\* Dedicamos esta especie al Dr. Eduardo Caballero y C., distinguido helmintólogo mexicano y excelente amigo, que nos ayudó notablemente con la prestación de su biblioteca.

El aparato excretor en forma de "Y". La vesícula excretora se abre al exterior por un poro póstero-terminal. Anteriormente se divide en dos conductos colectores gruesos que se extienden por delante hasta cerca del borde posterior de la faringe.

Los dos testículos ocupan la parte posterior del cuerpo; son grandes, lisos y esféricos u ovoideos con su eje mayor dirigido longitudinalmente, colocados sobre la línea media y uno inmediatamente detrás del otro. Generalmente se encuentran en contacto y a veces separados entre sí hasta 0.027 mm. El anterior en algunos ejemplares se observa un poco desviado hacia alguno de los lados, generalmente es más pequeño, siendo sus medidas 0.217-0.400 mm. por 0.183-0.383 mm., en tanto que las del posterior son 0.250-0.467 mm. por 0.166-0.400 mm. Dependiendo del grado de extensión de los ejemplares, se observa el último testículo separado hasta 0.228 mm. del extremo distal. Los conductos eferentes, después de unirse



Figs. 1-14.—*Acanthostomum caballeroi* nov. sp. 1. Aspecto del ejemplar número 11 completo; 2-4, extremo anterior de los ejemplares 12, 11 y 18 mostrando la corona adoral de espinas en detalle; 5, espinas de la corona adoral de perfil (a) y de frente (b); 6, espina tegumentaria de perfil; 7-10, extremos posteriores de los ejemplares 6, 12, 45 y 24, en los que se aprecia la variada disposición de testículos, ovario y receptáculo seminal, así como la terminación de los ciegos en anos; 11, región ovárica del ejemplar número 16, vista dorsalmente; C. L., conducto de Laurer; G. V., glándulas vitelógenas; Oo., ootipo; OV., ovario; K. S., receptáculo seminal; R. V., reservorio vitelógeno; T. A. y T. P., testículos anterior y posterior; V. D., viteloducto; 12 y 13, dos porciones de un scolex para-agital del ejemplar número 16 que muestran, el acetábulo con sus repliegues anteriores y posteriores y la posición relativa de las gónadas en el extremo posterior; 14, huevo. (Todas las figuras se han dibujado con el auxilio de la cámara clara, y las escalas se notan en mm.).

para formar el deferente, llegan a la vesícula seminal que se encuentra libre en el parénquima y se extiende 0.057-0.780 mm. por detrás del acetábulo. Es dorsal con respecto al útero, y está constituida por una parte posterior más o menos ensanchada en forma de saco, a la cual llega el conducto deferente, y otra delgada que, con varias asas, llega hasta detrás del acetábulo, donde forma un pequeño conducto eyaculador que se abre al atrio genital en la línea media y por delante de la ventosa ventral. El atrio genital se observa como una hendidura transversal poco curvada hacia atrás en sus extremos, que dista 0.068-0.353 mm. de la ventosa ventral.

Por delante del acetábulo, en la línea media ventral y a una distancia de 0.086-0.279 mm. de éste, se encuentra una depresión redondeada de bordes musculosos que frecuentemente se observa con un diámetro aproximado de la mitad del correspondiente al de la ventosa ventral. Esta es la bolsa copulatrix o gonotilo que parece una tercera ventosa.



El ovario es esférico o ligeramente oval y entero. Está colocado ventralmente por delante de los testículos hacia el lado derecho de la línea media en un 62% de los ejemplares, en la línea media en un 20%, y al lado izquierdo en un 18%. En la mayoría se encuentra junto al testículo anterior, estando en algunos separado hasta 0.114 mm. Mide 0.167-0.285 mm. en su diámetro anteroposterior y 0.137-0.251 mm. en el transversal, siendo la relación promedio de los diámetros mayores del ovario y testículo anterior de 1:1.51. Del ovario, posteriormente sale un pequeño oviducto que llega al ootipo. Poco visible en la mayor parte de los ejemplares, el ootipo es pequeño y recibe por otro lado al conducto vitelógeno común que parte del reservorio vitelógeno. Por detrás del ovario, en el espacio que queda entre éste y el testículo anterior, se encuentra un amplio receptáculo seminal, de forma ovoidea, con su eje mayor dirigida oblicuamente, y colocado

en la mayor parte de los ejemplares en el mismo lado del ovario, excepcionalmente en el contrario. Mide 0.137-0.300 mm. por 0.114-0.263 mm. y conecta con el ootipo. De este último parte también un fino conducto correspondiente al de Laurer que se abre en la superficie dorsal por un pequeño poro. El útero principia en el ootipo, de donde, describiendo numerosas asas se dirige anteriormente hasta desembocar en el atrio genital. Ocupa el área media que queda entre las dos ramas intestinales y se encuentra lleno de numerosos huevecillos pequeños, de color pardo-amarillento y que miden 0.0266-0.0304 mm. por 0.0133-0.0152 mm. Son de corion delgado, en uno de sus polos presentan un pequeño opérculo con reborde ligero y contienen al parecer un miracidio no bien diferenciado en su interior.

Los folículos vitelógenos están medianamente desarrollados, son grandes y colocados dorsalmente con respecto a las ramas intestinales. Miden 0.031-0.046 mm. de diámetro y ocupan las zonas que quedan entre las ramas intestinales y los bordes laterales del cuerpo aproximadamente desde el nivel medio del ovario hasta el sitio de unión del primero y segundo tercios de la zona comprendida entre el acetábulo y el ovario. La distancia que hay desde los primeros folículos vitelógenos al extremo anterior del verme es de 1.384-3.600 mm., en tanto que la de los últimos al posterior es de 0.467-1.184 mm., siendo la relación promedio de la longitud de la zona posterior carente de vitelógenos a la total del cuerpo, igual a 1:6.4. Por detrás del ovario pasan los viteloductos que se reúnen en la línea media para formar un pequeño reservorio vitelógeno del que parte al ootipo un corto viteloducto común.

*Huésped definitivo.*—*Crocodilus acutus acutus* Müller y Hellmich, 1940.

*Localización.*—Intestino delgado.

*Localidad.*—Río verde, Oaxaca (Istmo de Tehuantepec, México.)

*Colector.*—Fco. Cruz Lozano (mayo de 1950.)

*Tipos.*—183 ejemplares adultos (Números 1-183 (montados *in toto* en preparaciones coloreadas, en la Colección del Laboratorio de Parasitología de la Escuela Nacional de Ciencias Biológicas (Instituto Politécnico Nacional), México, D. F.; 25 ejemplares fijados en Lang y conservados en alcohol etílico de 70°, en la Colección del Dr. El Caballero y C., del Instituto de Biología (U. N. A.) de México, D. F. A más de éstos, se incluyeron en parafina otros 7 ejemplares (Números 185-188 y 196-198), cuyos cortes han servido de base para algunos dibujos de los que ilustran este trabajo. Las preparaciones correspondientes se conservan en nuestro Laboratorio.

*Observaciones.*—Por su morfología recuerda *A. caballeroi* nov. sp. a otras especies del género, pero se distingue de ellas por la longitud total del cuerpo, la relación promedio que existe entre los diámetros mayores de

ambas ventosas, la posición y distribución de los folículos vitelógenos y el número de espinas que forman la corona anterior.

Cabe dentro del grupo *spiniceps* propuesto por Looss en 1901, siendo las especies que más se le parecen las anotadas en la TABLA I.

En la TABLA II indicamos la totalidad de las especies consideradas en el género *Acanthostomum* hasta la fecha, anotando sus huéspedes y localidades.

2. *Atrophocoeum caballeroi* (Peláez et Cruz, 1953) comb. n. (Fig. 2.)

Host: *Crocodylus rhombifer* CUBA

Location: intestine

This specimen was found in 3 of the 21 examined hosts (2 in the age group of 19 months and 1 in the group of 31 months).

Description: Body elongated, anterior portion slightly widened in the region of testes. Cuticle armed with very fine scales, imitating the spines on both sides of body, in anterior half of body only. Body length 1.67 to 3.30 mm, width 0.249—0.327 mm. Oral sucker funnel-shaped, well developed, measuring 0.133—0.163 mm in length and 0.140—0.192 mm in width. Twenty peribuccal spines arranged in a single uninterrupted row. Length of spines 0.023—0.030 mm, maximum width 0.013—0.019 mm. Their characteristic shape is shown in Fig. 2C. Prepharynx distinct, measuring 0.096—0.185 × 0.022—0.044 mm. Oesophagus well developed, 0.214 to 0.311 mm long and 0.044—0.089 mm wide, bifurcating in front of acetabulum. In one of the specimens oesophagus was nearly indistinct. Intestinal branches extend along both sides of body in the whole length of the trematode. Their termination is shown in Fig. 2D. Acetabulum in the anterior portion of the second fourth of body, measuring 0.096—0.126 × 0.103—0.133 mm, situated 0.651—0.806 mm from the anterior end of body. Vesicula seminalis with a sac-shaped base runs into the anterior tubular part. It is coiled up behind acetabulum. Vitellaria are formed by small follicles situated along both sides of body in the region of intestinal branches between lower border of vesicula seminalis and posterior testis. Ovary spherical, in the last fourth of body, measuring 0.096—0.177 × 0.089—0.185 mm. Testes irregularly oval-shaped, of smooth outline, situated behind ovary; anterior testis measures 0.111—0.192 × 0.140—0.244 mm, posterior 0.118—0.237 × 0.140 to 0.251 mm. Receptaculum seminis between ovary and anterior testis alongside the longitudinal axis of body. Measurements 0.081—0.199 × 0.066—0.126 mm. Uterus intercecal between ovary, vesicula seminalis spiral, coiled, extending to a tube and short metraterm in front of oral sucker. Eggs measure 0.026—0.030 × 0.013—0.017 mm. Pseudogonotyl oval, slit-shaped, situated behind acetabulum. Porus genitalis anterior to acetabulum under cuticular wall (Fig. 2E).

Note: Our specimens differ from the original description in smaller size of body and, consequently, also of different organs. However, they possess the same number and type of peribuccal spines (Tab. 2).

FROM GEOSCHAF T & BARUS, 1970

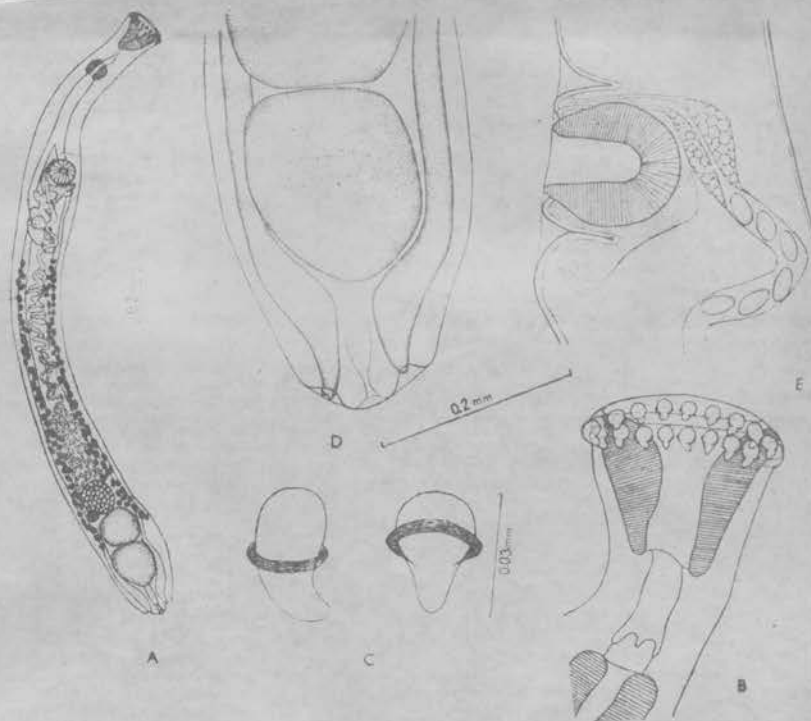


Fig. 2. *Atrophocoeum caballeroi* (Peláez et Cruz, 1953) comb. n. A — overall view; B — anterior portion; C — detail of peribuccal spines; D — posterior portion; E — detail of acetabulum (gonotyl and pseudogonotyl). Orig.

La descripción de esta especie ha sido realizada con un solo ejemplar de los dos colectados el 31 de octubre de 1954. Es un parásito largo, angosto, ligeramente plano, que mide 5.312 mm. de largo por 0.481 mm. de ancho a nivel de su porción más amplia: la cutícula tiene un espesor de 0.008 mm., lleva pequeñas espinas que se extienden hasta el extremo posterior del cuerpo siendo más abundantes en su mitad anterior, y que miden 0.004 mm. de largo por 0.002 mm. de ancho. Alrededor de la boca existe una corona de ganchos grandes que tienen la forma de diente, son en número de 20 y miden 0.038 mm. de largo por 0.019 mm. de ancho. La ventosa oral es amplia, fuertemente musculosa, infundibuliforme, subterminal, y mide 0.232 mm. de largo por 0.285 mm. de ancho; el acetábulo es ligeramente menor que la ventosa oral, de contorno circular, musculoso, está situado por detrás de la bifurcación intestinal, dista 1.162 mm. del extremo anterior y mide 0.190 mm. de largo por 0.213 mm. de ancho: la relación entre las dos ventosas es  $1:1.2 \times 1:1.6$ .

La boca es terminal, amplia, y mide 0.019 mm. de largo por 0.285 mm. de ancho: la prefaringe es corta, ancha, y mide 0.122 mm. de largo por 0.049 mm. de ancho; la faringe es cilíndrica, más ancha que larga, de paredes fuertemente musculosas, y mide 0.175 mm. de largo por 0.190 mm. de ancho; en sus bordes anterior y posterior existen conglomerados celulares que corresponden a células nerviosas; no hay esófago o es sumamente corto; la bifurcación intestinal se encuentra inmediatamente después de la faringe; los tubos intestinales son de paredes delgadas, membranosos, en su comienzo ocupan el área media central del cuerpo, pero a nivel del borde anterior del acetábulo se hacen laterales y desde ahí se extienden laterodorsalmente hasta el borde posterior del cuerpo, en donde se abren en dos aberturas anales próximas al poro excretor; miden 0.103 mm. de ancho.

El poro reproductor está situado por delante del acetábulo, sobre la línea media, y dista 1.112 mm. del extremo anterior; los testículos son casi esféricos, de contorno liso, se hallan situados en el extremo posterior del cuerpo, por delante de la vesícula excretora, uno detrás del otro sobre la línea media del cuerpo, sus bordes son tangentes, el anterior es menor que el posterior, y miden, el anterior 0.299 mm. de largo por 0.299 mm. de ancho, y el posterior 0.347 mm. de largo por 0.315 mm. de ancho; los conductos eferentes no fueron observados; la vesícula seminal está situada por detrás del acetábulo, en posición oblicua dentro

del área intercecal, y está formada por dos partes, la posterior ovoidea y la anterior tubular y sinuosa; es muy larga, y mide en su porción posterior 0.315 mm. de largo por 0.144 mm. de ancho a nivel de su porción más amplia; el gonostilo es grande, se extiende bajo la forma de un pliegue tegumentario desde los bordes laterales del acetábulo que convergen hacia el poro reproductor.

El ovario es casi esférico, de borde liso y entero, está situado por delante de los testículos y separado del anterior por un pequeño espacio, en el área intercecal, es menor que los testículos y mide 0.236 mm. de largo por 0.205 mm. de ancho; la glándula de Mehlis es difusa, se en-



Fig. 3. Dibujo de una preparación total de *Acanthostomum caballeroi* Peláez y Cruz, 1953. Región ventral.



cuentra situada sobre el lado izquierdo anterior del ovario; el seminal es ovoideo, de contorno liso, está situado en la izquierda del ovario y mide 0.182 mm. de largo por 0.11 mm. de ancho; el útero es amplio, se encuentra formado por naranjas transversales cortas que se sitúan en las áreas cecal e intercecales; entre el ovario y la porción posterior de la vesícula seminal a este nivel se hacen intercecales formando un tubo de trayectoria que va a terminar al poro reproductor; los huevecillos son pequeños, ovoideos, operculados, de cáscara delgada, lisa y miden 0.030 mm. de largo por 0.015 mm. de ancho.

Las glándulas vitelógenas principian por detrás de la porción posterior de la vesícula seminal y terminan a nivel del borde

del testículo anterior en el lado derecho, y en el izquierdo a nivel del testículo seminal; son folículos pequeños, ovoideos, aislados, se sitúan en las áreas extracecales y cecal, y algunos presentan la tendencia a agruparse. El poro excretor es terminal sobre el borde posterior del cuerpo, y de él parte una vesícula excretora en forma de Y.

**Hospedador.** *Caiman fuscus* (Cope).

**Localización.** Intestino.

**Distribución geográfica.** Región de Chepo Pacora, Panamá, Centroamérica.

Ejemplar en la Colección Helmintológica del Instituto de Biología. N° 214-3.

**Discusión.** Este ejemplar es muy semejante a los descritos por Peláez y Cruz en 1953 y que procedían de un cocodrilo de la región del Istmo de Tehuantepec, México; sin embargo existen algunas pequeñas diferencias, como por ejemplo el arreglo de los folículos vitelinos y la forma de los ganchos peribucales, caracteres éstos que entran bien en las variaciones que los mencionados autores encontraron en su extenso material examinado.

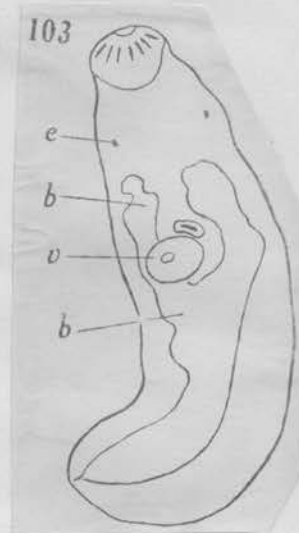
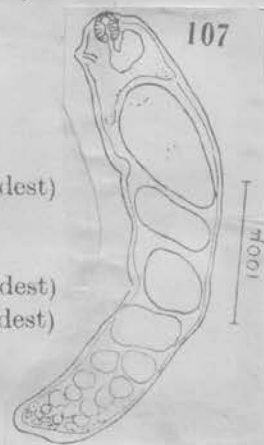
ercaria

Rothschild, 1938

METACERCARIA OF *C. coronanda* (figs. 103-106).

Measurements in Microns.

Body (length)	860
Body (width, maximum)	183
Oral sucker	75 × 75 (at widest)
Oral aperture (transversely)	38
Prepharynx (length)	91
Pharynx	23 × 19 (at widest)
Ventral sucker	53 × 57 (at widest)
Gonotyl (transversely, in living specimen)	46 × 14
Oral spine (length)	26
Eye-spot	14 × 7



Body elongated, about equal width along its whole length, tapering somewhat anteriorly, a little more than 4 times as long as broad. Eye-spots present with long axis longitudinal. Cuticle armed with very small spines. Anterior sucker (reminiscent of the anterior sucker found in *Pygidiopsis*, and allied genera) terminal and funnel shaped, encircled by single row of 15 blunt spines. These appear to be larger in comparison with the oral sucker than the spines of species of *Allocanthochasmus* and *Neochasmus* figured by Van Cleave and Mueller (1934). Mouth terminal, leading into long prepharynx, followed by well-developed pharynx. There is a bulb-like enlargement of the prepharynx anterior to the pharynx, most noticeable in the living animal. Oesophagus divides immediately above ventro-genital sac, each intestinal caeca extending to posterior end of body.

Ventral sucker situated a little more than  $\frac{1}{3}$  from anterior end of body, moderately well developed with 9 raised ridges on its surface. These are not visible in the mounted preparation, but were quite distinct during life. Excretory vesicle Y-shaped, forking immediately below ventral sucker, and branches extend forward to the oesophageal region. Excretory pore terminal, opening by narrow sphincter muscle to exterior. Anlage of testes, situated tandem in posterior end of body. Vasa efferentia, represented by a chain of cells, leave testes on left side and pass upwards to meet and form vas deferens about  $\frac{1}{2}$  from posterior end of body. Anlage of ovary forms a pretesticular band, probably lobed in mature worm. Germinal duct leaves it on left side. Uterus, represented by a chain of cells, can only be traced anterior to ovary. It passes forwards and joins vas deferens some distance posterior and to the right of ventral sucker. This hermaphrodite duct passes close to right border of ventral sucker and opens to exterior by genital pore above and slightly to right of the median line of ventral sucker. Genital pore surrounded by small transversely elongated oval sucker or

In the mature worm there are probably uterine loops in the posterior end of the body.

gonotyl (fig. 104). Vitellaria undeveloped, but what is probably anlage of vitelline ducts can be traced on either side of ovary, passing obliquely towards

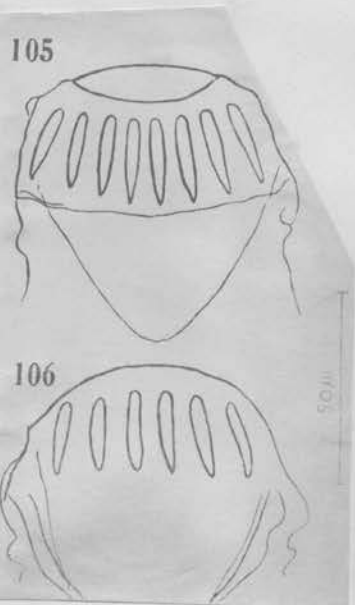
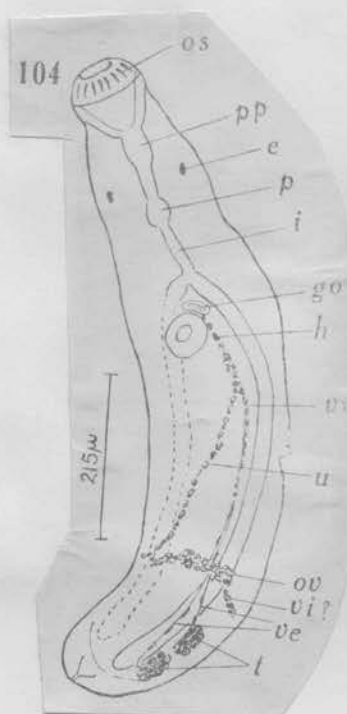


FIG. 103.—Metacercaria of *C. coronanda* drawn from the living specimen, showing the excretory bladder.

FIG. 104.—The same specimen mounted and fixed, showing Anlage of reproductive system. (The alimentary canal is much distorted by pressure.)

FIG. 105.—Oral spines of metacercaria of *C. coronanda* (ventral view). The mouth (corner) spine is not figured.

Fig. 106.—Oral spines of metacercaria of *C. coronanda* (dorsal view).

Fig. 107.—Redia of *C. coronanda*.

lateral edge of body.

It will be seen from the foregoing description that, unfortunately, the reproductive organs are in a somewhat undeveloped stage, although the characters of the metacercaria are such that it can with some confidence be placed in the subfamily Neochasminae.

#### SUMMARY.

(1) The excretory system of a new species of Opisthorchioidea cercaria, *Cercaria coronanda*, is described.

(2) The characters of cercariae of the superfamily Opisthorchioidea Vogel 1934 are discussed and a specific diagnosis of *Cercaria coronanda* is given.

(3) The first intermediate host is *Peringia ulvae* (Pennant) 1777, and the second intermediate host *Gobius ruthensparri* (Euphras.) 1786.

(4) The metacercaria pertains to the subfamily Neochasminae Van Cleave and Mueller 1932.

A note on the systematic position of *Cercaria coronanda* Rothschild, 1938.  
MIRIAM ROTHSCHILD, London, England.

Dr. H. A. Baylis and Dr. E. W. Price have kindly drawn my attention to certain morphological similarities between the metacercaria of *Cercaria coronanda* and species of the family Acanthostomidae. McCoy (1929, Jour. Parasitol. 16(1): 29-34) had tentatively assigned *Cercaria floridensis* McCoy, 1928, a pleurolophocercous larva, to this group, basing his belief on characters of the metacercaria which are now known to be common to both this family and more recently discovered heterophyoid trematodes (*Neochasmus*, Van Cleave & Muller, 1932, Roosevelt Wild Life Ann. 3(1): 5-51), *Allacanthochoasmus* (Van Cleave, 1922, Proc. U. S. Natl. Mus. 61 (Art. 9): 1-8), etc.

The type of circumoral spine, and more especially the position of the testes and the course of the uterus point to *Cercaria coronanda* pertaining to the Acanthostomidae rather than the Heterophyidae. It will also be recalled that the main excretory ducts showed very unusual features which were discussed in some detail in the original description. In view of Yamaguti's (1938, Ztschr. Parasitenk. 10(2): 293-296) recent description of the cercaria of *Centrocestus armatus*, in which he shows an identical excretory system for this larva, this apparently aberrant arrangement cannot be used as evidence one way or another.

The main character upon which *Cercaria coronanda* and its metacercaria were assigned to the Neochasminae was the presence of a genital sucker or gonotyl. In the mounted type specimen this structure does not appear very noticeable but in the living animal it is exceedingly conspicuous. It should also be stated that at this stage the vas deferens and hermaphroditic duct are poorly developed and represented merely by a chain of cells, and that the only structure of the reproductive organs which can be clearly seen in the living metacercaria is the genital sucker.

It is of course possible that in the fully matured trematode this organ is not very noticeable and that further examination of the Acanthostomidae may yet reveal the presence of an inconspicuous gonotyl. It is a curious fact that several organs in the pleurolophocercous cercariae show a fluctuating degree of development. Thus, for example, the ventral sucker is visibly more developed in very immature cercariae when a lip is discernible, but gradually disappears after the larvae leave the radiae to appear once again in the metacercarial stage.

At present I am inclined to consider my original confidence regarding the systematic position of this species as misplaced. It appears more likely that *Cercaria coronanda* represents a form midway between the Acanthostomidae and the Heterophyidae (Neochasminae) but inclining toward the former. The type and detailed morphology of the cercariae can leave no doubt as to its inclusion in the Opisthorchioidea. Should the adult form eventually prove to pertain to the Acanthostomidae it is difficult to see how this family could then be excluded from Vogel's superfamily Opisthorchioidea.

From ROTHSCHILD, 1940

Acanthostomum coronarium (Cobbold, 1861) Looss, 18997. *DISTOMA CORONARIUM*, Cobbold.

*Corpus lineare, depressum, retrorsum parum attenuatum; collum continuum; caput obconicum; os terminale globosum, limbo echinato, spinis ad numerum 24; acetabulum ore duplo minus, apertura circulari.*

Long.  $\frac{1}{2}$ , crassit.  $\frac{1}{8}$  unc.

Numerous examples from the intestines of an Alligator (*Alligator mississippiensis*). Ex. Dec. 25, 1860.

Cab. Coll. T. S. C. no. 91.

*Acanthostomum coronarium* (Cobbold)

Figs. 1, 7, 8, 12, 14-17

*Distomum coronarium* Cobbold, 1861:119.

*Acanthostomum coronarium*: Looss, 1899:578, 582 (new combination).

*Acanthochasmus coronarius*: Braun, 1901:35, 36 (new combination).

