

## *Nerocila sundaica* (Isopoda, Cymothoidae) parasitizing *Otolithes ruber* from Nagapattinam, Southeast coast of India

Ganapathy Rameshkumar · Mathan Ramesh ·  
Samuthirapandian Ravichandran · Jean-Paul Trilles ·  
Chellappan Shobana

Received: 1 January 2014 / Accepted: 6 February 2014 / Published online: 27 February 2014  
© Indian Society for Parasitology 2014

**Abstract** Several *Nerocila* species appear to have little or no host specificity. However, in India, *Nerocila sundaica* was found to be attached to the pectoral fin or on the body of the fish *Otolithes ruber*. During October 2013, the parasitic prevalence reached 42.2 % and the Mean intensity was equal to 1. The infected host fish's size ranged from 12.5 to 17.2 cm. Moreover, slight tissue damages were also observed in the host fish.

**Keywords** Cymothoid isopod · *Nerocila sundaica* · *Otolithes ruber* · India

### Introduction

The cymothoid isopods appear to be pelagic when they are young (Williams 1984) while the adults are parasitic or commensal attaching to the body, gill chamber and buccal cavity or in a pouch burrowed through the skin of the fish

host. *Nerocila* is a large genus of the family Cymothoidae including at least 65 species living attached to the skin or on the fins of fishes. Several species are morphologically highly variable and their identification is often difficult (Trilles 1972, 1979; Williams and Williams 1980, 1981; Bruce 1987). Variation within *Nerocila* is not yet fully documented, but some species are very variable. The species for which variability has been documented, at least in part, are: *Nerocila armata* and *Nerocila orbignyi* (Monod 1931); *Nerocila sundaica* (Bowman 1978); *Nerocila acuminata* (Brusca 1981); *Nerocila orbignyi*, *Nerocila monodi* and *Nerocila phaiopleura* (Bruce 1987); *Nerocila longispina* and *Nerocila poruvae* (Rameshkumar et al. 2011).

Until now, there are relatively few studies about Cymothoidae parasitizing Indian fishes. Twenty six species of cymothoid isopods belonging to twelve genera (*Alitropus*, *Anilocra*, *Ceratothoa*, *Cymothoa*, *Glossobius*, *Joryma*, *Lironeca*, *Lobothorax*, *Mothocya*, *Nerocila*, *Norileca* and *Ryukyua*) were reported by Rameshkumar et al. (2013). Nevertheless, 17 nominal species belonging to the genus *Nerocila* were so far recorded from Indian fishes by different authors. However, several of these reports, often published in local journals not easily accessible, contain misidentifications and descriptions that are of doubtful validity. Thus, a more accurate study of the Indian *Nerocila* species was necessary (Trilles et al. 2011). Eleven *Nerocila* species were collected from 22 Indian marine fishes belonging to 15 families (Trilles et al. 2013). The morphology of the *Nerocila* spp. showed greater variation than other cymothoid species from Thailand (Bruce and Harrison-Nelson 1988).

*Otolithes ruber* (Bloch and Schneider 1801) was collected from landing centres at Nagapattinam, Tamil Nadu, Southeast coast of India, during October 2013. It is a common species occurring particularly during this month. The fishes were examined carefully for the presence of

---

G. Rameshkumar (✉) · M. Ramesh · C. Shobana  
Unit of Toxicology, Department of Zoology, School of Life  
Sciences, Bharathiar University, Coimbatore 641 046, Tamil  
Nadu, India  
e-mail: grkumarcas@gmail.com

S. Ravichandran  
Centre of Advanced Study in Marine Biology, Faculty of Marine  
Science, Annamalai University, Parangipettai 608 502, Tamil  
Nadu, India

J.-P. Trilles  
UMR 5119 (CNRS-UM2-IFREMER-IRD), Equipe Adaptation  
Ecophysiologique et Ontogénèse, Université Montpellier 2,  
CC. 092, Place E. Bataillon, 34095 Montpellier Cedex 05,  
France  
e-mail: jp.trilles@cegetel.net

isopod parasites and the collected isopods were immediately preserved in 70 % ethanol and transported to the laboratory. The sampling date, locality, host fish, and site of attachment on the host fish were recorded. Mouthparts and appendages were carefully dissected using dissecting needles and forceps. Cymothoid isopods were identified according to Bowman (1978). The total length of isopods was measured and recorded in millimeters. 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). Host nomenclature and fish taxonomy are according to Fish Base (Froese and Pauly 2013).

