

Digenetic Trematodes (Acanthocolpidae Lühe, 1906: Genus Stephanostomum Looss, 1899) From Red Sea Fishes, Yemen Coast

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Abstract. 155 Red Sea fish, belonging to 3 species (60 *Thunnus tanggol* ; 80 *Abalistes stellaris* and 15 *Carangoides bajad*), 25- 92 cm total length, were examined for digenetic trematodes (Acanthocolpidae Lühe, 1906). Two species of *Stephanostomum* Looss, 1899 are described. They are the first records of these species from the Red Sea ,Yemen. *Stephanostomum australis* Manter,1954, from fishes of families: Scombridae and Balistidae (*Thunnus tanggol* and *Abalistes stellaris*) and unidentified species, *Stephanostomum* sp. from *Carangidae* (*Carangoides bajad*).

Introduction

Acanthocolpid digeneans, as currently recognized, are parasites mainly of marine teleost fishes (Bray *et al.* 2005). The Acanthocolpidae was erected by Lühe (1906), as a subfamily to include the genera *Acanthocolpus* Lühe, 1906 ; *Stephanochasmus* Looss, 1900 (now considered the junior synonym of *Stephanostomum* Looss, 1899) and *Deropristis* Odhner, 1902, and the species *Distomum semiarmatum* Molin, 1858. The family seems to be cosmopolitan in distribution since some of its members have been found in European, Green land, North American, Japanese, Ceylonese waters, Asia, Africa, and other areas in the world (Manter, 1940 ; Bartoli and Bray, 2001).

In Yemen coastal water on the Red Sea, no previous work has been done on this family in any fish hosts. In the course of our studies, two species of Acanthocolpidae: Genus *Stephanostomum* have been found in three different teleost fishes. The adult members of this family are parasitic in marine fishes and their metacercariae encysted in the soft tissues, mainly in the musculature, fins and skin (MacKenzie and Liversidge, 1975; Bartoli and Bray, 2001).

Materials and Methods

Between September 2008 and July 2010, a total of 155 specimens of marine fish, belonging to three different species (60 *Thunnus tonggol*; 80 *Abalistes stellaris* and 15 *Carangoides bajad*), 25- 92 cm total length, were examined for trematode parasites, especially Acanthocolpidae Lühe, 1906. Specimens were purchased in fish market in Hodeidah, Yemen. After collection, the fish were transported in an insulated box-filled with ice to the laboratory of Marine Biology and Fisheries Department, Hodeidah University. Specimens were subsequently necropsied and their organs were analyzed. The internal organs were transferred to the Petri dishes with a saline solution at 0.65% NaCl. Some larvae were found encysted in body cavity, and some organs in host. Larvae were collected fresh; some larvae were excysted out in saline. The excysted larvae observed alive were then prepared for fixation. The digeneans collected from the intestine were fixed in alcohol-formalin-acetic acid (AFA), without compression, stained in alum carmine, dehydrated in an ethyl alcohol series, cleared in Lacto phenol and finally mounted in Canada balsam. All the mounts were observed on the Olympus microscope, drawn with the aid of a camera Lucida.

Results and Discussion

-*Stephanostomum australis* Manter, 1954

-*Stephanostomum* sp.

Classification

Infrakingdom: Platyzoa Cavalier-Smith, 1998

Phylum: Platyhelminthes Gegenbaur, 1859

Subphylum: Neodermata (Ehlers, 1985) Cavalier-Smith, 1998

Infraphylum: Trematoda (Rudolphi, 1808) Cavalier-Smith, 1998

Class: Trematoda Rudolphi 1808
Subclass: Digenea Carus 1863
Order: Opisthorichiida
Suborder: Acanthocolpiata
Super family: Acanthocolpidea Lühe, 1906
Family: Acanthocolpidae Lühe, 1906
Genus: *Stephanostomum* Looss, 1899
Synonyms: *Stephanochasmus* Looss, 1900
Acanthocolpidae Lühe, 1909

1- *Stephanostomum australis* Manter, 1954 (Fig. 1).

1.1- Description (base on 5specimens)and Measurements (in mm):

Length: 4.00- 6.400; Width 0.750-0.925.

Forebody: 1.176 -1.260.

Posttesticular space: 0.238 - 0.840.

Oral sucker: 0.208 - 0.308 wide ; with 27 pairs of spines, total 54.

