

**Rotifera from Korean Inland Waters II. Colurellidae
(Rotifera: Monogononta)**

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韓國 淡水産 輪形動物門 II. Colurellidae (Rotifera : Monogononta)

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摘 要

韓國 淡水産 輪蟲類의 分類學的 研究를 위하여 1990年 3月부터 同年 12月까지 全國일대에 散在해 있는 댐, 호수, 저수지, 연못, 논, 웅덩이 등을 대상으로 총 197개 지점에서 採集을 實施하여 調査한바, Colurellidae科에 속하는 2種, 5亞種, 2型이 밝혀졌고, 그중 1種 3亞種: *Colurella uncinata uncinata*, *Squatinella rostrum rostrum*, *Lepadella patella patella*, *L. elliptica*가 韓國 未記錄種으로 판명되어 記載와 함께 도판을 作成하였고, 本 研究에서 確認된 Colurellidae 科내의 種들에 대한 韓國産 輪形動物의 檢索表를 만들었다. 따라서 지금까지 記錄된 韓國産 輪形動物은 2綱 4目 13科 40屬 165種이 된다.

Key words: freshwater Rotifera, taxonomy, Korea.

INTRODUCTION

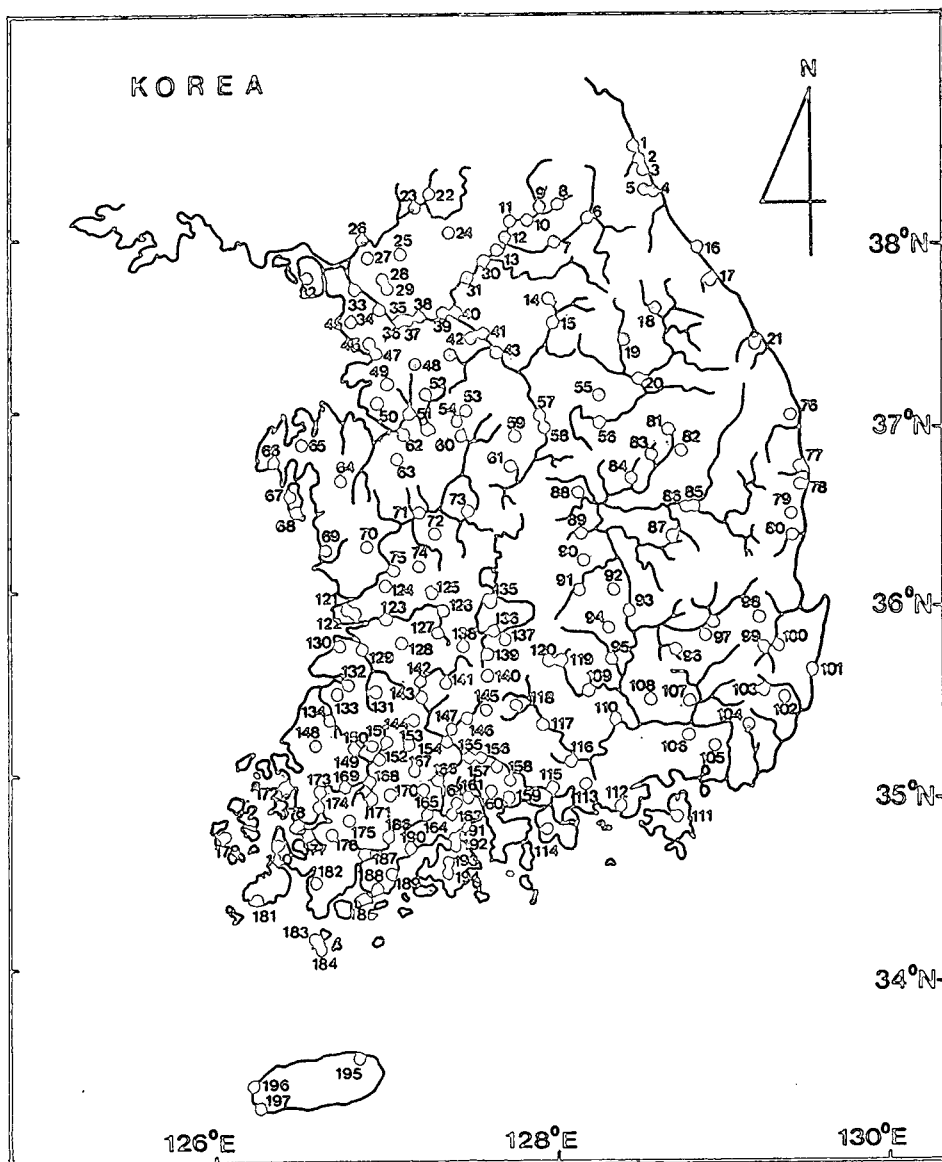
This paper is our second publication first paper: Chung *et al.*, 1991) on freshwater rotifers from Korean inland, this study deals with the species in Family Colurellidae of monogonont Rotifera.

