*Journal of Species Research* 5(3):313-317, 2016

# New record of two cymothoid isopods (Crustacea: Malacostraca: Isopoda) from South Korea

Ji-Hun Song and Gi-Sik Min*

*Department of Biological Sciences, Inha University, Incheon 22212, Republic of Korea*

**Correspondent: mingisik@inha.ac.kr*

Two marine isopods, *Elaphognathia sugashimaensis* (Nunomura, 1981) and *Metacirolana shijikiensis* Nunomura, 2008, have been reported for the first time in South Korea. Specimens of *E. sugashimaensis* and *M. shijikiensis* were collected using light traps from Yeongdeok-gun and Gageo-do Island in South Korea, respectively. The genera *Elaphognathia* Monod, 1926 and *Metacirolana* Kussakin, 1979 are new to South Korea. In this paper, we provide descriptions of diagnostic characteristics and illustrations of their morphologies. Additionally, the partial sequences of mitochondrial cytochrome *c* oxidase subunit 1 (*CO1*) of two species are provided as molecular characteristics.

Keywords: *CO1*, *Elaphognathia sugashimaensis*, Isopoda, *Metacirolana shijikiensis*, South Korea

© 2016 National Institute of Biological Resources
DOI:10.12651/JSR.2016.5.3.313

## Introduction

Recently, the number of newly recorded isopod species from South Korea has increased gradually: two new species and five unrecorded species (Song and Min, 2015a; 2015b; 2015c). In this paper, we reported two unrecorded isopod species: *Elaphognathia sugashimaensis* (Nunomura, 1981) and *Metacirolana shijikiensis* Nunomura, 2008.

The genus *Elaphognathia* Monod, 1926 (Isopoda: Cymothoida: Gnathiidae), is one of 12 genera that belong to the family Gnathiidae Leach, 1814. Currently, it comprises 23 species (Schotte, 2015). This genus is new to South Korea and diagnosed by: (1) frontal margin of cephalon, deeply excavated; (2) mandible long, cylindrical; (3) pylopod 2- or 3-articled; and (4) pereonite 1 immersed in cephalon (Cohen and Poore, 1994).

The genus *Metacirolana* Kussakin, 1979 (Isopoda: Cymothoida: Cirolanidae), is one of 64 genera that belong to the family Cirolanidae Dana, 1852. Currently, it comprises 32 species (Bruce and Schotte, 2015). This genus is also new to South Korea and diagnosed by: (1) pleonite 5 lateral margins not overlapped by those pleonite 4; (2) frontal lamina anterior margin, freely projecting; (3) maxillipedal palp slender, palp article 3 much wider and longer than article 4; and (4) uropod peduncle medial margin produced (Brusca *et al*., 1995; Schotte and Kensley, 2005).

Herein, we provide descriptions of the diagnostic characteristics and illustrations of morphologies of two species. In addition, the partial sequences of *CO1* of these species are provided as molecular characteristics.

## Materials and Methods

### Sample collection

Specimens of *E. sugashimaensis* and *M. shijikiensis* were collected using light traps from Yeongdeok-gun (36°21′N, 129°23′E) and Gageo-do Island (34°02′N, 125°07′E) in South Korea, respectively. They were preserved directly in 95% ethyl alcohol after collection. All examined specimens were deposited in the National Institute of Biological Resources (NIBR) and Inha University, South Korea.

### Morphological analysis

The specimens were transferred to glycerin for dissection and then examined and dissected under a stereomicroscope (Model SZX-7; Olympus, Tokyo, Japan). Figures of dissected appendages were obtained by light microscopy with attached drawing tube (Model DM 2500; Leica, X50-630, Wetzlar, Germany). Figures of the whole body were obtained using the drawing tube attached to a stereomicroscope (Olympus SZX-12, Tokyo,

Japan). The lengths of all appendages and the whole body were measured with a stage micrometer (Model No. 11513106; Leica, Germany) and an ocular micrometer. Photographs of the whole bodies were taken with a microscope digital camera (Model eXcope K6; DIXI Science, Korea).

