

Monogonont Rotifers (Monogononta: Rotifera) Inhabiting Several Lowland Swamps in Kyöngsangnam-do, Korea

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경남 자연늪에 서식하는 단성 율형동물

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적 요

1988년 2월 22일 부터 동년 10월 2일 까지 4차에 걸쳐 경상남도 일원의 우포늪, 주남지, 질남늪 및 외송늪의 10개 지소에서 채집한 율형동물 중 단성류(monogonont rotifers)를 관찰한 결과 5과 4종, 9아종, 2변종 및 2형이 동정되었다. 이중에서 *Testudinella mucronata hauerensis*, *Platyias quadricornis*, *Mytilina acanthophora*, *Lecane unguolata unguolata*, *Trichocerca bicristata bicristata*, *Dicranophorus epicharis*의 3종 및 3아종이 한국 미기록으로 이들에 대하여 재 기재하였다.

Key words: taxonomy, monogonont Rotifera, Korea.

INTRODUCTION

The study on the fauna of Korean Rotifera was begun by Hada (1936), who reported 14 species of Korean Rotifera for the first time in the process of faunal study of Söho in Suwon. Thereafter, studies on this taxon have been continued by Yamamoto(1953), Mizuno *et al.*(1980), Turner(1986), Kim and Park(1969), Cho *et al.*(1978) and some others. Song(1989) made a list of Korean freshwater Rotifera which have been reported until 1988. However, most of species in this list have resulted from limnological and ecological researches. No taxonomic study on Korean freshwater rotifers has been done so far. The aims of the present study are to carry out taxonomic study on Korean freshwater Rotifera and to provide this for ecological and/or other researches as basic data.

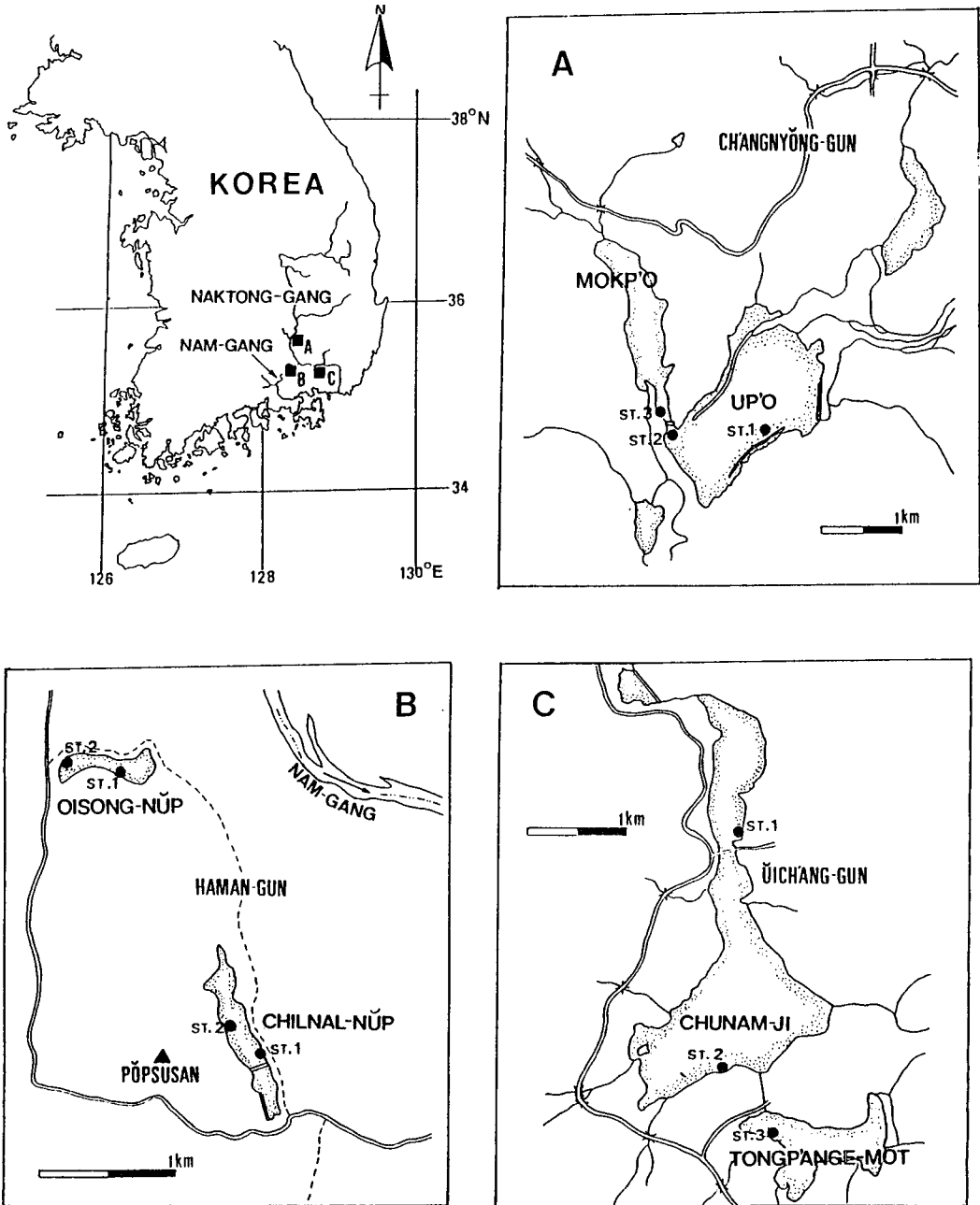


Fig. 1. Maps showing the sampling sites. A, Up'o: st.1, Tun'to; st.2, Top'yong-ri; st.3, Wit'op'yong-ri (Mokp'o); B, Chilnal-nup(Pöpsu-myön, Ugö-ri) and Oisong-nup(Pöpsu-myön, Taesong-ri); C, Chunam-ji: st.1, Yongsan-ri; st.2, Wolcham-ri; st.3, Taho-ri(Tongp'ange-mot).

MATERIALS AND METHODS

The materials examined in this study consist of the specimens collected from 10 sites of Up'o-nŭp, Chunam-ji, Chilnal-nŭp and Oisong-nŭp from February 22, 1988 to October 2, 1988 (Fig. 1). Collections were made with a conical plankton net (pore size: 25 μ and 100 μ). For loricates, all samples were fixed with 7-8% formalin. For observation of foot and corona, narcotizing step with about 5% alcohol was carried out before fixation. All samples were preserved in 5% formalin with 2% glycerin and a little eosin. Liquid mounting method (Harring & Myers, 1928) was used for microscopic observation. For trophi observation, Stemberger(1979) was referred to. Examination was conducted at $\times 100$ or $\times 400$ magnification of light or phase-contrast microscope. Drawings and measurements were made with a camera lucida and photographs. All descriptions and drawings of this study were based on characters of females because of parthenogenetic reproduction of rotifers.

The classification system in this study was based on Pontin(1978) and Ruttner-Kolisko(1974).

SYSTEMATIC ACCOUNT

As a result of this study, 4 species, 9 subspecies, 2 varieties and 2 forms in 5 families of Korean freshwater Rotifera were identified, of which 3 species and 3 subspecies are newly recorded from Korea and fully redescribed with figures and photographs. Diagnoses are added to 11 known species.

Phylum Rotifera 율형동물문
 Class Monogononta Plate, 1889 단성강
 Order Flosculariacea Remane, 1933
 Family Testudinellidae Bartos, 1959
 Genus *Testudinella* Bory de St. Vincent, 1826

1. *Testudinella patina* f. *trilobata* (Anderson & Shephard, 1892) (Fig. 2: A, B)

Pterodina trilobata Anderson & Shephard, 1892 (p. 79, pl. 12, fig. 7).

Testudinella trilobata: Harring, 1913 (p. 100).

Testudinella patina f. *trilobata*: Koste, 1978 (p. 527, T. 195: 1c).

