DOI:https://doi.org/10.36602/jsba.2026.21.81

Description and prevalence of Aponurus laguncula Looss, 1907 infecting Red Mullet (Mullus surmuletus Linnaeus, 1758) From Misurata Coast, Libya

Riad Mohamed Elshawesh
Department of Zoology, Faculty of Science, Misurata University
elshawesh_2009@sci.misuratau.edu.ly

Submission date: 25.2.2026 Acceptance date: 15.5.2026 Electronic publishing date: 19.5.2026

Abstract: One morphologically distinct species of the genus *Aponurus* Looss, 1907 was recovered from one family, one genus, and one species of marine fish in the waters off the coast of Misurata, western Libya: *Aponurus laguncula* in *Mullus surmuletus*. The following characters were used to distinguish the species of *Aponurus*: the general shape of body and vitellaria follicular; length and width body and other organs; size of sinus-sac; length of forebody; post-testicular region; eggs size; and the position of the acetabulum, genital pore, receptaculum seminis, and gonads. Except for the size, the present species of *Aponurus* showed interspecific similarities in all of the characters enumerated, the most dramatic being in the position of the genital pore in one species (*A. laguncula*). During the present study, infection with this digenean was noted in *M. surmuletus*, however, the prevalence was low (20%) and mean intensity of 4.3±0.43.

Keywords: Digenea - Lecithasteridae - *Aponurus* - *Mullus surmuletus* - Misurata - Libya - Mediterranean sea.

Introduction

As pointed out by Gibson and Yamaguti, the key generic features for *Aponurus* Looss, 1907 include a club-shaped or spindle-shaped body , acetabulum big and oral sucker small, two and tandem testes, seminal vesicle in forebody or sometimes dorsal to acetabulum, oval sinus-sac, absent or small genital atrium, oval or spherical ovary, small or massive seminal receptacle, genital pore ventral to oral sucker, vitellarium containing seven spherical lobes, and excretory arms extending to forebody [1, 2]. Yamaguti has reported *Aponurus laguncula* Looss, 1907 from the intestine of *Megalaspis* sp. The author described this species with diagnostic generic features, including subcylindrical body, and smooth cuticle, acetabulum at anterior end of middle third of body, subglobular testes and located one directly behind the other, post-ovarian, vesicula seminalis globular or pyriform and located directly in front of ventral sucker, receptaculum seminis located between ovary and posterior testis, genital pore close to the pharynx, vitellarium containing seven spherical masses located directly behind to ovary, oval eggs, and excretory arms extending into forebody [3]. Moreover, Bray and MacKenzie described *A. laguncula* Looss, 1907 with gonads separated; testes double, ovoid, obliquely tandem to symmetrical a short distance posterior to acetabulum, pre-ovarian, in middle third of body [4], while León-Règagnon *et al* found this species has a body elongate, small, subcylindrical, narrow and tapered anteriorly, rounded posteriorly, widest near posterior extremity, tegument unarmed and smooth [5]. Pereira Jr *et al* conducted the study on the characteristics of the digenetic trematodes from *Micropogollias fllrnieri* in Brazil. He characterized *A. laguncula* Looss, 1907 by body measurements of 0.57-1.31 mm (1.04) by 0.14-0.29 mm (0.19) and egg at 23-32 mm (29) by 11-16 mm (14) [6]. According to the previous reports by Parukhin, Shen and Shen & Li, four digeneans of *Aponurus* were recorded in fish of the South China Sea such as: *Aponurus carangis* in *Decapterus* sp.; *A. laguncula* in, *Selar crumenophthalmus* and *Seriolina nigrofasciata*; *Aponurus megaloporus* Shen & Li, 2000 in *Trichiurus lepturus*; and *Aponurus uraspis* Shen, 1990 in *Uraspis helvola* [7, 8, 9, 10]. *A. laguncula* Looss, 1907 was collected from *Chaetodipterus zonatus* in the Bay of Chamela, Mexico, with an overall prevalence of 71.4% [5]. In another work, Braicovich *et al* recorded that this species from *Percophis brasiliensis*, caught in the Uruguayan and Argentinean Seas, with the prevalence and mean intensity of 0.97% and 2.7 respectively [11]. In addition, A total of 100 samples of *Seriolella porosa* from Argentina were checked in the year 2006. The results showed that the marine fish was infected with the adult stage of internal helminth parasites *A. laguncula* looss, 1907 with the prevalence and mean intensity of 19.80% and 2 respectively [12].