### DNA sequencing

DNA was extracted from one pleopod 1 from each specimen using DNeasy Blood and Tissue Kit (Qiagen, Valencia, CA, USA) according to the manufacturer's instructions. The DNA was amplified using PCR (polymerase chain reaction) with two primers: jgLCO1490 5′-TITCIACIAAYCAYAARGAYATTGG-3′ and jgHCO 2198 5′-TAIACYTCIGGRTGICCRAARAAYCA-3′ (Geller *et al*., 2013). PCR amplification was conducted under the following condition: 3 min at 94°C, 35 cycles at 95°C for 15 s, 42°C for 30 s, and 72°C for 60 s, and a final extension at 72°C for 7 min. PCR products were purified using the QIAquick PCR Purification Kit (Qiagen, Valencia, CA, USA) and sequenced with the ABI 3100 automated sequencer (Perkin Elmer, Foster City, CA, USA).

## Results and Discussion

Order Isopoda Latreille, 1817 등각목
Suborder Cymothoida Wägele, 1989 부채벌레아목
Family Gnathiidae Leach, 1814 큰턱벌레과 (신칭)
Genus *Elaphognathia* Monod, 1926
오목머리큰턱벌레속 (신칭)

**1. *Elaphognathia sugashimaensis* (Nunomura, 1981)**
스가시마오목머리큰턱벌레 (신칭) (Fig. 1)

**Synonyms.** *Gnathia sugashimaensis* Nunomura, 1981: 19, figs. 1, 2; Muller, 1989: 25, figs. 1-4.
*Elaphognathia sugashimaensis*: Svavarsson and Gísladóttir, 2002: 161.

**Material examined.** Korea: 2♂♂, Ganggu harbor, Yeongdeok-gun, Gyeongsangbuk-do, 36°21′N, 129°23′E, August 27, 2014, depth 3-5 m, collected using light traps by Song J.-H.