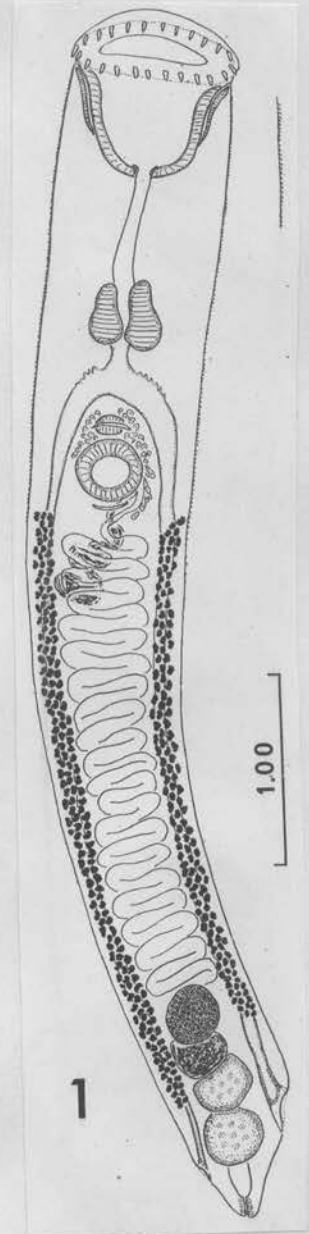
*Acanthochasmus diploporus* Stunkard, 1931:719-723, figs. 1-2.

*Acanthostomum diploporus*: Stunkard, 1938:40 (new combination).

*Acanthostomum imbutiforme*: Nasir, 1975:13 (in part, as senior synonym of both *A. coronarium* and *A. diploporus*).

*Supplemental data (based on 50 specimens, 30 measured).*—Living worm appearing chalky-white except for yellowish to brownish-black eggs. Body robust, 3.10-7.10 mm long by 0.45-0.90 mm at widest point near mid-body; posterior end with large median rounded protrusion; ratio of width to length 1:4-8 (1:5.2). Tegument with several sensory papillae at anterior end, spined; spines dense and up to 5 long anteriorly, sparser posteriorly. Eyespot pigment dispersed in some specimens, absent in most. Oral sucker terminal, cup-shaped, 425-690 long by 391-690 wide, surrounded anteriorly by single uninterrupted row of 23-25 (24.0) spines; oral spines 37-108 long by 15-45 wide ventrally, 45-132 long by 15-45 wide dorsally, with more than basal  $\frac{1}{2}$  attached to oral sucker; band of thick longitudinal muscle surrounding sucker from beyond middle anteriorly to base of oral spines. Acetabulum 218-345 long by 241-391 wide, with small sensory papillae in overlapping tegument. Ratio of oral sucker width to acetabular width 1:0.3-0.6 (1:0.4). Forebody 25-40% (31.0%) of total body length. Prepharynx thin-walled, 34-402 long in relaxed specimens. Pharynx widest near posterior end, 214-460 long by 172-300 wide. Ratio of oral sucker width to pharyngeal width 1:0.3-0.6 (1:0.4); ratio of acetabular width to pharyngeal width 1:0.6-1.2 (1:0.9). Esophagus in relaxed specimens occasionally wider than pharynx, 23-230 long, lined with epithelium up to 30 thick. Ceca bifurcating 1-9% (5%) of total body length preacetabular, with variable number of short forward-directed processes at anterior, lined with epithelium up to 30 thick; right cecum slightly atrophied, with anal opening 5-9% (7%) of total body length from posterior end; left cecum not atrophied, with anal opening 7-11% (9%) of total body length from posterior end; anal sphincters weakly developed.

Testes spherical to subspherical, smooth, tandem, usually contiguous; anterior testis 138-230 long by 149-345 wide; posterior testis 184-287 long by 149-345 wide; posttesticular space 3-8% (5%) of total body length. Seminal vesicle bipartite, with thin often indistinct distal portion extending past acetabulum before becoming long, conspicuous, and sinuous and sometimes constricted into 2 separate chambers, with globular posterior portion; entire organ median, intercecal, extending less than two acetabular lengths postacetabular. Prostatic duct surrounded by few prostatic cells. Preacetabular pit a transverse depression 79-211 (139) wide, surrounded by several elongated groups of gland cells, containing gonotyl 69-149 long by 93-175 wide and deeper than long. Genital pore immediately preace-



tabular. Postacetabular pit transverse, 92-185 (152) wide, immediately postacetabular.

Ovary pretesticular, spherical to subspherical, 161-310 long by 138-345 wide, separated from anterior testis by less than length of ovary. Seminal receptacle posterodorsal to ovary, 113-211 long by 37-277 wide. Mehlis' gland dorsal to anterior portion of ovary; Laurer's canal thin-walled, not surrounded by gland cells, opening dorsal to ovary. Uterus wound in ascending loops within intercecal space between ovary and acetabulum; loops occupying 35-48% (41%) of total body length; metaterm short, muscular, joining male duct at about depth of gonotyl to form elongated tubular genital atrium. Vitelline follicles 27-53 long by 16-40 wide, located dorsal, ventral, and lateral to ceca in 2 longitudinal groups extending from immediately postacetabular to testicular level; posterior termination within rear 10-18% (14%) of total body length on right side and 12-20% (16%) on left side. Eggs 29-32 long by 12-15 wide, yellowish near ovary, orangish between ovary and acetabulum, brownish-black near genital pore.

Excretory vesicle Y-shaped, bifurcating dorsal to acetabulum, with arms extending to posterior margin of oral sucker; pore terminal, with muscular sphincter surrounded by gland cells.

*Host*.—*Alligator mississippiensis* Daudin.

*Localities*.—Alachua County, Florida; Jackson County, Mississippi; Cameron Parish, Louisiana (all new localities).

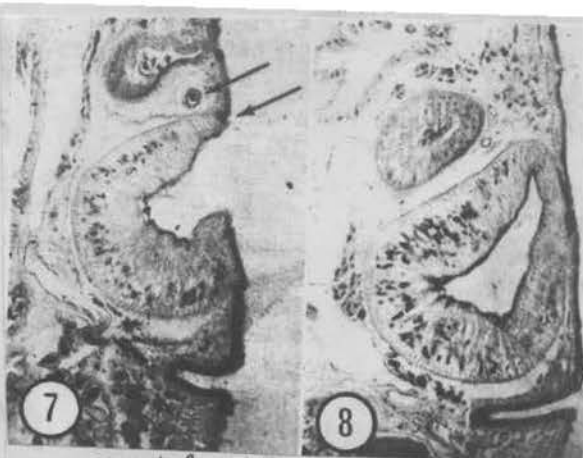
*Site of infection*.—Small intestine.

*Specimens deposited*.—USNM Helm. Coll. No. 74507 (2 slides); BM (NH) Reg. No. 1977.6.13.3-6; HWML No. 20854 (30 slides).

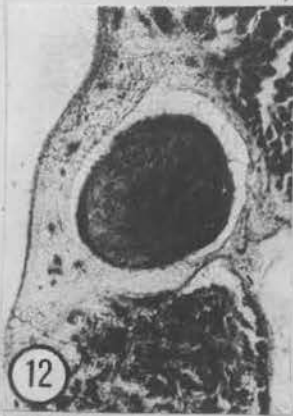
*Remarks*.—Inquiries to the British Museum, American Museum of Natural History, and U.S. National Museum failed to locate any of Cobbold's specimens. According to the description (1861) and figure (1864) by Cobbold, *Acanthostomum coronarium* possesses 24 oral spines, no anal openings, and vitelline follicles extending anteriorly to the level of the cecal bifurcation. *Acanthostomum diploporum*, which possesses 24 oral spines, purportedly differs from *A. coronarium* by possessing anal openings and vitelline follicles not reaching the level of the acetabulum (Horace W. Stunkard, personal communication). Specimens from Stunkard's collection are identical to ours described above. Assuming that *A. coronarium* represents a normal parasite of *Alligator mississippiensis* and not a casual parasite acquired during captivity in London, we believe Stunkard's, Cobbold's, and our specimens represent a single species for several reasons. First, such notable workers as Looss, Odhner, Braun, and Stossich in the early twentieth century failed to note the presence of anal openings in a variety of acanthostomes, so Cobbold's specimens may have had them; additionally, Cobbold did not note a pharynx in his specimens, although surely one occurred. Secondly, Stunkard's and our specimens possess vitelline follicles extending anteriorly to the posterior margin of the acetabulum with other prominently staining cells occurring anterior to them, and Cobbold could have interpreted gland cells or darkly-staining subtegumental parenchymal cells as vitelline follicles. In none of 26 nominal species of acanthostomes examined has the first author seen vitelline follicles extending farther anteriorly than the posterior margin of the acetabulum. Thirdly, we encountered only one of three acanthostomes infecting alligators which possessed 24 oral spines. We therefore declare *Acanthostomum diploporum* a junior synonym of *Acanthostomum coronarium*.

We consider the single specimen (USNM Helm. Coll. No. 2982) identified by A. Hassall as *Acanthostomum coronarium* from *Crocodylus acutus* in Honduras to be *A. americanum* (Pérez Vigueras, 1957) Yamaguti, 1971. Hughes and co-workers' reports (1941, 1942) of *A. coronarium* from *C. acutus* may have been based on that specimen because we found no other records of *A. coronarium* from *C. acutus*, and those reports did not include new collections.

From Brooks and Overstreet, 1977



gonotyl and postacetabular pit



Thin-walled sr,  
Sagittal sec.



Extruded gonotyl



Non-suctled gonotyl  
showing sucking pore openings



17



3. *Acanthostomum crocodili* ~~n. sp.~~ (Fig. 4) YAMAGUTI, 1954

Habitat and locality. Small intestine of *Crocodilus porosus*; Celebes.

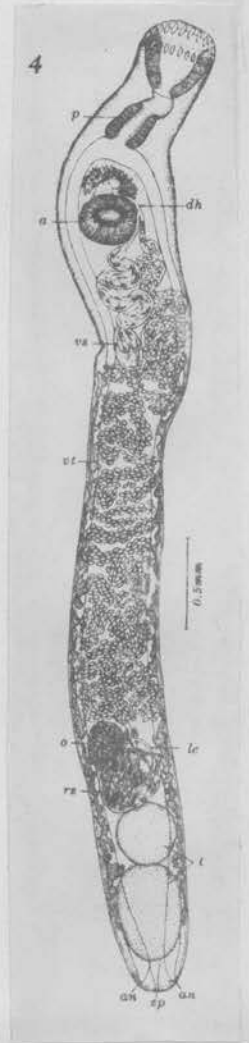
Material. 5 mature specimens fixed in acetic sublimate, stained and mounted in toto.

Body flattened cylindrical, 5.6-6.8 mm long, 0.55-0.65 mm at level of acetabulum; anterior extremity truncate, posterior extremity blunt-pointed. Cuticle beset throughout with minute spines. Oral sucker terminal, cup-shaped,  $0.37-0.4 \times 0.36-0.4$  mm; circumoral spines 23 in number without exception, arranged in a single row, measuring  $63-80 \mu$  by  $17-30 \mu$ , midventral spines smaller than middorsal ones, lateral ones  $70-80 \times 23-27 \mu$ . Pre-

pharynx wide, 0.06-0.25 mm long. Pharynx  $0.21-0.25 \times 0.18-0.21$  mm. Esophagus short, bifurcating in front of middle of anterior third of body. Ceca simple, opening dorsolaterally very close to posterior tip of body. Acetabulum round, 0.3 mm in diameter, situated behind middle of anterior third of body.

Testes ovoid,  $0.35-0.58 \times 0.31-0.4$  mm, situated one directly behind the other near posterior extremity, anterior one at middle of posterior third of body. Vesicula seminalis winding behind acetabulum, with maximum width of 0.1-0.13 mm at its posterior swelling which is very strongly constricted off from the remaining portion, and lies longitudinally at the junction of the anterior with the middle third of the body on the right of the median line. Pars prostatica 0.19-0.21 mm long by 20-25  $\mu$  wide, surrounded by prostate cells, joining with metraterm dorsal to acetabulum to form a hermaphroditic duct 0.25-0.29 mm long. Genital atrium opening immediately in front of acetabulum by a wide transversely elongate aperture. To this genital atrium is attached anterodorsally a subglobular body 0.09-0.1 mm long by 0.1-0.11 mm wide and enclosed in a thin membrane. It consists of closely massed gland ducts coming from the compact mass of gland cells in the surroundings, and is not a mere muscular bulb though it looks like this under low power magnification.

Ovary ovoid or subglobular,  $0.3-0.35 \times 0.21-0.24$  mm, situated on the left of median line in the anterior half of caudal third of body. The germiduct, arising from the dextrodorsal side of the ovary, joins the short duct from the seminal receptacle and Laurer's canal on the right of the ovary in front of the receptaculum seminis and then receives the vitelline duct. Receptaculum seminis large, ovoid,  $0.3-0.42 \times 0.22-0.31$  mm, situated in median line or a little to the right posterodorsal to ovary, pressed against anterior testis, giving off a short duct at its anterior end. Laurer's canal running backwards arcuately, opening outside dorsal to seminal receptacle. Uterus coiled from side to side between ovary and seminal vesicle, overreaching ceca ventrally, then confined to right side of vesicula seminalis. Eggs oval or somewhat pyriform, embryonated, with a distinct operculum and a prominent opercular ridge, measuring  $27-33 \mu$  long by  $14-17 \mu$  wide in life. Vitelline follicles surrounding ceca on all sides except the medial, commencing at level of posterior end of seminal vesicle or a little more posteriorly, and reach-



ing to posterior testis, where they terminate usually at about the middle, occasionally at different levels (at the anterior or posterior end of the organ on one side, but about the middle on the other). Vitelline reservoir median, immediately anterior to receptaculum seminis.

Excretory vesicle Y-shaped, with terminal pore; stem reaching to posterior end of acetabulum; arms extending as far as level of pharynx or prepharynx.

The differences between this species and the allied members of the genus, *A. atae* and *A. elongatum* (both by Tubangui and Masiluñgan, from Palawan *Crocodilus porosus*) and *A. diploporus* Stunkard are shown in the following table. Unless otherwise indicated all measurements are in mm.

	<i>A. diploporus</i>	<i>A. atae</i>	<i>A. elongatum</i>	Present species
Body . . . . .	2.6 - 3.3 × 0.3 - 0.39	4.1 - 5.5 × 0.3 - 0.5	10.8 - 16.3 × 0.5 - 0.85	5.6 - 6.8 × 0.55 - 0.65
Oral sucker . .	0.25 - 0.32 × 0.14 - 0.21	0.17 - 0.32 × 0.22 - 0.32	0.3 - 0.32 × 0.34 - 0.42	0.37 - 0.4 × 0.36 - 0.4
Oral spines . . .	24	25 - 26	21	23
Pharynx . . . . .	— × 0.13 - 0.146	0.12 - 0.15 × 0.08 - 0.13	0.17 - 0.24 × 0.13 - 0.17	0.21 - 0.25 × 0.18 - 0.21
Acetabulum . . .	— × 0.13 - 0.18	0.12 - 0.18 × 0.12 - 0.19	0.3 - 0.36 × 0.31 - 0.36	— × 0.3
Posterior extent of vitellaria . .	anterior end of posterior testis	anterior testis	in front of ovary	usually middle of posterior tes- tis
Eggs in μ . . . .	20 - 28 × 11 - 13	30.7 - 34.5 × 15.3 - 17.2	26.8 - 32.6 × 15.3 - 17.2	27 - 33 × 14 - 17
Host . . . . .	alligator	<i>Crocodilus porosus</i>	"	"

Tubangui and Masiluñgan simply state that the ceca reach to near the posterior end of the body, but there is no doubt that they open to the exterior at the posterior extremity in the Philippine species, too, as is the case with *A. diploporus* Stunkard and the present species.

In body size and relative position of the suckers and of the internal organs the present species resembles *A. atae* more closely than any other species, but differs distinctly in the number of the oral spines, in the posterior extent of the vitellaria, etc.

Acanthostomum diploporum (Stunkard, 1931) Stunkard, 1938  
n. comb.

Host: alligator

All of the worms were found in the small intestine. The sexually mature specimens (Fig. 1) measure from 2,6 to 3,3 mm. in length and from 0,3 to 0,39 mm. in width. The acetabulum measures from 0,13 to 0,18 mm. in diameter and is situated at the caudal end of the anterior third of the body, although the preacetabular portion is more extensible than the postacetabular region, and the proportions vary as the worm moves. Furthermore, the postacetabular portion increases in length with sexual maturity and the accumulation of eggs in the uterus. The mouth is almost terminal and is surrounded by a single row of large spines, twenty-four in number. They measure from 0,044 to 0,058 mm in length, and are set in a muscular collar which contains glandular cells. Each hook is provided with sets of longitudinal muscles which pass to the body wall and to the oral sucker. No other spines were observed on the cuticula, although there is a possibility that they may have been lost.

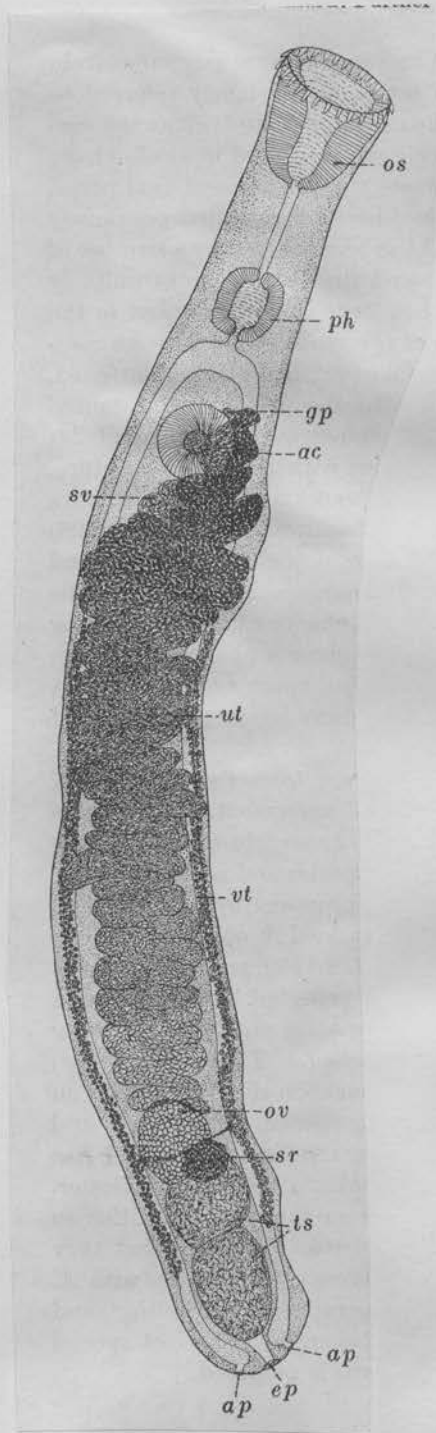
The oral sucker is thick-walled, funnel-shaped, and measures from 0,25 to 0,32 mm. in length by 0,14 to 0,21 mm. in diameter. There is a long prepharynx, a muscular pharynx which measures from 0,13 to 0,146 mm in diameter, and a shorter esophagus. The alimentary tract bifurcates a short distance anterior to the acetabulum and the intestinal ceca extend to the posterior end of the body where they open separately to the exterior (Fig. 2), one on either side of the excretory pore. The epithelial lining of the ceca extends almost to the surface of the body, and there is only a short section lined with cuticula.

The excretory pore is terminal (Fig. 2), and the vesicle is Y-shaped. The bladder extends forward to the region of the acetabulum where it divides, a branch passing on either side to the level of the prepharynx.

The testes are spherical to oval, 0,14 to 0,21 mm. in diameter. They are dorsal in position, situated one immediately behind the other at the posterior end of the worm. The vasa efferentia unite near the middle of

the body to form a large, much coiled seminal vesicle which lies in the dorsal region on the right side behind the acetabulum. From the vesicle the sperm duct passes forward along the right, dorsal surface of the acetabulum and opens into a shallow genital sinus. It is surrounded by a few secretory cells which may be regarded as a prostate gland. No cirrus sac is present. The genital sinus opens to the surface through a common pore, situated immediately in front of the ventral sucker.

The ovary is spherical to oval, 0,11 to 0,18 mm. in diameter. It is situated ventral to the cephalic testis and somewhat in front of it. The caudal margin of the ovary underlies the anterior portion of the testis. The ovary is slightly on the right and the cephalic testis slightly on the left of the median plane. The niche thus formed is occupied by the seminal receptacle. The oviduct arises from the dorsal surface of the ovary and passes to the ootype which is situated immediately above the ovary. From the ootype a short duct leads to the seminal receptacle, a sac-like structure, 0,07 to 0,085 mm. in diameter which extends toward the right side of the body. From the ootype, at a point near its communication with the receptacle, Laurer's canal passes dorsally to open at the surface of the body. The canal is about 0,03 mm in length. The ootype is surrounded by the secretory cells of the „shell gland“. Near the entrance of the duct from the seminal receptacle the ootype receives another duct from the vitelline reservoir. The vitellaria consist of numerous small follicles which occupy the lateral areas of the body. They extend posteriorly as far as the caudal testis and anteriorly they extend about four-fifths of the distance from the ovary to the acetabulum. Collecting ducts pass medially on the dorsal side at the level of the ootype and unite to form the receptacle which discharges into it. The uterus is a much coiled tube which occupies the intercecal area from the ovary to the genital pore. When it is very much crowded with eggs it may overlie the ceca. The uterus opens into the small genital sinus. Eggs measure from 0,02 to 0,028 mm. in length and from 0,011 to 0,013 mm. in width.



TEXT AND FIG. FROM STUNKARD'S  
DESCRIPTION OF ACANTHOCASMUS  
DIPLOPORUS ~~N. SP.~~ STUNKARD, 1931.

This species is represented by a large number of specimens collected from a crocodile. According to Looss (1899), the members of the genus *Acanthostomum* are parasites of fishes and reptiles. The trematode in question is easily distinguished from its relatives reported from fishes (*A. spiniceps*, *A. absconditus*, *A. imbutiformis*, and *A. præteritus*) by its very elongated shape and the posterior extent of its vitellaria, which do not reach the level of the ovary. It has, therefore, to be compared only with the remaining member of the genus; namely, *A. coronarium* (Cobbold, 1861), which is also a parasite of crocodiles. According to the brief description of *A. coronarium* given by Cobbold, the Philippine species differs from it in being much larger and in having twenty-one cephalic spines instead of fourteen.<sup>1</sup>

*Description.*—Body very elongate, with rounded or slightly attenuated extremities, 10.8 to 16.3 millimeters in length by 0.50 to 0.85 millimeter in maximum breadth. Cuticle armed with spines from anterior end to level in front of ovary; the spines are thickly set anteriorly, sparse posteriorly. Oral sucker well-developed, terminal, funnel-shaped, 0.30 to 0.32 by 0.34 to 0.42 millimeter in size, with twenty-one cephalic spines arranged in a single row and measuring 65 to 77 by 19 to 27 microns. Acetabulum very much anterior in position, only a short dis-

<sup>1</sup> Looss (1901) did not find the number of cephalic spines constant in the species of *Acanthostomum* described by him. In *A. elongatum*, however, as well as in another new member of the genus to be described below, the number of these spines has been found to be almost constant.

tance behind oral sucker, 0.30 to 0.36 by 0.31 to 0.36 millimeter in size. Pharynx measures 0.17 to 0.24 by 0.13 to 0.17 millimeter, separated from oral sucker by a prepharynx 0.17 to 0.26 millimeter long; œsophagus practically absent; intestinal cæca long, narrow, reaching to near posterior end of body.

Testes tandem, oval, postovarial, near posterior end of body; anterior testis 0.34 to 0.57 by 0.22 to 0.45, posterior testis 0.30 to 0.47 by 0.22 to 0.32 millimeter in size. Seminal vesicle long, free in parenchyma, in transverse coils between uterine coils and acetabulum. Common genital pore median, immediately preacetabular, leading into a moderately developed sinus.

Ovary oval, immediately pretesticular, to one side of median line, 0.24 to 0.38 by 0.19 to 0.32 millimeter in size. Receptaculum seminis prominent, between ovary and first testis; Laurer's canal present. Shell gland diffuse, to one side of median line opposite ovary. Uterus very long, in transverse coils confined between intestinal cæca and extending from in front of ovary to acetabulum. Vitellaria in small follicles, occupying lateral sides of body from near junction of anterior and middle thirds of body length to a short distance in front of level of ovary. Eggs numerous, thick-shelled, yellowish, operculated, with developed miracidia, 26.8 to 32.6 by 15.3 to 17.2 microns in size.

Excretory bladder roomy, opens exteriorly through a postero-terminal excretory pore.

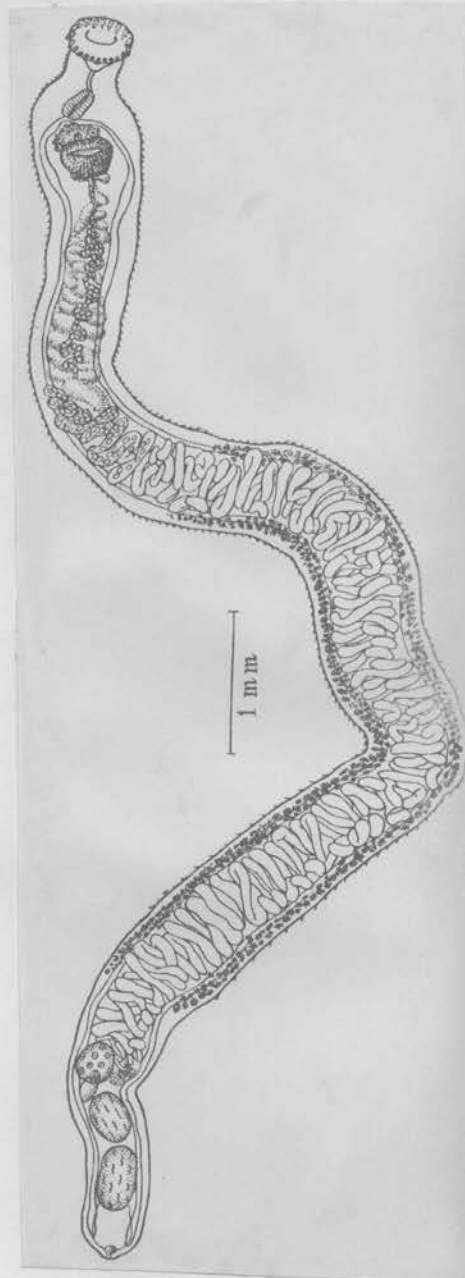
*Specific diagnosis.*—*Acanthostomum*: Body very elongate, 10.8 to 16.3 by 0.50 to 0.85 millimeters in size. Cephalic spines twenty-one, 65 to 77 by 19 to 27 microns in size. Vitellaria from near junction of anterior and middle thirds of body length to a short distance in front of ovary. Eggs with developed miracidia, 26.8 to 32.6 by 15.3 to 17.2 microns in size.

*Host.*—Crocodile (*Crocodylus porosus*).

*Location.*—Intestine.

*Locality.*—Palawan.

*Type specimens.*—Philippine Bureau of Science parasitological collection, No. 474.



ACANTHOSTOMUM FLORIDENSIS (McCoy, 1928) PRICE, 1940  
 SYN. Cercaria floridensis McCoy, 1928

*Two New Marine Trematode Life Histories.* O. R. McCoy, Johns Hopkins University.

*Cercaria floridensis* n. sp. from the marine snail *Cerithium litteratum* at Tortugas, Florida, has been identified as the larva of a member of the genus *Acanthochasmus* Looss. This larva is a lophocercous "monostome" cercaria characterized by the presence of eye spots, seven pairs of penetration glands and a dorso-ventral fin-fold on the tail. The cercariae were found experimentally to encyst in the fins and underneath the scales of small fish. Most of the adult characters then develop in the metacercaria; a ventral sucker is formed, the digestive tract develops and most striking a single row of 27 large spines appears in a complete circle around the mouth. Although the adult has not yet been determined, the cercaria can almost certainly be assigned to the genus *Acanthochasmus*. This observation throws light upon the type of life history to be expected of several described species of cercariae very similar to *C. floridensis* which heretofore have been grouped under the monostomes.

