

First Description of Three Species of Dactylogyrids (Monogenea) Infecting Three Species of Perciformes Marine Fishes from The Red Sea, Egypt

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Abstract: Three species of (monogenean parasites: Dactylogyridae), were described for the first time from the gill filaments of three species of marine fishes (Perciformes): from the Red Sea, Egypt during the period from March 2016 to February 2017. *Pseudohaliotrema sphincteroporos* in 23 out of 28 (82%) (*Siganus luridus* (Siganidae), *Metahaliotrema* sp. in 28 out of 50 (56%) *Lethrinus harak* (Lethrinidae) and *Haliotrema* sp. were recorded in 39 out of 46 (84.7%) *Parupeneus Forsskali* (Mullidae). Paraffin sections were done from gills of *Parupeneus Forsskali* infected with *Haliotrema* sp.

Keywords: Monogenea, Dactylogyridae, *Siganus luridus*, *Lethrinus harak*, *Parupeneus Forsskali*, Red-Sea, Egypt.

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I. Introduction

Marine fishes considered very important source of fish production in Egypt, most studies on monogenean parasites in Egypt were carried out on fresh water fishes but only a few studies on marine water fishes has been carried out Paperna (1972a,b,c); Bayoumy (2003), Bayoumy et al. (2007), Bayoumy and Abd El-Monem (2011) and Tadros et al. (2014). monogenea is one of the largest classes of fish parasites, gills of fishes exposed to the infection with different fish ectoparasites Rhode (1982). Monogenetic trematodes cause severe destructions of the gills as well as severe losses Morsy et al. (2012), monogenean parasitic diseases causes a serious problems in aquaculture (Okamoto, 1963; Ogawa and Inouye, 1997; Yoshinaga et al., 2000, 2001, 2009; Mushiake et al., 2001). Monogenea ingest the blood from gills of host fish, resulting in anaemic for wild and cultured fishes (Nakayasu et al., 2002; Anshary et al., 2001). Morsy et al. (2014, 2011) described *Acleotrema maculates*, (Monogenea: Diplectanidae) infecting the spotted coral grouper *Plectropomus maculatus* (F: Serranidea) and recorded *Benedenia sciaenae* Monogenea: Capsalidae from *Epinephelus chlorostigma* (Family: Serranidae) respectively from the Red Sea in Egypt. Mahmoud et al. (2014) recorded four monogenea species from sea bream gills in Egypt. Sun et al (2011, 2015) described four and two species of *Haliotrema* respectively in the South China Sea. But there are no previous studies on any *Haliotrema* spp., *Metahaliotrema* spp. or *Pseudohaliotrema* spp. in Egypt. So, these study, embrace description of *Haliotrema* sp., *Metahaliotrema* sp. and *pseudohaliotrema sphincteroporos* in three hosts of marine fishes (*Parupeneus forsskali*, *Lethrinus harak* and *Siganus luridus*) respectively from the Red Sea, Egypt.

II. Materials And Methods

Twenty eight specimens of *Siganus luridus* (15- 20 cm) length and (150-200 gm) weight, 50 specimens of *Lethrinus harak* (17- 22 cm) in length, and (160-250 gm) weight and 46 specimens of *Parupeneus Forsskali* (20–25 cm) in length, and (100-200 gm) weight were caught from the Red Sea, Hurghada (27°15'28"N 33°48'42"E), Red sea Governorate, during the period from March 2016 to February 2017, they were identified and transported in ice box to Qena laboratory, South Valley University for examination. Gills were transport to petri dish contains 0.8 saline solution to wash them from mucus, then monogenea isolated and fixed in 5 % formalin, washed with distilled water to remove the fixative, stained with acetic acid alum carmine (Carleton, 1967), after that dehydrated with ascending grade of ethyl alcohol, cleared in xylene and mounted with Canada balsam and photographed using a digital microscope. Other specimens were isolated, washed, and mounted fresh with glycerol Jelly according to Türkay & Ahmet (2014) and were drawn with camera Lucida.

Paraffin sections were done from gills of *Parupeneus Forsskali* infected with *Haliotrema* sp., stained with (H&E), examined and photographed.

III. Results And Discussion

Pseudohaliotrema sphincteroporos.