The historic review of studies on the freshwater Rotifera from Korea was presented in some foreign (Hada, 1936; Sato, 1939; Yamamoto, 1953; Mizuno *et al.*, 1980; Turner, 1986) and Korean specialists (Kim & Park, 1969; Kang, 1969; Cho *et al.*, 1978; Kim *et al.*, 1987), but most of species from these theses were recorded from limno-ecological investigation. The first taxonomical study in Korea was accomplished by Song (1989), Song and Kim (1989), and the key to the species of family Colurellidae (*Colurella*, *Squatinella* and *Lepadella*) from Korean inland was first provided in this paper.

MATERIALS AND METHODS

The materials used for this work were collected from 197 sites in Korea (Fig. 1) during the period from March 1990 to December 1990. Collections were made with a conical plankton net (mouth diameter: 30cm, length: 90cm, mesh size: 55 μ m) by horizontal haul from surface. All samples were fixed with 5% neutral formalin after collecting at once. The mounting method was in accordance with that given by Hanley (1949) and Stemberger (1979). Drawings and measurements were made with the aid of a camera lucida. All drawings and descriptions of this study were based on females because of parthenogenetic reproduction of rotifers. All specimens reported here are deposited in the Department of Biology Education, Chonnam National University.

The classification system was based on Koste (1978).