From: McCoy, 1928

Although the adult has not yet been determined, on the basis of the structure exhibited by the metacercaria *C. floridensis* apparently belongs in the genus *Acanthochasmus* as defined by Looss (1901). The characters on which this identification is based are principally the large, funnel-shaped oral sucker with the opening surrounded by a single, uninterrupted circle of spines, and the "Y"-shaped excretory vesicle with the lateral arms extending anteriorly to the region of the pharynx. The small size of the ventral sucker in proportion to that of the oral sucker and the long prepharynx and the large pharynx with the digestive ceca extending to the posterior end of the body are also characteristic of the genus *Acanthochasmus*. The metacercaria of *C. floridensis* also, in certain respects, resembles the genus *Asocotyle* of the family Heterophyidae, but the absence of the oral ceum found in *Asocotyle* and the presence of the long lateral arms of the excretory vesicle characteristic of *Acanthochasmus* make it much more probable that *C. floridensis* belongs to this latter genus rather than to the genus *Asocotyle*. Since the structure of the reproductive system could not be determined in the metacercaria, the identification cannot be made with absolute certainty. It is worthy of note that *Cercaria floridensis* does not show any characters which might indicate its systematic position. All of the distinguishing structures, oral spines, ventral sucker, digestive tract, and even the distinctive "Y"-shape of the excretory vesicle first appear in the metacercaria.

From: McCoy, 1929

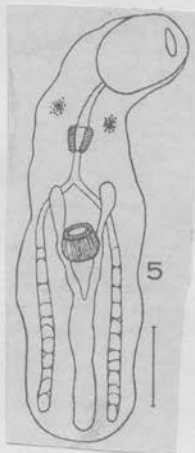


Fig. 5.—Metacercaria 9 days after penetration.

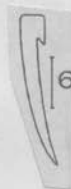


Fig. 6.—Oral spine in lateral view.

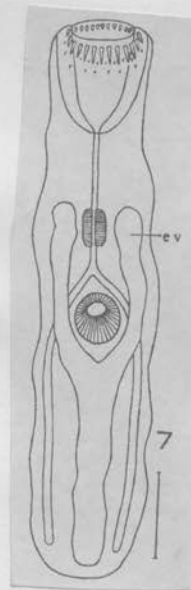


Fig. 7.—Mature metacercaria 22 days after penetration of the fish.

En esta especie, lo mismo que en *A. minimum* Stunkard, el cuerpo se contrae en general fuertemente, pero mis ejemplares son aún así más largos que los mayores de Stunkard. Miden 1.64 mm (fig. 5) mientras que los ejemplares más extendidos alcanzan a medir unos 2 mm. El ancho de los ejemplares contraídos es de 0.63 mm, el de los estirados 0.5 mm. La ventosa bucal, infundibuliforme, mide 0.245-0.250 mm de largo por 0.200 mm de ancho. En los ejemplares jóvenes más extendidos puede reconocerse bien la larga prefaringe, que en los ejemplares contraídos se ha encorvado tanto lateralmente, que la faringe se pone en contacto directo con la ventosa bucal; la faringe, que está bien desarrollada, es piriforme, de 0.12 mm de largo y 0.10 mm de ancho. El esófago es muy corto, y solo reconocible claramente en los ejemplares jóvenes. Los amplios divertículos intestinales alcanzan al borde posterior, donde forman, como en *A. minimum*, aberturas anales a derecha e iz-

quierda de la desembocadura de la vesícula excretora. Esta sería la tercera especie del género en que se señalan aberturas anales de los divertículos intestinales.

La ventosa ventral es notablemente más pequeña que la bucal y algo ensanchada, de 0.1 mm de largo y 0.15 mm de ancho.

Los órganos genitales tienen la ubicación propia del género. En el extremo posterior están ambos testículos, ovales transversos hasta

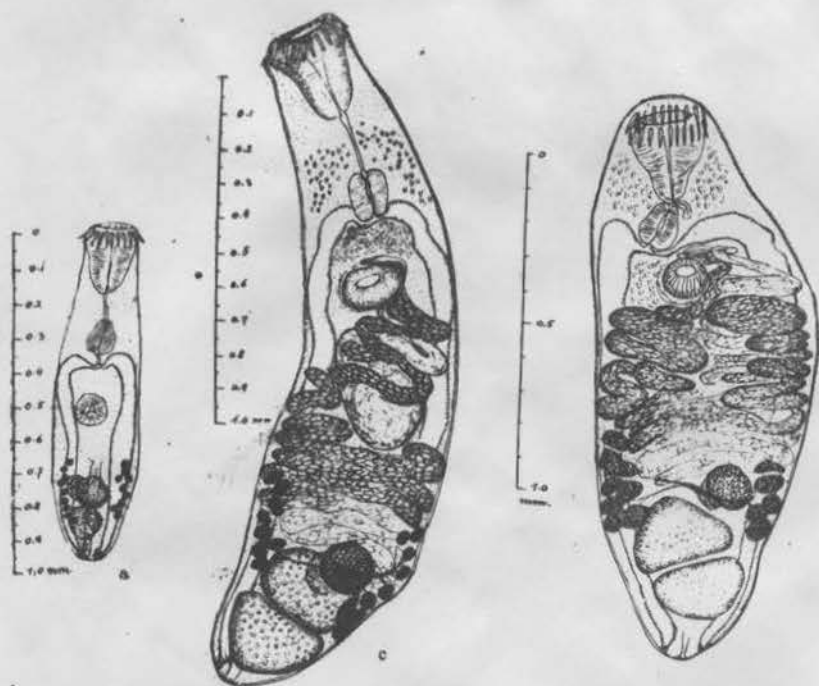


Fig. 5. — *Acanthostonum gnerii* n. sp. del intestino de *Rhamdia quelen* Eigenm. & Eigenm. del Rio Paraná cerca de Rosario: a) Ejemplar muy joven e inmaduro; b) ejemplar adulto con ventosa bucal invaginada; c) ejemplar adulto con ventosa bucal evaginada y con collar de espinas.

triangulares, de 0.15 a 0.18 mm de largo y 0.25 a 0.28 mm de ancho, que se aprietan el uno contra el otro. Sus vasa efferentia desembocan en una vesícula seminal enorme, libre en el parenquima y en forma de clava, que después de algunas vueltas de su extremo anterior, delgado, desemboca en el poro genital, ubicado inmediatamente por delante de la ventosa ventral.

Los órganos femeninos están formados por un ovario esférico de 0.12 a 0.13 mm de diámetro, y de pocos y grandes folículos del vitelógeno, generalmente de siete a nueve, en ambos bordes del cuerpo. Los canales de salida de éstos conforman un depósito vitelino de posición ventral respecto del ovario. El receptaculum seminis se ve claramente en

esta especie por estar cubierto en su mayor parte por el ovario. El útero, formado por muchas asas transversales, alcanza en su parte inferior a los bordes laterales del cuerpo, a ambos lados, por lo que los divertículos intestinales quedan cubiertos totalmente. En sentido longitudinal se extiende desde el ovario hasta la ventosa ventral, delante de la cual desemboca en una abertura genital común.

En las cercanías del ovario, los huevos, numerosos y pequeños, son todavía incoloros y transparentes, pero a medida que se acercan al poro genital se vuelven progresivamente pardo oscuro. Miden 0.029-0.037 mm de largo por 0.014-0.016 mm de ancho.

Por encima de la ventosa ventral y a ambos lados de la faringe pueden notarse, por su intenso teñido, numerosas glándulas unicelulares.

El epitelio del cuerpo tiene robustas púas o escamas que se hacen más débiles hacia atrás y desaparecen a la altura de la ventosa ventral. Alrededor de la boca, que es de posición terminal, se encuentran las robustas púas bucales, en una sola hilera, características del género. Su número es de 21 a 23 en los ejemplares de que dispongo. En su vista lateral son cuneiformes y miden 0.069 mm de largo y 0.012 mm de ancho.

*Huésped* : *Rhamdia quelen* Eigenmann et Eigenmann.

catfish

*Ubicación de los parásitos* : Parte anterior del intestino.

*Localidad* : Río Paraná, frente a Rosario, Rep. Argentina.

*Acanthostomum gnerii* Szidat, 1954

La descripción de esta especie ha sido realizada con once ejemplares arreglados para preparaciones totales; son parásitos de cuer-

po pequeño, fusiforme, con los extremos redondeados y miden de 1.028 a 2.161 mm. de largo por 0.313 a 0.596 mm. de ancho; la ven-

tosa oral está rodeada de 19 a 21 espinas, las que miden de 0.045 a 0.065 mm. de largo por 0.012 a 0.017 mm. de ancho y tienen una forma cónica, con los vértices dirigidos hacia atrás; la cutícula lleva pequeñas espinas en la porción anterior del cuerpo y se extienden hasta nivel del testículo anterior; miden de 0.008 a 0.008 mm. de largo por 0.004 a 0.004 mm. de ancho.

La ventosa oral es amplia, musculosa, tiene la forma de una copa y mide de 0.204 a 0.284 mm. de largo por 0.180 a 0.237 mm. de ancho; el acetábulo es menor que la ventosa oral, de diámetro transversal mayor que el anteroposterior, está situado a nivel de la bifurcación intestinal, es decir, al principio de los ciegos intestinales y mide de 0.092 a 0.139 mm. de diámetro anteroposterior por 0.129 a 0.167 mm. de ancho; la relación entre el tamaño de las dos ventosas es,  $1:2 \times 1:1$  a  $1:1 \times 1.4$ . La boca es amplia, circular, terminal; la prefaringe es larga y ancha y mide de 0.075 a 0.143 mm. de largo por 0.030 a 0.058 mm. de ancho; la faringe es pequeña y mide de 0.099 a 0.163 mm. de largo por 0.071 a 0.112 mm. de ancho; el esófago en animales no contraídos es largo y muy angosto mientras que en los contraídos llega hasta desaparecer; los ciegos intestinales son dos tubos que se extienden hasta el extremo posterior del cuerpo, abriéndose cada uno en un ano y miden de 0.031 a 0.078 mm. de ancho.

El poro reproductor está situado inmediatamente por delante del borde anterior del acetábulo, en posición mediana y dista de 0.343 a 0.596 mm. del borde anterior del cuerpo; los testículos son dos cuerpos ovoideos, de diámetro transversal mayor que el anteroposterior, se encuentran situados en el extremo posterior del cuerpo, uno detrás del otro, a menudo son tangentes entre sí, de bordes lisos y miden, el anterior de 0.099 a 0.224 mm. de largo por 0.136 a 0.313 mm. de ancho y el posterior de 0.082 a 0.238 mm. de largo por 0.102 a 0.313 mm. de ancho; la vesícula seminal es un tubo largo y sinuoso, más ancho en la porción posterior, se extiende desde por detrás del acetábulo hasta el poro reproductor, bordeando por un lado al acetábulo y mide de 0.255 a 0.646 mm. de largo por 0.045 a 0.075 mm. de ancho.

El ovario es un cuerpo esférico u ovoideo, de contorno liso; está situado sobre el lado derecho del cuerpo, dentro del área intercecal, por delante del testículo anterior del cual se halla separado por un corto espacio y mide de 0.071 a 0.150 mm. de largo por 0.078 a 0.177 mm. de ancho; el receptáculo seminal es un cuerpo grande,

ovoideo, de contorno liso, se encuentra situado entre el ovario y el testículo anterior, pero en el lado lateral derecho del cuerpo, en las áreas cecal y extracecal y mide de 0.075 a 0.238 mm. de largo por 0.065 a 0.122 mm. de ancho; la glándula de Mehlis y el ootipo se encuentran colocados en el área intercecal, casi en la porción media del cuerpo; la glándula mide de 0.091 a 0.187 mm. de largo por 0.062 a 0.083 mm. de ancho; conducto de Laurer presente; el útero es amplio, preovárico, ocupa la porción media del cuerpo, extendiéndose desde el ovario hasta el nivel del borde posterior del acetábulo y después, mediante un asa corta y ascendente que bordea al acetábulo, termina en el poro reproductor; los huevecillos son numerosos, de cáscara lisa, amarillenta, operculados y miden de 0.029 a 0.036 mm. de largo por 0.012 a 0.015 mm. de ancho.

Heterophyidae

N. gen. - 2nd sp.

Acanthostomum gnerii  
Dr. Burggren



arreglo estructural y topográfico de los distintos órganos y datos mensurables son muy semejantes a los encontrados por el profesor Szidat en sus ejemplares argentinos. En esta especie como en la descrita en 1938 por H. W. Stunkard, la abertura posterior de los ciegos intestinales en los años correspondientes, es muy clara, lo que confirma una vez más la presencia de estas estructuras en el género *Acanthostomum* Looss, 1899.

Por los datos que poseemos hoy, parece ser que estas dos especies de acantostómidos que parasitan a peces del género *Rhamdia* Bleeker, se distribuyen tan sólo en el área zoogeográfica neotropical, por lo que no es difícil encontrarlas también en regiones del Brasil, Colombia y Venezuela.

Las glándulas vitelógenas están circunscritas a las áreas extracecales del cuerpo, se extienden desde por delante del ecuador del cuerpo hasta nivel del borde anterior del testículo anterior, son folículos escasos, grandes, redondeados o alargados, cuyo número varía desde 9 hasta 15 sobre el lado izquierdo y de 10 a 15 sobre el lado derecho; los viteloductos transversales al reunirse por detrás del ovario forman, en algunos ejemplares, un pequeño reservorio vitelino. El poro excretor es terminal posterior.

Hospedador: *Rhamdia rogersi* (Regan). ("Barbudo"). *cat fish*

Localización: Intestino.

Distribución geográfica: Río Tiribí, Distrito Paso Ancho, Provincia de San José, Costa Rica, Centroamérica.

Ejemplares en las Colecciones Helminológicas del Instituto de Biología. No. 215-16; en la de la Escuela Nacional de Ciencias Biológicas del Instituto Politécnico Nacional. No. 1-16 y en la del Laboratorio de Helminología de la Facultad de Microbiología de la Universidad de Costa Rica.

Discusión: En el género *Rhamdia* Bleeker, peces de agua dulce, se encuentran únicamente por hoy, dos especies de tremátodos acantostómidos: *A. minimum* Stunkard, 1938 que parasita a *Rhamdia guatemalensis* (Günther) de los cenotes de Yucatán y *A. gnerii* Szidat, 1954 que vive en el intestino de *R. quelen* Eigenmann y Eigenmann, del Rosario, Argentina. Los ejemplares que redescubrimos en líneas anteriores corresponden a esta última especie, pues el

*Caballero + Brenes - Masóvil, 1957*

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*Caballero + Brenes - Madrid, 1957*

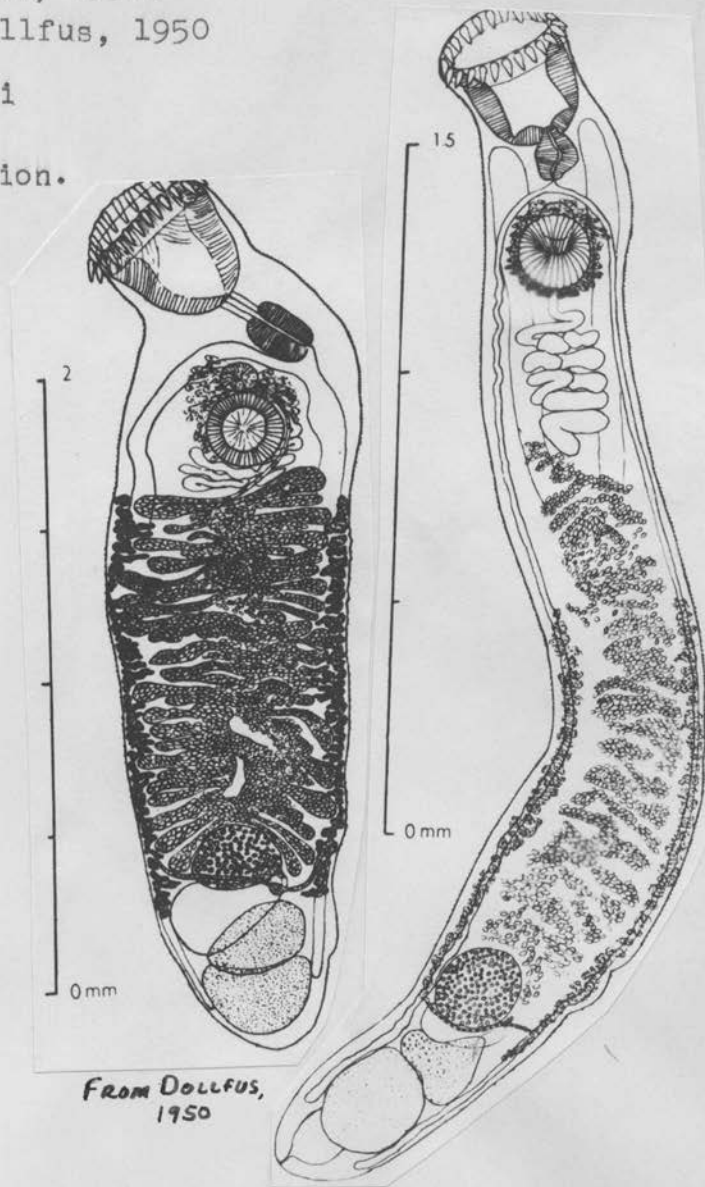
Acanthostomum gonotyl (Dollfus, 1950)

Acanthochasmus gonotyl Dollfus, 1950

host: Crocodilus niloticus Laurenti

loc.: Belgian Congo

See publication for description.



*Acanthostomum gymnarchi* (Dollfus, 1950)

Several specimens of this species were collected by the writer from the intestine of five fishes, *Gymnarchus niloticus* Cuvier from Khartoum area in the Sudan. The larger worms were collected from the posterior part of the intestine.

Body cylindrical, elongate, 2.9-3.6 mm. in length, with a maximum breadth of 0.6 mm. The width of the body is more or less uniform throughout the length of the body posterior to the anterior part. The surface of the body is covered with small spines set very close to each other extending as far posteriorly as the anterior testis where they diminish in number and finally disappear. In addition there is a single row of large cephalic spines on the outer surface of the body around the oral sucker. There are always 21 spines, and they measure 0.064-0.07 mm.  $\times$  0.022 mm. The oral sucker is terminal in position and very prominent with an aperture of 0.39-0.43 mm. across and a width of 0.22-0.26 mm. at its base, and a depth of 0.43-0.46 mm. The ventral sucker is more or less circular in shape measuring 0.144-0.146 mm. in diameter, and lies at 0.97-1.0 mm. from the anterior tip of the body. The mouth leads to a prepharynx measuring 0.18-0.25 mm. in length followed by a pharynx measuring 0.18  $\times$  0.21 mm. The oesophagus is short measuring 0.07-0.085 mm. in length. The bifurcation of the gut occurs anterior to the ventral sucker giving rise to two caeca, unequal in thickness. The left

caecum extends posteriorly to a short distance from the posterior end of the body and opens to the outside by an anal pore, while the right caecum is a little atrophied and in some specimens is only half the thickness of the left caecum, extending posteriorly to the same level as the left caecum but ends blindly.

The two intercaecal testes are median, spherical with entire margins, and are situated at the posterior part of the body, a small distance from the posterior extremity, one in front of the other, the anterior one measuring 0.22-0.25  $\times$  0.25-0.29 and the posterior testis 0.29-0.32  $\times$  0.32-0.36. The intertesticular space is absent. The vasa efferentia are short, arising from the left side of the testes and uniting a short distance in front of the anterior testis. The vas deferens is obscured by the uterus. The vesicula seminalis is large and loosely coiled and opens by the genital aperture which lies immediately anterior to the ventral sucker. A small gonotyl measuring 0.032-0.035  $\times$  0.04-0.045 mm. is present.

The spherical ovary which measures 0.13-0.17 mm. in diameter is separated from the anterior testis by the oval seminal receptacle which measures 0.14-0.18  $\times$  0.22-0.29 mm. Both the ovary and the receptaculum seminis lie slightly to the right side of the body. A short duct from the ovary is seen joining a short duct from the receptaculum seminis.

The vitellaria consist of compact follicles extending along each margin of the worm a short distance anterior to the posterior third of the body to the posterior extremity of the body and filling the space between the posterior border of the posterior testis and the posterior extremity of the body. A small vitelline reservoir could be seen on the left side in the level of the receptaculum seminis and the ovary.

The intercaecal uterus consists of coils filled with eggs, occupying the space from the ovary to the ventral sucker. The eggs are operculated, oval, measuring 11.2-14  $\times$  25.2-28  $\mu$ .

*Acanthostomum gymnarchi*

The excretory vesicle is Y-shaped and is seen in the young living specimens to bifurcate a very short distance posterior to the ventral sucker, with the lateral limbs extending anteriorly and laterally up to the anterior margin of the pharynx. The excretory vesicle opens to the outside by the median excretory pore at the posterior extremity of the body.

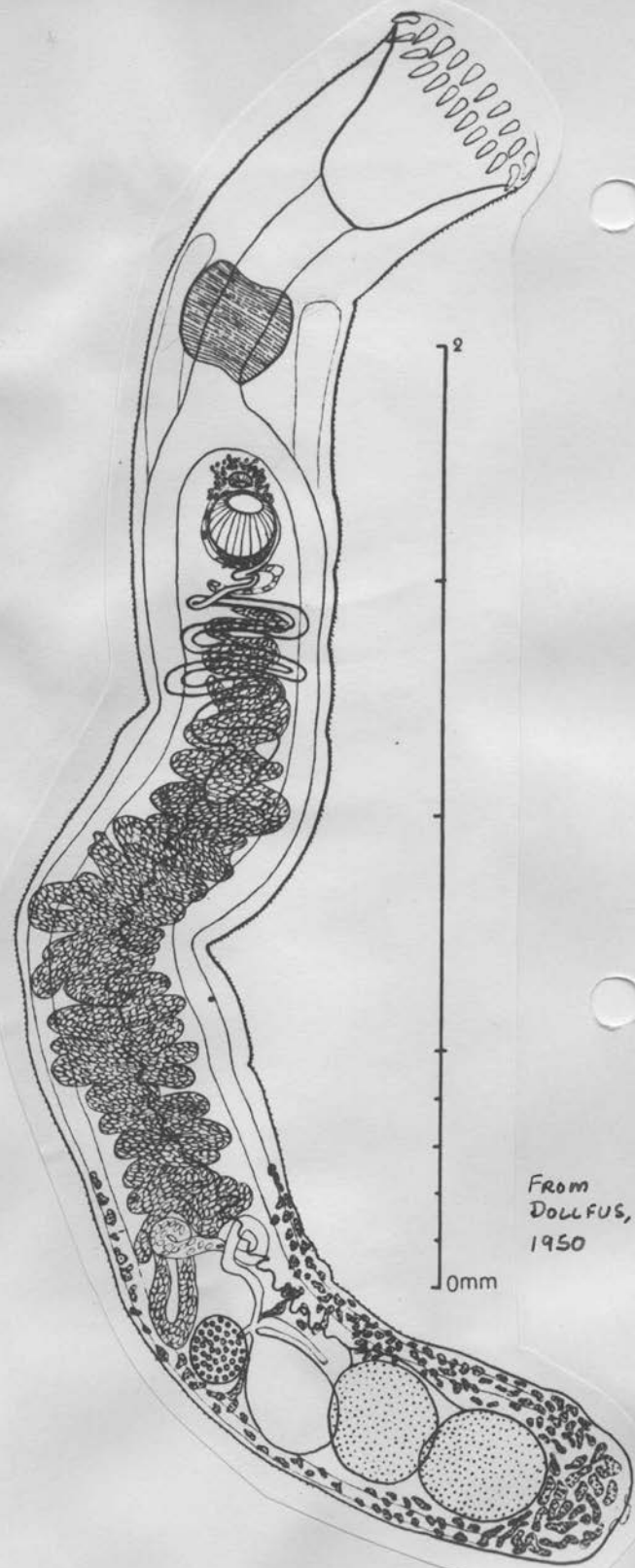
#### DISCUSSION

It is obvious from the above description that the species under consideration is identical with *Acanthostomum gymnarchi* described

by Dollfus (1950) as *Acanthochasmus gymnarchi* from specimens collected by Odhner from the intestine of the same fish host, *Gymnarchus niloticus* from Omdurman in the Sudan. The present material agrees with Dollfus's description and measurements except for two characters. Dollfus did not mention the presence of an anal pore at the end of the left caecum nor did he mention the difference in thickness of the two caeca. It seems that Dollfus did, in fact, overlook these two differences since they are undoubtedly present.

Similarly Looss, when he described *Acanthostomum spiniceps* and *A. absconditum*, overlooked the presence of anal pores which were later discovered.

FROM KHALIL (1963)



FROM  
DOLLFUS,  
1950

*Acanthochasmus imbutiformis* (Molin partim) Lss. Unterscheidet sich (zusammen mit der folgenden Art) von den beiden oben beschriebenen Formen zunächst dadurch, daß der Hinterleib gegenüber dem Vorderkörper fast garnicht verbreitert ist; der Körper hat eine fast bandförmige Gestalt mit gleichmäßig abgerundeten Enden. Die Maximallänge der von mir gesammelten Individuen beträgt ca. 6 mm, doch bleibt die bei weitem größte Zahl derselben beträchtlich hinter dieser Länge zurück, und viele besitzen überhaupt noch keine reifen Geschlechtsprodukte<sup>1)</sup>. Nach Stossich kann die Länge der Würmer bis auf 7,5 mm steigen. Die von dem eben genannten Autor gegebene, im allgemeinen richtige anatomische Beschreibung muß in folgenden Punkten genauer gefaßt werden. Mundsaugnapf nur wenig größer als der Bauchsaugnapf (0,27 mm zu 0,2 mm bei einem Individuum von 4 mm Länge); Mundrand besetzt von einem Kranze von 18, gelegentlich 17 oder 19 Stacheln (Fig. 9a). (Ich habe diese bei 41 Individuen gezählt und dabei 1mal 17, 35mal 18 und 5mal 19 gefunden.) Seitlich kurz vor dem Pharynx sind Reste von Cercarienaugen bemerkbar. Samenblase sehr lang und frei im Parenchym, aber nicht in stark Querschlingen gelegt, sondern nur wellenförmig gewunden; dafür aber weit (bei großen Individuen bis beinahe zur Hälfte der Entfernung zwischen Bauchsaugnapf und Keimstock) nach hinten reichend. Hoden im äußersten Hinterende dicht und meist auch etwas schräg hintereinander, der kleine kugelige Keimstock kurz vor ihnen und gewöhnlich seitlich, auf der Seite des hinteren Hodens. Receptaculum seminis groß, keulenförmig, nicht selten perlschnurartig eingeschnürt, nach vorn von dem Keimstock gelegen. Dotterstöcke beginnen am Hinterende des vorderen Hodens und reichen nach vorn bis nahe an das Ende der Samenblase, der hinter dem Keimstock gelegene Teil derselben ist wesentlich kürzer als der vor diesem gelegene, der Keimstock liegt also hinter der Mitte der Gesamtlänge der Dotterstöcke. Die Schlingen des Uterus können sich bis nahe an den Hinterrand des hinteren Hodens erstrecken; sie sind in allen den von mir untersuchten Exemplaren nicht sehr dicht und überschreiten die Darmschenkel nach außen nicht wesentlich. Eier zahlreich und klein mit dunkelgelb gefärbter Schale, nach vorn leicht verjüngt und mit deutlich abgesetztem Deckel, 0,023—0,024 mm lang und ca. 0,012 mm dick. Infolge dieser Färbung der Eier erscheint



Fig. 9.

der gefüllte Uterus bei lebenden und bei konservierten Exemplaren höchstens braungelb. Die hier als *Acanthochasmus imbutiformis* beschriebene Art lebt, wie schon Stossich angiebt, besonders im Enddarm und in dem angrenzenden Abschnitte des Dünndarmes bei *Labrax lupus*, wurde

von mir häufig aber auch an demselben Orte bei *Dentex vulgaris* angetroffen. Wie ich mich in jüngster Zeit überzeugt habe, findet sie sich sehr regelmäßig und wiederum an demselben Orte auch in den Exemplaren von *Labrax lupus*, die an den ägyptischen Küsten gefangen und im Winter auf den Cairiner Fischmarkt gebracht werden.