Host: *Siganus luridus* Ruppell 1829

Site: gills

Locality: Red-Sea, Egypt

Description: Figure (1)

Body is elongate and wide in middle, (1.4-1.8 mm) length, (300-400 μm) width, head with two lobes on each its lateral margin, two cephalic organs in each side and there are (4-5 pairs) glands in each side, eyes not distinct, pre-pharynx length (25-30 μm), pharynx length (50-75 μm) and its width (55-65 μm), esophagus is short (10-14 μm). Intestinal bifurcation closely post esopharyngeal and united posterior to the testis, testis is sub-spherical (160-190x 140-150 μm), vas deferens looping the left caecum and form the seminal vesicle, the male copulatory organ measured (80-100 μm) with wide base, there are many prostatic cells. Ovary is oval in shape (180-200x130-140 μm), vagina absent, vitellaria distributed in the body from the esophagus region to the haptor, haptor width (90-110 μm) and its length (80-95 μm) with two pairs of anchors (dorsal and ventral). Dorsal anchor outer length (70-80 μm), its inner length (35-43 μm), main part length (35-42 μm), span between roots (35-40 μm), length of its outer root (40-45 μm) but inner root (8-12 μm), base length (16-20 μm), the inner length of proximal part (30-35 μm), but its outer length (60-70 μm), shaft length (25-30 μm), distance from point tip to shaft end (20-25 μm), point length (5-8 μm), dorsal transverse bar (35-45 μm). Ventral anchor outer length (70-78), its inner length (75-85 μm), main part length (40-50 μm), span between roots (15-20 μm), length of its outer root (35-40 μm) but inner root (40-50 μm), base length (20--25 μm), the inner length of proximal part (60-70 μm), but its outer length (55-65 μm), shaft length (20-25 μm), distance from point tip to shaft end (25-30 μm), point length (7-10 μm), ventral transverse bar(43-52 μm).

Remarks:

The present monogenean parasite in *Siganus luridus* resemble *Pseudohaliotrema sphincteroporos* Yamaguti, 1953 it is very elongate, the first part of the body is wide, its haptor is small with two pairs of hooks, the region of cement gland is slender, dorsal hooks have a small truncate inner root and a large triangular outer root but the ventral hooks have a long truncate inner root and a long triangular outer root, ventral hook. Head is broad with large median lobe and two small lobes laterally with two pairs of head organs laterally (one pair in each side) and four-five pair of sticky glands lie in each side in the pharynx and esophagus level. Pharynx is globular in shape, esophagus is relatively long, caeca is simple without lateral branches, united posterior to testis. Testis sub-spherical lies in the posterior middle of the body, vas deferens not turning round the caecum with large seminal vesicle, genital pore behind the intestinal burification, lage prostatic cells are present in the first third of the body, ovary oval in shape, found anterior to testis, receptaculum seminalis anterior to ovary, vagina opens ventral to right caecum.

Metahaliotrema sp.

Host: *Lethrinus harak* Forsskal, 1775)

Site: gills

Locality: Red-Sea, Egypt

Description: Figure (2)

Body is flattened and sub cylindrical, with a distinct constriction at the neck region, (640-720 μm) in length and (100-125 μm) width, head with more or less distinct incision in front and in both sides, where three sticky glands open in each side, two pairs of eye spots are present anterior to pharynx, pharynx length (25-30 μm),