- Fig. 1. A map showing the sampling sites in Korean inland. 1, Hwajinp'o lake; 2, P'ukch'ön St.; 3, Songji lake; 4, Yongrang lake; 5, Haksap'öng Res. (T'osöng); 6, Soyang lake (Kunch'uk Bridge); 7, Yangju Bridge (Inje); 8, P'aro lake; 9, P'onghwa Dam; 10, P'aro lake (Hwach'ön); 11, Ch'unch'ön lake; 12, Ch'unch'ön Dam; 13, Üam lake; 14, Hongch'ön River; 15, Hakdam-ri St. (Hwing-söng); 16, Hyang lake (Chumunjin); 17, Kyöngp'o lake; 18, Odae St. (P'öng-ch'ang); 19, P'ongchang River; 20, Chuch'ön River (Yöndang Bridge); 21, Osib St. (Samch'ök); 22, Sangsuwon (Yönch'on-ü); 23, Hant'an River (Chönguk); 24, Münhwari Res. (P'ö-ch'ön); 25, Pongam Res. (Yangju); 26, Imjingak Bridge (Paju); 27, Aeryong Res.; 28, Streamlet near Kwansan-ri, Pyökjje; 29, Pond near Kwansan-ri; 30, Streamlet near Kap'öng-ü Bridge; 31, Ch'öngP'öng Dam; 32, Kukhwari Res. Kanghai-ü; 33, Ch'öngsuwon, Kimp'o-ü; 34, Haengju Bridge, Han River; 35, Söngsan Bridge, Han River; 36, Panp'o Bridge, Han River; 37, Chamsil Bridge, Han River; 38, Ch'önho Bridge, Han River; 39, P'aldang Dam; 40, P'aldang Lake, Yangp'öng; 41, Yangp'öng Bridge, Yangp'ong-up; 42, Böngsan Res.; 43, Namhan River, Yöju-ü; 44, Yangböri Res. Okp'o; 45, Fish-farm, Inch'ön City; 46, Iljik Res. Kwangmyöng City; 47, Pugok Res. Panwol; 48, Singal Res. Yongin; 49, Palan Res. Pongdam; 50, A small pind, Changan-myön; 51, Wolgok Res. P'yöngt'aek City; 52, Awböri Res. Yongin; 53, Ch'odang Res. Ansöng; 54, Küm kang Res.; 55, Üirimji, Chech'ön City; 56, Ch'ungju Lake, Sindanyang City; 57, Tegami pond, Ch'ungju City; 58, Hoamji pond, Ch'ungju City; 59, Kuanri Res. Ümsöng-ü; 60, Paekgok Res. Paekgok-myön; 61, Yanggok Res. Küisan-ü; 62, Myöngsüngji Res. Songhwan-up; 63, Sinjöng Lake, Onyang City; 64, Singokri Res. Kümma-myön; 65, Tongmundong Res. Sösan City; 66, Suyoung Res. Künhüng-myön; 67, A pond near Anmin-ü Taezan; 68, Changguk Res. Konam-myön; 69, Ch'ongra Res.; 70, Pansan Res. Kyuam-myön; 71, Küm River Bridge, Kongju City; 72, Kyöryong Res. Panpö-myön; 73, Taech'öng Dam; 74, Nonsan Res. Nonsan-ü; 75, Wangam Res. Nonsan; 76, Streamlet near Uljin-ü; 77, pond near Ch'öksan 3-ri, kisöng-myön; 78, Samyöri Res. Hup'o-myön; 79, Tasanri Res. Ch'angsu-myön; 80, Hwasu Res. Yöngdök-ü; 81, Kukjiri Res. Mülya-myön; 82, Streamlet near Samyöri Ponghwa-ü; 83, Deubalri Res. Changsu-myön; 84, Naktong River, Yongmun-myön; 85, Andong Dam, Andong City; 86, Andong regulator Dam, Andong City; 87, Orodong pond, Üisöng-ü; 88, Kambau Res. Ian-myön; 89, Kyowon pond Sangju City; 90, Sangsong Res. Muül-myön; 91, Chikji streamlet, Kimch'ön City; 92, Taesöng Res. Ap'o-myön; 93, pond near Kara-dong, Yakok-myön; 94, Samsan Res. Söngju-ü; 95, Najil Res. Koryöng-ü; 96, Susöng pond Taegu City; 97, Osu-dong pond, Yöngch'ön City; 98, Hwagokri Res. Ankang-ü; 99, Söch'ön streamlet, Kyöngju City; 100, Pomun Lake, Kyöngju City; 101, Pond near Taebon-ri, Kamp'o-ü; 102, T'ae-hwa River, Ulsan City; 103, Pond near p'ongri, Önyang-myön; 104, Taesukri Res. Yangsan-ü; 105, Pond near Nae-dong, Kimhae City; 106, Pond near Taechang-ri Chinyöng-ü; 107, Tökgokri Res. Pubuk-myön; 108, Myöngduk Res. Ch'angryöng-myön; 109, Hapch'ön Dam; 110, Sannam Res. Ch'ilguk-myön; 111, Yangjöng Res. Sinhyön-ü; 112, Taega Res. Taega-myön; 113, Turang pond, Sach'ön-ü; 114, Iphyönri Res. Namhae-myön; 115, Chinkyöri Res. Chinkyö-myön; 116, Chinyang Lake, Chinju City; 117, Naeri Res. Sanch'öng-ü; 118, Sosil Res. Hamyang-ü; 119, Streamlet near Köchang-ü; 120, Tongbyönri Res. Köch'ang-ü; 121, Okgu Res. Okgu-ü; 122, Taewuije, Okgu-myön; 123, Mokch'ön'p'o Bridge Osan-myön; 124, Hamyöl streamlet, Hamyöl-ü; 125, Kyöngch'ön Res. Wanju-ü; 126, Sinwol Res. Kosan-myön; 127, Ajungr Res. Chönju City; 128, Taehwari Res. Kümku-myön; 129, Wonp'öng streamlet, Puryang-myön; 130, ch'önghoji, Hasö-myön; 131, Naejangsan Res. Chöngju City; 132, Tongrim Res. Hüngdük-myön; 133, Osan Res. Puan-myön; 134, P'anjöng pond, Söngsong-myön; 135, Müju streamlet, Müju-ü; 136, Tökgok Res. Ansöng-myön; 137, Ansöng streamlet, Ansöng-myön; 138, Tanyang Res. Chinan-ü; 139, Changan Res. Changkyö-myön; 140, Changsu Res. Changsu-ü; 141, Anduisil Res. Imsil-ü; 142, Kaldam Res. Kangjin-myön; 143, Streamlet near Kangjin-ü; 144, Kangch'önsa Res. P'aldok-myön; 145, Kajang Res. Chuch'ön-myön; 146, Pond near rice fields, Namwon City; 147, Küm'ung Res. Chusaeng-myön; 148, Pulkap Res. Pulkap-myön; 149, Saengyong Res. Kwangju City; 150, Hakdong Res. Chinwon-myön; 151, Hanjae Res.