The present study aimed to identify digenean trematodes infecting *Mullus surmuletus* from the coast of Misurata, Libya, and to provide a detailed morphological description of the recovered parasites. The most important reason for studying fish parasites is to studying the relationships

between parasites and fish to understand. Studying about parasite prevalence and mean intensity will provide important information for understanding the relationship between these parasites and their hosts In addition, through the study of fish parasites, we will be able to determine the appropriate treatments needed to overcome if disease outbreaks occur.

Materials and methods

Thirty specimens of the red mullet *M. surmuletus* were collected in 2024 from the Mediterranean coast of Misurata, Libya (Fig. 1). These fishes were obtained with the help of local fishermen in Misurata, Libya. All fishes were taken to the laboratory, where they were checked macroscopically for digeneatic trematode. Fish were examined for gastrointestinal digenean trematodes. The gastrointestinal was removed from body and the contents were then checked under a dissecting microscope. The digeneans isolated were fixed in 70% ethyl alcohol for half hour. Samples were stained with alum-carmine stain, dehydrated, cleared and mounted in DPX.

Measurements of the digenean trematodes were taken in micrometers, with their ranges and averages. Drawings were done by using a camera lucida. Photography of whole samples were carried out by using a Nikon microscope. All these classical methods were done at Parasitology laboratory of Department of Zoology, Misurata University, Libya. Identification of the worms were done using Yamaguti [2, 3], Parukhin [7], Bray and MacKenzie [4], Shen & Qiu [13], Gibson *et al*. [14], and Guagliardo *et al*. [12]. Prevalence and intensity of digenean were calculated and clarified as arithmetic mean with standard error. Arithmetic mean was used for easy comparison with other studies. The prevalence and mean intensity of digenean were calculated according to Margolis *et al*. [15], using the following formulas:

$$\text{The prevalence} = \frac{\text{Number of fish infected}}{\text{Number of fish examined}} \text{X } 100$$

$$\text{The mean intensity} = \frac{\text{Number of Digenea found}}{\text{Number of fish infected}}$$

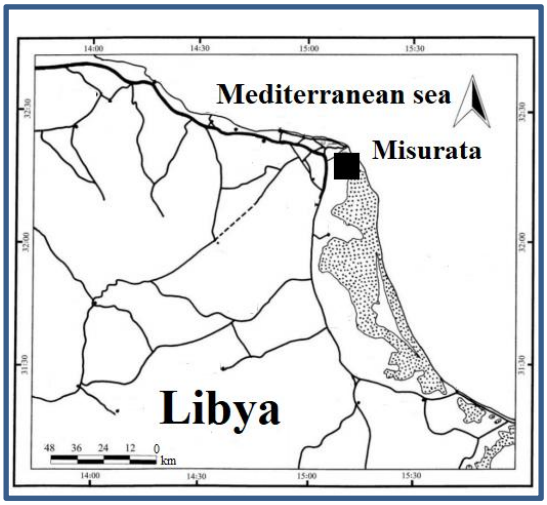

Fig 1. Map showing location of Misurata.

Results

Family: Lecithasteridae Odhner, 1905
Genus: *Aponurus* Looss, 1907
Aponurus laguncula Looss, 1907 (Fig. 2, 3).