Neben *A. imbutiformis* beherbergt *Labrax lupus* noch jene andere Art, von der oben bereits gesprochen wurde. Ich nenne dieselbe

1) Dasselbe gilt auch für die meisten übrigen der von mir in Triest gesammelten Distomum-Arten; die Zahl der in den eröffneten Wirten vorgefundenen jugendlichen Individuen überstieg die der Erwachsenen fast durchgängig ganz auffallend. Augenscheinlich sind demnach für Triest die Monate August und September die Hauptzeiten in welcher die Fische sich mit neuen Parasiten infizieren.

From Looss, 1901

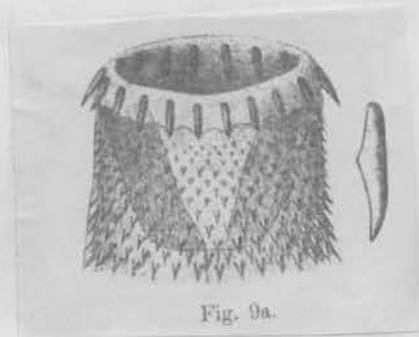


Fig. 9a.

Fig. 9. *Acanthochasmus imbutiformis* (Molin ex parte) Lss. aus *Labrax lupus* und *Dentex vulgaris*. Vergr. ca. 19. Fig. 9a Kopf mit dem Stachelkranz bei ca. 104maliger Vergrößerung, daneben ein Stachel noch stärker vergrößert.

Acanthostomum imbutiforme (Molin, 1859 partim) Looss, 1899

Found in Morone labrax

Dentex dentex

body length . . . . .	1.5—3.5 mm
„ width . . . . .	0.15—0.32 mm
oral sucker . . . . .	0.10—0.18×0.11—0.21 mm
acetabulum . . . . .	0.064—0.11×0.075—0.11 mm
testes . . . . .	0.086—0.19×0.064—0.25 mm
ovary . . . . .	0.028—0.13×0.065—0.10 mm
uterine eggs . . . . .	0.010—0.013×0.020—0.023 mm

There are 17 cephalic spines. Vesicula seminalis undulated. The ovary lies past of the equator of the body, and in the middle of the tellaria. Uterus coils extend to the posterior part of the testes. The eggs dull brown shells.

BIBLIOGRAPHY:

- Molin R. 1859. Nuovi Myzelmintha raccolti ed esaminati. Sitzber. Math. Naturwis. Akad. Wiss. Wien, Bd. 37, p. 844.
- Loossich M. 1883. Brani di Elmintologia tergestina, I. Boll. Soc. Adriat. Sc. Natur. in Trieste, vol. VIII, fig. 6.
- 1898. Saggio di una fauna elmintologica di Trieste e provincie contermini. Progr. Civ. Scuola R. Super. Trieste, p. 162.
- Looss A. 1899. Weitere Beiträge zur Kenntnis d. Trematodenfauna Agyptens. Zool. Jahrb. Syst. XII, No 5—6.
- 1900. Nachträgliche Bemerkungen zu den Namen der von mir vorgeschlagenen Distomidengattungen. Zool. Anz. Bd. XXIII, p. 603.
- Looss A. Fr. 1926. Der System der Platyodaria. Arch. Naturgesch. 91 Jahr., 1925, Abt. A. H. 2, p. 165.

From Janiszewska 1953

*Acanthostomum indicum* sp. nov. Bipin Bihari Sinha, 1942

The body is elongated, cylindrical and transparent, and measures 6.2-7.33 mm. in length and 0.36-0.45 mm. in greatest breadth which is

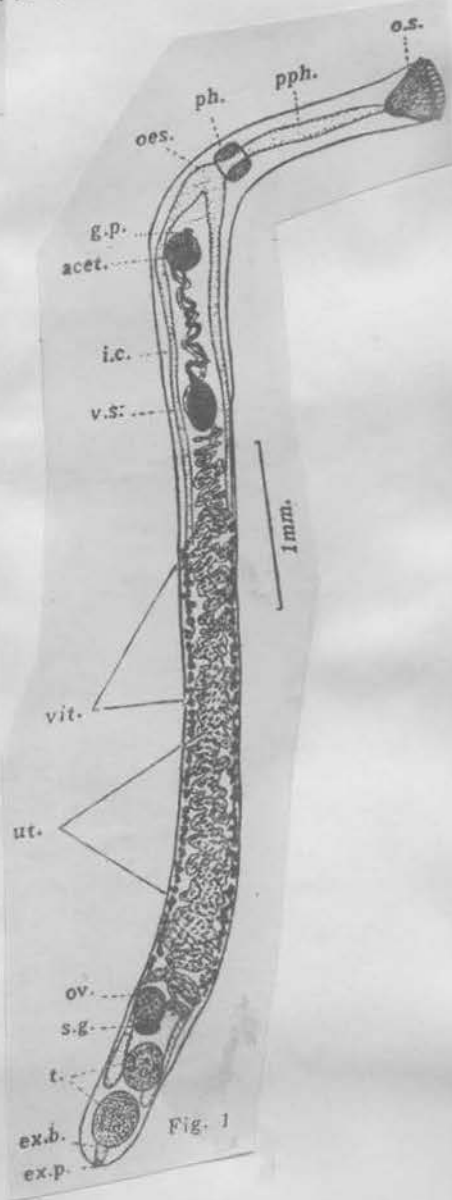
in the region of the ventral sucker. From this point the body gradually narrows down towards either end. In some specimens there is a slight bulging of the body wall in the region of the reproductive organs. The body is covered over by a thin cuticle armed with minute backwardly directed spines which are more numerous in the anterior region.

The oral sucker is terminal and measures 0.35 by 0.32 mm. in size, being broader antero-posteriorly. It bears a single row of 22 large spines measuring 0.051-0.053 mm. in length and 0.0138-0.0144 mm. in greatest breadth. The ventral sucker is situated at 1.74 mm. from the anterior end, i.e., at about  $\frac{1}{4}$ th of the body length. It is circular in shape and measures 0.2 mm. in diameter, being smaller than the oral sucker. The ratio of the two suckers is 5:3.

The oral sucker is followed by a long prepharynx, 0.865 mm. long. The pharynx is large and more or less globular in shape, measuring 0.181 by 0.181 mm. The œsophagus is very short and immediately divides into the intestinal cæca. The point of bifurcation is a little in front of the ventral sucker. The cæca are almost of uniform width and run posteriorly almost to the end of the body.

The excretory pore lies at the posterior end of the body and leads into an elongated excretory bladder extending as far forwards as the anterior end of the ovary where it divides into two cornua. The lateral excretory ducts extend anteriorly along the sides of the body upto the pharynx.

The testes lie one behind the other, at the posterior end of the body, behind the ovary. Usually they are oval in shape, with the long axis lying antero-posteriorly. The anterior testis is slightly smaller than the posterior and measures 0.28 mm. by 0.25 mm. in size. The posterior testis lies a little behind the anterior testis and measures 0.35 mm. by 0.25 mm. in size. The vesicula seminalis is large, extending to 0.95 mm. behind the ventral sucker. It consists of a large posterior basal sac-like portion and an anterior narrow coiled portion. The sac-like portion measures 0.3 mm. by 0.13 mm. About the middle of the ventral sucker, the vesicula seminalis is continued into a small ductus ejaculatorius, that opens at the genital pore. A cirrus or cirrus sac is absent. The genital pore is situated immediately in front of the ventral sucker.



*Acanthostomum indicum*, general anatomy, ventral view.

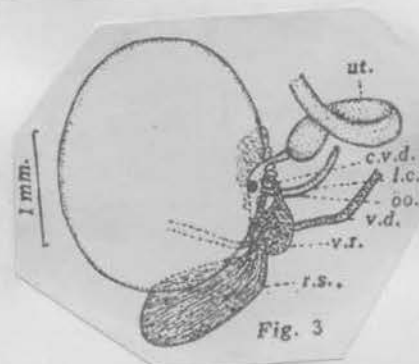


Fig. 3. Ovary and ootype complex.



The ovary is ovoid in shape, 0.22 mm. by 0.174 mm., and lies to the right of the median line in front of the testes. The oviduct arises from the middle of the ovary and opens into the öotype situated slightly beneath the left margin of the ovary and surrounded by shell gland cells. Opening into öotype from the posterior side is the duct of the receptaculum seminis, which is situated behind the ovary. The Laurer's Canal also meets it at this point and itself opens to the exterior through a small pore on the dorsal surface of the body. The receptaculum seminis is large and oval in shape, measuring 0.127 mm. in length and 0.062 mm. in greatest breadth.

The vitellaria are poorly developed and consist of small follicles. They are situated on the lateral sides of the body, mostly covering the intestinal cæca and extending from 3.72 mm. behind the anterior end of the body to the level of the anterior end of the ovary. The ducts from the vitelline glands meet in the middle line in front of the receptaculum seminis and form a large vitelline reservoir from where the common vitelline duct takes its origin and joins the oviduct at the öotype.

The uterus arises from the öotype and passes anteriorly, describing small transverse coils between the ovary and the basal sac-like portion of the vesicula seminalis. Anteriorly it runs more or less parallel to the latter and opens at the genital pore. The uterus is full of small eggs with yellowish brown shells. The eggs are operculated and measure 0.032-0.034 mm. by 0.0145-0.016 mm. in size.

The present form differs from all the known species of the genus, except *A. burminis* in the general shape of the body, coiled nature of the vesicula seminalis, uterine coils and the vitellaria ending anterior to the ovary and in the presence of a large receptaculum seminis behind the ovary. Though it resembles *A. burminis* in all these characters, it can be easily distinguished from it, in the ratio of two suckers, in the prepharynx being very long, in the reproductive organs being confined to the extreme posterior end of the body, in the oral spines being 22 in number as against 24-27 in *A. burminis* and lastly in its being a crocodilian parasite. These differences are sufficient to justify the creation of a new species for the reception of these forms.

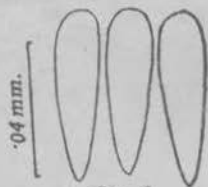


Fig. 2

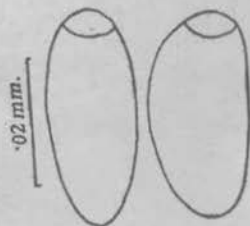


Fig. 4

Fig. 2. Oral spines highly magnified.  
Fig. 4. Eggs highly magnified.

*Acanthochasmus loossi* n. sp. Perez Viveras, 1956

(Fig. No. 50)

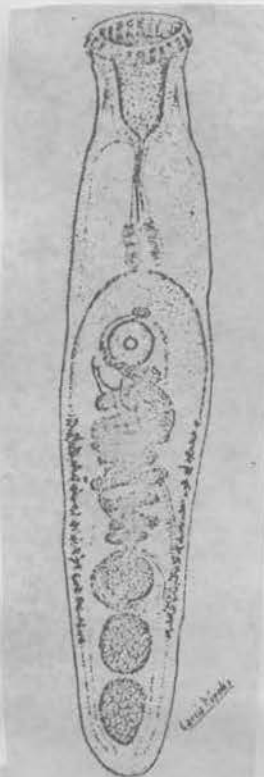
Esta especie fue recolectada del intestino de *Crocodylus acutus* capturado en la "Ciénaga de Zapata" (Prov. de Matanzas).

**Descripción.** — Es una especie pequeña, alargada, deprimada dorso-ventralmente, de ancho casi uniforme, de extremo anterior truncado y el posterior redondeado, cutícula delgada y cubierta en toda su extensión de pequeñas espinas de base ancha, mide 1.85 mm. de largo por 0.38 mm. de ancho máximo, pudiendo alcanzar hasta 3 por 0.45 mm. en sus dimensiones. Ventosa oral terminal, grande, infundibuliforme, de paredes musculosas, de aproximadamente 240 micras de largo por 220 micras de diámetro máximo. Ventosa ventral pequeña,

circular, musculosa, pre-ecuatorial y a corta distancia de la línea ecuatorial del cuerpo, mide 120 a 140 micras de diámetro. Abertura de la ventosa oral circular y se encuentra circundada en su borde por una corona de 24 espinas en fila sencilla no interrumpida, todas de igual tamaño midiendo cada una 38 a 40 micras de largo por 10 ó 12 micras de grueso. *Pre-pharynx* relativamente larga y gruesa, mide unas 200 micras de largo por 40 a 60 micras de grueso, le sigue una *pharynx* musculosa, de 140 micras de largo por 95 micras de grueso y a continuación hay un *oesophagus* muy corto que se bifurca en dos ciegos intestinales que terminan a corta distancia del extremo caudal del trematode, la bifurcación se produce por delante del poro genital y de la ventosa ventral.

El sistema reproductor se compone de dos testículos grandes, enteros, lisos, globulosos, ligeramente alargados antero-posteriormente, uno detrás del otro, situados en el extremo posterior del cuerpo, el testículo anterior mide unos 180 por 145 micras de diámetro, el posterior alcanza 200 por 130 micras. El *receptaculum seminis* es grande y se encuentra situado por delante y hacia la izquierda de la línea

media del *ovarium*. La vesícula seminal es voluminosa, se encuentra retorcida sobre su eje mayor formando dos o tres ondulaciones. El poro genital desemboca por delante del *acetabulum* y por detrás de la bifurcación esofágica. No se apreció la presencia de *gonotyl*. El *ovarium* es inmediatamente pre-testicular, se encuentra en la línea media, es esférico, liso, mide unas 125 micras. El *uterus* presenta numerosas asas transversales, intercecales, se extiende desde el borde anterior del testículo anterior entre éste y el *ovarium* hasta alcanzar el *acetabulum*. Las glándulas vitelógenas en forma de pequeños folículos se extienden en una estrecha banda a cada lado cerca del borde del cuerpo, desde su mitad ecuatorial hasta el nivel de la línea media ecuatorial del testículo anterior. Huevos de doble envolturas, elípticos, numerosos, operculados, de 25 por 15 micras.

*Acanthochasmus loossi* de *Crocodylus acutus*

1. *Acanthostomum loossi* (Pérez Viguera, 1956) (Fig. 1)Host: *Crocodylus rhombifer* CUBA

Location: small intestine

This species (21, 2 and 1 individual) was found in 3 out of 21 examined *C. rhombifer*. Original description was published by Pérez Viguera (1956) from *C. acutus*.

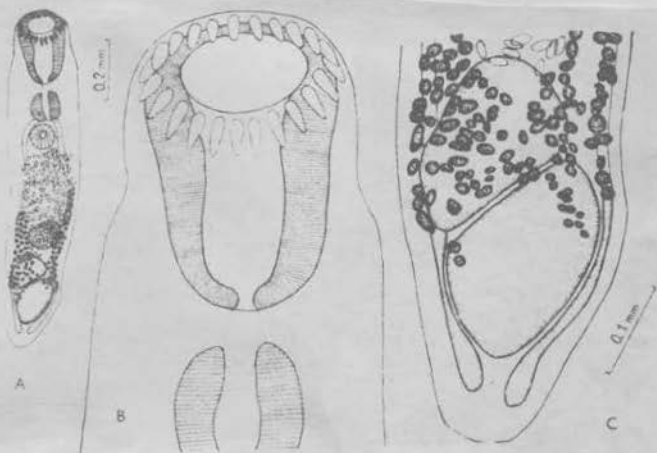
Description (10 specimens measured): Trematodes of small size, body elongated, fusiform. Cuticle armed with numerous small spines on the whole surface of body, especially in its anterior portion. Length of body 1.38 to 1.37 mm, maximum width sometimes in the region of acetabulum, sometimes in testes reaches 0.265—0.514 mm. Terminal oral sucker bell-shaped with thick muscular walls, measuring 0.244—0.310 mm in length and 0.192 to 0.251 mm in width. It is armed with one row of 24 straight spines of equal size, measuring  $0.044-0.053 \times 0.012-0.017$  mm. Prepharynx of most specimens well visible measuring  $0.051-0.333 \times 0.029-0.051$  mm. Pharynx well developed, measuring  $0.126-0.170 \times 0.111-0.163$  mm. Oesophagus indistinct, intestine bifurcates in two branches close below pharynx. Both intestinal branches terminate blindly below the posterior testis, midway between testis and body end. Acetabulum circular, smaller than oral sucker, situated at the beginning of the second third of body length,  $0.473-0.858$  mm from the anterior extremity, measuring  $0.103-0.148 \times 0.103-0.163$  mm. Vesicula seminalis spiral, close under acetabulum. Posterior portion of this organ sack-shaped, anterior tubular. Vitellaria formed by small follicles distributed in posterior half of body up to posterior testis. Ovary slightly oval, near by anterior testis, measuring  $0.103-0.155 \times 0.096-0.177$  mm. Receptaculum seminis and Mehlis' gland indistinct. Testes tandem, asymmetrical, oval, of smooth outline. Anterior testis measures  $0.133-0.241 \times 0.111-0.266$  mm, posterior  $0.185-0.370 \times 0.133-0.237$  mm. Posterior testis always larger. Uterus intercecal, occupying the area between ovary and acetabulum. Genital opening preacetabular, not too conspicuous. Egg measure  $0.026-0.032 \times 0.013-0.015$  mm.

Our specimens slightly differ from the original description in the size of oral sucker and length of oral spines. We assume, however, that these differences are due to the morphological variability of the species.

FROM GROSCHAF &amp; BARUS, 1970

We would like to note that in our collection we have found two specimens with shorter oral spines,  $0.026 \times 0.017$  and  $0.034 \times 0.015$  mm, slightly bent, with a wider base. Since their morphology corresponds in general to that of *A. loossi*, we suppose that also in this case it is the question of individual variability.

Fig. 1. *Acanthostomum loossi* (Pérez Viguera, 1956). A — overall view; B — anterior portion; C — posterior portion of body. Orig.



*Acanthostomum loossi* (Pérez Viguera)

Figs. 3, 5, 6, 11, 13

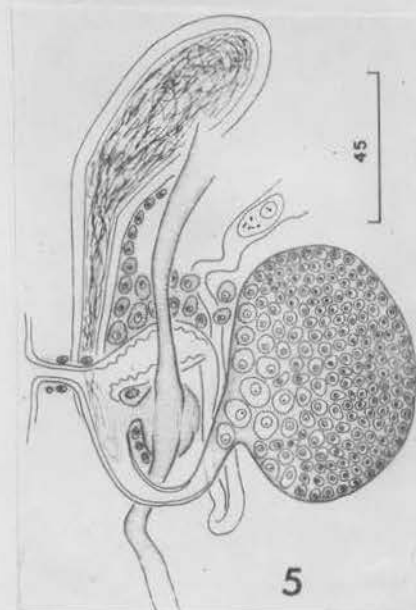
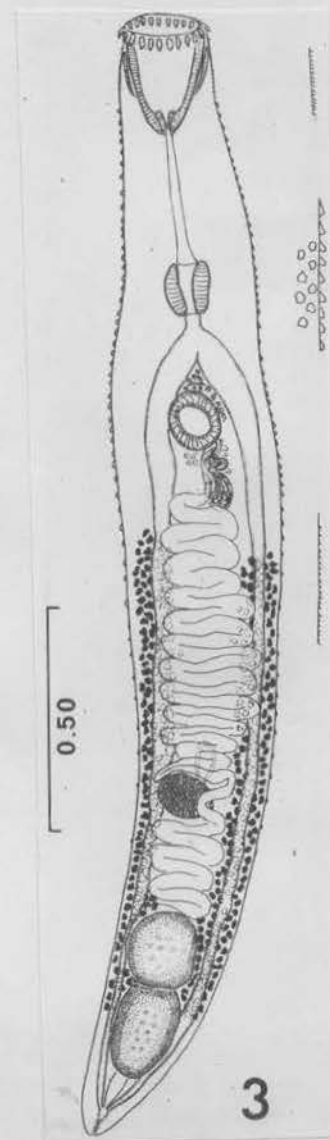
*Acanthochasmus loossi* Pérez Viguera, 1957:21-23, fig. 53 (in crocodile from Cuba).*Acanthostomum loossi*: Groschaft and Baruš, 1970:290-291, fig. 1 (new combination).*Acanthostomum scyphocephalum*: Nasir, 1975:3 (in part, as senior synonym).

**Supplemental data (based on 30 specimens, 19 measured).**—Living worm appearing chalky-white except for yellowish to brownish-black eggs. Body fusiform, more attenuated anteriorly, slightly truncate posteriorly, 1.18-2.92

mm long by 0.23-0.44 mm at widest point near midbody; ratio of body width to length 1:3-8 (1:5.6). Tegument spined; spines scalelike, usually wider than long, up to 5 long by 8 wide anteriorly, becoming progressively smaller and sparser in hindbody. Eyespot pigment lacking. Oral sucker terminal, cup-shaped, 92-270 long by 103-210 wide, surrounded anteriorly by single uninterrupted row of 20-22 (21.0) spines; spines 27-45 long by 10-15 wide ventrally, 37-53 long by 10-15 wide dorsally, with basal  $\frac{1}{2}$  attached to oral sucker; band of thick longitudinal muscle surrounding sucker from near middle anteriorly to base of oral spines. Acetabulum usually round in frontal view, 103-172 in diameter, deeper than wide. Ratio of oral sucker width to acetabular width 1:0.6-0.9 (1:0.7). Forebody 20-41% (31.2%) of total body length. Prepharynx 100-598 long in relaxed specimens, conspicuously muscular and pliable, often protruding into oral sucker in slightly contracted specimens. Pharynx usually widest near posterior end, 80-172 long by 57-172 wide. Ratio of oral sucker width to pharyngeal width 1:0.5-0.8 (1:0.6); ratio of acetabular width to pharyngeal width 1:0.4-1.0 (1:0.8). Esophagus thick-walled, usually indistinct, up to 35 long. Ceca bifurcating 2-8% (4.0%) of total body length preacetabular, lacking forward-directed processes near bifurcation, with epithelium up to 15 thick, opening into excretory vesicle near posterior end of body; ani with weakly-developed sphincters.

Testes spherical to elongate, smooth, tandem, contiguous; anterior testis 92-264 long by 138-241 wide; posterior testis usually larger, 149-276 long by 103-210 wide; posttesticular space 2-12% (5.3%) of total body length. Seminal vesicle bipartite, typically with curved narrow anterior portion and curved wide elongated posterior portion; entire organ dextral or sinistral, intercecal, extending less than two acetabular lengths postacetabular. Prostatic duct narrow, thick-walled. Preacetabular pit 42-66 wide, occasionally with few tegumental spines on upper lip, lacking gonotyl, surrounded by gland cells free in parenchyma. Genital pore immediately preacetabular, not opening through preacetabular pit. Postacetabular pit lacking.

Ovary spherical to transversely elongate, smooth, pretesticular, separated from anterior testis by about one ovarian length, 46-240 long by 115-240 wide. Seminal receptacle partially or entirely preovarian, median or submedian, 87-145 long by 50-119 wide, exceptionally thick-walled. Mehlis' gland overlying anterior of ovary; Laurer's canal thick-walled, surrounded by few gland cells, opening anterodorsal to ovary. Uterus wound in ascending loops in intercecal space between anterior testis and acetabulum; loops occupying 26-63% (42.1%) of total body length; metraterm relatively long and thick-walled, joining male duct near posterior border of acetabulum to form elongate tubular genital atrium. Vitelline follicles 16-29 long by 16-27 wide, located dorsolateral, dorsomedial, and rarely ventral to ceca in longitudinal groups, extending from near posterior margin of seminal



vesicle or 7–19% (13.4%) of total body length postacetabular to near level of testicular contiguity or 11–24% (17.3%) of total body length from posterior end, nearly confluent dorsal to anterior testis in most specimens. Eggs 23–25 long by 7–12 wide, yellowish near ovary, orangish between ovary and acetabulum, brownish-black near genital pore.

Excretory vesicle Y-shaped, bifurcating dorsal to anterior or in some cases posterior testis, with arms reaching posterior margin of oral sucker; pore terminal with muscular sphincter surrounded by gland cells, usually slightly recessed.

*Host.*—Alligator mississippiensis Daudin (new host).

*Locality.*—Cameron Parish, Louisiana (new locality).

*Site of infection.*—Anterior ½ of intestine.

*Specimens deposited.*—USNM Helm. Coll. No. 74508; BM (NH) Reg. No. 1977.6.13.7–8; HWML No. 20853 (8 slides).

*Remarks.*—Our specimens of *Acanthostomum loossi* agree closely with those reported from Cuba by Pérez Vigueras (1957) in *Crocodylus acutus* and by Groschaft and Baruš (1970) in *C. rhombifer*. Pérez Vigueras originally described *A. loossi* as possessing blindly-ending ceca, a point corroborated by Groschaft and Baruš. We examined three of Groschaft and Baruš' specimens, and interpreted the ceca to open into the excretory vesicle, the same as in our specimens. Louisiana specimens differ from Cuban ones that we examined by having 20–22 rather than 22–23 oral spines and by possessing eggs 23–25  $\mu\text{m}$  long by 7–12  $\mu\text{m}$  wide rather than 25–30  $\mu\text{m}$  by 13–15  $\mu\text{m}$ . Future work, including life-cycle studies, may show our specimens to represent a distinct species, but at present we consider the Cuban and American material conspecific.

*Acanthostomum loossi* differs from *A. scyphocephalum* (Braun, 1901) Peláez and Cruz, 1953 primarily by having ceca opening into the excretory bladder rather than externally and from the other two species described here in several respects other than the position of the ovary, lack of a postacetabular pit, and lack of an opening externally. One notable point is the relatively thick ducts in the female system (Figs. 5 and 13).



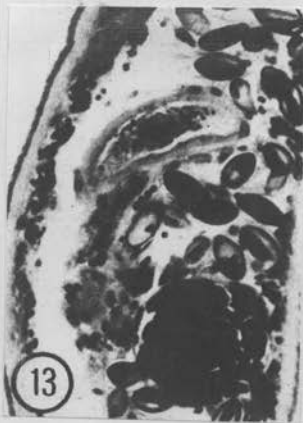
6

OS with 2 oral spines and longitudinal bands of muscle encircling anterior portion of sucker



11

no postacetabular pit ga (arrow)



13

Thick walled sr

*Acanthostomum megacetabulum* sp. nov. THATCHER, 1963

Figure 2

Host: *Drymarchon corais melanurus*.

Location: upper intestinal tract

Locality: 15 miles south of Villahermosa, Tabasco, Mexico.

Holotype: U.S.N.M. Hel. Coll. No. 60307.

Paratypes: Hel. Coll. Instituto de Biología, Mexico D. F.; Dept. of Zoology, Louisiana State University; Author's collection.

Diagnosis: With the characters of the genus. Body moderately elongate, cylindrical, spinous, 2.87(1.8-3.9) long by 0.54(0.39-0.60) wide; spination extending to posterior extremity; body spines attaining maximum length of 0.01 near anterior end; acetabulum large, 0.19(0.19-0.20) in diameter.

