

Four new records of trematodes from the Indian mackerel *Rastrelliger kanagurta* (Cuvier, 1816) from the Yemeni coastal waters of the Red Sea

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Abstract

Inspection of 182 specimens of the Indian mackerel *Rastrelliger kanagurta* from the Red Sea, Yemeni coastal waters revealed their infection with four trematodes. These were: *Aponurus laguncula* Looss, 1907; *Lecithocladium excisum* (Rudolphi, 1819) Lühe, 1901; *Opechona bacillaris* (Molin, 1859) Dollfus, 1927 and *Prodistomum orientale* (Layman, 1930) Bray & Gibson, 1990. These parasites were fully described and illustrated. Details on the parasitic indexes (prevalence, mean intensity and mean abundance of infection) for each parasite were demonstrated. All these trematodes are reported here for the first time from the Yemeni coastal waters of the Red Sea.

Keywords

Trematoda, *Rastrelliger kanagurta*, Red Sea, Yemen

1. Introduction

The scombrid fish, *Rastrelliger kanagurta* (Cuvier, 1816), popularly known as the Indian mackerel, is widely distributed in Indo and West Pacific Ocean region as well as their surrounding seas. It forms an important fishery item along its geographical distribution and particularly in Yemen. It is a schooling pelagic fish, inhabits the shallow coastal waters, caught mainly with gillnets, migrates from coastal waters to deeper areas during monsoon for spawning purpose (Jayasankar *et al.*, 2004). Being a planktonivorous, juveniles feed on phytoplankton and small zooplanktons including cladocerans and ostracods. As they mature, their intestines shorten, and their diet changes to include primarily macroplankton such as the larvae of shrimp and fishes (Madhavi and Lakshmi, 2012).

Helminthes are common parasites that occur in marine environments. Among these, the trematodes are considered as important endoparasites of vertebrates and invertebrates

(Díaz-Briz *et al.*, 2012). Trematodes have indirect life cycles and as adults, they live inside various vertebrates and spend their larval stages in intermediate hosts, mainly snails but also in some fishes (Olsen, 1974). The trematodes include 148 recognized families, almost 2800 nominal genera and an estimated 18,000 nominal species (Bray, 2008).

The trematodes of the Yemeni coastal waters of the Red Sea fishes were poorly investigated. During the last four years, nine species were reported from six fish species (Al-Zubaidy, 2010, 2011a, b, c; Al-Zubaidy and Mhaisen, 2011). Therefore, the present study was aimed to investigate the trematode fauna of *R. kanagurta* as this fish is considered as one of the important commercial fishes in the coast of the Red Sea, Yemen.

2. Materials and Methods

A total of 182 individuals of *R. kanagurta* ranging from 12.0 to 28.5 cm. in total length were purchased from the commercial fish catch at Hodeidah fish market (Al-Mehwat),

Yemen during the period from January 2012 till January 2013. Fish samples were transported to the laboratory at the Faculty of Marine Science and Environment, Hodeidah University where they were dissected out for parasites. Parasites were placed in separate Petri dishes containing physiological saline water. Live parasites were slightly compressed between a slide and a cover slip prior to examination under light microscope. Some parasites were fixed in AFA (ethanol, formalin, acetic acid) solution and then cleared and mounted in Canada balsam. Diagrams were drawn with the help of a camera Lucida. Measurements were made by using an ocular micrometer. For each species data on prevalence, mean intensity and abundance of infection were calculated as demonstrated by Bush *et al.* (1997). The recovered trematodes were identified according to some relevant accounts (Gibson *et al.*, 2002; Bray *et al.*, 2008) and confirmed by Prof. Dr. R. A. Bray of the Department of Zoology, British Museum (Natural History), London.

3. Results and Discussion

Four trematode species were identified from *R. kanagurta* in the present study. These are arranged in the following systematic scheme:

Class Trematoda

Super family Hemiuroidea

Family Lecithasteridae

Aponurus laguncula Looss, 1907

Family Hemiuridae

Lecithocladium excisum (Rudolphi, 1819)

Super family Lepocreadioidae

Family Lepocreadiidae

Opechona bacillaris (Molin, 1859)

Prodistomum orientale (Layman, 1930)

The following is an account on these trematodes with an emphasis on their indexes of parasitism, synonyms and description.

3.1. *Aponurus laguncula* Looss, 1907 (Fig. 1)

3.1.1. Materials Examined

This parasite was detected from the stomach of 59 fishes with 32.4% prevalence of infection, 1-4 (2.8) range (mean) intensity of infection and 0.9 mean abundance of infection. This represents the first record of *A. laguncula* in fishes of the Yemeni coastal waters of the Red Sea.

