

A rare infection of *Ceratothoa verrucosa* (Isopoda: Cymothoidae) on red seabream, *Pagrus major*, cultured in central Japan

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Abstract An immature female of the cymothoid isopod, *Ceratothoa verrucosa* (Schioedte and Meinert, 1883), was found to be attached ventrally to the roof of the buccal cavity of a red seabream, *Pagrus major* (Temminck and Schlegel, 1843), cultured in Kamisakiura Cove, Mie Prefecture, central Japan, in July 2008. Since April 1985, data on the diseases of marine fishes cultured in this prefecture have been taken at two prefectural organizations, but only two records of *C. verrucosa* infection, including the present case, were found in those long-term data from an examination of more than 14,591 farmed red seabream from April 1985 to July 2017. This indicates that *C. verrucosa* is an extremely rare parasite of farmed red seabream in Mie Prefecture.

Key words: aquaculture, *Ceratothoa verrucosa*, Cymothoidae, fish parasite, Isopoda, *Pagrus major*

INTRODUCTION

Isopods of the family Cymothoidae are found on marine fishes cultured in various countries (e.g., Horton and Okamura, 2001). In Japan, three species of cymothoid isopods have been reported to date: *Mothocya parvostis* Bruce, 1986 from Japanese amberjack, *Seriola quinqueradiata* Temminck and Schlegel, 1845 and mejina, *Girella punctata* Gray, 1835 (Hatai and Yasumoto, 1980, 1981, 1982 [reported as *Irona melanosticta*]; Bruce, 1986); *Ceratothoa verrucosa* (Schioedte and Meinert, 1883) from red seabream, *Pagrus major* (Temminck and Schlegel, 1843) (Hatai, 1989, 2006 [as *Rhexanella verrucosa*]); and *Nerocila phaiopleura* Bleeker, 1857 from Pacific bluefin tuna, *Thunnus orientalis* (Temminck and Schlegel, 1844) (Nagasawa and Shirakashi, 2017). Of these species, little is known about *C. verrucosa* because the available information on this species in aquaculture is only Hatai's (1989) one-page account in a reference book about fish diseases of Japan. A similar account (Hatai, 2006) was used in a revised version of the book. In other words, no scientific paper has been published on the infection of *C. verrucosa* on red seabream cultured in Japan.

Red seabream is one of the major fishes cultured in coastal marine waters of Mie Prefecture, central Japan. For their efficient treatment and control, fish diseases are routinely diagnosed at the Mie Prefecture Fisheries Research Institute, Hamajima, and its Owase Branch, Owase. During a recent fish examination, we found an infection of *C. verrucosa* on farmed red seabream, which is reported herein. We also report that this parasite is very rare in red seabream farming based on long-term data on the diseases of marine fishes cultured in this prefecture.

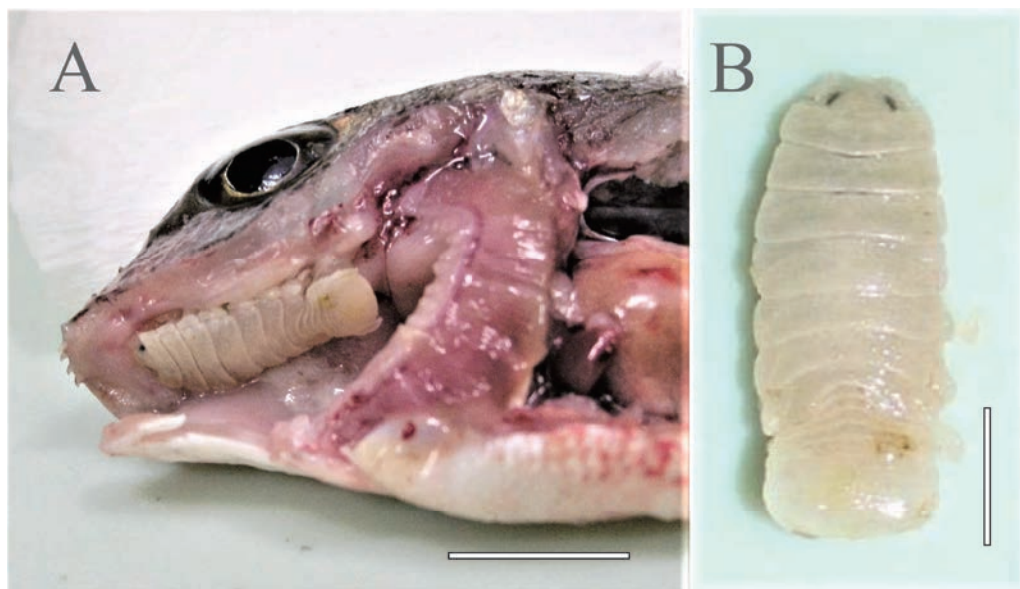


Fig. 1. A female of *Ceratothoa verrucosa* being attached ventrally to the roof of the buccal cavity of a farmed red seabream from Kamisakiura Cove, Mie Prefecture, central Japan (A) and a fresh specimen of *C. verrucosa* (B), dorsal view. Scale bars: 10 mm in A; 4 mm in B.

