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### Short Communication

## New host records for *Nerocila depressa* Milne Edwards, 1840 (Crustacea, Isopoda, Cymothoidae) from Digha coast, Bay of Bengal, India

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*Nerocila* is a large genus in Cymothoidae. The Cymothoidae are ectoparasitic isopods of marine, freshwater, or brackish-water teleost fishes. A new host of *Nerocila depressa* was identified from the two different body areas such as the upper pectoral fin and between pectoral and pelvic fin of the host fishes of a *Lepturacanthus pantului* and *Lagocephalus lunaris*, from Digha coast, Bay of Bengal, India.

**[Keywords:** Bay of Bengal, Cymothoid, Digha coast, Isopod parasite, New host]

### Introduction

Many species of fishes are infected by cymothoids (Crustacea, Isopoda, Cymothoidae). The Cymothoid isopods are observed on the body, buccal cavity or gill cavity of the host<sup>1,2</sup>. *Nerocila* is a large genus of the family Cymothoidae including at least 65 species living attached on the skin or fins of fishes<sup>3-5</sup>. Species variation within *Nerocila* is not yet fully documented, but some species are variable. About 330 species of cymothoid isopods were reported worldwide<sup>6</sup>. Very little is known about the isopod parasites of Indian fishes, but only 26 species were reported from India<sup>7</sup>. Most of the reports on Indian marine cymothoidae are from east coast and such studies are very few on West coast<sup>8</sup>. In the present study *Nerocila depressa* Milne-Edwards, 1840 parasite on the marine fishes of Digha coast, Bay of Bengal, India and the association with host fishes *Lepturacanthus pantului* (Gupta, 1966) and *Lagocephalus lunaris* (Bloch & Schneider, 1801) are new host records the worldwide.

### Materials and Methods

Fishes were collected directly from the shallow muddy beach from the Ganga riverine system along the coastal region of Digha (21.68° N; 87.55° E) which is located East coast of India (Fig. 1) during April 2017 and were examined for ectoparasites. Standard methods were followed for collection, fixation and identification of 'parasites'. Isopods were removed alive from the body surface of the fish *Lepturacanthus pantului* and *Lagocephalus lunaris* hosts and immediately placed in 70 % ethanol. Host fishes were identified according to FishBase<sup>9</sup>. The host species, the site of attachment and the geographical distribution of parasites were noted (Table 1). Cymothoid isopods were identified following published literature<sup>10-12</sup>. The specimens of cymothoid isopod are deposited in the National Zoological collection, Marine Aquarium and Regional Centre, Zoological Survey of India (MARC/ZSI/A4804). Their total length and fish

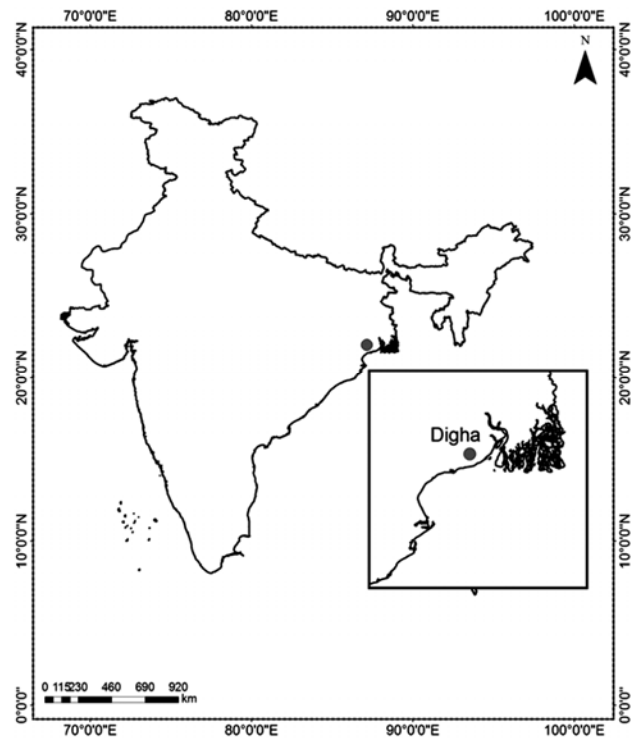


Fig. 1 — Location of collecting station in Digha coast, Bay of Bengal, India.

