

# Parasitic isopods from marine fishes off Nagapattinam coast, India

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**Abstract** This study was conducted from August 2013 to January 2014. Host fishes were collected from the Nagapattinam Coast, India. During the sampling period, 242 fishes were infested out of 1440 specimens examined from nine different species of marine fishes. A total of 267 parasitic isopods belonging to nine cymothoid species viz., *Anilocra dimidiata* (Bleeker 1857), *Catoessa boscii* (Bleeker 1857), *Cymothoa indica* (Schioedte and Meinert 1884), *Joryma sawayah* (Bowman and Tareen 1983), *Nerocila arres* (Bowman and Tareen 1983), *N. loveni* (Bovallius 1887) *N. phaiopleura* (Bleeker 1857), *N. serra* (Schioedte and Meinert 1881) and *N. sundaica* (Bleeker 1857) were collected. The *Nerocila* species were attached to the pectoral fin, the caudal peduncle and different regions of the body surface of the host fishes. The specimen belonging to the species *Catoessa boscii*, *Cymothoa indica* and *Joryma sawayah* were collected from the mouth and the branchial cavity of the infected fishes. *Anilocra dimidiata* was only found on the body surface of the host fish. The overall prevalence reached 16.80 %. A maximum prevalence was observed in *C. boscii* parasitizing

*Carangoides malabaricus* (26.81 %) and a minimum prevalence in *N. sundaica* parasitizing *Terapon puta* ( $P = 7.31$  %). The mean intensity ranged from 1 to 1.3.

**Keywords** Parasitic isopods · Occurrence · Prevalence · Nagapattinam · India

## Introduction

The Cymothoidae (Crustacea, Isopoda) are haematophagous parasitic isopods attached to the skin, the fins, the gills or the tongue of the teleost fishes (Trilles 1969, 1994; Brusca et al. 2001). Some cymothoids are occasionally found on sponges, jellyfish, crustaceans, cephalopods, amphibians, and even humans (Trilles and Öktener 2004). Such unusual associations are also observed with sharks and skates. Their life cycle involves only one host (Holo-xenic cycle).

Trilles (1994) provided a world catalogue of the Cymothoidae which highlighted the lack of information about the fish parasitic isopods particularly in Eastern, Northern and Southern Africa, South America and Asia. Recently, 47 nominal species of Cymothoidae have been reported from India (Trilles et al. 2011). However, several of these reports are wrong or doubtful and often published in local journals which are not easily accessible. However, several accurate studies were recently published in order to make up for this lack (Rameshkumar et al. 2011, 2012, 2013a, b, 2014). The Indian cymothoid fauna is relatively poorly known and until now studies on these parasitic isopods were scanty on marine fishes from the Indian coasts. Hence the present study is focused on the occurrence of these parasitic isopods on commercially important marine fishes from the Nagapattinam Coast, South India.

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## Materials and methods

This study was conducted from August 2013 to January 2014. Samplings were performed twice monthly. Host fishes were collected from the Nagapattinam Coast, India. During the sampling period, 242 fishes were infested out of 1440 specimens examined from nine different species of marine fishes. As soon as they were collected and transferred to the laboratory, all outer parts of their body were carefully examined for the presence of isopod parasites. Cymothoids were removed from the hosts and preserved in 70 % ethanol for further detailed examination. The overall prevalence (number of infested hosts/number of examined hosts  $\times$  100 %) and intensity (total number of parasites/number of infested hosts) were calculated according to Margolis et al. (1982) and Bush et al. (1997) as well as the mean prevalence and mean intensity for each parasite–host association. The parasites were identified according to (Bovallius 1887; Bowman and Tareen 1983; Bleeker 1857; Bruce 1990; Schioedte and Meinert 1881; Schioedte and Meinert 1884). Host nomenclature and fish taxonomy are according to Fish Base (Froese and Pauly 2013). The sampling date, locality, host fish, host family and site of attachment on the host fish were recorded. Voucher specimens of parasites were deposited at the Department of Zoology, Bharathiar University, Coimbatore-641046 (Rameshkumar collection).

