


# First record of *Gnathia* sp. an ectoparasitic isopod isolated from the coral reef fish, *Heniochus acuminatus* collected from the Gulf of Mannar region, southeast coast of India

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**Abstract** An ectoparasitic isopod, *Gnathia* sp. was found in the Gill chambers of *Heniochus acuminatus* collected from the Gulf of Mannar region, Southeast coast of India. The present study signifies the new record of *Gnathia* sp. an coral reef ectoparasitic isopod captured from the gill net during October 2014. Among the 36 specimens examined 5 specimens were infested with Pranzia larvae of *Gnathia* sp. The size of the isopods were ranged from 1.5 to 3.2 mm and the host fish length varied between 119 and 230 mm. They were specifically found attached to the gill chambers and no damage observed in the lamellar pattern.

**Keywords** *Gnathia* sp. · Pranzia larvae · Gill net · *Heniochus acuminatus* · Gulf of Mannar · Southeast coast of India

## Introduction

The Gulf of Mannar (latitude 8° 47'N and 9° 15'N and longitude 78° 12'E and 79° 14'E) region encompass 21 islands surrounded by fringing or patchy pattern of reefs about 100 species of ornamental fishes are recorded by (Murthy 1969). *Heniochus acuminatus* commonly called as pennant coral fishes commonly occur around the reefs of

the Gulf of Mannar islands. In live condition, it fetches a price of Rs. 300 per fish at Tuticorin and Mandapam coasts of the Gulf of Mannar region. The biology of this species has been studied in detail along this Gulf Coast (Venkataramni et al. 2005). The Coral reef fishes are parasitized by a wide range of ectoparasites (Rhode 1993) that can have significant detrimental effects on their growth, survival and reproduction (Adlard and Lester 1994). Gnathiids are the group of isopods that live as external fish parasites during their larval stage and later in the adult stage it lives in coral rubbles, sponges or sediment cavities (Smit and Davies 2004). These isopods are copious in coral reefs and found to be the common external parasites on coral reef fish (Grutter et al. 2000). They are found in the intertidal regions in the oceans (Tanaka and Aoki 1999) and to abyssal depths (Cohen and Poore 1994). The Isopoda family Gnathiidae includes about 200 species belonging to 12 genera (Schotte et al. 2008 onwards).

Male and female adult gnathiids are highly dimorphic; males have highly developed mandibles and females lack mandibles and possess a swollen thorax to brood their eggs. Their larvae have needle-like mouthparts for sucking body fluids from the fish. Gnathiid larvae with swollen thoraxes containing fish body fluid are traditionally called Pranzia larvae and those with segmented thoraxes before feeding are traditionally called zuphea larvae (Smit and Davies 2004). Gnathiid taxonomy is generally based on the morphology of the male, but larval descriptions have recently increased because ecological studies have identified larvae as ectoparasites on fish (Farquharson et al. 2012). By using the piercing mouth parts they attach to the skin and gills and they use a muscular oesophagus and the grooved paragnath to feed on blood and plasma (Monod 1926). They can inflame and destroy mucosal tissue (Honma et al. 1991), lower blood volume (Jones and Grutter 2005), and

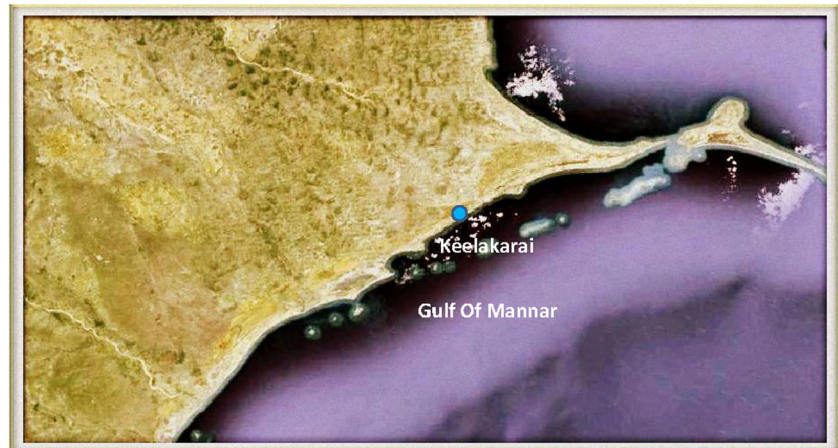
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**Fig. 1** Map showing the study area Keelakarai coast of Gulf Of Mannar South East Coast of India