Taejön-myön; 152, A pond in Chonnam Nat'l univ.; 153, A swamp near Yongdo-ri Okgwa-myön; 154, Streamlet near Ch'imgok-ri Ogok-myön; 155, Söji streamlet Kurye-üp; 156, Yongdu Res. T'oji-myön; 157, Sömjin river Kurye-Kun; 158, Suö Dam Chinsang-myön; 159, Changdong Res. Okgok-myön; 160, Paekun Res. Ponggang-myön; 161, Streamlet near Towol-ri Sangsa-myön; 162, Tongrae Res. Nakan-myön; 163, Döngkwangje Pölkyo-üp; 164, Streamlet near Chusan-ri Nam-myön; 165, Streamlet near Yongsan-ri Kyombaek-myön; 166, Streamlet near Kunggak-ri Chuam-myön; 167, Tongbok Dam Hwasun-Kun; 168, Tüdül River Sampo-myön; 169, Yöngsan River (Naju Bridge); 170, Chisök stream Hanch'ön-myön; 171, Naju Dam Samp'o-myön; 172, Yanggok Res. Unnam-myön; 173, Möngsan Res. Möngr'an-myön; 174, Chijangri Res. Mongt'an-myön; 175, Ssangjöngje Yöngam-üp; 176, Hakp'al Res. Söho-myön; 177, Söchang Res. Samho-myön; 178, Haguön Dam (Yongsan River) Mokp'o City; 179, Streamlet near Yongdong-ri Toch'o-myön; 180, Yangch'o Res. Hwawon-myön; 181, Yongsanje Imhwi-myön; 182, Kushi Res. Hyönsan-myön; 183, Pogildo Sangsudo Nohwa-myön; 184, Wolsongri Res. Nohwa-myön; 185, Ch'öngghakri Res. Kögün-myön; 186, Namjöngji (Tamjin River) Uych'i-myön; 187, Kumsa Res. Maryang-myön; 189, Kwansan Res. Kwansan-myön; 190, Yulch'on Res. Hwich'on-myön; 191, Chungsan Res. Namyang-myön; 192, Mindüng Res. Kwayök-myön; 193, Sinsongri Res. Duwon-myön; 194, Paeknyön Res. Kohüng-üp; 195, Pond near Chongdal-ri Kujwa-üp; 196, Kosan Res. Hankyöng-myön; 197, Pond near Posöng-ri Taejöng-üp.

SYSTEMATIC ACCOUNTS

Phylum Rotifera Cuvier, 1798 윤형동물 문
 Class Monogononta Plate, 1889 단성 강
 Order Ploima Hudson and Gosse, 1886 유형 목
 Family Colurellidae Bartos, 1959

Loricata rotifers. Corona covered with semicircular shield or membranous cap (except *Squatinella*). Ventral plate with caudal foot-opening; lateral sulcus wanting; toes slender, sharply pointed. Trophi malleate type.

Key to the genera of Colurellidae

- 1 Lorica laterally compressed 2
 Lorica dorso-ventrally flattened 3
 2(1) Lorica composed of one piece, with ventral aperture *Colurella*
 3(1) Hood or head-shield large, not retractable *Squatinella*
 Hood small, retractable *Lepadella*

Genus *Colurella* (Bory de St. Vincent, 1824)

Type species: *Colurella colurus* (Ehrenberg, 1830)

Body oval in lateral view, with rigid shell-shaped lorica; anterior margin of lorica somewhat truncated or rounded; posterior margin rounded, gradually merging into blunt, straight or curved projections, in some cases sharply pointed. Foot with 3-4 segments, about 1/4 of body length. Toes sharply pointed, usually fused. Body size 60-120 μ long. Trophi malleate type.