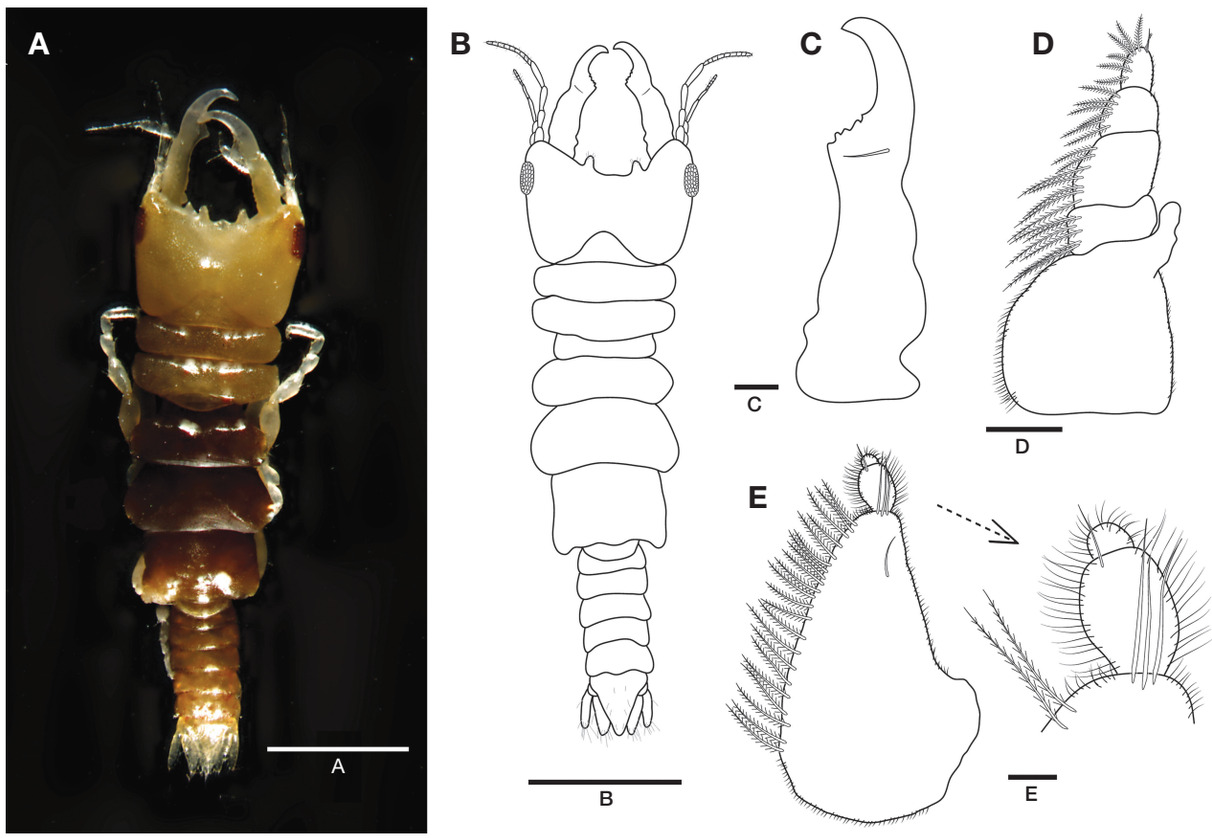


**Fig. 1.** *Elaphognathia sugashimaensis*, male. A, body, dorsal view; B, body, dorsal view, drawing; C, mandible; D, maxilliped; E, pylopod and enlargement of distal article. Scale bars: A, B = 1 mm, C-E = 0.1 mm.

**Diagnosis.** Body (Fig. 1A, B) flattened, about 3.5 mm, almost 3.3 times as long as wide. Cephalon (Fig. 1A, B) 1.5 times as wide as long, dorsally with depressions, medially excavated, with two frontal process bearing 4 short setae distally. Eyes (Fig. 1A) with dark pigment, ommatidia small. Mandible (Fig. 1C) with triangular projection with one seta. Maxilliped (Fig. 1D) comprise five segments with plumose setae on lateral margin. Pylopod (Fig. 1E) comprise three segments, distal article minute. Pereonite 1 immersed in cephalon; pereonites 2, 3 in similar length; pereonite 4 smaller than other pereonites; pereonite 7 longest (Fig. 1A, B). Telson (Fig. 1A, B) triangular, length as long as width.

**Remarks.** *Elaphognathia sugashimaensis* was described by Nunomura (1981) based on the specimens collected from the Sugashima, Ise Bay, Japan. This species was redescribed by Muller (1989), who provided a more detailed morphological description of the cephalon, and the species has been previously reported from Japan only. *Elaphognathia sugashimaensis* is similar to *E. lucanoides* (Monod, 1926) in external features. However, *E. sugashimaensis* differs from *E. lucanoides* in having a less excavated cephalon and more robust mandible (Muller, 1989). This species is also similar to *E. discolor*. However, *E. sugashimaensis* differs from *E. discolor* in having 3-articled pylopod (2-articled pylopod in *E. discolor*). In general, the illustrations and descriptions of *E. sugashimaensis* specimens from South Korea agreed well with the illustrations and original description of Nunomura (1981) and redescription of Muller (1989).

**Habitat.** This species was found on the surface of an ascidian, *Pyura sacciformis*, at the type locality. The specimens were collected from the sandy bottom with seaweeds at a depth of 3-5 m.

**World distribution.** Japan (Nunomura, 1981; Muller, 1989), Korea.

**Deposition.** NIBR No. NIBRIV0000437276 (1 male).

**Molecular characteristic.** GenBank accession number: KX078775 (1 male).

**Identifiers.** Ji-Hun Song, Gi-Sik Min.

Family Cirolanidae Dana, 1852 모래무지벌레과
Genus *Metacirolana* Kussakin, 1979
톱니꼬리모래무지벌레속 (신칭)

