J Parasit Dis (Oct-Dec 2015) 39(4):795–797
DOI 10.1007/s12639-013-0407-1

SHORT COMMUNICATION

Unusual attachment of *Nerocila exocoeti* in *Hemiramphus far* (Forsskal, 1775) from Parangipettai south east coast of India

Kanagasabapathy Sivasubramanian · Samuthirapandian Ravichandran

Received: 9 October 2013 / Accepted: 11 November 2013 / Published online: 30 November 2013

Abstract A female *Nerocila exocoeti* was found attached on the head region of the halfbeak fish *Hemiramphus far* reported for the first time from Parangipettai south east coast of India. This was abnormal position to all known cymothoids attached on the surface of host fishes. This isopod naturally occurs in the fish belongs to Exocoetidae. The attachment must have occurred accidentally. This is only the second time this isopod has been collected in the south coast India and the first for this host.

Keywords Unusual attachment · *Nerocila exocoeti* · Halfbeak · *Hemiramphus far*

Cymothoids isopods settle on various regions of the fish body including fins, the buccal cavity, the gill chambers, or sometimes found in a pouch. Upon finding a suitable host, they start their parasitic life feeding on blood and tissues (Trilles et al. 2012; Rameshkumar et al. 2011; Horton and Okamura 2003). A number of cymothoid isopods reside on the body surface of fishes; however, all of these attach on the side region of their fish host (Bunkley-Williams and Williams 1998). Morton (1974) partly reviewed the subject of position on the host fish and suggested a rather sophisticated and directed mode of attachment for *Nerocila phaeopleura*. In some cases occur, such as bilateral or multiple infestations of the gills or situations in which the host fish is placed in physically stressful environments. Trilles (1964) has shown that (in some species of European Cymothoidae) a correlation exists between size of the isopod and size of the host, while in other species no such correlation exists. Trilles hypothesized that the former situation is common in cymothoid species that lose their ability to swim at an early age (e.g. *Anilocra physodes*) and that the latter situation occurs in species that retain their swimming ability well into the adult male stage (e.g. *Nerociluorbignyi*).

On routine analysis of parasitic infection along the Parangipettai (11°29′N, 79°46′E) south east coast of India, we obtained a specimen of half beak fish, *Hemiramphus far*, which had an isopod attached on the head region (Fig. 1). The host *H. far* was a 27.8 cm total length female (Fig. 2a, b). When removed from the fish, we found the isopod was a 29 mm long and 8 mm wide female of *Nerocila exocoeti* (Pillai 1954) (Isopoda, Cymothoidae). Due to the attachment of peropods host tissues were compressed and eroded at the attachment site, which were surrounded by an inflamed peripheral welt of peropods. The lesioned sites were pale red colour indicating anemia (Fig. 3). Lesions associated with infestation of parasite to the host are related to the direct activity of the parasite. The female of this isopod has been reported from the head region of *Exocoetus volitans* (Sivasubramanian et al. 2011), but not the family Hemiramphidae. This isopod probably was either dislodged from its natural host or abandoned surface after its host died in a trawl net and it either crawled into the head region of the half beak.

In the present study, the *H. far* expired prior to its collection so the possibility of survival of the host or isopod could not be tested. The fish was subsequently brought to the laboratory where it was photographed and preserved in 10 % buffered formalin. The isopod would appear to have occupied much of the head region of the host possibly

K. Sivasubramanian · S. Ravichandran (✉)
Centre of Advanced Study in Marine Biology, Annamalai University, Parangipettai 608502, India
e-mail: sravicas@gmail.com

K. Sivasubramanian
e-mail: siva4516@yahoo.co.in

Fig. 1 Attachment of *Nerocila exocoeti* (indicated by *arrow mark*) on half beak fish, *Hemiramphus far*

