Description of appendages from three marine trachyleberidid species (Ostracoda, Crustacea) from Japan

GEGO TANAKA¹,⁎ & KOJI SETO²

¹Gunma Museum of Natural History, Tomioka, Gunma 370-2345, Japan
²Research Center for Coastal Lagoon Environments, Shimane University, Matsue 690-8504, Japan
⁎Corresponding author (e-mail: tanaka@gmnh.pref.gunma.jp)

ABSTRACT – Three living trachyleberidid ostracod species, Acanthocythereis munechikai Ishizaki, Actinocythereis kisarazuensis Yajima and Hirsutocythere hanaii Ishizaki, were discovered in the Tsushima Straits, c. 120 km east of Tsushima Island (north Island), N 34° 46’ E 130° 46’ at a depth of 116 m. This is the first description of complete appendages for these genera. J. Micropalaeontol. 29(1): 5–16. May 2010.

KEYWORDS: Acanthocythereis munechikai, Actinocythereis kisarazuensis, Hirsutocythere hanaii, Ostracoda, Trachyleberididae

INTRODUCTION

Ostracods are small bivalved crustaceans (average adult length of c. 1 mm) abundantly found in the fossil record from the Ordovician onwards, as well as in a wide range of aquatic environments. The ostracod Family Trachyleberididae was defined by Sylvester-Bradley (1948) with a fossil record from the Cretaceous onwards (Whatley et al., 1993). To date, 57 trachyleberidid species belonging to 22 genera have been described from Japan (Table 1). The Trachyleberididae has been classified into several subfamilies, such as Trachyleberinidae, Buntoniinae and Phacorhabdotinae. The heavily calcified trachyleberidid ostracod carapaces are found abundantly in Cenozoic sediments around Japan. Many Recent trachyleberidid species have a fossil record from the Neogene onwards. However, only four Trachyleberidid species with appendages have been recorded from Japan, T. scabrocuneata (Brady, 1880) (for illustrated appendages, see Harding & Sylvester-Bradley, 1953; Okubo, 1979), T. ikeyai (Tanaka, 2008), Bicornucythere bisanensis (Okubo, 1975) and Pistocythereis bradyi (Ishizaki, 1968) (for description of the appendages, see Okubo, 1979). The aim of this study is to describe three Japanese trachyleberidid ostracod species with their appendages.

MATERIAL AND METHODS

Surface sediments of the Tsushima Strait (St. 13) were collected using the Smith–McIntyre grab sampler during cruises by TRV Toyoshio-maru (November 15 – 20, 1999), c. 120 km east of Tsushima Island (north Island), N 34° 46’ E 130° 46’ at a depth of 116 m. A total of 36 ostracod species were identified in the sample (see Tanaka, 2008). To extract additional specimens with appendages, a spare sample of St. 13 was examined under a binocular microscope. As a result, seven cytheroidean ostracod species with appendages were recovered from 132 g of dry sediment: Acanthocythereis munechikai Ishizaki, 1981; Actinochythereis kisarazuensis Yajima, 1978; Bradleya japonica Benson, 1972; Cytheropteron uchioi Hanai, 1957; Hirsutocythere hanaii Ishizaki; 1981; Munseyella oborozukiyama Yajima, 1982; and Trachyleberis ikeyai Tanaka, 2008. Of these, three trachyleberidid species, A. munechikai, A. kisarazuensis, and H. hanaii, were analysed further. Dried specimens were softened in a 10% sodium tripolyphosphate solution. Dissections of appendages were made in glycerine under a Nikon SMZ-U stereoscopic microscope, mounted in Neo-Shigiral on glass slides, and covered. The appendages and valves were drawn with a camera lucida attachment and an Olympus BX41 stereoscopic microscope. Other carapaces were mounted on stubs and coated with gold using a JEOL ion sputter (JFC-1100), prior to being viewed using a JEOL JSM-6100 scanning electron microscope. All illustrated specimens are deposited in the University Museum, University of Tokyo (UMUT RA).