Material examined: 7 inds., Oisong(st.1), 27 VI 1988; 5 inds., Chilnal(st.1), 27 VI 1988; 3 inds., Oisong, 27 VI 1988; 10 inds., Up'o(st.3), 26 VI 1988; 13 inds., Up'o(st.2), 26 VI 1988; 8 inds., Up'o(st.1), 26 VI 1988; 21 inds., Chunam-ji(st.1), 2 X 1988; 17 inds., Chunam-ji(st.3), 2X1988; 26 inds., Up'o(st.1), 1X1988; 17 inds., Up'o(st.2), 1X1988; 92 inds., Up'o(st.3), 1X1988; 33 inds., Chilnal(st.1), 2X1988; 3 inds., Chilnal(st.2), 2X1988; 54 inds., Oisong(st.2), 2X1988.

Diagnosis: Lorica circular or more or less elliptical in outline. Foot opening circular, in middle of ventral side. Anterodorsal margin having semicircular projection, with two broad bulgings on either side, giving it tri-lobed appearance.

Distribution: Cosmopolitan.

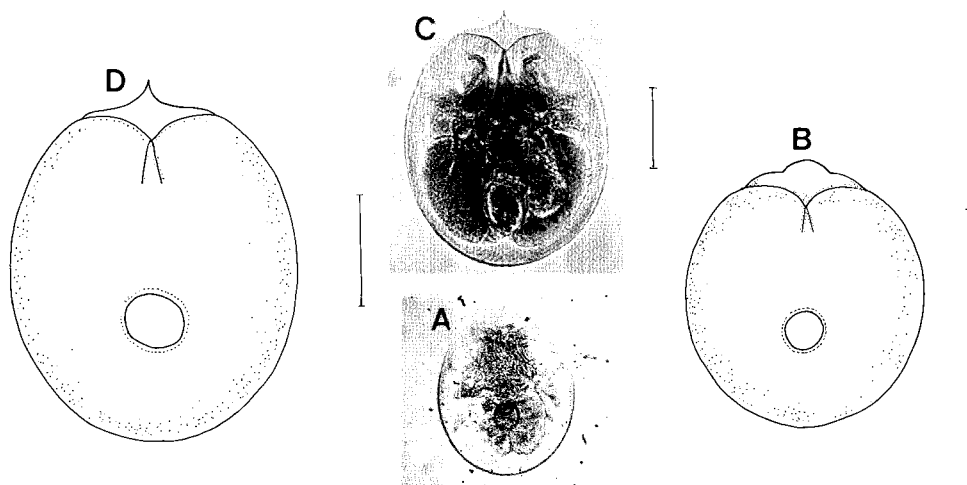


Fig. 2. A-B, *Testudinella patina* f. *trilobata* (Anderson & Shephard, 1892): A, photograph of whole animal (x500); B, entire ventral view (Scale bar: 100µm). C-D, *Testudinella mucronata hauerensis* (Gillard, 1967): C, photograph of whole animal; D, entire ventral view (Scale bar: 50µm).

2. *Testudinella mucronata hauerensis* (Gillard, 1967)

(Fig. 2: C, D)

Testudinella hauerensis Gillard, 1967 (pp. 16-17, figs. 23-24).

Testudinella mucronata hauerensis: Koste, 1978 (p. 528, T. 194: 6).

Material examined: 48 inds., Chunam-ji(st.3), 14 IV 1988.

Diagnosis: Anterodorsal margin with sharp and long median projection.

Description: Body loricate. Lorica circular or more or less elliptical in outline, dorsoventrally flattened. Ratio of lorica length to its width less than 4/3. Cross section crescent-shaped, slightly bulging at ventral part. Foot opening circular, about 20-25µ, with cuticular flange, in 2/3 of median line of ventral plate. Anterodorsal margin wholly passing over ventral margin. Anterodorsal margin with sharp and long projection, about 10-17µ long. Either side by the projection slightly swollen. Anteroventral margin shallow, sharply pointed V-shaped, its sides more or less bulging, symmetrical. Two eyes red. Yolk gland (vitellarium) horseshoe-shaped. Lorica length about 144-177µ, its width about 115-131µ.

Remarks: This species differs from *T. mucronata mucronata* (Koste, 1978) in that its anterodorsal margin wholly rises above anteroventral margin.

Distribution: Cosmopolitan.

Order Ploima Hudson & Gosse, 1886

Family Brachionidae Wesenberg-Lund, 1899

Genus *Platyas* Haring, 1913

3. *Platyas quadricornis* (Ehrenberg, 1832)

(Fig. 3)

Noteus quadricornis Ehrenberg, 1832 (p. 143, T. 4: 5; cited from Ahlstrom, 1940); Hudson & Gosse, 1886 (vol. 2, pp. 121-122, pl. 28, fig. 5).

Noteus stuhlmanni Collin, 1897 (p. 8, fig. 9).

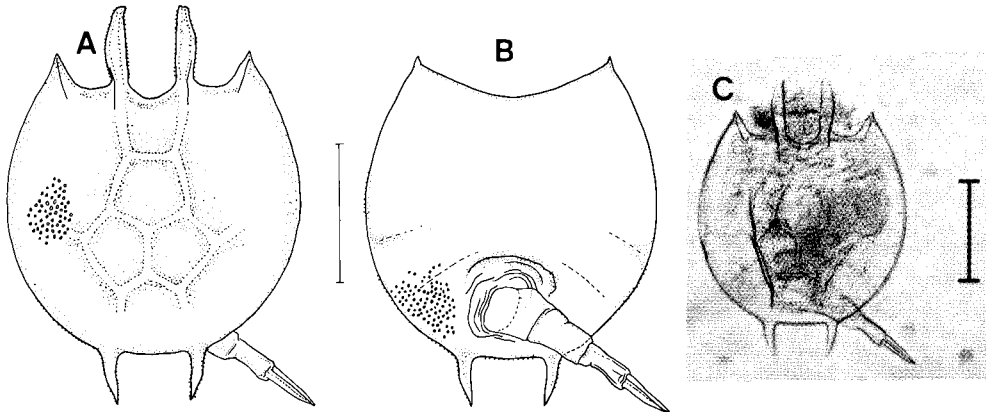


Fig. 3. *Platyas quadricornis* (Ehrenberg, 1832): A, entire dorsal view; B, entire ventral view; C, photograph of whole animal (Scale bar: 50 μ m).

Platyas quadricornis: Harring, 1913 (p. 84); Ahlstrom, 1940 (p. 174, pl. 18, figs. 6-9); Gillard, 1948 (pp. 194-195, pl. 3, fig. 1); Yamamoto, 1949b (p. 141, fig. 21a, b, c); Tan & Perng, 1976 (p. 16, fig. 21); Koste, 1978 (pp. 63-64, T. 6: 1-2; T. 7: 1-2); Mamaril & Fernando, 1978 (p. 125, fig. 49).

Material examined: 6 inds., Chunam-ji(st.2), 14 IV 1988; 2 inds., Up'o(st.3), 16 IV 1988; 2 inds., Oisong(st.2), 15 IV 1988; 1 ind., Oisong, 27 VI 1988; 4 inds., Chilnal, 27 VI 1988; 1 ind., Up'o(st.2), 26 VI 1988; 2 inds., Chunam-ji(st.3), 27 VI 1988; 191 inds., Chunam-ji(st.3), 2 X 1988; 270 inds., Up'o(st.1), 1 X 1988; 19 inds., Up'o(st.2), 1 X 1988; 121 inds., Up'o(st.3), 1 X 1988; 161 inds., Chilnal(st.1), 2 X 1988; 14 inds., Chilnal(st.2), 2 X 1988; 2 inds., Oisong(st.1), 2 X 1988; 13 inds., Oisong(st.2), 2 X 1988.

Diagnosis: Anterodorsal margin with two broad and stout median projections, bending somewhat ventrally. Posterior margin of lorica with two short, stout parallel spines. Spines tapering. Pattern of facets of dorsal surface forming three central pentagons surrounded by six marginal areas.