**2. *Metacirolana shijikiensis* Nunomura, 2008**
시지키톱니꼬리모래무지벌레 (신칭) (Fig. 2)

**Synonyms.** *Metacirolana shijikiensis* Nunomura, 2008: 28, figs. 11, 12.

**Material examined.** Korea: 2♂♂, Gageo-do Island, Sinan-gun, Jeollanam-do, 34°02′N, 125°07′E, June 4,

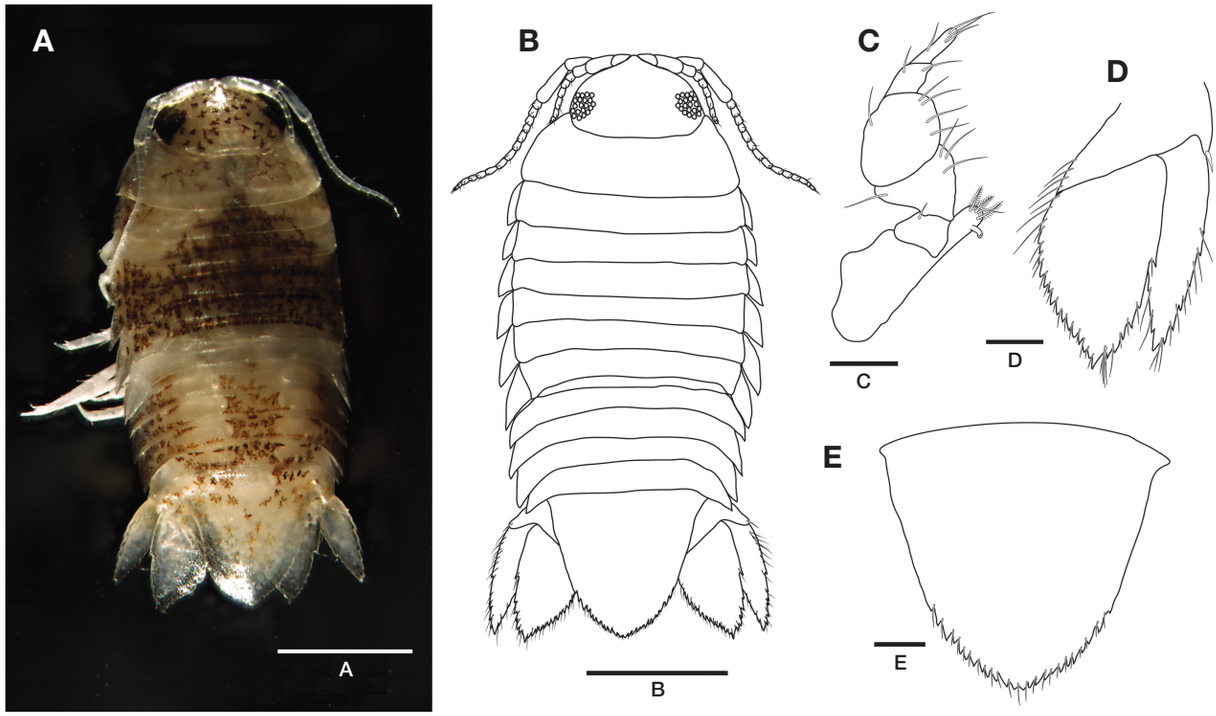


**Fig. 2.** *Metacirolana shijikiensis*, male. A, body, dorsal view; B, body, doral view, drawing; C, maxilliped; D, uropod; E, pleotelson. Scale bars: A, B = 1 mm, C, E = 0.1 mm, D = 0.2 mm.

2013, depth 3-5 m, collected using light traps by Lim B.-J.

**Diagnosis.** Body (Fig. 2A, B) flattened, about 3.9 mm, almost 2.3 times as long as wide. Color white in ethanol. Cephalon (Fig. 2A, B) 1.7 times as wide as long, with median rostral process. Eyes (Fig. 2A) with dark pigment, ommatidia small. Maxilliped (Fig. 2C) palp slender, third article expanded and longest. Uropod (Fig. 2D) exopod with 12 teeth and marginal setae, spine-like seta is absent; endopod with 22 teeth and marginal setae, spine-like seta is absent. Pleotelson (Fig. 2E) triangular, posterior margin serrated, provided with 24 teeth.

**Remarks.** *Metacirolana shijikiensis* was described by Nunomura (2008) based on the specimens collected from the Mouth of Shijiki Bay, off Ehonohana, Japan. This species has been previously reported from Japan only. *Metacirolana shijikiensis* is similar to *M. chemola* Schotte & Kensley, 2005 in external features. However, *M. chemola* differs from *M. shijikiensis* in having two short, stout spine-like setae and simple setae on lateral margin on uropodal exopod and one stout spine-like seta and long simple setae on lateral margin on uropodal endopod (uropodal exopod and endopod with no spine-like setae, but marginal setae in *M. shijikiensis*). This species is also similar to *M. agaricicola* Kensley, 1984. However, *M. shijikiensis* differs from *M. agaricicola* in having a convex posterior margin on pleonite 5 (trilobed margin on pleonite 5 in *M. agaricicola*). In the original description, the third article of the maxillipedal palp is not expanded and similar length to other articles. We believe that the description of the maxillipedal palp was inaccurate, because all species of the genus *Metacirolana* have an expanded article 3 on the maxillipedal palp as a generic characteristic (Brusca *et al*., 1995). In general, the illustrations and description of *M. shijikiensis* specimens from South Korea agreed well with the illustrations and original description of Nunomura (2008).

