DOI:https://doi.org/10.36602/jsba.2025.20.88

Digenean parasite (Ectenurus trachuri) of Bigeye scad (Selar crumeophthalmus) in the Malaysian coastal water

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Submission date: 6.10.2025 Acceptance date: 20.11.2025 Electronic publishing date:29.12.2025

Abstract: The hemiurid digenean *Ectenurus trachuri* Looss, 1907 is a common stomach parasite of the bigeye scad *Selar crumenophthalmus* and several other marine fishes. Thirty specimens of *S. crumenophthalmus* were examined for digeneans using standard parasitological techniques under a dissecting microscope. One species, *E. trachuri*, was identified from the eastern coastal area of Terengganu, Malaysia, facing the South China Sea. This trematode is characterized by an elongate body with a slight bulge around the acetabulum, a smooth tegument lacking spines, and an anteriorly located mouth opening leading to the oral sucker. The ovary is post-testicular, while the testes are pre-ovarian and juxtaposed, differing slightly in size. The vitellaria are post-ovarian, consisting of seven long digitiform lobes. *E. trachuri* differs from previously described specimens in its overall body size and organ measurements. This study represents the first record of *E. trachuri* from marine fishes in Malaysian waters, contributing to the knowledge of trematode.

Keywords: Digenea - Hemiuridea - *Ectenurus* - *Selar crumeophthalmus* - Malaysian coastal water- South China Sea.

Introduction:

Digenetic trematodes are commonly elliptical and body flattened dorsoventrally, leaf-like in form, but they can also be long and narrow in shape, and circular or oval in cross-section. These unsegmented flat worms normally have two simple adhesive organs, the mouth opens into oral sucker in the anterior region and most have an acetabulum on the ventral surface of the body [1, 2, 3]. The oral sucker may have strong lappets, as in genus *Bunodera*, or there may be an anterior adhesive organ with tentacles, as in *Bucephalus* [1]. Digeneans reach from tiny parasites no more than 250 µm in length to big such as *Hirudinella ventricosa*, a parasite of the stomach of some fishes that may be above10 cm long. Some thread-like didymozoid are especially long; *Nematobibothrioides histoidii* reaches above 12 m in length in the muscler tissu of the ocean sunfish. Despite these differences, most digenetic trematodes are 0.5 mm to 5 mm in length. These parasites have a living tegument as their outer layer, armed with spines or smooth. [1,3]. One species of hemiurid digenean (*Stomachicola muraenesocis* Yamaguti, 1934) was collected from the stomach of *Muraenesox cinereus* off the Persian Gulf of Iran [4].

In Malaysia, there are not many studies on digenetic trematodes in fish [5]. But some studies on these parasites have been done, particularly in Malaysian coastal water. One of these studies has shown the existence of two new parasites of digeneans in fishes from North Borneo (Malaysia) as follows: *Helicometra borneoensis* n.sp. from *Epinephelus fasciatus* and *Neoapocreadium malaysiae* n.sp. from *Scarus fasciatus* and *Scolopsis margaritifer* [6]. Another marine digenea found in the bulbus arteriosus of the seabass have been described and named as *Cnuoricola lates* gen. nov. sp. nov. and *Parasanguinicola macrospina* sp. nov. [7, 8]. In another study, a new worm of digenean parasites are discovered from fishes *Sillago sihama* and *Otolithes ruber* from Penang, Malaysia namely, *Macvicaria taksengi* n. sp. of family Opecoelidae [9]. Moreover, One known digenetic trematode (*Adlardia novaecaledoniae*) was recorded from marine fish (*Nemipterus peronii*) of Malaysia [10]. Moreover, three known digenetic trematodes (*Pseudopecoeloides tenuis*, *Monascus*

filiformis and *Podocotyloides parupenei*) were described from marine fish of Malaysia [11,12, 13].

As pointed out by Looss and Gibson, the important diagnostic characteristics for *Ectenurus* Looss, 1907 are the surface body with plications (may be absent in bad prepared specimens) and ecsoma; seminal vesicle, saccular divided into two or three parts, posterodorsal to acetabulum or in anterior hindbody; elliptical ovary; ventral succker much bigger than an oral sucker; small sinus-sac; missing or small pars prostatica, joined to seminal vesicle by long, aglandular duct; excretory arms not joined in forebody [14,15]. Lebedev has reported *Ectenurus trachuri* (Yamaguti,1934) Yamaguti, 1970 from the gastrointestinal of *Selar crumeophthalmus* which was collected from the South China Sea. Six digeneans of the genus *Ectenurus* have been recorded in fish from the South China Sea [16, 17].

