SEVEN NEW SPECIES OF FRESHWATER OSTRACODA FROM JAPAN
(FRESHWATER OSTRACODA FROM JAPAN XIV)

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日本の淡水産介形虫類の7新種

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Introduction

This paper deals with seven new species of the freshwater Ostracoda from Japan. Dr. Toshihiko MIZUNO of Osaka Aoyama College has planned to publish illustrations of freshwater animal plankton from Japan and invited me to describe freshwater Ostracoda. I have examined my specimens collected 20 years ago to recent years, and found about 30 freshwater species inclusive of some new species and some species new to Japan, in addition to 15 species I reported for 1972 to '76.

Here the following seven new species are reported: Candonidae—Cyclocypridinae—*Cypria* (1*) & *Physocypria* (1). Cyprididae—Cyprinotinae—*Cyprinotus* (1) & *Hemicypris* (4).

Almost all the specimens examined are dissected and embedded in Canada Balsam (valves) and in Neo Shigalar (soft parts). In *Material examined* of each species, [Provisional number, (Sex), Length-Height in 0.01 mm of Left, Right Valves, etc.] are written.

I wish to thank Dr. T. MIZUNO who has recommended me to investigate freshwater Ostracoda from Japan.

Family CANDONIDAE KAUFMANN, 1900

Subfamily CYCLOCYPRIDINAE KAUFMANN, 1900

Diagnosis. Carapace small. Second antenna with well-developed natatory setae. Distal podomere of second thoracic leg normal type, with two short setae of equal length and one long reflexed seta.

* Number of species, and so on

Genus *Cypria* ZENKER, 1854*Cypria biwaense* sp. nov.

(Figs. 1A-D; 2A, C, D)

Description. Carapace small (about 0.5 mm long), ovate in dorsal view; surface covered with a great number of minute hollows, especially on posterior half, as well as with sparse normal pores. Colour whitish ocher with three brown patterns: large square one at antero-ventral area, wide lateral striped one along mid-dorsal margin and small one along posterodorsal margin; each composed of a number of patches.

Left valve sub-reniform in lateral outline; greatest height $3/5$ of the length, situated slightly behind the middle; dorsal margin arched, anterior part gently sloped, posterior part short, nearly straight; anterior and posterior margins broadly round; ventral margin almost straight, but ventral outline slightly convex owing to marginal swell.

Right valve slightly shorter and lower than the left; dorsal margin arched more roundly; anterior margin broadly and uniformly round; posterior margin broadly and uniformly round; posterior margin broadly and distortedly round; ventral margin slightly concave, in a few specimens with a few faint tubercles along posteroventral margin.

Males common, nearly equal to female in number; scarcely sexual dimorphous.

Vestibule broad anteriorly, somewhat narrow posteriorly and ventrally. Adductor muscle scars of cyprid type, each scar somewhat flattened; two mandibular scars apart from each other. Marginal pore canals short, simple, small in number. Hinge adont.

Fig. 1. A-D: *Cypria biwaense* n. sp. A, B, FO-515♀; C, D, FO-513♂. E-H: *Physocypria nipponica* n. sp. FO-18♂. A, E, left valve; B, F, right valve; C, G, furca; D, H, ♂ copulatory organ. Scales 0.05 mm for valves alone.

Furca symmetric, rather curved, stout, the length 8 or 9 times the narrowest width; with two claws and two setae; length ratio of ramus (ventral margin), terminal seta, terminal claw, subterminal claw and dorsal seta: roughly 16: 4: 10: 6: 5; dorsal seta apart from subterminal claw by its length. Furcal attachment Y-shaped in male; in female Y-shaped with sharpened branch near basal part.

Male copulatory organ composed of roundly triangular basal part and two processes, one of which is sharpened distally.

Material examined.

FO-513, ♂, LV (52-33), RV (50-31), holotype.

FO-515, ♀, LV (50-32), RV (51-31), allotype.