3.1.2. Synonyms

According to WoRMS (2014), *A. laguncula* has four synonyms. These are *Aponurus elongatus* Siddiqi & Cable, 1960; *Aponurus trachinoti* Manter, 1940; *Aponurus waltirensis* Hussain, Rao & Shyamasundari, 1984 and *Lecithophyllum trachinoti* (Manter, 1940) Yamaguti, 1971.

3.1.3. Description

Based on six specimens, the elongated body is relatively small, narrow, widest near posterior extremity, 2.1-3.5 (2.8) mm. long x 0.58-0.65 (0.62) mm. wide. Integument is without

spines. Ecsoma is absent. Oral sucker is sub globular and sub terminal, 0.14-0.18 (0.16) x 0.20-0.25 (0.23) mm.; pharynx is oval and bulbous; esophagus is absent; ventral sucker (acetabulum) is 0.44-0.48 (0.46) x 0.41-0.47 (0.44) mm.; sucker width ratio 1: 2.17. Two oval postacetabular testes are arranged in tandem. Anterior testis is 0.081-0.146 (0.096) x 0.054-0.098 (0.085) mm.; posterior testis is 0.079-0.122 (0.090) x 0.058-0.105 (0.088) mm.; ovary is oval to sub triangular, in posterior position to the testes, 0.057-0.130 (0.087) x 0.061-0.175 (0.108) mm.; uterus is filled with eggs, occupies the entire hind body and reaches half the fore body; eggs are numerous, 0.025-0.032 (0.029) x 0.015-0.019 (0.016) mm. The genital pore opens at the level of the pharynx. The post-ovarian vitelline glands are formed of seven irregular follicles.

The general measurements obtained in this study are similar to those found by both Braicovich *et al.* (2009) in *Percophis brasiliensis* from the Argentinean and Uruguayan waters and Acebal *et al.* (2011) in *Porichthys porosissimus* from the estuary of Bahía Blanca. The distinctive shape of the eggs is similar to that reported by Bray and Mackenzie (1990), who considered it as a diagnostic character of the species.

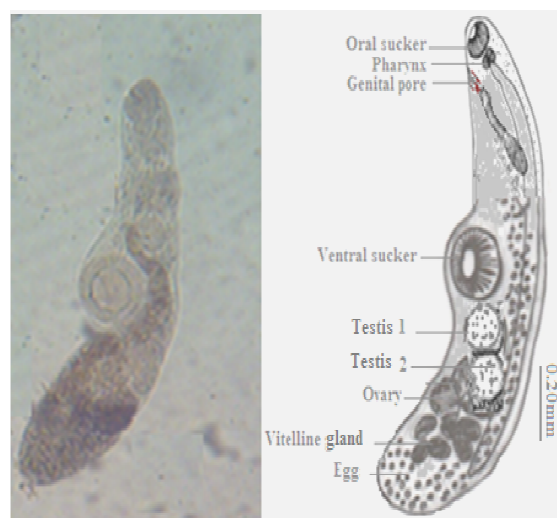


Fig 1. *Aponurus laguncula* from the Red Sea fish *R. kanagurta*.

3.2. *Lecithocladium excisum* (Rudolphi, 1819) Lühe, 1901 (Fig. 2)

3.2.1. Materials Examined

This parasite was detected from the stomach, intestine and pyloric appendage of 78 fishes with 42.9% prevalence of infection, 1-9 (2.9) range (mean) intensity of infection and 1.23 mean abundance of infection. This represents its first record in fishes of the Yemeni coastal waters of the Red Sea. It is relevant to state here that El-Ekiaby (2009) had reported this species from *Trachurus mediterraneus* in the Egyptian coast of the Red Sea.

3.2.2. Synonyms

According to WoRMS (2014), *L. excisum* has only one synonym which is *Lecithocladium crenatum* (Molin, 1859) Looss, 1907.

3.2.3. Description

Based on 10 specimens, the body is tubular. Its front part is truncated, while the posterior end is tapered and is in the form of a cone. Body length is 4.35-6.50 (5.45) x 0.55-0.60 (0.58) mm. wide. The oral sucker is terminal, cup-shaped, larger in size than the ventral sucker and measures 0.40-0.50 (0.44) mm. long x 0.53-0.65 (0.55) mm. wide. The pharynx is muscular, 0.41-0.54 (0.48) mm. long x 0.43-0.60 (0.54) mm wide. The esophagus is very short and the intestinal caeca terminate near the posterior end of the body. Ventral sucker is prominent near the anterior extremity, 0.29-0.43 (0.35) mm. long x 0.31-0.40 (0.38) mm. wide. Testes are tandem and situated anterior to mid-body. The anterior testis is 0.19-0.29 (0.25) mm. long x 0.13-0.25 (0.18) mm. wide, while the posterior testis measures 0.17-0.28 (0.22) mm. long x 0.10-0.22 (0.16) mm. wide. The ovary is oval in shape, situated post-testicular and measures 0.17-0.30 (0.24) mm. in diameter. The post-ovarian vitellaria consist of seven long winding tubules; uterus extends into tail, 2.0-3.0 (2.8) mm. in length. The numerous eggs are small in size, 0.022-0.025 (0.023) x 0.012-0.016 (0.014) mm. The excretory pore is terminal.