Description: Lorica firm, circular, moderately compressed dorsoventrally, shield-shaped. Anterior margin wide, 3/5 of lorica width. Anterodorsal margin with two stout median spines tapering but little and bluntly rounded to nearly truncate at their tips, usually bending somewhat ventrally, about 25-33 μ wide, and 100-140 μ long. External angles of anterior margin terminating in triangular cusps with small and pointed spines. Anteroventral margin concave, serrate. Posterior margin of lorica with two short, stout parallel spines. Spines tapering, 60-80 μ long, 1/3 of lorica width apart. Foot opening more or less elliptical, locating at first 1/5 of lorica length from posterior margin. Above foot opening, several concentric circular folds present. Lorica granulated, serrated along margins, facets more or less distinct. Pattern of facets of dorsal surface forming three central pentagons surrounded by six marginal areas. Foot of 3 sections with two long, pointed conical toes. Toe 35-40 μ long. Lorica 480-583 μ long and 343-462 μ wide. Littoral genus, found amongst plants.

Distribution: Cosmopolitan.

Genus *Brachionus* Pallas, 1766

4. *Brachionus patulus patulus* O.F. Müller, 1786

(Fig. 4: A-E)

Brachionus patulus O.F. Müller, 1786 (p. 361, pl. 47, figs. 14, 15; cited from Ahlstrom, 1940); Mamaril & Fernando, 1978 (p. 123, fig. 43); Koste & Shiel, 1987 (p. 972, Fig. 14: 1-6).

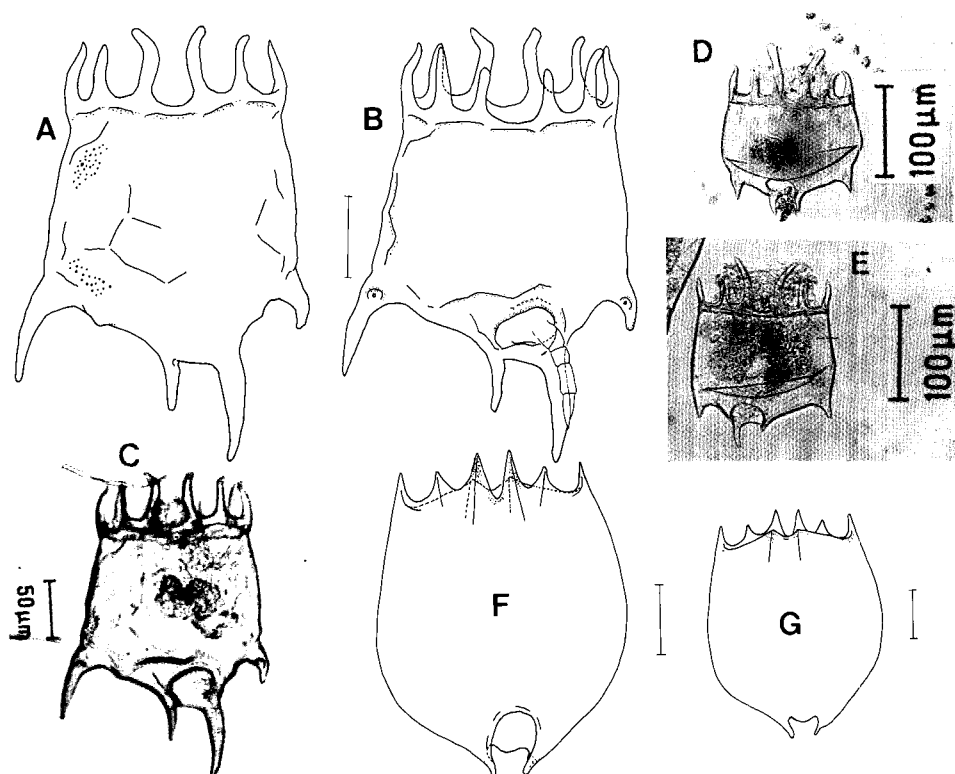


Fig. 4. A-E, *Brachionus patulus patulus* (O.F. Müller, 1786): A, entire dorsal view; B, entire ventral view; C, photograph of whole animal; D-E, photographs of specimens collected in June (Scale bar: 50µm). F-G, *Brachionus urceolaris urceolaris* O.F. Müller, 1773: F, entire lorica; G, ventral view (Scale bar: 50µm).

Brachionus militaris Ehrenberg, 1834 (p. 199); Hudson & Gosse, 1889 (p. 52, pl. 34, fig. 23).

Platygaster patulus: Ahlstrom, 1940 (pp. 175-176, pl. 19, figs. 1-4); Yamamoto, 1949b (p. 141, fig. 2a, b, c).

Platygaster (patulus) patulus: Gillard, 1948 (pp. 195-196, pl. 3, fig. 2).

Brachionus patulus patulus: Koste, 1978 (p. 69, T. 8: 1, 2a, 3, 6).

Material examined: 5 inds., Oisong, 27 VI 1988; 2 inds., Chilnal(st.1), 27 VI 1988; 2 inds., Up'o(st.3), 26 VI 1988; 2 inds., Up'o(st.2), 26 VI 1988; 2 inds., Up'o(st.1), 26 VI 1988; 1 ind., Chunam-ji(st.1), 27 VI 1988; 114 inds., Chunam-ji(st.3), 2 X 1988; 126 inds., Up'o(st.1), 1 X 1988; 129 inds., Up'o(st.3), 1 X 1988; 463 inds., Chilnal(st.1), 2 X 1988; 2 inds., Chilnal(st.2), 2 X 1988; 27 inds., Oisong(st.1), 2 X 1988; 4 inds., Oisong (st.2), 2 X 1988.

Diagnosis: Lorica firm, subrectangular and granulated. Lorica with pattern of reticulated areolations, as well as simple pattern of cuticular ridges on dorsal plate. Ten anterior spines present. Two occipital median spines longest, curving over head ventrally. Two pectoral median spines shortest, straight. Two posterolateral spines present. Foot opening bounded by two short spines.

Distribution: Cosmopolitan.

5. *Brachionus urceolaris urceolaris* O.F. Müller, 1773

(Fig. 4: F-G)

Brachionus urceolaris O.F. Müller, 1773 (p. 131; cited from Ahlstrom, 1940); Ahlstrom, 1940 (pp. 171-172, pl. 16, figs. 1-11); Gillard, 1948 (pp. 205-207, pl. 4, fig. 2); Yamamoto, 1949a (p. 94, fig. 13); Tan & Perng, 1976 (p.

19, fig. 33); Mamaril & Fernando, 1978 (p. 124, figs. 4, 46); Pontin, 1978 (p. 58, fig. 47a, c).

Brachionus urceus: Rylov, 1935 (p. 62-63, T. 7, fig. 59).

Brachionus urceolaris urceolaris: Koste, 1978 (pp. 78-79, T. 9: 3a-e; Abb. 30: a; Abb. 31); Koste & Shiel, 1987 (p. 985, fig. 19: 1).

Material examined: 3 inds., Chilnal(st.2), 22 II 1988; 5 inds., Chilnal(st.1), 22 II 1988; 6 inds., Oisong, 22 II 1988; 10 inds., Up'o(st.3), 24 II 1988; 21 inds., Up'o(st.2), 24 II 1988; 12 inds., Chunam-ji(st.3), 23 II 1988; 8 inds., Oisong(st.2), 15 IV 1988; 1 ind., Chilnal(st.1), 15 IV 1988; 1 ind., Chilnal(st.2), 15 IV 1988; 13 inds., Chunam-ji(st.3), 15 IV 1988; 84 inds., Chunam-ji(st.2), 23 II 1988; 5 inds., Chunam-ji(st.1), 14 IV 1988; 30 ir.ds., Up'o(st.1), 16 IV 1988; 2 inds., Up'o(st.2), 16 IV 1988; 4 inds., Up'o(st.3), 1 X 1988; 6 inds., Oisong(st.1), 22 II 1988; 9 inds., Oisong(st.2), 22 II 1988.

Diagnosis: Dorsal plate with six anterior spines, of which two median spines longest and highest. Posterolateral spine absent. Foot opening without both spines and tubular projections, with M-shaped aperture in dorsal plate and rather large oval aperture ventrally.

Distribution: Cosmopolitan.