SYSTEMATIC DESCRIPTIONS

Family Trachyleberididae Sylvester-Bradley, 1948

Genus Acanthocythereis Howe, 1963

Acanthocythereis munechikai Ishizaki, 1981
(Pl. 1; Fig. 1)

1981 Acanthocythereis munechikai Ishizaki: 45, 46, pl. 9, figs 1, 2a–c; 3; pl. 14, fig. 8; pl. 15, figs 3 & 4.
1985 Acanthocythereis munechikai Ishizaki; Wang & Zhao: pl. 7, fig. 8.
1988 Acanthocythereis munechikai Ishizaki; Paik & Lee: pl. 2, fig. 16.
1988 Acanthocythereis munechikai Ishizaki; Zhao & Wang: pl. 2, fig. 14.
1988 Acanthocythereis munechikai Ishizaki; Wang et al.: 246, 247, pl. 18, figs 1–3.
1989 Trachyleberis zhoushanensis Liu: 154, pl. 168, figs 9 & 10.
1992 Acanthocythereis munechikai Ishizaki; Ikeya & Suzuki: pl. 1, fig. 3.
1992 Acanthocythereis munechikai Ishizaki; Lee & Paik: pl. 4, fig. 8.
1998 Acanthocythereis munechikai Ishizaki; Irizuki et al.: fig. 6 (6).
2001 Acanthocythereis munechikai Ishizaki; Irizuki et al.: fig. 7 (14).
2001 Acanthocythereis munechikai Ishizaki; Nakao et al.: fig. 11 (13).
2007 Acanthocythereis munechikai Ishizaki; Hou & Gou: 454, pl. 172, figs 15 & 16.
| Family                      | Genus                        | Species                                                                 |
|-----------------------------|------------------------------|-------------------------------------------------------------------------|
| Trachyleberididae           | Abrocythereis Gou, 1983      | Abrocythereis ryakuyenste Mal & Tabuki, 1988                           |
|                            | Acanthocythereis Howe, 1963  | Acanthocythereis japonica Irizuki & Yamada, 2004 (in Irizuki et al., 2004) |
|                            | Acanthocythereis matsuwensis Ishizaki, 1971 | Acanthocythereis matsuwensis Ishizaki, 1971 |
|                            | Acanthocythereis inouei Yasuhara et al., 2002 | Acanthocythereis inouei Yasuhara et al., 2002 |
|                            | Acanthocythereis yatsukanus Tanaka, 2002 | Acanthocythereis yatsukanus Tanaka, 2002 |
|                            | Actinocythereis Puri, 1953 (Puri, 1953a in this reference) | Actinocythereis Puri, 1953 (Puri, 1953a in this reference) |
|                            | Alocopocythere Siddiqui, 1971 | Alocopocythere? ishizakii Nohara, 1987                                 |
|                            | Ambicythere Van Den Bold, 1957 | Ambicythere? Yajima, 1978                                             |
|                            | Ambtonia Malz, 1982         | Ambtonia? matsubari Yamaguchi, 2006                                    |
|                            | Ambtonia Malz, 1982         | Ambtonia obi (Ishizaki, 1971)                                          |
|                            | Ambtonia shimanensis Tanaka, 2002 | Ambtonia shimanensis Tanaka, 2002 (in Tanaka et al., 2002) |
|                            | Amphileberis Guan, 1978 (in Guan et al., 1978) | Amphileberis nipponica (Yajima, 1978)                                   |
|                            | Australimoosella Hartmann, 1978 | Australimoosella Tomokouru (Ishizaki, 1968)                            |
|                            | Bicornucythere Schornikov & Shaitarow, 1979 | Bicornucythere? bisonensis (Okubo, 1975)                                |
|                            | Buntonia Howe, 1935 (in Howe & Chambers, 1935) | Buntonia? parascorta Ishizaki, 1983                                    |
|                            | Campyclyctheris Omatsola, 1971 | Campyclyctheris? ukifune Yajima, 1982                                  |
|                            | Celtia Neale, 1973          | Celtia japonica Ishizaki, 1981                                         |
|                            | Falsobuntonia Malz, 1982    | Falsobuntonia? waitens Yamaguchi, 2007 (in Yamaguchi & Kamiya, 2007)   |
|                            | Hirsatocythere Howe, 1951   | Hirsatocythere? akatsukiborensis Yajima, 1992                          |
|                            | Isocythereis Triebel, 1940  | Isocythereis? rochuenis Nohara, 1987                                   |
|                            | Murrayino Puri, 1954        | Murrayino japonica Tabuki, 1986                                        |
|                            | Neoclyctheretta Van Morkhoven, 1963 | Neoclyctheretta? iwasakii (Nohara, 1987)                                |
|                            | Pacambocythere Malz, 1982   | Pacambocythere ishizakii Nohara, 1987                                  |
|                            | Pistocythereis Gou, 1983 (in Gou et al., 1983) | Pistocythereis Bradyformis (Ishizaki, 1968)                            |
|                            | Robertsonites Swain, 1963   | Robertsonites Bradyformis (Ishizaki, 1968)                             |
|                            | Sinoeleberis Hu, 1979       | Sinoeleberis tosaensis (Ishizaki, 1968)                                |
|                            | Trachyleberis Brady, 1898   | Trachyleberis? funatsuensis Yamaguchi, 2006                            |