Oral sucker funnel-shaped, 0.32(0.25-0.32) in diameter by 0.27(0.27-0.32) in length; oral spines long, straight, 19-21 in number, measuring 0.069 in length by 0.017 in lateral width at base; prepharynx 0.09(0-0.13) long; pharynx barrel-shaped, 0.15(0.14-0.16) long by 0.13(0.13-0.14) wide; oesophagus not apparent; intestinal crura of variable diameter, attain maximum diameter of 0.075 near bifurcation; anal apertures present.

Testes spherical, tandem, in posterior one-fifth of body; anterior testis 0.19(0.19-0.23) long by 0.19(0.14-0.22) wide; posterior testis usually larger than anterior one, measuring 0.22(0.14-0.25) long by 0.19(0.19-0.23) wide; seminal vesicle large, convoluted, situated posterior to acetabulum; ejaculatory duct present; cirrus and cirrus sac lacking; genital pore on mid-line immediately anterior to acetabulum; gonotyl lacking.

Ovary spherical, immediately anterior to anterior testis and usually contiguous with that structure, 0.19(0.19-0.20) long by 0.16(0.14-0.18) wide; seminal receptacle large, often overlaps ovary ventrally, measuring 0.22(0.22-0.28) long by 0.14(0.14-0.18) wide; ootype and Mehlis' gland medial or anterior to ovary; uterus highly convoluted, filling intercrural region from anterior margin of ovary to seminal vesicle; vitelline follicles lateral, dorsal to crura, extending from equatorial region to level of middle of anterior testis; vitelline follicles 0.024-0.069 in diameter.

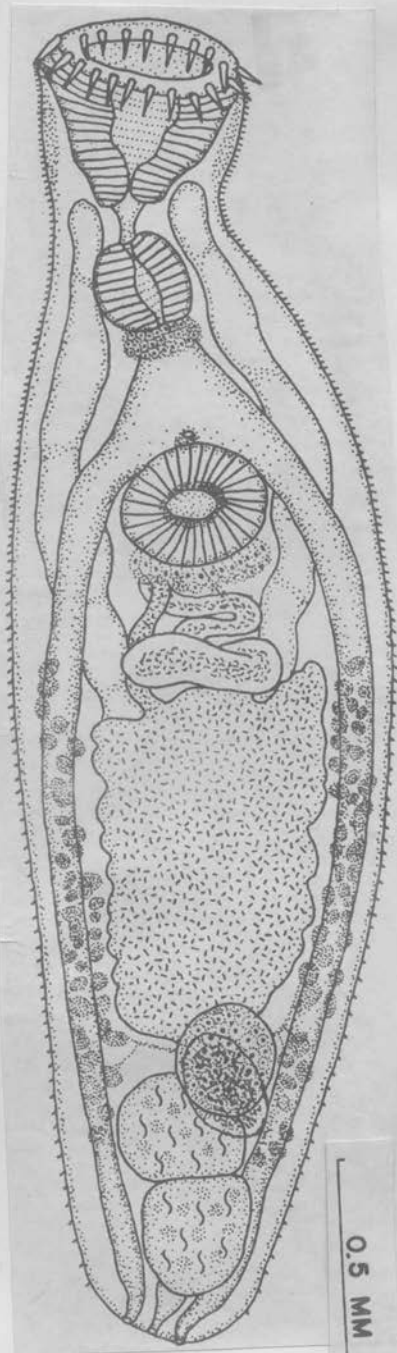
Eggs small, operculate, numerous, 0.014-0.015 x 0.031-0.033.

Excretory vesicle Y-shaped, branches extend anteriorly to vicinity of oral sucker.

Discussion: *A. megacetabulum* resembles *A. caballeroi* Pelaez and Cruz, 1953, but it differs from the latter in being smaller, in having a relatively larger acetabulum, and in lacking a gonotyl. Also, the eggs of the new species are larger than those of *A. caballeroi*.

Specimens of an apparently undescribed species of *Acanthostomum* were recovered from five (20 percent) of the Mexican indigo snakes examined. This form was present in collections from both 1958 and 1959. The largest infection encountered numbered more than 50.

The present diagnosis is based on studies of 35 stained and cleared specimens, 23 whole mount preparations, and serial sections of one specimen. The measurements in the diagnosis are of the holotype followed by the size ranges in parentheses.



*Acanthostomum minimum* ~~n. sp.~~ Stunkard, 1938

(Fig. 2)

The material consisted of two specimens from *Rhamdia guatemalensis*, one (vial 25) collected June 16 at Kaua Cave and the other (vial 71), July 3 at San Isidro Cave. The first specimen was stained and mounted *in toto*, the other was cut in serial sections. The first specimen (Fig. 2) is much contracted, 0.63 mm. long by 0.39 mm. wide. The second specimen is more extended and before sectioning measured 1.18 mm. in length and 0.42 mm. in width. The suckers in the two worms are the same size. The acetabulum measures 0.12 by 0.13 mm. and the oral sucker 0.17 by 0.18 mm. The acetabulum is situated one-third to two-fifths of the body length from the anterior end, but this relation may be somewhat abnormal since the specimens are distorted. The mouth is subterminal and the anterior end bears a single row of large spines, about 0.04 mm. in length, though the measurement is approximate since they were set at an angle. In one specimen 20 spines were counted; in the other only 18 were observed. They are set in a muscular thickening of the body wall and are separated by conspicuous glandular cells. At the anterior end, the cuticula is beset with broad, flattened spines, which decrease in size and number posteriorly and are absent behind the testes.

The oral sucker is thick-walled, funnel-shaped, but so retracted that the prepharynx protrudes into the sucker. The pharynx is large, 0.1-0.11 mm. in length and 0.068-0.085 mm. in width. The esophagus is short; the digestive ceca arise just behind the pharynx and open to the surface of the body on either side near the posterior end. The excretory pore is terminal and the vesicle is Y-shaped.

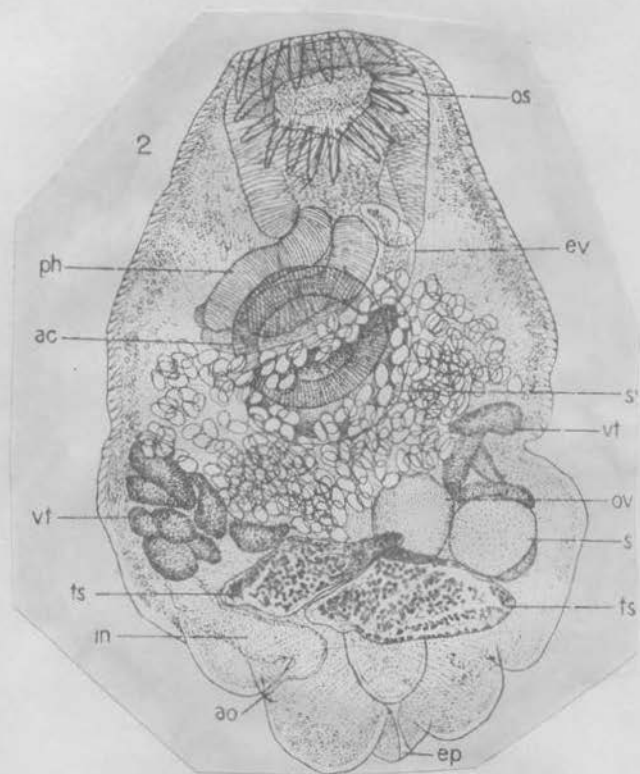
The stem extends forward on the ventral side to the middle of the body where it turns dorsally and divides into the crura which continue to the level of the prepharynx.

The testes are irregularly oval, wider than long, and measure 0.14-0.22 mm. by 0.07-0.15 mm. They are situated obliquely, with adjacent faces flattened, the anterior testis on the left and the posterior testis on the right side of the body. Sperm ducts from the testes unite and discharge into a large, coiled seminal vesicle. This extends across the body behind the acetabulum, turns forward dorsally on the right side of the sucker, and a narrow duct leads ventrad and forward to the genital pore immediately in front of the acetabulum. The ovary is situated on the right side, slightly anterior to the testes and is ventral in position. It is almost spherical, measuring 0.07-0.15 mm. in diameter. The oviduct arises from the dorsal surface of the ovary and communicates by a short duct with the seminal receptacle, which is above, behind, and at the right of the ovary. The receptacle measures 0.08-0.13 mm. in diameter. The oviduct then expands to form the ootype from which Laurer's canal passes to the dorsal surface. Near the origin of Laurer's canal, the ootype receives the short common vitelline duct. Mehlis' gland is represented by a few secretory cells. The vitellaria consist of large, irregularly-shaped, compact follicles which lie in the lateral areas of the body between the testes and the seminal vesicle. Collecting ducts pass mediad at the level of the ootype to form the common vitelline duct. The coils of the uterus occupy the central portion of the body from the level of the ovary to the genital pore. The eggs measure 0.028-0.03 mm. by 0.016-0.018 mm. They are ovate, operculate, and those in the terminal part of the uterus contain miracidia.

FIG. OVER

## DISCUSSION

The discovery of this species adds another to the list of trematodes which have anal openings. Stunkard (1931) described *Acanthochasmus diploporus* from the alligator and listed other trematodes in which the digestive ceca open to the surface of the body, either directly or by way of the excretory vesicle. With the restoration of the name *Acanthostomum*, *Acanthochasmus diploporus* becomes *Acanthostomum diploporum*. The original diagnosis of the genus *Acanthostomum* was emended by Looss (1901) and later contributions were reviewed by Stunkard (1931). While it appears almost incredible that so accurate an observer as Looss overlooked anal openings in the species studied by him, the discovery of two species of the genus *Acanthostomum* in which these structures occur suggests that their presence may be a generic character.





*Acanthostomum (Orientoacanthostomum) nigeri* ~~new species~~ ZAIDI AND KHAN, 1977

(Fig. 24)

Host: *Pampus niger* (Bloch.)

Location: Intestine

Locality: Fish Harbour, Karachi (Arabian Sea).

Two specimens of this species were collected from the intestine of one out of thirteen specimens of *Pampus niger* (Bloch.) examined at Fish Harbour, Karachi in January, 1968.

## DESCRIPTION

The body of the worm is long, slender, of moderate size and the tegument is armed with spines. The maximum width is at acetabular level. The oral sucker is terminal finger

bowls shaped with circumoral spines. The prepharynx is fairly long. The pharynx is about midway between the two suckers, in the posterior region of anterior third of the body. The oesophagus is short. The intestinal caeca are of uniform thickness and extend to the posterior extremity where they open outside. The acetabulum, smaller than the oral sucker is situated nearly in the middle of the body.

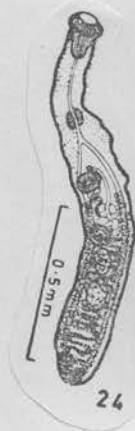
The testes are tandem, intercaecal and are in the anterior region of the posterior third of the body. They are oval in shape with entire margins. The posterior testis is slightly larger than the anterior. The vesicula seminalis is tubular, behind the acetabulum and occupies the middle third of the distance between the ovary and acetabulum. The ovary is spherical, pretesticular, placed in middle third of the body. It is slightly on the right side of the median line. The vitellaria consist of follicles extending from level of seminal vesicle to the posterior extremity. The uterus is extensive almost filling ovarian level by its coils. It is almost intercaecal and extends upto the genital pore situated just in front of the acetabulum. The eggs are rounded to oval. The excretory vesicle is Y shaped.

## MEASUREMENTS (IN MM.)

Body length	1.13-1.18
Body width	0.14-0.16
Oral sucker	0.102-0.103 × 0.102-0.103
Ventral sucker	0.094-0.096 × 0.068-0.071
Prepharynx	0.190
Pharynx	0.053-0.054 × 0.064-0.065
Oesophagus	0.043-0.045
Ovary	0.064 × 0.064
Anterior testis	0.102-0.104 × 0.066-0.068
Posterior testis	0.102-0.103 × 0.071-0.072
Eggs	0.046-0.048 × 0.038-0.041

## DISCUSSION

Khalil (1963) has split the genus *Acanthostomum* Looss, 1899 into four subgenera. The species under study does not fit in any of these subgenera, with its two intestinal caeca which are of equal thickness and vitellaria extending from nearly the middle of the body to the posterior end. It is obvious from the above discussion that the species under study is a new species and a new subgenus should be erected from it. The name *Orientoacanthostomum* is proposed for the new subgenus and *Acanthostomum (Orientoacanthostomum) nigeri* for the new species.



## Genus *ACANTHOSTOMUM* Looss, 1899

The genus *Acanthostomum* was erected by Looss (1899) to receive *Acanthostomum spiniceps* (Looss, 1896) extracted from *Bagrus bayad* from Egypt and *A. coronatum* (Cobbold, 1861). Looss (1900) gave another name, *Acanthochasmus*, to this genus as the name *Acanthostomum* was preoccupied by a hymenopteran genus. Some workers like Dollfus (1950) accepted this change but several others like Dawes (1946), Yamaguti (1958) and Khalil (1963) favoured the retention of the original name. The genus *Atrophocaecum* was erected by Bhalerao (1940) and was accepted as valid by Morosov (1955) but has been synonymized with *Acanthostomum* Looss, 1899 by other workers, like Dollfus (1950) and Yamaguti (1958) whereas Khalil (1963) regards it as subgenus of the genus *Acanthostomum* Looss, 1899. Similarly the genus *Haplocaecum* erected by Simha (1958) has also been regarded as subgenus of *Acanthostomum* Looss, 1899 by Khalil (1963). Morosov (1955) established the genus *Gymnatotrema* for the species, *Acanthostomum gymnarchi* Dollfus, 1950 but some of the subsequent workers did not agree with this view of Morosov, while Yamaguti (1958) proposed that *Gymnatotrema* Morosov, 1955 may be regarded as subgenus of *Acanthostomum* Looss, 1899. Khalil (1963) gave four subgenera, *Acanthostomum*, *Atrophocaecum*, *Gymnatotrema* and *Haplocaecum* Khalil, 1963. The species under study does not fit in any of the subgenera given by Khalil (1963) and therefore, a new subgenus has been erected to accommodate this new species.

### *ORIENTOACANTHOSTOMUM* new subgenus

The body is long and slender. The oral sucker is terminal and is finger bowl shaped with circumoral spines. The prepharynx is fairly long. The pharynx is midway between the two suckers. Oesophagus is short. The intestinal caeca are of uniform thickness. Ventral sucker is smaller than oral sucker. The testes are tandem and intercaecal. Ovary is pretesticular. The vitellaria extend from nearly the middle of the body to the posterior extremity. Eggs are rounded to oval. The excretory vesicle is Y shaped.

*Acanthostomum nuevoleonensis* Caballero et Caballero, 1964

Numerosos ejemplares de este tremátodo fueron colectados en una autopsia de la tortuga de agua dulce *Trionyx spinifer emoryi* (Agassiz, 1857), el 22 de mayo de 1963, por el biólogo Arturo Jiménez Guzmán y, fueron fijados en solución saturada acuosa de cloruro mercúrico, adicionada de ácido acético, ligeramente comprimidos entre portaobjetos, tratados con alcohol yodado, teñido con hemalumre de Mayer, transparentados con creosota purísima de haya y montados en resina sintética neutra. La descripción se realizó con trece ejemplares.

Son parásitos muy pequeños que miden de 1.427 a 1.647 mm de largo por 0.311 a 0.348 mm de ancho. Los extremos del cuerpo se angostan pero sin terminar en punta, es decir, son redondeados y con los bordes laterales, casi paralelos. La cutícula se encuentra densamente poblada en la mitad anterior del cuerpo, por abundantes y diminutas espinas, escamiformes, mientras que en la mitad posterior, van decreciendo en número hasta desaparecer en el extremo más posterior. El espesor de la cutícula es de 0.004 a 0.004 mm y el tamaño de las espinas varía de 0.004 a 0.006 mm de largo por 0.002 a 0.002 mm de ancho. En torno a la porción externoanterior de la ventosa oral se presenta un collar de recias espinas, oblongas, en número de 18 a 20, las cuales miden de 0.016 a 0.025 mm de largo por 0.008 a 0.008 mm de ancho.

La ventosa oral es subterminal, fuertemente musculosa, en forma de una vasija, con su extremo anterior redondeado y el posterior truncado en sentido transversal, es tan grande como el acetábulo y mide de 0.107 a 0.119 mm de diámetro anteroposterior por 0.102 a 0.107 mm de diámetro transversal. El acetábulo está situado en el tercio anterior del cuerpo del parásito, de contorno casi circular, de diámetro transversal ligeramente mayor que el anteroposterior, musculoso y mide de 0.094 a 0.102 mm de diámetro anteroposterior por 0.094 a 0.115 mm de diámetro transversal; la relación entre los diámetros de estas ventosas es: 1:1 × 0.8:1 a 1:1 × 1:1.

La boca es terminal, pequeña y mide de diámetros 0.020 a 0.029 × 0.041 a 0.049 mm; la prefaringe es corta y mide de 0.037 a 0.039 mm de largo por 0.012 a 0.012 mm de ancho; la faringe es grande, pero de tamaño menor que las ventosas, fuertemente musculosa, de forma cilíndrica y mide de 0.074 a 0.082 mm de diámetro anteroposterior por 0.074 a 0.078 mm de diámetro transversal; el esófago es corto y ancho y mide de 0.041 a 0.082 mm de diámetro anteroposterior por 0.041 a 0.041 mm de diámetro transversal; los ciegos intestinales se extienden dorso lateralmente hasta el borde posterior del cuerpo en donde se abren en el correspondiente ano y miden de 0.049 a 0.049 mm de ancho.

Los poros reproductores se encuentran por delante del acetábulo, dentro de un área genital y distan de 0.366 a 0.384 mm del borde anterior del cuerpo. Los testículos están situados en el extremo posterior del cuerpo, uno detrás del otro en la zona intercecal media, son tangentes, de bordes lisos, casi del mismo tamaño que el ovario, esféricos y con el diámetro transversal mayor que el anteroposterior y miden el anterior de 0.086 a 0.111 mm de diámetro anteroposterior por 0.111 a 0.123 mm de diámetro transversal y el posterior de 0.107 a 0.123 mm de diámetro anteroposterior por 0.102 a 0.115 mm de diámetro transversal. La vesícula seminal se encuentra formada por dos porciones, una posterior, grande, esférica u ovoidea que se halla situada en la porción izquierda intercecal, a nivel del inicio de las vitelógenas y mide de 0.078 a 0.131 mm de diámetro anteroposterior por 0.082 a 0.094 mm de diámetro transversal; la porción anterior, en forma de cordón, es larga, se dobla varias veces dentro del área intercecal media, por delante, de la parte posterior de este mismo órgano y por detrás del acetábulo, alcanza, en su trayecto, a este mismo órgano y corre por su borde izquierdo para, después, ir a terminar al poro reproductor masculino, por delante del acetábulo; este cordón mide de 0.463 a 0.693 mm de largo por 0.020 a 0.057 mm de ancho. Masas de células prostáticas, situadas dentro del área intercecal, por detrás del acetábulo y a los lados del gonotilo, rodean a la porción anterior de la vesícula seminal.

preparación total de *Acanthostomum*

Dibujo y microfotografía de una

*nuevoleonensis* n. sp. Región dorsal.

El ovario se encuentra situado por delante de los testículos, en el área intercecal y sobre el lado izquierdo del cuerpo y, también por delante del receptáculo seminal; por lo general es ovoideo, pero puede tener también la forma esférica, es de contorno liso y mide de 0.131 a 0.148 mm de diámetro anteroposterior por 0.094 a 0.098 mm de diámetro transversal. El receptáculo seminal es grande, ocupa toda el área comprendida entre el ovario y el testículo anterior, su diámetro transversal es mayor que el anteroposterior y mide de 0.049 a 0.082 mm de largo

por 0.020 a 0.086 mm de ancho. La glándula de Mehlis y la región del ootipo se hallan colocados sobre el lado izquierdo, intercecal del ovario, ocupando la línea media; el conducto de Laurer es corto y muy fino. El útero principia a nivel de la porción interna y media del ovario y mediante asas cortas transversales, llena toda el área intercecal comprendida entre el ovario y la porción posterior de la vesícula seminal y, mediante un asa ascendente que cruza entre la porción anterior de la vesícula seminal, rodea al gonotilo, para después cruzar hacia el lado derecho, en donde se hace paralelo a la parte anterior de la vesícula seminal y termina en el poro genital femenino. Los huevecillos son numerosos, de cáscara lisa y amarillenta, operculados y miden de 0.025 a 0.029 mm de largo por 0.014 a 0.016 mm de ancho. Por detrás del acetábulo se encuentra un área amplia, en forma de un surco, la cual corresponde al gonotilo.

Las glándulas vitelógenas tienen su inicio a nivel de la porción posterior de la vesícula seminal y se extiende hasta la porción media del testículo posterior, en las porciones laterales del cuerpo, es decir, en las áreas extracecales; están constituidas por folículos gruesos, ovoideos o esféricos; a nivel del ootipo se encuentra un pequeño receptáculo vitelino. El poro excretor se abre en la porción media del borde posterior del cuerpo y comunica con una amplia bolsa por detrás del testículo posterior.

Hospedador. *Trionyx spinifer emoryi* (Agassiz, 1857). (Testudines Batsch, 1788)  
Localización. Intestino delgado.

Localidad. Río Pesquerías, Agua Fria, Municipio de Apodaca, Estado de Nuevo León, México.

Tipo. Colección helmintológica de E.C.C. N° 460.

Paratipos. Colección helmintológica del Instituto de Biología de la Universidad Nacional Autónoma de México. N° 219-15.

DISCUSIÓN. *Acanthostomum nuevoleonensis* n. sp. constituye la tercera especie del género que parasita a Testudines Batsch, 1788 de agua dulce, pues las restantes veintisiete, son parásitas de peces, de culebras y de cocodrilos. Los caracteres diferenciales de esta nueva especie son los siguientes: a), las dos ventosas son casi iguales en tamaño; b), la forma de la vesícula seminal; c), la prótata se encuentra en las porciones laterales y posterior del acetábulo, rodeando al gonotilo y a una porción de la vesícula seminal anterior; d), el útero ocupa todo el ancho del cuerpo, a nivel de su porción media; e), el ovario es un poco mayor que los testículos y, f), en el arreglo de las glándulas vitelógenas.

Para diferenciar esta especie de las ya conocidas no se ha tenido en cuenta el número de espinas o ganchos peribucales, puesto que el número es variable en una misma especie dada, hecho que ya había sido puesto en claro por el Prof. Dr. Arthur Looss en el año de 1901.

La bibliografía de las treinta especies conocidas que forman a este género y, la cual se ha consultado, se incluyen a los sinónimos, *Acanthochasmus* Looss, 1899; *Caimanicola* Freitas y Lent, 1958; *Atrophocaecum* Bhalerao, 1940 y *Gymnatotrema* Morosov, 1955. B. B. Sinha en 1948 creó la nueva especie *Acanthostomum indicum* y S. S. Sinha en 1958 la especie también nueva *Atrophocaecum indicus*, pero como el género *Atrophocaecum* es un sinónimo de *Acanthostomum* Looss, 1899 L. F. Khalil, para evitar la homonimia, ha propuesto, para la especie de S. S. Sinha, el nombre de *Acanthostomum simhai* (Sinha, 1958).

E. C. Herber en 1961 identifica como *Acanthostomum americanus* Pérez Vigueras, 1950 los ejemplares colectados en *Crocodylus acutus acutus* de la República de El Salvador, Centro América, pero se piensa que estos ejemplares pertenecen a *A. acuti* Caballero y Brenes, 1950, del mismo hospedador de la República de Costa Rica, atendiendo a que el hospedero corresponde a la misma zona geológica y geográfica de Centro América; además, ciertas estructuras de los ejemplares de Herber, como por ejemplo, los órganos reproductores, son muy semejantes a los que presentan los ejemplares de Costa Rica.

Un reciente estudio del género *Acanthostomum* fue realizado por L. F. Khalil en 1965 y, este autor se pronuncia tan sólo, por considerar con el rango subgenérico a *Atrophocaecum* Bhalerao, 1940, a *Gymnatotrema* Morosov, 1955 y a *Haplocaecum* Sinha, 1958, pero nosotros estamos de acuerdo con otros autores en considerar a todos estos géneros o subgéneros como sinónimos de *Acanthostomum* Looss, 1899, pues la presencia de aberturas anales es un carácter del género y los otros mencionados para diferenciar a *Gymnatotrema* y *Haplocaecum* no son del rango subgenérico, ni genérico, sino de orden específico.

Acanthostomum nuevoleonensis Caballero & Caballero, 1964

## SUMMARY

*Acanthostomum nuevoleonensis* n. sp. is the third species of the genus that parasites to Testudines Batsch, 1788 (Syn. Chelonia Macartney, 1802) of freshwaters because the other 27 are parasites of fishes, snakes and crocodylians. The differential characters of the new species are, as follows: a).. both suckers are nearly equals in size; b).. the form of seminal vesicle is characteristic; c).. the prostatic gland is located in the lateral and posterior portions of the ventral sucker, surrounding the gonostyle and part of the anterior seminal vesicle; e).. the ovary is a little bigger than the tests; d).. the uterus fills all the wide of the body at the middle part and f).. the arrangement of the yolk glands is special.

To differentiate these species from the others, we have not taken note of the spines or hooks around the mouth, because their number varies in the same species, this having been reported by Prof. A. Looss in 1901. In the literature of the 30 known species that forms the genus *Acanthostomum* Looss, 1890 we have consulted, are included the synonyms *Acanthochasmus* Looss, 1900; *Caimanicola* Freitas and Lent, 1958; *Atrophocaecum* Bhalerao, 1940 and *Gymnatotrema* Morosov, 1955. B. B. Sinha in 1948 created the new species *A. indicum* and later in 1958, S. S. Simha, the species, new too, *Atrophocaecum indicus*, but as the genus *Atrophocaecum* is a synonymous of *Acanthostomum*, L. F. Khalil to avoid the homonymy has proposed to the new species of S. S. Simha the name *Acanthostomum simhai* (Sinha, 1958).

E. E. Herber in 1961 identified as *Acanthostomum americanum* Pérez Vigueras, 1950 the specimens collected in *Crocodylus acutus acutus* from Republic El Salvador, Central America, but we have that these specimens could be *A. acuti* Caballero and Brenes, 1959, from the same host of the Costa Rican Republic, because the host lives in the same geological and geographical zone of Central



y microfotografía de una porción de la región dorsal.

America. Furthermore, some structures in the specimens of Herber, for instance the reproductive organs, are very similar to those of the parasites from Costa Rica.

A new review of the genus was realized by L. F. Khalil in 1965 and this author considers in the subgeneric rank *Atrophocaecum* Bhalerao, 1940; *Gymnatotrema* Morosov, 1955 and *Haplocaecum* Sinha, 1958, but we agree with other authors in considering this genus and subgenus as synonyms of *Acanthostomum* Looss, 1890, because the presence of proctal openings is a generic characters. The other characters mentioned for *Gymnatotrema* and *Haplocaecum*, as we have seen, belong neither to the generic rank, nor subgeneric, but are specific.

*Acanthostomum pakistanensis* n. sp.