FO-501, ♀, LV (51-31), RV (50-31), paratype.

FO-505, ♂, LV (broken), RV (47-30), paratype.

All specimens collected on Sept. 9th, 1988, from western beach of Lake Biwa, where long thread-like green algae flourished. Swimming among the algae or near the bottom sand, and resting on the algae.

Remarks. The coloration of the carapace, that is, three brown patterns on the whitish ground, is characteristic of this species. The specific name is derived from Lake Biwa, where a number of specimens were collected.

Although some specimens possess a few faint tubercles on the ventral margin of the right valve, this species undoubtedly belongs to the genus *Cypria* in shape.

Genus *Physocypria* VÁVRA, 1897

Physocypria nipponica sp. nov.

(Figs. 1E-H; 2B, E, F)

Physocypria sp.: OKUBO & IDA, 1989, p. 105, pl. 1, figs. I, J.

Description. Carapace small (ca. 0.6 mm long), narrow ovate in dorsal view; greatest width slightly less than half the length, situated at anterior 3/5; left valve overlapping the right at both ends and ventrally; dorsally right valve overlapping the left. Surface covered with a number of small hollows as well as with sparse normal pores. Colour brown apparently, covered with a number of brown to light brown small polygonal patches, which are darker anteriorly, mid-dorsally and posteriorly.

Both valves dimorphous. Left valve sub-trapezoid in lateral outline; dorsal margin weakly arched, greatest height in front of the middle; anterior margin broadly and distortedly round; posterior margin more broadly and uniformly round than the anterior; ventral margin nearly straight, but looking convex owing to marginal swell; vestibule of moderate width, somewhat wide anteriorly, narrow posteriorly; dorsal vestibule prominent.

Right valve sub-trapezoid; dorsal margin higher and shorter than the left; anterior and posterior margins broadly and distortedly round, anterior margin more

projecting than the posterior; ventral margin nearly straight or slightly concave, without ventral swell. Dorsal vestibule more prominent than in left valve. About 15 tubercles in a row along anteroventral margin, about 20 along posteroventral margin; these tubercles reduced in some specimens.

Marginal pore canals simple, short, small in number. Muscle scars of cyprid-type, each scar somewhat round. Hinge adont.

Male common, little sexual dimorphous.

Furca rather stout, about 10 times as long as the narrowest width, gently curved, length ratio of ramus (ventral margin), terminal seta, terminal claw, subterminal claw and dorsal seta: roughly 14: 4: 9: 7: 6; dorsal seta apart from subterminal claw by its length. Furcal attachment Y-shaped; tumid in male; slender, with branch and loop near the base in female.

Male copulatory organ composed of roundly triangular basal part and two processes.

Material examined:

FO-524, ♂, LV (55-40), RV (53-38), Okayama, holotype.

FO-18, ♂, LV (50-35), RV (48-34), Okayama, paratype.

FO-26, ♀, LV (54-39), RV (52-37), Okayama, allotype.

FO-626, ♀, LV (61-44), RV (59-42), Gumma, paratype.

FO-524 collected on June 14th, 1974; FO-18 & 26 in June, 1969; FO-626 on July 26th, 1989.

Occurrence. Common, but not so abundant; collected from Kyushu to Kanto Districts. Early spring to autumn. Usually swimming near mud bottoms of paddy fields.

Remarks. This species is discriminated in the shape and the coloration from the other species of this genus.

Family CYPRIDIDAE BAIRD, 1845

Subfamily CYPRINOTINAE BRONSTEIN, 1947

Genus *Cyprinotus* BRADY, 1886

Cyprinotus setoensis sp. nov.

(Figs. 2I, J)

Cyprinotus kimberleyensis McKenzie: OKUBO, 1974, p. 66 (part), fig. 2 (*C. kimderleyensis* [sic], low carapace type); not fig. 4.