Description based on ten specimens. Body small, subcylindrical, narrow and tapered anteriorly, rounded posteriorly, widest near posterior extremity, tegument unarmed and smooth, longer than wide 497–887 X 182–260 (756 X 221) µm; forebody 227–366 (305) µm in length; oral sucker subglobular, occasionally surmounted by preoral lobe, smaller than acetabulum 47–79 X 50–72 (57 X 61) µm; prepharynx absent; pharynx rounded, short 30–42 X 33–51 (36 X 42) µm; oesophagus absent; caeca double, extending only slightly beyond the vitellaria; intestine bifurcated in forebody; mouth subterminal; acetabulum large and at anterior end of middle third of body 102–135 X 99–132 (117 X 119) µm; testes double, ovoid, obliquely tandem to symmetrical a short distance posterior to acetabulum, pre-ovarian, anterior testis at about middle of body 48–85 X 56–89 (67 X 75) µm; posterior testis 51–82 X 55–85 (65 X72) µm; post-testicular region 179–409 (284) µm in length; ovary ovoid to globular, post-testicular, situated about in middle of hindbody 44–79 X 52–84 (62 X 71) µm; uterus filled with eggs, occupies the entire hindbody and reaching half the forebody; a sinus-sac oval to elongate-oval or pyriform in forebody 63–78 X 24–34 (70 X 28) µm; seminal vesicle saccular, round or pyriform, situated immediately in front of acetabulum 74–95 X 45–79 (84 X 42) µm; pars prostatica tubular; genital pore just ventral to posterior end of pharynx; receptaculum seminis "seminal receptacle canalicular" very large, between and dorsal to anterior part of ovary and posterior testis; excretory arms united in forebody and reaching to pharynx; excretory pore terminal

at posterior end of body; vitellaria seven rounded lobes or masses, post-ovarian 43–83 (60) µm in diameter; eggs oval to pyriform, numerous, pale yellow to black, dark pigmented, small in size 18–22 X 7–11 (21 X 9).

Host: *Mullus surmuletus*.
Site: Intestine.
Locality: Misurata city.

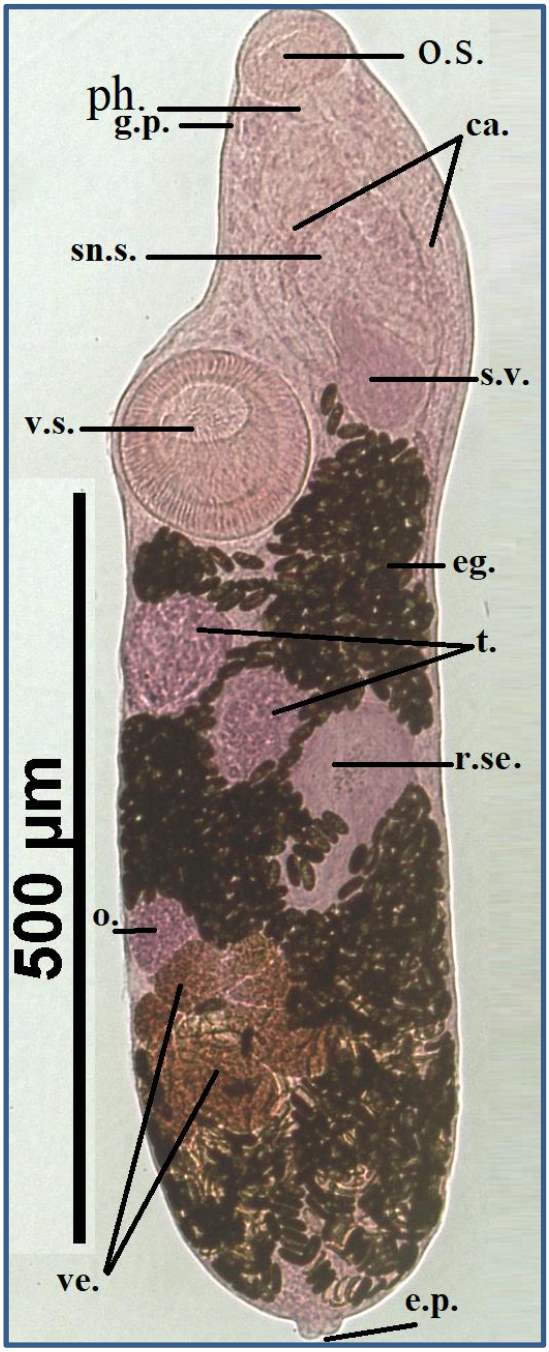

Fig 2. Photo of *Aponurus laguncula* Looss, 1907. o.s., oral sucker; ph., pharynx; g.p., genital pore; ca., caeca; sn.s., sinus-sac; s.v., seminal vesicle; v.s., ventral sucker; eg., egg; t., testes; r.se., receptaculum seminis; o., ovary; ve., vitellaria; e.p., excretory pore.