Figures 2-4

Diagnosis: With the characters of the genus. Narrow, elongate distomes up to 7 mm long and 0.29 wide at the level of the acetabulum;

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W. H. COIL AND R. E. KUNTZ, 1960

small cuticular spines present from anterior end to just past anterior vitelline follicles, larger and thus apparently more dense anteriorly; anterior end armed with single row of large rod-like spines of variable size; ventral cephalic spines smallest, 0.021-0.027, lateral cephalic spines 0.023-0.026, dorsal cephalic spines 0.030-0.038 long; oral sucker terminal, 0.15-0.18 wide and 0.21-0.26 long; acetabulum 0.099-0.12 wide, located 0.21-0.24 from oral sucker. Prepharynx short, 0.011-0.030, thin-walled; pharynx 0.095-0.11 wide; esophagus short, 0.010-0.025; bifurcation of gut occurs just anterior to acetabulum; caeca thin-walled, with many thin, longitudinal muscle fibers, extending to posterior end of body where they open to exterior through small, lateral pores, 0.005-0.015. Genital pore just anterior to acetabulum; no cirrus sac present; *ductus hermaphroditicus* extends from genital pore to a point dorsal to acetabulum where male and female ducts enter; long, sinuous seminal vesicle extends posteriorly from acetabulum; testes ellipsoidal, 0.11-0.17 wide located in posterior one-sixth of body, 0.37-0.57 from posterior end; testes short distance apart, frequently contiguous; ovary 0.095-0.12 wide, slightly lateral and anterior to testes; seminal receptacle ellipsoidal, generally median, 0.19-0.22 long; loops of uterus extend, between vitellaria, from ovary to seminal vesicle; uterus joins ductus hermaphroditicus dorsal to acetabulum; excretory bladder a single stem to level of acetabulum where it bifurcates and curae extend to level of pharynx; pigment granules dorsal to pharynx; vitelline follicles lateral in middle quarters of body; eggs 0.012-0.014 by 0.020-0.022.

Host: *Hydrophis cyanocinctus* (water snake).

Site of infection: Small intestine.

Locality: Dacca, East Pakistan.

Type specimen: In the Helminthological Collection of the U.S.N.M.

There are two other trematodes in the Asian region which are similar to *Acanthostomum pakistanensis*: these are *A. burminis* (Bhalerao, 1926) parasitic in *Natrix piscator* and *A. indicum* Sinha from a crocodile. *A. pakistanensis* can be differentiated from *A. indicum* by its possession of smaller cephalic spines (0.021-0.038 v. 0.053) and by its possession of an egg which is shaped differently. *A. burminis* has been reported as having spines, apparently all about the same length, and furthermore, its egg is more than twice as long as the egg of *A. pakistanensis*.

Anterior to the *ductus hermaphroditicus* and the acetabulum is a pyriform structure which, in longitudinal section, appears to be an invagination of the cuticle. Judging from its location and structure, it appears that it might be associated with copulation. This "genital sac" consists of a heavy, nonmuscular wall which reacts to stains in a manner similar to cuticle (A.G.E. Pearse's stain, 1950, Hotchkiss PAS, Celestin blue, Toluidine blue). Inside the genital sac, but on the inner wall, is a substance similar to that found on the surface of the acetabulum. This appears to be a secretion from the many unicellular glands associated with both the genital sac and the acetabulum. There are many muscle fibers running from the genital sac toward the dorsal musculature and toward the acetabulum. Dollfus (1950) described a similar structure in a species of *Acanthostomum* collected in the Belgian Congo. He called it a "pouche copulatrice ou gonoty!" and observed that it was evaginated in some individuals.

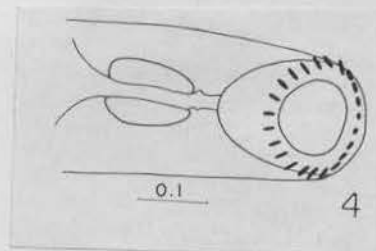
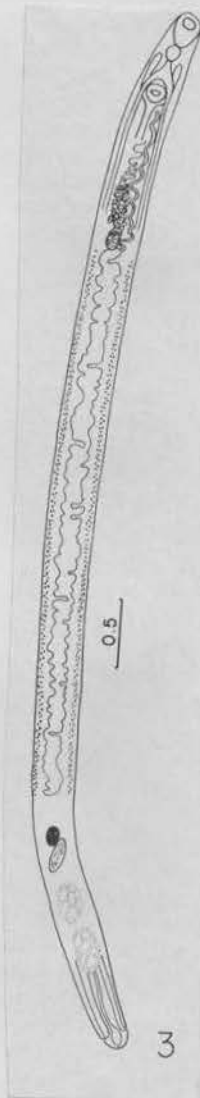
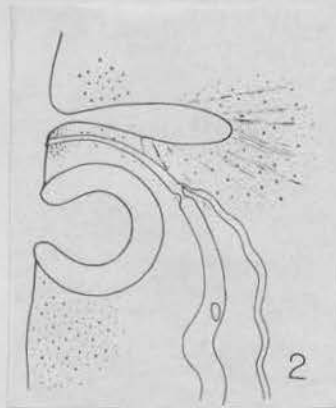


FIG. 2. Freehand sketch made from sections of *Acanthostomum pakistanensis* sp. nov.  
 FIG. 3. *Acanthostomum pakistanensis* sp. nov., ventral view.  
 FIG. 4. *Acanthostomum pakistanensis* sp. nov., anterior end.

KARYAKARTE, 1968

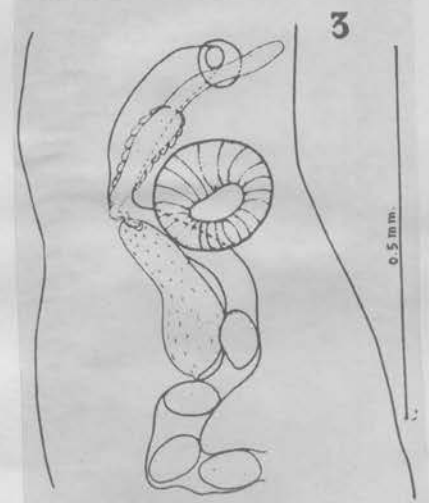
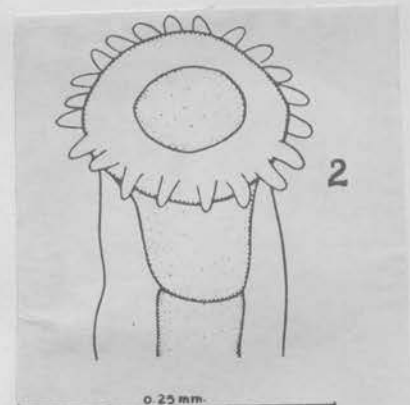
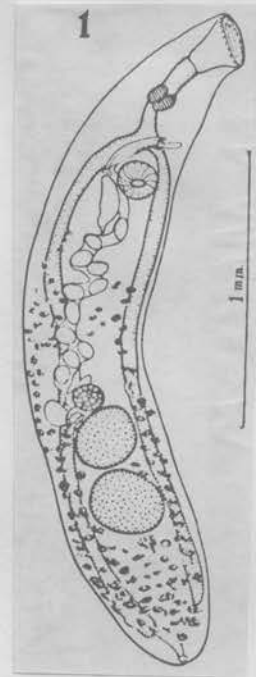
*ACANTHOSTOMUM (GYMNATREMA) PAMBANENSE* N. SP.*Morphology.*

The description is based on ten specimens selected at random from type host. All the measurements are in millimeters unless otherwise indicated.

The body of the fluke is cylindrical, elongate and spinose. The spines are richly set on the anterior, sparsely on the middle and none on the posterior regions of the body. In addition to the body spines, 19 to 21 large cephalic spines are present around the mouth, measuring 0.025 to 0.030 (average 0.027). The mounted specimens measure from 1.64 to 3.58 (2.22) in length and from 0.24 to 0.52 (0.32) in the region of maximum breadth at the level of the space between the ventral sucker and the anterior testis. The oral sucker is terminal in position and is very prominent with an aperture of 0.09 to 0.19 (0.15) across and a width of 0.08 to 0.15 (0.11) at its base and a depth of 0.07 to 0.12 (0.09). The ventral sucker is smaller than the oral sucker and measures 0.09 to 0.17 (0.12) in length and 0.12 to 0.14 (0.13) in width and is situated on the margin of the anterior quarter of the body. The mouth leads into prepharynx, 0.08 to 0.20 (0.11) in length, which in turn opens into a muscular pharynx, 0.05 to 0.09 (0.07) long and 0.08 to 0.12 (0.09) in length. The oesophagus is short, varies from 0.03 to 0.12 (0.07) in length. The bifurcation of the gut occurs anterior to the ventral sucker giving rise to two intestinal caeca which extend upto the posterior extremity and end blindly.

The testes are tandem, intercaecal, spherical with entire margins and are situated in the four fifths of the body. The anterior testis measures 0.07 to 0.24 (0.16) in length and 0.08 to 0.27 (0.15) in width and the posterior 0.05 to 0.27 (0.17) in length and 0.07 to 0.29 (0.16) in width. In some of the specimens examined the intertesticular space is present while in other it is absent. The seminal vesicle is large having a sac like portion, 0.24 to 0.41 (0.29) by 0.04 to 0.10 (0.06) and a tubular and slightly coiled portion. A non-muscular ejaculatory duct is also visible. Prostate gland cells are well defined. A feebly developed gonotyle is present. The genital pore is situated on the intestinal bifurcation, sometimes slightly displaced from the median line on the left side.

The ovary is pretesticular in position, spherical and measures from 0.04 to 0.12 (0.07) in length and from 0.04 to 0.14 (0.08) in breadth. The seminal receptacle is present on the right side of the ovary. It is slightly smaller than the ovary and measures 0.03 to 0.11 by 0.02 to 0.07 with an average of 0.05 by 0.04. A small but conspicuous Laurer's canal is observed. The vitellaria are follicular, extending along each margin of the fluke from equator, in the posterior part of the body the follicles are confluent. A conspicuous vitelline reservoir is also seen. Shell gland cells are diffused and surround the ootype. The uterus is small and never enters into the post-ovarial region. It is filled with operculated and well developed eggs. The eggs are limited in number and measure from 0.04 to 0.07 (0.06) in length and 0.03 to 0.06 (0.05) in width.



The excretory system traced in the young flukes is 'Y' shaped with a long stem reaching upto the ventral sucker. The arms extend upto the pharynx. The excretory pore is terminal.

#### Discussion.

It is obvious from the collar spines, topography of gonads, presence of seminal receptacle and absence of cirrus sac that the present fluke belongs to the genus *Acanthostomum* Looss, 1899. The presence of vitellaria in the post-testicular region of the body clearly shows its affinity to the subgenus *Gymmatrema* Yamaguti, 1958. A detailed study of this parasite shows that it differs considerably from *Acanthostomum* (*Gymmatrema*) *gymnarchi* (Dollfus, 1950), the only species of the subgenus reported so far.

*A. (G.) gymnarchi* has the caeca of unequal thickness and the left caecum opens outside by an anal pore while the right caecum ends blindly. In contrast to this, the parasite described herein has caeca of equal thickness and the both end blindly.

The testes are situated in the four fifths of the body region in the present form whereas these are situated in the posterior region of the body in the known species.

The present form resembles *A. (G.) gymnarchi* in having vitellaria in the post-testicular region, but while in the former the follicles occupy posterior half of the body these are limited only to the posterior third of the body in the latter.

While the seminal vesicle is large and loosely coiled in *A. (G.) gymnarchi*, it has a saccular and a less coiled tubular portions in the new species.

The uterus is long, coiled and filled with numerous eggs in the known form whereas it is short, less coiled and filled with limited number of eggs.

The form under discussion also differs from *A. (G.) gymnarchi* in having bigger eggs. (0.040 to 0.070 by 0.030 to 0.060 against 0.011 to 0.014 by 0.025 to 0.028).

Besides these differences, the hosts as well as locality of the two differ. The known form is reported from Sudan while the new from India.

In view of the facts mentioned above it is considered that the parasite belongs to a new species and is named as *Acanthostomum* (*Gymmatrema*) *pambanense* sp. n.

*Host*: *Therapon puta* (Cuv. and Val.).

*Habitat*: Intestine.

*Locality*: Pamban island, Madras state, India.

*Type specimen*: Zoological Museum, Department of Zoology, Maharashtra University, Aurangabad, Maharashtra, India.

Fifteen specimens of this species were collected from the intestine of the fish, *Therapon puta*. The flukes were fixed in 4% Formalin, stained in Ehrlich's haematoxylin and were mounted permanently in Canada balsam. The drawings were made with the aid of a camera lucida.



BROOKS AND OVERSTREET, 1977

*Acanthostomum pavidum*, new species—

Figs. 2, 4, 9, 10

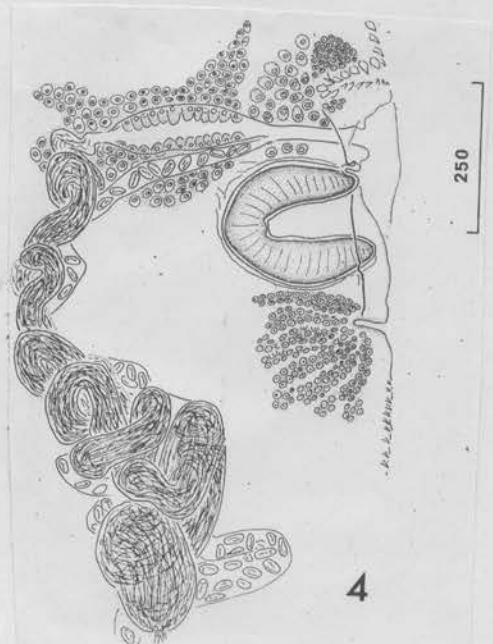
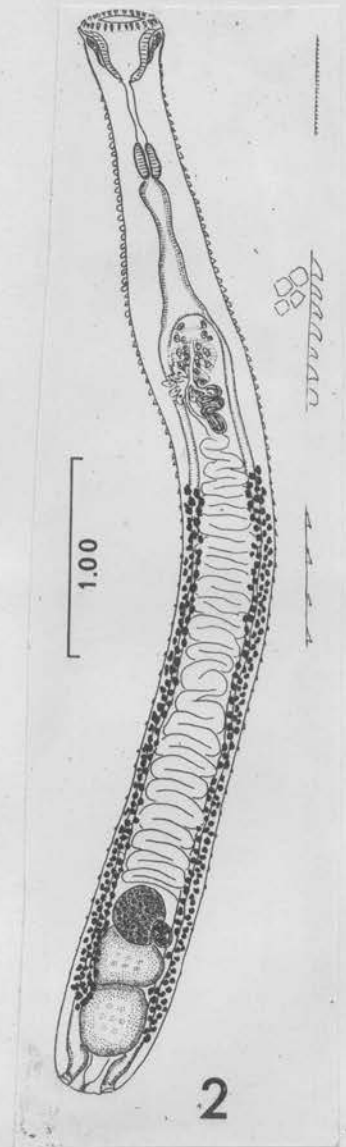
**Description (based on 50 specimens, 30 measured).**—Living worm appearing chalky-white except for yellowish to brownish-black eggs. Body elongate with attenuated anterior end and distinctly-truncated posterior end, 1.6–10.6 mm long by 0.4–1.1 mm at widest point near midbody; ratio of width to length 1:3–13 (1:8.2). Tegument spined, with several sensory papillae at anterior end; spines up to 5 long anteriorly, increasing in size toward acetabular level to a maximal 14–19 long by 11–14 basal width, conspicuously scalelike in midforebody and progressively smaller and sparser in hindbody. Eyespot pigment lacking. Oral sucker terminal, cup-shaped, 195–575 long by 230–552 wide, surrounded anteriorly by single uninterrupted row of 26–28 (27.0) spines; spines 45–77 long by 12–27 wide ventrally, 53–85 long by 12–27 wide dorsally, with more than basal ½ attached to sucker; band of thick longitudinal muscle surrounding sucker from beyond middle anteriorly to base of oral spines. Acetabulum 138–310 long by 72–322 wide, with small sensory papillae in overlying tegument. Ratio of oral sucker width to acetabular width 1:0.5–0.8 (1:0.6). Forebody 24–49% (35%) of total body length. Prepharynx muscular, pliable, 120–402 long in relaxed specimens. Pharynx usually widest near posterior end, 126–345 long by 115–345 wide. Ratio of oral sucker width to pharyngeal width 1:0.3–0.9 (1:0.5); ratio of acetabular width to pharyngeal width 1:0.5–1.5 (1:0.9). Esophagus wider than pharynx in relaxed specimens, 180–689 long, lined with epithelium up to 25 thick. Ratio of pharyngeal length to esophageal length 1:1.4–5.5 (1:2.0). Ceca bifurcating 2–6% (4.0%) of total body

length preacetabular, lacking forward-directed processes near bifurcation, with epithelium up to 35 thick, opening at posterior end of body through separate ani; ani recessed, with weakly-developed sphincters.

Testes spherical to subspherical, smooth, tandem, contiguous; anterior testis 149–460 long by 161–568 wide; posterior testis 148–575 long by 172–483 wide; posttesticular space 1–4% (2.5%) of total body length. Seminal vesicle bipartite, with thin long sinuous anterior portion and globular posterior portion, occasionally with constriction forming short third distal portion; entire organ dextral or sinistral, intercecal, usually extending less than 2 acetabular lengths postacetabular. Prostatic duct moderately swollen, surrounded by few prostatic cells free in parenchyma. Genital pore immediately preacetabular, separated from preacetabular pit; preacetabular pit a transverse depression 79–250 wide, lined with tegumental spines, lacking gonotyl, surrounded by clustered elongated groups of gland cells. Postacetabular pit a transverse slit 106–211 wide, immediately postacetabular.

Ovary pretesticular, spherical to subspherical, smooth, separated from or occasionally contiguous with anterior testis, 115–379 long by 149–425 wide.

Seminal receptacle overlaying posterior portion of ovary dorsally, either dextral or sinistral, moderately thick-walled, 86–316 long by 53–237 wide. Mehlis' gland anterior to seminal receptacle; Laurer's canal thin-walled, not surrounded by gland cells, opening dorsal to ovary. Uterus wound in ascending loops in intercecal space between ovary and acetabulum; loops occupying 25–50% (37.5%) of total body length; metraterm short, muscular, joining short male duct at about depth of preacetabular pit to form elongated tubular genital atrium. Vitelline follicles 27–66 long by 19–53 wide, dorso-lateral and dorsomedial to ceca in two longitudinal groups, extending posteriorly from near level of posterior margin of seminal vesicle or 5–17% (10.3%) of total body length postacetabular to near level of testicular contiguity or 10–14% (12.0%) of total body length from posterior end. Eggs 32–35 long by 15–17 wide, yellowish near ovary, orangish between ovary



and acetabulum, brownish-black near genital pore.

Excretory vesicle Y-shaped, bifurcating dorsal to acetabulum, with arms extending to posterior margin of oral sucker; pore terminal with muscular sphincter surrounded by gland cells, usually slightly recessed.

*Type-host*.—*Alligator mississippiensis* Daudin.

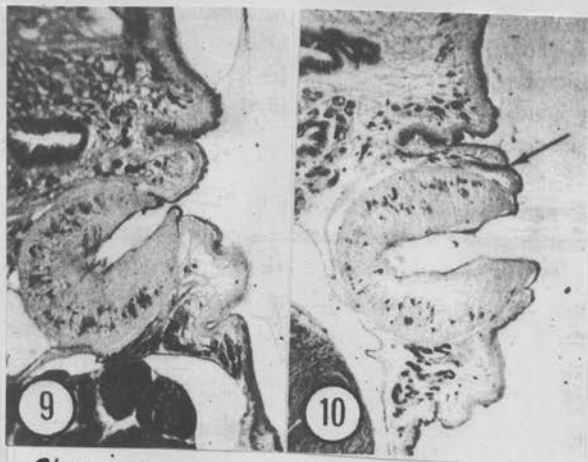
*Localities*.—Cameron Parish, Louisiana (type-locality); Jackson County, Mississippi; Alachua County, Florida.

*Site of infection*.—Middle third of intestine.

*Holotype*.—USNM Helm. Coll. No. 74505. *Paratypes*.—USNM Helm. Coll. No. 74506 (2 slides); BM (NH) Reg. No. 1977.6.13.9–11; HWML No. 20851–20852 (42 slides).

*Etymology*.—The Latin *pavidum*, meaning fierce, alludes to the oral spines and robust tegumental spines in the forebody.

*Remarks*.—*Acanthostomum pavidum* resembles *A. marajoarum* (Teixeira de Freitas and Lent, 1938) Hughes, Higginbotham, and Clary, 1941, *A. brauni* Mañé-Garzón and Gil, 1961, and *A. caballeroi* Pelaéz and Cruz, 1953 by possessing distinctly robust tegumental spines in the forebody, an esophagus longer than the pharynx, and anal openings at the posterior end of the body. It differs from all of them by having 26–28 rather than 20–23 oral spines and eggs more than 30  $\mu\text{m}$  long. The new species differs additionally from *A. brauni* and *A. marajoarum* by having a prepharynx typically longer than the pharynx and from *A. brauni* by having a sucker ratio of more than 1:0.5.



Showing  
postacetabular  
pit.

gp (arrow)

Both show spines of preacetabular pit.

Looss, 1901

*Acanthochasmus praeteritus*<sup>1)</sup> n. sp. Sie ähnelt der vorhergehenden, wie schon gesagt, in Körpergestalt und innerem Aufbau dermaßen, daß beide nicht so leicht zu unterscheiden sein würden, wenn nicht die Farbe des Uterus resp. der Eier ein leicht erkennbares Merkmal abgäbe. Ich beschränke mich hier darauf, die Unterschiede aufzuführen, welche beide von einander trennen. Die Länge meines größten Individuums von *A. praeteritus* beträgt 3,2 mm, doch wird sehr wahrscheinlich dieses Maß von älteren Tieren noch wesentlich überschritten. Der Mundsaugnapf ist dem Bauchsaugnapf gegenüber relativ größer

(0,24 mm zu 0,13 mm bei dem oben genannten Individuum), sein Rand mit 21 oder 22 Stacheln ausgerüstet, die merklich kleiner und auch etwas anders gestaltet sind als bei *A. imbutiformis* (cf. die Fig. 10a). Eine an 20 Individuen vorgenommene genaue Zählung ergab das Vorhandensein von 18 Stacheln 1mal, 19 Stacheln 3mal, 21 Stacheln 8mal und 22 Stacheln ebenfalls 8mal. Samenblase relativ kürzer und bei weitem nicht bis halbwegs zwischen Bauchsaugnapf und Keimstock hinabreichend. Dotterstöcke kleiner als bei *A. imbutiformis*; sie beginnen hinten ebenfalls am Hinterrande des hinteren Hodens, endigen vorn aber weit von dem blinden Ende der Samenblase entfernt; der Keimstock liegt fast genau in der Mitte ihrer Gesamtlänge. Eier etwas größer als bei der vorigen Art; 0,025–0,026 mm lang und 0,013 mm dick, ihre Schale nach vorn stark verjüngt und von dunkelbrauner Farbe.

Dieser *Acanthochasmus praeteritus* lebt, soweit ich gesehen, nur in der ersten Hälfte des Darmes; außer bei *Labrax lupus* fand ich ihn in Triest noch im Anfangsdarm von *Chrysophrys auratus* und *Corvina nigra*; dagegen nicht in *Dentex vulgaris* in dem *Labrax* der ägyptischen Küsten kommt er ebenfalls vor, ist aber hier anscheinend bedeutend seltener als bei Triest.

Vergleicht man diese vier Angehörigen des Genus *Acanthochasmus* näher miteinander, so zeigt sich wiederum das bemerkenswerte Faktum, daß sie in zwei deutlich voneinander gesonderte Gruppen zerfallen. In der Gruppe des *A. spiniceps* haben wir einen deutlich verbreiterten Hinterleib, eine in starke Querwindungen gelegte Samenblase, hinter den Keimstock gelagertes Receptaculum seminis und Uterusschlingen, die nur ganz ausnahmsweise bis zum Niveau des vorderen Hodens nach hinten reichen; in der Gruppe des *A. imbutiformis* dagegen findet sich ein nicht verbreiteter Hinterleib, eine in schwache Schlingen oder nur in Wellenlinien gelegte Samenblase, vor den Keimstock gelagertes Receptaculum seminis und Uterusschlingen, die bis zum hinteren Hoden hinabreichen können. Betreffs des systematischen Wertes dieser Gruppen gilt dasselbe, was ich oben bei Besprechung der in dem Genus *Stephanochasmus* sich zeigenden Variationen gesagt habe.

Eine in verschiedener Hinsicht vermittelnde Stellung zwischen den Angehörigen des Genus *Stephanochasmus* und denjenigen von *Acanthochasmus* nehmen *Dist. inflatum* Molin und *Dist. hispidum* Abildg. ein. Da beide Formen auch in den wesentlichen Zügen ihres inneren Baues eine weitgehende Übereinstimmung zeigen, so kann man sie mit Fug und Recht als Angehörige einer natürlichen Gattung betrachten. Es ist es mir indessen bekannt geworden, daß über eben diese Gattung bereits von anderer Seite Mitteilungen vorbereitet werden; ich verzichte deshalb auf ein weiteres Eingehen auf dieselben an dieser Stelle.

(Schluß folgt.)



Fig. 10.

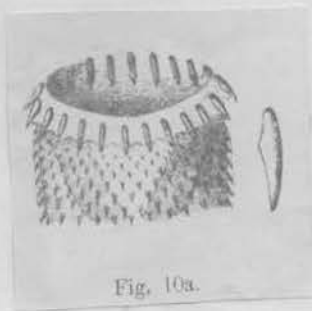


Fig. 10a.

1) Praeterire, übergelassen, nicht berücksichtigen.

ACANTHOSTOMUM PRODUCTUS (ODHNER, 1902) GOHAR, 1934SYN. Acanthochasmus productus ~~n. sp.~~ ODHNER, 1902

Länge durch Schüttelung ausgestreckt konservierter Exemplare bis 3,5 mm. Körper drehrund, beinahe gleichdick, von ca 0,35 mm Durchmesser. Mundsaugnapf ca 0,27 mm weit bei einer Tiefe von 0,2 mm. Sein Rand normal mit einem Kranze von 23 höchstens 0,057 mm langen Stachein bewaffnet. Bauchnapf 0,17 mm im Durchmesser, im Anfang des zweiten Viertels bis Fünftels der Körperlänge. Samenblase wellenförmig gewunder, nach hinten ungefähr bis zum Ende des ersten Drittels der Entfernung zwischen Bauchnapf und Keimstock reichend. Im äussersten Hinterende folgen hinter einander Keimstock, grosses Receptaculum seminis und die beiden längsovalen ganzrandigen Hoden. Die drei Keimdürsen liegen alle völlig median, das Receptaculum ist dagegen ein wenig seitlich verschoben. Dotterstöcke in der Höhe des Receptaculums beginnend und vorn ein kleines Stück vor dem Hinterende der Samenblase aufhörend. Uterusschlingen weniger dicht verlaufend. Eier langgestreckt, 0,034 mm lang, aber nur 0.11 mm breit.

From ODHNER, 1902

During September, October and November, 1964, the author dissected a large number of water snakes *Tropidonotus piscator*. Along with the infection of *Encylometra* sp., eighteen worms belonging to the genus *Haplocaecum* Simha, 1958 were collected. They all contained a single intestinal ramus, which was confirmed on sectioning two worms. On further study they were found to be new, and are here described under the name of *Haplocaecum proctophorum* n. sp.