Acetabulum: 0.300 - 0.385 wide.

Sucker ratio: 1.118 - 1.450.

Prepharynx: 0.385 - 0.616 long.

Pharynx: 0.200 - 0.292 long by 0.192 - 0.269 wide.

Oesophages: short; bifurcation shortly anterior to acetabulum; uroproct probably present but concealed by vitellaria.

Testes: elongate, close together in posterior third of body.

Cirrus sac: curving around right side of acetabulum or less than halfway to ovary. Cirrus sac containing a slightly coiled seminal vesicle.

Ovary: immediately anterior to anterior testis,not separated from it by vitellaria.

Vitellaria: usually beginning at about level of middle of cirrus sac, rarely at base of cirrus sac, extending to posterior end of body covering the uterus dorsally.

Uterus : with short coils.

Eggs: thin-shelled with pointed projection at anopereular end, 66-71 x 36-50 μ .

Excretory system: not observed.

1.2-Taxonomic Summary:

Host: *Thunnus tanggol* (65.5 cm total length ; *Abalistes stellaris*(25-46 cm).

Locality: Red Sea, Hodeidah- Yemen Coastal Water.

Site of infection: Intestine.

Prevalence: *Thunnus tanggol* (1.6%). *Abalistes stellaris* (5.0%).

Intensity of infection: in *Thunnus tanggol* :1 out of the 60 fish examined were parasitized by 2 trematodes. While intensity of infection in *Abalistes stellaris* was 4 out of the 80 fish examined were parasitized by 1,1,2, and 1 trematodes respectively. **Range** =1-2. **Mean** =1.25 parasite per infected fish.

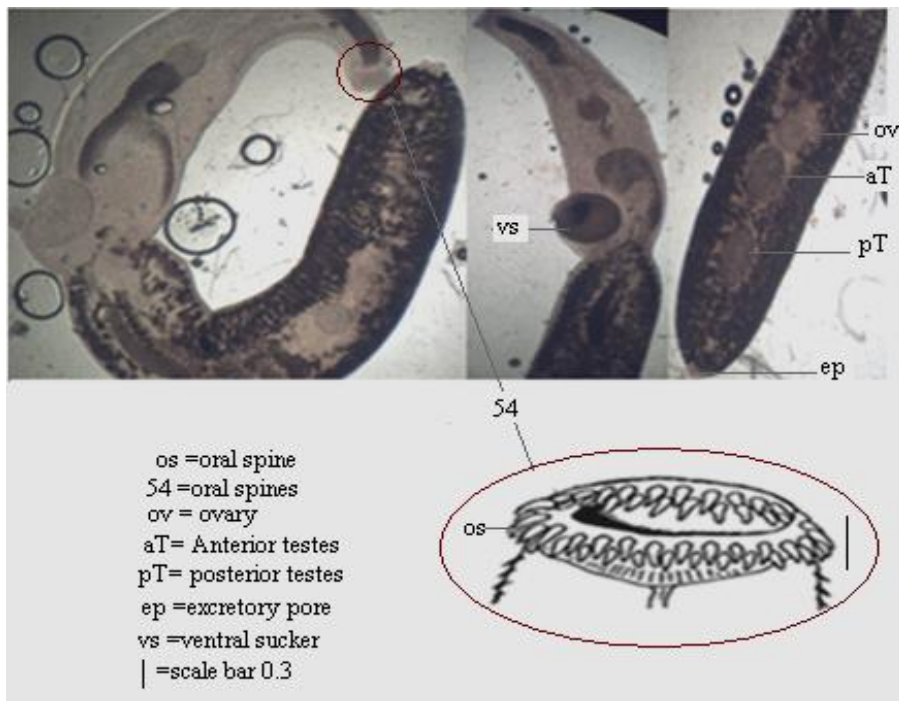


Fig. 1. *Stephanostomum australis* from Red Sea fish (*Thunnus tanggol* & *Abalistes stellaris*) Yemen Coastal Water.

Discussion

The genus *Stephanostomum* Looss, 1899 has a wide distribution. Its members infect marine teleosts, particularly those of warmer waters. A large number (117) of nominal species is to be found in the literature (Bartoli and Bray, 2001; and Bray and Cribb, 2003; Bray and Reimer, 2004). This genus is also the best known in terms of the life cycle, which has been recognized as the usual pattern for the family (Bray *et al.* 2005).

