Two New Species of *Microloxoconcha* (Crustacea: Ostracoda) from the Sublittoral Zone in Western Japan

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In the present study, we describe two new marine species, *Microloxoconcha toyoshioae* n. sp. and *M. sublittoralis* n. sp., collected from the sandy bottom in the western part of Japan, from the depths of approximately 20 to 30 m and 50 m, respectively. This represents the first record of this genus from such depths, since all 10 previously described species are known from the beach interstitial waters. We suspect the two new species are most probably also inhabiting spaces between sand grains since they have very small body and have been collected with other common interstitial ostracods belonging to *Cobanocythere* Hartmann, 1959; *Parovocythere* Hartmann, 1959; *Paracobanocythere* Gottwald, 1983; *Parapolycope* Klie, 1936; and *Psammocythere* Klie, 1936. Owing to their small body and fragile carapace, previous studies might have overlooked the existence of interstitial ostracods from habitats other than beach interstitial. In addition, a key to all species of the genus *Microloxoconcha* is provided.

Key Words: Podocopida, Cytheroidea, interstitial ostracods, TRV *Toyoshio-maru*, meiobenthos.

Introduction

The Ostracoda is a large group of small bivalved crustaceans that inhabit various aquatic habitats (Horne et al. 2002), including interstices of sand grains. Taxonomic studies on interstitial species have been conducted in Japan since the 1970's, with a considerable increase in the number of species descriptions in the last decade (see Table 1). All of these species have been reported from marine or brackish beach interstitial habitats of intertidal to supralittoral zones, except for *Callistocythere ventricostata* Hao in Ruan and Hao, 1988. The species was originally described from empty valves obtained from sediments at a depth of 1,400–1,500 m from the Okinawa Trough. Subsequently, Tran and Tsukagoshi (2015) reported living individuals of this species from interstitial environments of sandy bottoms near the shoreline in Sesoko Beach, Okinawa. We consider that Ruan and Hao (1988) had described this species based on the allochthonous fossil.

Most Japanese interstitial ostracod species have been a very restricted distribution. However, there are some exceptions, *Parapolycope widoensis* Karanovic, Tanaka, and Tsukagoshi, 2016; *P. japonica* (Hiruta, 1983) and *P. uncatata* Tanaka and Tsukagoshi, 2013 are reported from both Japan and South Korea (Karanovic et al. 2016). Consequently, 12 genera and 35 living species of marine and brackish interstitial ostracods have hitherto been known from Japanese interstitial waters (Table 1).

The podocopid ostracod genus *Microloxoconcha* Hartmann, 1954 is characterized by the laterally compressed carapace with smooth external surface, and a relatively large seventh limb (Hartmann 1954; Higashi and Tsukagoshi 2008). To date, all 10 species have been described from and are known to inhabit only interstitial environments of the intertidal to shallow subtidal zones of the world (Table 2). During the faunal surveys on Japanese ostracods with TRV *Toyoshio-maru*, both sexes of the two new species of *Microloxoconcha* were found from coarse sandy bottoms in shallow waters of western Japan, and are described in detail herein.

Materials and Methods

Sediment samples were obtained from two sites in western Japan, using a dredge (mouth 50 cm wide×15 cm high; 5-mm mesh) of TRV *Toyoshio-maru*, Hiroshima University: off the north of Hosonosu sand bank, Hiroshima Prefecture, Japan (34°22′29″N, 133°07′36″E; depth 19–28 m; 4 November 2014) (Fig. 1A, B); off the south of Nagannu Island, Okinawa Prefecture, Japan (26°14′20″N, 127°32′17″E; depth 52 m; 21 May 2016) (Fig. 1A, C). Sediments were stirred in sea-water, and the supernatant was filtered with a small plankton net (0.1 mm mesh). Living specimens of ostracods were extracted from the remaining deposits under a binocular stereo-microscope (OLYMPUS SZ60). The collected specimens were fixed and preserved in 80% ethanol at room temperature by November 10, 2020.
Table 1. List of interstitial Ostracoda from Japan.