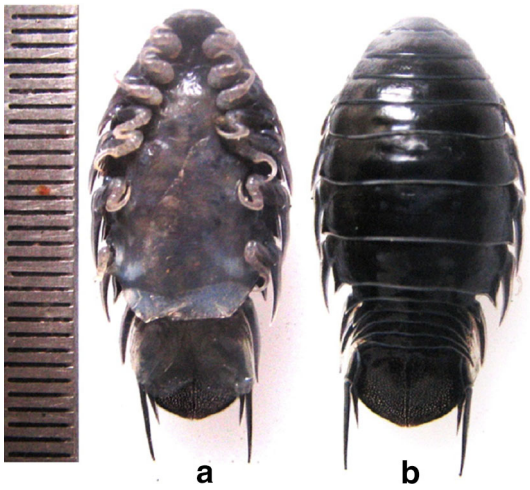

Fig. 2 Dorsal (**a**) and ventral (**b**) of isopod parasite *Nerocila exocoeti*

making discomfort to swim, eat and also other activities of the host. However, some relatively large cymothoids occupy much of the skin tissue. To assess the effect of isopod, fish tissues were taken from the infested region and also from the uninfested region. The tissues were cut out in fresh condition fixed in 10 % buffered neutral formalin and sections were made using cryostat. In normal muscle tissue the tensile strength of muscle fibres with extra cellular

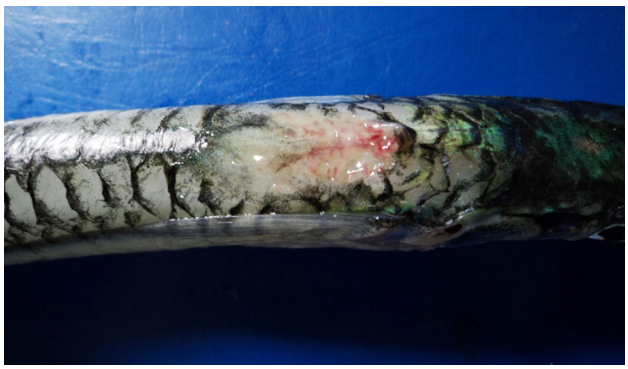

Fig. 3 Eroded skin lesions caused by *Nerocila exocoeti* on half beak fish, *Hemiramphus far*

matrix collagen is extensively tight associated. This gives a rigid musculature pattern to the tissues. Histopathological section of normal fish tissues denotes this extensive normal muscle fiber arrangement with the extracellular matrix of collagen (Fig. 4a). Intense tissue damage to host by *N. exocoeti* was observed due to crypting, a necrotic eroding reaction of host tissues pressed by the parasite or deformation (Fig. 4b).

Nerocila exocoeti piercing-sucking mouth parts seem more suited to body fluids. Trilles and Öktener (2004) summarized unusual cymothoid associations. They listed 11 species of cymothoids. Williams et al. (2010) reported an accidental attachment of *Elthusa raynaudii* from the shark. *N. exocoeti* has a wide range of distribution. It was previously recorded from the Southern India (Pillai 1954) to Papua New Guinea (Trilles 1977), Indonesia and Taiwan (Bruce and Harrison-Nelson 1988) and recently from Southeastern coasts of India (Sivasubramanian et al. 2011). Parangipettai is a second time locality record for this isopod in the south east coast of India and the host will be a new, if accidental, record once it is described.

