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ACANTHOCOLPID TREMATODES OF MARINE FISHES OF INDIA, WITH CONSIDERATIONS ON SYNONYMIES IN THE GROUP

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ABSTRACT

The present study is based on a collection of specimens belonging to the family Acanthocolpidae, Luhe, 1909 collected from the marine fishes of the east and west coasts of India. These species are spread over four genera, *Stephanostomum* Looss, 1899 *Tormopsolus* Poche, 1962, *Stephanostomoides* Mamaev and Oshmarin, 1966, and *Acanthocolpus* Luhe, 1906. It has been discussed that the rules of Zoological Nomenclature [Article 56 (a)] do not invalidate the name *Stephanostomun* Looss, 1899 as against *Stephanochasmus* Looss, 1900. It is also proposed to suppress Stephanochasmidae Dollfus, 1972 fn favour of Acanthocolpidae Luhe, 1909. *Stephanostomum cloacum* (Srivastava, 1938) is reported for the second time from a different host and locality with interesting observations. It has been shown that *Tormopsolus* is very close to *Acanthocolpus*. Morphological evidences have also been furnished to show that *Acanthocolpus luhei* Srivastava, 1939 is distinct from *A. liodorus* Luhe, 1906 in more than one character. The former was considered as a synonym of the latter by Caballero (1952), Yamaguti (1958) and Manter (1963). *Acanthocolpus caballeroi* Gupta and Sharma, 1972 has been considered as synonym of *A. luhei*. Ample evidences have been provided to suggest that *Acanthocolpus tenuis* Manter, 1963 does not belong to the genus *Acanthocolpus* Luhe, 1906 but to *Stephanostomoides* Mamaev and Oshmarin, 1966.

INTRODUCTION

The present study is based on a collection of trematodes belonging to the family Acanthocolpidae Luhe, 1909 collected from marine fishes of the east and west coasts of India. The acanthocolpid collection brought by Dr. T. D. Soota, Superintending Zoologist, Zoological Survey of India, Calcutta from Mandapam, Kozhikode and Mangalore have also been included. The aim of this study is to assess the stability of the members of the family Acanthocolpidae reported so far from the Indian region.

All measurements are in microns unless otherwise stated. Diagrams have been drawn with the aid of a camera lucida.

Looss (1899) named the genus *Stephanostomum* for the species *Distomum cesticellum* Molin, 1858, and included in it other four species also. In 1900, thinking that the name *Stephanostomum* is preoccupied as *Stephanostoma* Danielssen and Koren, 1880, he renamed his genus as *Stephanochasmus*. Manter (1934, 1940, 1947) opined that as the rules of nomenclature did not invalidate a name only due to slight change in the spelling, *Stephanochasmus* must be considered a synonym of *Stephanostomum*. For quite some time both the names were used by workers, but during recent years all the leading workers on Digenea have used only the name *Stephanostomum*.

The author agrees with Manter that the name *Stephanostomum* (syn. *Stephanochasmus*) should be held valid. He expressed his apprehension also that some workers would use the name *Stephanochasmus* in literature. Dollfus

(1972) does not agree with Manter, and gives more weight to Recommendation No. 3 (Appendix D, pages 104, 105) than to Article 56 (a) of the International Code of Nomenclature of 1964, accepting *Stephanochasmus* as valid name and *Stephanostomum* its synonym. According to Article 56 (a), the name *Stepnanostomum* does not get invalidated as against *Stephanochasmus* which Looss (1900) confusedly thought to be preoccupied as *Stephanostoma* Danielssen and Koren, 1880. As the relevant Rule of Nomenclature is very clear, the author agrees with Late Prof. H. W. Manter, and maintains that the literature should be kept confusion free. In this light Dollfus' (1972) action seems to be unjustifiable.

Looss (1972) makes a correction in the excretory system of the subfamily Stephanochasminae Nicoll (1910) as emended by Yamaguti (1934). He says that the subfamily has I-shaped or saccular excretory system instead of Y-shaped one. He further believes that Distomes with Y-shaped excretory vesicle do not belong to those with tubular excretory vesicle. With this belief he raises, the subfamily Stephanochasminae to the status of a new family Stephanochasmidae to accommodate *Stephanochasmus* Looss, 1900.

As the author considers *Stephanochasmus* Looss, 1900 a synonym of *Stephanostomum* Looss, 1899, the family Stephanochasmidae Dollfus, 1972 should be suppressed in favour of Acanthocolpidae Luhe, 1909 to which *Stephanostomum* belongs. There are genera like *Manteria* Caballero, 1950, *Pseudacaenodera* Yamaguti, 1965 and *Stephanostomoides* all with I-shaped excretory vesicle which are included in the family Acanthocolpidae.

