

New occurrence of parasitic isopod *Argathona* sp. (Stebbing, 1905) from *Epinephelus undulosus* in the Tuticorin coast, Gulf of Mannar region

Gurusamy Chelladurai¹ · Srinivasan Balakrishnan² · Ganapathy Rameshkumar³ · Kannan Banumathi¹

Received: 20 March 2015 / Accepted: 9 April 2015 / Published online: 8 May 2015
© Indian Society for Parasitology 2015

Abstract In the present study of *Epinephelus undulosus* captured in gillnets from the inshore waters of Tuticorin, Gulf of Mannar region during December 2014. The present findings represent the first occurrence of *Argathona* sp. and here in reported. The materials examined were deposited at the Kamaraj College, Marine Biological Research Laboratory, Tuticorin, India. The parasitological indexes were calculated. The site of attachment of the parasites on their hosts was also observed. Host-parasite relationships are considered and these parasites can cause the damage in gill, eye and internal organ including swim bladder. Marine fish parasitology is a rapidly developing field of aquatic science.

Keywords *Argathona* sp. · *Epinephelus undulosus* · Gulf of Mannar region

Introduction

Parasitic isopods are like common group of crustacean ectoparasites of fish in marine ecosystem. Among the isopod crustaceans, species belonging to the family Corallanidae are of special interest, because their hosts are fishes of commercial importance. Several species belonging to the Genus *Argathona* (Crustacea: Isopoda) are known to inhabit

the mouth and gill chambers of fishes, but most of the known species are marine. Very little is known about the isopod parasites of Indian fishes (Kensley 1998; Bruce 2003). Fish parasitic isopods are alleged to indicate tropical fishes which are free of ciguatera (fish poisoning toxins). Approximately 4000 species have been described, and more than 450 species are known to parasitize fishes. They vary from 0.5 to 440 mm in length. The largest species on earth occurs off Puerto Rico (Bunkley-Williams et al. 2006).

Epinephelus undulosus is one of the most important groupers in fisheries and aquaculture of the Indo-Pacific region. It is also one of the most common for live export trade and caught employing trawls, long-lines, traps, spear and hook-and-line Heemstra and Randall (1993). Parasitic isopods 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. It is one of the 13 principal species in the live-fish trade which sources wild-caught and maricultured large reef fishes from the Indo-Pacific for export primarily to Hong Kong, China (Sadovy et al. 2003). In the present survey, 11 species were collected. parasitologic indexes, host species, and geographic distribution are reported for each. A taxonomic study is performed for *Argathona* species poorly known or inadequately identified. A comprehensive summary of the nominal *Argathona* species until now recorded from India is also provided.

Materials and methods

The specimen was collected from fresh fish landed along the coast of Therespuram, Tuticorin (Lat. 80°48'N; Long. 78°94'E) during December 2014. Isopods were removed

✉ Gurusamy Chelladurai
chellam.zoo@gmail.com

¹ Marine Gastropods Research Laboratory, Department of Zoology, Kamaraj College, Tuticorin, Tamil Nadu, India

² Department of Marine Science, School of Marine Sciences, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India

³ Department of Zoology, School of Life Sciences, Bharathiar University, Coimbatore, Tamil Nadu, India

alive from the body surface of the fish hosts and immediately placed into 70 % ethanol. 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. The total length of isopods was measured and recorded in millimetres (mm). 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 intensity for each parasite host association. The parasites were identified according to Pillai (1954), Trilles (1975), Bowman (1978), Bowman and Tareen (1983), Bruce (1987), Bruce and Harrison-Nelson (1988), Rameshkumar et al. (2011) and Rameshkumar and Ravichandran (2015). Voucher specimens were deposited at the Kamaraj College, Marine Biological Research Laboratory, Tuticorin, India (collection Gurusamy Chelladurai).

