

First occurrence of *Argathona macronema* (Bleeker, 1857) (Isopoda: Cirolanidae) on coral reef fishes along the Tuticorin coastal water, Gulf of Mannar

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Abstract Isopod Parasites are considered as a major threat to the fishing industry, due to rigorous disease outbreaks. The parasites from the two economically important reef fish family Lutjanidae and Serranidae are analyzed i.e. *Epinephelus malabaricus* and *Lutjanus rivulatus*. The samples are obtained from the landings of Trawl net from Gulf of Mannar region of South east coast of India. They are severely infested by the isopod parasite *Argathona macronema* in the Pectoral fins and ventral region of the body. This species is found to be the new record in the Gulf of Mannar region and deposited in the Marine laboratory of Kamaraj College. Length and weight of the host and parasites are measured. The parasites infested on 13 specimens of *E. malabaricus* out of 8 and 17 out of 12 species of *L. rivulatus*. The prevalence of parasite on the grouper and snapper fish (61.53 and 70.58 %) and mean intensity (2.62 and 2.58 %) respectively. The prevalence was maximum in *L. rivulatus* and minimum in *E. malabaricus* may be to the host specificity. Further studies are needed to know the life cycle of the parasite, host preference, disease outbreak and its role in the coral reef ecosystem.

Keywords *Argathona macronema* · *Lutjanus rivulatus* · *Epinephelus malabaricus* · Tuticorin · South east of India

Introduction

Isopod parasites have received considerable scientific attention because they cause serious damage to fishery resources. The parasitic fauna of fish represents the result of the interrelationship between the parasites of various developmental stages and many interdependent influences of the macro and micro-environment. The Cirolanidae isopods are predominant marine family with about 300 species presently known (the validity of some marine and some stygobiont species is open to question. An isopod fish parasite is mostly external and feeds on blood. The larvae of the Gnathiidae family, adult cymothoids and Cirolanidae have piercing and sucking mouthparts and clawed limbs adapted for clinging onto their hosts (Ruppert Edward et al. 2004). Cirolanidae isopods (*Argathona* sp.) are typically marine and usually inhabit the warmer seas. Their body form varies from an easily recognisable isopod to a relatively amorphous sac recognised as an isopod only from the less modified male found within the folds. Though free—living isopods tend to be detritivores, parasitic forms feed on host blood or host haemolymph. Their mouth-parts form a cone with maxillipeds that tear at the flesh and tiny pointed mandibles that pierce into the tissue to penetrate blood vessels or blood sinuses. The gut, particularly the hind gut, is quickly filled, often swelling the body, then the contents are slowly transferred to the mid gut glands for digestion. Thus the parasites tend to be intermittent feeders. They can be a major drain on the host, frequently affecting reproductive performance and sometimes affecting growth rate. The Malabar grouper of *E. malabaricus* are excellent marine food fishes in the Indo-Pacific and Caribbean regions an assumed importance for commercial culture in recent years. About 49 species of this genus have been reported from the seas

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around India. Most of them inhabit coral reefs and rocky habitats, while others sea grass beds, muddy and sandy bottoms. Juveniles of some species occur in lower reaches of estuaries, occasionally ascending upper reaches also. Most species are solitary and all are predators' moon fishes and invertebrates. The *L. rivulatus* are commonly known as Snappers and belong to the family Lutjanidae. These are rocky fish and abundantly occur throughout the Indian coast. These fishes are commercially known for their delicacy as food fish and have good quality of proteins and other nutrients. They harbour a wide variety of copepod parasitic fauna. These fishes are usually parasitized by copepods of the family, Caligidae, Acanthosomatidae and Dichelesthidae (Ho 1963; Ho et al. 2000; Ho and Lin 2004; Rodriguez 2004; Yuniar et al. 2007 and Morales et al. 2008). *E. malabaricus* along with other members of the Serranidae and Lutjanidae families constitute a major group of commercially important fishery of Indian coast. Many parasitic infections can be treated by a variety of medical procedures, such as the use of antibiotics. The best way of controlling infection, however, is prevention. Scientists have developed and continue to test a number of drugs that can be taken as a barrier to certain parasites. Other measures of control include improving sanitary conditions of water and food sources, proper cooking techniques, education about personal hygiene, and control of intermediate and vector host organisms. Until now few studies were performed on parasites

collected from Indian marine fishes (Pillai 1985; Ravichandran and Ajithkumar 2008; Rameshkumar et al. 2012; Trilles et al. 2011). The present study investigates about the occurrence and infestation of Cirolanidae Isopod *Argathona macronema* on Indian Marine Reef fishes along the Tuticorin coastal water.