Table 1 — Host parasite list, host species and family, sampling localities, and site of attachment

ISOPOD SPECIES	HOST SPECIES	HOST FAMILY	LOCALITY	SITE OF ATTACHMENT
<i>Nerocila pigmentata</i>	<i>Opisthopterus tardoore</i>	Pristigasteridae	Mumbai	Body surface <sup>17,19</sup>
	<i>Sardinella gibbosa</i>	Clupeidae	Parangipettai coast	Body surface <sup>5</sup>
	<i>Scleroides leptolepis</i>	Carangidae	Parangipettai coast	Body surface <sup>5</sup>
	<i>Carangoides malabaricus</i>	Carangidae	Parangipettai coast	Body surface <sup>2</sup>
	<i>Coilia dussumieri</i>	Engraulidae	Malabar coast	Body surface <sup>20</sup>
<i>Nerocila exocoeti</i>	<i>Exocoetus volitans</i>	Exocoetidae	Parangipettai coast	Body surface <sup>5,21</sup>
	<i>Parexocoetus brachypterus</i>	Exocoetidae	Travancore	Body surface, Caudal peduncle <sup>22</sup>
<i>Nerocila longispina</i>	<i>Hemirhampus far</i>	Hemiramphidae	Parangipettai coast	Body surface <sup>23</sup>
	<i>Terapon puta</i>	Terapontidae	Vedaranyam coast	Body surface <sup>24</sup>
	<i>Otolithes ruber</i>	Sciaenidae	Vedaranyam coast	Body surface <sup>24</sup>
	<i>Ambassis ambassis</i>	Ambassidae	Malabar coast	Body surface, postero-ventral side of the head, body surface, close to the lateral line <sup>20</sup>
<i>Nerocila loveni</i>	<i>Eubleekeria splendens</i>	Leiognathida	Parangipettai and Nagapattinam coast	Caudal peduncle <sup>5,7</sup>
	<i>Carangoides malabaricus</i>	Carangidae	Parangipettai coast	Body surface <sup>2</sup>
	<i>Thryssa malabarica</i>	Engraulidae	Malabar coast	Body surface, under the base of pectoral fin, overlying the lateral line and the operculum <sup>20</sup>
<i>Nerocila phaiopleura</i>	<i>Escualosa thoracata</i>	Clupeidae	Malabar coast	The body surface in the close vicinity of the lateral line <sup>20</sup>
	<i>Ilisha melastoma</i>	Pristigasteridae	Kakinada	Body surface <sup>11</sup>
	<i>Parastromateus niger</i>	Carangidae	Tamil Nadu and Bay of Bengal	Body surface <sup>11</sup>
<i>Nerocila phaiopleura</i>	<i>Chirocentrus dorab</i>	Chirocentridae	Parangipettai coast	Body surface <sup>25</sup>
	<i>Sardinella longiceps, Sardinella sindensis, Sardinella brachysoma</i>	Clupeidae	Parangipettai coast	Body surface <sup>25</sup>
	<i>Thryssa dussumieri</i>	Engraulidae	Parangipettai coast	Body surface <sup>25</sup>
	<i>Thryssa mystax</i>			
	<i>Dussumieria acuta</i>	Dussumieriidae	Parangipettai coast	Body surface <sup>25</sup>
	<i>Scomberomorus guttatus</i>	Scombridae	Parangipettai coast	Body surface <sup>25</sup>
	<i>Chirocentrus dorab</i>	Chirocentridae	Parangipettai coast	Body surface <sup>26</sup>
	<i>Stolephorus commersonii</i>	Engraulidae	Parangipettai coast	Body surface <sup>27,28</sup>
	<i>Arius jella</i>	Ariidae	Parangipettai coast	Body surface <sup>29</sup>
	<i>Istiophorus platypterus</i>	Istiophoridae	Bay of Bengal and Chennai coast	Body surface <sup>30,31</sup>
	<i>Rastrelliger kanagurta</i>	Scombridae	Parangipettai and Odisha coast	Caudal peduncle <sup>32,33</sup>
	<i>Carangoides malabaricus</i>	Carangidae	Tamil Nadu coast	Body surface <sup>5</sup>
	<i>Chirocentrus dorab</i>	Chirocentridae	Tamil Nadu coast	Body surface <sup>5</sup>
	<i>Dussumieria acuta</i>	Dussumieriidae	Tamil Nadu coast	Body surface <sup>5</sup>
	<i>Rastrelliger kanagurta</i>	Scombridae	Tamil Nadu coast	Caudal peduncle <sup>5</sup>
<i>Sardinella longiceps; S. gibbosa</i>	Clupeidae	Tamil Nadu coast	Body surface <sup>5</sup>	
<i>Selaroides leptolepis</i>	Carangidae	Tamil Nadu coast	Body surface <sup>5</sup>	
<i>Thryssa mystax</i>	Engraulidae	Tamil Nadu coast	Body surface <sup>5</sup>	
<i>Sphyaena jello</i>	Sphyaenidae	Tamil Nadu coast	Body surface <sup>5</sup>	
<i>Tenuailosa ilisha</i>	Clupeidae	Tamil Nadu coast	Body surface <sup>5</sup>	

(Contd.)

