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Infection with *Peniculus minuticaudae* (Copepoda: Pennellidae) on Threadsail Filefish (*Stephanolepis cirrhifer*) and Black Scraper (*Thamnaconus modestus*) Cultured in Japan

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Abstract Female adult specimens of the pennellid copepod Shiino, 1956 were collected from the fins of two species of monacanthid fishes, threadsail filefish ( ) and black scraper ( ), cultured in floating cages in Japan. These collections represent the rst records of ae from farmed marine shes as well as the rst records of this copepod species from farmed and . The nding of in this study is also the second record of pennellid copepods from maricultured shes. Both the pectoral ns and the second dorsal n were most heavily infected, followed by the caudal n and the anal n.

Key words: aquaculture, black scraper, Copepoda, sh parasite, , , , threadsail le sh

INTRODUCTION

Shiino, 1956 is a poorly studied parasitic copepod of marine teleost shes in Japanese waters. The species was originally described by Shiino (1956) based on female specimens from the fins of threadsail filefish ((Temminck and Schlegel), recorded as) landed at Shirahama on the Paci c coast of Wakayama Prefecture, central Japan. Recently, Okawachi . (2012) found this copepod species infecting the fin rays of three species, unicorn leatherjacket le sh ((Linnaeus)), hair nned leatherjacket ((Tilesius, 1809)) and brown-banded butter y sh ((Temminck and Schlegel)), held at a public aquarium in Kagoshima Prefecture, southern Japan. These authors also found developmental stages of parasitic on and suggested that the life cycle of the parasite was completed in the tanks at the aquarium.

Two species of monacanthid shes, threadsail le sh and black scraper ((Günther, 1877)), are currently cultured in coastal waters of Japan. Despite their increasing importance in aquaculture, only little information is available on the parasites and parasitic diseases of these sh species farmed in Japan. This note reports on infections with on and cultured in Japan.

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MATERIALS AND METHODS

In this study, only fish infected with were examined. Eleven were collected at two sites: one fish (fish size not measured, 630g body weight [BW]) was collected on 7 December 2005 from a floating cage at a fish farm in the western North Pacific off Minami-Ise (34° 14'40"N, 136°30'20"E), Mie Prefecture, Honshu, while ten sh (22.4-27.2 [mean 25.4] cm total length, 274-603 [467] g BW) were sampled on 28 November 2008 from a oating cage in the Bungo Channel off Kamiura (33°2'47"N, 131°56'10"E), Saiki, Oita Prefecture, Kyushu. Also, two (sh size not measured, 168-203 [186] g BW) were collected on 11 August 2011 from a oating cage in the Bungo Channel (Nyutsu Bay) off Kamae (32°49'54"N, 131°58'31"E), Saiki, Oita Prefecture. These sh were brought to the laboratory, where copepods were removed from the sh, xed in 10% formalin or 70% ethanol, and then preserved in 70% ethanol. For identification, some of the copepods from two host species were soaked in lactophenol and examined using the wooden slide procedure of Humes and Gooding (1964). Representative specimens are deposited in the crustacean collection at the National Museum of Nature and Science, Tokyo (NSMT-Cr 21852 from from Oita Prefecture; and NSMT-Cr 21853 from from Oita Prefecture).

RESULTS AND DISCUSSION

Copepod specimens were collected from the fins (Fig. 1A). They were adult females, and total length (excluding the egg sacs) of 10 specimens from sampled in Oita Prefecture was 2.30-2.85 (mean 2.48) mm. The morphology of the specimens (Fig. 1B) well corresponded to the original description and recent redescription of given by Shiino (1956) and Okawachi . (2012), respectively. The present collections represent the rst records of from farmed shes as well as the rst records of the species from cultured and . Moreover, only one pennellid species, , has been so far reported to accidentally infect farmed Atlantic salmon (L.) in Canada (Kent ., 1997; Johnson ., 2004). Thus, our nding of in this study is also the second documented record of pennellid copepods from commercially cultured shes.

One from Mie Prefecture harbored 99 copepods. Ten from Oita Prefecture were individually infected with 4 to 80 (mean 31.1) copepods. Also, two carried each 47 and 123 copepods. All of these copepods were found attached to the n rays (Fig. 1A), as previously reported by Shiino (1956). In the 10 from Oita Prefecture, copepods were most abundantly found on both the pectoral ns (n=128, 41.2%) and the second dorsal n (98, 31.5%), followed by the caudal n (56, 18.0%) and the anal n (29, 9.3%), which suggests that females prefer the pectoral and second dorsal ns of the sh. The rst dorsal n has only spines and thus was not infected.

The membrane of the fins heavily infected with was usually damaged, and the distal part of some of the n rays was exposed to the water. Okawachi . (2012) observed a similar n damage in aquarium shes. Since much remains unknown about the pathogenicity of , it is desirable to study its impact on the host sh.

has been reported so far to infect four species of teleost shes in Japanese waters (Shiino, 1956; Okawachi ., 2012). Among those species, is classi ed in the family Chaetodontidae (order Perciformes), while three other species (, and) belong to the family Monacanthidae (order Tetraodontiformes). In this study, another