A CASE REPORT

Six individuals of age-0 farmed red seabream (108-123 mm in fork length [FL]) were examined from Kamisakiura Cove, Minami-Ise, on 9 July 2008 because a mortality was found by a fish farmer among those age-0 farmed fish. One of these fish (108 mm FL) was infected by a cymothoid isopod in the buccal cavity (Fig. 1A). The isopod was attached ventrally to the roof of the buccal cavity with its cephalon being oriented anteriorly. It was an immature female of *C. verrucosa* (Fig. 1B), measuring 13.8 mm in total length and 6.0 mm in maximum width. It has a rectangular and slightly elongate body; a subtriangular cephalon; pereonite 4 being widest; pleon as wide as pereon; and a slightly rounded posterior margin of the pleotelson. The infected fish was emaciated and parasitized by several worms of the acanthocephalan, *Longicollum pagrosomi* Yamaguti, 1935, in the rectum, but it is not clear whether the observed emaciation was induced by the isopod and/or acanthocephalans.

DISCUSSION

Ceratothoa verrucosa is a parasite found in the buccal cavity of sparids in Japanese waters (Saito *et al.*, 2000; Yamauchi, 2016; Nagasawa, 2017). The known sparid hosts are red seabream (*e.g.*, Hiraiwa, 1934; Sanda, 1941; Shiino, 1951; Yamauchi and Nunomura, 2010; Hadfield *et al.*, 2016) and crimson seabream, *Eyynnys tumifrons* (Temminck and Schlegel, 1843) (Nagasawa and Isozaki, 2016; Hata *et al.*, 2017). Currently, darkbanded rockfish, *Sebastes inermis* Cuvier, 1829 (Scorpanidae), was also listed as a host of the isopod (Hata *et al.*, 2017). No published information exists on prevalences of *C. verrucosa* in wild populations of sparids, but this parasite has been recorded from red seabream in various localities of Japan ranging from northern Honshu to Kyushu (Nagasawa, 2017), which suggests that it is not a rare parasite of wild red seabream in Japanese waters.

Since 1985, data on the diseases of farmed marine fishes including red seabream have been accumulated at the Mie Prefecture Fisheries Research Institute, Hamajima, and its Owase Branch, Owase (Tanaka, 2001), and more than 14,591 individuals of red seabream were examined a total of 3,822 times for 32 years between April 1985 and July 2017. Nevertheless, only two cases of infection of *C. verrucosa*, including the case reported herein, were found in those data, which indicates that this parasite is extremely rare in red seabream farming of Mie Prefecture. The other case was recorded as occurring in two individuals of age-0 fish (78 and 189 g in body weight) cultured in Hikimotoura Cove, Miyama (currently Kihoku), in September 1985: these fish were emaciated and harbored cymothoid isopods identifiable as *C. verrucosa* in the gill operculum region (not in the buccal cavity). No further information, such as the morphology of the parasite, was present.

A similar rare occurrence of *C. verrucosa* on farmed red seabream may occur in such other prefectures as Oita and Ehime, whose aquaculture production of red seabream is high, because there is no report of the isopod from farmed fish in these prefectures (Fukuda, 1999; Matsuoka, 2000).

Unlike *C. verrucosa*, another species of crustacean parasite, *Caligus sclerotinosus* Roubal, Armitage and Rohde, 1983 (Copepoda: Caligidae) frequently and heavily parasitizes red seabream cultured in Mie Prefecture (Tanaka *et al.*, 2013). As both parasites have direct life cycles without any intermediate hosts (Sanada, 1941; Maran *et al.*, 2012), they are considered to easily find and proliferate on their hosts when once they succeed in invading the culture cages. This is, however, not the case with *C. verrucosa*, and at present, the reason why the species cannot establish its populations within the cages is unknown.

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養殖マダイにおけるタイノエの稀な寄生

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要 旨 三重県南伊勢町神前浦で養殖されていたマダイ当歳魚の口腔に等脚類ウオノエ科のタイノエ *Ceratothoa verrucosa* (Schioedte and Meinert, 1883) の寄生を認めた。タイノエは雌で腹面を宿主の口蓋に向けて寄生していた。三重県では養殖海水魚の魚病診断記録が1985年4月から蓄積されている。2017年7月までの32年間に調べられた14,591尾以上の養殖マダイにタイノエの寄生が認められたのは本件を含めて僅か2件であった。これは、タイノエが養殖マダイの極めて稀な寄生虫であることを示している。

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