Key to the species of *Colurella*

1. Posterior end of lorica curved, blunt-spined or tapered; lorica short, toes long
 *C. adriatica adriatica*
 Posterior end of lorica with raised lines terminating in variable tapering. Lorica long, toes short
 2
- 2(1) Posterior end of lorica with downward-tapering spines; lorica length/
 lorica height<1.8 *C. uncinata uncinata*
 Posterior end of lorica with somewhat upward-curving; lorica length/
 lorica height<1.4 *C. uncinata f. bicuspidata*

1. *Colurella adriatica adriatica* Ehrenberg, 1831 (Pl. I, Fig. 1)

Colurella adriatica Ehrenberg, 1831 (pl. 3, fig. 3; cited from Haring, 1913); Haring, 1913 (p.29); Yamamoto, 1950b (p.42, fig. 42); Koste and Shiel, 1989 (p. 121, fig. 1:1).

Colurella adriatica adriatica: Koste, 1978 (pp. 168-169, T. 55: 4a-d; T. 53: 3a-e).

Material examined: 19 inds., st. 1, 28 X 1990; 4 inds., st. 2, 29 X 1990; 1 ind., st. 6, 28 X 1990; 7 inds., st. 8, 28 X 1990; 7 inds., st. 13, 28 X 1990; 2 inds., st. 14, 27 X 1990; 2 inds., st. 15, 27 X 1990; 13 inds., st. 18, 30 X 1990; 7 inds., st. 19, 30 X 1990; 11 inds., st. 20, 30 X 1990; 9 inds., st. 21, 13 X 1990; 22 inds., st. 22, 26 IX 1990; 16 inds., st. 28, 26 IX 1990; 3 inds., st. 29, 26 IX 1990; 1 ind., st. 41, 24 IX 1990; 1 ind., st. 44, 24 IX 1990; 1 ind., st. 49, 25 IX 1990; 5 inds., st. 50, 25 IX 1990; 1 ind., st. 52, 24 IX 1990; 7 inds., st. 76, 13 X 1990; 27 inds., st. 82, 13 X 1990; 14 inds., st. 84, 15 X 1990; 8 inds., st. 91, 15 X 1990; 6 inds., st. 99, 14 X 1990; 4 inds., st. 101, 14 X 1990; 3 inds., st. 105, 25 IX 1990; 1 ind., st. 113, 26 IX 1990; 6 inds., st. 115, 27 IX 1990; 3 inds., st. 116, 27 IX 1990; 1 ind., st. 118, 27 IX 1990; 3 inds., st. 119, 27 IX 1990; 1 ind., st. 128, 5 IV 1990; 1 ind., st. 135, 27 V 1990; 1 ind., st. 137, 27 V 1990; 1 ind., st. 143, 10 VI 1990; 2 inds., st. 146, 26 V 1990; 1 ind., st. 152, 20 IX 1990; 1 ind., st. 161, 27 VII 1990; 3 inds., st. 170, 20 V 1990; 1 ind., st. 183, 5 V 1990.

Description: Lorica of one piece; anterior margin of lorica somewhat truncated or rounded; surface of lorica smooth; lorica slender posteriorly in lateral view, ending with curved spines. Size of lorica variable. Shape of lorica also variable particularly in posterior end of lorica.

Remarks: This is the largest known species in this genus. This species is very similar to *C. colurus* (Koste & Shiel, 1989), but distinguished from *C. colurus* by rounded form at posterior part of lorica.

Distribution: Cosmopolitan, Euryhaline.

2. *Colurella uncinata uncinata* (O.F. Müller, 1773) (Pl. I, Fig. 2)

Brachionus uncinatus Müller, 1773 (p. 134).

Colurus uncinatus: Hudson and Gosse, 1886 (vol. 2, p. 103).

Colurella uncinata: Haring, 1913 (p. 30).

Colurella uncinata uncinata: Koste, 1978 (p. 170, T.54: 6a-c; Abb. 41); Koste and Shiel, 1989 (p. 121, fig. 2:2).