The information provided in this work could be very useful, especially for knowing on characterization of one genus of one family within the digenetic trematodes of marine fish from the Malaysian coastal area. This badly known digenetic trematodes family is distinguish by a short history of scattered badly documented recorded, insufficient descriptions, bad specific diagnoses and extensive synonymy. Studying about parasite shape and site specificity will provide important information for understanding the relationship between this parasite and its host with regard to its presence and habitat.

Materials and methods

The research was behaved in Malaysia in the western section of the South China Sea area. The collected fish, *S. crumeophthalmus* obtained from the Malaysian coastal water facing the China Sea region, have been orderly investigated for a while of three months. A total number of 30 marine fishes were investigated during the period out of which only 20 fishes were harbored digeneans in their stomach [18]. These samples were examined for these parasites using classical methods under a dissecting microscope (Fig. 1).

Figure 1: Photo of dissecting microscope

Hemiurids were collected live from fish (*S. crumeophthalmus*) as soon as they had died or been anaesthetized. The worms were fixed in cold saline solution and then kept in 70% ethanol. Later, digeneans were stained in alum-carmine, dehydrated in a different concentrations of ethanol (70, 80, 90, 100) %, cleared in clove oil and mounted in DPX or Canada balsam [19, 20]. Good specimens, of adult digenetic trematodes were drawn for identification purposes. However, only one drawing was made for each stage of the species and the drawing illustrated the external and internal morphology of the digenetic trematodes for the identification purposes and the parasite studies. The drawings of the worms were done by a Leica microscope fitted with a camera Lucida, utilizing a calibrated ocular micrometer which was equipped to the compound light microscope. The drawing was done using a pencil on a piece of A1 paper which was installed on the drawing table. Then, the sketching paper was utilized to sketch the drawing on the table by overlapping the

sketching paper on the drawing table. Each drawing possessed a scale which could be referred to when measuring the width and length of the digenean parasites. Finally, the drawings on the sketching paper were photographed and reduced in size to fit it with A4 size paper before being printed to form a soft copy [21]. The morphological identification of the digenetic trematode was conducted according to the keys provided by some previous studies [22, 23, 24, 25 & 26]. The morphological classification of the digenetic trematode was conducted according to the features provided by some previous researches [22, 23, 24, 25& 26]. The measurements of the best samples were made by advanced microscope fitted with a digital camera (in micrometers).

Metrical information, when joined in the descriptions, are given as ranges followed by the mean in parentheses.

Results

Family: Family Hemiuridae Loos, 1899

Genus: *Ectenurus* Loos, 1907

Ectenurus trachuri (Yamaguti, 1934) Yamaguti, 1970 (Fig. 2, 3).

Morphological characterization and measurements are based on 4 adult samples collected from the stomach of *S. crumeophthalmus*. Body surface slightly plicated, elongate, slightly cylindrical, bulging around the ventral sucker, with relatively short ecsoma, longer than wide, 2000 – 2500 (2313) µm in length, 258 – 310 (277) µm in width at region of ovary; oral sucker slightly subterminal, 138 – 171 (155) µm in length, 126 – 157 (137) µm in width; prepharynx absent; pharynx oval 54 – 68 (60) µm in length, 48 – 60 (53) µm in width; oesophagus very short or not evident; caeca, double, extending into ecsoma; forebody long 606–740 (674) µm in length; an intestinal bifurcation to acetabulum 72 – 89 (82) µm in length; ventral sucker large, conical in lateral view, much bigger than oral sucker and close together, in anterior quarter of body, near anterior extremity 324 – 405 (364) µm in length, 414 – 517 (468) µm in width; gonads adjacent, situated in anterior half of hindbody, testes double, oval, pre-ovarian, close together, juxtaposed, anterior testis 168 – 210 (188) µm in length, 174 – 218 (196) µm in width; posterior testis 138 – 172 (155) µm in length, 186 – 233 (209) µm in width; ovary oval, post-testicular, in middle third of body 150 – 188 (164) µm in length, 222 – 278 (253) µm in width; uterus not forming such dilatation, including gonads space and not extending to posterior extremity, and not extend into ecsoma; post-uterine region 654 – 818 (754) µm in length; seminal vesicle thin walled usually tripartite but bipartite in some specimens in anterior hindbody, posterodorsal to ventral sucker, 120 – 150 (135) µm in length, 90 – 120 (105) µm in width; the duct extension of seminal vesicle relatively long and the pars prostatica close to sinus-sac; a sinus-sac cylindrical, narrow, weakly muscular and not reach the oral sucker; 30 – 60 (46) µm in length, 28 – 39 (33) µm in width; genital atrium grow and opens with median genital pore near oral sucker; metraterm narrow and extends dorsally until it joins with male duct at the base of sinus-sac; anterior extremity to genital pore 108 – 140 (125) µm in length; vitellaria post-ovarian consisting of seven long digitiform lobes; anterior extremity to vitellaria 1080 – 1400 (1245) µm in length; posterior extremity to vitellaria 672 – 700 (687) µm in length; eggs small, oval, 12 – 16 (14) µm in length 6 – 8 (7) µm in width; excretory pore terminal.