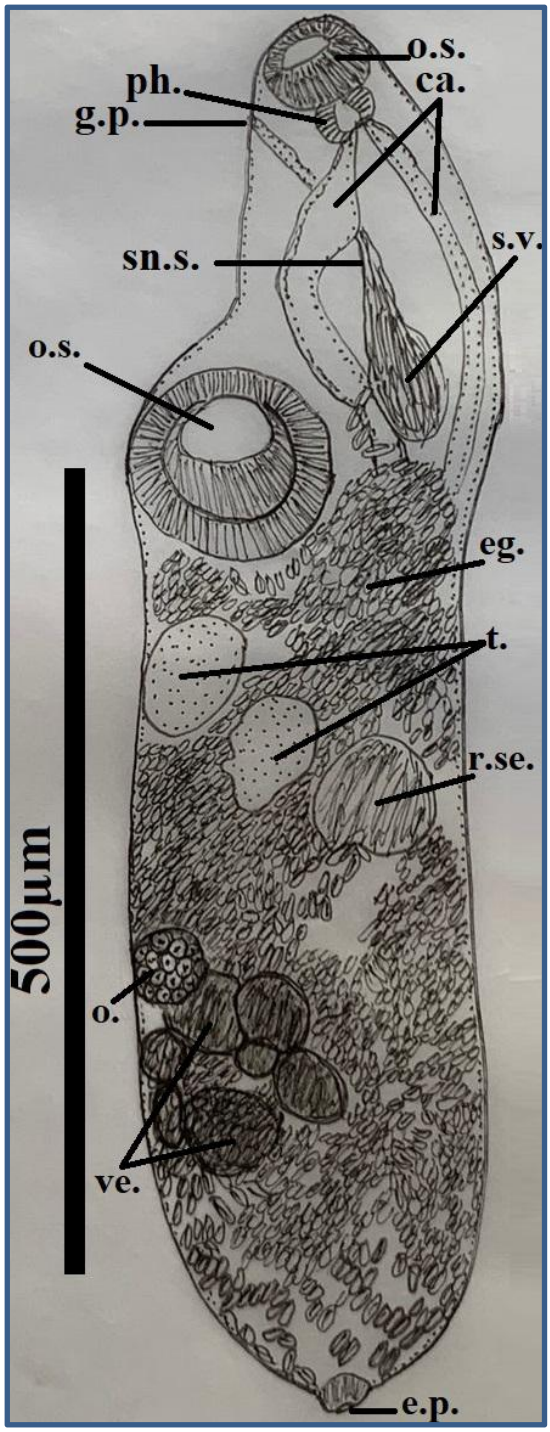

Fig 3. Drawing of *Aponurus laguncula* Looss, 1907. o.s., oral sucker; ph., pharynx; g.p., genital pore; ca., caeca; sn.s., sinus-sac; s.v., seminal vesicle; v.s., ventral sucker; eg., egg; t., testes; r.se., receptaculum seminis; o., ovary; ve., vitellaria; e.p., excretory pore.

Out of the total host fish (*M. surmuletus*) examined, 7 (20%) were found to be infected with one digenetic trematode (*A. laguncula*). The prevalence of *A. laguncula* was 20% with a mean intensity per infected fish (4.3±0.43) (Table 1).

Table (1): Prevalence (%) (P), mean infection intensity (MI) and standard error (SE) of *Aponurus laguncula* found infecting *Mullus surmuletus* from the Misurata coastal water.

Parasite species	No. of fish examined	No. of fish infected	P(%)	MI±SE
Aponurus laguncula	30	7	20	4.3±0.43