Table 1 — Host parasite list, host species and family, sampling localities, and site of attachment (Contd.)

ISOPOD SPECIES	HOST SPECIES	HOST FAMILY	LOCALITY	SITE OF ATTACHMENT
<i>Nerocila arres</i>	<i>Nemipterus japonicus</i>	Nemipteridae	Nagapattinam	Caudal peduncle <sup>5</sup>
<i>Nerocila depressa</i>	<i>Sardinella gibbosa</i>	Clupeidae	Pazhaiyar	Body surface <sup>5</sup>
	<i>Sardinella albella</i>	Clupeidae	Trat Province, Thailand	Upper pectoral fin, between pectoral and pelvicfin, upper pelvicfin, between pelvic and analfin, upper analfin, under the dorsal fin and the caudal peduncle <sup>18</sup>
	<i>Lagocephalus lunaris</i>	Tetraodontidae	Digha West Bengal	Pectoral fin*
	<i>Lepturacanthus pantului</i>	Trichiuridae	Digha, West Bengal	Pectoral fin & Body surface*
<i>Nerocila poruvae</i>	<i>Thryssa mystax</i>	Engraulidae	Vedaranyam	Body surface <sup>5</sup>
	<i>Trichiurus lepturus</i>	Trichiuridae	Vedaranyam	Body surface <sup>5</sup>
<i>Nerocila serra</i>	<i>Arius maculatus</i>	Ariidae	Nagappatinam	Caudal peduncle <sup>5</sup>
	<i>Hexanematchichthys sagor</i>	Ariidae	Odisha and Vizagapatanam	Pectoral fin <sup>30</sup>
<i>Nerocila sigani</i>	<i>Siganus oramin</i>	Siganidae	Mudusalodai	Caudal fin <sup>5,7</sup>
	<i>Terapon threps</i>	Terapontidae	Odisha	Body surface <sup>34</sup>
<i>Nerocila sundaica</i>	<i>Carangoides malabaricus</i>	Carangidae	West coast and Nagappatinam	Pectoral fin <sup>2,5,7,35</sup>
	<i>Ilisha melastoma</i>	Pristigasteridae	West coast and Nagappatinam	Body surface <sup>2,5,7,35</sup>
	<i>Otolithes ruber</i>	Sciaenidae	West coast and Nagappatinam	Body surface <sup>2,5,7,35</sup>
	<i>Selaroides leptolepis</i>	Carangidae	Nagappatinam	Body surface <sup>2,5,7</sup>
	<i>Terapon puta</i>	Terapontidae	West coast and Nagappatinam	Pectoral fin <sup>2,5,7,35</sup>
	<i>Opisthopterus tardoore</i>	Clupeidae	Nagappatinam	Body surface <sup>2,5,7</sup>
<i>Nerocila trichiura</i>	<i>Exocoetus volitans</i>	Exocoetidae	Parangipettai	Pectoral fin <sup>5</sup>
<i>Nerocila indica</i>	<i>Rastrelliger kanagurta</i>	Scombridae	Parangipettai and Cochin	Caudal peduncle <sup>7,36</sup>
	<i>Selar crumenophthalmus</i>	Carangidae	Off Mumbai coast	Body surface <sup>37</sup>

\*New host

Table 2 — Comparison of length (cm), width (cm) and weight (g) was randomly selected from 6 among uninfected and infected *Lagocephalus lunaris* and *Lepturacanthus pantului* specimens (Mean ± SD).

Host family	Host species	Site of attachment	Length (cm)	Width (cm)	Weight (g)	Parasites collected and mean intensity	Number of fish infested and % prevalence
Tetraodontidae	<i>Lagocephalus lunaris</i>	Pectoral fin	7.7 ± 0.08	2.0 ± 0.81	20 ± 0.81	2 (1)	2 (7.40)
Trichiuridae	<i>Lepturacanthus pantului</i>	Pectoral fin & Body surface	28.1 ± 0.41	1.1 ± 0.08	15 ± 0.81	2 (1)	4 (7.14)

length measurements of fishes were noted in centimeters (Table 2).