Table 1. Trachyleberidid ostracods described from Japan.
Description. Valve sub-quadrate in lateral view (Pl. 1, figs 1, 2, 7, 8). Anterior margin evenly rounded with conical spines, especially anteroventrally; dorsal margin straight, sloping toward posterior with several conical spines; posterior margin truncated near middle, slope nearly straight above, convex below with several long conical spines; ventral margin concave in middle. Strong sexual dimorphism; male elongated in lateral view; female carapace inflated laterally in anterior, dorsal and posterior views. Eye tubercle absent. Surface ornamented by polygonal reticulations with conical and clavate spines. Row of prominent clavate spines at base of anterodorsal corner running nearly parallel to anterior margin. In dorsal and ventral views, lateral outline fusiform-shaped (Pl. 1, figs 4, 5, 10, 11). In anterior and posterior views, carapace subovate, broadest near mid-height (Pl. 1, figs 3, 6, 9, 12). Marginal pore canals straight and/or curved with median swellings; 53 anterior, 21 ventral and
17 posterior pore canals (Fig. 1A). Duplicature developed. Hinge holamphidont: left valve, anterior element with auxiliary tooth in large elongate socket; anteromedian element a smooth tooth, posteromedian element a bar; posterior element an elongated socket. Four elliptical adductor scars in vertical row (upper two semi-circular, others elliptical). Two elliptical mandibular scars. Small anteromedian depression in front of adductor scars.

Antennule (Fig. 1B): six articulated segments. Length ratio between distal segments 85: 60: 25: 17: 20: 30. Exoskeletons developed, especially segments 2–5. First segment with long setules on middle anterior margin and posterior proximal margin, small bunch of short setules anterior distal end. Second segment with plumose seta posterior distal end, and middle posterior margin; long setules proximal half of anterior margin; small bunch of short setules anterior distal end. Third segment with seta anterior distal end, row of small bunches of short setules on distal end. Fourth segment with long seta and relatively stout seta on anterior distal end, numerous short setules anterior margin, long setae centre. Fifth segment ledge anterior distal end with 4 setae: 2 long setae, 1 relatively stout seta and 1 short seta. Sixth segment distal end with 3 long setae, 1 relatively short seta with club-like structure at distal end.

Antenna (Fig. 1C): four articulated segments. Length ratio between distal segments 40: 12: 51: 8. Exoskeletons developed, especially broad in third and fourth segments. First segment

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**Fig. 1.** The valve and the male soft parts of *Acanthocythereis munechikai* Ishizaki, 1981: A, male left valve (UMUT RA30560); B–J, soft parts of the male (UMUT RA30561) – B, antennule, C, antenna, D, mandible, E, distal segment of maxillula, F, branchial plate of maxillula, G, first thoracic leg, H, second thoracic leg, I, third thoracic leg, J, copulatory organ. Scale 1, 100 µm for A; scale 2, 100 µm for B–J.
with row of numerous short setules outer lateral side. Second segment with short 2-segmented (actually 3 segments, but first and second fused), endopodite with several long setules at base and long plumose seta posterior distal end. Third segment with paired setae anterior margin, 1 relatively long seta and 2 short setae, one of which shows paddle-like shape at the distal end, numerous short setules one-third from distal end, and pair of unequal setae (outer seta longer and stouter) and row of small bunches of short setules distal end. Fourth segment with stout claw-like seta anterior margin distal end and 2 setae (claw-like stout seta and relatively fine seta) ledge posterior margin.

