

## Annelida, Hirudinida, Stibarobdella moorei (Oka, 1910): New distribution and host records

Alison Carlos Wunderlich 1\*, Otto Bismarck Fazzano Gadig 2, Teodoro Vaske Júnior 2 and Marcelo Antonio Amaro Pinheiro 2

- 1 Universidade Estadual Paulista (UNESP), Instituto de Biociências de Botucatu, Departamento de Parasitologia. Distrito de Rubião Júnior s/n. CEP 18618-970. Botucatu, SP, Brasil.
- 2 Universidade Estadual Paulista (UNESP), Campus Experimental do Litoral Paulista (CLP). Praça Infante D. Henrique s/n. CEP 11330-900. São Vicente, SP, Brasil.
- \* Corresponding author. E-mail: wunderlich@ibb.unesp.br

**ABSTRACT:** The present report is the northernmost capture of the piscicolid leech *Stibarobdella moorei* in the western South Atlantic Ocean. This is also the first time S. moorei is found associated to a batoid fish in the Brazilian coast, the eyespot skate Atlantoraja cyclophora. Stibarobdella moorei was found fixed in the dorsal side of a male eyespot skate, caught by bottom trawl around of the São Paulo coast, southeastern Brazil. A brief description of the morphology of the parasite and a discussion on the taxonomic status of the *S. moorei* are presented.

The only group of annelids known to include species that parasitize elasmobranchs is the Hirudinea, or leeches (Caira and Healy 2004). Marine leeches are well known as parasitic of numerous elasmobranch species around the world, and such parasitism is restrict to marine leeches of Piscicolidae (Benz and Bullard 2004; Utevsky and Trontelj 2004). Approximately 20 known species of leeches have been reported from the skin of the sharks and rays (Caira and Healy 2004). Regarding marine leeches parasitizing elasmobranchs in Brazil, few data records are available. Studies of leeches of the elasmobranchs are scarce in Brazilian waters and thus the species list are incomplete, due to lack of interest in this subject, because of the very low number of specialists working along the Brazilian coast (Schlenz 1999; Christoffersen 2008).

Schlenz (1999) was the first to reports leech-fish associations, when he recorded Branchellion sp. fixed to cownose rays (*Rhinoptera* sp.), guitarfish (*Rhinobatos* sp.) and spotted eagle ray (Aetobatus narinari (Euphrasen, 1790)) in Cananéia, southern coast of São Paulo. More recently, Stibarobdella macrothella (Schmarda, 1861) was found on cooper shark (Carcharhinus brachyurus (Günther, 1870)) in southern Brazil by Soto (2000) and on the Caribbean sharpnose shark Rhizoprionodon porosus (Poey, 1861) from northeastern Brazil (Naércio Menezes, personal communication). Stibarobdella moorei (Oka, 1910) (Hirudinea, Piscicolidae) was found as parasite of three angel sharks (Squatina argentina, (Marini, 1930), S. guggenheim Marini, 1936 and S. punctata Marini, 1936) and on sandtiger shark Carcharias taurus Rafinesque, 1810, from southern Brazil (cited as *S. loricata* (Harding, 1924) by Soto (2003)).

In this article, we first report S. moorei (Oka, 1910) (Hirudinida) in a new elasmobranch host, the eyespot skate Atlantoraja cyclophora (Regan, 1903) (Rajidae: Arhynchobatinae), an endemic batoid elasmobranch that inhabits the bottom of the continental shelf and slope of the western South Atlantic, from Rio de Janeiro, Brazil (22° S) to the Gulf of San Jorge, Argentina (47° S) (Menni and Stehmann 2000; Oddone and Vooren 2004).