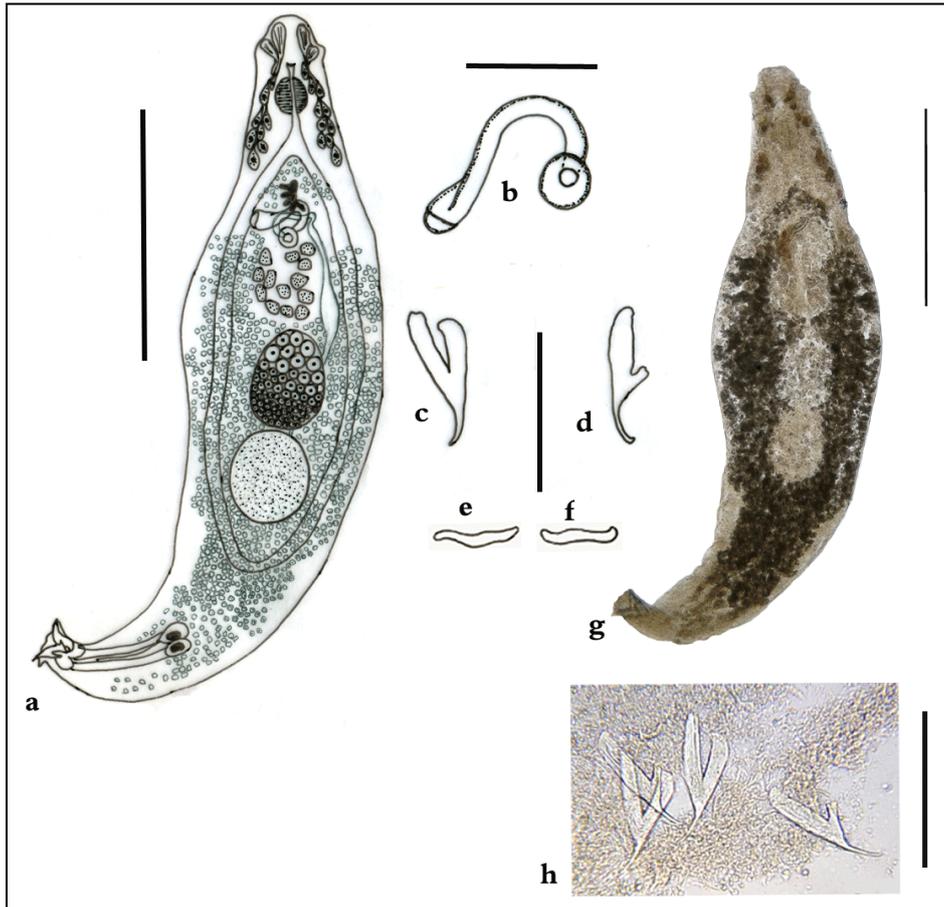


Figure (1): *Pseudohaliotrema sphincterporus* from *Siganus luridus*, a- drawing of whole worm, b- male copulatory organ, c- ventral anchor, d- dorsal anchor, e- ventral bar, f- dorsal bar, g- unstained fresh worm, h- separated ventral and dorsal anchors. Scale bar in figs. a, g = 500 μ m, in b=50 μ m and in c-f, h= 100 μ m.

esophagus is short, caeca simple, intestinal bifurcation closely post esopharyngeal and united posterior to the testis. Testis is oval (65-75x 30-40 μ m) and lies behind the middle body, vas deferens looping the left caecum and form the seminal vesicle (8-12 μ m) in width, cirrus is curved and tubular-shaped, there are a pyriform prostate. Many prostatic cells were obtained in the first middle of the body. Ovary is oval in shape (70-90x 40-50 μ m), situated at the middle of the body, vagina absent, vitellaria distributed from esophagus region to posterior of caeca. Haptor (80-95 μ m) in width, less than body width and (70- 80 μ m) in length, with two pairs of hooks (dorsal and ventral), ventral hook length (30-35 μ m), ventral bar width (45-55 μ m), ventral bar height (6-7.5 μ m). Dorsal hook length is (32-40 μ m), dorsal bar width (38-47 μ m), dorsal bar height (5.5- 6.6 μ m). Three cement glands were found posterior to the caeca, and two cement reservoirs also were found in haptor region.

Remarks:

The head shape in present study is similar to that of *Metahaliotrema arii* Yamaguti, 1953 with more or less distinct incision in front and in both sides, but *Metahaliotrema scatophagi* head has only two lobes in each side. Testis in present is oval, differ than the elongate one in *M. arii*, the present sp. testis also is smaller than that of *Metahaliotrema scatophagi*, where Ovary in present species is larger than that of *M. scatophagi*, also the present parasite resembles *Metahaliotrema arii* in the shape, site and size of both the ovary and the prostatic cells. From the previous description it was observed that the present species resemble *Metahaliotrema arii* Yamaguti, 1953 but they are different in the size and shape of testis. Further studies must be considered to detect species of genus *Metahaliotrema* that was recorded for the first time in *Lethrinus harak* in present study. *Metahaliotrema* is from Dactylogyridae Andrea et al. (2003), it has a small and elongate body, well-marked haptor with two hooks, head with two lobes containing the sticky glands ducts on each side, the caeca united in posterior to testis, testis is oval or elongate, vas deferens turns around the left caecum, ovary lies anterior to the testis, the vagina and the receptaculum seminalis are absent, vitellaria are scattered from pharynx anterior to cement glands posterior. *Metahaliotrema* parasitic on marine fishes.