kill captive fish (Mugridge and Stallybrass 1983). After the final blood meal, third stage larvae metamorphose into adult males or females that live in the benthos and do not feed. They play an important role in tropical reefs as they act as the potential food source for reef-associated planktivores (Motro et al. 2005). They are the most dominant crustacean parasite of reef fishes, and are believed to transmit protozoan blood parasites to host fishes (Davies and Smit 2001). They may play a key role in shaping the reef community structure (Floeter et al. 2007). They are also consistently reported from the Indian Oceans (Svavarsson and Jorundsdottir 2004). On the other hand, the gnathiid fauna are poorly understood in most areas, and many species have not been reported (Svavarsson and Bruce 2012). There is no previous record and information regarding the Ectoparasitic isopod i.e. *Gnathia* sp. in the coral reef ecosystem of the Gulf of Mannar region south-east coast of India. So the present study reports the new occurrence of *Gnathia* sp., Pranzia larvae on the coral reef fish, *Heniochus acuminatus* from the coral reef ecosystem of Southeast coast of India.

## Materials and methods

Fishes were collected from the gill nets operated around the Keelakarai coast of the Gulf of Mannar (Latitude 9°10'49.14"N and Longitude 78°47'56.24") Southeast coast of India (Fig. 1) during October 2014 and examined for ectoparasites. The collection and fixation were done by removing the specimen alive from the gill chambers of the host body and immediately placed into 70 % ethanol. They are further dissected for anatomical studies following the recommendations described elsewhere (Smit et al. 1999; Smit and Basson 2002). The taxonomy and fish names were updated according to (Froese and Pauly 2011). The identified specimen was preserved in formalin and



**Fig. 2** An overview of *Heniochus acuminatus* (Coral reef fish), infested with Ectoparasites *Gnathia* sp.

deposited in the fishery museum, Department of Marine and coastal Studies Madurai Kamaraj University (MKU/DMCS/2014/10/8). The host species, the site of attachment and the geographical distribution of parasites were noted. Mean intensity, prevalence was calculated according to the method described by (Bush et al. 1997).

## Results

### Systematics

Kingdom: Animalia  
 Phylum: Arthropoda  
 Subphylum: Crustacea  
 Class: Malacostraca  
 Order: Isopoda  
 Family: Gnathiidae  
 Genus: *Gnathia*

The present study reveals that the coral reef fish, *Heniochus acuminatus* was infested by the ectoparasites, Pranzia larvae of *Gnathia* sp. (Fig. 2). It is the common



**Pranzia larvae attached in the gills of *Heniochus acuminatus***



**Different stages of Pranzia larvae of *Gnathia* sp**

**Fig. 3** Infestation of isopod parasites gnathiid in the Gill chamber of *Heniochus acuminatus* and light microscopic view of Pranzia larvae

**Table 1** Biometric and parasitological data of the fishes captured from Gulf of Mannar, South east coast of India

| Type of parasite   | Host                        | Location in the host | Host length (mm) | Parasite length (mm) | No. of fish examined | No. of infected fish | No. of parasites | Prevalence % | Mean intensity |
|--------------------|-----------------------------|----------------------|------------------|----------------------|----------------------|----------------------|------------------|--------------|----------------|
| <i>Gnathia</i> sp. | <i>Heniochus acuminatus</i> | Gill rakers          | 119–230          | 1.5–3.2              | 36                   | 5                    | 85               | 13.9         | 17             |

reef fish found in the Gulf of Mannar region of southeast coast of India. Totally 36 specimens captured from gill net were analyzed for ectoparasites. Out of these, 5 specimens were infested in the gill chambers and its stomach is filled with blood of the host fish. Totally 85 isopods were isolated from the five infested fish. Three stages of Pranzia larvae have been observed (Fig. 3) in Light microscope. Mean intensity, prevalence, length of the host and isopod represented in (Table 1). They colonize the Gill chambers in the rising order pattern in most of the cases. The Pranzia larvae found more in the first gill followed by the rest (Table 3). No adult was observed and discoloration of the gill has been found due to loss of blood.