Description. Carapace medium in size (1.1 mm long). Surface sculptured with a number of small hollows which are scattered on the surface except for that lined with ovary and liver.

Left valve sub-reniform in lateral outline; greatest height $\frac{3}{5}$ the length, situated in front of the middle, from which dorsal margin descending straight towards both ends, anterior part shorter and more inclined than posterior part; anterior margin

obliquely round; posterior margin almost straight in upper two-thirds, narrowly round in lower third; ventral margin nearly straight.

Right valve sub-reniform; slightly shorter than the left; without dorsal hump it resembling the left. Dorsal hump relatively small. About 25 and 20 tubercles in a row along antero- and postero-ventral margins, respectively.

Males unknown.

Soft parts similar to those of *C. kimberleyensis*.

Material examined. (all females)

FO-387, LV (116-68), RV (113-66), holotype

FO-383, LV (114-67), RV (110-68), paratype

FO-384, LV (104-63), RV (100-65), paratype

FO-385, LV (106-63), RV (101-64), paratype

All the specimens were collected at paddy fields near coast of Kurosaki, Kurashiki City, Okayama Prefecture on April 6th, 1969, when a rice plant was not set yet.

Occurrence. Rare. I have never seen this species since then.

Fig. 2. A, C, D: *Cyprina biwaense* n. sp. A, FO-513♂; C, D, FO-505♀. B, E, F: *Physocyprina nipponica* n. sp. FO-524♂. G, H: *Cyprinotus kimberleyensis* MCKENZIE, 1966. FO-374♀. I, J: *Cyprinotus setoensis* n. sp. FO-387♀. A, B, ♂ copulatory organ; C, E, G, I, left valve; D, F, H, J: right valve. Scale 1(=0.1 mm) for A, B; 2(=1.0 mm) for C-J.

Remarks. OKUBO (1974) regarded this species as the low carapace type of *C. kimberleyensis*. Detailed observation, however, revealed the obvious difference between this species and *C. kimberleyensis* (Figs. 2 G, H). The valve surface of this species is covered with a number of small hollows irregularly, that is, they are not found on the surface contacted with the ovary and the liver, whereas the valve surface of *C. kimberleyensis* is adorned with a great number of minute hollows densely and regularly. Needless to say, both species are clearly different from each other also in the size of the dorsal hump. Then, this low carapace type may deserve a specific status.

Genus *Hemicypris* Sars, 1903

Diagnosis. Carapace sub-ovate in dorsal view; surface smooth, with sparse normal pores; colour light brownish ocher with brown patterns. Valves sub-reniform to sub-ovate in lateral outline. Dorsal margins arched; both ends rounded; ventral margin nearly straight. Regarding valve structure cf. OKUBO (1974, fig. 1-4 and 1972, fig. 1). This genus having reversal valve structure of *Cyprinotus* and *Heterocypris*. Right valve overlapping the left along margins. Right valve of simple structure: selvage peripheral on valve margin. Left valve possessing round marginal swells anteriorly and posteriorly, where a number of tubercles are in a row. Vestibule not broad in general. Dorsal vestibule existent in some species. Marginal pore canals numerous, short, simple, straight. Hinge adont.

Appendages resembling those of the other genera of this subfamily.

Furca moderately developed, slightly curved; rather stout, the length 10 to 15 times (in Japanese species) as long as the narrowest width; furnished with two claws and two setae. Furcal attachment S-shaped with minute twig near the middle.

Remarks. The genus *Hemicypris* Sars, 1903, has been established for the species with the reverse overlap of valves to other members of the genus *Cyprinotus* sl. Left valves are smaller than right valves, and possess a number of tubercles along antero- and postero-ventral margins.

Most species of this genus have not the peculiar characters of carapaces and/or of soft parts, so that it is not easy to identify the species within this genus.

Four new species are discovered from Japan, in addition to *H. kaufmanni* (Vávra, 1906) that has not found by the author.

Key to the four Japanese species.