Mandible (Fig. 1D): five segmented. Length ratio between 2 protopodite segments and 3 endopodite segments 51: 14: 10: 15: 16. Basal segment (coxa, first segment of protopodite) with about 6 teeth, 1 seta anterior distal margin. Second segment of protopodite (basis) with exopodite consisting of 5 setae, and 2 plumose setae posterior distal margin. First segment of endopodite with 2 long feather-like setae, 1 short comb-like seta, and 1 simple seta ventral distal end, plumose seta dorsal distal end. Second segment of endopodite with a pair of unequal setae (long plumose seta and short comb-like seta) posterior distal end, and 7 long fine setae anterior distal end. Third segment of endopodite bearing 3 simple setae and 1 plumose seta.

Maxillula (Figs 1E, F): extremely thin branched plate (exopodite) with 16 plumose setae (Fig. 1F). Basal podomere bearing palp and 3 masticatory processes (Fig. 1E). Palp 2-segmented. Proximal segment with 3 setae anterior distal end. Distal segment with 1 stout seta and 7 setae on distal end and near inner masticatory lobe, respectively. Outer masticatory process with 7 setae on distal end. Each of the middle and inner masticatory processes with 4 setae.

Thoracic legs (Figs 1G–I): all three legs 4-segmented and similar in shape. Length ratio between distal segments 60: 55: 38: 15: 15: 15: 15. Exoskeletons developed, on both margins of each segments. First segment with two unequal anterior margin and 1 or 2 plumose setae anterior distal end. Second segment bearing plumose seta on anterior distal margin, and 7 long fine setae anterior distal end. Third segment of endopodite bearing 3 simple setae and 1 plumose seta.

Antennule (Fig. 2B): six articulated segments. Length ratio between distal segments 62: 40: 15: 15: 15: 15: 21. Exoskeletons developed, especially segments 2–5. First segment with row of short setules outer lateral side, two rows of short setules near distal end, and long setales on posterior proximal margin. Second segment with plumose seta on posterior distal end, long setales near proximal anterior margin; small bunch of short setules on anterior distal end. Third segment with seta on anterior distal end and row of small bunches of short setules on distal end. Fourth segment with long seta and stout seta anterior distal end with numerous short setules anterior margin, long seta centre. Fifth segment ledge anterior distal end with 4 setae: 2 long setae, 1 relatively stout seta, and 1 short seta. Sixth segment distal end with 3 long setae and 1 relatively short seta with club-like structure at the distal end.

Antenna (Fig. 2C): four articulated segments. Length ratio between distal segments 30: 11: 35: 6. Exoskeletons developed,
especially in broad third and fourth segments. First segment with two unequal rows of numerous short setules outer lateral side. Second segment with short 2-segmented (actually 3 segments, but first and second fused) exopodite, 2 long setules at base of exopodite and a long plumose seta posterior distal end, numerous setules outer lateral side. Third segment with a pair of setae (1 short plumose seta and 1 long simple seta) along anterior margin, posterior margin with one relatively long seta and 2 short setae, one of which shows paddle-like shape at distal end, a pair of unequal setae (outer seta longer and stouter) and a row of small bunch of short setules on distal end. Fourth segment with stout claw-like seta along anterior margin distal end and 2 setae (claw-like stout seta and relatively fine seta) on ledge on posterior margin.