Stephanostomum cloacum (Srivastava, 1938) Manter and van Cleave, 1951

(Fig 1, A)

Host : *Rachycentron canadus* (L), Black Kingfish, (Pisces ; Rachycentridae).

Location : Intestine

Locality : Kakinada (Bay of Bengal)

Number of specimens : 1, collected on February, 1975.

Distribution : Puri, and Kakinada (Bay of Bengal), Karachi (Arabian Sea).

The species was originally described from the fish *Lates calcarifer* in 1938. Since then it was never reported again from any part of the world. This is the second time that this species is being reported from a locality neighbouring to Puri, and from a different fish host. Morphologically, the present single specimen agrees fairly well with the original description of *Stephanostomum cloacum* (Srivastava, 1938) except in two notable differences. Firstly, the male and female terminal ducts are spined in the present specimens whereas the absence or presence of spines on them was not mentioned in the original description. The spined metraterm is almost as long as the cirrus sac as has been originally described. Secondly, there is some difference regarding arrangement of the peribuccal spines which are 34 in all. On the ventral side six oral spines alternate with six aboral ones. Similarly, on the dorsal side also six orals alternate with the six aborals. The rest of the spines are in single row on the lateral side. It can therefore be said that the peribuccal spines are arranged in two alternating rows dorsally and ventrally, while laterally the ring is single as occurs in *S. hispidum*. In the original description, the peribuccal spines are in two alternating rows on the dorsal side whereas on the ventral and lateral sides the row in single. I believe that these characters indicating the differences from the original description simply escaped Srivastava's observation.

Thus, in the arrangement of the peribuccal spines also *Stephanostomum cloacum* (Srivastava, 1938) resembles *Stephanostomum hispidum* (Yamaguti, 1934) to a great extent. The