The above measurements are in agreement with those of *L. excisum* in *Scomber japonicus* reported by Cisse and Belghyti (2005), in both *S. japonicus* and *S. scombrus* by El-Sayed Ahmed (2007) and in *T. mediterraneus* by El-Ekiaby (2009).

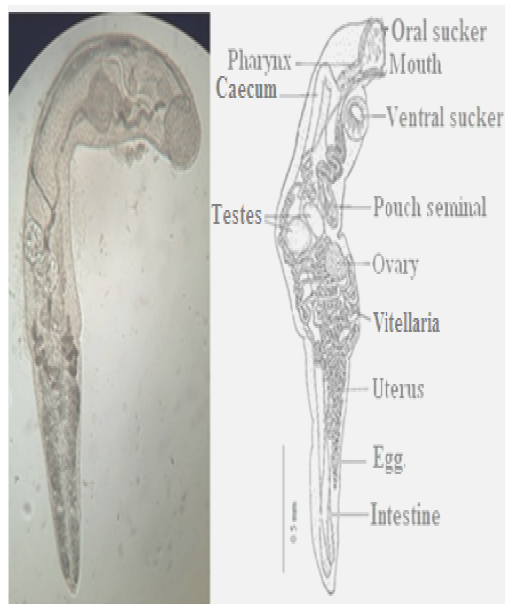


Fig 2. *Lecithocladium excisum* (Rudolphi, 1818) Lühe, 1901 from the Red Sea fish *R. kanagurta*.

3.3. *Opechona bacillaris* (Molin, 1859) Dollfus, 1927 (Fig. 3)

3.3.1. Materials Examined

This parasite was detected from the stomach and intestine of 28 fishes with 15.38% prevalence of infection, 2-3 (2.2) range (mean) intensity of infection and 0.34 mean abundance of infection. This represents the first record of *O. bacillaris* in fishes of the Yemeni coastal waters of the Red Sea.

3.3.2. Synonyms

According to WoRMS (2014), *O. bacillaris* has three synonyms which are *Lepocreadium guptai* Gupta & Gupta, 1987; *Opechona retractilis* (Lebour, 1908) and *Pharyngora retractilis* Lebour, 1908.

3.3.3. Description

Based on four specimens, this species is characterized by somewhat elongated body, 0.108-1.46 (1.15) mm. long x 0.032-0.54 (0.40) mm. wide; infundibuliform oral sucker, 0.055-0.075 (0.067) mm. long x 0.054-0.072 (0.069) mm. wide; ventral sucker, 0.048-0.065 (0.058) mm. long x 0.046-0.063 (0.060) mm. wide. The average sucker ratio is 1:1.04. Gonads are in the posterior third of the body. Vitellarial follicles extend to near the posterior border of ventral sucker. The excretory vesicle extends to the intestinal bifurcation. Eggs measure 0.022-0.030 (0.025) x 0.014-0.017 (0.015) mm.

The description and measurements of the present specimens agree in all details with those provided by Madhavi and Lakshmi (2012) for this species from *R. kanagurta* from the coast of Visakhapatnam, Bay of Bengal.

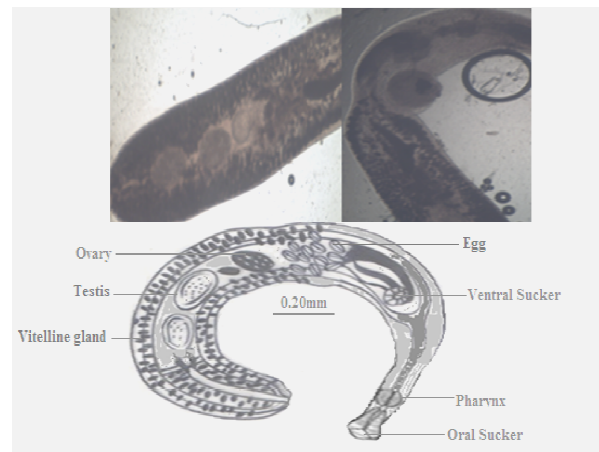


Fig 3. *Opechona bacillaris* (Molin, 1859) Dollfus, 1927 from the Red Sea fish *R. kanagurta*.

3.4. *Prodistomum orientale* (Layman, 1930) Bray & Gibson, 1990 (Fig. 4)

3.4.1. Materials Examined

This parasite was detected from the intestine of 27 fishes with 14.8% prevalence of infection, 1-5 (2.4) range (mean) intensity of infection and 0.36 mean abundance of infection. This represents the first record of *P. orientale* in fishes of the Yemeni coastal waters of the Red Sea.