6. *Brachionus quadridentatus quadridentatus* Hermann, 1783

(Fig. 5: A-C)

Brachionus quadridentatus Hermann, 1783 (p. 47, T. 2, fig. 9); Ahlstrom, 1940 (pp. 165-167, pl. 11, fig. 9; pl. 12, figs. 1-9; pl. 13, fig. 3); Gillard, 1948 (pp. 203-205, pl. 3, fig. 3a-c); Yamamoto, 1949a (p. 93, fig. 11a-f); Tan & Perng, 1976 (p. 19, figs. 31-32); Mamaril & Fernando, 1978 (pp. 123-124, figs. 44, 45); Pontin, 1978 (p. 54, fig. 44); Koste & Shiel, 1987 (p. 977, figs. 12, 16).

Brachionus quadridentatus quadridentatus: Koste, 1978 (p. 73, T. 11: 4a-b; Abb. 32a).

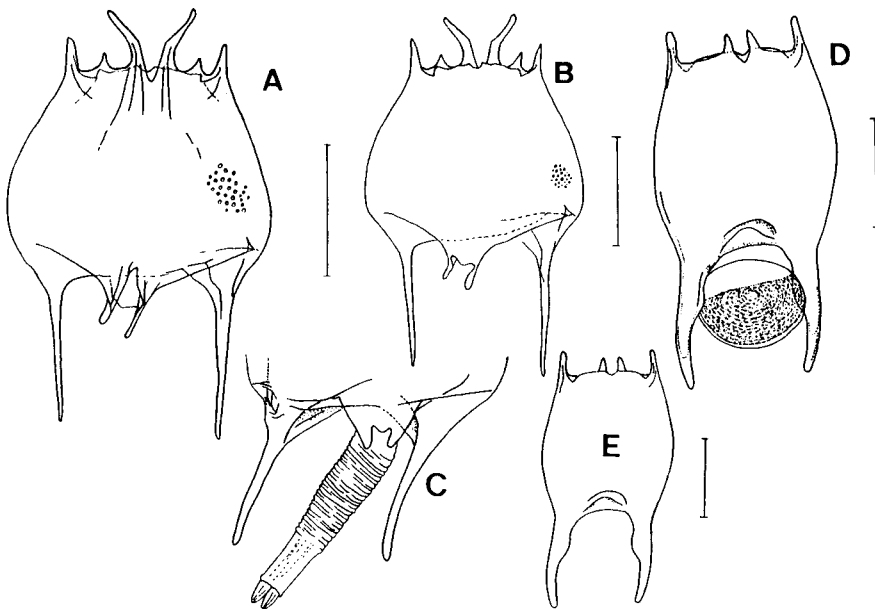


Fig. 5. A-C, *Brachionus quadridentatus quadridentatus* Hermann, 1783: A, entire lorica; B, ventral view; C, foot (x1000) (Scale bar: 100 μ m). D-E, *Brachionus forcifulca forcifulca* Wierzejski, 1891: D, entire lorica (egg carrying); E, ventral view (Scale bar: 50 μ m).

Material examined: 10 inds., Oisong(st.1), 27 VI 1988; 2 inds., Chilnal(st.1), 27 VI 1988; 9 inds., Up'o(st.3), 26 VI 1988; 6 inds., Up'o(st.2), 26 VI 1988; 5 inds., Up'o(st.1), 26 VI 1988; 14 inds., Chunam-ji(st.3), 27 VI 1988; 12 inds., Chunam-ji(st.1), 27 VI 1988; 8 inds., Chunam-ji(st.2), 27 VI 1988; 23 inds., Chunam-ji(st.1), 2 X 1988; 9 inds., Chunam-ji(st.3), 2 X 1988; 29 inds., Up'o(st.1), 1 X 1988; 17 inds., Up'o(st.2), 1 X 1988; 15 inds., Up'o(st.3), 1 X 1988; 48 inds., Chilnal(st.1), 2 X 1988; 2 inds., Chilnal(st.2), 2 X 1988; 2 inds., Oisong(st.1), 2 X 1988; 9 inds., Oisong(st.2), 2 X 1988.

Diagnosis: Anterodorsal margin with six spines, of which two median ones longest, curving outward and two submedian ones shortest. Two posterolateral spines, parallel to body axis, 1/3 of total length. Posteroventral portion of lorica prolonged into tubular sheath around base of foot.

Distribution: Cosmopolitan.

7. *Brachionus forficula forficula* Wierzejski, 1891

(Fig. 5: D-E)

Brachionus forficula Wierzejski, 1891 (p. 51, fig. 3a); Rylow, 1935 (p. 65, T. 8, fig. 67); Ahlstrom, 1940 (pp. 162-163, pl. 7, fig. 8; pl. 20, figs. 1, 2); Tan & Perng, 1976 (p. 17, fig. 24); Yamamoto, 1949a (p. 95, fig. 17); Koste & Shiel, 1987, (p. 988, fig. 20: 2a-e, 3a-c).

Brachionus forficula forficula: Koste, 1978 (pp. 95-96, T. 14: 7c, e).

Material examined: 1 ind., Chunam-ji(st.3), 27 VI 1988; 5 inds., Chunam-ji(st.2), 27 VI 1988; 1 ind.(ovi.), Chunam-ji(st.1), 2 X 1988.

Diagnosis: Anterodorsal margin with four bluntly pointed spines. Lateral spines 1.6-1.8 times as long as medians. Intermediates quite obliterate. Two stout, usually long, subequal posterolateral spines, having knee-like swellings on inner sides of their bases.

Distribution: Eastern Europe, Africa, Asia Minor, Japan, Taiwan, Ceylon, Korea.

Genus *Mytilina* Bory de St. Vincent, 1836

8. *Mytilina acanthophora* Hauer, 1938

(Fig. 6: A-C)

Mytilina acanthophora Hauer, 1938 (p. 550, Abb. 73a-c); Koste, 1978 (p. 149, T. 41: 5a-c; Abb. 37a-b); Koste & Shiel, 1989 (p. 97, figs. 10: 1, 2).

Material examined: 4 inds., Up'o(st.3), 24 II 1988; 3 inds., Oisong, 22 II 1988; 2 inds., Up'o(st.3), 27 VI 1988; 16 inds., Up'o(st.3), 1 X 1988.

Diagnosis: Lorica half-moon shaped in lateral view. Cross section of lorica pentagon in shape. Its top with narrow wedge-shaped cleft. Both anterolateral corners forming trigonal pyramids. Lorica dented right under anteroventral margin. Posteroventral part of lorica forming shield-shaped plate. Two toes long, slender, 3/5 of lorica length.

Description: Lateral view of lorica half-moon-shaped, both ends of which truncated. Cross section of lorica pentagon shaped, its base wide and slightly swollen and its top having V-shaped depression. Lorica firm, thick and granulated. Lateral surface of lorica having smooth band pattern. Lorica length 149-161 μ , lorica width 92-114 μ . Lorica having dorsal cleft, its depth 21-25 μ . In front view, anteroventral margin V-shaped, which deeper than dorsal one. Anterolateral part of lorica forming trigonal pyramids. Lorica dented right under anteroventral margin. Posteroventral part of lorica forming shield-shaped plate, both sides of which deeply and obliquely incurvated toward dorsal part. Foot short, of 2 sections. Two toes pointed, long and slender, its width about 3 μ , its length 84-89 μ , about 3/5 of lorica length. Both sides of toe almost

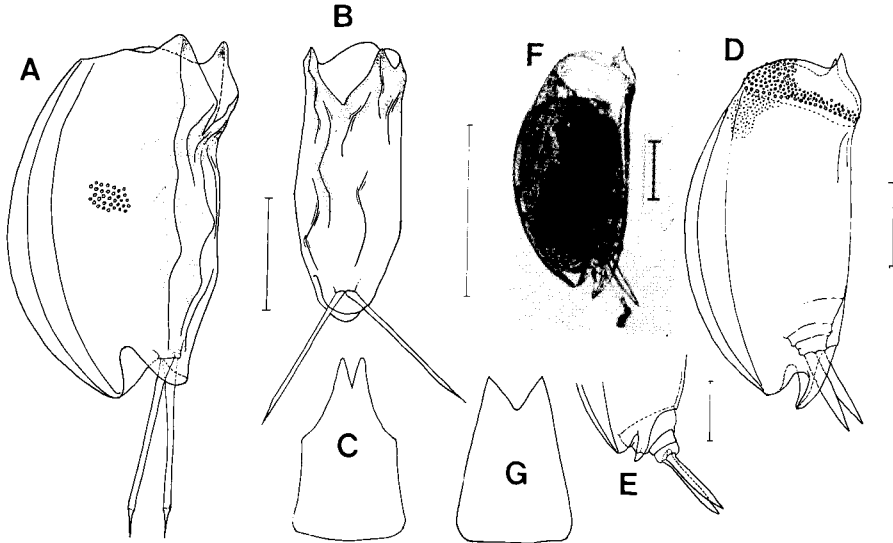


Fig. 6. A-C, *Mytilina acanthophora* Hauer, 1938: A, whole animal; B, front view; C, cross section (Scale bar; 50 μ m). D-G, *Mytilina ventralis* var. *brevispina* (Ehrenberg, 1832): D, whole animal; E, foot; F, photograph of whole animal; G, cross section (Scale bar: 50 μ m).

parallel but abruptly tapering at 1/6 of toe length from end. Total body length about 217-231 μ . Found about humus and muddy bottom.