Result and discussion

During the investigations on *Argathona* sp. isopod parasites were found in the body surface region (Fig. 1a, b). The number of fishes examined and those infested were given in the following (Table 1). The parasites have been found 16 out of 14 species of *E. undulosus*. Table 2 showed the prevalence of parasite on the grouper fish was (88 %) and mean intensity (1.3 %). The host fish length (63 cm) and weight (2.7 kg) of this further conformed that the parasites were specific in the selection the host of *E. undulosus*. Parasites in finfish mariculture can have monoxenous (single host) or heteroxenous (multiple hosts) life cycles. The infection of the fish can happen either direct or indirect through the infected intermediate host. Under mariculture conditions, a variety of both monoxenous and heteroxenous parasites can occur in high numbers. Especially parasites with direct life cycles such as ciliates, monogeneans and crustaceans (e.g., Copepoda, Isopoda) occur in fish cages under high stocking densities (Grabda 1991; Diamant et al. 1999; Williams and Bunkley-Williams 2000). Such infestations can lead to enormous economic loss due to resulting mass mortalities Tucker et al. (2002). Fig. 2 a, b showed the dorsal and ventral view of genus *Argathona*. The parasite of *Argathona* genus length (9 mm) and weight (4 mg). There is no record found in south Indian sea. Especially maximum were found in west Indian sea. The genus of *Argathona* and *Tachaea* have high percentage of species recorded as temporary parasites (50 and 84 %) respectively and yet are restricted to the India-west pacific region (Delaney 1989).

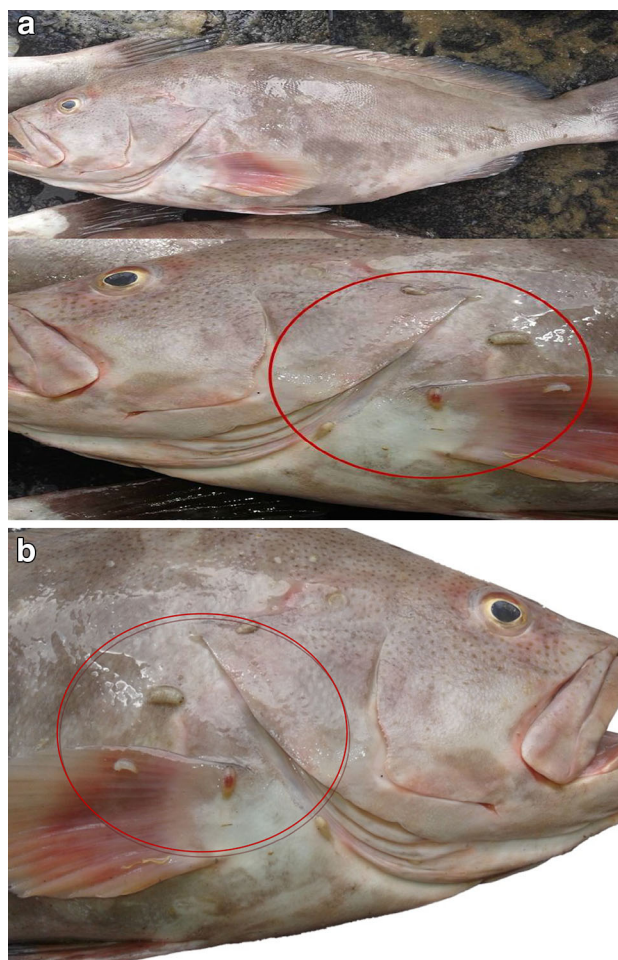


Fig. 1 a Grouper fish *Epinephelus undulosus* collected from Therspuram, Tuticorin, Gulf of Mannar coast. b Parasitic isopod, genus *Argathona* attached body surface of a grouper fish *E. undulosus*

