

Observations on *Ceratothoa verrucosa* (Isopoda: Cymothoidae) parasitic on sparid fishes from central Japan, with the third record of the isopod from crimson seabream, *Evynnis tumifrons*

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Abstract

Specimens of *Ceratothoa verrucosa* (Schioedte and Meinert, 1883) were collected from the buccal cavity of a red seabream, *Pagrus major* (Temminck and Schlegel, 1843), and a crimson seabream, *Evynnis tumifrons* (Temminck and Schlegel, 1843), in coastal waters of the Northwestern Pacific Ocean off Mie Prefecture, central Japan. The collection of *C. verrucosa* from *E. tumifrons* represents its third record from the fish species. Based on the present and previous records of *C. verrucosa* from Japan, it is likely that, in addition to *P. major*, sparids of the genus *Evynnis* also serve as significant hosts for the isopod.

Introduction

The cymothoid isopod *Ceratothoa verrucosa* (Schioedte and Meinert, 1883) is a parasite of marine fishes in Far East Asia including Japan (Yamauchi, 2016; Hadfield and Smit, 2020) and China (Huang and Lin, 2012). In Japan, the species is commonly found on red seabream, *Pagrus major* (Temminck and Schlegel, 1843) (Yamauchi, 2016; Nagasawa, 2017) but much remains poorly known about other fish hosts. During a recent examination of cymothoid isopods kept at the Mie Prefecture Fisheries Research Institute, Shima, we found specimens of *C. verrucosa* from two sparid species, i.e., red seabream and crimson seabream, *Evynnis tumifrons* (Temminck and Schlegel, 1843). The finding of *C. verrucosa* from *E. tumifrons* represents its third record from the fish species.

Materials and Methods

The specimens of *C. verrucosa* found were collected from the buccal cavity of one *P. major* (body size not measured) and one *E. tumifrons* (173 mm standard length) and in coastal waters of Gokasho Bay, an inlet of the Northwestern Pacific Ocean, off Shuku-ura (34°18'39"N, 136°41'33"E), Minami-Ise, Mie Prefecture, central Japan, on 21 October 2011 and 25 April 2011, respectively. The infected fishes were both commercially caught and landed at the Shukutaso Fishing Port. The cymothoid specimens were initially fixed in 10% formalin but later preserved in 70% ethanol. The specimens were examined for their morphology using an Olympus SZX10 stereo microscope. At present, they are retained at the Aquaparasitology Laboratory, Shizuoka Prefecture, for an ongoing taxonomic study of cymothoid isopods of Japanese marine fishes but will be deposited in the Crustacea collection of the National Museum of Nature and Science, Tsukuba, Ibaraki Prefecture. The scientific and common names of fishes used in this paper follow those recommended by Froese and Pauly (2021), but both *E. tumifrons* and crimson seabream follow Iwatsuki et al. (2007).

Results and Discussion

The specimens from *P. major* consist of an ovigerous female and an adult male (Fig. 1A), measuring 39.0 × 23.5 mm (total length × maximum body width) and 25.3 × 12.0 mm, respectively. Similarly, the specimens from *E. tumifrons* are composed of an ovigerous



Fig. 1. *Ceratothoa verrucosa* from sparid fishes in Gokasho Bay, an inlet of the Northwestern Pacific Ocean, Mie Prefecture, central Japan. A, ovigerous female (left) and adult male (right) from a red seabream, *Pagrus major*, dorsal view; B, ovigerous female (left) and adult male (right) from a crimson seabream, *Evynnis tumifrons*, dorsal view. Scale bars: A, B, 10 mm.

female and an adult male (Fig. 1B), measuring 28.6×16.5 mm and 15.6×6.1 mm, respectively. The gross morphology of the females corresponds to that of female *C. verrucosa* reported by Thielemann (1910), Hiraiwa (1934), Shiino (1951), and Hadfield et al. (2016), and there was no gross morphological difference between the males collected and that reported by Shiino (1951). The pereonites, in particular pereonites 1–4, have bumpy dorsal surfaces in the specimens of both sexes (Fig. 1), which is one of the morphological features in *C. verrucosa* (see Thielemann, 1910, figs. 3, 4; Hiraiwa, 1934, fig. 1; Shiino, 1951, fig. 1A, B; Nagasawa and Isozaki, 2016, fig. 1A; Hadfield et al., 2016, fig. 10A, B; Nagasawa and Nitta, 2018, fig. 1C).

The present collection of *C. verrucosa* from *P. major* is not surprising because there are many records of the isopod from wild populations of *P. major* in various localities of Japan (e.g., Hiraiwa, 1934; Sanada, 1941; Shiino, 1951; Nunomura, 1981, 1985; Yamauchi and Nunomura, 2010; Nagasawa, 2017; Nagasawa and Nitta, 2018; Nagasawa and Fukuda, 2018; Nagasawa and Kawai, 2019; Nagasawa et al., 2020; Ohtani et al., 2021). Nonetheless, it is interesting to note that *C. verrucosa* is a very rare parasite in cage farming of *P. major* in Mie Prefecture: more than 14,591 farmed *P. major* were examined from April 1985 to July 2017, but only two cases of infection by *C. verrucosa* were de-

tected (Nagasawa and Tanaka, 2017). The reason for this extreme low prevalence of infection in farmed *P. major* is unknown.

There are two records of *C. verrucosa* from *E. tumifrons*: one infected fish was from Kowaura Bay, Mie Prefecture (Nagasawa and Isozaki, 2016) and another infected fish was from Sagami Bay, Kanagawa or Shizuoka Prefecture (Hata et al., 2017). Further, there is a record of *C. verrucosa* from threadfin porgy, *Evynnis cardinalis* (Lacepède, 1802), from Yawatahama, Ehime Prefecture (Hata et al., 2017). These facts suggest that, like *P. major*, sparids of the genus *Evynnis* also serve as significant hosts for *C. verrucosa* in Japanese waters, and it is desirable to examine those sparids in order to clarify their status as the hosts. There is a record of *C. verrucosa* from sparid fishes including *E. tumifrons* from northern Honshu Island (Suzuki, 1979), but Nagasawa (2017) states that the isopod and host identifications need verification because no information was given on these animals.

Two non-sparid species are known as the hosts of *C. verrucosa* in Japan: blackthroat seaperch, *Doederleinia berycoides* (Hilgendorf, 1879) (Acropomatiformes: Acropomatidae) (Nunomura, 2011) and darkbanded rockfish, *Sebastes inermis* Cuvier, 1829 (Perciformes/Scorpaenoidei: Sebastidae) (Hata et al., 2017). As there is no information on the morphology of *C. verru-*

cosa from these non-sparid hosts, it is necessary to examine and report the morphological features of the specimens from the hosts.

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