Material examined: 9 inds., st. 3, 29 X 1990; 2 inds., st. 16, 29 X 1990; 2 inds., st. 17, 29 X 1990; 6 inds., st. 22, 26 IX 1990; 2 inds., st. 73, 9 VIII 1990; 5 inds., st. 76, 13 X 1990; 10 inds., st. 82, 13 X 1990; 1 ind., st. 83, 13 X 1990; 23 inds., st. 84, 15 X 1990; 1 ind., st. 123, 5 IV 1990; 1 ind., st. 128, 5 IV 1990; 1 ind., st. 168, 28 IV 1990; 3 inds., st. 186, 21 IV 1990.

Description: Lorica broadly ovate in dorsal view; anterior margin of lorica rather truncated; posterior part of lorica ending with two short spines. Posterior end of lorica with raised lines terminating in variable

tapered, downward-curving from sometimes lightly upward-curving spines. Lorica about two times as long as broad. Toes short. Width of head-opening shorter than length of lorica in lateral view. Total length of body 90-101 μ , width 58-64 μ , length of toe 21-22 μ .

Remarks: The anterior margins of Korean specimens were more elongated than those of the specimens described by Hudson and Gosse (1886) and Koste and Shiel (1989), while the width of lorica was somewhat narrower.

Distribution: Cosmopolitan.

3. *Colurella uncinata* f. *bicuspidata* (Ehrenberg, 1832)

(Pl. I, Fig. 3)

Colurus bicuspidatus Ehrenberg, 1832 (p. 129; cited from Koste, 1978); Hudson and Gosse, 1886 (vol. 2, pp. 102-103, pl. 26, fig. 2).

Colurella bicuspidata: Collin *et al.*, 1912 (p. 185, fig. 367); Hauer, 1924 (p. 185, fig. 6a-c); Wulfert, 1942 (p. 197, Abb. 6a-d); Yamamoto, 1950b (p. 43, fig. 43).

Colurella uncinata f. *bicuspidata*: Koch-Althaus, 1963 (p. 407, Abb. 18e-f); Wulfert, 1966 (p. 64, Abb. 8e-f); Koste, 1978 (p. 171, T. 54; 4a-c, 7a-e); Fernando and P-Zankai, 1981 (p. 208, fig. 14); Koste and Shiel, 1989 (p. 121-123, fig. 2.3).

Material examined: 2 inds., st. 2, 29 X 1990; 1 ind., st. 13, 28 X 1990; 1 ind., st. 14, 27 X 1990; 1 ind., st. 15, 27 X 1990; 1 ind., st. 20, 30 X 1990; 1 ind., st. 21, 13 X 1990; 4 inds., st. 28, 26 IX 1990; 11 inds., st. 40, 24 IX 1990; 1 ind., st. 44, 24 IX 1990; 2 inds., st. 91, 15 X 1990; 2 inds., st. 97, 14 X 1990; 1 ind., st. 98, 14 X 1990; 8 inds., st. 99, 14 X 1990; 14 inds., st. 101, 14 X 1990; 5 inds., st. 118, 27 IX 1990; 1 ind., st. 129, 3 XI 1990; 1 ind., st. 131, 3 XI 1990; 1 ind., st. 148, 3 XI 1990; 6 inds., st. 152, 20 IX 1990; 9 inds., st. 152, 7 XI 1990; 3 inds., st. 152, 21 XI 1990.

Description: Lorica undivided beneath. In lateral view, ventral part oval and dorsal part gradually slender, pointed. This pointed ending upward; frontal hood appeared not the segment of sphere, but somewhat indented in front. Lorica width similar to the height. In dorsal and ventral parts, no cleft; narrow sinus, reaching to more than one-third of the lorica in length; highest extension of lorica at head-opening; lorica ends short, most curve downwards; toes relatively short.

Distribution: Cosmopolitan.

Genus *Squatinella* (Bory de St. Vincent, 1826)

Type species: *Squatinella rostrum* (Schmarda, 1846)

Body spindle-shaped, cylindrical with thin lorica; lorica with 3 long or short posterior spines or projections, or spineless; ventral part of lorica smooth, with attached shield-like plate; caudal part of lorica rounded, truncated or tapered to variable points. 2 distinct eye spots under head shield. Foot 2 or 3 segmented with long pointed toes. Body size 150-200 μ long. Trophi malleate type.