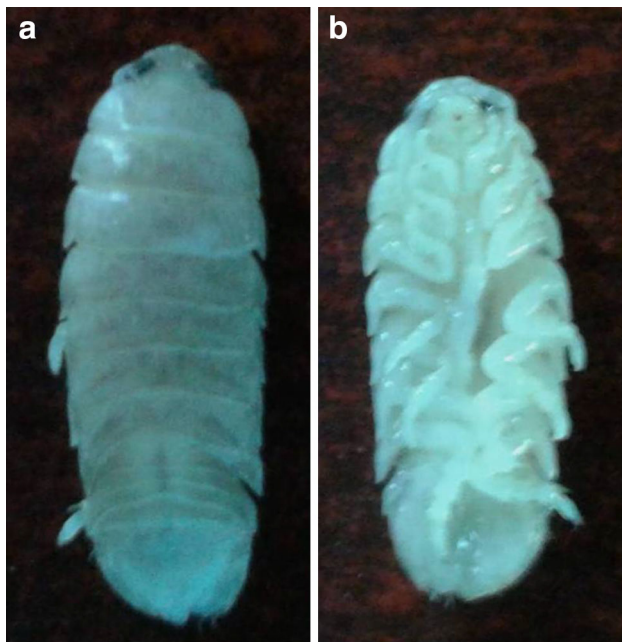
In this study, the prevalence of infestation of genus *Argathona* on *E. undulosus* was 88 % and infestation intensity ranged was 1.3 per fish including parasite occurs in fishes. The parasites also affected the stability of their host requiring them to expend more energy just to keep upright (Östlund-Nilsson et al. 2005). These isopods are potentially economically important parasites as they have been shown to cause detrimental effects on fish in captivity including growth inhibition, anaemia and death in smaller fish Adlard and Lester (1995). Most ectoparasite that effect groupers re-facultative in nature. Many studies that have been done on parasites of grouper fishes deal mainly with endoparasites which are easily collected (Sparks 1957; Overstreet 1968; Thompson and Munro 1987). Thompson and Munro (1987) reported parasitic isopods clinging to the nostrils of groupers from Jamaica but no identifications or details were provided. Fish parasites are an integral part of water ecosystem and they are common in natural and cultured populations of fish. In natural conditions, most

Table 1 Parasite index of *Argathona* species from Therespuram, Tuticorin, Gulf of Mannar coast

Name of the parasite	Colour of the parasite	Location in the host of parasite	Length of the parasite (mm)	Weight of the parasite (g)	Width of the parasite (mm)
<i>Argathona</i>	White	Buccal cavity, gills, body surface	11	0.065	4

Table 2 Infestation of parasite on the grouper fish *Epinephelus undulosus*

Host species	Length of the host (cm)	Wight of the host (kg)	No. of fishes examined	No. of fishes infested (% prevalence)	No. of parasite collected (% mean intensity)
<i>Epinephelus undulosus</i>	63	2.7	16	14 (88)	19 (1.3)

**Fig. 2** a Dorsal b ventral view of genus *Argathona*

parasites do not tend to severely injure their hosts and cause mortalities which affect the population size at detectable levels. It is very difficult to estimate the actual harm to fish caused by the presence of parasites; if this is uneasy in cultured fish, it is almost impossible in feral fish populations. In aquaculture, some parasites are able to reproduce rapidly and heavily infect a large proportion of fish which may lead to diseases with significant economic consequences (Rameshkumar et al. 2014). This study revealed for the first occurrence of parasitic isopod (*Argathona* sp.) from *E. undulosus* in the Tuticorin, Gulf of Mannar region. The distribution of parasitic isopods is closely related to the occurrence and ecology of their hosts.

Acknowledgments Authors are Thankful to Central Marine Living Resource and Ecology, Ministry of Earth Sciences, Government of

India (Grant No. MoES/10-MLR/01/12) for providing financial support and Kamaraj College, Manonmaniam Sundaranar University, Tuticorin for providing facilities and encouragement.

References

- Adlard RD, Lester RJG (1995) The life-cycle and biology of *Anilocra pomacentri* (Isopoda, Cymothoidae), an ectoparasitic isopod of the coral-reef fish, *Chromis nitida* (Perciformes, Pomacentridae). *Aust J Zool* 43:271–281
- Bowman TE (1978) Restoration of the subgenus *Emphyllia* Koelbel for the parasitic isopod *Nerocila sundaica* Bleeker (Flabellifera, Cymothoidae). *Crustaceana* 34:33–44
- Bowman TE, Tareen IU (1983) Cymothoidae from fishes of Kuwait (Arabian Gulf) (Crustacea: Isopoda). *Smith Contrib Zool* 382:1–30
- Bruce NL (1987) Australian species of *Nerocila* Leach, 1818, and *Creniola* n. gen. (Isopoda: cymothoidae), crustacean parasites of marine fishes. *Rec Aust Mus* 39:355–412
- Bruce NL (2003) New genera and species of sphaeromatid isopod crustaceans from Australian marine coastal waters. *Mem Mus Vic* 60:309–370
- 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* 101:585–602
- Bunkley-Williams L, Williams EH Jr, Bashirullah AKM (2006) Isopods (Isopoda: Aegidae, Cymothoidae, Gnathiidae) associated with Venezuelan marine fishes (Elasmobranchii, Actinopterygii). *Rev Biol Trop Int J Trop Biol Con* 54(3):175–188
- 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
- Delaney PM (1989) Phylogeny and biogeography of the marine isopod family Corallanidae (Crustacea, Isopoda, Flabellifera). *Contribution in Science, Natural History Museum of Los Angeles County* 409:1–75
- Diamant A, Banet A, Paperna I, von Westernhagen H, Broeg K, Kruener G, Koerting W, Zander S (1999) The use of fish metabolic, pathological and parasitological indices in pollution monitoring. II The Red Sea and Mediterranean. *Helgol Mar Res* 53:195–208
- Grabda J (1991) *Marine fish parasitology: an outline*. VCH-Verlag, Weinheim
- Heemstra PC, Randall JE (1993) *FAO Species Catalogue. Vol. 16. Groupers of the world (family Serranidae, subfamily*