Materials and methods

The samples of *Epinephelus malabaricus* (Grouper fish) and *Lutjanus rivulatus* (Snapper fish) were collected directly from the trawlers landed at Therespuram coast, Tuticorin (Lat. 80°48'N; Long. 78°94'E), south east coast of India, Gulf of Mannar (Fig. 1). They were examined for ectoparasites during March 2015. Standard methods were followed for collection, fixation and identification of parasitic isopods. They were removed alive from the body surface, buccal cavities and pectoral fin of the fish hosts and immediately placed into 70 % ethanol. The taxonomy and fishes were updated according to (Jayaram 2009). The host species length (mm) and weight (g), the site of attachment and parasites length (mm) and weight (g) were recorded. The prevalence (%) and mean intensity (I) were calculated according to (Bush et al. 1997). The identification of the *A. macronema* was performed according to (Botosaneanu 2000). The specimens of *A. macronema* isopod is preserved in personal collection were deposited at

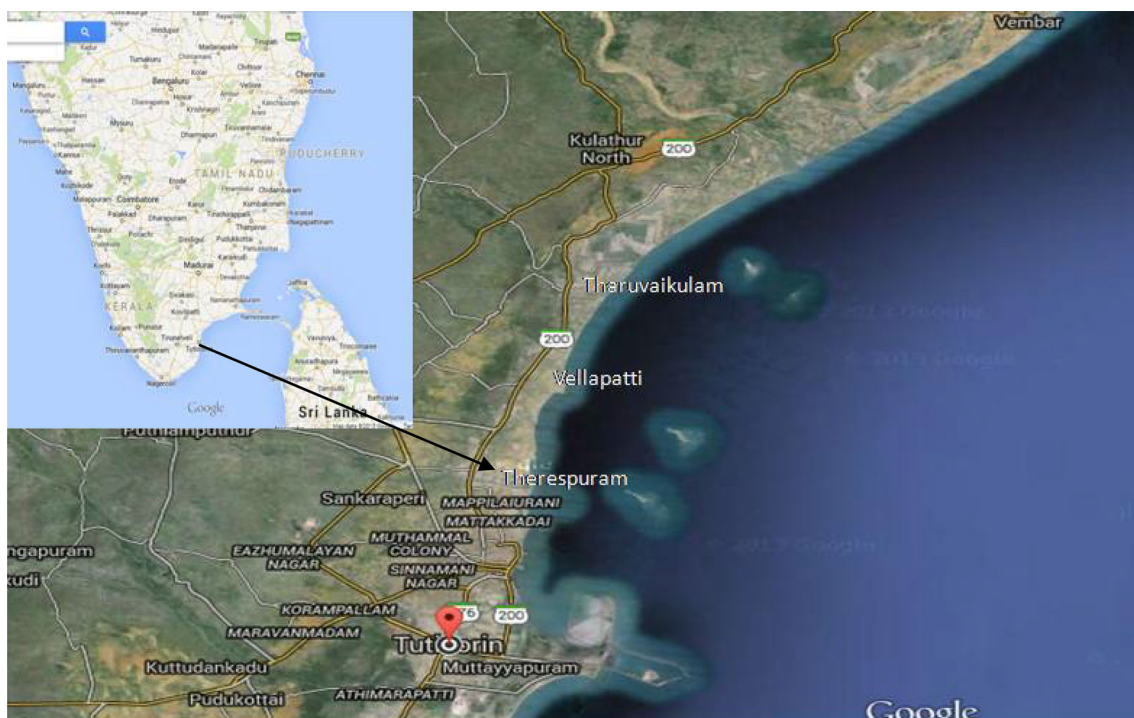


Fig. 1 Map showing the study area

the Marine biological research centre, Kamaraj College, Tuticorin, Tamilnadu, India.