Discussion

According to Yamaguti, 1958 many species of *Aponurus* are currently recognised. In the type-species (*A. laguncula*), *Aponurus*, the body like a club or spindle and without ecsoma, acetabulum bigger than an oral sucker, two and tandem testes, seminal vesicle in forebody or sometimes dorsal to acetabulum, oval sinus-sac, genital atrium absent or small, oval or spherical ovary, small or massive seminal receptacle, genital pore ventral to oral sucker, vitellarium seven spherical lobes, and excretory arms extending to the forebody [1, 2]. In *A. laguncula* reported by Yamaguti body subcylindrical and measuring 1.15-1.25 by 0.22-0.25 mm, smooth cuticle, ventral sucker at anterior end of middle third of body, subglobular testes and located one directly behind the other, post-ovarian, globular or pyriform vesicula seminalis and located directly in front of ventral sucker, receptaculum seminis located between ovary and posterior testis, genital pore at posterior end of pharynx, vitellarium seven spherical lobes situated directly posterior to ovary, oval eggs and measuring 24-27 by 13-16 µm, and excretory arms extending into forebody [3]. Bray and MacKenzie described *A. laguncula* Looss, 1907 with the measuring of body 500–705 (620) by 167–242 (192) and egg 16–21 (18) by 32–42 (38), while León-Règagnon *et al* found this species has measurements of body 2600–3300 (2900) by 664–670 (660), and egg 27–30 (28) by 15–18 (16) [5]. Moreover, Pereira Jr *et al* characterized *A. laguncula* by measurements of body 0.57-1.31 mm (1.04) by 0.14-0.29 mm (0.19) and egg 23-32 mm (29) by 11-16 mm (14) [6], while Guagliardo *et al* described this species with the measuring of body 750–1005 µm (866.87) by 162.5–225 µm (202.18) and egg 25–30 µm (28.13) by 12.5–15 µm (13.75) [12]. Florencia *et al* found this species has measurements of the body and eggs 800-1.675 by 280-400 µm and 22,5-37,5 by 7,5-17,5 µm respectively [16]. Except for the size, the present material resembles *A. laguncula* as described by Bray and MacKenzie [4], Florencia *et al*. [16], Guagliardo *et al*. [12], León-Règagnon *et al*. [5], Pereira Jr *et al*. [5] and Yamaguti [2, 3] from different regions. Despite the wide difference in size of the body, egg, and other organs, the present study concluded that this species reported under genus *Aponurus* is *A. laguncula*.

The present specimens *A. laguncula* was described from the intestine of host fish *M. surmuletus* which was collected from the Mediterranean Sea in Misurata, Libya. According to previous reports by Parukhin, Shen and Shen & Li, there are 4 species of the genus *Aponurus* were recorded in marine fish from the South China Sea such as *A. carangis* in *Decapterus* sp.; *A. laguncula* in *A. atropos*, *S. crumenophthalmus* and *S. nigrofasciata*; *A. megaloporus* in *T. lepturus*; and *A. uraspis* in *U. helvola* [7, 8, 9, 10]. The species *A. laguncula* is widely distributed around the world. Yamaguti has reported *A. laguncula* from the intestine of *Megalaspis* sp. which was caught in Celebes [3], while in Ghana this species was described by Fischthal and Thomas from the stomach of *Trachinotus glaucus* [17]. Bray and MacKenzie recorded this digenetic trematode from the stomach of *Clupea harengus* collected from the English Channel of the north-eastern Atlantic Ocean [4]. This trematode was also described from the stomach of marine fish taken in the USA, Brazil and the Mediterranean Sea [18]. Subsequently, Pereira Jr *et al*recorded this digenetic trematode from host fish *M. fllrnieri* in Brazil [6]. Later, Guagliardo *et al* and Florencia *et al* reported this species from *S. porosa* and *P. porosissimus* in Argentina [12, 16]. Recently, *A. laguncula* was described by Madhavi & Lakshmi and Al-Zubaidy and Mhaisen from the stomach of *R. kanagurta* which was collected from the Bay of Bengal and the Red Sea [19, 20]. This digenetic trematode was described of Atlantic Spadefish *Chaetodipterus faber* from Brazilian Coastal Zone [21].