| Subclass | Order     | Family                  | Species                        | Type locality                  | Latitude, Longitude | Reference                      |
|----------|-----------|-------------------------|--------------------------------|--------------------------------|---------------------|--------------------------------|
| Myodocopa | Halocyprida | Polycopidae             | Kilecope oligohalina          | Kanogawa Rivermouth, Numazu, Shizuoka | 35°04′52″N, 138°51′33″E | Tanaka and Tsukagoshi (2010)     |
|          |           |                        | Kilecope mihoensis            | Miho-masaki Beach, Shizuoka    | 35°01′15″N, 138°30′58″E | Tanaka et al. (2014)             |
|          |           |                        |                                | Mukaihashima, Onomichi, Hiroshima | 34°21′54″N, 133°12′57″E | Hiruta (1983), this study***     |
|          |           |                        |                                | Ohura Beach, Shimoda, Shizuoka  | 34°40′03″N, 138°56′28″E | Tanaka et al. (2010)             |
|          |           |                        |                                | Miho-masaki Beach, Shizuoka    | 35°01′15″N, 138°31′20″E | Tanaka and Tsukagoshi (2010)     |
|          |           |                        |                                | Orange Beach, Ito, Shizuoka    | 34°97′52″N, 139°09′70″E | Tanaka and Tsukagoshi (2013a)    |
|          |           |                        |                                | Kojirio Beach, Ito, Shizuoka   | 34°57′15″N, 139°08′51″E | Tanaka and Tsukagoshi (2013a)    |
|          |           |                        |                                | Miho-masaki Beach, Shizuoka    | 35°01′15″N, 138°30′58″E | Tanaka and Tsukagoshi (2014)     |
|          |           |                        |                                | Wado Island, South Korea*      | 35°35′05″N, 126°15′12″E | Karanovic et al. (2016)          |
|          |           |                        |                                | Kilecope mihoensis             | 35°08′45″N, 139°40′48″E | Tanaka et al. (2014)             |
|          |           |                        |                                | Kitagi island Beach, Kasaoka, Okayama | 34°22′29″N, 133°31′54″E | Tanaka et al. (2014)             |
|          |           |                        |                                | Miho-uchihama Beach, Shizuoka  | 35°00′51″N, 138°31′07″E | Tanaka et al. (2014)             |
|          |           |                        |                                | Shijuchima Beach, Onomichi, Hiroshima | 34°21′41″N, 133°09′46″E | Tanaka and Ohsuka (2016)         |
|          |           |                        |                                | no information                |                     | Schornikov (1975)               |
|          |           |                        |                                | no information                |                     | Schornikov (1975)               |
|          |           |                        |                                | Mochimune Beach, Shizuoka      | 35°55′04″N, 138°21′43″E | Hiruta et al. (2011)             |
|          |           |                        |                                | Ohura Beach, Shimoda, Shizuoka | 34°40′06″N, 138°56′28″E | Hiruta et al. (2011)             |
|          |           |                        |                                | Mataroki Beach, Kushiho, Hokkaido | 42°56′25″N, 144°29′23″E | Hiruta (1989), this study***     |
|          |           |                        |                                | Ohura Beach, Shimoda, Shizuoka | 34°40′06″N, 138°56′28″E | Watanabe et al. (2008)           |
|          |           |                        |                                | Ikeji Beach, Kitakami Island, Kagoshima | 28°19′42″N, 129°57′06″E | Hiraga and Tsukagoshi (2008)     |
|          |           |                        |                                | Wada-Nagahama Beach, Yokosuka, Kanagawa | 35°11′24″N, 139°36′42″E | Hiraga and Tsukagoshi (2008)     |
|          |           |                        |                                | Wada-Nagahama Beach, Yokosuka, Kanagawa | 35°11′24″N, 139°36′42″E | Hiraga et al. (2011)             |
|          |           |                        |                                | Mihomaki Beach, Shizuoka       | 35°01′13″N, 138°31′20″E | Yamada and Tanaka (2011)         |
|          |           |                        |                                | Toshiki Beach, Awaji Island, Hyogo | 34°24′12″N, 134°06′01″E | Yamada and Tanaka (2013)         |
|          |           |                        |                                | Sosoko Beach, Motobu, Okinawa  | 26°39′04″N, 127°51′27″E | Tran and Tsukagoshi, 2015        |
|          |           |                        |                                | Sosoko Beach, Motobu, Okinawa  | 26°39′04″N, 127°51′27″E | Tran and Tsukagoshi, 2015        |
|          |           |                        |                                | Ohura Beach, Shimoda, Shizuoka | 34°40′06″N, 138°56′28″E | Watanabe et al. (2008)           |
|          |           |                        |                                | Kour Beach, Odawara, Kanagawa  | 35°16′44″N, 139°12′45″E | Hiraga and Tsukagoshi (2012)     |
|          |           |                        |                                | Daito-zaiki, Shima, Mie         | 34°16′35″N, 136°53′49″E | Hiraga and Tsukagoshi (2012)     |
|          |           |                        |                                | Mataroki Beach, Kushiho, Hokkaido | 42°56′25″N, 144°29′23″E | Hiruta (1991), this study***     |

