

***Brachiella thynni* (Copepoda: Lernaepodidae) parasitic on wahoo,
Acanthocybium solandri, from off Japan,
with an observation of its infection in the pectoral-fin axil of the host**

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■ **Abstract**

The lernaepodid copepod *Brachiella thynni* Cuvier, 1830 is reported based on two ovigerous females from a wahoo, *Acanthocybium solandri* (Cuvier, 1832), caught in the western North Pacific Ocean near the southern Izu Islands off central Japan. This represents the third record of *B. thynni* infecting wahoo from off Japan. The females of *B. thynni* were each attached by their maxillae and bulla to the anterior wall of small pockets present in the axil of the pectoral fins, and their body fitted in each pocket. The female of the species is considered to be protected in the pocket from exposure to strong water flow because this copepod usually infects highly migratory scombrids, such as fast-swimming tunas (*Thunnus* spp.), and their pectoral fins can cover the pockets during rapid swimming.

■ **Introduction**

The wahoo, *Acanthocybium solandri* (Cuvier, 1832), is a large scombrid, reaching 210 cm in fork length, and occurs in the tropical and subtropical waters of the Atlantic, Pacific, and Indian oceans (Collette and Nauen, 1983). The commercial catch of wahoo in the western and central Pacific Ocean has increased dramatically since the late 1990's, and the species is also important in recreational fisheries in Hawaii and in subsistence and artisanal fisheries in the Pacific Island nations (Zischke, 2012).

Wahoo is incidentally caught in pelagic tuna longline fisheries in the western North Pacific Ocean off Japan, and much remains unstudied about its biology in this region. Little information is available on the parasitic copepod fauna of the species in Japan, where only three species of copepods have been reported: *Brachiella thynni* Cuvier, 1830 (Lernaepodidae), *Gloiopotes hygomianus* Steenstrup and Lütken, 1861 (Caligidae), and *Caligus coryphaenae* Steenstrup and Lütken, 1861 (Caligidae) (Shiino, 1956; Ho and Nagasawa, 2001; Saito, 2004).

Recently, we found *B. thynni* infecting a wahoo caught in the western North Pacific Ocean off central Japan, where the copepod was previously collected from wahoo from off Owase and Suruga Bay (Shiino, 1956; Saito, 2004). This note reports on our collection of *B. thynni* as its third record from wahoo in Japanese waters and also an observation of its infection in the pectoral-fin axil of the wahoo.

■ **Materials and Methods**

A single individual of wahoo was caught with pelagic longline gear in the western North Pacific Ocean (31°06'N, 141°09'E) near the southern Izu Islands off central Honshu, Japan, on 19 May 2018 during a survey of highly migratory fishes conducted by the National Research Institute of Far Seas Fisheries. The fish was frozen soon after capture and transported to the institute, where it was thawed, measured for fork length (FL), and examined for parasitic copepods. Copepods found were fixed and preserved in 70% ethanol and then identified based on Shiino (1956), Lewis (1967), and Kabata (1979). When the copepods were removed, their attachment to the pectoral-fin axil of the fish was observed. Voucher specimens of *B. thynni* have