- 1 Valve medium in length, thick, with tubular normal pores; colour brown with three dark brown patterns. *H. mizunoi*
- 1 Valve rather thin, with dot-like normal pores.
 - 2 Valve medium (smaller than 1 mm long), with narrow dorsal vestibule that is as wide as or less than valve thickness. *H. kibiensis*

- 2 Valve large (ca. 1.2 long), with broad dorsal vestibule that is more than twice valve thickness.
- 3 Carapace adorned with clear oblique brown stripes on the upper half. Furca with dorsal seta smaller than subterminal claw. *H. nipponica*
- 3 Carapace adorned with large light brownish pattern on posterodorsal part in addition to light brown anterior pattern. Furca with dorsal seta nearly as long as subterminal claw. *H. vulgaris*

Hemicypris mizunoi sp. nov.

(Figs. 3A-C)

Description. Carapace medium in size (about 1 mm long), oval in dorsal view; colour light brown ground with three dark brownish patterns: first one along anterior margin, second one in front of middle, third one on posterodorsal part.

Valves thick; normal pores relatively large in number, looking like possessing small canals in valves.

Left valve roundly sub-reniform in lateral view; greatest height slightly less than $2/3$ the length, situated at the middle; dorsal margin roundly roof-shaped, anterior part gently inclined, posterior part more gently inclined; anterior margin broadly round; posterior margin nearly straight, inclined steeply in upper two-thirds, narrowly round in lower third; ventral margin almost straight. About 30 tubercles in a row along antero- and postero-ventral margins, respectively. Inner lamella medium in width along anterior margin, narrow along ventral and posterior margins.

Right valve somewhat different from left valve in shape, higher and rounder than the left; greatest height $2/3$ of the length, situated at the middle; dorsal margin roof-shaped, its wall rather thick; anterior margin broadly and uniformly round; posterior margin distortedly round; ventral margin nearly straight, the outline looking like convex because of marginal swell. In some specimens along antero- and postero-ventral margins a few minute spinous processes present.

Marginal pore canals numerous, short, simple, along all free margins.

Furca rather slender, about 13 times the narrowest width; length ratio of ramus (ventral margin), terminal seta, terminal claw, subterminal claw and dorsal seta: roughly 11: 2: 7: 5: 5; dorsal seta slightly longer than subterminal claw. Furcal attachment narrow, S-shaped, with minute dorsal twig at distal $3/7$.

Material examined. (all females)

FO-183, LV (97-62), RV (101-67), holotype.

FO-181, LV (94-61), RV (95-65), paratype.

FO-182, LV (93-60), RV (97-65), paratype.

FO-186, LV (90-57), RV (94-65), paratype.

Fig. 3. *Hemicypris* spp. (all females) A-C: *Hemicypris mizunoi* n. sp. FO-183. D-F: *Hemicypris kibiensis* n. sp. FO-172. G-J: *Hemicypris nipponica* n. sp. FO-552. J-L: *Hemicypris vulgaris* n. sp. FO-163. A, D, G, J, left valve; B, E, H, K, right valve; C, F, I, L, furca. Scales (0.5 mm) for all valves.

All specimens collected from paddy fields of Ashimori, Okayama, on July 24th, 1974.

Occurrence. Not common, not abundant. Swimming on or creeping in bottom mud of paddy fields. In summer.

Remarks. This species is discriminated from the other members of this genus by the thick valves, in which normal pores look like to have canals and by the round carapace. The specific name is derived from Dr. Toshihiko MIZUMO who has encouraged me to re-observe freshwater ostracods.

Hemicypris kibiensis sp. nov.

(Figs. 3D-F)

Hemicypris sp. B. OKUBO & IDA, 1989, p. 106, pl. 3, figs. O, P.

