New records of two parasitic cymothoids from Indian fishes

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Published online: 4 June 2011
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Abstract Two parasitic cymothoidae (Crustacea, Isopoda) are reported parasitizing fishes Hemiramphidae in India. *Ceratothoa angulata*, found in the buccal cavity of its host, is reported for the first time from India. *Mothocya plagulophora*, a branchial species, already known from the South-west coast, is now recorded from the Southeast coast of India. Host-parasite relationships are considered.

Keywords Isopoda · Cymothoidae · *Ceratothoa* · *Mothocya* · India

Cymothoids (Crustacea, Isopoda, Cymothoidae) are ectoparasitic isopods on marine, brackish and freshwater fish (Trilles 1994; Rameshkumar et al. 2011). Several species usually collected in the buccal cavity of host belong to the genus *Ceratothoa* Dana, 1852 (Trilles 1994; Bruce and Bowman 1989). Other species found attached in the branchial cavities of the infected fishes are members of the genus *Mothocya* Costa (in Hope, Costa 1851) recently treated in detail by Bruce (1986). In the present study, *Ceratothoa angulata* (Richardson 1910) is reported for the first time from India and *Mothocya plagulophora* (Haller 1880) is recorded from the Southeast coasts of India.

Cymothoids were collected from fishes belonging to the family Hemiramphidae caught along the coast of Parangipettai, South-eastern India (11°29'N, 79°46'E) in June 2010. Several specimens belonging to the species *Hyporhamphus dussumieri* and *Hemiramphus far* were examined. The parasites were removed and preserved in 70% ethanol. They were identified according to Bruce (1986) and Bruce and Bowman (1989). Their total length (TL) was measured and measurements are in millimetres. The Prevalence (P) and the mean Intensity (Im) 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 2011).

Sixty *H. dussumieri* were examined. One ovigerous female (TL = 18 mm) belonging to the species *C. angulata* (Fig. 1a) was found in the buccal cavity of one specimen of them (P = 1.6%; Im = 1). This species is reported for the first time from India.

Ceratothoa angulata was first reported from the Philippines but its host was unidentified (Richardson 1910). It was later reported from WCS Beach Lagoon, Guam (Kami et al. 1968) Borneo (Bruce and Bowman 1989) and Guam (Williams et al. 2000) parasitizing the Dussumier's halfbeak *H. dussumieri*. This species is a wide-spread tropical fish found from Madagascar through the East Indies to the Philippines, New Guinea, Australia and Oceania (Collette 1974). According to Bruce and Bowman (1989), it is possible that *C. angulata* has a similar widespread distribution and according to Trilles (1994), this species is certainly uncommon. Our results agree with their conclusions.

Three hundred and eighty *H. far* were examined. Fifty-one females (TL = 17–26 mm) and twenty-nine males (TL = 12–14 mm) belonging to the species *M. plagulophora* (Fig. 1b) were collected in the branchial cavities of fifty-six of them (P = 14.7%; Im = 1.4).

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Fig. 1 **a** *Ceratothoa angulata*: dorsal view. **b** *Mothocya plagulophora*: dorsal view

Fig. 2 **a** *Mothocya plagulophora* female attached in the gill chamber of *Hemiramphus far*. **b** Branchial cavity of *Hemiramphus far* with *Mothocya plagulophora* removed

The overall mean prevalence of *M. epimerica* Costa, parasitizing *Atherina boyeri* in the Mesolongi and Etolikon Lagoons, Greece (41.91%) (Leonardos and Trilles 2003) was higher than that found, for the same species, by Bello et al. (1997) in the Lesina Lagoon, Italy (7.7%) and for *M. plagulophora* infecting *H. far* (14.7%) in India (this study). However, this latter value is similar to those observed for *M. epimerica* by Trilles (1968) along the French coasts (12.7%) and by Mariniello and Dicave (1993) in the Lesina Lagoon (14%). The females (57.14%) *H. far* were significantly more frequently infected than males (42.86%). A similar result (47.36 and 36.21% for females and males, respectively) was reported about *A. boyeri* by Leonardos and Trilles (2003) while equal numbers of parasitized males and females were found by Bello et al. (1997).

The infected fishes usually carried one cymothoid per branchial cavity (Fig. 2a). However, in three cases, two parasites were found in the same cavity, two females, two males and a pair female with male. In all cases, the isopods were attached to the anteroventral portion of the host's gill chambers, with their head always directed to the host's ventral side. In most cases, the parasite was located between the second and third branchial arches, attached either to the vomerine arch or to the internal wall of the branchial operculum. Such infections induce serious damages to the host's gills particularly in the area on which the female isopods rest their brood pouch (Fig. 2b).

Until now, *M. plagulophora* was only reported on *H. far* from Comoro Islands, Mauritius, Kenya, Somalia, Indonesia, Australia Great Barrier reef, Sri Lanka and India (Madapam Camp, Madras) (Bruce 1986).

Acknowledgments Authors are thankful to Department of Science and Technology and Ministry of Environment & Forest, Government of India for providing financial support and Director of Centre of Advanced Study in Marine Biology for providing facilities and encouragement.

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