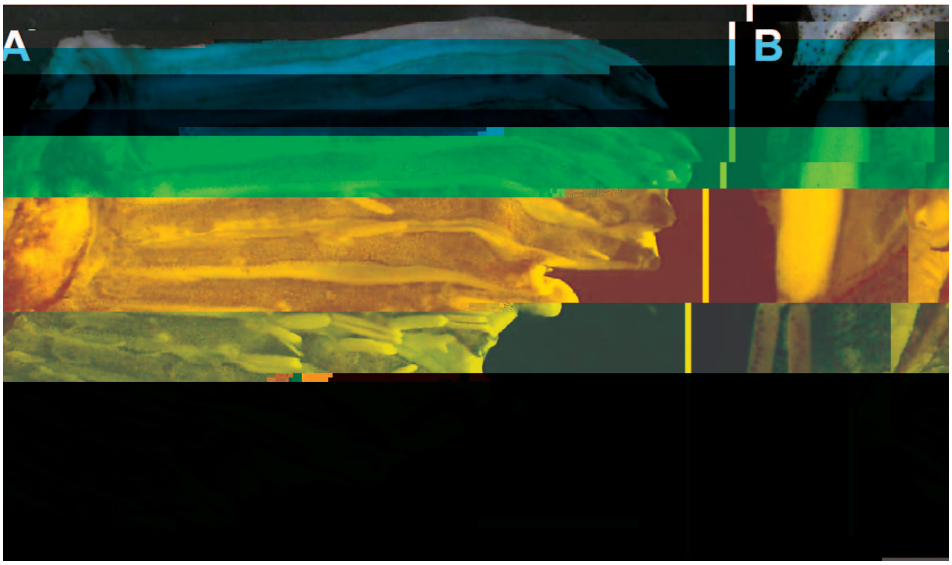

Fig. 1. Females of infecting the pectoral n of threadsail le sh ( ). The sh was sampled from a oating cage in the Bungo Channel off Kamiura, Saiki, Oita Prefecture, Japan. Alcohol-preserved specimen. A. Females attached to the n rays, B. An ovigerous female with a pair of egg sacs, dorsal view. Scale bars: 5 mm in A and 1 mm in B.

monacanthid ( ) is added as a new host for , which implies that the monacanthid shes are preferred hosts for this species of pennellid. In addition, it has been reported that and farmed in Oita Prefecture were infected with unidentified copepods of (Fukuda, 1999: 57). These copepods may be identical with because the sampling locality and hosts were the same as those in the present study.

Pennellid copepods need two hosts to complete their life cycle, which comprises two free-swimming nauplius stages, one infective copepodid stage, four chalimus stages, and the adult stage (Kabata, 1981; Brooker ., 2007). Both invertebrate and vertebrate hosts, such as cephalopods (Rose and Hamon, 1953), gastropods (Ho, 1966; Perkins, 1983) and teleosts (Schram, 1979; Brooker ., 2007), are known to serve as the hosts for juvenile pennellids. On the other hand, Okawachi . (2012) currently suggested, based on their observations made at an aquarium, that can complete its life cycle using only a single host (a monacanthid,). If this is the case at farming sites, individuals of cage-cultured and may serve as the hosts for juvenile and adult . We need to examine both farmed sh and those occurring near the oating cages to detect developmental stages of the parasite.

The mass seed production has not yet been successful for and in Japan, where wild-caught young sh are used for farming. However, as nothing is known about the parasites of those young fish, we need to examine them for the prevalence and intensity of various parasites including .

REFERENCES

Brooker, A. J., Shinn, A. P., Bron, J. E., 2007. A review of the biology of the parasitic copepod (L., 1767) (Copepoda: Pennellidae). , **65**: 297-341.

Fukuda, Y., 1999. Diseases of marine fishes and shellfishes cultured in Oita Prefecture diagnosed from 1980 to 1997. , **2**: 41-73. [In Japanese.]

Ho, J.-S. 1966. Larval stages of sp. (Caligoida: Lernaeoceriformes), a copepod parasitic on shes. **16**: 159-199.

Humes, A. G., Gooding, R. U., 1964. A method for studying the external anatomy of copepods. , **6**: 238-240.

Johnson, S., Treasurer, J. W., Bravo, S., Nagasawa, K., Kabata, Z., 2004. A review of the impact of parasitic copepods on marine aquaculture. , **43**: 229-243.

Kabata, Z., 1981. Copepoda (Crustacea) parasitic on fishes: problems and perspectives. , **19**: 1-71.

Kent, M. L., Whitaker, D. J., Mora, J. D. W., Kabata, Z., 1997. , an accidental parasite of seawater pen-reared Atlantic salmon. **38**: 110-111.

Okawachi, H., Uyeno, D., Ogino, K., Nagasawa, K., 2012. Redescription of Shiino, 1956 (Copepoda: Pennellidae) from aquarium-held marine fishes in Japan, with notes on parasite occurrence and life cycle in captivity. , **6** (in press).

Perkins, P. S., 1983. The life history of (Wilson), a copepod parasite of lantern shes (Myctophidae). , **3**: 70-87.

Rose, M., Hamon, M., 1953. A propos de Steenstrup et Lütken, 1861, parasite des branchies de Céphalopodes. , **44**: 172-183.

Schram, T. A., 1979. The life history of the eye-maggot of the sprat, (Sowerby) (Copepoda, Lernaeopoidae). , **64**: 279-316.

Shiino, S. M., 1956. Copepods parasitic on Japanese shes. 7. and , **11**: 593-608.

養殖カワハギとウマヅラハギに寄生していたカイアシ類 *Peniculus minuticaudae*

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要　旨　三重県南伊勢町地先の北太平洋で養殖されていたカワハギ　　および大分県佐伯市上浦地先と蒲江地先の豊後水道でそれぞれ養殖されていたカワハギとウマヅラハギ　　の鰭から寄生性カイアシ類　　Shiino, 1956の雌成虫を採集した。これは本寄生虫の養殖魚類および養殖カワハギ・ウマヅラハギからの初記録であるとともに，養殖魚類にペンネラ科カイアシ類の寄生を認めた2度目の事例である。本寄生虫は胸鰭と第2背鰭に多く見られ，次いで尾鰭と臀鰭の順に多く寄生していた。

キーワード：ウマヅラハギ，カイアシ類，カワハギ，魚類寄生虫，水産養殖，　　，
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