* Parapolycope widiosis is also found from interstitial environment of Miho-masaki Beach, Shizuoka, Japan (35°01′15″N, 138°30′58″E). ** Callistocythere ventricostata was originally described by dead specimens (empty valve) collected from the Oki- nawa Trough, however, Tran and Tsukagoshi (2015) found living specimens of this specime from marine interstitial habitat of Sosoko Beach, Okinawa. *** Exact localities were not shown in original descrtions. Therefore, we got accurate information from the author.
Two new species of *Microloxoconcha*

Table 2. List of the genus *Microloxoconcha* of the world.

| Species                     | Habitat | Water depths | Locality                                      | Reference                        |
|-----------------------------|---------|--------------|-----------------------------------------------|----------------------------------|
| *Microloxoconcha compressa* | intertidal | —            | Beaches of Argeles, Saint-Cyprien and Corsica (Moriani Plage), France | Hartmann (1954); Gottwald (1983) |
| *Microloxoconcha marinovi*  | sublittoral | 2 to 3 m    | Black Sea                                    | Schornikov (1969)               |
| *Microloxoconcha fragilis*  | sublittoral | 3 m         | Coral debris, Tanga, Tanzania                | Hartmann (1974)                 |
| *Microloxoconcha santacruzensis* | sublittoral | 0.5 to 1.5 m | Bahia Academy (Santa Cruz Island) and Cabo Douglas (Fernandina Island), Ecuador | Gottwald (1983)                 |
| *Microloxoconcha subterranea* | intertidal | —            | Makapu’u Beach and Hau’ula Beach, Oahu Island, Hawaii | Gottwald (1983)                 |
| *Microloxoconcha kushiroensis* | intertidal | —            | Matatoki Beach, Kushiro, Hokkaido, Japan      | Hiruta (1989)                    |
| *Microloxoconcha ikeyai*    | intertidal | —            | Ohura Beach, Shimoda, Shizuoka, Japan         | Watanabe et al. (2008)           |
| *Microloxoconcha kikaijimaensis* | intertidal | —            | Ikei Beach (Kikaijima Island), Kagoshima, Japan | Higashi and Tsukagoshi (2008)   |
| *Microloxoconcha schornikovi* | intertidal | —            | Wada-Nahama Beach, Yokosuka, Kanagawa, Japan  | Higashi and Tsukagoshi (2008)   |
| *Microloxoconcha dimorpha*   | intertidal | —            | Wada-Nahama Beach, Yokosuka, Kanagawa, Japan  | Higashi et al. (2011)            |
| *Microloxoconcha toyoshioae* | sublittoral | 18 to 29 m  | Off Hosonosu sand bank, Hiroshima, Japan      | This study                      |
| *Microloxoconcha sublittoralis* | sublittoral | 52 m        | Off Nagannu Island, Okinawa, Japan            | This study                      |

![Fig. 1. Map showing the sampling sites.](image)

temperature for description. The valves and soft parts were dissected using fine needles. The valves were preserved on a cardboard cell slide and the soft parts were mounted in a type of Hoyer’s medium (Shiga Konchu Fukyusha, Neo-Shigarai), on glass slides under a binocular stereo microscope. These specimens were then observed and illustrated using a transmitted-light binocular microscope (OLYMPUS BX53) equipped with a differential interference contrast system and a camera lucida. The valves were washed with distilled water and gold-coated with an ion sputtering device (JEOL, JFC-1100). The material was then observed under a scanning electron microscope (SEM) (JEOL, JSM-6510LV). The type specimens are deposited in the collection of the National Museum of Nature and Science, Tokyo (NSMT), with the prefix ‘NSMT-Cr.’ The terminology of morphological description follows Higashi et al. (2011): abbreviations; LV, left valve; RV, right valve.