The first intermediate hosts are prosobranch gastropods in which rediae develop. The oculate, caudate cercariae emerge (stylets are usually reported) and penetrate a large number of teleost species where they encyst in the flesh. The definitive hosts are piscivorous teleosts which acquire the worms by ingestion of the second intermediate hosts (Martin 1939; Wolfgang 1955; MacKenzie and Liversidge 1975; Kjøie, 1978; and Stunkard 1961). Specific determination of *Stephanostomum* is based on the number, shape and position of the circum-oral spines, the relative size of the suckers, the extent and arrangement of the Vitellarium, the length of the cirrus-sac and genital atrium, the distances between the gonads, the presence or absence of a uroproct and egg-size (Stunkard, 1961).

Stephanostomum australis was originally described by Manter, 1954 from *Chelidonichthys kumu* (Lesson and Garnot) from Wellington, New Zealand. In this study, the specimen is agree with specimen of Manter (1954), and is similar to *Stephanostomum imparaspine* (Linton, 1905) Manter, 1940; *Stephanostomum anisotremi* (Manter, 1940) and *Stephanostomum baccatum* (Nicoll, 1907), in most detail. *Stephanostomum australis* here differs from them most appreciably by having 54 oral spines, the cirrus sac does not extend so far toward the ovary, vitellaria dorsal to the uterus. In contrast, *Stephanostomum imparaspine* has 33-34 oral spines, the cirrus sac extends so far toward the ovary; vitellaria dorsal to the uterus are not described for *Stephanostomum imparaspine*. *Stephanostomum anisotremi* has a sucker ratio of 1:2; the vitellaria do not cover the uterus dorsally; and there are 40 rather than 54 oral spines. *Stephanostomum baccatum* (Nicoll, 1907) Manter, 1934 has 54 oral spines but has a short cirrus sac and larger eggs. Three species of genus *Stephanostomum*, were previously recorded in the Red Sea, these were *Stephanostomum megacephalum* Manter, 1940 (Parukhin, 1970 & 1976); *Stephanostomum ditrematis* Yamaguti, 1939 (Parukhin, 1970 & 1976) and *Stephanostomum lebedevi* Parukhin, 1974 (Parukhin, 1976).

2-*Stephanostomum* sp. (Fig. 2).

2.1-Description (base on 5specimens),and Measurements (in mm).

Encysted metacercariae:

The metacercariae cysts are round, translucent, 0.75-1.300 in diameter. It had a thick wall comprising , 2 layers, and larvae can be seen curved inside. As previously reported (Faliex, 1991), the inner layer

probably derives from the parasite and the outer layers derive from the host. These 2 layers sequester the parasite against a possible inflammatory reaction of the host. When excysted the larvae exhibit the general features of genus *Stephanostomum* Looss, 1899.

Excysted metacercariae:

Body: is pear-shaped with a spinose dorsally, 3.81-4.96 long, 1.16-1.74 maximum width.

Eye-spot: 2

Oral sucker: 0.231-0.313 + 0.340-0.422 with double row of 36 spines.

Acetabulum: preequatorial, 0.422-0.503+0.462-0.490.

Pharynx: 0.204-0.272+0.258-0.326.

Oesophagus: 0.109-0.190 long.

Caeca: broad, passed laterally to the ventral sucker, extendg to posterior region where a uroproct is formed.

Ventral sucker: near the anterior end, measuring 0.364 (0.312–0.442) long.

Testes: developing testes median, tandem each 0.122-0.204 in diameter.

Ovary : pretesticular, 0.068-0.082 in diameter.

Cirrus sac: developing cirrus sac posterior to acetabulum.

Excretory vesicle: sac-like, distended with minute granules.

Pore: terminal.

2.2-Taxonomic Summary:

Host: *Carangoides bajad* (31.5 - 46.8 cm length).

Locality: Red Sea, Hodeidah- Yemen coastal water

Site of infection: Body cavity.

Prevalence: 60%

Intensity of infection: 9 out of the 15 fish examined were parasitized by 2, 2,1, 3, 7,3,5, 5 and 3 trematodes respectively.

Range =1-7. **Mean**= 4.4 Parasite per infected fish.