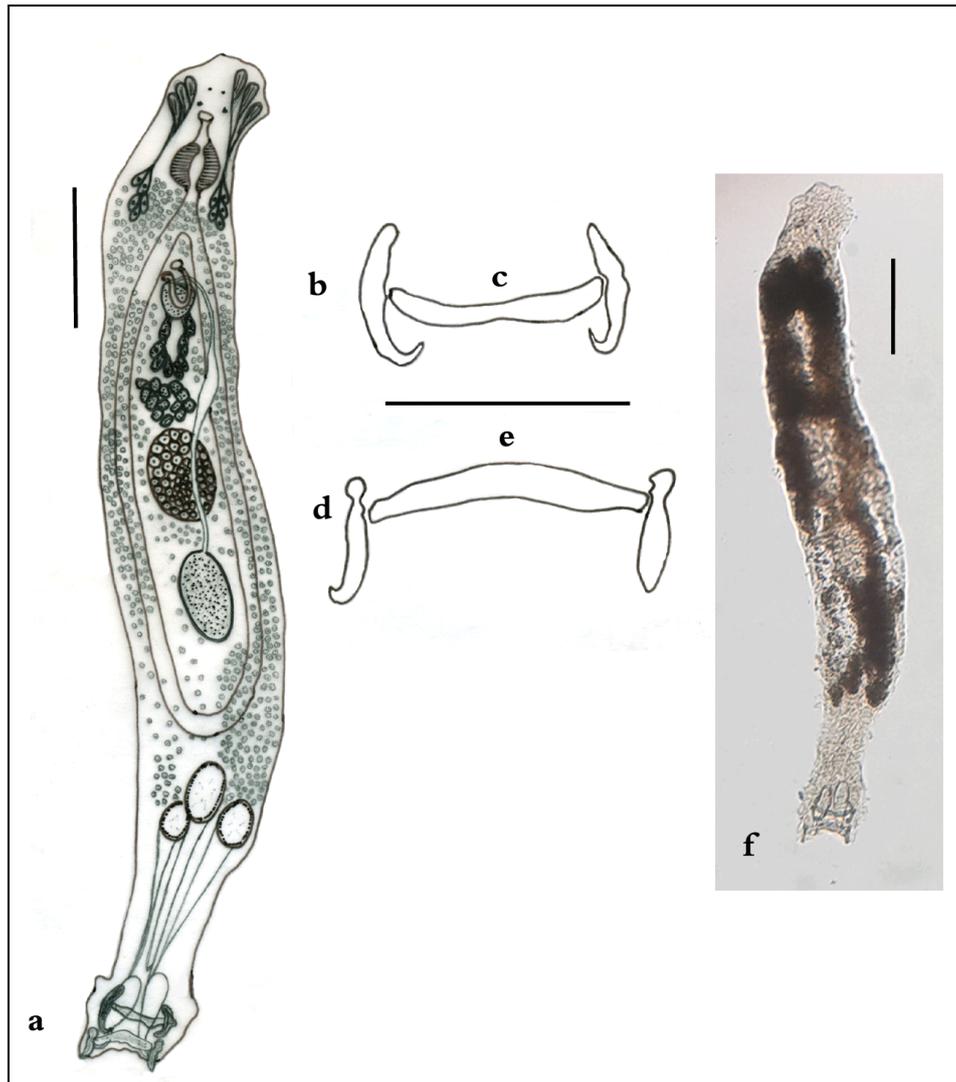


Figure. (2): a- d, drawing of *Metaaliootrema* sp. with camera Lucida, a- whole worm, b - dorsal anchor, c- dorsal bar d- ventral anchor, e- ventral bar, f fresh unstained worm. Scale bar in a, f= 100 μ m and b-e =50 μ m.

***Haliotrema* sp.:**

Host: *Parupeneus Forsskali* (Fourmanoir and Gueze, 1976)

Site: gills

Locality: Red-Sea, Egypt

Description: Figures (3, 4)

Body is fusiform (630 - 790 μ m) in length, (220- 240 μ m) in width in the testis region, cephalic region is short, no eye spots distinct, it contains three pairs of head organs and four pairs of cephalic glands on each side in the esophagus level. Pharynx is sub-spherical (38-42 x 35-38 μ m). Esophagus is very short, intestinal bifurcation closely post pharyngeal, caeca confluent posterior to testis that is sub-spherical inter caecal (100-110 x 95-105 μ m), vas deferens looping the left caecum and extend upward forming seminal vesicle. The main copulatory organ measured (86-93 μ m) with cup-like base. Ovary is dextral (55-60 x 70-75 μ m), lies up to testis. Vaginal vestibule is sac-like with muscles along its axis with narrow duct measuring (80-90 μ m long), (15-20 μ m wide). Haptor width (90-100 μ m) less than the body width, haptor length (60-80 μ m), two pairs of anchors are present and their measurements were taken according to Dmitrieva et al. (2007) as follow: the dorsal outer length (120-128 μ m), its inner length (160-165 μ m), it has elongate inner root (50-58 μ m) but their outer root is short (30-34