Many of the collected *Otolithes ruber* was parasitized by *Nerocila sundaica* (Bleeker 1857) attached on their body sides. Two hundred and eighty two *O. ruber* were collected and examined. One hundred and twenty one specimens were parasitized (Prevalence = 42.2 %). One hundred and twenty one *N. sundaica* were collected (Mean intensity = 1). The maximum number of parasite was one per host fish (Fig. 1). The length of specimens ranged from 1.7 to 2.9 cm and the width of the body was half as broad as the length. The colour is yellowish white with minute light spots at the posterior part of the segments (Fig. 2). The infected host fish's size ranged from 12.5 to 17.2 cm. *N. sundaica* were found to be attached to the pectoral fin or on the body of the fish. Infestation rates are not known for other host fishes but appear to be considerably lower than that of *O. ruber*. Weak tissue damages were observed on the host fish and we observed that the infected *O. ruber* were thinner than the uninfected fish.

*Nerocila sundaica* was firstly identified by Bleeker (1857). Later, Bowman (1978) collected and re-described this species in and near the mouth of croakers from Hong Kong, Singapore and Persian Gulf. This is one of the most common Indo-Pacific *Nerocila* species with a wide distribution including the South China and Java Seas in the Pacific Ocean, and the Northern Indian Ocean including the Bay of Bengal, the Arabian Sea and the Persian Gulf (Bowman 1978). It is also known from the Red Sea and Northern Indian Ocean (Bruce 1982).

*Otholites ruber* is an Indo-West Pacific species reported from East Africa and Madagascar, but missing in the Red Sea, to the Southern China Sea and Queensland, Australia (Rameshkumar et al. 2011). Until now, *N. sundaica* has been recorded from several fishes (Trilles 1994). It show an euryxenic parasitic specificity *N. sundaica* parasitizes generally fish species belonging to the families Carangidae, Clupeidae, Pristigasteridae, Sciaenidae, Terapontidae (Trilles et al. 2013). It was recorded from *Scatophagus argus* (Trilles 1979), *Pseudosciaena polyactis* (Bruce 1982), *Sciaena* sp., *Eleutheronema* sp. and *Mugil* sp. (Bruce and Harrison-Nelson 1988). It was also reported from several hosts in India. Sometimes, the hosts are unknown but Chidambaram and Menon (1945) reported it from 6 different species of fishes on the West coast of India, i.e. *O. ruber*, *Therapon jarbua*, *Engraulis mystax*, *Serranus gilberti*, *Pellona indica* and *Sardinella fimbriata*. Trilles et al. (2013) recorded *N. sundaica* from six host species belonging to five families and six genera, including *Carangoides malabaricus*, *Ilisha melastoma*, *O. ruber*, *Selaroides leptolepis* and *Therapon puta*. Our study report that *N. sundaica* can parasitize *O. ruber* in Southeast coast

**Fig. 1** *Nerocila sundaica* parasitizing *Otolithes ruber* (mean intensity = 1)



**Fig. 2** Male and female specimens of *Nerocila sundaica*



of India. The oldest records contain no information about the host fish damages associated with the isopod infection. However, in the present study we observed that the infected *O. ruber* were thinner than the uninfected fish.

**Acknowledgments** Author (G. Rameshkumar) are thankful to UGC, New Delhi for the Grant of Dr. D. S. Kothari Post-Doctoral Fellowship No. F.4-2/2006 (BSR)/13-1011/2013 (BSR) and the head, Department of Zoology, Bharathiar University, Coimbatore for providing facilities and encouragement.