Specimens of Atlantoraja cyclophora, were caught by bottom trawl during III Oceanographic Cruiser organized by Universidade Estadual Paulista (UNESP/CLP) in October 2008, onboard the research vessel "Soloncy Moura" (South Coast Fisheries Research Center - CEPSUL/ICM-Bio). The specimen was collected about 100 m deep in a transect between 24°25'41.4" S, 44°57'49.8" W and 24°26'14.6" S, 44°59'22.4" W.

Parasite morphometry and identification follow Soto (2003) and Furiness et al. (2007) and the systematic arrangement follows Furiness et al. (2007), who considered S. moorei as the valid name and S. loricata, as a junior synonym. The specimen was fixed in 70% alcohol and deposited in the Helminthological Collection of the Departamento de Parasitologia of the Instituto de Biociências (CHIBB), Universidade Estadual Paulista (UNESP), municipality of Botucatu, state of São Paulo, Brazil.

One 450 mm total length (TL) male specimen of the eyespot skate (A. cyclophora) was captured with a 97 mm TL marine leech S. moorei (Voucher - CHIBB 5021) parasitizing its dorsal side. The parasite attachment caused two typical circleson host epidermal tissue (Figure 1), which were represented by a major lesion (oral sucker = os) and a minor one (caudal sucker = cs).

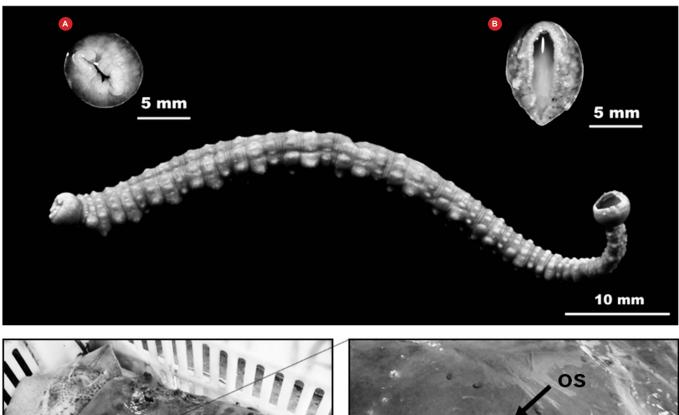
The general morphology of the *S. moorei* specimen herein examined fits the description presented by Furiness et al. (2007) in having the diagnostic characters to distinguish from all other known Stibarobdella species, as follows: no eyes; small, terminal caudal sucker; large, very deeply cupped oral sucker with marginal fringe; and three pairs of small marginal papillae (Figure 1). Concerning these two last features, previous studies consider S. moorei and *S. loricata* as distinct species on the basis of the oral sucker morphology (smooth margins and lacking papillae in *S. moorei* and fringed margin and three pairs of papillae

in S. loricata). Furiness et al. (2007) resurrect S. moorei and regard S. loricata as junior synonym of S. moorei clarifying that in the original description of *S. moorei* by Oka (1910) there are no data on the papillae number or arrangement, and the oral sucker was described as smooth. A more careful type specimen re-examination by these authors revealed the presence of three pairs of papillae and fringed oral sucker margins, as described early for S. loricata by Harding (1924) who did not examine the S. moorei holotype.

Stibarobdella moorei is known to occur in the Indian Ocean (Oka 1910), Japan and Tasmania (Furiness et al. 2007). Soto (2003) presented the first record of this species in the Atlantic Ocean (as S. loricata), parasitizing four shark species from southern Brazil. Previous known positively identified elasmobranch hosts were coastal demersal-benthic sharks (three Squatina and Carcharias taurus), totaling four species (Soto 2003). Herein is presented the first record of S. moorei on an identified batoid fish, A. cyclophora, becoming the fifth identified elasmobranch host for S. moorei. One unidentified skate

(Rajidae) from Tasmanian waters, Australia, was also recorded infected by this species, but no further additional data was presented (Furiness et al. 2007). Moreover, the present report extends the previous known western South Atlantic distribution of the species to a northernmost position (about 24°26' S) in relation to the data reported by Soto (2003) in the latitude 29°34' S.

