

Heavy Infection of Groupers *Epinephelus* spp. with *Lernaeenicus ramosus* (Copepoda, Pennellidae) in the Sea of Japan

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Abstract. One hundred thirteen and 53 adult females of the mesoparasitic pennellid copepod *Lernaeenicus ramosus* Kirtisinghe, 1956 were found infecting a Hong Kong grouper *Epinephelus akaara* (Temminck & Schlegel) and a yellow grouper *Epinephelus awoara* (Temminck & Schlegel) from the southern Sea of Japan off Shimane Prefecture, western Japan in October and November 2004, respectively. These findings constitute the first records of *L. ramosus* from the Sea of Japan. The skin near the base of the dorsal fin was most heavily infected. *Epinephelus awoara* is a new host of *L. ramosus*.

Key words: *Lernaeenicus ramosus*, *Epinephelus akaara*, *Epinephelus awoara*, groupers, new host

Introduction

The pennellid copepod *Lernaeenicus ramosus* Kirtisinghe, 1956 is a parasite of marine fishes in the Indo-West Pacific region. This species was originally described by Kirtisinghe (1956) from the comet grouper *Epinephelus morrhua* (Valenciennes) from the Wadge Bank in the Indian Ocean off Sri Lanka. It was later redescribed by Shiino (1958) from the blacktip grouper *Epinephelus fasciatus* (Forsskål) (as “*Epinephelus tsirimenaria*”) and the Hong Kong grouper *Epinephelus akaara* (Temminck & Schlegel) in Japanese waters, where it was recently reported from *E. akaara* (Doi, 2007; Doi *et al.*, 2008). The species is also known to infect the bluestriped fangblenny *Plagiotremus rhino-*

rhynchus (Bleeker) (as “*Runula rhinorhynchus*”) from the Great Barrier Reef off Queensland, Australia (Boxshall, 1986). In October and November 2004, we encountered two cases of heavy infection with *L. ramosus* on groupers from the southern Sea of Japan off Shimane Prefecture, western Japan, which are herein reported.

Materials and Methods

Two fish with heavy infection by *Lernaeenicus ramosus* were examined in this study: a Hong Kong grouper *Epinephelus akaara* captured in a set net installed in the coastal waters of the Sea of Japan (34°49'N, 131°57'E) off Yoshiura in Misumi, Hamada, Shimane Prefecture on October 15, 2004, and a yellow grouper *Epinephelus awoara* (Temminck & Schlegel) caught

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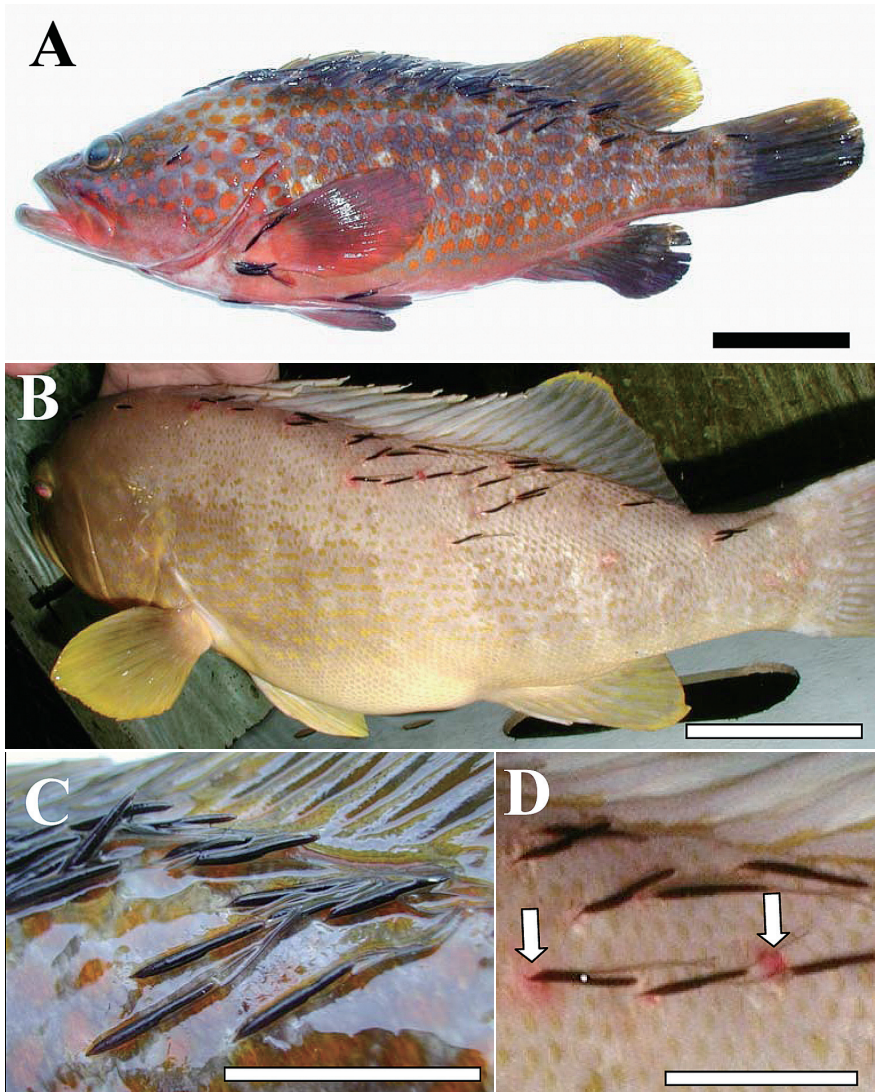