Explanation of Plate 2.
figs 1–12. Scanning electron photomicrographs of the carapaces of *Actinocythereis kisarazuensis* Yajima, 1978, female (1–6; UMUT RA30562) and male (7–12; UMUT RA30563) from the Tsushima Strait, southwestern Japan: 1, 7, left lateral view; 2, 8, right lateral view; 3, 9, anterior view; 4, 10, dorsal view; 5, 11, ventral view; 6, 12, posterior view. Scale bar 100 µm.
**Mandible (Fig. 2D):** five segmented. Length ratio between 2 protopodite segments and 3 endopodite segments 80: 14: 17: 21: 19. Basal segment (coxa, first segment of protopodite) with six teeth. Second segment of protopodite (basis) with exopodite consisting of five setae, and 2 plumose setae posterior distal margin. First segment of endopodite with 2 long feather-like setae, 1 short comb-like seta, and 1 short plumose seta ventral distal end, stout plumose seta dorsal distal end. Second segment of endopodite with a pair of unequal plumose setae posterior distal margin, and 5 long fine setae and 2 short setae anterior distal end. Third segment of endopodite bearing 3 plumose setae and 1 simple seta.

**Maxillula (Figs 2E, F):** extremely thin branchial plate (exopodite) with 15 plumose setae (Fig. 2F). Basal podomere bearing palp and 3 masticatory processes. Palp 2-segmented. Proximal segment with 3 setae anterior distal end. Distal segment with 1 plumose seta and 4 setae distal end. Outer masticatory process with 7 setae distal end. Each of the middle and inner masticatory processes with 4 setae.

**Thoracic legs (Figs 2G–I):** All three legs 4-segmented and similar in shape. Length ratio between distal segments 46: 32: 25: 24 in first thoracic leg, 52: 42: 27: 31 in second thoracic leg, and 61: 55: 25: 35 in third thoracic leg. Distal margin of each segment sometimes covered with many short setules. Exoskeletons developed on both margins of each segments. First segment with two setae anterior margin, 1 or 2 plumose setae anterior distal end. Second segment bearing plumose seta on anterior distal end. Fourth segment bearing large terminal claw.

**Copulatory organ of male (Fig. 4J):** basal capsule rounded. Exoskeleton developed along anterior margin. Subtriangular supporting lobe (distal lobe) developed distal end basal capsule. Ductus ejaculatorius well developed and coiled at one-half from distal end. One linguiform clasping apparatus posterior side of ductus ejaculatorius.

**Remarks.** Puri (1953a) distinguished *Actinocythereis* from *Trachyleberis* by its three distinct rows of spines on the carapace. The spines of *A. kisarazuensis* do not show such an arrangement,
although two horizontal rows of spines are recognized in the species (Yajima, 1978). However, other morphological characters of *A. kisarazuensis* are closely assigned to the genus *Actinocythereis*, as Hanai *et al.* (1977) mentioned. The present species is similar to *Actinocythereis scutigera* (Brady) figured in Zhao *et al.* (1985; pl. 19, fig. 12), but the node pattern on the dorsal part of the carapace is different. This species differs from *A.?* sp. E, which was reported from the Recent sediment of the Ulleung Basin, Korea by Cheong *et al.* (1986), in its more protruded caudal process.

Genus *Hirsutocythere* Howe, 1951

*Hirsutocythere hanaii* Ishizaki, 1981

(Pl. 3, Fig. 3)
Appendages from marine trachyleberidid species, Japan

Fig. 3. The valve and the male soft parts of *Hirsutocythere hanaii* Ishizaki, 1981: A, male right valve (UMUT RA30568); B–J, soft parts of the male (UMUT RA30569) – B, antennule; C, antenna; D, mandible; E, maxillula; F, first thoracic leg; G, second thoracic leg; H, third thoracic leg; I, copulatory organ. Scale 1, 100 µm for A; scale 2, 100 µm for B–J.

1981 *Hirsutocythere? hanaii* Ishizaki: 46, 47, pl. 9, figs 4a, b, 5a, b, 6a, b, 7; pl. 15, fig. 6.
1985 *Hirsutocythere? hanaii* Ishizaki; Wang & Zhao: pl. 7, fig. 12.
1988 *Hirsutocythere? hanaii* Ishizaki; Wang et al.: 247, 248, pl. 18, figs 10–13.
1988 *Hirsutocythere? hanaii* Ishizaki; Paik & Lee: pl. 2, fig. 17.
1988 *Hirsutocythere? nozokiensis* Ishizaki; Yajima: pl. 2, fig. 16.
1988 *Hirsutocythere? hanaii* Ishizaki; Ruan & Hao: 360, 361, pl. 66, figs 12 & 13.
1989 *Hirsutocythere? hanaii* Ishizaki; Liu: 158, 159, pl. 171, figs 7 & 11.