Discussion

The Acanthocolpidae Lühe, 1906 is a large family of digenean trematodes that infects the gastrointestinal tract of marine fishes. Metacercariae of trematodes of the family Acanthocolpidae are frequently recorded in marine fishes. Sometimes they invade the muscles under the skin or the fins in great numbers, thus making some fish

catches unmarketable which results in considerable economical losses. The highest level of muscle infection has been observed by Pacific Research Institute of Fisheries and Oceanography specialists on flatfishes of the northwest Pacific, *i.e.*, *Lepidopsetta biliniata* (39% at an intensity of up to 101 individuals), *Limanda aspera* (58.5% at an intensity of up to 25 individuals), *Hippoglossoides elassodon* (20.4% at an intensity of up to 38 individuals), and *Caprodon longimanus* (100% at an intensity of up to 75 individuals). Such high levels of infection off the Asian coast may be attributed primarily to the greater availability there of continental shelves and slopes where fish have more chances of becoming infected from benthic invertebrates the first intermediate hosts of these trematodes (Korotaeva, 1973; and Rojas *et al.*, 1999).

Although 17 genera were recognized in the family by Bray (2005), *Stephanostomum* Looss, 1899, with over one hundred species, is by far the largest in the family and one of the largest in marine fishes, it is a second largest genus of trematodes of fishes (Cribb *et al.*, 2002). The success of this genus is evident from the huge range of fishes (over 70 families) that are infected as adults. The genus also appears to have low specificity for first intermediate hosts, having been identified (or inferred) from three families and two super families of molluscs. Given the current size of the genus there are clearly many more intermediate hosts to be found (Barnett *et al.*, 2010).

In this study, the general features of these trematode larvae, particularly the number, shape and arrangements of perioral spines, suggest that it belongs to Family Acanthocolpidae Luhe (1906), genus *Stephanostomum* Looss (1899). Metacercariae of this family are found in various species of fishes (Moravec *et al.*, 1997 ; and Kardousha , 2005). According to Korotaeva (1973), metacercariae of *Stephanostomum* spp. have been observed in 29.5% of the fish examined (of 12 fish species) in the northwest Pacific. They were found on 6.9% of fish (three fish species) in the northeast Pacific; 54.5% (four fish species) in the Hawaiian area; 10.8% (two fish species) in the Philippine Sea area; and 51.6% (six fish species) in the Australia-New Zealand area.

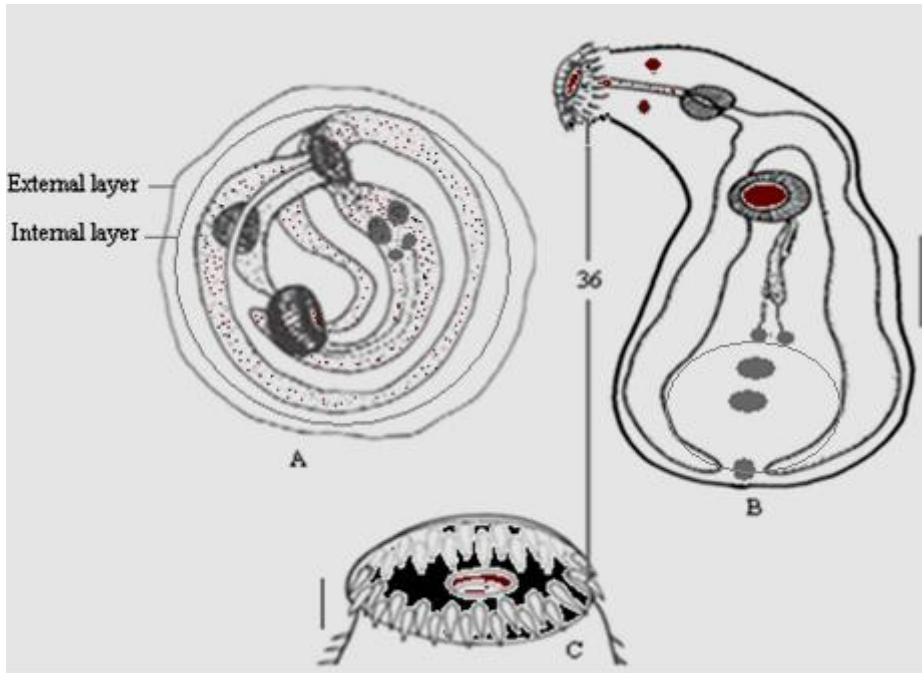


Fig. 2. Metacercariae of *Stephanostomum* sp. from *Carangoides bajad*. A. Encysted larva. B. Excysted larva (total view), scale bar = 0.8mm. C. anterior end bears 36 spines (Oral sucker), Scale bar = 0.3mm.

