

Research Note

The marine leech *Stibarobdella moorei* (Oka, 1910) (Hirudinea, Piscicolidae) parasitic on the thornback ray *Raja clavata* Linnaeus, 1758 and angelshark *Squatina squatina* (Linnaeus, 1758) in Antalya Bay, Mediterranean Sea of Turkey

S. Y. BULGUROĞLU, J. KORUN*, M. GÖKOĞLU, Y. ÖZVAROL

Akdeniz University, Faculty of Fisheries, Aquaculture Division, Department of Fish Diseases,
Antalya, Turkey, 07058, *E-mail: jalekorun@akdeniz.edu.tr

Summary

The marine leech, *Stibarobdella moorei* was collected from dorsal parts of the thornback ray (*Raja clavata*) and angelshark (*Squatina squatina*) (Elasmobranchii) captured by commercial trawl vessels as non-target species from depth of 50 meters of Antalya Bay which is located in the eastern Mediterranean coast of Turkey on April and July, 2013. The leeches caused two typical lesions on epidermal tissues of both hosts: the major lesion by oral sucker and a minor one by caudal sucker. The leeches were identified as *Stibarobdella moorei* which has not been reported from elasmobranchs in the Turkey's Mediterranean shores. This study represents new host and geographical records.

Keywords: new geographical record; parasitic annelids; Elasmobranchii; *Stibarobdella moorei*; *Raja clavata*; *Squatina squatina*

Introduction

Leeches (Annelida: Clitellata: Hirudinea) are common in the worldwide and they can be found as living in marine, estuarine, moist terrestrial and freshwater ecosystems (Yamauchi *et al.*, 2008). Hirudinea represent the monophyletic group that includes 14 families (Sket and Trontelj, 2008). Out of them, Piscicolidae and Glossiphoniidae parasitize predominantly freshwater or marine fishes (Govedich *et al.*, 2004). Glossiphoniid leeches (e.g. *Helobdella europaea*) occur on a wide variety of freshwater fish species (three-spined stickleback, *Gasterosteus aculeatus*) while piscicolid leeches (e.g. *Piscicola geometra* and *Stibarobdella loricata*) occur on both freshwater and marine fishes including tench *Tinca tinca* and the greater weever *Trachinus draco* (Kutschera, 2004; Akmirza, 2004). Body of Piscicolidae members consists of two sections, except for the genera *Myzobdella* and *Piscicolaria*, anteriorly narrower neck which is called trache-

losome and posteriorly longer and wider urosome (Yamauchi, *et al.*, 2008).

Leeches can potentially affect the health of fish in variety of ways. Marine leeches damage on areas of feeding or attachments on the fish and this situation reduces economic value of the demanded fish; however, the most important role of them is that they act as vectors of potentially pathogenic organisms for the fish hosts. Also, it was reported that hemoflagellates of genera *Trypanosoma* and *Cryptobia*, intracellular *Haemogregarina* spp., viruses and bacteria were transmitted by both freshwater and marine leeches (Hayes *et al.*, 2006).

Marine leeches of the family Piscicolidae are known as parasites of elasmobranch species. About 20 species of leeches have been reported from the skins of the sharks and rays including thornback ray (*Raja clavata*), sandtiger shark (*Carcharias taurus*) and argentina angelshark (*Squatina argentina*) from regions such as Indian Ocean, Atlantic Ocean, Japan, and southern Brazil (Oka, 1910; Soto, 2003; Wunderlich *et al.*, 2011). Annelids which infest elasmobranchs are still poorly known in Turkish waters (Arslan and Öktener, 2012).

In this paper, we first report *Stibarobdella moorei* in two fish hosts, the thornback ray *Raja clavata* (Linnaeus, 1758) and angelshark *Squatina squatina* (Linnaeus, 1758) in the Mediterranean Sea of Turkey.

Material and methods

Thornback ray and angelshark were captured by commercial trawl vessels as non-target, due to the lack of selectivity of trawl mesh from depth of 50 meters of Antalya Bay, which is located in the eastern Mediterranean coast of Turkey, on April and July 2013. The first leech from the dorsal surface of angel shark was taken without any damage to the host and later the shark was returned to the

sea. The second leech was picked up from the dorsal surface of thornback ray and then preserved in 70 % ethanol without relaxation until brought to the research laboratory. Subsequently, the fixed parasites were examined under a stereo microscope. Length and width, diameters of oral and caudal suckers of parasites were measured. Annulation on body surface of parasites was separated as a_1 , a_2 and a_3 annulus. After, somites on these annuli were examined in terms of morphological characteristics and then these somites were counted according to dorsal, lateral and ventral regions. Morphometry and identification of the parasites were performed according to Soto (2003), Furiness *et al.* (2007), and Wunderlich *et al.* (2011). Then, the parasites were stored in 70 % ethylalcohol.

