



Redescription of five gnathiid species from Japan (Crustacea: Isopoda)

YUZO OTA

Graduate School of Biosphere Science, Hiroshima University, 1-4-4 Kagamiyama, Higashi-Hiroshima City, Hiroshima 739-8528, Japan. E-mail: yota231@hiroshima-u.ac.jp

Abstract

Five gnathiid species from Japan are redescribed based on 14 holotypes, their paratypes, topotypes, and new materials. Observations of these specimens revealed that *Caecognathia kikuchii* (Nunomura, 1992) should be transferred to genus *Elaphognathia* and *Caecognathia nasuta* (Nunomura, 1992) to genus *Gnathia*. Furthermore, *Caecognathia amakusaensis* Nunomura, 1992, *C. saikaiensis* Nunomura, 1992, *Gnathia azumai* Nunomura, 2012a, *G. quadricephala* Nunomura, 2012a, and *G. recticornata* Nunomura, 2012a are considered to be junior synonyms of *E. kikuchii*. *Gnathia hirayamai* Nunomura, 1992, *G. nagasakiensis* Nunomura, 2012a, *G. shijikiensis* Nunomura, 2012a, and *G. brevicephala* Nunomura, 2012a are considered to be junior synonyms of *G. nasuta*. Moreover, *Gnathia sanrikuensis* Nunomura, 1998 and *G. mutsuensis* Nunomura, 2004 are redescribed. *Gnathia bungoensis* Nunomura, 1982 is not completely redescribed because the key characteristics were lacking. The geographical records of these species are provided.

Key words: Gnathiidae, Isopoda, Japan, redescrptions

Introduction

The marine isopod family Gnathiidae Leach, 1814 includes over 200 species in 12 genera (Schotte *et al.* 2008 onward). Among these, 38 species that belong to six genera have been recorded from Japanese waters (Shimomura & Tanaka 2008; Shimomura *et al.* 2008; Ota 2012). Unlike other free-living isopod crustaceans, the morphologies of adult gnathiids exhibit strong sexual dimorphism. The adult males have elongated mandibles, whereas the adult females lack mandibles and have a swollen thorax for brooding. Furthermore, the morphology of gnathiid larvae differs from that of the adults because the larvae have needle-like mouthparts for sucking fish body fluids (Monod 1926; Smit & Davies 2004). However, the species descriptions of gnathiids are based on the male morphology (Monod 1926; Cohen & Poore 1994).

Since the 1980s, 18 gnathiid species have been described from Japan by Nunomura (Nunomura 1981, 1982, 1988, 1992, 1998, 2012a, 2012b; Nunomura & Honma 2004). However, these species were poorly described, and they lacked detailed drawings of important characteristics such as the frontal border of the head and the detailed shape of the pleotelson. Thus, species identification on the basis of these descriptions is almost impossible without observing the type materials. In fact, Müller (1989a) redescribed *Elaphognathia sugashimaensis* Nunomura, 1981 for this reason.

In this study, re-examination of 14 holotypes of *Gnathia bungoensis* Nunomura, 1982, *Caecognathia kikuchii* (Nunomura, 1992), *C. amakusaensis* (Nunomura, 1992), *C. saikaiensis* (Nunomura, 1992), *C. nasuta* (Nunomura, 1992), *Gnathia hirayamai* Nunomura, 1992, *G. sanrikuensis* Nunomura, 1998, *G. mutsuensis* Nunomura, 2004, *G. azumai* Nunomura, 2012a, *G. quadricephala* Nunomura, 2012a, *G. recticornata* Nunomura, 2012a, *G. nagasakiensis* Nunomura, 2012a, *G. shijikiensis* Nunomura, 2012a, and *G. brevicephala* Nunomura, 2012a was performed. In addition, their paratypes and new materials were observed. This study provides a taxonomical revision of these species and geographical records.

Material examined. Male adult, holotype, TOYA Cr-1455, 3.5 mm, from the estuary of Bansho River, Oita Pref., eastern coast of Kyusyu, southern Japan (32°58'N, 131°55'E), 14 Sep. 1981, coll. Michio Ohtani.

Redescription (Fig. 12). *Antennule* (Fig. 12A) composed with 3 peduncle and 5 flagellar articles. One and 3 feather-like bristles on distal margins of peduncle article I and III, respectively. One feather-like bristle on flagellar article I. One aesthetasc on flagellar article III, IV, and V, respectively. Flagellar article V terminating in 3 setae.

