

Occurrence of the parasitic copepod *Acanthochondria spirigera* (Chondracanthidae) on anglerfish *Lophius litulon* in the East China Sea off western Japan

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Abstract Anglerfish *Lophius litulon* (Jordan) caught commercially in the East China Sea off western Japan were found to be infected with the chondracanthid copepod *Acanthochondria spirigera* Shiino, 1955. *Lophius litulon* is a new host for this copepod. We made an observation on the occurrence of *A. spirigera* on anglerfish because the copepods of the genus *Acanthochondria* cause food hygiene problems at fish markets in Japan. Overall prevalence of infection with *A. spirigera* was high (71% of 31 fish examined), and one or two copepods were usually found on an infected fish. Their attachment site was the roof and floor of the buccal cavity of the fish. The number of copepods per fish showed an increasing trend with fish size and during the fall months (September to November).

Key words: parasitic copepod, *Acanthochondria spirigera*, new host, anglerfish, *Lophius litulon*, East China Sea

INTRODUCTION

The chondracanthid copepod *Acanthochondria spirigera* was described by Shiino (1955) from blackmouth angler *Lophiomus setigerus* (Vahl) (as *L. setigerous*) (type host) landed at Choshi and Amatsu (as Tyôsi and Amatu, respectively) in Chiba (as Tiba) Prefecture and at Owase in Mie Prefecture, Japan. This copepod was subsequently recorded from the same fish host in Sagami Bay (Shiino, 1959), off the west coast of Japan (Avdeev and Kazatchenko, 1985), and in the Sea of Japan off southern Korea (Choi *et al.*, 1996). In Japan, the copepod was also found on goosefish *Lophioides naresi* (Günther) (= *Chirolophius* [as *Cherolophius*] *moseleyi* Regan) at Owase (Shiino, 1955). The sites of attachment are the roof and floor of the buccal cavity and the gills (Shiino, 1955; Avdeev and Kazatchenko, 1985; Choi *et al.*, 1996). Goosefishes (family Lophiidae) are highly appreciated as food in Japan, and the copepods of *Acanthochondria* spp., including a species infecting *Lophiomus setigerus*, cause food hygiene problems at fish markets (Tokyo Metropolitan Wholesale Market Sanitary Inspection Station, 1990). Since the biology of *A. spirigera* is poorly known, we examined the occurrence of the copepod on anglerfish *Lophius litulon* (Jordan) caught in the East China Sea.

MATERIALS AND METHODS

A total of 31 *Lophius litulon* were purchased at Imabari Fish Market, Ehime Prefecture, Japan, from January to May and September to November, 2007. The fish were all commercially caught with bottom trawls in the East China Sea. No fish was sampled from June to August 2007 because fishing was prohibited for fisheries management. Since the catches were usually small and the fish price was high, only 1-6 (usually 3-4) fish were available for this study per month (Table 1). The fish were brought to the laboratory and individually examined for total length (TL, mm), body weight (g) and the presence of *Acanthochondria spirigera*. The copepods found were fixed and preserved in 70% ethanol. Voucher specimens are deposited in the crustacean (Cr) collection at the National Museum of Nature and Science, Tokyo, Japan (NSMT-Cr 18775).

RESULTS

A total of 57 female copepods occurred on 22 (71%) of the 31 fish examined (Table 1). These copepods were all identified as *Acanthochondria spirigera* Shiino, 1955 (Fig. 1). Their attachment site was the roof and floor of the buccal cavity. One or two copepods were usually found on an infected fish, but as many as 13 copepods were recorded from a fish of 715 mm TL (Fig. 2). The number of copepods per fish showed an increasing trend with fish size. Due to the small number of our fish samples, it was difficult to draw a conclusion about seasonal changes in infection level of *A. spirigera* (Table 1). Nevertheless, mean abundance of the copepod gradually increased during the fall months (September to November).