Results

Two typical lesions on the epidermal tissues of two different fish species, the thornback ray *Raja clavata* Linnaeus, 1758 and angelshark *Squatina squatina* (Linnaeus, 1758) were found. The major lesion was caused by oral sucker and the minor lesion was induced by caudal sucker of leeches.

Color of the fresh parasitic specimens was green in the field condition while the fixed leeches were pale yellow. The body length and width of the specimen taken from *R. clavata* measured 98.27 mm and the diameters of both oral and caudal suckers were recorded as 5.3 mm, respectively. The body length and width of the specimen taken from *S. squatina* were determined as 99 and 26 mm, respectively. The diameters of oral and caudal suckers were measured 4.3 mm, respectively. The body shapes of the parasites were cylindrical, slight flattened, and were divided into trachelosome, clitellum and urosome. The oral sucker was large, deeply cup-shaped and eccentrically attached to the body. The dorsal surface was larger than ventral surface of oral sucker. The oral sucker had 3 pairs of small submarginal papillae with obvious marginal fringe (Fig.1). No eyes on oral sucker were present. The posterior sucker was small and terminal, not wider than the maximum width of body, and it was usually contracted in the preserved specimens. Annulation of specimens was as follows; uniannulate somites: none; biannulate somites: XI-XII, XXV-XXVII; triannulate somites: VII-X, XIII-XVIII; quadriannulate somites: XIX-XXIV. a_2 annulus was slightly wider than a_1 and a_3 annuli. Urosomal tubercle numbers were 12 tubercles as 4 dorsal, 2 lateral and 6 ventral on a_1 ; 8 tubercles as 4 dorsal and 4 ventral on a_2 , 10 tubercles as 4 dorsal, 2 lateral and 4 ventral on a_3 . Dorsal tubercles on a_2 annulus were larger and more prominent than those on other 2 annuli. The parasitic species was identified as *Stibarobdella moorei*.

Discussion

A parasitic annelid *Stibarobdella moorei* was first reported as *Pontobdella moorei* from shark from the Indian Ocean by Oka (1910) but the author did not give the detailed

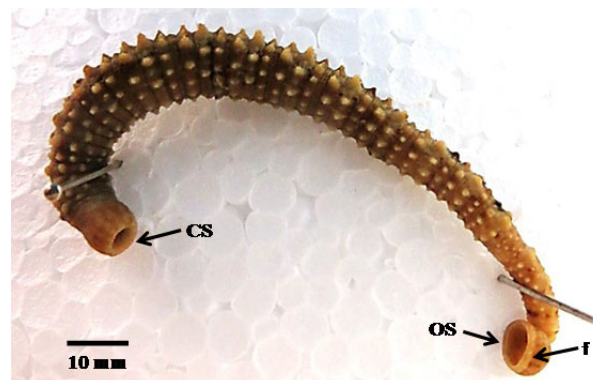


Fig. 1. *Stibarobdella moorei* (98 mm) collected from the dorsal region of the thornback ray *Raja clavata*, the eastern Mediterranean coast of Turkey. Small terminal caudal sucker (C) and cup-shaped oral sucker (OS) demonstrated with arrows, marginal fringe (f) on oral sucker indicated with arrow. Scale bar = 10 mm.

information on the shark species. He emphasized that the oral sucker of the parasite had a smooth margin and neither papillae nor eyes; however, the author did not report numbers or arrangements of the tubercles of the species. The genus *Stibarobdella* includes trimeric species while the genus *Pontobdella* contains tetrameric species (Leigh-Sharpe, 1925). For this reason, *P. moorei* was transferred to the new genus *Stibarobdella* due to it had triannulate somites on its body (Furiness *et al.*, 2007). Although *S. moorei* was already described by Oka (1910), the same species was further named as *Stibarobdella loricata* by Harding (1924). Nevertheless, the author did not compare *S. loricata* with other *Stibarobdella* species. Furiness *et al.* (2007) re-described *S. moorei* which was well preserved and deposited in the Museum National d'Histoire Naturelle, Paris, France (MNHN) and compared it with *S. loricata* samples which were conserved in various museums (Llewellyn, 1966). The authors found that the tuberculation patterns on *S. moorei* were identical with those of *S. loricata* specimens. Therefore, the original description of *S. moorei* by Oka (1910) was confirmed and *S. loricata* was proposed to be the junior synonym. The descriptions of the presently studied leeches agreed to the characteristics of species *S. moorei* specified by Furiness *et al.* (2007) and Wunderlich *et al.* (2011).