**Habitat.** There is no information on the habitat at the type locality. The specimens were collected from the sandy bottom with seaweeds at a depth of 3-5 m.

**World distribution.** Japan (Nunomura, 2008), Korea.

**Deposition.** NIBR No. NIBRIV0000437275 (1 male).

**Molecular characteristic.** GenBank accession number: KX078776 (1 male).

**Identifiers.** Ji-Hun Song, Gi-Sik Min.

## Acknowledgements

This work was supported by a grant from the National Institute of Biological Resources (NIBR), funded by the Ministry of Environment (MOE) of the Republic of Korea (NIBR201601201 and NIBR201624202), and the program on Management of Marine Organisms causing Ecological Disturbance and Harmful Effects, funded by KIMST/MOF.

## References

Bruce, N.L. and M. Schotte. 2015. *Metacirolana* Kussakin, 1979. In: C.B Boyko, N.L. Bruce, K.L. Merrin, Y. Ota, G.C.B. Poore, S. Taiti, M. Schotte & G.D.F. Wilson (eds.) (2008 onwards) World Marine, Freshwater and Terrestrial Isopod Crustaceans database [Available from: http://www.marinespecies.org/aphia.php?p=taxdetails&id=118403, accessed 25 January 2016].

Brusca, R.C., R. Wetzer and S.C. France. 1995. Cirolanidae (Crustacea: Isopoda: Flabellifera) of the tropical eastern Pacific. Proceedings of the San Diego Society of Natural History 30:1-96.

Cohen, B.F. and G.C.B Poore. 1994. Phylogeny and biogeography of the Gnathiidae (Crustacea: Isopoda) with descriptions of new genera and species, most from southeastern Australia. Memoirs of Museum Victoria 54:271-397.

Geller, J., C. Meyer, M. Parker and H. Hawk. 2013. Redesign of PCR primers for mitochondrial cytochrome *c* oxidase subunit I for marine invertebrates and application in all-taxa biotic surveys. Molecular Ecology Resources 13:851-861.

Muller, H.G. 1989. Redescription of *Gnathia sugashimaensis* Nunomura (Crustacea: Isopoda) from Japan. Publications of the Seto Marine Biological Laboratory 34:25-30.

Nunomura, N. 1981. *Gnathia sugashimaensis*, a new gnathiid isopod from Sugashima, Ise Bay, central Japan. Bulletin of the Toyama Science Museum 3:19-24.

Nunomura, N. 2008. Marine Isopod Crustaceans Collected from Shijiki Bay, Western Japan (1) Valvifera, Cymothoida, Sphaeromatidea, Limnoriidea and Oniscidea. Bulletin of the Toyama Science Museum 344:13-43.

Schotte, M. 2015. *Elaphognathia*. In: C.B. Boyko, N.L. Bruce, K.L. Merrin, Y. Ota, G.C.B. Poore, S. Taiti, M. Schotte & G.D.F. Wilson (eds.) (2008 onwards) World Marine, Freshwater and Terrestrial Isopod Crustaceans database [Available from: http://www.marinespecies.org/aphia.php?p=taxdetails&id=118436, 25 January 2016].

Schotte, M. and B. Kensley. 2005. New species and records of Flabellifera from the Indian Ocean (Crustacea: Peracarida: Isopoda). Journal of Natural History 39:1211-1282.

Song, J.-H. and G.-S. Min. 2015a. Two new species, *Caenanthura koreana* sp. nov. and *Apanthura koreaensis* sp. nov. (Crustacea: Isopoda: Anthuridae) from South Korea. Zootaxa 3937:362-376.

Song, J.-H. and G.-S. Min. 2015b. New Record of Three Isopod Species (Crustacea: Malacostraca: Isopoda) from South Korea. Korean Journal of Environmental Biology 33:182-188.

Song, J.-H. and G.-S. Min. 2015c. New Report of Two Species of Genus *Pentias* (Crustacea: Malacostraca: Isopoda) from South Korea. Korean Journal of Environmental Biology 33:177-181.

Svavarsson, J. and E. Gísladóttir. 2002. *Elaphognathia korachaensis* sp. nov., a new gnathiid species (Crustacea, Isopoda) from Thailand. Phuket Marine Biological Center Special Publication 23:157-164.

*Submitted: April 20, 2016*
*Revised: August 12, 2016*
*Accepted: October 13, 2016*