Antenna (Fig. 12B) composed with 4 peduncle and 6 flagellar articles. Two and 4 feather-like bristles on peduncle III and IV, respectively. 1–4 setae on distal margins of flagellar articles I–V. Article VI terminates in 4 setae.

Pylopod (Fig. 12C) 3-articled. Article I semicircular with 3 areolae, 31 plumose setae on internal margin, 1 seta on external margin, 7 setae on distal margin. Article II elliptical with 4 setae. Article III minute.

Pereopod (Fig. 12D) sparsely covered with small setae on inner margin. Basis oblong with 1 feather-like bristle. Ischium shorter than basis, becoming larger distally. Merus with 1 projection on outer margin. Carpus with 1 projection on inner margin. Propodus rectangular, bearing 2 denticulate compound spines on inner-mid and inner-distal margins. Dactylus terminating in unguis.

Remarks. *Gnathia bungoensis* was originally described by Nunomura (1982) based on one male specimen. Unfortunately, most of the parts of the *G. bungoensis* holotype have been lost. Thus, only the antennule, antenna, pylopod, and pereopod could be redescribed. In *Gnathia* species, there are seven flagellar articles in the antenna, whereas *G. bungoensis* had six. However, this characteristic is insufficient to distinguish it from other *Gnathia* species. In fact, *Gnathia cooki* Müller, 1989b, *G. lignophila* Müller, 1993, and *G. coralmaris* Svavarsson & Bruce, 2012 have six flagellar articles in their antennae (Müller 1989b; Müller 1993; Svavarsson & Bruce 2012). New materials from the type locality will be necessary for an adequate redescription.

Acknowledgments

I thank Dr T. Yamauchi (Toyama Institute of Health), Dr M. Shimomura (Kitakyushu Museum of Natural History & Human History), Dr S. Otsuka (Hiroshima University), Dr K. Kakui (Hokkaido University), Y. Narahara (Shoubara Kakuchi High School), and Dr T. Saito (Kochi University) for providing samples. N. Nunomura (Museum of Medicine Peddlers) readily consented and accommodated me during the re-examination of the materials in Toyama Science Museum. I appreciate H. Negoro (Toyama Science Museum) for loaning type materials. I am indebted to two anonymous reviewers for improving the manuscript. Part of the field study was conducted with the support of the Marine and Coastal Research Center of Ochanomizu University. This study was supported partly by a Grant-in-Aid for JSPS Fellows (No. 23-527).

References

- Cohen, B.F. & Poore, G.C.B. (1994) Phylogeny and biogeography of the Gnathiidae (Crustacea: Isopoda) with descriptions of new genera and species, most from south-eastern Australia. *Memoirs of Museum Victoria*, 54, 271–397.
- Holdich, D.M. & Harrison, K. (1980) The crustacean isopod genus *Gnathia* Leach from Queensland waters with description of nine new species. *Australian Journal of Marine and Freshwater Research*, 31, 215–330.
<http://dx.doi.org/10.1071/mf9800215>
- Monod, T. (1926) Les Gnathiidae. *Mémoires de la Société des Sciences Naturelles du Maroc*, 13, 1–668. [in French]
- Müller, H.G. (1989a) Redescription of *Gnathia sugashimaensis* Nunomura (Crustacea: Isopoda) from Japan. *Publication of the Seto Marine Biological Laboratory*, 34, 25–30.
- Müller, H.G. (1989b) Two new species of *Gnathia* Leach from coral reefs at Moorea, Society Islands, with redescription of *Gnathia margaritarium* Monod, 1926 from Panama Pacific (Isopoda: Cymothoidea: Gnathiidae). *Bulletin Zoologisch Museum*, 12 (3), 65–78.
- Müller, H.G. (1993) Gnathiidae from coral reefs in the Tioman Archipelago, Malaysia, with description of two new species (Crustacea: Isopoda: Cymothoidea). *Mitteilungen aus dem Zoologischen Museum in Berlin*, 69, 3–17.
<http://dx.doi.org/10.1002/mmnz.19930690102>
- Nunomura, N. & Honma, Y. (2004) *Gnathia capillata*, a new species of the genus *Gnathia* (Crustacea, Isopoda) from Sado Island, the Sea of Japan. *Contribution from the Biological Laboratory, Kyoto University*, 29, 343–349.
- Nunomura, N. & Shimomura, M. (2012) Isopoda from Japan (18) Family Gnathiidae j. *Aquabiology*, 203, 583–589. [in Japanese with English abstract]