### Description

The size of the specimen varies from 1 to 3.2 mm and the morphology of maxillipedes of the female, and the total number of teeth on the mandibles, maxillules, pereonites and pereopods were described (Table 2).

**Table 2** The morphological characteristics of Pranzia larvae of *Gnathia* sp.

| Species            | Teeth on mandible | Teet on tip of mandible | Teeth on maxillipede | Teeth on the maxillule | Setae on the pleotelson |
|--------------------|-------------------|-------------------------|----------------------|------------------------|-------------------------|
| <i>Gnathia</i> sp. | 7                 | 2                       | 4                    | 6                      | 5                       |

### Discussion

In the present study new occurrence of *Gnathia* sp. has been found and there was no previous record of the species in the coral reef ecosystem of the Gulf of Mannar region South East Coast of India. The ectoparasites found only in the Gill chamber and nowhere else in the host body. Larval isopod parasites of the family Gnathiidae are abundant on the gills of tropical marine fish and represent a primary source of food for cleaner fish (Ravichandran et al. 2009). In the earlier studies (Paperna and Zwerner 1976) revealed



**Table 3** Infestation and site attachment of Pranzia larvae of *Gnathia* sp.

| Host name                     | No. of larvae present in each gill of gill arch |        |        |        | Total no Pranzia larvae |
|-------------------------------|---|--------|--------|--------|-------------------------|
|                               | Gill 1  | Gill 2 | Gill 3 | Gill 4 |                         |
| <i>Heniochus acuminatus</i> 1 | 9   | 5      | 1      | 2      | 17                      |
| <i>Heniochus acuminatus</i> 2 | 10  | 3      | 2      | 1      | 16                      |
| <i>Heniochus acuminatus</i> 3 | 8   | 3      | 3      | –      | 14                      |
| <i>Heniochus acuminatus</i> 4 | 10  | 5      | 2      | 1      | 18                      |
| <i>Heniochus acuminatus</i> 5 | 12  | 4      | 3      | 2      | 21                      |

that the infection in the gill chamber often leads to the mechanical damage of lamellar structure. Whereas, (Paperna and Por 1977) reported Gnathiids were pathogenic to teleosts and depend upon the species of reef fishes infestation level is more. On the contrary, (Jones and Grutter 2005) argued that the deaths might not only be through blood-feeding parasites but also to stress or subsequent bacterial infection. But in the present study no deformities have been observed in the lamellar pattern of gill chambers, but they appear in pale in color, it may be due to the loss of blood by blood sucking ectoparasites *Gnathia* sp. (Genc et al. 2005) reported that the number of gnathiid parasite ranged between 2 and 48 (Mean intensity, 15.8) per white grouper (*Epinephelus aeneus*) while the other study results indicated that the number of gnathiid parasites ranged between 8 and 68 (Mean intensity, 21.35) per dusky grouper (*Epinephelus marginatus*) from the Iskenderun Bay in Northeast Mediterranean Sea. In the present study mean intensity of *Heniochus acuminatus* was 13.9. Its mean intensity was slightly lower when compared with other species. According to (Heupel and Bennett 1999) no tissue reaction observed in *Hemiscyllium ocellatum* (epaulette shark), indicating that the pranzia had recently attached and the host response was not yet developed. Three stages of Pranzia larvae were infested in the host, so further studies has to be done to know the life cycle of *Gnathia* sp. and its stage of pathogenicity to the host.

## Conclusion

This is the first record of *Gnathia* sp. as ectoparasitic isopods on coral reef fish *Heniochus acuminatus* from the coral reef ecosystem of southeast coast of India. Future studies are required to identify its pathogenicity and impact on coral fish populations in India. The results of this study encourage further investigations in different locations of coral reefs in order to find patterns of prevalence and intensity of *Gnathia* sp. infestation for other reef species.

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## Compliance with ethical standards

**Conflict of interest** The authors declare no conflict of interest.

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