Host: *Selar crumeophthalmus***.**
Site: stomach**.**
Locality: Terengganu city.

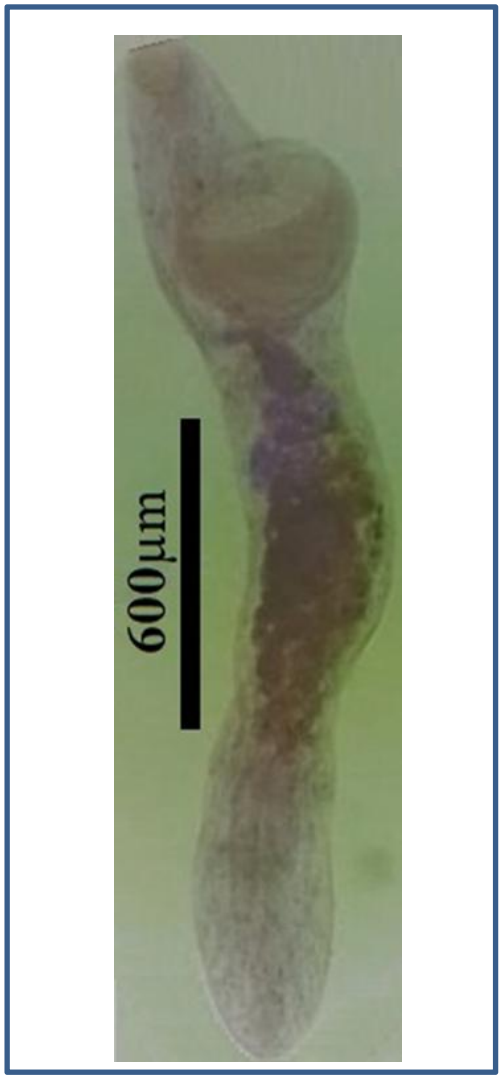

Figure 2:*Ectenurus trachuri* (Yamaguti, 1934) Yamaguti, 1970 ex *Selar crumeophthalmus*. Digenean photographed by Nikon microscope (Eclipse 80i).