**Taxonomy**

Subclass *Podocopa* Sars, 1866  
Order *Podocopida* Sars, 1866  
Superfamily *Cytheroidea* Baird, 1850  
Family *Cytheromatidae* Elofson, 1938  
Genus *Microloxoconcha* Hartmann, 1954  
*Microloxoconcha toyoshioae* n. sp.  
(Figs 2–6)

**Type series.** Holotype: adult male (NSMT-Cr 26685), RV length 0.30 mm, height 0.13 mm, LV length 0.30 mm, height 0.13 mm, soft parts mounted on a slide and valves preserved.
in a cardboard cell slide. The holotype specimen was collected from the bottom consisting of coarse granite sand off north of Hosonosu sand bank, Hiroshima Prefecture, Japan (34°22′29″N, 133°07′36″E) at depth 19–28 m, on 4 November 2014. Paratypes: adult male (NSMT-Cr 26686), RV length 0.28 mm, height 0.12 mm, LV length 0.29 mm, height 0.12 mm; adult male (NSMT-Cr 26687), RV length 0.30 mm, height 0.13 mm, LV length 0.30 mm, height 0.13 mm; and adult female (NSMT-Cr 26688), RV length 0.28 mm, height 0.12 mm, LV length 0.28 mm, height 0.12 mm. Same data as in holotype.

**Diagnosis.** Carapace round-subcrescent in lateral view. Marginal infold and vestibula broad in both anterior and posterior regions. Seventh limb much longer than fifth and sixth limbs. Upper ramus shape of male copulatory organ gently bending spoon-like with one protrusion on anterior-middle margin. In female, Sclerotized framework of paired genital openings elongated triangle shape.

**Description of adult male.** Carapace (Figs 2A, B, 3). Carapace round-subcrescent in lateral view (Figs 2A, B, 3). Surface smooth. Anterior and posterior margins rounded in lateral view (Figs 2A, B, 3). Marginal infold and vestibula broad in both anterior and posterior regions (Fig. 3). Adductor muscle scar pattern consisting of row of four closely spaced scars and two frontal scars (Fig. 3). Hingement weak adont type.

Antennula (Fig. 4A). Consists of five slender articulated podomeres. First and second podomere bare. Third podomere with one anterio-distal seta. Fourth podomere with one short anterio-middle seta and two long anterio-distal setae. Fifth podomere with one long slender seta and two spatulate setae (aesthetascs) at distal end.

Antenna (Fig. 4B). Four articulated podomeres. First podomere (basis) bare, with a long, thick, three-segmented exopodite (spinneret seta). Second (first endopodial) podomere with one medium seta on posterio-distal end. Third (second endopodial) podomere with one medium posterio-middle seta, one short posterio-distal spine, and one stout claw at posterio-distal end. Fourth (third endopodial) podomere small, with one stout distal claw.

Mandibula (Fig. 4C). Coxal with one short seta on anterior margin. Coxal endite consisting of seven teeth with two short setae. Palp consisting of four indistinct podomeres. First podomere of palp (Basis) with thick nib-like plate (exopodite) near posterio-middle margin and short anterio-distal seta. Second and third podomeres of palp fused. Second podomere of palp (first endopodite) with one posterio-distal setulous seta and two anterio-distal setulous setae. Third podomere of palp (second endopodite) with three long setae at anterio-distal end. Fourth podomere of palp...
Two new species of *Microloxoconcha* (third endopodite) slender, with three distal setae.

Maxillula (Fig. 4D). Thin branchial plate with 16 plumose setae. Basal podomere with one palp (endopodite) and three endites. Palp consisting of two distinct podomeres: first podomere with two distal setae; second podomere with three distal setae. Endite: dorsal one with four setae; middle one with five setae; ventral one with five setae.

Fifth limb (Fig. 5A). Four articulated podomeres. First podomere with one antero-distal seta, one setulous antero-middle seta and setulous postero-middle seta. Second and third podomeres with rows of setulae on distal margin. Fourth podomere with rows of setulae on anterior surface and one distal claw.