1992 *Hirsutocythere? hanaii* Ishizaki; Ikeya & Suzuki: pl. 5, fig. 5.
1992 *Hirsutocythere hanaii* Ishizaki; Lee & Paik: pl. 4, fig. 7.
1996 *Hirsutocythere? hanaii* Ishizaki; Kamiya et al.: pl. 4, figs 9 & 10.
1996 *Hirsutocythere? hanaii* Ishizaki; Ozawa: pl. 5, fig. 6.
1998 *Hirsutocythere? hanaii* Ishizaki; Izuki et al.: fig. 6 (7).
2001 *Hirsutocythere? hanaii* Ishizaki; Izuki et al.: fig. 7 (15).
2001 *Hirsutocythere? hanaii* Ishizaki; Nakao et al.: fig. 11 (13).
2007 *Hirsutocythere? hanaii* Ishizaki; Hou & Gou: 456, pl. 179, figs 17–21; pl. 182, figs 13 & 14.
2008 *Hirsutocythere? hanaii* Ishizaki; Tanaka: fig. 2r.
Description. Valve sub-quadrate in lateral view (Pl. 3, figs 1, 2, 7, 8). Anterior and posterior margins evenly rounded with conical spines, spines especially large and long ventrally; dorsal margin straight, sloping toward posterior with several long conical spines; ventral margin convex. Male slightly elongated in lateral view; female carapace slightly inflated laterally in anterior, dorsal and posterior views. Prominent long conical spine ventro-lateral side male right valve. Eye tubercle absent. Surface ornamented by many prickly spines, some clustered. Lateral outline fusiform-shaped in dorsal and ventral views, anterior end more pointed than posterior (Pl. 3, figs 4, 5, 10, 11). Carapace subovate in anterior and posterior views, broadest near mid-height (Pl. 3, figs 3, 6, 9, 12). Marginal pore canals straight and/or curved numbering 49 anterior, 20 ventral and 17 posterior (Fig. 3A). Duplicature developed. Hinge holamphidont: right valve anterior element with stepped tooth; anteromedian element a large elongate socket, posteromedian element a long socket; posterior element a round tooth. Four elliptical adductor scars in vertical row. Two elliptical mandibular scars. Deep anteromedian depression anterior of adductor scars.

Antennule (Fig. 3B): six articulated segments. Length ratio between distal segments 23: 16: 6: 5: 6: 9. Exoskeletons developed, especially in segments 2–5. First segment with three clusters of setules outer lateral side and row of long setules posterior proximal margin. Second segment with plumose seta posterior distal end, long setules near proximal end anterior and posterior margins; small bunch of short setules anterior distal end. Third segment with seta anterior distal end and row of small bunches of short setules distal end. Fourth segment with long seta and stout seta with comb-like structure anterior distal end, numerous short setules on anterior margin, long seta centre. Fifth segment with 4 setae: 2 long setae, 1 stout seta with comb-like structure, and 1 short seta ledge anterior distal end. Sixth segment with 3 long setae and 1 short seta distal end.

Antenna (Fig. 3C): Four articulated segments. Length ratio between distal segments 58: 19: 72: 6. Exoskeletons developed, especially in broad third and fourth segments. First segment with a row of numerous setules outer lateral side. Second segment with short 2-segmented (actually 3 segments, but first and second fused) exopodite, a long setule at the base of the exopodite, two long setules on anterior proximal end, and 6 long setules outer lateral side, long plumose seta posterior distal end. Third segment with a pair of setae anterior margin, 1 relatively long seta and 2 stout setae distal end, numerous short setules middle, and a pair of unequal setae (outer seta longer and stouter with comb-like structure) on distal end. Fourth segment with stout claw-like seta along anterior margin distal end and 2 setae (claw-like stout seta and relatively fine seta) ledge posterior margin.