### Results and Discussion

*Nerocila depressa* was firstly identified by Bleeker<sup>13</sup>. Two characters readily distinguish this species from the similar *Nerocila loveni*: the coxae and posterolateral corners of the pleonites are posteriorly directed and are not bent dorsally. The

species has been recorded from the northern Indian and Pacific oceans with a probable range from India eastwards to Hong Kong. It was found attached to the flank, posterior to the dorsal fin, of *Sardinella fimbriata*, as reported from Starfish Bay<sup>13</sup> and Hong Kong<sup>14</sup>. *Nerocila depressa* were found on the left and right side of the body surface of the two fishes *Selaroides leptolepis* and *Carangoides malabaricus*<sup>2</sup>. This species has been previously reported from Gulf

of Tonkin<sup>15</sup> and Indonesia<sup>4</sup>. At the site of attachment, the cymothoid isopod *N. depressa* infested on *Lepturacanthus pantului* and *Lagocephalus lunaris*. *Nerocila depressa* was found attached on two different regions of *L. lunaris* and *L. pantului* such as upper pectoral fin and between pectoral and pelvic fin of the host fishes (Figs. 2a-d).

*Nerocila depressa* are widely distributed and have been previously reported from Northern Indian and Pacific oceans in a range that encompasses India<sup>11</sup>, Hong Kong<sup>14</sup>, Taiwan<sup>16</sup>, the Gulf of Tonkin<sup>15</sup> and Indonesia<sup>4</sup>. They have been recorded in association with host fish including *Coila dussumieri*, *Engraulis* sp. (Family Engraulidae), *Cyclocheilichthyes apogon* (Cyprinidae)<sup>11</sup>, *Opisthopterus turtoor* (Family Clupeidae)<sup>17</sup> and *Sardinella fimbriata* (Family Clupeidae)<sup>14</sup>. Until now, *N. depressa* were found attached to the bodies of *Sardinella albella* (Engraulidae) from the estuarine coastal region of Trat Province, Thailand. Printrakoon and Purivirojkul<sup>18</sup>, and *N. depressa* parasitizing *Sardinella gibbosa* (Engraulidae) in Pazhaiyar Region, India<sup>5</sup> and the *C. malabaricus*, *S. leptolepis* (Carangidae), in the coast of Parangipettai<sup>2</sup>. This is the new host record of *N. depressa* infection in *Lepturacanthus pantului* and *Lagocephalus lunaris* in the West Bengal, East coast of India.

*Nerocila pigmentata* was synonymized with *N. depressa* by several researchers<sup>6,8,11,15</sup> but it will be useful to verify once more this synonymy. Besides that, the species identified as *N. pigmentata*<sup>19</sup> is of uncertain identity and clearly not *N. depressa*<sup>11</sup>. In the present study, it is clearly observed that *N. depressa* had broad host specificity, when the hosts are represented by a variety of species viz., *C. malabaricus* and *S. leptolepis*. The specificity can be discussed only as a result of interaction between ecological, physiological

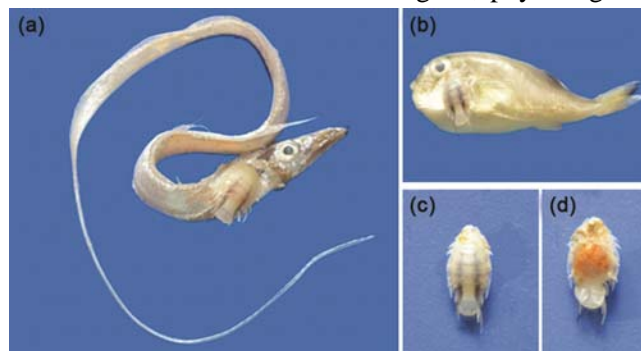


Fig. 2 — a. *Nerocila deppresa* attached on *Lepturacanthus pantului*; b. *Lagocephalus lunaris*; c. dorsal view of *N. deppresa* and d. ventral view of *N. deppresa*.

and phylogenetic factors, and cannot as an independent property of some genera.

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### Conflict of Interest

Authors have read the manuscript and have agreed to submit it in its current form for consideration for publication in the journal. We declare that we have no conflict of interest.

### Author Contributions

First author conceived surveys, identified, data analysis and wrote the manuscript, second author conceived revisions to the scientific content of the manuscript and also provided grammatical revisions to the manuscript.

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