DISCUSSION

The morphology of female copepod specimens of the present material is identical with that of the

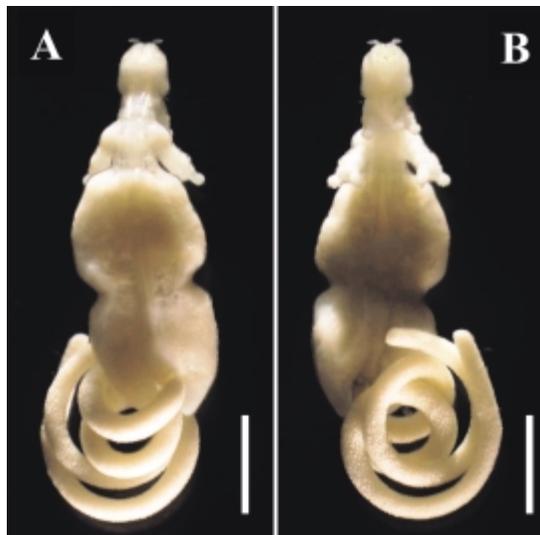


Fig. 1. Adult female of *Acanthochondria spirigera* from the buccal cavity of anglerfish *Lophius litulon* from the East China Sea on September 19, 2007. A. dorsal view, B. ventral view. Scale bars: 10 mm.

Table 1. Monthly occurrence of *Acanthochondria spirigera* on anglerfish *Lophius litulon* from the East China Sea in 2007*

Month	No. of fish examined	Total length (mean, mm)	Prevalence (%)**	Mean abundance (range)***
January	4	383-452 (422)	50.0	0.8 (0-2)
February	4	395-553 (473)	100	1.3 (1-2)
March	5	392-523 (447)	80.0	1.2 (0-2)
April	6	398-513 (469)	66.7	1.0 (0-3)
May	3	441-840 (610)	66.7	1.0 (0-2)
September	5	405-673 (495)	60.0	3.4 (0-9)
October	1	862 (862)	100	4.0 (4)
November	3	415-715 (522)	66.7	6.3 (0-13)
Total	31	383-860 (495)	71.0	2.3 (0-13)

* No fish was caught from June to August due to fishing ban.

** Percentage of fish infected.

*** Mean number of copepods per fish examined.

female of *A. spirigera* described by Shiino (1955). *Lophius litulon* is a new host for *A. spirigera*. The hitherto known hosts are two lophiids (*Lophiomus setigerus*, *Lophioides naresi*: see the Introduction section for the current and previous scientific names of the latter species) (Shiino, 1955, 1959; Avdeev and Kazatchenko, 1985; Choi *et al.*, 1996), indicating that this copepod is specific to goosefishes of the family Lophiidae.

The distributional records of *A. spirigera* are confined to Japanese and Korean waters. There has been no record of the species from off Far East Russia and China (e.g., Markevich and Titar, 1978; Song and Kuang, 1980), but it is likely that it occurs in Chinese waters because the host fish is distributed in the Yellow Sea and the East China Sea (Yamada *et al.*, 2007).

Avdeev and Kazatchenko (1985) collected *A. spirigera* from the gills and buccal cavity of *Lophiomus setigerus*. There is also a record of *Acanthochondria* sp. (probably *A. spirigera* based on