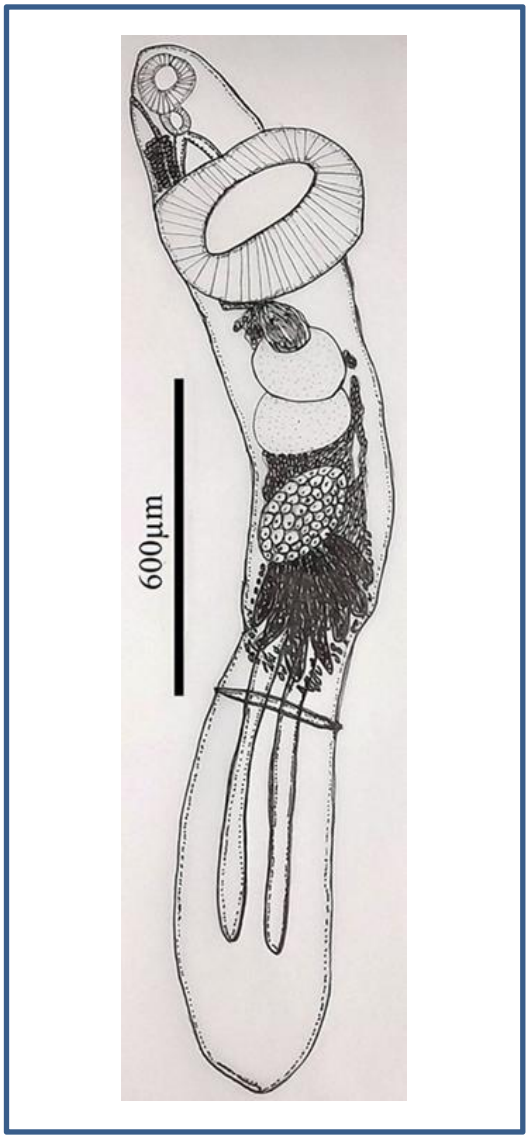

Figure 3:*Ectenurus trachuri* (Yamaguti, 1934) Yamaguti, 1970 ex *Selar crumeophthalmus*. Specimens drawn by camera lucida.

Discussion

In the present study, the morphological analysis suggested that *E. trachuri* (see Figure 2 and 3) belongs to the genus *Ectenurus* Loos, 1907, where the tail was not withdrawn into the body and the oval shape of a hindbody. This species is similar to other described members of *Ectenurus* Loos, 1907 but can be clearly differentiated depending on morphometric data and by the shape of the body, oral sucker, and internal organs. The worm registered under current work has the

transversely ventral sucker, wider than the width of the body, close with oral sucker; gonads separated, and testes close together. Morphologically, the description of *E. trachuri* under this study disagreed in many esteems, such as the shape of general body and suckers; location of testes, genital pore, ovary, plications and preoral lobe, vitellaria, all measurements and with *E. virgulus* as described by [27, 28, 29 & 30] showed them to be basically not similar. *E. trachuri* (Yamaguti, 1934) Yamaguti, 1970 is acknowledged for the Indo-Pacific forms of *Ectenurus* Loos, 1907 mostly from carangids, with a narrow weakly but a relatively short sinus- sac and relatively large ventral sucker [29]. The features of the 4 specimens collected from Malaysian waters in the South China Sea agree with Bray's redescription. Alkuwari *et al*. re-described this species with an elongated body, a total length with tail of 2500-3700 µm; the oral sucker from lateral view 100-120 long x 110-130 depth; ventral sucker large, much bigger than oral sucker and close together, in anterior quarter of body, near anterior extremity 320-400 µm in length, 300-400 µm in width; long pharynx and measured 50-70 x 60-80 µm; uterus not extending into the tail; testes 110-140 from ventral sucker; testes 110-140 µm from acetabulum; sinus-sac not clear; ovary 60-100 µm in length x 100-200 µm in width; and eggs 20.4 - 38 µm in length 12.5-16 µm in width [30]. The current species *E. trachuri* is very similar to *E. trachuri* which were described by [22, 25, 29, 34], but differs in all measurements. In view of these great similarities in all general diagnostic features and differences in measurements only, the current material is considered *E. trachuri* (Yamaguti, 1934) Yamaguti, 1970.

This digenean (*E. trachuri*) in adult form is a common parasite of *S. crumeophthalmus* [35] and many other hosts[36]. This trematode has been reported from *Trachurus capensis* in the Indian Ocean [37, 38], and from *Trachurus trachurus* in the Arabian Gulf [39]. This species was isolated by [40,41] from the stomach of some marine fishes (*S. crumeophthalmus* and *Caranx* sp.), caught in the South China Sea, while this digenean was recorded by [42] from the stomach of marine fish *Trachurus japonicus* in the Yellow Sea and the Bo Hai Sea. During current study, *E. trachuri* was described from the stomach of *S. crumeophthalmus* which was caught from the Terengganu coast, Malaysia. This is the first report of this parasite in the Malaysian coast of the South China Sea.

Conclusion

The present study recovered one digenetic trematodes from the gastrointestinal canal of one marine fish species from the Terengganu coastal water. The results of the current detailed comparative morphological study confirmed the presence of (*E. trachuri* in *S. crumeophthalmus*) previously described in literatures.

Recommendations

Consequently, in future, monitoring plans for fish parasites should be accessorily performed to develop an early warning system, especially in big and intricate systems such as the South China Sea to assist in protecting fish resources. Further examinations on fish are required in order to develop parasitological integrated monitoring in marine fish from the South China Sea in Malaysia.

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