μm), the main part length (110-118 μm), span between roots (60-70 μm), base length (45-50 μm), the proximal part inner length (40-45 μm) but its outer length (75-80 μm). Shaft is short (25-28 μm), the distance from point tip to shaft end (70-75 μm), point length (13-15 μm), dorsal bar is straight (110-120 μm) in width and (20-24 μm) in height. The ventral anchor is longer than the dorsal (140-145 μm) but its inner length is shorter than that of dorsal anchor (140-145 μm). The main part length (98-106 μm), span between roots (50-56 μm), outer root length (43-47 μm), inner root length (46-51 μm), base length (28-33 μm), the inner length of the proximal part (60-65 μm) and the outer length (60-63 μm), shaft is long (70-75 μm), distance from point tip to shaft end (67-74 μm) and the point length (13-17 μm). Ventral transverse bar is bulky, arcuate.

Remarks:

The cephalic region is short, eye spots absent, haptor is small, testis is sub-spherical, there are three pairs of cephalic organs, esophagus is short, intestinal bifurcation closely post pharyngeal, caeca confluent posterior to testis and that resembles *Haliotrma zigmoidocirrus* and *Haliotrma dongshaense* Sun et al. (2011) and the present parasite resemble the *Haliotrma dongshaense* in the male copulatory organ length. The dorsal bar width and the male copulatory organ of present species is greater than that of *H. zigmoidocirrus*. The vaginal vestibule is large and pyriform as *H. magnihamus*, the ventral bar is slightly bow-like as *H. dongshaense*, the dorsal bar is almost straight as *H. tubulovagina* and *H. heraldi* which differs than that of *H. dongshaense*. Also the present one resembles *Haliotrema guadeloupensis*, Vala et al. (1982) in the body size, and both of them have a bulky