This widespread distributional pattern of Stibarobdella (notably S. macrothella, another marine leech recorded as parasitic of elasmobranch in Brazilian waters) is often explained by the highly mobile and power swimming hosts, since most elasmobranch species targeted by Stibarobdella spp. are "wide ranging sharks" (Sawyer et al. 1975; Williams 1982; Sawyer 1986; Benz and Bullard 2004; Furiness et al. 2007). Despite the fact that S. macrothella is regarded as parasitic of oceanic sharks and that the species of Stibarobdella feed primarily on sharks (Sawyer 1986). Thus the bottom sea associated marine leech life, the more adequate criteria to distinguish host specificity among the representatives parasites leech of the Pontobdellinae could be the elasmobranchs general



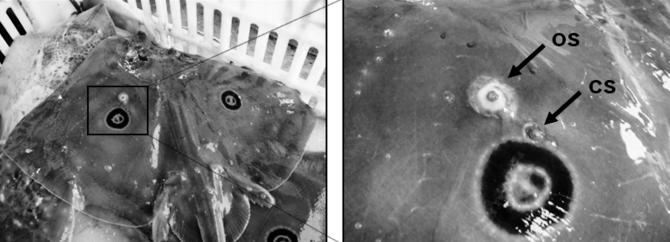


FIGURE 1. Terminal views of the caudal sucker (a) and oral sucker (b), in the last one showing the marginal fringe and three pairs of small papillae that characterize marine leech Stibarobdella moorei. This specimen was captured on dorsal epidermis of an adult male Atlantoraja cyclophora (total length, TL = 450mm) (photo inferior left), with the occurrence of two epidermal whitish rounded lesion next the left ocellus (photo inferior right), caused by the oral and caudal sucker (os and cs, respectively).

habitat, more than the imprecise terms "sharks" or "rays". In an updated list of elasmobranchs host for S. macrothella provided by Yamaguchi et al. (2008), there are at least 22 positively identified elasmobranchs, of which 18 are sharks and four are rays, but in fact 14 of the listed species are coastal-demersal or benthic and the remaining are coastal-oceanic pelagic.

Therefore, based on the above mentioned facts, the regarded worldwide distributional pattern of *S. moorei* and S. macrothella must be reviewed because most recorded elasmobranch hosts do not exhibit a global distribution pattern, some worldwide pelagic sharks recorded as hosts (e.g., Carcharhinus leucas Valenciennes, 1839, C. limbatus (Valenciennes, 1839), and Galeocerdo cuvier (Péron and Lesueur, 1822) are more associated to coastal areas, and there are no evidences of transoceanic migratory movements (with the possible exception for Carcharhinus falciformis (Bibron, 1839) and C. longimanus (Poey, 1861), both also recorded as hosts for S. macrothella). Due to the complex Stibarobdella taxonomy, the lack of more conclusive studies on host specificity, and the fact that most elasmobranch hosts are coastal nearshore species, it is possible that *S. moorei* comprises actually a species complex rather than a single worldwide distributed species.

Finally, more elucidative taxonomic studies, including molecular sequence data, are suggested to solve this question.

ACKNOWLEDGMENTS: The authors would like to thank to the South Coast Fisheries Research Center - CEPSUL/ICM-Bio, Santa Catarina) and crew of the research vessel "Soloncy Moura" for support during the field trip of III Oceanographic Cruiser of UNESP/CLP; Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), for individual grants to authors; UNESP General Administration, in supporting the research cruises; and João Pedro Barreiros (Universidade dos Açores, Portugal) for the valuable manuscript comments.

## LITERATURE CITED

Benz, G.W. and S.A. Bullard. 2004. Metazoan Parasites and Associates of Chondrichthyans with Emphasis on Taxa Harmful to Captive Hosts; p. 325-416 In M.D. Smith, D.T. Warmolts, D.A. Thoney and R.E. Hueter (ed.). The Elasmobranch Husbandry Manual: Captive Care of Sharks, Rays and their Relatives. Ohio: Special Publication of the Ohio Biological Survey.