3.4.2. Synonyms

According to WoRMS (2014), *P. orientale* has 13 synonyms which are *Acanthocolpoides guevarai* Lopez-Roman, 1979; *Acanthocolpoides israelensis* Fischthal, 1980; *Acanthocolpoides pauloi* Travassos & Teixeira de Freitas, 1965; *Lepocreadium ghanense* Fischthal & Thomas, 1970; *Lepocreadium puriense* Gupta & Gupta, 1987; *Lepocreadium retrusum* Linton, 1940; *Lepocreadium scombri* (Yamaguti, 1938); *Neolepidapedon retrusum* (Linton, 1940)

Sogandares-Bernal & Hutton, 1960; *Opechona orientalis* (Layman, 1930); *Opechona scomberi* (Yamaguti, 1938); *Pharyngora orientalis* (Layman, 1930); *Prodistomum israelensis* (Fischthal, 1980) and *Prodistomum pauloi* (Travassos & Teixeira de Freitas, 1965).

3.4.3. Description

Based on four specimens, the elongated body is 2.2-3.7 (2.8) mm. long x 0.38-0.50 (0.41) mm. wide. Cuticle of entire body is covered with minute spines. Cup-shaped oral sucker is 0.075-0.088 (0.082) mm. in diameter. Prepharynx 0.15-0.18 (0.16) mm. Pharynx is cylindrical, 0.041-0.070 (0.056) mm. Esophagus is 0.11-0.15 (0.013) mm. Intestine bifurcates at anterior of ventral sucker and extends to end of body. Cirrus pouch is club-shaped and includes internal seminal vesicle and pars prostatica. Genital pore is oblique and situated in front of the ventral sucker. Seminal receptacle and vitelline reservoir are located between the ovary and the anterior testis. Testes are elliptical, slightly elongated in transversal axis and tandem. Anterior testis is 0.11- 0.15 (0.14) mm. x 0.10- 0.25 (0.16) mm. Posterior testis is 0.14-0.23 (0.18) mm. x 0.12- 0.29 (0.20) mm. Ovary is variable in shape, globular or oval or subtrilobate, 0.14-0.16 (0.15) mm. Uterus is located between the ovary and the cirrus pouch. Eggs are elliptical, 0.050-0.055 (0.052) mm. x 0.030-0.034 (0.031) mm.

The description and measurements of these specimens agree with the description and measurements of *P. orientale* given by Bray and Gibson (1990).

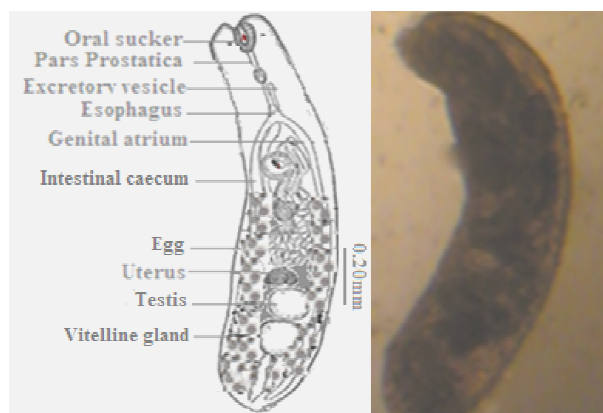


Fig 4. *Prodistomum orientale* (Layman, 1930) from the Red Sea fish *R. kanagurta*.

4. Conclusion

The present work showed that *R. kanagurta* of the Yemeni coastal waters of the Red Sea is parasitized with four trematode species: *A. laguncula*, *L. excisum*, *O. bacillaris* and *P. orientale*. In general, the parasitic fauna exhibited a high degree of host specificity. Except for *A. laguncula* which is found to be polyxenic, all the other species showed specificity to *R. kanagurta* and the low number of generalist parasites observed may reflect the reduced exchange of parasites between *R. kanagurta* and other marine fishes (Madhavi and Lakshmi, 2011).

As the trematodes require more than one host to complete

their life cycles, the most important limiting factor for their dispersal is the intermediate host such as gastropods and bivalves (Paperna and Dzikowski, 2006). The trematode fauna of *R. kanagurta* is dominated by hemiurids and this situation is related to its feeding on planktonic organisms, crustaceans, etc. (Madhavi and Lakshmi, 2011). Information available on the life cycles of *Lecithocladium* spp. and *Aponurus* spp. indicates that planktonic organisms such as medusae and copepods serve as intermediate and/or paratenic hosts (Køie, 1991). Similarly, the life cycle of *O. bacillaris* and *P. orientale* also involves medusae as second intermediate hosts (Køie, 1975). Thus, the parasite fauna of *R. kanagurta* is a clear reflection of its planktonivorous diet (Madhavi and Lakshmi, 2011).

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