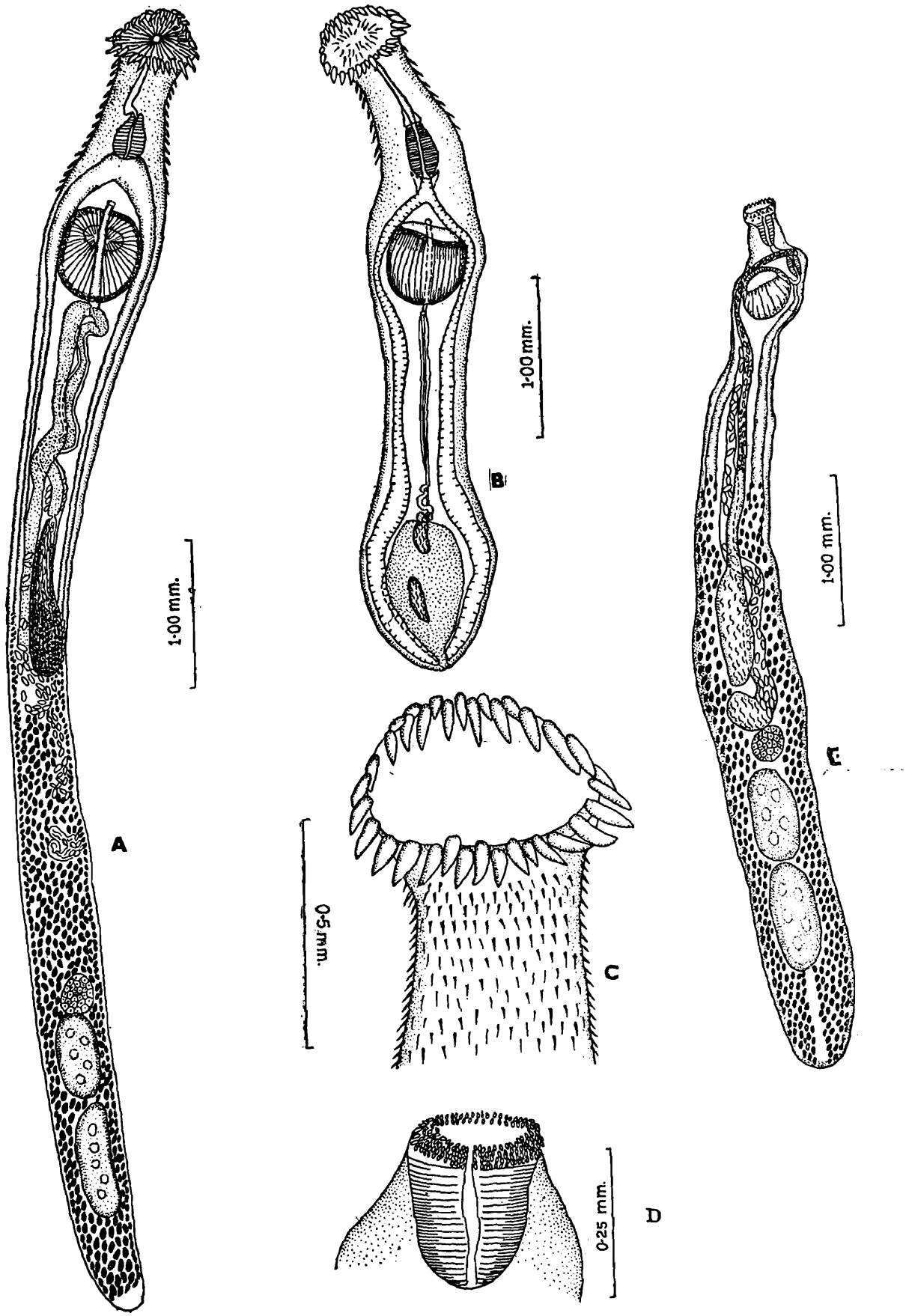

Fig. 1. A *Stephanostomum cloacum* (Srivastava, 1938)—Entire worm, dorsal view, B. *Stenphanostomum* metacercaria—Entire larva, ventral view. C. Same—Anterior part showing peribuccal spines in ventral view. D. *Stephanostomoides tenuis* (Manter, 1963) —Anterior part showing arrangement of peribuccal spines. E. Same—Entire worm, ventral view.

main difference between the two species lies in the number of peribuccal spines which is 42 in Yamaguti's species and 34 in Srivastava's one. Genital atrium long, unspined. Collapsed eggs measure 63-68 × 34-36 as compared to 60-73 × 38 in original description.

Apparently, *S. cloacum* and *S. attenuatum* Hafeeullah, 1971 look similar, but the latter is distinguishable from the former in having a feeble and attenuated body, in not having an as long spined cirrus and matraterm, in the anterior extent of the vitellaria with respect to the posterior extent of the cirrus sac, and in the number and arrangement of the peribuccal spines.

Hafeezullah (1971) enumerated the differences between *S. adinterruptum* Hafeezullah, 1971 and *S. fistulariae* (Yamaguti, 1940). Both these flukes have been described from the same fish genus. Hafeezullah's species further differs from Yamaguti's one in having longer and armed cirrus and more posterior extent of the cirrus sac.

Only abstract of the account of *Stephanostomum indicum* (Srivastava, 1973) Yamaguti, 1958 collected at Puri (Bay of Bengal) and Karachi (Arabian Sea) from the fish *Pristis cuspidatus* was published by Srivastava (1937). Since then its morphological details were never published. Yamaguti (1971) considered it as *Nom. Sol.*

Stephanostomum metacercaria

(Fig 1—B, C)

Host : *Minuous monodactylus* (Bl. & Schn.), Gray goblin fish, Pisces : Synanceidae)

Location : Cysts balls attatched with liver and heart muscles

Locality : Kozhikode (Arabian Sea)

Number of specimens : 9, collected in 1965

Description : (with measurements on 3 specimens only) Body 4.085-5.048 mm long 0.946-1.032 mm wide at testicular level, elongate with swollen posterior part. Cuticle spinose ; spines probably lost in posterior part of body, larger in forebody, comparatively much smaller behind acetabulum. Eye-spot pigment present. Acetabulum 516-612 in diameter, spherical, preequatorial, at 1482-1620 from anterior end of body. Oral sucker 266-275 long, 576-670 wide, terminal. Peribuccal spines 34, in two alternating rings. Oral spines a bit smaller than aboral ones, 4 orals alternating with aborals on ventral side, 6 oral alternating with aborals on dorsal side, row of spines single on lateral sides. (Thus the number of peribuccal spines and their arrangement is exactly as occuring in *S. cloacum* Srivastava, 1938). Prepharynx 559-696 long ; pharynx 361-378 long, 215-232 wide, pear-shaped ; oesophagus 43-120 long ; caecal bifurcation between pharynx and acetabulum ; caeca reaching posterior end of body.

Testes 258-387 long, 96-132 wide, tandem, separated, situated in swollen posterior part of body. Cirrus sac extending posteriorly up to base of swollen part of body, enclosing seminal vesicle, pars prostatica and long cirrus. Spines on cirrus not yet developed. Genital atrium long. Genital pore immediately preacetabular.