In this study, the metacercariae are distinctly larger and their oral sucker bears only 36 spines. Circum-oral spine number is an important diagnostic character of *Stephanostomum* species (Bray *et al.*, 2005). 14 out of 117 *Stephanostomum* species have 36 circum oral spines: *Stephanostomum pristis* (Deslongchamps, 1824), Looss, 1899, from *Physiculus bachus*; *Stephanostomum minutum* Looss, 1901, from *Uranoscopus scaber*; *Stephanostomum ditremotis* (Yamaguti, 1939) Manter, 1946, [Syns: *Echinostephanus ditrematis* Yamaguti, 1939; *Stephanostomum seriolae* Yamaguti, 1970], from *Gnathanodon speciosus*, *Caranx latus* and *Caranx ruber*; *Stephanostomum coryphaenae* Manter, 1947 from *Corynaena hippurus*; *Stephanostomum manteri* Vigueras, 1955, from *Carangoides ruber*; *Stephanostomum hawaiiense* Yamaguti, 1970 from *Carangoides fulvoguttatus*; *Stephanostomum simhai* Gupta and Ahmad, 1979, from *Rhabdosargus sarba*; *Stephanostomum trumpeteri* Zhukov, 1983, from *Fistularia tabacaria*; *Stephanostomum carangi* Liu, 1998, from *Caranx ignobilis*; *Stephanostomum lateolabracis* Liu, 1998, from *Lateolabrax japonicus*;

Stephanostomum gaidropsari Bartoli and Bray, 2001, from *Gaidropsarus mediterraneus*; *Stephanostomum cobia* Bray and Cribb, 2003; *Stephanostomum talakitok* Bray and Cribb, 2006; *Stephanostomum tupatupa*, Bray and Cribb, 2008, from *Caranx papuensis*.

This species was recorded from *Carangiodes bajad* fish. According to Bray and Cribb (2008) a large proportion of *Stephanostomum* species is reported in fishes of the family Carangidae (i.e., *Stephanostomum ditrematis* (Manter, 1946; *Stephanostomum manteri* Vigueras, 1955; *Stephanostomum hawaiiense* Yamaguti, 1970; *Stephanostomum nyoomwa* Bray and Cribb, 2003; *Stephanostomum madhaviae* Bray and Cribb, 2003; *Stephanostomum euzeti* Bartoli and Bray, 2004; *Stephanostomum tantabiddii* Bray and Cribb, 2004; *Stephanostomum tupatupa* Bray and Cribb, 2008).

Acknowledgement

I would like to express my deep gratitude to Prof. Dr. R.A. Bray, Department of Zoology, Natural History Museum, Cromwell Road, London, for his assistance in identification and additional information on the digeneans parasites.

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المثقبات ثنائية التولد (عائلة أكانثوكولبيدي، جنس ستيفانوستوميوم) من أسماك البحر الأحمر، الساحل اليمني

علي بناوي الزبيدي

قسم الأحياء البحرية والمصائد، كلية علوم البحار والبيئة،
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المستخلص. تم جمع 155 سمكة من أسماك البحر الأحمر تعود إلى ثلاثة أنواع مختلفة خلال الفترة بين سبتمبر 2008م ويوليو 2010م. فحصت تلك الأسماك بحثاً عن المثقبات الطفيلية ثنائية التولد من عائلة أكانثوكولبيدي Acanthocolpidae. تم وصف نوعين يعودان إلى جنس ستيفانوستوميوم، وإن وجودهما يعد التسجيل الأول لطفيليات هذا الجنس في أسماك البحر الأحمر - الساحل اليمني، وهما:

- ستيفانوستوميوم أوسـترالس مـانتر، 1954
Stephanostomum australis سجل وجودها في أسماك من عائلتي
سكمبريدي Scombridae (تعرف محلياً أسماك الدراك والتونة)
وبالستيدي Balistidae (تعرف محلياً الأسماك الخنزيرية أو حجوم).

- نوع غير مشخص *Stephanostomum sp.* من جنس
ستيفانوستوميوم سجل وجوده في أسماك عائلة كرانكيدي
Carangidae (تعرف محلياً أسماك البياض أو أسماك الحمام
والخضرة).