Result and discussion

In the present study *A. macronema* an isopod ectoparasites were found in the ventral surface of the body and pectoral fin of *E. malabaricus* and *L. rivulatus* (Figs. 3a, b, 4a, b). The number of fishes examined and those infected were specified in the following (Table 1). The parasites have been found on 13 specimens of *E. malabaricus* out of 8 and 17 out of 12 species of *L. rivulatus*. Table 2 shows the prevalence of parasite on the grouper and snapper fish (61.53 and 70.58 %) and mean intensity (2.62 and 2.58 %) respectively. The host length of grouper and snapper fish (71 and 73 cm) and weight (3.4 and 3.7 kg) have been measured. Further it was confirmed that the parasites were specific in the selection the host fish species. Figure 2a, b shows the dorsal and ventral view of *A. macronema*. The parasite total length (22 mm) and weight (0.110 mg) were measured. There is no record found in south Indian sea however they were found more in Australian sea. In

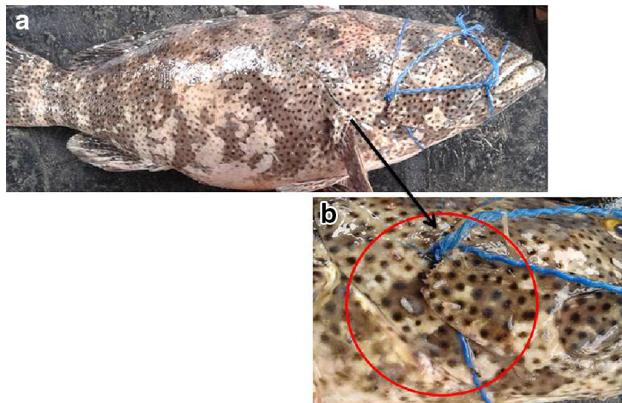


Fig. 2 a Grouper fish *Epinephelus malabaricus* collected form Tuticorin coast. b *Epinephelus malabaricus* affected with *Argathona macronema*

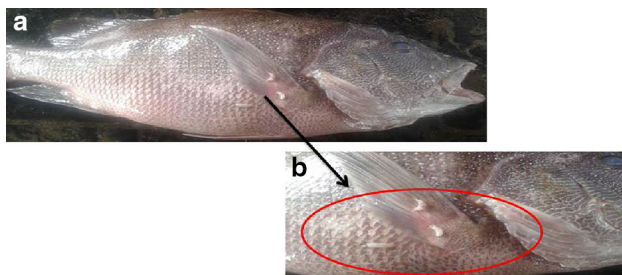


Fig. 3 a Snapper fish *Lutjanus rivulatus* collected form Tuticorin coast. b *Lutjanus rivulatus* affected with *Argathona macronem*

common the size of the Marine isopods range from approximately 1 mm (smallest asellotes and anthuroids bordering on interstitial or meiofauna size) and 2 mm (smallest Gnathiidae, Cirolanidae, Sphaeromatidae) to the largest of all isopods, *Bathynomus giganteus* at over 350 mm (Lowry and Dempsey 2006). The Cirolanidaeae isopod contain genera that are commensal on fishes, live in sponges and some that are micropredators, to feed off humans; others feed on worms (e.g. Lanocira), and possess grasping and piercing mouthparts similar to those of the Cymothoidae (Semmens et al. 2006).