Distribution: Indonesia, Japan, Korea.

9. *Mytilina ventralis* var. *brevispina* (Ehrenberg, 1832)

(Fig. 6: D-G)

Salpina brevispina Ehrenberg, 1832 (p. 133; cited from Haring, 1913); Hudson & Gosse, 1886 (vol. 2, p. 84, pl. 22, fig. 4).

Mytilina ventralis brevispina: Haring, 1913 (p. 75).

Mytilina ventralis var. *brevispina*: Koste, 1978 (p. 147, T. 42: 6e).

Material examined: 1 ind., Oisong(st.1), 27 VI 1988; 7 inds., Chinal(st.1), 27 VI 1988; 1 ind., Mokp'o (st.3), 26 VI 1988; 1 ind., Up'o(st.1), 26 VI 1988; 2 inds., Chunam-ji(st.3), 27 VI 1988; 9 inds., Chunam-ji(st.3), 2 X 1988; 1 ind., Oisong(st.1), 2 X 1988; 11 inds., Oisong(st.2), 2 X 1988.

Diagnosis: Two anterolateral spines sharp and trigonal. In lateral view, dorsal part more swollen than ventral part. Two posterolateral spines long, strong and protruding backward. Spines absent at end of dorsal cleft.

Distribution: Cosmopolitan.

10. *Mytilina ventralis* var. *macracantha* (Gosse, 1886)

(Fig. 7)

Salpina macracantha Gosse, 1886 [In: Hudson & Gosse, 1886 (vol. 2, pp. 84-85, pl. 12, fig. 6)].

Mytilina macracantha: Collin, Dieffenbach, Sachse & Voigt, 1912 (p. 157, fig. 307).

Mytilina ventralis var. *macracantha*: Koste, 1978 (p. 147, T. 42: 6a-b).

Material examined: 15 inds., Oisong(st.1), 27 VI 1988; 25 inds., Up'o(st.3), 26 VI 1988; 8 inds., Up'o(st.2), 26 VI 1988; 2 inds., Up'o(st.1), 26 VI 1988; 8 inds., Chunam-ji(st.3), 27 VI 1988; 35 inds., Chunam-ji(st.1), 27 VI 1988; 4 inds., Chunam-ji(st.2), 27 VI 1988; 9 inds., Chunam-ji(st.1), 2 X 1988;

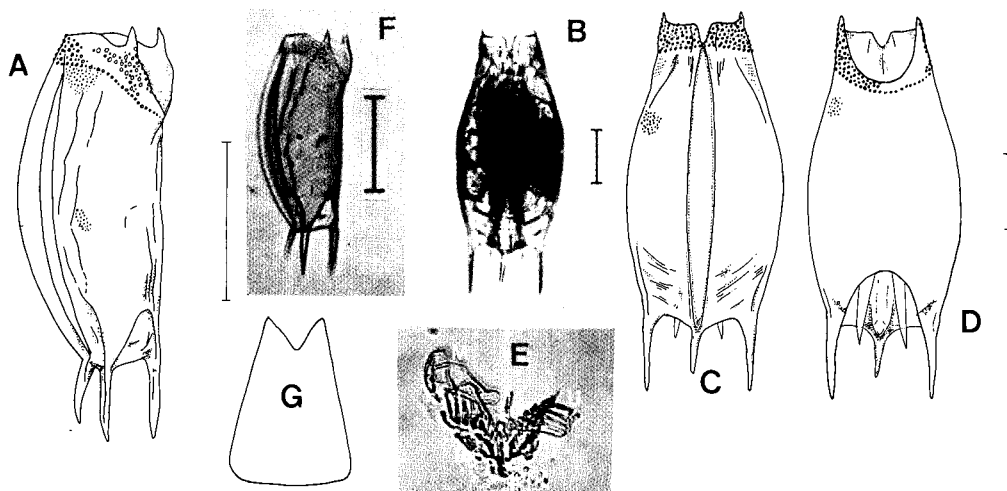


Fig. 7. *Mytilina ventralis* var. *macracantha* (Gosse, 1886): A, entire lorica; B, photograph of dorsal view; C, dorsal view; D, ventral view; E, photograph of trophi (x1000, F: fulcrum; M: manubrium; R: ramus; U: uncus); F, photograph of entire lorica; G, cross section (Scale bar: 50 μ m).

53 inds., Up'o(st.1), 1 X 1988; 86 inds., Up'o(st.2), 1 X 1988; 428 inds., Up'o(st.3), 1 X 1988; 95 inds., Chilnal(st.1), 2 X 1988; 28 inds., Oisong(st.2), 2 X 1988.

Diagnosis: Two anterolateral spines sharp and trigonal. At end of dorsal cleft, long spine present, which shorter than two posterolateral spines.

Remarks: Hudson and Gosse described the present species as a new species in their monograph published in 1886. However, they listed this species as "*Salpina macracantha*, Gosse, sp. nov" at page 84. Therefore we consider that the priority of naming this species goes to Gosse as they indicated.

Distribution: Cosmopolitan.

Family Lecanidae Bartos, 1959

Genus *Lecane* Nitzsch, 1827

11. *Lecane (Monostyla) bulla bulla* (Gosse, 1851)

(Fig. 8: A-B)

Monostyla bulla Gosse, 1851 (p. 203); Hudson & Gosse, 1886 (vol. 2, p. 99, pl. 25, fig. 4); Murray, 1913 (pp. 353-354, pl. 15, fig. 33a-c); Haring & Myers, 1926 (pp. 388-389, pl. 37, figs. 1, 2); Yamamoto, 1956 (p. 53, fig. 120).

Monostyla bipes Stokes, 1896 (p. 23, pl. 8, figs. 11-13).

Lecane bulla: Hauer, 1965 (p. 357).

Lecane (Monostyla) bulla: Mamaril & Fernando, 1978 (pp. 119-120, fig. 25).

Lecane (Monostyla) bulla bulla: Koste, 1978 (pp. 252-253, T. 83: 2a-b; T. 85: 1a-c).

Material examined: 2 inds., Up'o(st.1), 16 IV 1988; 2 inds., Oisong(st.1), 27 VI 1988; 10 inds., Chilnal(st.1), 27 VI 1988; 11 inds., Up'o(st.3), 26 VI 1988; 10 inds., Up'o(st.2), 26 VI 1988; 5 inds., Chunam-ji(st.1), 27 VI 1988; 55 inds., Chunam-ji(st.1), 2 X 1988; 33 inds., Chunam-ji(st.3), 2 X 1988; 62 inds., Up'o(st.1), 1 X 1988; 22 inds., Up'o(st.2), 1 X 1988; 209 inds., Up'o(st.3), 1 X 1988; 2528 inds., Chilnal(st.1), 2 X 1988; 205 inds., Chilnal(st.2), 2 X 1988; 20 inds., Oisong(st.1), 2 X 1988; 15 inds., Oisong(st.2), 2 X 1988.