Seven out of 30 examined Mullus surmuletus were infected with a single digenean species, *A. laguncula*. The prevalence of this parasite was (20%) with a mean intensity per infected fish (4.3±0.43). These data is in disagreement with several other studies carried out on marine fish from different regions of the world which showed prevalence rate and mean intensity of infection for this parasite higher or lower than that these obtained here. *A. laguncula* Looss, 1907 was collected from *C. zonatus* in the Bay of Chamela, Mexico, with an overall prevalence of 71.4% [5]. In another work, Braicovich *et al* recorded that this species from *P. brasiliensis*, caught in the Uruguayan and Argentinean Seas, with the prevalence and mean intensity of 0.97% and 2.7 respectively [11]. In addition, a total of 100 samples of *S. porosa* from Argentina were checked in the year 2006. The results showed that the marine fish was infected with the adult stage of internal helminth parasites *A. laguncula* looss, 1907 with the prevalence and mean intensity of 19.80% and 2 respectively [12]. Moreover, Alves and da Silva Gonçalves recorded *A. laguncula* looss, 1907 of *Trachurus lathami*, with prevalence rate and mean intensity 26.56% and 1.76 respectively [22]. In the same year, Braicovich *et al* found *A. laguncula* looss, 1907 parasitizing in *T. lathami* with the prevalence rate and mean intensity 2% and 0.02 respectively, in September [23]. In addition, Pereira *et al* also recorded *A. laguncula* looss, 1907 in *Urophycis brasiliensis* with prevalence of infection 11.5% in the Rio Grande do Sul, and to be higher than that prevalence of infection for this digenean in the other regions, Rio de Janeiro, Santa Catarina and Mar del Plata which were 3.8%, 0% and 0% respectively [24].

Conclusion

The current paper described one digenean from the intestine of one marine fish species from the Misurata coastal water. The results of the present detailed comparative morphological study confirmed the presence of (*A. laguncula* in *M. surmuletus*) formerly recognized in literatures. Furthermore, infection with this digenean was noted in *M. surmuletus*, however, the prevalence was low (20%) and mean intensity of 4.3±0.43.

Recommendations

Thus, in future studies, warning plans for fish parasites should be accessorily performed to develop an advanced control system, especially in big and intricate systems such as the Mediterranean Sea to aid in protecting fish wealth. Further investigation on marine fish are wanted in order to develop parasitological integrated monitoring in fish from the Mediterranean in Libya. Moreover, other parasitological studies as well should be conducted such as prevalence, mean intensity, site specificity, and life cycle of digenetic trematodes to prevent dangerous pathogenic incidents which may lead to transmission of the parasite to humans or the death of fish.

References

[1] Gibson, D. I. (2002). Family Lecithasteridae Odhner,1905. In: Keys to the Trematoda Vol. 1. Gibson D.I., Jones A., Bray R.A. (eds.), CAB International Cambridge, Wallingford, pp. 385-386.

[2] Yamaguti, S. (1958). Systema Helminthum. Vol. I. The Digenetic Trematodes of Vertebrates. Parts I and II. *Interscience Publ*., N. Y. pp. 1575.

[3] Yamaguti, S. (1953). Parasitic Worms mainly from Celebes. Part 3. Digenetic Trematodes of Fishes, II. *Journal of Acta medica Okayama, 8*(3).

[4] Bray, R. A., & MacKenzie, K. (1990). Aponurus laguncula Looss, 1907 (Digenea: Lecithasteridae): a report from herring, *Clupea harengus* L., in the eastern English Channel and a review of its biology. *Systematic Parasitology, 17*(2), 115-124.

[5] León-Règagnon, V., De León, G. P.-P., & Lamothe-Argumedo,R.(1997). Hemiuriformes de peces marinos de la Bahía de Chamela, México, con la descripción de una nueva especie del género *Hysterolecitha* (Digenea: Hemiuridae: Lecithasterinae). Paper presented at the *Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología, 68*, 1–34.

[6] Pereira Jr, J., Fernandes, B. M., & Robaldo, R. B.(2000). Digenea (Trematoda) of Micropogonias furnieri (Desmarest) (Perciformes, Sciaenidae) from Rio Grande do Sul, Brazil. *Revista Brasileira de Zoologia, 17*(3), 681-686.

[7] Parukhin, A. M. (1966). Helminth fauna of carangid fish from the South China Sea. In V. A.Vodyanitsky (Ed.), *Helminth fauna of animals of the southern seas*. Kiev: Naukova Dumka, pp. 80-96. (In Russian).

[8] Parukhin, A. M. (1976). Parasitic worms in food fishes of the southern seas. Kiev: Naukova Dumka, 183 pp. (In Russian).

[9] Shen, J. W. (1990). Digenetic trematodes of marine fishes from Hainan Island. Beijing: Science Press, 228 pp. (In Chinese).

[10] Shen, J. W., & Li, X. H. (2000). Addendum to the parasite digenetic trematodes from marine fishes in Hainan Island. Studia Marina Sinica, 42, 153-162. (In Chinese).

