

A record of a crustacean parasite *Argulus matuii* (Branchiura: Argulidae) in finfish mariculture in Japan

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Abstract Four specimens of crustacean parasite were collected from the caudal fin and caudal peduncle of a bastard halibut *Paralichthys olivaceus* (Temminck and Schlegel) cultured in Saiki Bay, the western Bungo Channel (western North Pacific), off Shirahama, Oh-nyu Island, Saiki, Oita Prefecture, Japan in June 1992. The specimens were lost but one of them was identified as the argulid branchiuran *Argulus matuii* Sikama, 1938, based on its morphological characters recorded on a photograph of the whole body. This finding represents the first record of *A. matuii* from farmed marine fishes. *P. olivaceus* is a new host for *A. matuii*. A total of 8,165 specimens belonging to 57 species of marine fishes cultured in coastal waters of Oita Prefecture were examined for parasitic diseases for 18 years from 1980-1997, but only three cases of argulid infection, including the present case, were found, indicating that argulids are very rare parasites in finfish mariculture in this prefecture.

Key words: *Argulus matuii*, Argulidae, Branchiura, bastard halibut, *Paralichthys olivaceus*, fish parasite, fish disease

INTRODUCTION

The argulid branchiuran *Argulus scutiformis* Thiele, 1900 is known to infect Japanese pufferfish *Takifugu rubripes* (Temminck and Schlegel) cultured in Japan (Ogawa and Yokoyama, 1998; Nagasawa, 2009). Its infection was observed only at two sites each on the coast of the Sea of Japan (Taki, 1962) and the Seto Inland Sea (Egusa, 1978). No morphological and ecological study of *A. scutiformis* infecting farmed Japanese pufferfish has been made to date. On the other hand, there are two records of argulid infection of marine fishes other than Japanese pufferfish cultured in Japan: Fukuda (1999: 57) found the argulids on Japanese amberjack *Seriola quinqueradiata* Temminck and Schlegel and bastard halibut *Paralichthys olivaceus* (Temminck and Schlegel) from Oita Prefecture, Kyushu, and Tanaka (2001: 26) also reported argulid infections of greater amberjack *Seriola dumerili* (Risso) from Mie Prefecture, central Honshu. These authors regarded the argulids as *Argulus scutiformis* without examining their morphology. In order to confirm this identification, we tried to find the specimens but were not successful because they had been lost. Nonetheless, we discovered a photograph to show the dorsal view of an argulid from a bastard halibut and concluded that it was not *A. scutiformis* but *A. matuii* Sikama, 1938, which is reported herein as the first case of infection by *A. matuii* on farmed marine fishes.

MATERIALS AND METHODS

One bastard halibut *Paralichthys olivaceus* was sampled by a fish farmer at a net cage in coastal waters of Saiki Bay, the western Bungo Channel (western North Pacific), off Shirahama (32°59'45" N, 131°55'56" E), Oh-nyu Island, Saiki, Oita Prefecture, on June 9, 1992. Within a day of capture, this fish was brought for parasitological examination to the Oita Prefectural Fisheries Experimental Station (currently the Fisheries Research Institute, Oita Prefectural Agriculture, Forestry and Fisheries Research Center), Kamiura, Oita Prefecture, Kyushu. Four argulid branchiurans were found and fixed in 70% ethanol. Later, these specimens were unfortunately lost, but one individual was identified based on its external morphology recorded on a photograph. The fish names used in this paper follow Froese and Pauly (2009).

RESULTS

Three and one argulid branchiurans were found on the caudal fin and caudal peduncle of the bastard halibut, respectively (Fig. 1A). The fish infected was 1 year old and about 415 mm in total length. No injury nor hemorrhage was observed at attachment sites.

Since the argulid specimens were lost, we could not observe nor measure them in details using a microscope. One of them, however, was identified as *Argulus matuii* Sikama, 1938 based on its morphological characters recorded on the photograph of the whole body (Fig. 1B). The body is strongly flattened dorsoventrally and covered by an oval or elliptical dorsal shield. The anterior and anterolateral margins of the shield are rounded and the posterolateral lobes overlap the base of the abdomen. A pair of compound eyes is large and present at 18% length of the dorsal shield from its anterior margin. The abdomen is much longer than wide and its posterolateral lobes are sharply pointed. Six ochre streaks bordered by purplish brown are present on the dorsal side of the shield. Both compound eyes and nauplius eye are deep purple in color. Five (two long but three short) deep purple streaks are found on the dorsal side of the abdomen. Total length is about 6 mm.