Ovary 45-53 in diameter, preacetabular, separated from anterior testis. Uterus preovarian ; meteraterm almost as long as cirrus sac ; spines on metraterm not yet developed.

Excretory pore teminal ; excretory vesicle saccate. These larvae were found encysted in ball-like cysts infesting liver and heart. They were obtained in living condition by bursting the cyst balls. The cyst-balls had membranous wall having two concentric layers. The larvae lived in a pool of transluscent liquid.

Discussion : The peribuccal spines and body spines are developed, but at the same time the male and the female ducts are devoid of them. It indicates that they do not begin to grow and develop on terminal genital ducts simultaneously with the body and peribuccal spines. From the study of the morphology of metacercariae reported by various workers, it seems highly probable that the intestinal caecae establish communication with the saccate or tubular excretory vesicle forming uroproct during late metacercarial stage. Obviously, the spination on the anterior male and female ducts seem to be correlated with the sexual maturity of the fluke.

It has been mentioned above that *Stephanostomum cloacum* (Srivastava, 1938) has been reported both from the east and west coasts of India. The number of oral spines, their arrangement around the mouth, and the long as well as equal sizes of cirrus sac and metraterm are the chief characteristics of Srivastava's species. The presence of these characteristics in the present *Stephanostomum* metacercaria along with the geographical distribution of both of them from the west coast (Arabian Sea) of India suggest that this metacercaria might be the one of *S. cloacum* (Srivastava, 1938).

Stephanostomoides (Manter, 1963) n. comb.

Stephanostomoides dorabi Mamaev and Oshmarin, 1966 (Syn. Novo)

Stephanostomum tenuis Manter, 1963 (Syn. Novo) (Fig. 1—D, E)

Host : *Chirocentrus dorab* Cuv., wolf herring, (Pisces : Chrocentridae)

Localities : Mandapam (Gulf of mannar) ; Gopalpur and Pondicherry (Bay of Bengal) ; Kozhikode and Mangalore (Arabian Sea)

Location : Intestine

Number of specimens : 4+2+1+4+3=14

Distribution : Fiji ; North Vietnam ; India

Hafeezullah (1971) reported *Acanthocolpus tenuis* Manter, 1963 from the fish *Chifocentrus dorab*, but missed to give the locality from where collected. The flukes were collected from Tuticorin (Gulf of Mannar) in 1965.

From a single specimen of *Chirocentrus dorab*, a population of four specimens of *Stephanostomoides tenuis* (Manter, 1963) was collected at Mandapam (Gulf of Mannar) by Dr. T. D. Soota in March, 1975. They have long cirrus and metraterm, and both these organs are studded with two kinds of spines as shown by Manter (1963) in his Figures 4a and 4b. Out of these, three have five rings of short spines on the oral sucker whereas the remaining one does not possess any spines on it. This single specimen exactly resembles *Acanthocolpus tenuis* Manter, 1963. In another population of two specimens collected by the author in November, 1973 at Gopalpur (Bay of Bengal), one has the five rings of oral spines whereas the other one lacks them and exactly resembles Manter's species. The third population of single specimens from Pondicherry (Bay of Bengal) is normal with all the five rows of oral spines. The fourth population comprises four specimens collected by Dr. T. D. Soota at Calicut (Arabian Sea). Of these, one is decapitated, one has a few oral spines and the remaining two have all the five rows of oral spines. The fifth population of three specimens was also collected by Dr. T. D. Soota at Mangalore (Arabian Sea) on January 4, 1976. All these three specimens have lost all the five rows of oral spines, and look like Manter's *Acanthocolpus tenuis*.

It is of interest to note that Manter (1963) described *Acanthocolpus tenuis* on the basis of only one out of fourteen specimens which were in a highly macerated condition. It means it is highly probable that the rings of the spines on the oral sucker might have been lost due to high degree of maceration as is very common regarding body spines as well as

those on the oral sucker in the family Acanthocolpidae. In view of this strong evidence the author is inclined to believe that the species *Acanthocolpus tenuis* Manter, 1963 should belong to the genus *Stephanostomoides* Mamaev and Oshmarin, 1966. It will be named then as *Stephanostomoides tenuis* (Manter,1963) h. comb. (Syn. Nov. : *Stephanostomoides dorabi* Mamaev and Oshmarin, 1966).

It may also be noted that this species sometimes occurs mixed with the population of *Acanthocolpus liodorus* Luhe, 1906 in India in the fish *Chirocentrus dorab.*

Tormopsolus spatulum Bilquees, 1972.