## Results

Nine fish species belonging to eight families were examined. A total of 267 parasitic isopods belonging to nine cymothoid species viz., *Anilocra dimidiata*, *Catoessa boscii*, *Cymothoa indica*, *Joryma sawayah*, *Nerocila arres*, *N.loveni*, *N. phaiopleura*, *N.serra* and *N.sundaica* were collected (Fig. 1). The site of the parasite attachment on the host fish was always recorded. The species belonging to the genus *Nerocila* were found attached to the pectoral fin, the caudal peduncle and different regions of the body surface. *Nerocila phaiopleura* was most commonly attached to the pectoral fin, between the pectoral and the pelvic fins, the pelvic fin, between the pelvic and the anal fins, the anal fin, under the dorsal fin. *C.boscii*, *C.indica* and *J. sawayah* were collected from the buccal and the branchial cavities of the infected fishes. *A.dimidiata* was only found on the body surface of the host fish. All cymothoid species characterized by an oioxenic parasitic specificity were collected from a single host fish. From August 2013 to January 2014, the overall prevalence reached 16.80 %. A maximum prevalence was observed in *C.boscii* parasitizing *C.malabaricus* (P = 26.81 %) and a minimum prevalence in *N. sundaica* parasitizing *Terapon puta* (P = 7.31 %). The mean intensity ranged from 1 to 1.3 (Table 1).

## Discussion

Seven species of parasitic cymothoid isopods on the marine fishes of the Kerala coast were reported by Pillai (1964). Likewise, several Indian cymothoids were already reported from 74 host species and 34 fish families. Clupeiformes species belonging to the families Chirocentridae, Engraulidae, Pristigasteridae and particularly Clupeidae are reported to be very high with at least 21 species identified (Trilles et al. 2011). From the Tamil Nadu coast, eleven *Nerocila* species were collected from 144 fish hosts belonging to 22 marine fish species and 15 families, Carangidae, Leiognathidae, Nemipteridae, Sciaenidae, Scombridae, Siganidae, Sphyracidae, Terapontidae and Trichiuridae (Perciformes), Chirocentridae, Engraulidae, Pristigasteridae and Clupeidae (Clupeiformes), Ariidae (Siluriformes), and Exocoetidae (Beloniformes) (Trilles et al. 2013). Carangidae and Clupeidae are the most parasitized families with three and five species respectively (Trilles et al. 2013). Six species belonging to three genera (*Catoessa*, *Cymothoa* and *Nerocila*) parasitizing four species of Carangid fishes along the Parangipettai coast were studied (Rameshkumar et al. 2014). Two *Nerocila* species, *N. exocoeti* and *N. Trichiura* were collected from fishes belonging to the family Exocoetidae. *Joryma hilsae* and *J. sawayah* were found infecting *Pellona ditchela* along the Bay of Bengal off Chennai coast, India (Sethi 2012). Seven of 56 fish species belonging to 23 families parasitized by either one or two species of *Nerocila* were reported from the Malabar coast (Aneesh et al. 2013). In the present study, nine host species belonging to eight families, Leiognathidae, Carangidae, Sphyracidae, Pristigasteridae, Nemipteridae, Clupeidae, Ariidae, and Terapontidae are recorded from the Nagapattinam coast.

Several host fish are parasitized by a single species of cymothoidae and some others by two or more species of parasitic isopods. Until now, *N. phaiopleura* was collected from several host fishes in India (Trilles et al. 2011). *Thryssa mystax*, *T. setirostris*, *T. malabarica* and *Opisthopterus tardoore* were identified as potential hosts for this species from the Southwestern coasts of India (Aneesh et al. 2013). *J. hilsae* and *J. sawayah* were reported in the single species *P. ditchela* along the Chennai coast (Sethi 2012). In the present study, every one cymothoid species recorded, characterized by an oioxenic parasitic specificity was found on a single host fish. Cymothoid species are often attached in the mouth cavity and the gills chambers of the host, better protected and with higher oxygen level and blood irrigation (Lima et al. 2005). To date, the maximum number of the Indian Cymothoids was noticed on the body surface rather in the branchial chambers and the buccal cavity (Trilles et al. 2011). In the present study, we also observed that the body surface of the host was the major site of attachment.