Parasites in finfish culture can have monoxenous (single host) or heteroxenous (multiple hosts) life cycles. Parasite infections can impair the courtship dance of male three spine sticklebacks. When that happens, the females reject them, suggesting a strong mechanism for the selection of parasite resistance Bronseth and Folstad (1997). In most isopods the sexes are separate and relatively easy to tell apart. The males tend to be smaller than the females and have no eggs under their abdomen. Some isopods display a phenomenon known as *Protandrous hermaphroditism* (being a male when young and then developing into a female). *A. macronema* was already known from New Caledonia (Justine et al. 2010; Delaney 1989). It was previously reported from *Epinephelus tauvina*, *Diagramma cinerascens*, *Pseudolabrus* sp., *Trachichtodes affinis*, *Cromileptes altivelis*, *L. argenti-maculatus*, *Plectropomus leopardus* and *P. Maculates* (Justine et al. 2010). The parasites also affected the stability of their host requiring them to expend more energy just to keep upright (Östlund-Nilsson et al. 2005). The Prevalence and intensity of parasitic copepods on fish can vary with habitat, season, and host size (Hudson et al. 2006). According to Hayden and Rogers (1998) the prevalence of infection in Saginaw Bay was not as high as in the Alabama ponds, where 100 % of the fishes were infected. From the present study it is found that the prevalence was maximum in *L. rivulatus* (70.58 %) and minimum in *E. malabaricus* (61.53 %) and mean intensity of parasitic isopod on these fishes differ from

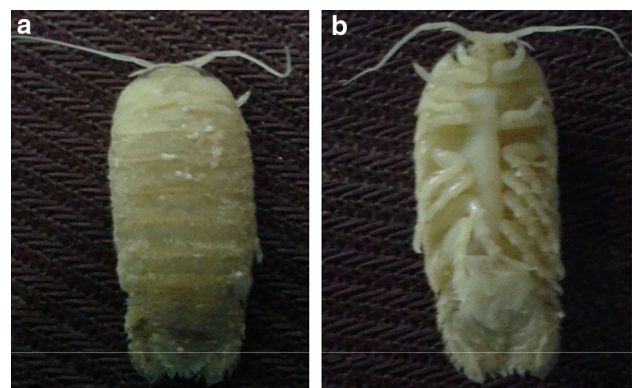


Fig. 4 a Dorsal and b ventral view of *Argathona macronema*

Table 1 Parasitological index of *A. macronema* on the marine fishes form Tuticorin coastal water

S. no	Name of the parasite	Location in the host of parasite	Length of the parasite (mm)	Weight of the parasite (g)	Width of the parasite (mm)
1	<i>Argathona macronema</i>	Gills, pectoral fins, body surface	22	0.110	7

Table 2 Prevalence (%), intensity (I) Cirolanidae Isopod *A. macronema* form marine reef fishes form Tuticorin coastal water

S. no	Host species	Length of the host (cm)	Weight of the host (kg)	No of fish examined	No of the fishes infested (% prevalence)	No of parasite collected (intensity)
1	<i>Epinephelus malabaricus</i> (Grouper fish)	71	3.4	13	8 (61.53)	21 (2.62)
2	<i>Lutjanus rivulatus</i> (Snapper fish)	73	3.7	17	12 (70.58)	31 (2.58)

2.62 to 2.58. The Cirolanidae isopods have frequently been recorded as temporary associates and as commensals or parasites of fishes Delaney (1989) as well as other marine organisms such as sponges. The genera of *Argathona* sp. and *Excorallana* sp. are commonly found in association with serranids, carangids and other commercial fishes. *Argathona* sp. has been reported as taken “from the eye of a grouper” by (Hale 1925). *A. macronema* from the eye of turtle Monod (1975) The *Cymothoa exigua* is a parasite of the spotted rose snapper *L. guttatus*, it causes the tongue of the fish to atrophy and takes its place in what is believed to be the first instance discovered of a parasite functionally replacing a host structure in animals Brusca and Gilligan (1983). These isopods cause detrimental effects on fish in captivity including growth inhibition, anaemia and death in smaller fish Adlard and Lester (1995). Such mass infestation of copepod, and worms on surface body of fishes is probably common, but not accidental. Parasites in the body surface and pectoral fin are usually associated with mucus and body tissue from damage associated with feeding and skin lesions.

Conclusion

The infestation of the isopod parasite may cause immediate death or it will affect the normal growth of the host fishes. Hence the study about the isopods was mandatory to know about its impact on the host and ecosystem. So the present identifies the occurrence of an infestation by parasitic isopod *A. macronema* in the grouper and snapper fish from the South-Eastern coast of India, and it is found be the first record. Future studies are compulsory for knowing the complete life history of the parasite and host specific relationship, periodicity and the reason for disease outbreak or any internal pathological damage and its role in the coral reef ecosystem.

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