Description. Carapace medium in size (about 0.9 mm long), relatively small in this genus; sub-ovate in dorsal view; colour light brown, with four brown stripes: first one along anterior margin, second one at anterodorsal part of muscle scars, not reaching dorsal margin, third one largest, from mid-dorsal margin to posterior part of muscle scars, fourth one along posterodorsal margin.

Both valves of almost the same outline; dorsal vestibule very narrow.

Left valve sub-reniform in lateral view; dorsal margin roundly roof-shaped, both sides of which are almost straight and roughly symmetrical; anterior margin broadly round; posterior margin inclined steeply in upper half, narrowly round in lower half; ventral margin nearly straight, with faint indentation mid-ventrally. About 15 tubercles in a row along antero- and postero-ventral margins, respectively.

Furca rather stout, the length 12 times the narrowest width; length ratio of ramus, terminal seta, terminal claw, subterminal claw and dorsal seta: roughly 22: 3: 12: 8: 7.

Material examined. (all females)

FO-172, LV (85-52), RV (89-55), holotype.

FO-170, LV (85-52), RV (86-?) broken, paratype.

FO-171, LV (84-52), RV (86-54), paratype.

FO-646, LV (89-54), RV (93-56), paratype.

The former three collected from at paddy fields of Ashimori, Okayama Prefecture, on July 24th, 1974. The latter one collected at Kunisada, Gumma Prefecture on July 25th, 1989.

Occurrence. Common, rather abundant in paddy fields in summer.

Remarks. This species differs from other species of this genus in the small size and in the very narrow posterodorsal vestibule.

"Kibi" is the old name of Okayama and its neighbours.

Hemicypris nipponica sp. nov.

(Figs. 3G-I)

Description. Carapace rather large (1.2-1.3 mm long); sub-ovate in dorsal view; surface smooth, scattered with normal pores. Colour light brownish ocher with clear dark brown striped-patterns: anterior one, middle oblique one and posterodorsal one.

Left valve sub-reniform laterally; greatest height 7/13 of the length, situated at the middle; dorsal margin roundly roof-shaped, anterior part more steeply than posterior part, so that, anterior half slightly lower than the posterior; anterior margin broadly round; posterior margin distortedly round, the extremity at one-third of the height; ventral margin almost straight, with faint indentation at the middle. Tubercles about 30 and 25 in a row along antero- and postero-ventral outlines, respectively; vestibule narrow along the whole free margin. Posterodorsal vestibule existent, rather broader than valve wall.

Right valve almost the same as left valve in outline; slightly longer and higher than the left, overlapping it along free margins; ventral margin nearly straight or very weakly convex. Posterodorsal vestibule present.

Furca rather stout, the length ca. 11 times the narrowest width; dorsal seta obviously smaller than subterminal claw; length ratio of terminal claw, subterminal claw and dorsal seta: roughly 4: 3: 2.

Material examined. (all females)

FO-153, LV (126-71), RV (131-72), 1970-7-4, Okayama

FO-552, LV (115-67), RV (120-70), 1988-7-2, Okayama

FO-553, LV (121-71), RV (126-72), 1988-7-2, Okayama

FO-611, LV (125-72), RV (128-72), 1989-6-7, Gumma

FO-153 holotype, the others paratypes.

Occurrence. Rather common, not abundant. In paddy fields. In summer.

Remarks. See the remarks of the next species, *H. vulgaris*. This species closely resembles *H. vulgaris*, except for the coloration of the carapace.

Hemicypris vulgaris sp. nov.

(Figs. 3J-L)

Hemicypris sp. A: OKUBO & IDA, 1989, p. 106, pl. 3, figs. K-N.

Description. Carapace resembling the preceding species, *H. nipponica*. Colour light brownish ocher with light dirty brown patterns: small dorsoanterior one, long oblique one between anterior margin and muscle scars, and noticeably broad one on posterodorsal part.

Both valves greatly resembling those of the *H. nipponica* in size and shape. If

compared, valves very slightly higher than those of *H. nipponica*, and posterodorsal margin sloping more steeply than in *H. nipponica*.