Sixth limb (Fig. 5B). Four articulated podomeres. First podomere with one antero-distal seta, one setulous antero-middle seta and postero-middle seta. Second podomere with one antero-distal seta and rows of setulae on distal margin. Third podomere with rows of setulae on distal margin. Fourth podomere with rows of setulae on anterior surface and one distal claw.

Seventh limb (Fig. 5C). Four thick articulated podomeres. First podomere with one stout antero-distal seta, one short antero-middle spine, and short seta on near postero-proximal part. Second podomere with one stout antero-distal spine and rows of setulae on anterior and distal margin. Third podomere small, with rows of setulae on anterior and distal margin. Fourth podomere small, with rows of setulae on anterior and distal margin and long distal claw.

Male brush-shaped organ (Fig. 5D). Consisting of two branches (right and left) each with 13 setae on distal margin.

Male copulatory organ (Fig. 5E). Consisting of semi-quadrilateral basal capsule, with very thin and semi-triangular distal lobe; copulatory duct short, approximately one fourth as long as length of capsule; upper ramus gently bending spoon-like with one protrusion on antero-middle margin; and clasping apparatus thick, parallelogram with a...
concave on posterior margin.

**Description of adult female.** Carapace (Fig. 2C, D). Carapace round-subcrescent in lateral view (Fig. 2C, D). Surface smooth. Anterior and posterior margin rounded in lateral view (Fig. 2C, D).

Posterior part of body and female genitalia (Fig. 6). Sclerotized framework of paired genital openings elongated triangle in shape. Spermathecal duct long, connecting with genital opening and receptaculum seminis. Rows of tiny setulae on abdominal end.

**Occurrence.** So far known only from the type locality.

**Etymology.** The species was named after TRV "Toyoshio-maru," the ship deployed for the sample collection.

**Remarks.** The carapace shape and pattern of the anterior vestibule of *Microloxoconcha toyoshioae* n. sp. resembles those of *M. dimorpha* Higashi et al., 2011. *Microloxoconcha* 

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Fig. 5. *Microloxoconcha toyoshioae* n. sp. A, B, paratype male (NSMT-Cr 26687); C–E, holotype male (NSMT-Cr 26685). A, fifth limb; B, sixth limb; C, seventh limb; D, brush shaped organ; E, male copulatory organ. Scale bar: 0.05 mm. Abbreviations: Bc, basal capsule; Ca, clasp- ing apparatus; Cd, copulatory duct; Di, distal lobe; Ur, upper ramus.
dimorpha has genetically indistinguishable two morphotypes in the male (Higashi et al. 2011). However, this new species can be easily distinguished from M. dimorpha by the shape of the upper ramus of the male copulatory organ: a gently bending spoon-like in M. toyoshioae n. sp. versus elliptical in M. dimorpha. In addition, the terminal claw of the seventh limb is different in length between M. toyoshioae n. sp. and M. dimorpha; 1.5 and 2.5 times as long as fourth podomere, respectively.

Co-occurring species. Following ostracod species were found in the same sample: Cobanocythere sp. 1, Microcythere sp. 1, Parvocythere sp., and Cobanocytheridae gen. et sp.

**Microloxoconcha sublittoralis** n. sp.

(Figs 7–11)

**Type series.** Holotype: adult male (NSMT-Cr 26689), RV length 0.24 mm, height 0.10 mm, LV length 0.24 mm, height 0.09 mm, soft parts mounted on a slide and valves preserved in a cardboard cell slide. The holotype specimen was collected from the bottom consisting of coarse coral sand off south of Nagannu Island, Okinawa Prefecture, Japan (26°14′20″N, 127°32′17″E) at depth 52 m on 21 May 2016. Paratype: 1 adult female (NSMT-Cr 26690), RV length 0.24 mm, height 0.10 mm, LV length 0.24 mm, height 0.10 mm, same data as in holotype.