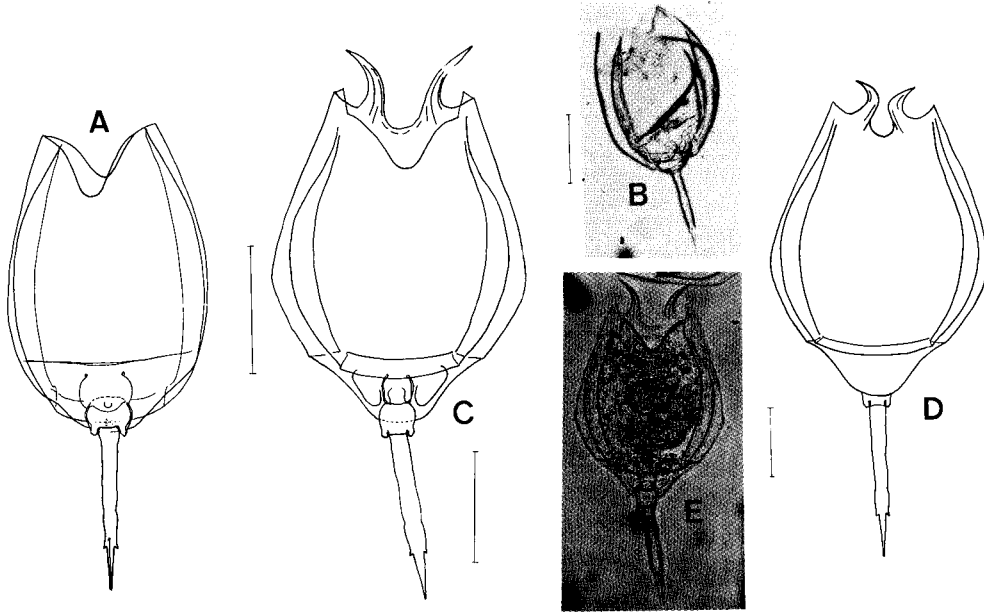


Fig. 8. A-B, *Lecane (Monostyla) bulla bulla* (Gosse, 1851): A, whole animal; B, photograph of whole animal (Scale bar: 50 μ m). C-E, *Lecane (Monostyla) quadridentata* (Ehrenberg, 1832): C, whole animal; D, dorsal view; E, photograph of whole animal (Scale bar: 50 μ m).

Diagnosis: Anterodorsal margin with shallow, V-shaped sinus having median notch. Anteroventral margin with very deep sinus, rounded at posterior end, deeper than dorsal one. Anterolateral spine absent. One toe long, slender, 1/3 of total length, and ending in long and acute claw with two distinct basal spicules. Claw having distinct median line.

Distribution: Cosmopolitan.

12. *Lecane (Monostyla) quadridentata* (Ehrenberg, 1832)

(Fig. 8: C-E)

Monostyla quadridentata Ehrenberg, 1832 (p. 130; cited from Koste, 1978); Hudson & Gosse, 1886 (vol. 2, p. 100, pl. 25, fig. 3); Murray, 1913 (p. 354, pl. 15, fig. 34); Harring & Myers, 1926 (pp. 391-392, pl. 38, figs. 3-5); Yamamoto, 1956 (p. 52, fig. 117).

Metopidia cornuta: Hudson & Gosse, 1889 (p. 47, pl. 34, fig. 3).

Lecane quadridentata: Hauer, 1965 (p. 365).

Lecane (Monostyla) quadridentata: Koste, 1978 (p. 255, T. 83: 8a-c); Mamaril & Fernando, 1978 (p. 121, fig. 34).

Material examined: 14 inds., Chilnal(st.1), 27 VI 1988; 10 inds., Up'o(st.3), 26 VI 1988; 3 inds., Up'o(st.2), 26 VI 1988; 1 ind., Chunam-ji(st.1), 2 X 1988; 2 inds., Up'o(st.2), 1 X 1988.

Diagnosis: Anterodorsal margin flanked by two stout, long and hornlike spines. Between them, margin deeply and narrowly incurvated. One toe very long, about 1/3 of total length, slender, parallel sided, and having faint annular constriction near posterior end. Claw with two small basal spicules, 1/5 of total toe length and without median line.

Distribution: Cosmopolitan.

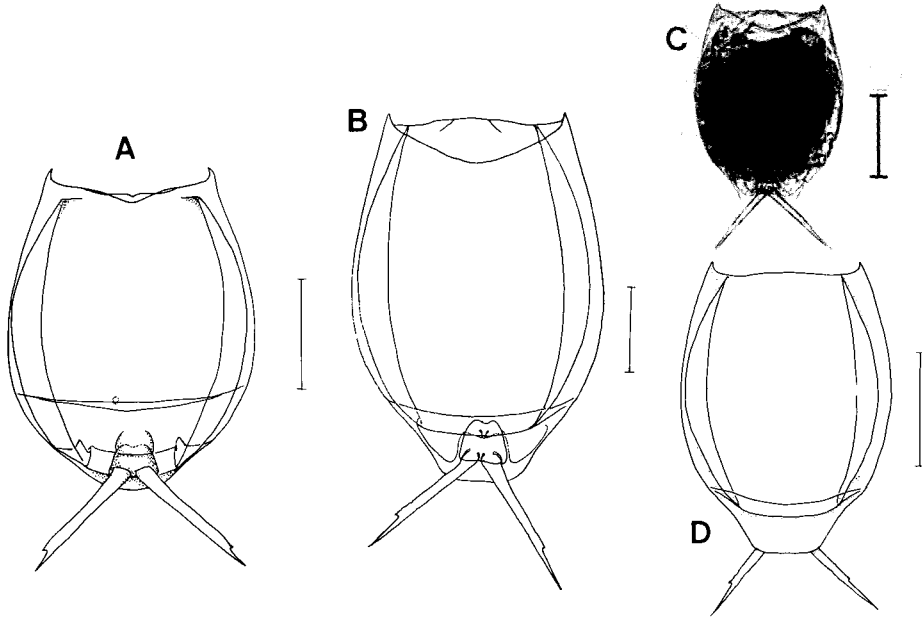


Fig. 9. A, *Lecane curvicornis curvicornis* (Murray, 1913); B-D, *Lecane ungulata ungulata* (Gosse, 1887): B, whole animal; C, photograph of whole animal; D, dorsal view. (Scale bar: 50 μ m)

13. *Lecane curvicornis curvicornis* (Murray, 1913)

(Fig. 9: A)

Cathypna curvicornis Murray, 1913 (pp. 346-347, pl. 14, fig. 22).

Lecane curvicornis: Harring, 1914 (pp. 535-536, pl. 17, fig. 3); Harring & Myers, 1926 (pp. 321-322, pl. 8, figs. 1, 2); Hauer, 1965 (p. 358, Abb. 15); Mamaril & Fernando, 1978 (pp. 115-116, fig. 9).

Lecane curvicornis curvicornis: Koste, 1978 (p. 224, T. 74: 2e).

Material examined: 4 inds., Up'o(st.3), 24 II 1988; 1 ind., Chilnal(st.1), 22 II 1988; 6 inds., Up'o(st.1), 16 IV 1988; 8 inds., Up'o(st.2), 16 IV 1988; 1 ind., Oisong(st.1), 27 VI 1988; 1 ind., Up'o(st.3), 26 VI 1988; 2 inds., Chunam-ji(st.2), 14 IV 1988; 2 inds., Up'o(st.3), 16 IV 1988; 14 inds., Chunam-ji(st.3), 2 X 1988; 24 inds., Up'o(st.1), 1 X 1988; 2 inds., Up'o(st.2), 1 X 1988; 32 inds., Up'o(st.3), 1 X 1988; 288 inds., Chilnal(st.1), 2 X 1988; 8 inds., Chilnal(st.2), 2 X 1988; 1 ind., Oisong(st.1), 2 X 1988; 1 ind., Oisong(st.2), 2 X 1988.

Disgnosis: Anterior margins normally coincident except median part. Two anterolateral spines small and triangular. Their sharp points slightly curved towards each other. Lateral sulcus not quite reaching anterior margin, and abruptly bending inward at right angle. Two toes somewhat shorter than 1/3 of total length. Claw 1/7-1/6 of total toe length, with small spicule at outer side of its base.

Distribution: The tropics, The subtropics, The United States, Korea.