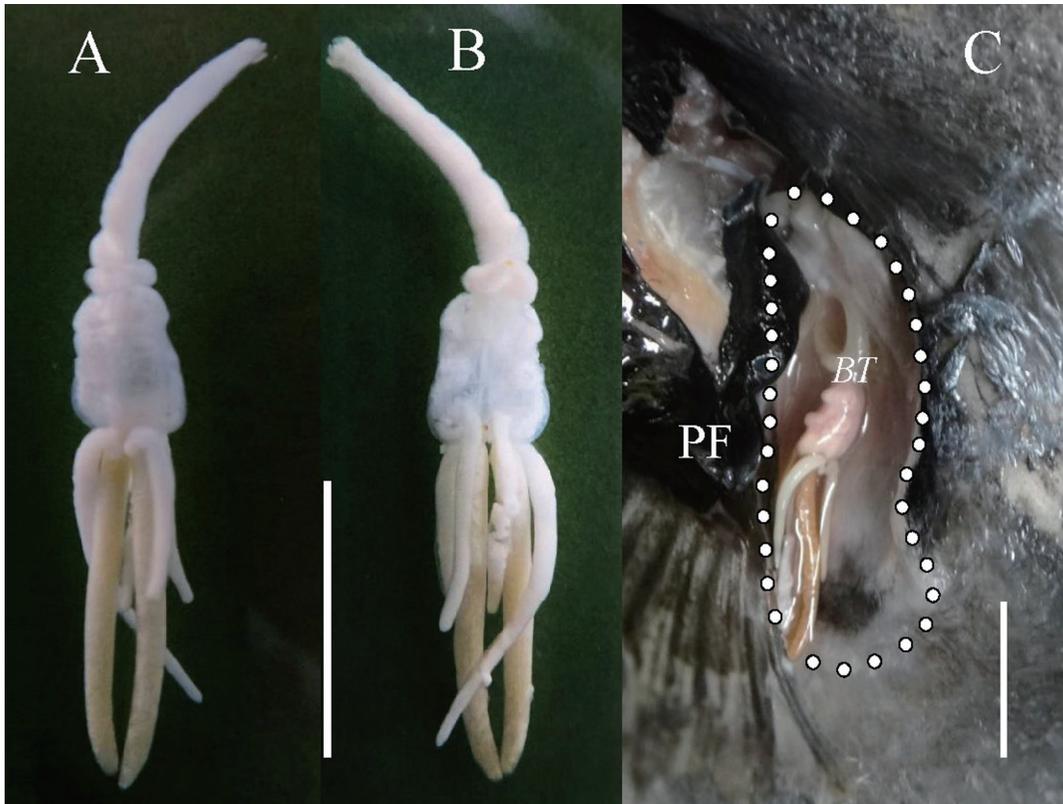


Fig. 1. *Brachiella thynni*, NSMT-Cr 26027. A and B, female (dorsal and ventral views, respectively), from *Acanthocybium solandri*; C, female in a pocket present in the pectoral fin-axil of *A. solandri*. BT, *B. thynni*; PF, pectoral fin (left). Dotted line shows the margin of the pocket. Scale bars: 10 mm in A-C.

been deposited in the Crustacea (Cr) collection of the National Museum of Nature and Science, Tsukuba, Ibaraki Prefecture, Japan (NSMT-Cr 26027). The scientific and common names of fishes mentioned in this paper are those recommended in FishBase (Froese and Pauly, 2018).

■ Results

The wahoo (140 cm in FL) was infected by two ovigerous females of *B. thynni* (Fig. 1A, B), which were found in shallow pockets in the axil of the pectoral fins of the fish (Fig. 1C). The females were 15.1–17.0 mm long (without the posterior processes).

The individuals of *B. thynni* were each attached by their maxillae and bulla to the anterior wall of the pockets, measuring 26–28 mm long, 12–14 mm wide, and 12 mm deep, and their body fitted in each pocket (Fig. 1C).

Remarks: *Brachiella thynni* is a parasite of perciform fishes, the majority of which are oceanic migratory species (Kabata, 1979; Cressey and Cressey, 1980; Walter and Boxshall, 2018). The species has

been reported from various oceans (Cressey and Cressey, 1980, fig. 108). In the North Pacific Ocean and adjacent seas, it is found from the western (Shiino, 1956; Cressey and Cressey, 1980; Saito, 2004; Ho and Lin, 2012; Venmathi Maran et al., 2015; Nagasawa, 2015), central (Bonnet, 1948; Shiino, 1963; Lewis, 1967; Cressey and Cressey, 1980), and eastern (Cressey and Cressey, 1980; Zischke et al., 2012) regions. The known hosts of *B. thynni* in this ocean are wahoo (Shiino, 1956; Lewis, 1967; Cressey and Cressey, 1980; Saito, 2004; Ho and Lin, 2012; Zischke et al., 2012); yellowfin tuna, *Thunnus albacares* (Bonnaterre, 1788) (Shiino, 1963); big-eye tuna, *Thunnus obesus* (Lowe, 1839) (Shiino, 1963 [reported as *Parathunnus sibi*]; Cressey and Cressey, 1980); albacore, *Thunnus alalunga* (Bonnaterre, 1788) (Shiino, 1963; Cressey and Cressey, 1980; Venmathi Maran et al., 2015); and *Thunnus* sp. (Bonnet, 1948). Recently, Pacific bluefin tuna, *Thunnus orientalis* (Temminck and Schlegel, 1844), farmed in Japan has also been reported to harbor *B. thynni* (Nagasawa, 2015).

■ Discussion

The infection sites of *B. thynni* on fish hosts were previously reported as, for example, “the axil behind pectoral fin, or hind surface of, or close to the base of that fin” (Shiino, 1956), “external surface” (Lewis, 1967), “body surface” (Venmathi Maran et al., 2015), or “body surface near the base of the right pectoral fin” (Nagasawa, 2015), but no detailed observation has been made on the site and mode of infection of the species. In this study, *B. thynni* females were found in shallow pockets in the pectoral-fin axil of the wahoo examined (Fig. 1C). This is interesting in terms of survival of *B. thynni* on fish hosts because 1) this parasite usually infects fast-swimming scombrids (e.g., tunas of the genus *Thunnus*) (Cressey and Cressey, 1980; Walter and Boxshall, 2018, see also Remarks) and 2) the pectoral fins of these fishes can fold down into depressions present on the lateral body side when they swim rapidly (Collette and Nauen, 1983) and cover the pockets. Although wahoo is not a fast swimmer, tunas can swim very rapidly (more than 1 body length per second, Magnuson, 1973). Thus, it is considered that the female of *B. thynni* is protected in the pocket from exposure to strong water flow, which would lead the species to increase its survival rate on the fish.

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