Caira, J.N. and C.J. Healy. 2004. Elasmobranchs as Hosts of Metazoan Parasites; p. 523-551 In J.C. Carrier, J.A. Musick and M.R. Heithaus. (ed.). Biology of Sharks and Their Relatives. New York: CRC Press

- Christoffersen, M.L. 2008. A Catalogue of the Piscicolidae, Ozobranchidae, and Arhynchobdellida (Annelida, Clitellata, Hirudinea) from South America. Neotropical Biology and Conservation 3(1): 39-48.
- Furiness, S., J.L. Williams, K. Nagasawa and E.M. Burreson. 2007. A collection of fish leeches (Hirudinida: Piscicolidae) from Japan and surrounding waters, including redescriptions of three species. Journal of Parasitology 93(4): 875-883.
- Harding, W.A. 1924. Descriptions of some new leeches from India, Burma and Ceylon. Annal and Magazine of Natural History 14: 491-493.
- Menni, R.C. and M.F.W. Stehmann. 2000. Distribution, environment and biology of batoid fishes off Argentina, Uruguay and Brazil. A review. Revista del Museo Argentino de Ciencias Naturales 2(1): 69-109.
- Oddone, M.C. and C.M. Vooren. 2004. Distribution, abundance and morphometry of Atlantoraja cyclophora (Regan, 1903) (Elasmobranchii: Rajidae) in southern Brazil, Southwestern Atlantic. Neotropical Ichthyology 2(3): 137-144.
- Oka, A. 1910. Synopsis der Japanischen Hirudineen, mit Diagnosen der Neuen Species. Annotationes Zoologicae Japonenses 7: 165-183.
- Sawyer, R.T. 1986. Leech biology and behaviour. Vol. II. Feeding biology, ecology, and systematics. Oxford: Clarendon Press. 375 p.
- Sawyer, R.T., A.R. Lawler and R.M. Overstreet. 1975. Marine leeches of the eastern United States and the Gulf of Mexico with a key to the species. Journal of Natural History 9: 633-667.
- Schlenz, E. 1999. Hirudinea; p. 183-184. In A.E. Migotto and C.G. Tiago (ed.). Biodiversidade do Estado de São Paulo, Brasil: síntese do conhecimento ao final do século XX. 3: Invertebrados Marinhos. São Paulo: Fundação de Amparo a Pesquisa do Estado de São Paulo. 310
- Soto, J.M.R. 2000. Marine leech, Stibarobdella macrothela (Schimarda, 1861) (Hirudinea, Piscicolidae), parasitic on the whaler shark, Carcharhinus brachyurus (Günther, 1870) Chondrichthyes, Carcharhinidae), in southern Brazilian waters. Revista Brasileira de Biologia 60(4): 713-714.
- 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. Brazilian Journal Biology 63(4): 691-694.
- Utevsky, S. Y. and P. Trontelj. 2004. Phylogenetic relationships of fish leeches (Hirudinea, Piscicolidae) based on mitochondrial DNA sequences and morphological data. Zoologica Scripta 33: 375-385.
- Yamauchi, T., Y. Ota and K. Nagasawa. 2008. Stibarobdella macrothela (Annelida, Hirudinida, Piscicolidae) from elasmobranchs in Japanese waters, with new host records. Biogeography 10: 53-57.
- Williams, E.H.Jr. 1982. Leeches of some marine fishes of Porto Rico and adjacent regions. Proceedings of the Helminthological Society of Washington 49: 323-325.

RECEIVED: March 2011 LAST REVISED: May 2011 ACCEPTED: May 2011 Published online: June 2011

EDITORIAL RESPONSIBILITY: Luis Ernesto Arruda Bezerra