Wunderlich *et al.* (2011) reviewed data on shark hosts of *S. moorei* (*S. loricata*) and reported its additional, batoid host – eyespot skate *Atlantoraja cyclophora* from the western South Atlantic Ocean. In the Mediterranean, *S. moorei* (again as *S. loricata*) was reported to parasitize the perciform fish, greater weever *Trachinus draco* but not any elasmobranch (Akmirza, 2004). On the other hand, several batoids (*R. clavata*, *Raja* sp., and marbled electric ray *Torpedo marmorata*) were parasitized by another leech species *Pontobdella muricata* in the Aegean or Marmara Sea (Ergüven and Candan, 1992, Sağlam *et al.*, 2003). Therefore, the current data represent the second record of *S. moorei* occurrence from batoid elasmobranch worldwide, and the first notification from the Turkey's Mediterranean shores.

References

- AKMIRZA, A. (2004): Parasite fauna of the greater weever (*Trachinus draco* Linnaeus, 1758). *Acta Adriat.*, 45: 35 – 41
- ARSLAN, N., ÖKTENER, A. (2012): A general review of parasitic Annelida (Hirudinea) recorded from different habitats and hosts in Turkey. *Turk. J. Zool.*, 36(1): 141 – 145
- ERGÜVEN, H., CANDAN, A. (1992): A parasitic Hirudinea (*Pontobdella muricata* Linnaeus) at *Raja* sp. in Marmara Sea. *Turk. J. Fish. Aquat. Sci.*, 2: 1 – 4
- FURINNESS, S., WILLIAMS, J. L., NAGASAWA, K., BURRESON, E. M., (2007): A collection of fish leeches (Hirudinida: Piscicolidae) from Japan and surrounding waters, including redescrptions of three species. *J. Parasitol.*, 93(4): 875 – 883. DOI: 10.1645/GE-979R1.1
- GOVEDICH, F. R., MOSER, W. E., DAVIES, R. W. (2004): Annelida: Clitellata, Hirudinea, Euhirudinea. In: YULE, C. M., SEN, Y. H. (Eds) *Freshwater Invertebrates of the Malaysian Region*. Kuala Lumpur: Academy of Sciences Malaysia, pp. 175 – 190
- HARDING, W. A. (1924): Descriptions of some new leeches from India, Burma and Ceylon. *Ann. Mag. Natur. Hist.*, 9(14): 491 – 493
- HAYES, P. M., SMIT, N. J., SEDDON, A. M., WERTHEIM, D. F., DAVIES, A. J. (2006): A new fish haemogregarine from South Africa and its suspected dual transmission with trypanosomes by a marine leech. *Folia Parasitol.*, 53: 241 – 248. DOI: 10.14411/fp.2006.031
- KUTSCHERA, U. (2004): The freshwater leech *Heleobdella europa* (Hirudinea: Glossiphoniidae): an invasive species from South America. *Lauterbornia*, 52: 153 – 162
- LEIGH-SHARPE, W. H. (1925): *Stibarobdella superba* n.g. et sp. A new ichthyobdellid leech, *Parasitology*, 17: 417 – 420. DOI: 10.1017/S0031182000004832
- LLEWELLYN, L. C. (1966): Pontobdellinae (Piscicolidae: Hirudinea) in the British Museum (Natural History) with a review of the subfamily. *Bull. Br. Mus.*, 14: 391 – 439
- OKA, A., (1910): Synopsis der Japanischen Hirudineen, mit Diagnosen der Neuen Species. *Annot. Zool. Jpn.*, 7: 165 – 183
- SAGLAM, N., OGUZ, M. C., CELIK, E. S., DOYUK, S. A., USTA, A. (2003): *Pontobdella muricata* and *Tracheobdella lubrica* (Hirudinea: Piscicolidae) on some marine fish in the Dardanelles, Turkey. *J. Mar. Biol. Ass. U.K.*, 83: 1315 – 1316. DOI: 10.1017/S0025315403008749
- SOTO, J. M. R. (2003): The marine leech *Stibarobdella loricata* (Harding, 1924) (Hirudinea, Piscicolidae), parasitic on the angel shark *Squatina* spp. and sandtiger shark *Carcharias taurus* Rafinesque, 1810 (Chondrichthyes, Squatinidae, Carchariidae) in southern Brazilian waters. *Braz. J. Biol.*, 63(4): 691 – 694. DOI: 10.1590/S1519-69842003000400016
- SKET, B., TRONTELJ, P. (2008): Global diversity of leeches (Hirudinea) in freshwater. *Hydrobiologia*, 595: 129 – 137. DOI: 10.1007/s10750-0079010-8
- YAMAUCHI, T., OTA, Y., NAGASAWA, K. (2008): *Stibarobdella macrothela* (Annelida, Hirudinida, Piscicolidae) from elasmobranchs in Japanese waters, with new host records. *J. Biogeogr.*, 10: 53 – 57
- WUNDERLICH, A. C., GADING, O. B. F., JUNIOR, T. V., PINHEIRO, M. A. A. (2011): Annelida, Hirudinea, *Stibarobdella moorei* (Oka, 1910): new distribution and host records. *Check List*, 7(3): 360 – 362

RECEIVED APRIL 30, 2014

ACCEPTED JULY 28, 2014