Family: ACANTHOSTOMIDAE Poche, 1926

Subfamily: Acanthostominae Nicoll, 1914

Genus: *Haplocaecum* Simha, 1958

*Haplocaecum proctophorum* n. sp. DWIVEDI, 1966

Body elongated, the anterior end flat and the posterior end round. It measures 1.98 - 2.85 mm in length and 0.18 - 0.21 mm in breadth from the level of the ventral sucker to that of the ovary. Body surface covered by minute spines. The oral sucker is funnel-like, anteriorly directed, surrounds the mouth and measures 0.135 - 0.150 mm in length and 0.105 - 0.130 mm in breadth. It is

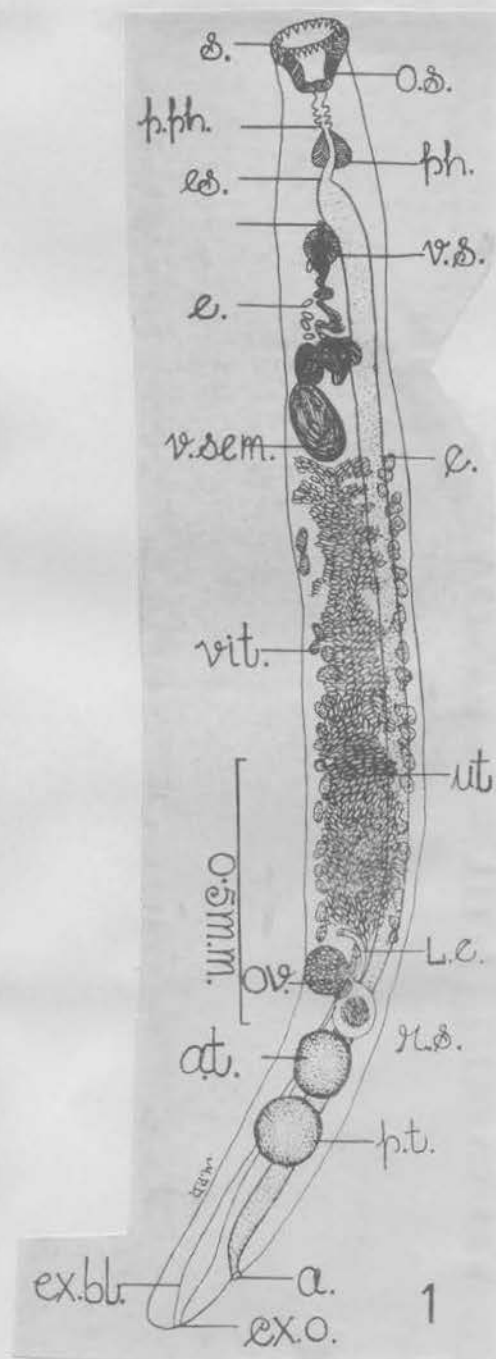
armed with a cirlet of 20 to 22 spines which measure 0.052 - 0.054 mm in length and 0.0134 - 0.0141 mm in breadth. The ventral sucker is smaller than the oral sucker; it is situated 1/6 of the body length from the anterior end, in the median line or slightly towards the left, and measures 0.075 - 0.090 mm in length and 0.060 - 0.075 mm in breadth, nearly spherical.

The oral sucker communicates with the pharynx through a long, convoluted prepharynx which measures 0.075 - 0.150 mm. The pharynx is muscular, globular, and measures 0.060 - 0.090 mm in length and 0.060 - 0.075 mm in breadth. The esophagus is small, 0.018 - 0.021 mm in length, and leads into a single caecum which opens in the posterior end of the body through an anus.

The gonads lie in the posterior region of the body. The testes are tandem situated dorsally above the cecal ramus, almost in contact with each other or with an intertesticular space of 0.017 mm. Both testes are entire, round, and spherical. The anterior testis measures 0.090 - 0.135 mm in length and 0.090 - 0.105 mm in breadth. The posterior testis measures 0.112 - 0.165 mm in length and 0.090 - 0.105 mm in breadth, i. e., it is a little larger than the anterior. The cirrus sac is absent. The vesicula seminalis is coiled below the ventral sucker, and shows a prominent basal sac. The common genital aperture lies immediately above the ventral sucker.

The ovary is smooth, round, pretesticular, situated slightly to the right of the median line, and measures 0.080 - 0.100 mm in length and 0.064 - 0.080 mm in breadth. The receptaculum seminis is almost as big as the ovary and measures 0.076 - 0.084 mm in length and 0.076 - 0.080 mm in breadth. The shell gland complex is situated close to the left internal margin of the ovary. The vitellaria are distributed laterally in the body from the lower margin of the vesicula seminalis up to the posterior level of the ovary. They do not form a lattice in front of the ovary, such as SIMHA (1) reported in *Haplocaecum asymmetricum*. The uterus forms transverse coils between the ovary and the basal sac of the vesicula seminalis, and opens through the common genital opening in front of the ventral sucker.

Eggs are operculate, numerous in mature forms, and measure  $0.032 \times 0.012$  mm. A long Laurer's canal is present, which opens above the ovary by a minute opening. The excretory opening lies on the posterior end of the body. The excretory bladder is tubular and long, extending to the upper margin of the ovary where it divides into two long cornua which reach to the level of the pharynx.



## DISCUSSION

The genus *Haplocaecum* Simha, 1958 until now includes only the type species *H. asymmetricum*. A second species is here added to it, *H. proctophorum* n. sp., recorded from *Tropidonotus piscator*. *H. proctophorum* differs from the type species in having a narrower, more elongated body; a smaller oral sucker; a more elongated prepharynx; a smaller pharynx; a receptaculum seminis as large

as the ovary; no converging lattice of vitelline follicles immediately above the ovary, and lastly, in having an anus. The inclusion of *H. proctophorum* n. sp. necessitates the amendment of the generic diagnosis proposed by SIMHA (1).

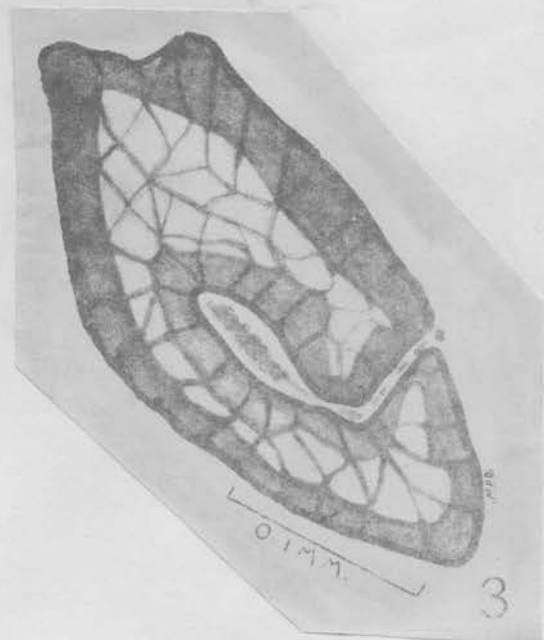
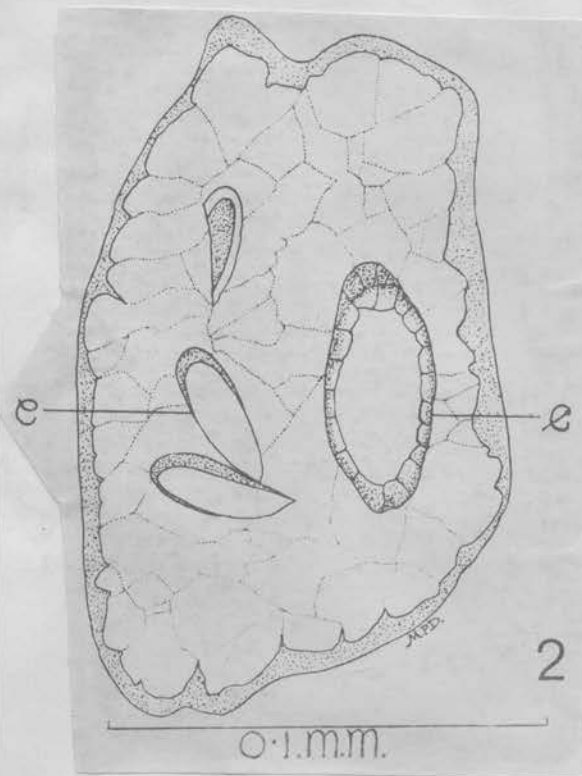
### AMENDED DIAGNOSIS OF THE GENUS *HAPLOCAECUM* SIMHA, 1958

**Acanthostomidae: Acanthostominae:** Distomes with flattened and elongated bodies covered with spines; oral sucker armed with 20—28 spines; ventral sucker median or slightly asymmetrical. Prepharynx small or long (0.044 - 0.150 mm); esophagus small. Single caecum present, with or without an anus. Excretory bladder tubular, opening at the level of the posterior end, of the ovary where it bifurcates into two cornua; the collecting ducts extend up to the side of the pharynx; terminal opening slightly asymmetrical. Gonads lie in the posterior region of the body closely packed in a line. Ovary pretesticular; testes tandem; receptaculum seminis small, or voluminous, as large as the ovary. Laurer's canal present. Vitellaria restricted to the middle third of the body, converging or not in front of the ovary.

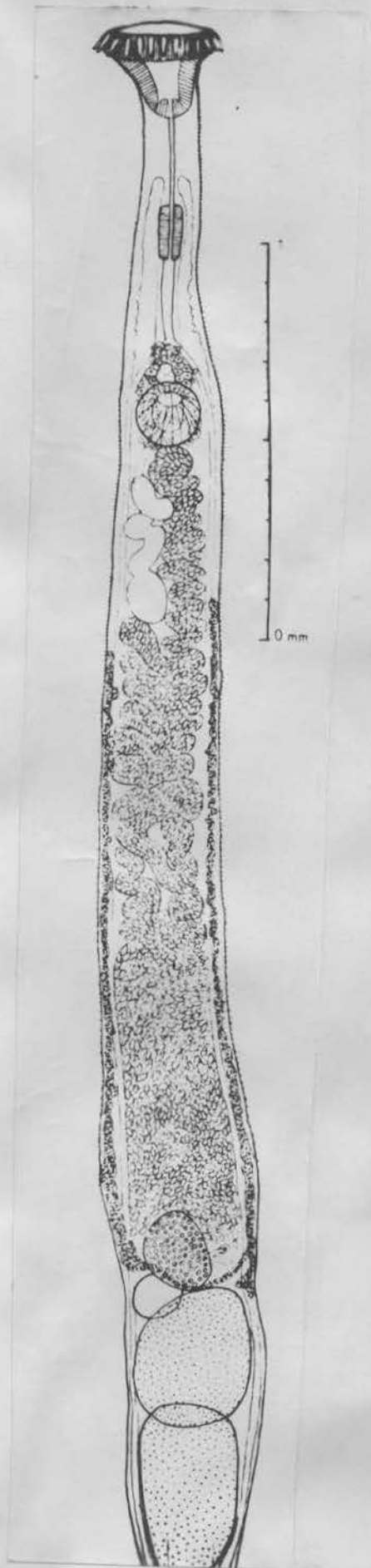
TYPE SPECIES: *Haplocaecum asymmetricum* Simha, 1958.

### KEY TO THE SPECIES OF THE GENUS *HAPLOCAECUM* SIMHA, 1958

- A. Single caecum present ..... *Haplocaecum* Simha, 1958  
 B. Anus absent; vitellaria converging above the ovary; receptaculum seminis small; oral sucker armed with 24 - 28 spines ..... *H. asymmetricum* Simha, 1958  
 BB. Anus present; vitellaria do not converge above the ovary; receptaculum seminis voluminous, almost the size of the ovary; oral sucker armed with 20 - 22 spines ..... *H. proctophorum* sp. nov.



Acanthostomum productum (Odhner, 1902)



SYNTYPE (MUSEE DE STOCKHOLM)

(Figure 3)

Two specimens were recovered from the intestine of a Nile crocodile (*Crocodylus niloticus*) taken in the Olifants River system. Unfortunately, these specimens are fragmentary, but sufficient of their characteristics have been made out to enable a specific determination to be made with a degree of certainty.

The parasite is elongate, sub-cylindrical in section, with a rounded posterior end. The anterior end is obtuse with a circum-oral ring of 23 spines of roughly equal size. The spines are somewhat bullet-shaped, and measure about 44 by 13  $\mu\text{m}$ . The body bears very small, backwardly-pointed, narrow spines, which are clearly visible on the anterior half of the body, but which appear to be absent from the posterior half.

The oral sucker is well developed, and provided with a deep cavity. It is terminal, somewhat funnel-shaped, with a maximum diameter of 0,30 mm and a depth of 0,29 mm. The walls of the oral sucker are thick and strongly muscular, but the wall is less thick at the base of the sucker. The ventral sucker is compact and muscular, globular or pyriform, with a diameter of about 0,16 mm. It lies at about 1,16 mm from the anterior end of the body in the midline of the ventral surface. The oral/ventral sucker ratio is about 1:1. A prepharynx, 0,18–0,26 mm long, leads from the base of the oral sucker to a well-developed oval pharynx, measuring 0,16 by 0,10 mm. The gut bifurcates close behind the pharynx, so that the oesophagus is very short. The caeca descend beyond the posterior testis almost to the end of the body, where they open to the exterior (Figure 3b).

A genital pore is situated immediately anterior to the ventral sucker in the median line. Just anterior to the pore, and also in the median line, there is a gonotyl invested with a mass of glandular tissue just behind the intestinal bifurcation. The gonotyl is pyriform, 52  $\mu\text{m}$  in diameter and with a depth of 62  $\mu\text{m}$ . Its structure would indicate that it functions as a genital sucker, and Dollfus (1950) has suggested that it may be partly eversible.

The two testes are compact, oval or rounded structures. The anterior testis measures 0,21 mm in diameter, whilst the posterior one is 0,25 mm long and 0,16 mm wide. They are contiguous and lie one directly behind the other in the posterior region of the body and between the gut-caeca. The seminal vesicle is a convoluted tube, lying just behind the ventral sucker. Its distal end joins with the distal end of the uterus to form a short hermaphroditic duct which leads to the genital pore.

The ovary is compact and rounded, 0,23 mm long and 0,17 mm wide. It lies immediately in front of, and somewhat ventrally to, the anterior testis. In one fragment it lies in the midline. The oval receptaculum seminis lies to one side of the ovary and overlaps the anterior testis.

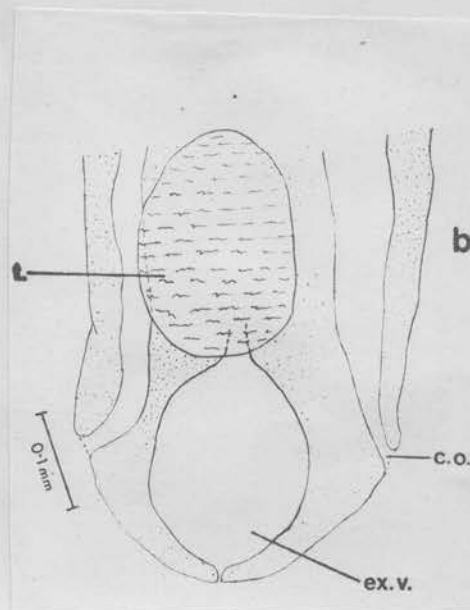
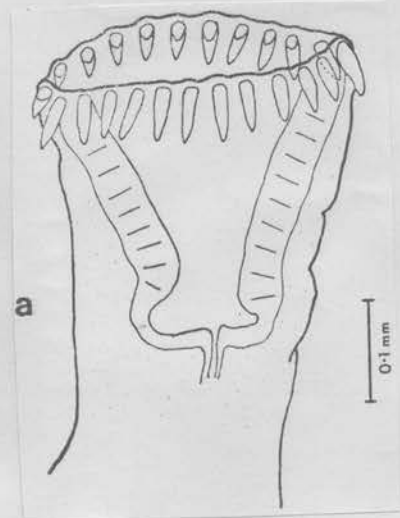
The vitelline glands are follicular and extend as a narrow band lateral to each intestinal caecum from the anterior testis forward to about the middle level of the body. The uterus follows a sinuous course from just anterior to the ovary until it joins the hermaphroditic duct at the level of the ventral sucker. It is filled along its length with eggs measuring 33 by 17  $\mu\text{m}$ . The eggs are operculate and embryonated.

There is an excretory pore at the posterior tip of the body, but further details of the excretory system have not been made out in the material available, except for a very much swollen section of the vesicle before it opens externally.

Although fragmentary, the present material has an interesting feature inasmuch as the ends of the intestinal caeca open to the exterior in the posterior region of the body. Several specimens of *Acanthostomum gonocotyl* Dollfus and *A. productum* (Odhner) from African crocodiles, and many of *A. spiniceps* (Odhner) from African *Bagrus* in the collections of the British Museum (Natural History) all show either a distinct opening or an involution of the body-wall where the caeca terminate, suggesting a connection between the end of the caecum and the body-wall.

Six or seven species of *Acanthostomum* have been recorded from African crocodiles and freshwater fishes, but Nasir (1974) has recently placed all these species in the synonymy of *A. imbutiforme* (Molin, 1850), a parasite of Mediterranean fishes. On available evidence, it is exceedingly doubtful whether all six species from African freshwater hosts are synonymous, especially when it is realized that all known specimens from crocodiles invariably have 23 circum-oral spines, a figure that has not yet been found to be constant in specimens from African freshwater fishes.

Where known, the metacercariae of *Acanthostomum* occur encysted in the subcutaneous tissues of various fishes.





*Acanthochasmus quaesitus* sp. n. inquir. Nicoll, 1918

Over two hundred specimens of a species of *Acanthochasmus* were taken from the intestine of a crocodile (*Crocodilus johnstoni*) which was killed at Armadale, North Queensland. Unfortunately a considerable time had elapsed before the animal was brought for examination and

by then the parasites were in a macerated condition. As a consequence the majority had lost all trace of spines but several showed remnants of the cuticular spines with a few cephalic spines.

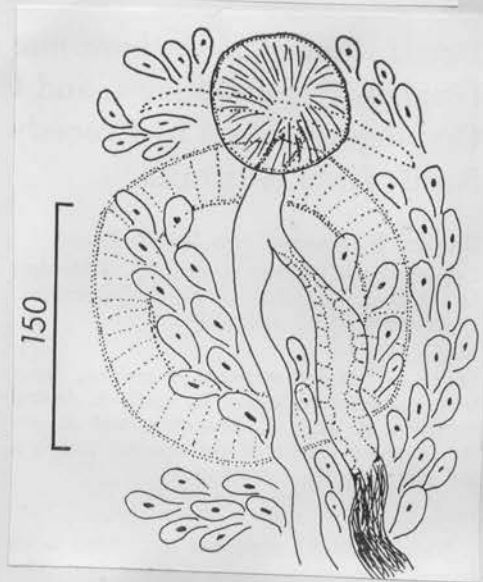
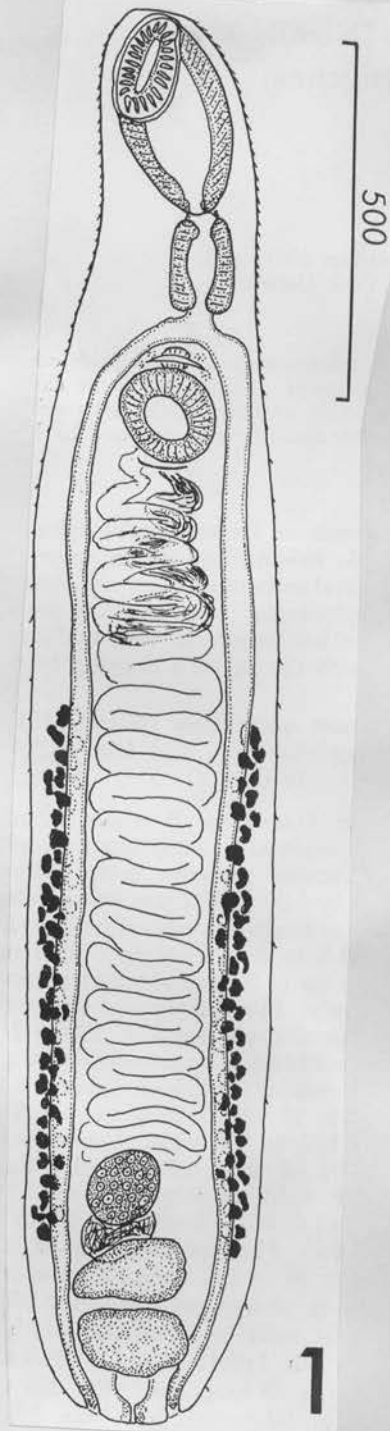
Most of the specimens had died in an abnormally extended condition and many of them were so greatly etiolated that they presented the appearance of mere threads. On that account no attempt will be made here at a description which at best could be only conjectural and misleading. Sufficient details were available however to satisfy me that the species is distinct from any of the already known species of the genus.

*Acanthostomum quaesitum* (Nicoll, 1918)  
Hughes, Higginbotham, and Clary, 1941  
(Figs. 1, 2)

DESCRIPTION (based on 9 whole mounts and sectioned material): Body elongate with somewhat truncated posterior end, 1.79 to 1.85 mm long by 0.30 to 0.37 mm wide; widest point variable in hindbody; ratio of body width to length 1:4.5 to 6.0. Tegument with numerous spines up to 5 long anteriorly; spines sparse posteriorly. Eyespot pigment dispersed. Oral sucker cup-shaped, terminal, 169 to 253 long by 169 to 229 wide, surrounded by single uninterrupted row of 24 spines; spines 36 to 41 long by 7 to 10 wide. Acetabulum 135 to 181 long by 137 to 186 wide. Forebody 15 to 23% (18%) of total body length. Ratio of oral sucker width to acetabular width 1:0.75 to 0.95 (1:0.85). Prepharynx 20 to 30 long, thin-walled. Pharynx barrel-shaped, 108 to 181 long by 60 to 121 wide. Ratio of oral sucker width to pharyngeal width 1:0.35 to 0.44 (1:0.39); ratio of acetabular width to pharyngeal width 1:0.41 to 0.51 (1:0.46). Esophagus up to 25 long, lined with thin epithelium. Cecal bifurcation less than 5% of

total body length preacetabular; ceca lined with epithelium, opening separately at posterior end of body; ceca not atrophied.

Testes spherical to subspherical, smooth, tandem, contiguous; anterior testis 84 to 128 long by 145 to 181 wide, posterior testis 132 to 145 long by 108 to 176 wide; posttesticular space 2.0 to 6.6% (3.4%) of total body length. Seminal vesicle bipartite, sinuous, median, intercecal, extending 1.5 to 2.5 times acetabular length postacetabular. Prostatic duct surrounded by few prostatic cells free in parenchyma. Preacetabular pit lined with tegumental spines, with transverse aperture 48 to 106 wide, containing solid-muscular gonotyl 43 to 67 long by 69 to 84 wide; pit surrounded



by gland cells free in parenchyma. Genital pore immediately preacetabular, not opening through preacetabular pit. Postacetabular pit a transverse slit 72 to 84 wide.

Ovary less than ovarian diameter pretesticular, not contiguous with anterior testis, spherical, 84 to 132 long by 108 to 145 wide. Seminal receptacle posterodorsal to ovary, 55 to 120 long by 120 to 200 wide. Ootype region not clearly seen. Uterus wound in ascending intercecal loops between ovary and acetabulum; loops occupying 50 to 65% (56%) of total body length; short muscular metraterm joining hermaphroditic duct dorsal to acetabulum. Vitellaria follicular; follicles in two longitudinal rows dorsal and lateral to ceca, extending from level of middle of ovary or of anterior testis to 21 to 23% of total body length postacetabular; follicles not reaching anteriorly to level of posterior margin of seminal vesicle, 13 to 24 long by 10 to 17 wide. Eggs 29 to 33 long by 10 to 12 wide.

Excretory vesicle Y-shaped; bifurcation posterodorsal to acetabulum; arms reaching posterior margin of oral sucker; pore terminal with muscular sphincter surrounded by gland cells.

HOST: *Crocodylus johnsoni* Krefft.

SITE OF INFECTION: Intestine.

LOCALITY: Lynd River, Amber Station, Mount Surprise, North Queensland, Australia.

SPECIMENS DEPOSITED: USNM Helm. Coll. No. 74504. Other specimens in collections of

North Queensland Museum and South Australian Museum.

By having a solid-muscular gonotyl, esophagus shorter than the pharynx, preovarian uterine loops, and postovarian seminal receptacle, *Acanthostomum quaesitum* resembles *A. coronarium* (Cobbold, 1861) Looss, 1899; *A. productum* (Odhner, 1902) Stossich, 1905; *A. vicinum* (Odhner, 1902) Stossich, 1905; *A. gonotyl* (Dollfus, 1950) Morozov, 1955; *A. atae* Tubangui and Masiluñgan, 1936; *A. elongatum* Tubangui and Masiluñgan, 1936; and *A. crocodili* Yamaguti, 1954. It differs from the first four and resembles the latter three by having anal openings at the posterior end of the body rather than laterally, and possessing a prepharynx less than two times longer than the pharynx. *Acanthostomum quaesitum* differs from *A. atae*, *A. elongatum*, and *A. crocodili* by having vitelline follicles not reaching the level of the posterior margin of the seminal vesicle, and exhibiting a prepharynx much shorter rather than slightly longer than the pharynx. *Acanthostomum atae* reportedly possesses 25 to 26 oral spines, *A. quaesitum* has 24, *A. crocodili* 23, and *A. elongatum* 21 to 22, but we do not rely heavily on those differences because of the reported variation in number of oral spines among other species of acanthostomes.

Nicoll (1918) reported collecting acanthostome digeneans from *Crocodylus johnsoni* Krefft in northern Australia, stating that the worms differed from any other known species but were in such poor condition that no description could be made. He did, however, name the species *Acanthochasmus quaesitus* sp. inq. Hughes, Higginbotham, and Clary (1942) transferred the species to *Acanthostomum* because *Acanthochasmus* was a junior synonym of that genus. Until the present report the species has remained a *species inquirendum* and *nomen nudum*. During a study of the acanthostomes, the first author borrowed and examined Nicoll's specimens and found them to consist of macerated, unmounted, unidentifiable fragments. Subsequently, the second author obtained specimens of acanthostomes from *C. johnsoni* in northern Australia near the locality of Nicoll's material. The somewhat contracted specimens are distinct from any other known species, and are similar in shape and size to those collected by Nicoll. We therefore assign our specimens to that species and present the following description to validate the *nomen nudum*. We assign the species to the family Cryptogonimidae following the suggestions of Cable and Hunninen (1942).

Worms were collected from intestinal scrapings of a preserved male *Crocodylus johnsoni* 101.5 cm in total length and 53.9 cm in snout-vent length. Some specimens were mounted in Canada balsam or Histoelad after staining with acetocarmine or Mayer's hematoxylin for study as whole mounts, and others were cut into serial sagittal sections at 8  $\mu$ m and stained with hematoxylin-eosin. Measurements are in micrometers unless otherwise stated; figures were drawn with the aid of a drawing tube.

FROM BROOKS AND BLAIR, 1978

Distomum scyphocephalum Braun, 1901

in meiner zweiter vorläufigen Mitteilung beschrieben und ihre nächsten Verwandten (D. coronarium Cobb., D. spiniceps Lss.) namhaft gemacht; als Wirt kann nur Chelys. fimbriata (= Testudo matamata) sicher angegeben werden, die übrigen Wirtsangaben sind nicht mehr zu eruieren.

Dist. scyphocephalum ist die kleinste der bis jetzt bekannten Acanthochasmus-Arten, da sie nur 2,3 - 3 mm lang wird, während Ac. spiniceps 7 und Ac. coronarius 12 - 14 mm lang ist. Der Körper ist fast drehend, hinten abgerundet, vorn quer abgestutzt. Mit Ausnahme des hintersten Endes ist die ganze Oberfläche bestachelt, vorn am dichtesten.

Die beinahe kreisrunde, endständige Mundöffnung, welche in den trichterförmigen Saugnapf führt, ist von einem einfachen Kranze von 0,032 - 0,037 mm langen, platten Stacheln umgeben, deren Zahl gewöhnlich 24 beträgt; einmal zählte ich 22, bei zwei anderen Exemplaren 26 und 30. Ac. spiniceps hat 26 Stacheln von 0,1 mm und Ac. coronarius 24 von 0,112 mm Länge.