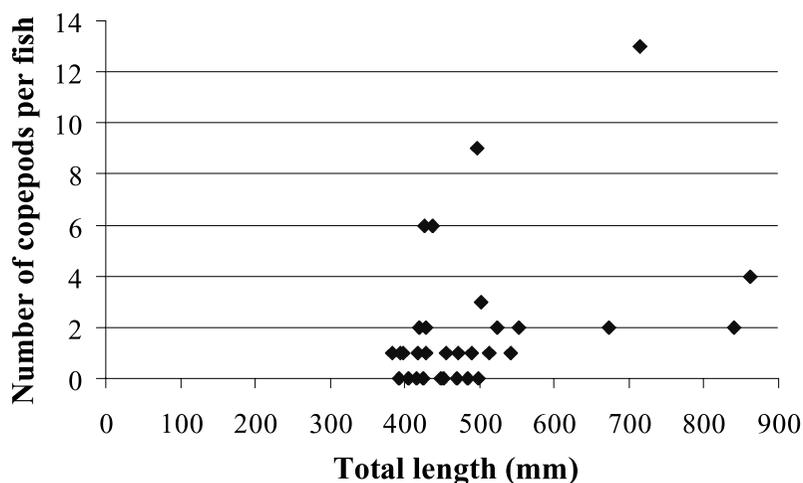


Fig. 2. Relationship between number of *Acanthochondria spirigera* per fish and total length of anglerfish *Lophius litulon* from the East China Sea.

a picture) from the gills of *L. setigerus* (Tokyo Metropolitan Wholesale Market Sanitary Inspection Station, 1990). In this study, however, all copepods were found in the buccal cavity of *Lophius litulon*. *A. spirigera* may show a different site preference in the two fish hosts.

As for seasonal changes in infection level of *A. spirigera* (Table 1), there was a slight increase in mean abundance of the copepod from September to November. Choi *et al.* (1996) observed a decline from January to May in infection level of *A. spirigera* on *Lophiomus setigerus* from Korean waters. These results imply that the copepod abundance may change seasonally. More fish samples are, however, necessary for a quantitative study on the seasonal occurrence of *A. spirigera*, although it is not easy to obtain many fish from the East China Sea due to low level of their abundance.

The known fauna of parasitic copepods of *Lophius litulon* in Japan consists of five species: *A. spirigera*, *Acanthochondria oralis* Yamaguti, 1939, *Anthessius lophiomi* Avdeev and Kazatchenko, 1985, *Prohatschekia antennalis* Avdeev and Kazatchenko, 1985, and *Hoi hoi* Avdeev and Kazatchenko, 1985 (Yamaguti, 1939; Shiino, 1955, 1959; Avdeev and Kazatchenko, 1985). *A. spirigera* also occurs on *Lophiomus setigerus* and *Lophioides naresi* (Shiino, 1935). Further, *L. setigerus* is known to harbor *Acanthochondria sixteni* (Wilson, 1912) although this copepod is a parasite of flatfishes (Ho and Kim, 1995). Of these copepods, in order to eliminate possible confusion in identification of chondracanthids from Japanese lophiids, the morphology of *A. oralis* should be reexamined in some detail because the original description of this species is poorly known based on a single female and a single male and, like *A. spirigera*, it occurs in the buccal cavity (as mouth cavity) of *L. setigerus*, a type host of *A. spirigera*, from Japan (Yamaguti, 1939).

During this study, we had an opportunity to examine one *Lophius litulon* from the Sea of Japan off Yamaguchi or Tottori Prefecture caught on April 18, 2007 and collected 10 specimens of *A. spirigera*. This finding constitutes the first record of the copepod from this region. Voucher specimens are deposited at the National Museum of Nature and Science, Tokyo (NSMT-Cr 18776).

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東シナ海産キアンコウにおけるトゲナシツブムシ *Acanthochondria spirigera*の寄生状況

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要 旨 東シナ海で漁獲されたキアンコウ*Lophius litulon*の口腔壁にカイアシ類ツブムシ科のトゲナシツブムシ*Acanthochondria spirigera*の寄生を認めた。キアンコウは本寄生虫の新宿主である。トゲナシツブムシを含む*Acanthochondria*属のカイアシ類は魚市場等で食品衛生的な問題を起こすことがあるため、その寄生状況を観察した。全検査魚における寄生率は72%で、キアンコウ1尾当たり普通1~2個体が寄生していた。寄生部位は口腔壁で、鰓への寄生は見られなかった。1尾当たり寄生数は魚体長が増すほど、また季節的には秋(9~11月)に多くなる傾向がみられた。

キーワード：寄生性カイアシ類, トゲナシツブムシ, *Acanthochondria spirigera*, 新宿主, キアンコウ, 東シナ海