Mandible (Fig. 3D): five segmented. Length ratio between 2 protopodite segments and 3 endopodite segments 41: 9: 8: 11: 12. Basal segment (coxa, first segment of protopodite) with 6 teeth, and 1 seta anterior distal margin. Second segment of protopodite (basis) with exopodite consisting of three setae, and 2 plumose setae posterior distal margin. First segment of endopodite with 2 long feather-like setae and two plumose setae ventral distal end, a plumose seta dorsal distal end. Second segment of endopodite with a pair of unequal plumose setae on posterior distal margin, and 7 long fine setae on anterior distal end. Third segment of endopodite bearing 1 simple seta and 2 plumose setae.

Maxillula (Figs 3E): extremely thin branchial plate (exopodite) with 16 plumose setae and many long setules edge anterior distal margin (Fig. 3E). Basal podomere bearing palp and 3 masticatory processes (Fig. 3E). Palp 2-segmented. Proximal segment with 3 setae anterior distal end. Distal segment with 1 stout plumose seta, 3 simple setae and 1 stout comb-like seta distal end. Outer masticatory process with 6 setae distal end. Each of the middle and inner masticatory processes with 4 setae.

Thoracic legs (Figs 3F–H): all 3 legs 4-segmented and similar in shape. Length ratio between distal segments 56: 36: 22: 23 in first thoracic leg, 32: 23: 12: 14 in second thoracic leg, 32: 30: 13: 15 in third thoracic leg. Distal margin of each segment sometimes covered with many short setules. Exoskeletons developed on both margins of each segments. First segment with two plumose setae anterior margin, and 1 or 2 plumose seta(e) anterior distal end. Second segment with plumose seta anterior distal end. Forth segment bearing large terminal claw.

Copulatory organ of male (Fig. 3I): basal capsule semilunar. Exoskeleton developed along anterior margin. Subtriangular supporting lobe (distal lobe) developed on distal end of basal capsule. Long ductus ejaculatorius with single coil. One large quadrangular clasping apparatus posterior side of ductus ejaculatorius.

Remarks. This species has been unreliable included in the genus *Hirsutocythere* by many authors since Ishizaki (1981) described it. The present species differs from the genotype species *Hirsutocythere hornotina* Howe, 1951, in its narrow marginal infold area (possibly equal to the vestibule of Scott, 1961). However, the width of the vestibule of a trachyleberidid Ostracoda *Alocopocythere kendengensis* shows wide variation even in the same species (e.g., Carbonel & Hoibian, 1988, fig. 7), although the cause of the variation of the vestibule has not yet been clarified. Moreover, the shell outline and its surface ornamentation with long prickly spines are closely similar to *H. hornotina*. The Japanese genus also resembles the genus *Echinoctythere* Puri (1953b), but differs with its prickly spines and has no concentric arrangement pattern of the spines. *Carinocythereis* (Ruggieri, 1956) is clearly distinguished from the Japanese genus, with its prominent four longitudinal ridges developed from anterior to posterior of the shell surface. This species resembles *Hirsutocythere? akatsukiborensis* Yajima, 1992 in carapace outline, but the pattern of surface ornamentation of the carapace is clearly distinct from that of *H. akatsukiborensis*. This species differs from *Hirsutocythere? nozokienis* (Ishizaki, 1963) in its arrangement of the prickly spines of anteromedian area. The fossil specimens figured by Iizuki et al. (1998, 2001) and Nakao et al. (2001) as *Hirsutocythere? hanaii* have slightly different shell outlines from Recent ones.

ACKNOWLEDGEMENTS

The authors express sincere thanks to the crew of TRV *Toyohoshi-maru* for collecting and lending sediment samples. Thanks go to Robin Smith (Lake Biwa Museum), Ian Boomer (University of Birmingham) and Rosalie Maddocks (University of Houston) for helpful comments aiding improvement of the paper. The authors are grateful to Elly Brouwers (USGS) and
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John Gregory (PetroStrat Ltd) for reviewing and editing this paper and to Haruyoshi Maeda and Terufumi Ohno (Kyoto University) and Akira Tsukagoshi (Shizuoka University) for use of the facility and relevant references. Finally, thanks to Crimson Interactive Pvt. Ltd for correcting the English.

Manuscript received 20 January 2009
Manuscript accepted 26 January 2010

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