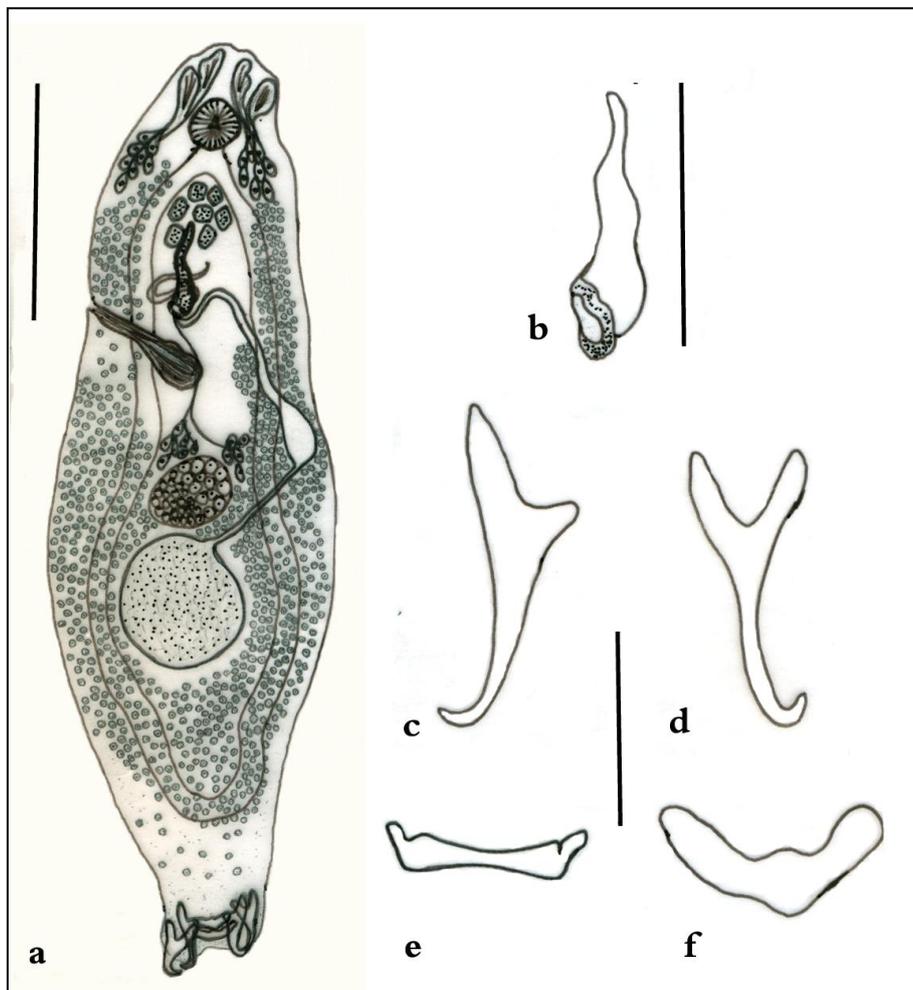


Figure (3): drawing *Haliotrema* sp. with camera Lucida, a- whole worm, b- male copulatory organ, c- dorsal anchor, d- ventral anchor, e- dorsal bar, f- ventral bar. Scale bar in a= 200 μm and in b-f =100 μm .

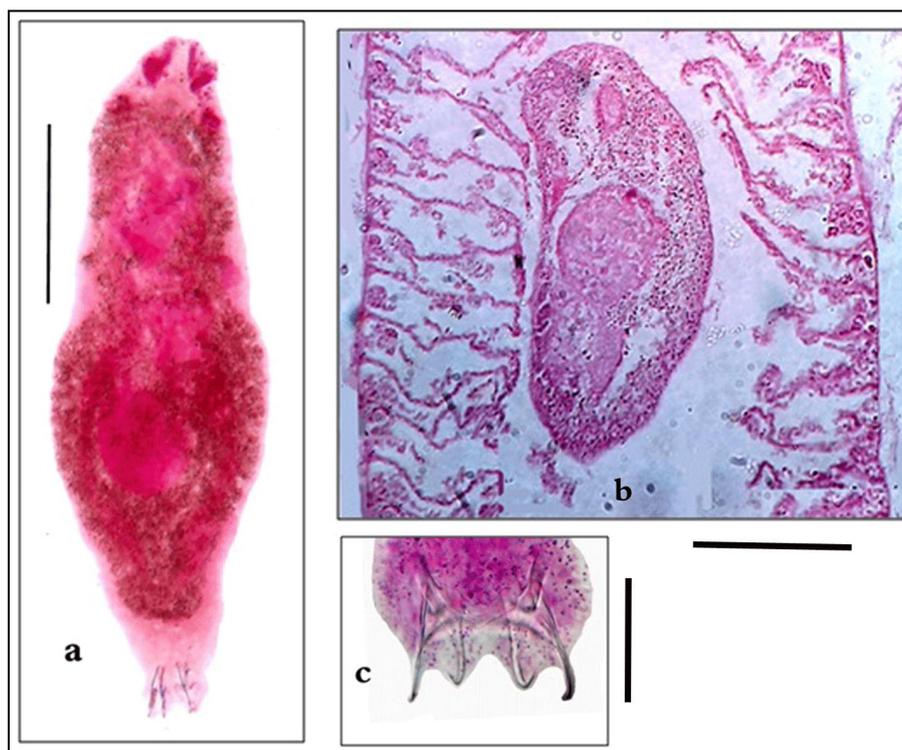


Figure (4): *Haliotrema* sp. in *Parupeneus Forsskali*, a- light photograph of whole worm stained with acetic acid alum carmine, b- transverse paraffin section (5 μ thick) in infected gill filaments of *Parupeneus Forsskali* stained with H&E distinguish *Haliotrema* sp., c- enlarged haptor. Scale bar in a & b= 200 μ m but in c =50 μ m.

and arcuate ventral transverse bar, but in *H. guadeloupensis*, it was provided with two divergent process at each end that are absent in present species, both of them also have a dorsal transverse bar that is narrow in the middle, also they resemblance in containing a spherical pharynx, smooth testis, vas deferens looped around the left caecum, large prostatic glands, dextral ovary, The vaginal aperture dextro-lateral according to Kritsky & Bakenhaster (2016) and lies at the first third of the body, further studies must be considered to detect the species of genus *Haliotrema* that was recorded for the first time in *Parupeneus Forsskali* in present study. *Haliotrema* includes more than 100 different species parasites on large numbers of fishes (Kritsky & Stephens, 2001). The structure of haptor and the reproductive organs (ovary, testis, male copulatory organ and the vaginal vestibule) are most important for identifications of Dactylogyrid monogeneas (Rehulkova et al., 2010). *Haliotrema* includes a haptor armed with dorsal and ventral anchors that joined with transverse bars, confluent intestinal caeca, and their vas deferens looping the left intestinal caecum and the vagina opens dextrally (Young 1968).

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