**Diagnosis.** Carapace in lateral view, elongate and bean-shaped, anterior margin rounded, postero-dorsal margin gently inclined toward posterior end (Figs 7A, B, 8). Surface smooth. Marginal infold broad in both anterior and posterior regions (Fig. 8). Vestibula broad in anterior and narrow in posterior regions, respectively (Fig. 8). Adductor muscle scar pattern consisting of row of four closely spaced scars and two frontal scars (Fig. 8). Hingement weak adont type.

Antennula (Fig. 9A). Consists of five slender articulated podomeres. First podomere bare. Second podomere with row of setulae on anterior margin. Third podomere with one antero-distal seta. Fourth podomere with one short antero-middle seta and one long antero-distal seta. Fifth podomere with one slender seta and two spatulate setae (aesthetascs) at distal end.

Antenna (Fig. 9B). Four articulated podomeres. First podomere (basis) bare, with a long, thick, three-segmented exopodite (spinneret seta). Second (first endopodial) podomere with one short seta on postero-distal end. Third (second endopodial) podomere with one medium postero-middle seta, one short postero-distal spine, and one stout claw at postero-distal end. Fourth (third endopodial) podomere small, with one stout distal claw.

Mandibula (Fig. 9C). Coxa with one short setulous seta on anterior margin. Coxal endite consisting of six teeth. Palp consisting of four articulated podomeres. First podomere of palp (Basis) with thick nib-like plate (exopodite) near postero-middle margin and short seta on antero-middle margin. Second podomere of palp (first endopodite) with one thick antero-distal seta, and one thick and one slender postero-distal setae. Third podomere of palp (second endopodite) with two setae near antero-proximal margin, one thick and one slender antero-distal setae, and one short postero-distal seta. Fourth (third endopodite) podomere of palp slender, with three distal setae.

Maxillula (Fig. 9D). Thin branchial plate bearing 11 plumose setae. Basal podomere with one palp (endopodite) and three endites. Palp consisting of two distinct podomeres: first podomere with one distal seta; second podomere with three distal setae. Endite: dorsal one with five setae; middle
one with four setae; ventral one with five setae.

Fifth limb (Fig. 10A). Four articulated podomeres. First podomere with one antero-distal seta, one stout setulous antero-middle seta and one slender postero-middle seta. Second podomere with one short antero-distal spine. Third podomere bare. Fourth podomere with one stout distal claw.

Sixth limb (Fig. 10B). Four articulated podomeres. First podomere with one antero-distal seta, one antero-middle seta and postero-middle seta. Second podomere with one antero-distal seta. Third podomere bare. Fourth podomere with one stout distal claw.

Seventh limb (Fig. 10C). Four thick articulated podomeres. First podomere with one antero-distal seta, one short antero-middle spine, and short seta on near postero-proximal part. Second podomere with one stout antero-distal spine and rows of setulae on anterior and distal margin. Third podomere small, with rows of setulae on anterior and distal margin. Fourth podomere small, with rows of setulae on anterior and distal margin and one distal claw.

Male brush-shaped organ (Fig. 10D). Consisting of two branches (right and left) each with 11 setae on distal margin.

Male copulatory organ (Fig. 10E). Consisting of spindle-shaped basal capsule, with very thin and semi-triangular distal lobe; copulatory duct long flagellum shape, approximately half lengths as capsule.

Description of adult female. Carapace (Fig. 7C, D). Carapace elongate and bean-shaped in lateral view, anterior margin rounded, postero-dorsal margin gently inclined toward posterior end (Fig. 7C, D).

Posterior part of body and female genitalia (Fig. 11). Sclerotized framework of paired genital openings liver-like shape. Spermathecal duct long, connecting with genital opening and receptaculum seminis. Rows of tiny setulae on abdominal end.

Occurrence. So far known only from the type locality.

Etymology. Sublittoral, referring to the habitat of this species.