[11] Braicovich, P. E., Etchegoin, J. A., & Timi, J. T. (2009). Digenetic trematodes of the Brazilian flathead, *Percophis brasiliensis* Quoy et Gaimard, 1825 (Percophidae, Perciformes), from Argentinean and Uruguayan waters. *Acta Parasitologica, 54*(4), 368-373.

[12] Guagliardo, S., Schwerdt, C., Martorelli, S., Galeano, N., & Tanzola, R. (2010). Digenean trematodes of *Seriolella porosa* (Pisces, Centrolophidae) in San Matías Gulf, Argentina. *Acta Parasitologica, 55*(1), 29-38.

[13] Shen, J. W., & Qiu, Z. Z. (1995). Studies on the trematodes of fishes from the Yellow Sea and the Bo Hai Sea. Beijing: Science Press, 207 pp.

[14] Gibson, D. I., Jones, A., & Bray, R. A. (2002). Keys to the Trematoda, vol. 1: CAB International Cambridge, Wallingford, pp. 521.

[15] Margolis, L., Esch, G., Holmes, J., Kuris, A., & Schad, G. (1982). The use of ecological terms in parasitology (report of an ad hoc committee of the American Society of Parasitologists). *The Journal of Parasitology, 68*(1), 131-133.

[16] Florencia, A. M., Silvia, G., Carla, S., Noelia, G., Melisa, P., Javier, M., Javier, S., Román, U., & Daniel, T. (2011). Digeneos parásitos de *Porichthys porosissimus* (Teleostei: Batrachoididae) en el estuario de bahía blanca. *BioScriba, 4*(1), 26-37.

[17] Fischthal, J. H., & Thomas, J. (1971). Some hemiurid trematodes of marine fishes from Ghana. *The Helminthological Society of Washington, 38*(2), 181-189.

[18] Bunkley-Williams, L., & Williams, E. H. (1994). *Parasites of Puerto Rican freshwater sport fishes*: Department of Natural and Environmental Resources, University of Puerto Rico, ISBN 978-0-07-302827-9, Mayaguez. pp 701.

[19] Madhavi, R., & Lakshmi, T. T. (2012). Community ecology of the metazoan parasites of the Indian mackerel *Rastrelliger kanagurta* (Scombridae) from the coast of Visakhapatnam, Bay of Bengal. *Journal of parasitic diseases, 36*(2), 165-170.

[20] Al-Zubaidy, A. B., & Mhaisen, F. T. (2014). Four new records of trematodes from the Indian mackerel Rastrelliger kanagurta (Cuvier, 1816) from the Yemeni coastal waters of the Red Sea. *American Journal of Biology and Life Sciences, 2*(6): 141-145.

[21] Machado A. B., Simões R. O., Maldonado A. Jr., Santos M. A. J., Luque J. L. (2024). Morphological and Molecular Analyses of *Aponurus laguncula* Looss, 1907 (Digenea: Lecithasteridae) Parasitic in Atlantic Spadefish *Chaetodipterus faber* (Broussonet, 1782) (Acanthuriformes: Ephippidae) from Brazilian Coastal Zone. Acta Parasitol, *69*(3):1600-1612. doi: 10.1007/s11686-024-00878-z. Epub 2024 Aug 20. PMID: 39162922.

[22] Alves, D. R., & da Silva Gonçalves, P. H. (2012). Ecologia da comunidade de metazoários parasitos do xixarro, *Trachurus lathami* Nichols, 1920 (Osteichthyes: Carangidae) do litoral do Estado do Rio de Janeiro, Brasil. *Cadernos UniFOA*(20), 105-113.

[23] Braicovich, P. E., Luque, J. L., & Timi, J. T. (2012). Geographical patterns of parasite infracommunities in the rough scad, *Trachurus lathami* Nichols, in the southwestern Atlantic Ocean. *Journal of Parasitology, 98*(4), 768-777.

[24] Pereira, A. N., Pantoja, C., Luque, J. L., & Timi, J. T. (2014). Parasites of *Urophycis brasiliensis* (Gadiformes: Phycidae) as indicators of marine ecoregions in coastal areas of the South American Atlantic. *Parasitology research, 113*(11), 4281-4292.