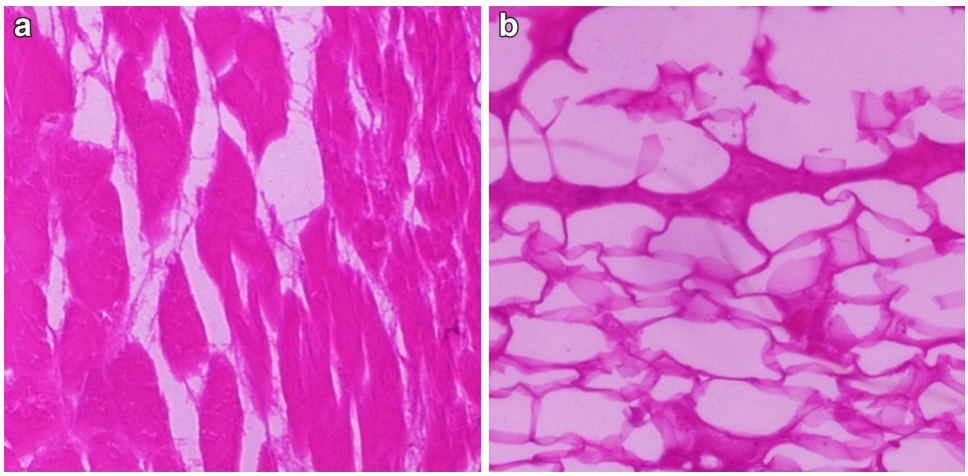

Fig. 4 **a** Histopathology of uninfested region of *Hemiramphus far.* **b** Histopathology of infested region of *Hemiramphus far*

Acknowledgments Authors are thankful to Department of Science and Technology (Grant No: SR/FF/LS-088/2007) and Ministry of Environment and Forest, Government of India (Grant No: 22-18/2008-CS-I) for providing financial support and Director of Centre of Advanced Study in Marine Biology for providing facilities and encouragement.

References

Bruce NL, Harrison-Nelson EB (1988) New records of fish parasitic marine isopod crustaceans (Cymothoidae, subfamily Anilocrinae) from the Indo-west pacific. Proc Biol Soc Wash 101: 585–602

Bunkley-Williams L, Williams EH Jr (1998) Isopods associated with fishes: corrections and a synopsis. J Parasitol 84:893–896

Horton T, Okamura B (2003) Post-haemorrhagic anaemia in sea bass, *Dicentrarchus labrax* (L.), caused by blood feeding of *Ceratothoa oestroides* (Isopoda: Cymothoidae). J Fish Dis 26:401–406

Morton B (1974) Host specificity and position on the host in *Nerocila phaeopleura* Bleeker (Isopoda, Cymothoidae). Crustaceana 26(2): 143–148

Pillai NK (1954) A preliminary note on the Tanaidacea and Isopoda on Travancore. Bulletin of the Central Research Institute, University of Kerala, Trivandrum, India. Ser C Nat Sci 3:1–21

Rameshkumar G, Ravichandran S, Trilles JP (2011) Cymothoidae (Crustacea, Isopoda) from Indian fishes. Acta Parasitol 56(1): 78–91

Sivasubramanian K, Ravichandran S, Rameshkumar G, Allayie SA (2011) Infestation of *Exocoetus volitans* (Linnaeus, 1758), a new host of *Nerocila exocoeti* (Crustacea, Isopoda, Cymothoidae). Sci Parasitol 12(2):99–101

Trilles JP (1964) A propos d'un fair particulier d'Cthologie parasitaire chez les Isopodes Cymothoidae: la relation de taille entre parasites et poissons. Note prbliminaire. Vie et Milieu 15: 365–369

Trilles JP (1977) Les Cymothoidae (Isopoda, Flabellifera) parasites des poissons du Rijksmuseum van Natuurlijke Historie de Leiden. Méditerranée et Atlantique Nord- Oriental. Zool Meded 52(2):7–17

Trilles JP, Öktener A (2004) *Livoneca sinuata* (Crustacea; Isopoda; Cymothoidae) on *Loligo vulgaris* from Turkey, and unusual cymothoid associations. Dis Aquat Organ 61:235–240

Trilles JP, Ravichandran S, Rameshkumar G (2012) *Catoessa boscii* (Crustacea, Isopoda, Cymothoidae) parasitic on *Carangoides malabaricus* (Pisces, Carangidae) from India. Taxonomy and host parasite relationships. Acta Parasitol 57(2):179–189

Williams EH Jr, Bunkley-Williams L, Ebert DA (2010) An accidental attachment of Elthusa raynaudii (Isopoda, Cymothoidae) in Etmopterus sp. (Squaliformes, Etmopteridae). Acta Parasitol 55(1):99–101