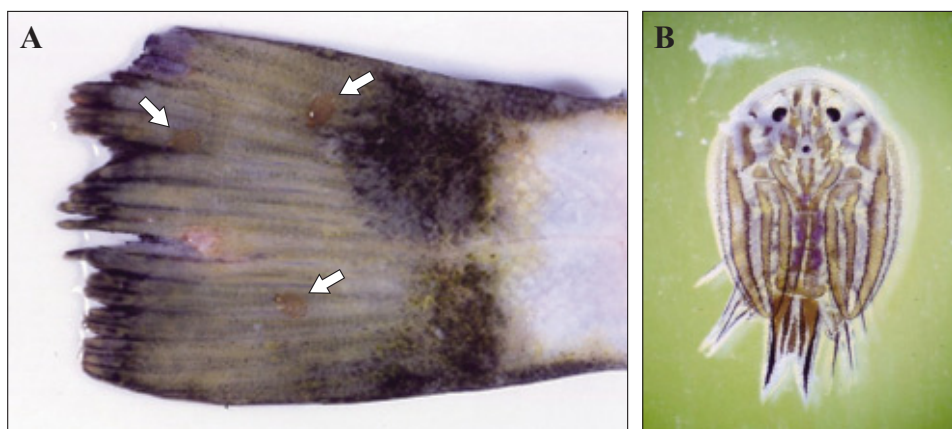


Fig. 1. A. Caudal fin of a bastard halibut *Paralichthys olivaceus* infected with three individuals of *Argulus matuii* (arrowheads), ventral view, B. *Argulus matuii* (live specimen, ca 6 mm in total length), dorsal view.

DISCUSSION

Argulus scutiformis has been reported from Japanese pufferfish *Takifugu rubripes* farmed in Japan (Taki, 1962; Egusa, 1978; Ogawa and Yokoyama, 1998; Nagasawa, 2009). This argulid is also known to occur on flathead mullet *Mugil cephalus* Linnaeus cultured in the Caribbean Sea (Leong and Colorni, 2002: table 6.11). *A. matuii* is the second species of the genus found in marine finfish culture.

Argulus matuii was originally described by Sikama (1938) based on female and male specimens from chicken grunt *Parapristipoma trilineatum* (Thunberg) (Perciformes: Haemulidae) collected in the Pacific waters of Chiba (as "Tiba") Prefecture, central Japan. This parasite has never been reported since its original description. Thus, the present finding represents the second record of *A. matuii*. One of the most distinguished morphological features of the species is the beautiful coloration of its body, especially characterized by six ochre streaks on the dorsal side of the shield. The specimen examined by us using the photograph showed similar coloration. It was about 6 mm in total length and slightly smaller than those individuals (5.23-12.94 [mean 8.53] mm, n=15) described by Sikama (1938).

Argulus matuii is known to infect other perciform fishes, as well as chicken grunt, in an aquarium, including white trevally *Pseudocaranx dentex* (Bloch and Schneider) (as "*Caranx delicatissimus*") (Carangidae), gnomefish *Scombrops boops* (Houttuyn) (Scombridae) and red seabream *Pagrus major* (Temminck and Schlegel) (as "*Pagrosomus major*") (Sparidae) (Sikama, 1938). The bastard halibut *Paralichthys olivaceus* (Pleuronectiformes: Paralichthyidae) is a new host for *A. matuii*. This parasite may not be host-specific.

A total of 8,165 specimens belonging to 57 species of marine fishes cultured along the coast of Oita Prefecture were examined for parasitic diseases by one (YF) of the present authors for 18 years from 1980-1997 (Fukuda, 1999). Even during this long-term, large scale examination, only three cases (0.04%) of argulid infection were found, indicating that argulids are very rare parasites in marine fish farming in this prefecture. One case is reported herein and the other two cases are from Japanese amberjack *Seriola quinqueradiata*. Since no argulid specimens from Japanese amberjack remained, their exact identification was impossible.

Similar low prevalence of argulid infection was reported by Tanaka (2001), who found only a single case (0.02%) for 15 years from 1985-2000 among 5,286 fishes of 20 farmed species from the coast of Mie Prefecture. He stated that "*Argulus scutiformis*" infected greater amberjack *Seriola dumerili* but this identification was not based on morphological observations. Infection by *Argulus scutiformis* on farmed Japanese pufferfish was recorded in the 1960's and 1970's (Taki, 1962; Egusa, 1978) but since then there has been no report of argulid infection in Japanese finfish mariculture, except for Fukuda (1999) and Tanaka (2001). Based on these facts, it is very unlikely that argulids are frequent and serious parasites of marine fishes farmed in Japanese waters.

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養殖海産魚におけるマツイウミチヨウの記録

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要 旨 1992年6月に大分県佐伯市大入島白浜地先の佐伯湾（豊後水道）で養殖されていたヒラメ *Paralichthys olivaceus* 1尾の尾鰭と尾柄部にエラオ類の1種が4個体寄生していた。それらエラオ類の標本は紛失したが、写真に記録された外部形態から、これらはマツイウミチヨウ *Argulus matuii* Sikama, 1938に同定された。これは、マツイウミチヨウの2度目の記録であると同時に、養殖海産魚からのマツイウミチヨウの初記録である。ヒラメは新宿主である。1980～1997年の18年間に大分県沿岸で実施された魚病診断で57種8,165尾の養殖海産魚を検査したが、エラオ類の寄生は本例を含む3例のみであった。このことから、大分県の養殖海産魚ではエラオ類は極めて稀な寄生虫であると示唆された。

キーワード：マツイウミチヨウ, *Argulus matuii*, チョウ科, エラオ類, ヒラメ, 魚類寄生虫, 魚病