Der Durchmesser der Mundöffnung beträgt beinahe so viel wie die Länge des Mundsaugnapfes; die Zahlen schwanken zwischen 0,2 - 0,25 mm. Der unpaare, dem Saugnapf sich ausschliessende Darm ist je nach der Kontraktion der Tiere verschieden lang und demgemäss liegt auch der Pharynx etwas verschieden, stets aber näher der Gabelstelle als dem Mundsaugnapf, in dieser Beziehung stimmt Ac. scyphocephalus mit Ac. spiniceps überein, beide Arten weichen aber von Ac. coronarius insofern ab, als sie einen deutlichen muskulösen Pharynx besitzen, während ein solcher bei der Cobbold'schen Art nach Parona\*) fehlt und nur durch eine wenig hervortretende Erweiterung des Oesophagus angedeutet ist. Die Gabelstelle des Darms liegt vor dem Bauchsaugnapf und die Darmschenkel ziehen bei allen drei Arten nahe dem Seitenrand bis in das hinterste Leibesende.

Der Bauchsaugnapf liegt etwa an der Grenze zwischen erstem und mittelrem Körperdrittel, Quer- wie Längsdurchmesser schwanken zwischen 0,08 und 0,11 mm was erheblich weniger ist als bei Ac. spiniceps (0,5 mm) und Ac. coronarius (0,238 resp. 0,280 mm). Hinter dem Bauchsaugnapf habe ich bei zahlreichen Exemplaren einen schmalen queren Spalt gesehen, der den Eingang in eine flache nach hintengerichtete Tasche darstellt; letztere ist etwa halb so breit und lang wie der Bauchsaugnapf und war sowohl in Rücken- wie Seitenlage des Tieres zu erkennen. Über ihre Bedeutung kann ich nichts angeben, mit den Genitalien hat sie nichts zu thun.

Mit Ausnahme der Dotterstöcke und Genitalien im Mittelfelde zwischen Bauchsaugnapf und Hinterrand des Körpers; ganz hinten, von den Darmschenkeln eingefasst finden wir hinter einander die beiden kugligen Hoden (0,14 - 0,19 mm), dicht vor ihnen in der Mittellinie oder etwas nach einer Seite verschoben den Keimstock (0,1 - 0,13 mm) und von diesem bis zum Bauchsaugnapf sich erstreckend den Uterus, der auch hier nur einen, den aufsteigenden Schenkel bildet, Der Genitalporus liegt vor dem Bauchsaugnapf, ein Cirrusbeutel fehlt, doch findet sich hinter dem Bauchsaugnapf eine kropfförmige Auftreibung in Vas deferens, die man als Vesicula seminalis ausprechen kann. Die Eier sind 0,020 - 0,028 mm lang, 0,11 mm breit und oval; in Grösse und Form stimmen sie mit den Eiern vorn Ac. spiniceps überein, bei Ac. coronarius sind sie nach Parona (l.c.) birntörmig und nur 0,014 mm lang.

Die schmalen Dotterstöcke beginnen jederseits eine Strecke hinter dem Bauchsaugnapf und reichen bis zwischen die beiden Hoden; ihr Beginn liegt bei Ac. spiniceps etwa an derselben Stelle, bei Ac. coronarius dagegen mehr nach vorn, neben dem Bauchsaugnapf, sie erreichen bei der Looss'schen Art den Vorderrand des vorderen Hodens, bei der Cobbold'schen dagegen dehnen sie sich bis auf den hinteren Hoden aus.

In den angegebenen Unterschieden liegt auch die Rechtfertigung für die Aufstellung einer dritten Acanthochasmus-Art.

From BRAUN, 1901

Cuerpo alargado, trunco en el extremo anterior, redondeado en el posterior (Lám. III, fig. 1); mide de longitud total entre 3.407 mm. y 3.148 mm., con un ancho máximo, tomado a nivel del ovario de 0.444 mm. a 0.481 mm. La cutícula está provista de pequeñas espinas que miden entre 0.011 mm. y 0.013 mm. de la base al vértice, que cubren todo el cuerpo, dejando libre una pequeña banda anterior inmediatamente por debajo de las espinas bucales y otra posterior a nivel de los poros cecales, pero siendo más abundantes en el tercio anterior del cuerpo.

La ventosa oral es terminal infundibuliforme, en campana, mide 0.481 mm. a 0.518 mm. de largo por 0.447 mm. a 0.518 mm. de ancho; en su borde se disponen 23 espinas piriformes, que forman una sola fila y que miden 0.070 mm. a 0.074 mm. de largo (Lám. III, fig. 2). La prefaringe es ancha, de paredes muy delgadas, mide 0.417 mm. a 0.456 mm. de largo por 0.143 mm. a 0.170 mm. de ancho. Le sigue una fuerte faringe, globulosa, que mide 0.209 mm. de largo por 0.235 mm. de ancho. Esófago ausente. Los divertículos intestinales le siguen inmediatamente a la faringe, son anchos al comienzo y se van afinando gradualmente, hasta terminar por abrirse en el extremo posterior del cuerpo por poros anales situados a ambos lados del orificio terminal de la vesícula excretora.

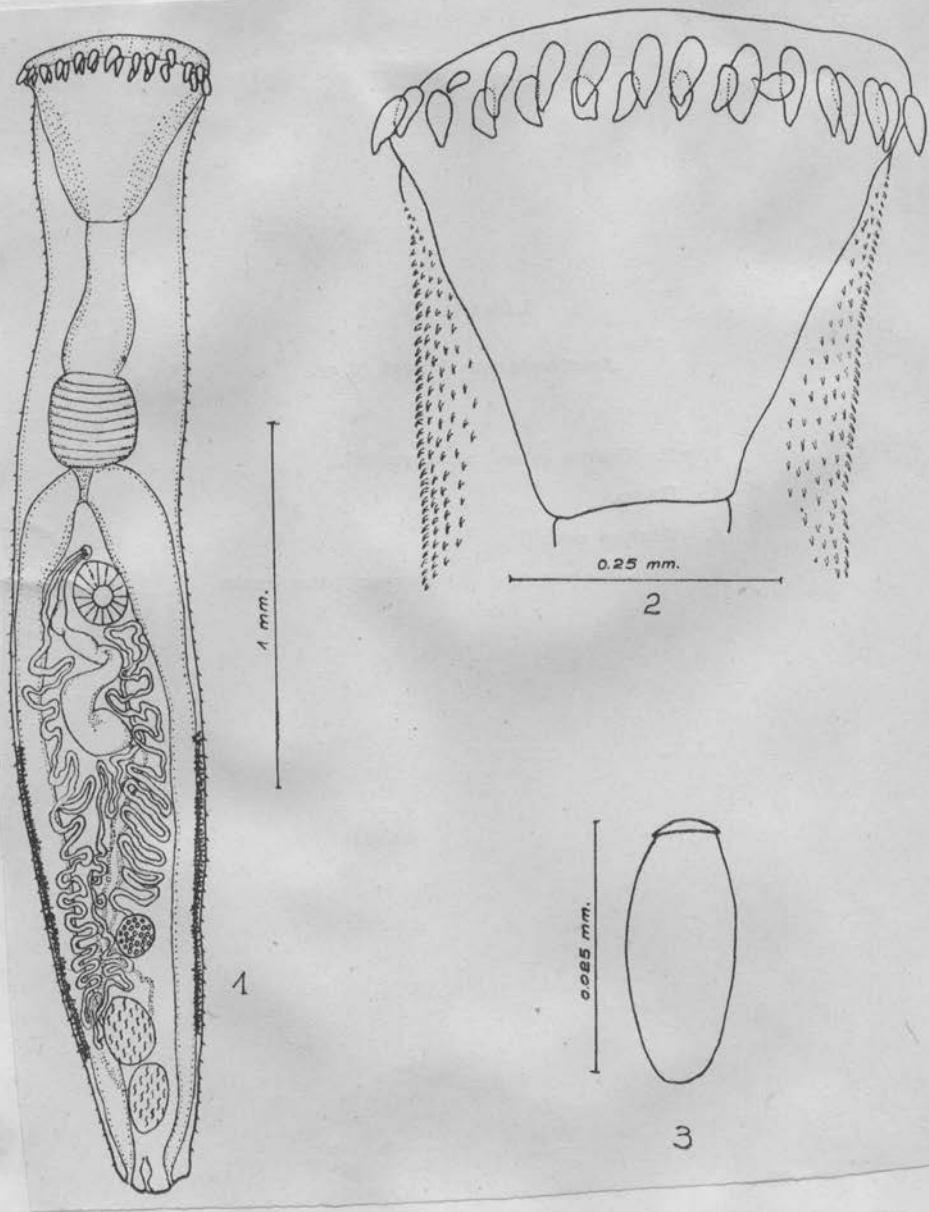
El acetábulo es circular, prácticamente situado en la línea ecuatorial del cuerpo; mide 0.156 mm. de diámetro. Relación ventosa oral: acetábulo 2.3 : 1.

Los testículos, situados en el extremo posterior del cuerpo, redondeados, en tandem, intracecales, muy próximos uno de otro, miden: el anterior 0.196 mm. de largo por 0.131 mm. de ancho; el posterior 0.222 mm. de largo por 0.131 mm. de ancho. Los deferentes desembocan en una vesícula seminal muy bien desarrollada, que mide de longitud total entre 0.652 mm. y 0.717 mm.; luego de formar una o dos ansas, desemboca en el poro genital, situado en la línea media, inmediatamente preacetabular.

El ovario, situado inmediatamente pretesticular, es redondeado, más pequeño que cualquiera de los dos testículos, mide 0.117 mm. a 0.131 mm. de diámetro. De él se remonta un oviducto corto, que se une al reservorio vitelógeno; sale entonces el útero, que asciende hasta el acetábulo, para descender luego nuevamente hasta el ovario, formando luego una ansa entre el ovario y el testículo anterior; vuelve a ascender luego, para terminar en el poro genital. No se observa glándula de Mehlis ni receptáculo seminal. El útero, que está poco desarrollado, contiene huevos operculados que miden 0.024 mm. de largo por 0.011 mm. de ancho (Lám. III, fig. 3). Las glándulas vitelógenas, poco desarrolladas, están formadas por folículos pequeños, en su mayor parte extracecales, se extienden desde algo por encima del ovario hasta la base de la vesícula seminal.

*Habitat:* Intestino delgado de *Phrynosoma geoffroyana hillarii* D. & B. Río Negro, Paso de los Toros, Departamento de Tacuarembó, Uruguay. 2 ejemplares en la colección Helmintológica del Museo de Historia Natural de Montevideo.

*Discusión:* Nuestros dos ejemplares de esta especie coinciden exactamente con las descripciones de BRAUN, 1901, de PELÁEZ y CRUZ, 1953 y de CABALLERO, 1955. Sólo queremos agregar pues, una nueva observación de este trematodo en un nuevo huésped.



Acanthostomum  
scyphocephalum  
Braun after Braun  
From Pratt, 1902

Acanthostomum scyphocephalum (Braun, 1901) Pelaez y Cruz, 1953

1. Cuerpo entero, vista ventral.
2. Ventosa oral.
3. Huevo.

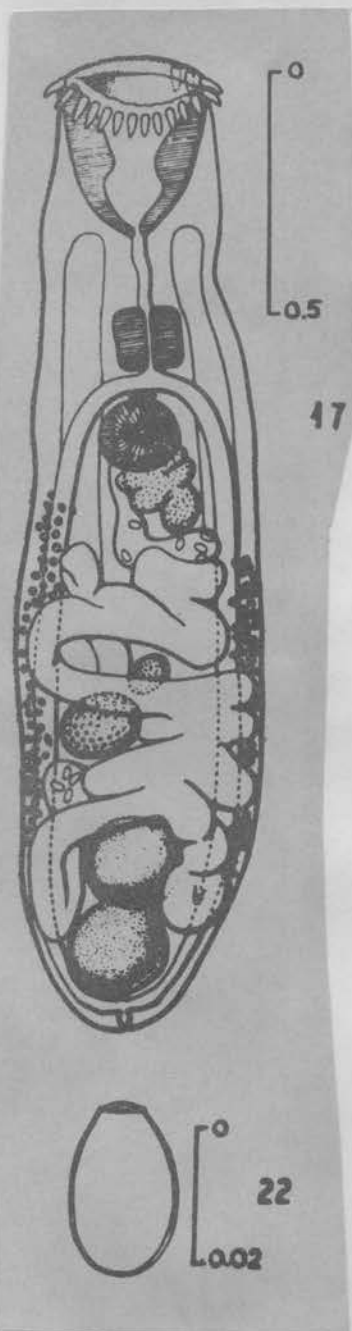
**Descripción.**—Cuerpo cilíndrico, más o menos alargado, con 1.846-2.331 mm. de longitud y 0.347-0.567 mm. de anchura. Su máximo diámetro se observa al nivel de la zona pre-testicular. La parte anterior de su cuerpo es truncada y la posterior roma, siendo semitransparente por su escaso parénquima.

El acetábulo semi-esférico, está situado en la línea media de la superficie ventral y anterior al plano ecuatorial; fuertemente musculoso, con su diámetro transverso ligeramente mayor que al anteroposterior, y mide 0.157-0.203 mm. por 0.318-0.182 mm.; con respecto a la longitud total del cuerpo, se encuentra colocado a una distancia de 1/2.7-1/3.3 del extremo anterior. Ventosa oral en posición terminal, fuertemente musculosa y en forma de embudo con su vértice dirigido hacia atrás. Mide 0.311-0.331 mm. de diámetro por 0.268-0.473 mm. de profundidad. La relación promedio existente entre los diámetros mayores de ambas ventosas es de 1:1.78.

La cutícula tiene un espesor de 0.003-0.005 mm., está provista en su totalidad de pequeñas espinas, semejantes a las de la especie anterior, pero con su punta más aguda y doblada; son más numerosas en la parte anterior del tremátodo.

Corona adoral de 30 espinas, cuya disposición es semejante a la de *A. caballeroi*, y que miden 0.055-0.073 mm. por 0.013-0.025 mm. En el fondo de esta ventosa se encuentra la abertura oral que comunica con la pre-faringe de paredes tenues y 0.146-0.189 mm. de longitud. Esta comunica con la faringe musculosa de aspecto cuadrangular, cuya dimensión antero-posterior es 0.130-0.175 mm. y la transversal de 0.140-0.188 mm. La faringe se observa muy próxima al acetábulo, distando de él 0.036-0.119 mm. Inmediatamente por detrás de la faringe se separan dos ramas intestinales

\* Esta especie tenemos el honor de dedicarla a la Universidad Nacional Autónoma de México (U.N.A.M.) en el IV Centenario de la fundación de la Universidad Mexicana.



de 0.029 mm. de ancho que, extendidas por los bordes laterales y cerca de ellos, llegan hasta el extremo posterior, rodean el último testículo y se abren a la vesícula excretora colocada sobre la línea media. El poro excretor es póstero-terminal. La vesícula anteriormente se divide en dos ramas colectoras gruesas que se extienden por delante hasta el nivel posterior de la ventosa oral, presentando así el conjunto forma de "Y".

Los testículos se encuentran en la parte posterior del cuerpo uno detrás del otro sobre la línea media, son esféricos o ligeramente ovales y de bordes lisos. El primero mide 0.167-0.189 mm. en su diámetro transversal por 0.157-0.189 mm. en el anteroposterior, en tanto que el segundo tiene 0.145-0.220 mm. por 0.196-0.220 mm. y se encuentra separado 0.036-0.084 mm. del extremo posterior. En los ejemplares estudiados los conductos eferentes y deferente no se apreciaron debido a la gran cantidad de huevecillos contenidos en el útero. La vesícula seminal se encuentra libre en el parénquima, está enrollada y a 0.073-0.180 mm. por detrás del acetábulo; es dorsal con respecto al útero, estando su porción posterior un poco más ensanchada que el resto; por detrás del acetábulo se adelgaza para formar un pequeño conducto eyaculador que se abre al atrio genital colocado inmediatamente por delante del acetábulo entre éste y el quiasma intestinal. El atrio se presenta como una hendidura transversa que dista 0.005-0.018 mm. del borde anterior de la ventosa ventral. No hay gonotilo.

El ovario es ovoideo y entero, situado por delante de los testículos al lado derecho o izquierdo de la línea media y con su eje mayor dirigido oblicuamente. Dista del primer testículo 0.044-0.152 mm., mide 0.101-0.138 mm., por 0.142-0.182 mm., siendo la relación promedio de los diámetros mayores del ovario y testículo anterior de 1: 1.1. En nuestros ejemplares, el oviducto, ootipo, conductos vitelógenos y conducto de Laurer no son aparentes. El receptáculo seminal se encuentra por delante del ovario en la línea media; es ovoide y dorsal con respecto al útero; mide 0.080 mm., por 0.051 mm., con su eje mayor dirigido longitudinalmente. El útero presenta varias asas amplias que bajan hasta el testículo posterior por los lados, sube formando otras transversales que ocupan el área comprendida entre el testículo anterior y el ovario y de éste hasta el nivel posterior del acetábulo en donde se observa una rama ascendente que, pasando por detrás de la ventosa ventral, va a desembocar al atrio genital. Las asas uterinas invaden también las zonas ocupadas por las ramas intestinales y se encuentran llenas de numerosos huevecillos de 0.0250-0.00326 mm., por 0.0127-0.0164 mm., cuya morfología es similar a la de *Acanthostomum caballeroi*.

Las glándulas vitelógenas se encuentran medianamente desarrolladas; están constituidas por pequeños folículos de 0.006-0.008 mm., de diámetro, dorsales con respecto a las ramas intestinales y colocados en los campos

laterales y zonas intestinales. Los más posteriores se encuentran al nivel de la mitad del primer testículo, en tanto que los anteriores llegan hasta una corta distancia por detrás del acetábulo. La distancia que hay desde los primeros folículos vitelógenos al extremo anterior del cuerpo es de 1.118-1.260 mm., en tanto que la de los últimos al posterior es de 0.246-0.360 mm. La longitud total de los vitelógenos corresponde a 0.684-0.799 mm., siendo la relación promedio de la longitud de la región posterior carente de vitelógenos a la total del cuerpo igual a 1: 6.9.

*Huésped definitivo.*—*Crocodilus acutus acutus* Müller y Hellmich, 1940.

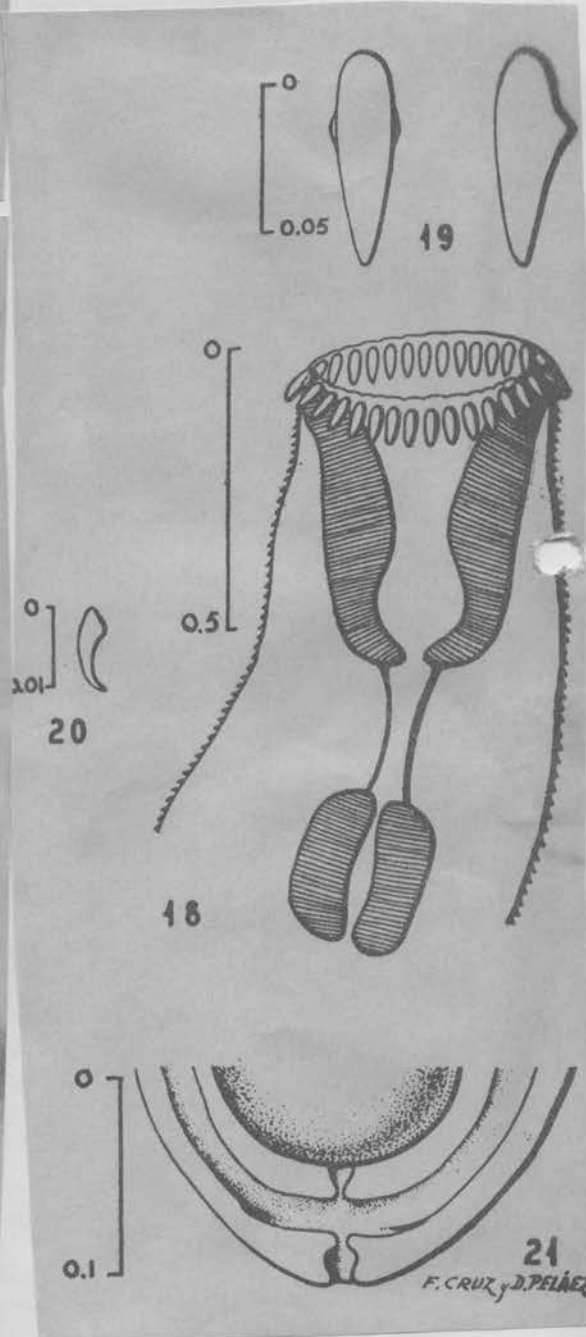
*Localización.*—Intestino delgado.

*Localidad.*—Río Verde, Oaxaca; (Istmo de Tehuantepec, México).

*Colector.*—Fco. Cruz Lozano, (mayo de 1950).

*Tipos.*—7 ejemplares adultos (Números 189-195) montados *in toto* en preparaciones coloreadas, en la Colección del Laboratorio de Parasitología de la Escuela Nacional de Ciencias Biológicas (Instituto Politécnico Nacional), México, D. F.

*Observaciones.*—Por su morfología cabe dentro del grupo *imbutiformis* propuesto por Looss en 1901 y se parece algo a las especies *A. vicinus* (Odhner, 1902) y *A. marajoara* (Freitas y Lent, 1938), pero se distingue de ellas por presentar el útero con una rama descendente que llega hasta el testículo posterior y luego sube describiendo varias asas amplias que invaden los campos medio y laterales, en tanto que en las especies mencionadas el útero es únicamente ascendente y ocupa sólo el campo medio en *A. vicinus* y además los laterales en *A. marajoara*. En esta última no es aparente el receptáculo seminal, en la nuestra se observa por delante del ovario y por detrás en *A. vicinus*. Además, el número de espinas que forman la corona anterior es también diferente en las tres especies (30 en nuestra especie, 23 en *A. vicinus* y 20 en *A. marajoara*). Respecto a la relación promedio que existe entre los diámetros mayores de ambas ventosas, vemos que en *A. unami* es de 1: 1.78, en *A. vicinus* 1: 1.41 y en *A. marajoara* 1: 1.83. La relación promedio entre la longitud de la zona posterior carente de vitelógenos y la total del cuerpo corresponde a 1: 4.9 para *A. marajoara*, 1: 8.0 en *A. vicinus* y 1: 6.9 en *A. unami*.



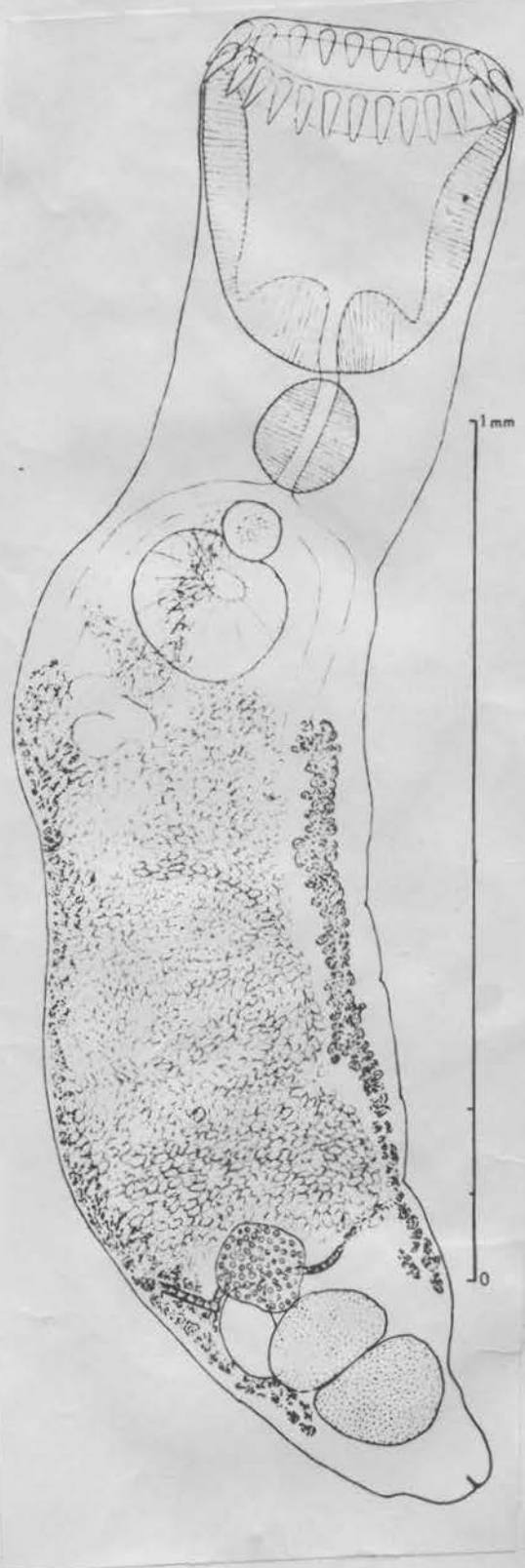


ACANTHOSTOMUM VICINUM (ODHNER, 1902) GOHAR, 1934  
 SYN. Acanthochasmus vicinus n. sp. ODHNER, 1902

Diese Art unterscheidet sich von der vorigen schon für dan blosser Auge durch andere Körperform. Die Länge beträgt bei den meisten meiner Exemplare ein wenig über 2 mm, kann indessen bis zu 3 mm steigen. Der Körper ist bedeutend abgeplattet in dorsoventraler Richtung mit einer Maximalbreite von 0,5 mm in der Höhe des Bauchnapfes. Der Hinterkörper wie bei Acanth. spiniceps Lss. deutlich verbreitert. Mundsaugnapf 0,23 - 0,25 mm, weit und 0,3 - 0,33 mm tief, also viel tiefer als bei Ac. productus. Die Zahl der Stacheln an seinem Rande ist 23, also genau dieselbe wie bei jener Art. Sie sind indessen bedeutend grösser, mit einer Maximallänge von 0,075 mm. Der Bauchnapf 0,18 - 0,21 mm in Durchmesser am Anfang des zweiten Drittels bis Viertels der Körperlänge. Samenblase locker knäuelartig geschlängelt und nur ein ganz kurzes Stück nach hinten reichend. Receptaculum seminis zwischen Keimstock und vorderen Hoden. Dotterstocke vom Vorderrande des vorderen Hodens bis in die Höhe des Hinterrandes des Barchsaugnapfes reichend. Uterusschlingen äusserst dicht liegend. Eier immer nur ca 0,026 mm lang und 0,01 mm breit.

Die spezifischen Unterschiede zwischen beiden Arten dürften bei einer Vergleichung der geschilderten Merkmale ohne Weiteres einleuchten. Von sämtlichen bis jetzt beschriebenen Arten der Gattung Acanthochasmus, incl. Ac. coronarius (Cobb.) aus dem Alligator, sind sie leicht zu unterscheiden. In den beiden von Looss bekannt gemachten Fällen von einem Vorkommen zweier Acanthochasmus-Arten im Darne desselben Wirtes sind die neben einander wohnenden Formen mit einander näher verwandt, als es hier der Fall ist, indem die beiden Arten des Krokodils nicht derselben Untergruppe der Gattung angehören. Ac. vicinus ist nämlich nach dem Typus von Ac. spiniceps Lss. gebaut, während Ac. productus mit Ac. imbutiformis (Mol.) am nächsten verwandt ist. Der letzteren Gruppe gehören auch die beiden schon bekannten Arten aus Reptilien, Ac. scyphocephalus Brn. und Ac. coronarius (Cobb.) an.

Acanthostomum vicinum (Odhner, 1902)



SYNTYPE (MUSEE DE STOCKHOLM)

FROM DOLLFUS, 1950