## References

- Bleeker P (1857) Recherches sur les Crustacés de L'Inde Archipelagique. n. Sur les Isopodes Cymothoïdiens de L'Archipel Indien. N atuurkundige vereeniging in Nederlandsche-Indie, Batavia. Verhandelingen 2:20–40, pls 1,2
- Bloch ME, Schneider JG (1801) Blochii Systema Ichthyologiae iconibus ex illustratum. Post obitum auctoris opus inchoatum absolvit, correxit, interpolavit J.G. Schneider, Saxo, Berolini, 1x, 1–584, pls 1–110
- Bowman TE (1978) Restoration of the subgenus *Emphyllia* Koelbel for the parasitic isopod *Nerocila sundaica* Bleeker (Flabellifera, Cymothoidae). *Crustaceana* 34:33–44
- Bruce NL (1982) On a small collection of marine Isopoda (Crustacea) from Hong Kong. In: Morton B S Tseng K (ed) Proceedings of the first international marine biological workshop: the marine flora and fauna of Hong Kong and Southern China, Hong Kong, 1980 1:315–324
- Bruce NL (1987) Australian species of *Nerocila* Leach, 1818, and *Creniola* n. gen. (Isopoda: Cymothoidae), crustacean parasites of marine fishes. *Rec Aus Mus* 39:355–412
- 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(3):585–602
- Brusca RC (1981) A monograph on the Isopoda Cymothoidae (Crustacea) of the eastern Pacific. *Zool J Linn Soc* 73:117–199
- Bush AO, Lafferty KD, Lotz JM, Shostak AW et al (1997) Parasitology meets ecology on its own terms: Margolis et al. revisited. *J Parasitol* 83:575–583
- Chidambaram K, Devidas Menton M (1945) The isopod parasite *Nerocila sundaica* on west coast food fishes. *Curr Sci* 14(11):308
- Froese R, Pauly D (2013) Fish stocks. In: Levin S, Waltham MA (eds) Encyclopedia of biodiversity, 2nd edn. Academic Press/Elsevier, Amsterdam, pp 477–487
- Margolis L, Esch GW, Holmes JC, Kuris AM, Schad GA (1982) The use of ecological terms in parasitology (report of an ad hoc Committee of the American Society of Parasitologists). *J Parasitol* 68:131–133
- Monod T (1931) Sur quelques crustacés aquatiques d'Afrique (Cameroun et Congo). *Revue de Zoologie et de Botanique Africaine* 21:1–36
- Rameshkumar G, Ravichandran S, Trilles JP (2011) Cymothoidae (Crustacea, Isopoda) from Indian fishes. *Acta Parasitol* 56:78–91
- Rameshkumar G, Ravichandran S, Sivasubramanian K (2013) Invasion of parasitic isopods in marine fishes. *J Coast Life Med* 1(2):99–105
- Trilles JP (1972) Sur quatre isopodes cymothoïdés du Pacifique (Nouvelle Calédonie). *Cah O.R.S.T.O.M. Océanogr Fr* 10:3–17
- Trilles JP (1979) Les Cymothoidae (Isopoda, Flabellifera; parasites des poissons) du Rijksmuseum van Natuurlijke Historie de Leiden. II. Afrique, Amérique et régions Indo-Ouest-Pacifique. *Zool Meded Leiden* 54:245–275
- Trilles JP (1994) Les Cymothoidae (Crustacea, Isopoda) du Monde. *Prodromes pour une Faune. Stud Mar* 21/22:1–288
- Trilles JP, Ravichandran S, Rameshkumar G (2011) A checklist of the Cymothoidae (Crustacea, Isopoda) recorded from Indian fishes. *Acta Parasitol* 56:446–459

- Trilles JP, Rameshkumar G, Ravichandran S (2013) *Nerocila* species (Crustacea, Isopoda, Cymothoidae) from Indian marine fishes. *Parasitol Res* 112(3):1273–1286
- Williams LB (1984) Geographic distribution and early life history of *Anilocra* (Isopoda: Cymothoidae) parasites of Caribbean coral reef fishes. Ph.D. Thesis, Auburn Univ., Auburn, OR
- Williams EH Jr, Williams LB (1980) Four species of *Renocila* (Isopoda: Cymothoidae), the first reported from the new world. *Proc Biol Soc Wash* 93:573–592
- Williams EH Jr, Williams LB (1981) Nine new species of *Anilocra* (Crustacea: Isopoda: Cymothoidae) external parasites of West Indian coral reef fishes. *Proc Biol Soc Wash* 94:1005–1047