Remarks. Microloxoconcha sublittoralis n. sp. has unique morphology of the male copulatory organ: a long flagellate copulatory duct has never been reported from any other Microloxoconcha species. It most closely resembles M. santacruzensis Gottwald, 1983 in the shape of the carapace. However, the appendages differ between these species: distal end of the antennula has one slender seta and two spatulate setae in M. sublittoralis n. sp. versus two slender setae and one spatulate seta in M. santacruzensis; posterior seta on the third podomere of the antenna has one slender seta in M. sublittoralis n. sp. versus one stout and one spoon-like setae in M. santacruzensis; basal capsule of the male copulatory organ is spindle-shaped in M. sublittoralis n. sp. versus tear-drop-shaped in M. santacruzensis. Microloxoconcha sublittoralis n. sp. is similar with M. toyoshioae n. sp. by the cha-
Two new species of Microloxoconcha

Two new species of Microloxoconcha totaxy of antennula and a three segmented spinneret seta. However, Microloxoconcha sublittoralis n. sp. and M. toyoshioae n. sp. can be distinguished by the carapace shape (elliptical and bean-shaped versus round-subcrescent) and the appendage morphologies (the mandibula has a 4 segmented palp versus 3 segmented palp; the branchial plate bears 11 setae versus 16 setae).

Co-occurring species. The following 35 ostracod species were found in the same sample: Parapolycope sp. 1, Parapolycope sp. 2, Polycoopia sp. 1, Polycopiella sp. 2, Pontopolycope sp., Micropolycope sp., Anchistrocheles sp., Neonesidea sp., Triebelina sp., Bythoceratina sp. 1, Bythoceratina sp. 2, Pseudocythere sp., Cobanocythere sp. 2, Paracobanocythere sp., Pontocythere sp., Microloxoconcha sp., Hemicytherura sp., Semicytherura sp. 1, Semicytherura sp. 2, Semicytherura sp. 3, Callistocythere sp., Loxoconcha sp., Microcythere sp. 2, Cytherois sp. 1, Cytherois sp. 2, Cytherois sp. 3, Paradoxostoma sp., Xiphichilus sp., Keijia sp., Propontocypris sp. 1, Propontocypris sp. 2, Psammocythere sp., Xestoleberis sp. 1, Xestoleberis sp. 2, and Xestoleberis sp. 3.

Discussion

It is likely that the two new Microloxoconcha species described herein inhabit the interstices of sand grains. All the previously known species of Microloxoconcha have been recorded from only interstitial environments of intertidal to...

Fig. 9. Microloxoconcha sublittoralis n. sp., holotype male (NSMT-Cr 26689). A, antennula; B, antenna; C, mandibula; D, maxillula. Scale bar: 0.05 mm. Abbreviations: ba, basis; cx, coxa; en, endopodite; ex, exopodite.
shallow subtidal zones (Table 2). Some species of the genera Cobanocythere, Parvocythere, Paracobanocythere, Parapolycope, and Psammocythere co-occur with the two new Microloxoconcha species. Extant species of these five genera have been reported so far only from the interstitial environments of the intertidal to shallow subtidal zones (Hiruta 1991; Higashi and Tsukagoshi 2011, 2012; Tanaka 2013; Tanaka et al. 2016). A small body size of *M*. toyoshioae n. sp. and *M*. sublittoralis n. sp. seems to imply their habitat in sandy interstices (Hartmann 1973; Maddocks 1976; Yamada and Tanaka 2013). Due to their small body size and fragile carapace, previous studies that are mainly performed by palaeontological methods might have overlooked their existence. However, it is difficult to be affirmative on the original habitat of *M*. toyoshioae n. sp. and *M*. sublittoralis n. sp., because they were obtained by dredge sampling in the present study.

In order to determine whether these ostracods actually live in the interstitial habitat of the sublittoral zone, a quantitative sampling method that can collect coarse sediments with infaunal meio-benthos such as the use of a Reinecker type box-corer (Farris and Crezée 1976), should be applied.

**Key to species of Microloxoconcha**
Hartmann, 1954

1. Second podomere of antennula with one postero-distal seta. ........................................... *M*. santacruzensis
   - Second podomere of antennula lacks postero-distal seta. ........................................... 2

2. Copulatory duct of male copulatory organ is long flagellated ..................................... *M*. sublittoralis n. sp.

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Fig. 10. Microloxoconcha sublittoralis n. sp., holotype male (NSMT-Cr 26689). A, fifth limb; B, sixth limb; C, seventh limb; D, brush shaped organ; E, male copulatory organ. Scale bar: 0.05 mm. Abbreviations: Bc, basal capsule; Ca, clasping apparatus; Cd, copulatory duct; Di, distal lobe; Ur, upper ramus.
Two new species of Microloxoconcha

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