Regarding the size, both species overlapping each other.

About 25 tubercles along antero- and postero-ventral margins, respectively.

Furca rather stout, the length 12 times the narrowest width; dorsal seta relatively long, slightly shorter than subterminal claw; length ratio of teminal claw, subterminal claw and dorsal seta: roughly 8: 5: 4.

Material examined. (all females)

FO-163, LV (113-67), RV (117-69), holotype, 1988-7-25, O

FO-160, LV (105-63), RV (117-69), paratype, 1988-7-25, O

FO-161, LV (107-64), RV (112-66), paratype, 1974-7-24, O

FO-610, LV (116-68), RV (118-70), paratype, 1989-7-26, G

FO-638, LV (104-60), RV (108-64), paratype, 1989-7-25, G

O: from Okayama Pref., G: from Gumma Pref.

Occurrence. common, commonest in this genus; abundant in the paddy fields; in spring to autumn.

Remarks of H. nipponica n. sp. and *H. vulgaris* n. sp. Both species are obviously different from each other in the coloration of the carapaces. *H. nipponica* is adorned with clear dark brown oblique stripes, whereas *H. vulgaris* is covered with light brown pattern on posterodorsal and anterior areas.

However, faded valves of both species closely resemble each other in size and shape; so that, when only one specimen is examined, it may be difficult to determine which species it belongs to.

The furca may be useful in dividing between both sepcies, besides the coloration of valves. The furca of *H. nipponica* is furnished with the dorsal seta shorter than the subterminal claw, while that of *H. vulgaris* with the dorsal seta nearly as long as the subterminal claw.

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摘 要

日本の淡水産介形虫類の新種7種を報告する。大阪青山短期大学の水野寿彦教授が淡水産動物プランクトンの検索図鑑の刊行を計画され、そのうち介形虫類を分担し、発見したものであ

る。最近採集したものや20年前に作られた標本から、約30種の日本未記録の種を得たが、そのうち、カンドナ科キクロキプリス亜科の *Cypria* (オヨギカイミジンコ属)・*Physocypria* (イボオヨギカイミジンコ属) 各1種と、キプリス科コブカイミジンコ亜科の *Cyprinotus* (コブカイミジンコ属) 1種と、*Hemicypris* (ヒダリイボカイミジンコ属) 4種の計7新種を記載する。

Cypria biwaense (ビワオヨギカイミジンコ) および *Physocypria nipponica* (イボオヨギカイミジンコ) はともに、小型 (0.5 mm 前後)、第2触角に長い遊泳剛毛があり、第2胸脚の末節は正常型。前者は琵琶湖沿岸から、後者は各地の水田等から採集された。

Cyprinotus setoensis (セトコブカイミジンコ) は、OKUBO (1974) が *C. kimberleyensis* の1変種として報告したものであるが、後背縁のこぶ状隆起が小さく、殻表の模様が明らかに異なるので、ここに新種として報告する。

Hemicypris 属は、コブカイミジンコ亜科のうち左殻の殻縁に小瘤状突起が並ぶもので、4種が発見された。外形はよく似ており、同定の面倒な種である。*H. mizunoi* (マルイボカイミジンコ) は、中型で、殻は厚く、側孔管が線状に見える。*H. kibiensis* (コイボカイミジンコ) は中型で、両殻片の背縁の前庭は殻の厚さより狭い。*H. nipponica* (シマイボカイミジンコ) はやや大型で、殻表に斜めのはっきりした褐色の縞模様がある。*H. vulgaris* (ヒダリイボカイミジンコ) はやや大型で、外形は前種によく似るが、殻表の後背部に薄褐色の大きな模様がある。後2者は後背部に殻の厚さの2倍以上の前庭がある。ともに日本各地の水田に広く分布する。この属には他に、*H. kaufmanni* (VÁVRA, 1906) が長崎より報告されているが、筆者は確認していない。