14. *Lecane ungulata ungulata* (Gosse, 1887)

(Fig. 9: B-D)

Cathypna ungulata Gosse, 1887b (p. 361, pl. 8, fig. 1).

Cathypna glandulosa Stokes, 1897 (pp. 632-633, pl. 14, figs. 8-10).

Cathypna magna Stenroos, 1898 (p. 161, T. II: 21, 22); Lucks, 1912 (p. 109, fig. 32).

Lecane ungulata: Harring, 1913 (p. 62); Harring & Myers, 1926 (pp. 323-324, pl. 9, figs. 3, 4); Koch-Althaus,

1963 (p. 420, Abb. 29); Mamaril & Fernando, 1978 (p. 119, figs. 2, 21).

Lecane ungulata ungulata: Koste, 1978 (p. 225, T. 74: 6a-g).

Material examined: 2 inds., Chilnal(st.1), 27 VI 1988; 4 inds., Up'o(st.1), 26 VI 1988; 7 inds., Chunam-ji(st.2), 27 VI 1988; 5 inds., Chunam-ji(st.1), 2 X 1988; 2 inds., Up'o(st.2), 1 X 1988; 112 inds., Chilnal(st.1), 2 X 1988; 2 inds., Oisong(st.1), 2 X 1988.

Diagnosis: Lorica elongated oval in outline. Anterodorsal margin nearly horizontal, often slightly convex. Anteroventral margin rather concave. Two anterolateral spines triangular and distinct. Posterior part of lorica extended into broad, thin, and truncated plate. Posterior end of lorica passing over foot end. Two toes 1/3 of total length. Toe having long and stout claw, which 1/3 of toe length, and with small and sharp basal spicule at outer side of its base.

Description: Total length 280-326 μ . Lorica elongated oval in outline. Ventral plate rather flat and dorsal one convex. Lorica with deep lateral sulci, which dividing lorica into dorsal and ventral plates outwardly. Anterodorsal margin more or less horizontal, often slightly convex and anteroventral margin rather concave. Anterolateral corners with triangular cusps. Width of anterior margin 111-131 μ , 8/10 of lorica width. Dorsal plate somewhat narrower and much shorter than ventral one. Dorsal plate width 141-170 μ , length 184-227 μ . Ventral plate width 151-189 μ , length 205-258 μ . Lorica having deep lateral sulci, which not reaching anterior margin completely, so not forming distinct anterodorsal edges. Posterior part of dorsal plate truncated and slightly convex. Foot of 2 sections. First foot joint very indistinct, second one trapezoid in longitudinal section. Foot end not passing over posteroventral margin. Posterior part of lorica extended into broad, thin and truncated plate. Posterior end of lorica passing over foot end and whose edges round. Two toes straight, nearly parallel-sided, very slightly enlarged at their bases and ending in long, sharp and stout claws with prominent basal spicule. Toe 90-113 μ long, 1/3 of total length, 7-8 μ , wide. Claw length 29-43 μ . Toe with two annular constrictions in middle of it. Littoral, occurring between plants.

Remarks: This is the largest known species of this genus. This species is closely related to *L. acronycha* (Harring & Myers, 1926; Koste, 1978), but above all, this is distinguished from *L. acronycha* by its greater size. Posterior part of lorica of *L. acronycha* is also extended into broad and thin plate, which passes over foot end but is more oval and shorter than that of this species. And toes of *L. acronycha* don't have any annular constrictions in the middle of it. Claw length of this species is 1/3 of toe length, but that of *L. acronycha* is only 1/7-1/6.

Distribution: Cosmopolitan.

Family Trichocercidae Remane, 1933

Genus *Trichocerca* Lamarck, 1801

15. *Trichocerca bicristata bicristata* (Gosse, 1887)

(Fig. 10: A-E)

Mastigocerca bicristata Gosse, 1887a (p. 2, pl. 1, fig. 5); Hudson & Gosse, 1889 (p. 35, pl. 31, fig. 27).

Rattulus bicristatus: Jennings, 1903 (pp. 330-331, pl. 9, figs. 77-80).

Trichocerca bicristata: Yamamoto, 1952 (p. 84, fig. 99); Pontin, 1978 (p. 88, fig. 72b).

Trichocerca bicristata bicristata: Koste, 1978 (pp. 395-396, T. 137: 3a-m).

Material examined: 2 inds., Oisong(st.1), 27 VI 1988; 4 inds., Chilnal(st.1), 27 VI 1988; 1 ind., Up'o(st.2), 26 VI 1988; 2 inds., Up'o(st.1), 26 VI 1988; 1 ind., Chunam-ji(st.1), 27 VI 1988; 5 inds., Chunam-ji(st.3), 27 VI 1988; 35 inds., Chunam-ji(st.1), 2 X 1988; 2 inds., Up'o(st.2), 1 X 1988; 2 inds., Up'o(st.3),

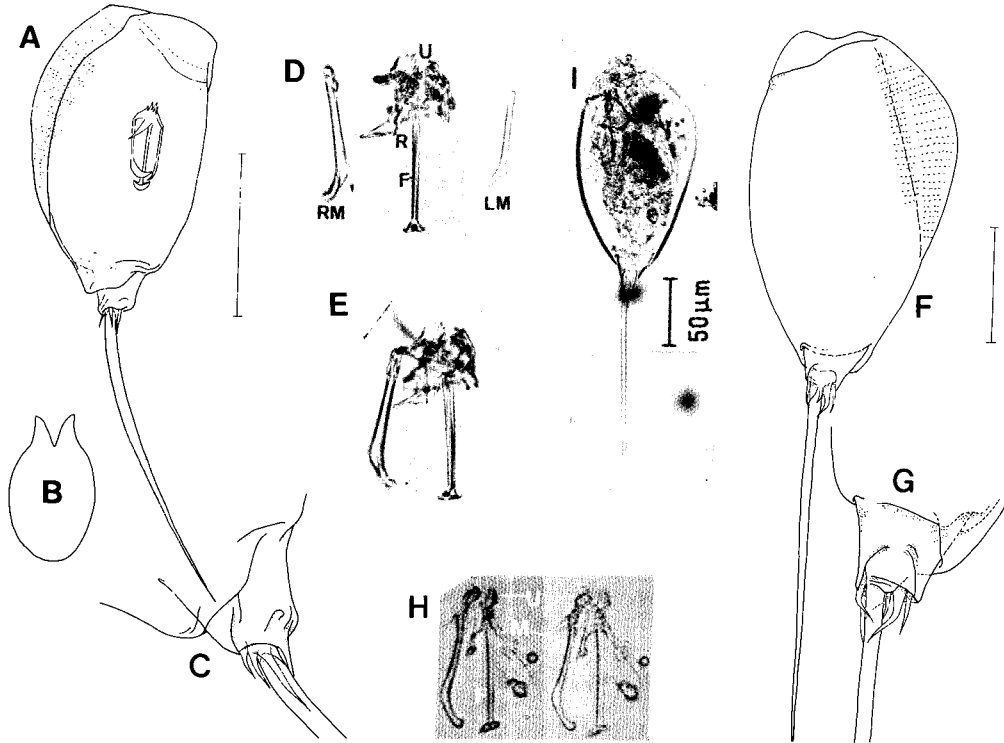


Fig. 10. A-E, *Trichocerca bicristata bicristata* (Gosse, 1887): A, whole animal; B, cross section; C, foot (x600); D-E, photographs of trophi (x1000, F: fulcrum; LM: left manubrium; R: ramus; RM: right manubrium; U: unci) (Scale bar: 100 μ m). F-I, *Trichocerca rattus f. carinata* (Ehrenberg, 1830): F, whole animal; G, foot (x600); H, photograph of trophi (x1320); I, photograph of whole animal (Scale bar: 50 μ m).

1 X 1988.

Diagnosis: Lorica with two high dorsal ridges passing from anterior end backward for about 3/4 of lorica length. Anterior margin without spines. Tip of left toe tridentate and median dentation longest.