- Nunomura, N. & Shimomura, M. (2013a) Isopoda from Japan (20) Family Gnathiidae k. *Aquabiology*, 204, 142–152. [in Japanese with English abstract]
- Nunomura, N. & Shimomura, M. (2013b) Isopoda from Japan (21) Family Gnathiidae l. *Aquabiology*, 205, 289–295. [in Japanese with English abstract]
- Nunomura, N. (1981) *Gnathia sugashimaensis*, a new gnathiid isopod from Sugashima, Ise Bay, Central Japan. *Contributions from the Toyama Science Museum*, 3, 19–24.
- Nunomura, N. (1982) A new gnathiid isopod from Saeki Bay, western Japan. *Contributions from the Toyama Science Museum*, 4, 17–21.
- Nunomura, N. (1988) A new species of *Gnathia* (Crustacea, Isopoda) from the Sea off Ibaragi, Central Japan. *Contributions from the Toyama Science Museum*, 12, 27–28.
- Nunomura, N. (1992) Marine Isopoda from Amakusa, Kyushu (II). *Publications from the Amakusa Marine Biological Laboratory*, 11, 59–71.
- Nunomura, N. (1995) ISOPODA. In: Nishimura, S. (Ed.), *Guide to Seashore Animals of Japan with Color Pictures and Keys Vol. II*. Hoikusha, Osaka, 205–233. [in Japanese]
- Nunomura, N. (1998) A new species of the gnathiid isopod crustacean from the Sea off Sanriku, Northern Japan. *Contributions from the Toyama Science Museum*, 21, 55–60.
- Nunomura, N. (2004) Isopod crustaceans collected from Aomori Prefecture Northern Japan. *Contributions from the Biological Laboratory, Kyoto University*, 29, 351–360.
- Nunomura, N. (2012a) Marine isopod crustaceans collected from Shijiki Bay, Western Japan, (2) Gnathiidae. *Contributions from the Toyama Science Museum*, 35, 57–76.
- Nunomura, N. (2012b) Marine isopod crustaceans of Seto Inland Sea deposited at Toyama Science Museum, 3 Suborder Cymothoidea, Limnoriidea and Sphaeromatidea. *Contributions from the Toyama Science Museum*, 35, 77–85.
- Ota, Y., Tanaka, K., Hirose, M. & Hirose, E. (2010) Description of a new species of *Elaphognathia* (Isopoda: Gnathiidae) from Japan based on morphological and molecular traits. *Journal of Crustacean Biology*, 30 (4), 710–720.
<http://dx.doi.org/10.1651/09-3232.1>
- Ota, Y. (2012) Gnathiidae from Kumejima Island in the Ryukyu Archipelago, southwestern Japan, with description of three new species (Crustacea: Isopoda). *Zootaxa*, 3367, 79–94.
- Schotte, M., Boyko, C., Bruce, N.L., Poore, G.C.B., Taiti, S. & Wilson, G.D.F. (Eds.) (2008 onwards) Isopoda statistics. *World Marine, Fresh- water and Terrestrial Isopod Crustaceans*. Available from: <http://www.marinespecies.org/isopoda> (Accessed 7 February 2013)
- Shimomura, M., Ohta, S. & Tanaka, K. (2008) *Bathygnathia* from Japan (Isopoda, Gnathiidae) with description of a new species. *Crustaceana*, 81 (6), 737–749.
- Shimomura, M. & Tanaka, K. (2008) A new species of *Thaumastognathia* Monod, 1926 from Japan (Isopoda, Gnathiidae). *Crustaceana*, 81 (9), 1091–1097.
- Smit, N.J. & Davis, A.J. (2004) The curious life-style of the parasitic stages of gnathiid isopods. *Advances in Parasitology*, 58, 289–391.
[http://dx.doi.org/10.1016/s0065-308x\(04\)58005-3](http://dx.doi.org/10.1016/s0065-308x(04)58005-3)
- Svavarsson, J. & Bruce, N.L. (2012) New and little-known gnathiid isopod crustaceans (Cymothoidea) from the northern Great Barrier Reef and the Coral Sea. *Zootaxa*, 3380, 1–33.
- Saito, N., Itani, G. & Nunomura, N. (2000) A preliminary check list of isopod crustaceans in Japan. *Bulletin of the Toyama Science Museum*, 23, 11–107.
- Tanaka, K. (2004) A new species of *Gnathia* (Isopoda: Cymothoidea: Gnathiidae) from Ishigaki Island, the Ryukyus, southwestern Japan. *Crustacean Research*, 33, 51–60.