Fig. 1. A Hong Kong grouper *Epinephelus akaara* (A, C) and a yellow grouper *E. awoara* (B, D) with heavy infection by adult females of *Lernaeenicus ramosus*. Note the host's skin redness (arrows) at attachment sites (D). Scale bars: 50 mm in A and B; 20 mm in C and D.

with rod and line in the neritic waters of the Sea of Japan (35°00'N, 132°06'E) off Hamada in Shimane Prefecture on November 18, 2004. These fish were each measured for total length (TL, mm) and examined for the number and attachment sites of *L. ramosus*. Voucher specimens are deposited in the crustacean (Cr) collection at the National Museum of Nature and Science, Tokyo (NSMT-Cr 21135 from *E. akaara*). The English and scientific names of fishes used in this

paper follow Froese & Pauly (2010).

Results

The Hong Kong grouper *Epinephelus akaara* (305 mm TL) and the yellow grouper *E. awoara* (480 mm TL) examined were infected with 113 and 53 adult females of *L. ramosus*, respectively (Fig. 1A-B). The copepods inserted the anterior part of the body into the

host's subcutaneous tissues. The attachment sites of the copepods ($N=166$) were scattered over the host's body surface (excluding the fins), but the majority ($N=128$, 77.1%) was attached to the skin near the base of the dorsal fin (Fig. 1C), followed by the thorax ($N=13$, 7.8%), lateral body surface ($N=12$, 7.2%), caudal peduncle ($N=8$, 4.8%), head ($N=4$, 2.4%), and belly ($N=1$, 0.6%). The infected fish were not emaciated but the skin exhibited redness at some attachment sites (Fig. 1D).

Discussion

Lernaenicus ramosus is known to occur off Sri Lanka, Japan, and Australia. In Japanese waters, the species has been reported from the western North Pacific and the Seto Inland Sea (Shiino, 1958; Doi, 2007; Doi *et al.*, 2008). Our findings constitute the first records of *L. ramosus* from the Sea of Japan. The localities where *L. ramosus* was collected in Japan are all in the temperate region that is more or less affected by the Kuroshio, a warm-water current, and its branch, the Tsushima Current.

Lernaenicus ramosus so far has been recorded from four perciform fishes, including three serranids (*Epinephelus morrhua*, *E. fasciatus*, *E. akaara*) and one blenniid (*Plagiotremus rhinorhynchos*) (Kirtisinghe, 1956; Shiino, 1958; Boxshall, 1986; Doi, 2007; Doi *et al.*, 2008). *Epinephelus awoara*, from which *L. ramosus* was collected in this study, represents a new host. Based on our data and previous information, *L. ramosus* may prefer groupers *Epinephelus* spp. but the host specificity of this parasite is probably not strict.

Lernaenicus ramosus is a mesoparasitic copepod. While the trunk and abdomen were protruded into the water, the anterior part of the body was embedded in the host's subcutaneous tissues. According to Doi *et al.* (2008), the affected host's tissues exhibit inflammation, which causes formation of granuloma around the head and holdfast of the parasite. In our material, the skin redness was observed at some attachment sites, which indicates the host's inflammatory response to the parasite.

The adult females of *L. ramosus* were abundantly

attached to the skin near the base of the dorsal fin of the fish. A similar result was reported by Doi (2007) who examined the infection of *L. ramosus* on *E. akaara* from the Seto Inland Sea. These observations suggest that female *L. ramosus* exhibits preference for that skin region but it is not known whether most infective copepods initially attach to the region or females move from other regions after their initial infection.

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