Host : *Rachycentron canadus* (L.), Black Kingfish ; (Pisces : Rachycentridae)

Location : Intestine

Locality : Kakinada (Bay of Bengal)

Number of specimens : 8, collected in February, 1975

Distribution : Arabian Sea ; Bay of Bengal

These specimens with spatulate body in the prepharyngeal region agree fairly well with the description of *Tormopsolus spatulum* Bilquees, 1972 described from Karachi, except in certain characters and details. Bilquees described that the tegument of this species is unspined whereas the cuticle of the specimens in the present collection is armed with spines throughout the body. Probably the spines in her specimens were lost. Again, it seems from the description that the seminal vesicle is undivided whereas actually it is bipartite although in some specimens the division is indiscernible. The third and the important thing which Bilquees missed is the spination of the terminal ducts. In the present specimens a small part of the male duct just behind the acetabulum is beset with spines which have broad base with minute spiuous part, and look like tubercles. The terminal part of the female duct seems to be unspined.

Acanthocolpus liodorus Luhe, 1906.

Host : *Chirocentrus dorab* Cuv. wolf herring, (Pisces : Chirocentridae)

Location : Intestine

Localities : Konarak, Ennore, Madras (Bay of Bengal) ; Kozhikode (Arabian Sea)

Number of specimens : Several, collected in 1973 and 1976

Distribution : Sri Lanka ; East and west coasts of India ; North Viet-Nam Bay

It may be important to note that the specimens are spined (although shed off in most cases), have profuse eye-spot pigment just posterior to oral sucker, and the seminal vesicle is bipartite but indiscerinible in most cases.

Acanthocolpus luhei Srivastava, 1939.

A. caballeroi Gupta and Sharma, 1972 (Syn. Novo)

Host : *Chirocentus dorab* Cuv., wolf herring, (Pisces : Chirocentridae)

Location : Intestine

Localities : Pondicherry (Bay of Bengal) ; Mandapam (Gulf of Mannar)

Number of specimens : Several

Distribution : East and west coasts of India

The cuticle of body is spined, eye-spot pigment is present, the seminal vesicle is bipartite (although indiscernible in most specimens) and the acetabulum is borne on a protuberance which, at times, may be retracted.

Caballero (1952), Yamaguti (1958) and Manter (1963) have considered *A. luhei* Srivastava, 1939 synonymous witht he type species *A. liodorus* Luhe,1906 merely on the basis of assumption. Mamaev and Oshmarin (1966), Hafeezullah (1971) and Gupta and Sharma (1972) have disagreed with this synonymy. On the basis of the present collection, the author maintains his view as given by him (1971)

that *A. luhei* appears to be distinct from *A. liodorus* in the anterior extent of vitellaria with respect to the posterior extent of cirrus sac and in sucker ratio. In fact the populations of the two species sometimes co-occur in the same fish, *Chirocentrus dorab*, along the Indian coasts. It may be so if the intermediate hosts of the two species form the favourite food of the host fish. Gupta and Sharma (1972) have not furnished sufficient scientific criteria for erecting their new species, *Acanthocolpus caballeroi*, distinct from *A. luhei*. Therefore, their species is considered a synonym of the latter.

In my exhaustive collection of digenetic trematodes of marine fishes of east and west coasts of India, *Acanthocolpus indicus* Srivastava, 1939 and *A. orientalis* Srivastava, 1939 are not represented, in spite of the fact that I examined good number of species of sciaenid fishes from the reported hosts of the repective trematode species.

In his key to the genera Acanthocolpinae Luhe, 1906, Yamaguti (1971) characterised (probably from literature) *Acanthocolpus* Luhe, 1906 as not having body spines and eye-spot pigment. It is reported above that *Acanthocolpus liodorus*, the type species of the genus, and *A. luhei* do have body spines and eye-spot pigment. Yamaguti (1971) has also mentioned in a foot note on page 121 that in the genus *Tormopsolus* Poche, 1926 the seminal vesicle is "definitely unipartite". The author has reported in this paper that, at least, in *Tormopsolus spatulum* Bilquees, 1972 the seminal vesicle is bipartite. Thus the characters i. e. presence of body spines, eye-spot pigment and bipartite seminal vesicle, are common in *Acanthocolpus* and *Tromopsolus*. This fact further leads to the conclusion that these two genera are very close to each other differing mainly in the absence or presence of communication of the intestinal caeca with the excretory vesicle near the hinder end of the body. In this respect the genus *Acanthocolpus* has not been studied at all. There may be substance in the suggestion of Mamaev and Oshmarin (1966) that *Trormopsolus* is a synonym of *Acanthocolpus*, which Yamaguti (1971, p. 121) has so vehemently refuted.

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