**Fig. 1** A–I: Some species of parasitic isopods collected in this study



**A** *A. dimidiata*



**B** *C. boscii*



**C** *C. indica*



**D** *J. sawayah*



**E** *N. arres*



**F** *N. loveni*



**G** *N. phaiopleura*



**H** *N. serra*



**I** *N. sundaica*



**Table 1** Cymothoid parasite with host fish, number of specimens collected, prevalence, mean intensity and site of attachment

Parasite species	Host fish/Host family	Number of examined fishes	Number of infected fishes and prevalence (P %)	Parasites collected and mean intensity (Im)	Site of attachment
<i>Anilocra dimidiata</i>	<i>Leiognathus</i> sp. (Leiognathidae)	36	4 (11.11)	4 (1)	Body surface
<i>Catoessa boscii</i>	<i>Carangoides malabaricus</i> (Carangidae)	522	140 (26.81)	152 (1.1)	Buccal cavity
<i>Cymothoa indica</i>	<i>Sphyaena jello</i> (Sphyaenidae)	29	5 (17.24)	5 (1)	Buccal cavity
<i>Joryma sawayah</i>	<i>Ilisha melastoma</i> (Pristigasteridae)	51	8 (15.68)	8 (1)	Branchial cavity
<i>Nerocila arres</i>	<i>Nemipterus japonicus</i> (Nemipteridae)	84	12 (14.28)	12 (1)	Caudal peduncle
<i>N.loveni</i>	<i>Eubleekeria splendens</i> (Leiognathidae)	162	19 (11.72)	19 (1)	Caudal peduncle
<i>N.phaiopleura</i>	<i>Sardinella longiceps</i> (Clupeidae)	386	41 (10.62)	54 (1.3)	Body surface
<i>N.serra</i>	<i>Arius maculatus</i> (Ariidae)	88	7 (7.95)	7 (1)	Caudal peduncle
<i>N.sundaica</i>	<i>Terapon puta</i> (Terapontidae)	82	6 (7.31)	6 (1)	Pectoral fin
Total		1,440	242 (16.80)	267 (1.1)	

*Nerocila* is a large genus of the family Cymothoidae including at least 65 species living attached on the skin or on the fins of fishes, caudal or dorsal fin and the base of the dorsal or pectoral fin (Trilles 1969; Morton 1974). Until now few studies were performed on *Nerocila* species collected from Indian marine fishes (Rameshkumar et al. 2011, 2013a; Trilles et al. 2013). The body surface, the postero-ventral side of the head and the lateral line of the host fish were the major attachment site for the *Nerocila* species collected by Aneesh et al. (2013). In this study, the collected species belonging to the genus *Nerocila* were found attached to the pectoral fin, the caudal peduncle and different regions of the body surface.

The main factors determining the fish parasite fauna as well as the intensity and the prevalence of infestation in marine environments were studied by Radhakrishnan and Nair (1983). In Indian marine fishes, (Rameshkumar et al. 2013b) reported a maximum prevalence (P = 17.11 %) in March 2010 and a minimum prevalence (P = 0.27 %) in February 2010. The intensity ranged from 1 to 1.7 parasites during the different months from December 2008 to November 2011. From April 2009 to December 2011, Trilles et al. (2013) reported that the overall prevalence reached 8.74 %, a maximum prevalence being observed in *N. depressa* parasitizing *Sardinella gibbosa* (P = 12.5 %) and a minimum prevalence in *N. sundaica* parasitizing *Ilisha melastoma* (P = 3.84 %). The mean intensity ranged from 1 to 1.4. Raja et al. (2014) reported for *N. phaiopleura* parasitizing *Chirocentrus nudus* a maximum prevalence reaching 6.3 % and a mean intensity reaching 3.2. In the present study, the overall prevalence reached 16.80 %. A maximum prevalence was observed in *C. boscii* parasitizing *Carangoides malabaricus* (P = 26.81 %) and a minimum prevalence in *N. sundaica* parasitizing *Terapon puta* (P = 7.31 %). The mean intensity ranged from 1 to 1.3.

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