Description: Lorica cylindrical and half-moon-shaped in side view. Lorica length including foot, 183-218 μ , height 102-134 μ . Lorica smooth. Lorica cross section approximately elliptical. Two high dorsal ridges present, running from anterior end backward and a little to left, for about 3/4 of lorica length, thin at edges, growing thicker toward their bases, having broad, well-defined bands of muscle fibers within them, which resulting in transverse striations outwardly. Between ridges, wide V-shaped trough present. Ridges lowering backward after their maximum height (17-24 μ). Anterior margin without spines or projections. Head sheath marked off from remainder of lorica merely by slight constriction, largely confined to ventral side. Foot conical, about 20-25 μ long. Posterodorsal part of lorica extended, covering dorsal part of foot, but not reaching foot end. Two toes very long, curved and needle-shaped. Left toe somewhat longer than lorica length (192-213 μ) while right one conspicuously degenerate or rudimentary and its length only 1/8-1/7 of left toe length (25-37 μ). Tip of left toe tridentate and median dentation longest. Foot end with five substyles except two toes and their length about 8-17 μ .

Trophi virgate type. Its left manubrium thinner and shorter than right one, but all curved inward. Fulcrum inverted T-shaped. Upper end of unci and rami dentate. Lower part of right ramus projecting lengthwise and sharply like wing of swallow. Found among detritus and plants.

Remarks: This species is distinguished from *T. bicristata* var. *mucosa* (Koste, 1978) by the ratio of the length of dorsal ridges to lorica length. While the ridges pass over 3/4 of lorica length in this species, only 1/2 in *T. bicristata* var. *mucosa*.

Distribution: Cosmopolitan.

16. *Trichocerca rattus* f. *carinata* (Ehrenberg, 1830) (Fig. 10: F-I)

Mastigocerca carinata Ehrenberg, 1830 (p. 66; cited from Koste, 1978); Hudson & Gosse, 1886 (vol. 2, p. 60, pl. 20, fig. 7).

Acanthodactylus carinatus: Tessin, 1890 (p. 156, fig. 15).

Rattulus carinatus: Jennings, 1903 (pp. 332-333, pl. 11, figs. 95-97).

Trichocerca rattus f. *carinata*: Koste, 1978 (pp. 398-399, T. 137a: 7; T. 139: 1a-d).

Material examined: 9 inds., Up'o(st.1), 16 IV 1988; 1 ind., Oisong(st.1), 27 VI 1988; 8 inds., Up'o(st.2), 26 VI 1988; 2 inds., Up'o(st.1), 26 VI 1988; 15 inds., Chunam-ji(st.1), 27 VI 1988; 1 ind., Chunam-ji(st.1), 2 X 1988.

Diagnosis: Anterior margin of lorica without any spines or projections. Dorsal part of lorica with fin-like ridge. Dorsal ridge higher than 1/3 of lorica height, and passing over 2/3 of lorica length. Left toe almost as long as lorica or more or less longer.

Remarks: This species differs from *T. rattus rattus* (Koste, 1978) in that the ridge of this species is very high and 1/3 of lorica height.

Distribution: Cosmopolitan.

Family Dicranophoridae Remane, 1933

Genus *Dicranophorus* Nitzsch, 1827

17. *Dicranophorus epicharis* Harring & Myers, 1928

(Fig. 11)

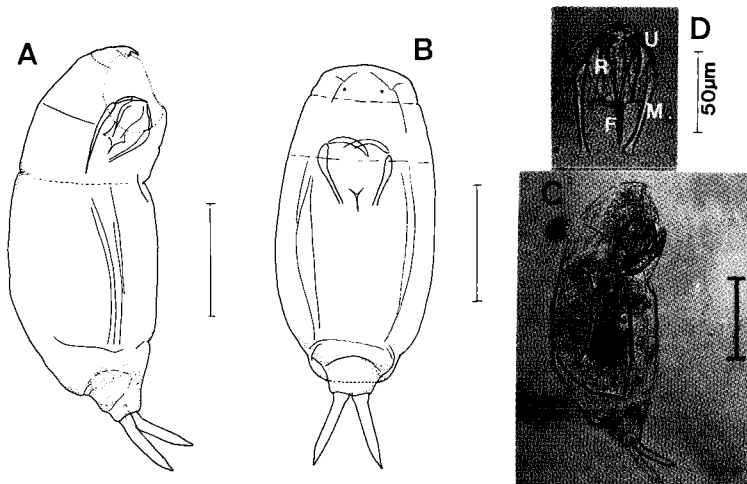


Fig. 11. *Dicranophorus epicharis* Harring & Myers, 1928: A, lateral view; B, front view; C, photograph of whole animal (lateral view); D, photograph of trophi (F: fulcrum; M: manubrium; R: ramus; U: uncus) (Scale bar: 100 μ m).

Dicranophorus epicharis Harring & Myers, 1928 (pp. 705-707, pl. 25, figs. 1, 2); Koch-Althaus, 1963 (pp. 408-409, Abb.20); Wulfert, 1966 (p. 64, Abb. 9); Koste, 1978 (p. 469, T. 169: 4; T. 170: 3a-b; T. 172: 1a-g).

Material examined: 4 inds., Oisong(st.1), 27 VI 1988; 4 inds., Oisong, 27 VI 1988; 10 inds., Chilnal(st.1), 27 VI 1988; 16 inds., Up'o(st.3), 26 VI 1988; 15 inds., Up'o(st.2), 26 VI 1988; 12 inds., Up'o(st.1), 26 VI 1988; 10 inds., Chunam-ji(st.1), 27 VI 1988; 2 inds., Chunam-ji(st.2), 27 VI 1988; 8 inds., Oisong(st.2), 2 X 1988.

Diagnosis: Corona strongly oblique, almost ventral, and little shorter than 1/3 of body length. Uncus consisting in three long teeth.

Description: Illoricate, i.e., cuticle very thin and transparent, but outline more or less unchangeable. Body elongate, subcylindrical and very slightly gibbous posteriorly. Total length 265-407 μ . Body width 123-140 μ . Dorsal surface more swollen than ventral surface. Integument divided longitudinally by distinct lateral sulci into dorsal and ventral plates, limited anteriorly and posteriorly by transverse folds, which dividing body into head, trunk and foot. Head long, about 1/3 of body length, and separated from abdomen by well marked neck. Corona strongly oblique, almost ventral, and little shorter than 1/3 of body length(60-123 μ). Rostrum very short, broad and rounded anteriorly. Below rostrum, two red eyes present. Abdomen becoming gibbous at 2/3 of body length and tapering gradually. Between abdomen and foot, two transverse folds present. Foot stout, conical and 35-50 μ long. Within foot, two club-like pedal gland present. Two toes straight, parallel sided, very slightly enlarged at their bases, ending in bluntly conical tips and 47-65 μ long, about 1/7 of total length. Width of their bases 11-12 μ . Toes slightly curved toward ventral side.

Trophi forcipate type, larger than any other species of the *forcipatus* group (Harring & Myers, 1928), about 59-70 μ long. Manubrium widen toward end like spatula. Uncus consisting of three long teeth, middle of which longest, thickest, having swollen tip. Rami having 8-9 teeth on inner margin, decreasing in size toward fulcrum. Fulcrum rod-shaped in front view, triangular in side view. Alulae short, triangular, and its end hanging down. Carnivorous. Benthic.

Remarks: As this species has a strong resemblance to *D. grandis* (Harring & Myers, 1928; Koste, 1978), these two species can not be discriminated by general appearances. This species differs from *D. grandis* in the numbers of teeth in uncus. While uncus of this species consists of three long teeth, that of *D. grandis* only one long teeth.

Distribution: Cosmopolitan.

ABSTRACT

The rotifers inhabiting several lowland swamps in Kyongsangnam-do were taxonomically investigated. Collectings were carried out four times at 10 sites in such lowland swamps as Up'o, Chunam-ji, Chilnal-nŭp and Oisong-nŭp from 22 February 1988 to 2 October 1988. As a result, 4 species, 9 subspecies, 2 varieties and 2 forms of monogonont rotifers in 5 families were identified, of which following 3 species and 3 subspecies are new to Korea: *Testudinella mucronata hauerensis*, *Platyias quadricornis*, *Mytilina acanthophora*, *Lecane ungulata ungulata*, *Trichocerca bicristata bicristata*, and *Dicranophorus epicharis*.

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