- Epinephelinae). An annotated and illustrated catalogue of the grouper, rockcod, hind, coral grouper and lyretail species known to date. Rome: FAO. FAO Fisheries Synopsis No. 125(16): 382
- Kensley B (1998) Estimates of species diversity of free-living marine isopod crustaceans on coral reefs. *Coral Reefs* 17:83–88
- 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
- Östlund-Nilsson SL, Curtis GE, Nilsson AS (2005) Parasitic isopod *Anilocra apogonae*, a drag for the cardinal fish *Cheilodipterus quinquelineatus*. *Mar Ecol Prog Ser* 287:209–216
- Overstreet RM (1968) Digenetic trematodes of marine teleost fishes from Biscayne Bay, Florida. Ph.D Thesis, University of Miami Coral Gables FL: 188
- Pillai NK (1954) A preliminary note on the Tanaidacea and Isopoda of Travancore. *Bull Cent Res Inst Univ Travancore* 3:1–21
- Rameshkumar G, Ravichandran S (2015) First occurrence of *Norileca triangulata* (Crustacea: isopoda: Cymothoidae) from Indian marine fishes. *J Parasit Dis* 39(1):33–36. doi:10.1007/s12639-013-0274-9
- Rameshkumar G, Ravichandran S, Trilles JP (2011) Cymothoidae (Crustacea, Isopoda) from Indian fishes. *Acta Parasitol* 56(1):78–91. doi:10.2478/s11686-011-0002-5
- Rameshkumar G, Ravichandran S, Sivasubramanian K (2014) A new record of parasitic isopod for the Indian fauna (*Mothocya karobran* Bruce, 1986) from *Strongylura strongylura* in the Pazhayar region, Southeast coast of India. *J Parasit Dis* 38(3):328–330. doi:10.1007/s12639-013-0268-7
- Sadovy YJ, Donaldson TJ, Graham TR, McGilvray F, Muldoon GJ, Phillips MJ, Rimmer MA, Smith A, Yeeting B (2003) While stocks last: The live reef food fish trade. Asian Development Bank Pacific Studies Series, Manila, p 147
- Sparks AK (1957) Some digenetic trematodes of marine fishes of the Bahamas Islands. *Bull Mar Sci* 7(3):255–265
- Thompson R, Munro JL (1987) Aspects of the biology and ecology of Caribbean reef fishes: serranidae (hinds and groupers). *J Fish Biol* 12:115–146
- Trilles JP (1975) Les Cymothoidae (Isopoda, Flabellifera) des cotes francaises. II. Les Anilocridae Schioedte et Meinert, 1881. Genres *Anilocra* Leach, 1818, et *Nerocila* Leach, 1818. *Bull Mus natn Hist nat, Paris 3e serie* 290 (Zoologie 200):347–378
- Tucker CS, Sommerville C, Wootten R (2002) Does size really matter? Effects of fish surface area on the settlement and initial survival of *Lepeophtheirus salmonis*, an ectoparasite of Atlantic salmon *Salmo salar*. *Dis Aquat Org* 49:145–152
- Williams EJ, Bunkley-Williams L (2000) Multicellular parasite (Macroparasite) problems in aquaculture. In: Stickney RR (ed) *Encyclopedia of aquaculture*. Wiley, New York, pp 562–579