4. *Squatinella rostrum rostrum* (Schmarda, 1846)

(Pl. II, Fig. 1)

Brachionus lamellaris Müller, 1786 (p. 340, T. 47: 8-11).

Listrion rostrum Schmarda, 1846 (p. 20, T. 2:4; cited from Koste, 1978).

Stephnops lamellaris: Collin *et al.*, 1912 (p. 150, fig. 293).

Squatinella rostrum: Wulfert, 1939 (p. 613, fig. 27); Koste and Shiel, 1989 (p. 125, fig. 3:1).

Squatinella rostrum rostrum: Koste, 1978 (p. 177, T. 57: 2a-g, 3a-e).

Material examined: 7 inds., st. 81, 13 X 1990.

Description: Body cylindrical. Hyaline shield, over head and corona, apically pointed shield shaped like fan. Lorica smooth and shield-like dorsally and ventrally. Caudal part of lorica tapered to three pointed processes which arise from narrow bases; median spine curved ventrally and two lateral spines parallel. Foot 3 segmented with long pointed toes; small thin spine at base of toes. Two distinct eye spots on head widely separated. Lateral antenna sunk in dorsal lorica margins. Length 152-173 μ , width 53-61 μ , head shield 32-35 μ high; length of toe 23-25 μ .

Remarks: This species appeared in only one site from Korea, with 7 individuals. Especially, head shield region is more rounded and smaller than those from other countries which are of triangle in shaped.

Distribution: Europe, Australia, Korea.

Genus *Lepadella* Bory de St. Vincent, 1826

Type species: *Lepadella ovalis* (O.F. Müller, 1768)

Body oval, pear-shaped or circular; somewhat dorsoventrally flattened. Anterior opening of lorica with relatively large ventral sinus and usually with dorsal sinus of moderate depth. Lorica firmly joined laterally. Occipital margin of lorica often with granulated collar. Dorsal lorica smooth and domed. Foot with 3 to 4 segments; foot aperture large. Two slender toes moderately long. Two lateral eye spots. Body size 100-200 μ long. Trophi malleate type.

Key to the species of *Lepadella*

- 1. Dorsal lorica without keel or ribs 2
 - Dorsal lorica with keel and/or longitudinal ribs or other ornamentation 6
- 2(1) Lorica oval to circular; head aperture notched both dorsally and ventrally. Dorsal lorica shallowly domed, or dorso-ventrally flattened *L. Ovalis*
 - Dorsal lorica highly domed or hemisphere 3
- 3(2) Lorica elongate oval or circular; posterior margin of lorica round or truncate 4
 - Lorica more elongated; posterior margin of lorica never pointed 5
- 4(3) Head aperture without ribs of dorsal collar *L. patella patella*
- 5(3) Head aperture with parallel cuticular ribs ventrally and rather wide granulated collar dorsally *L. elliptica*
- 6(1) Lorica ovoid. Posterior part of lorica tapered to acute tip, which dorsally ridged occasionally *L. acuminata acuminata*

5. *Lepadella ovalis* (O.F. Müller, 1786) (Pl. II, Fig. 3)

Brachionus ovalis Müller, 1786 (p. 345, pl. 49, figs. 1-3).

Metopidia solidus: Gosse, 1851 (p. 201).

Metopidia ovalis: Hudson and Gosse, 1889 (p. 46, pl. 34, fig. 2); Anderson & Shephard, 1892 (p. 78, pl. 12, fig. 6).

Lepadella ovalis: Harring, 1913 (p. 64); Harring, 1916 (p. 537, pl. 89, figs. 4-10); Wulfert, 1939 (p. 611, fig. 22); Chengalath *et al.*, 1973 (p. 51, fig. 97); Chengalath, 1975 (p. 904, figs. 21-25); Koste, 1978 (p. 182, T.60: 1a-c; Abb. 45); Mamaril and Fernando, 1978 (p. 125, fig. 53); Sharma and Sharma, 1987 (p. 18, figs. 10-11); Koste and Shiel, 1989 (p. 133, fig. 6:5).

Material examined: 1 ind., st. 2, 29 X 1990; 1 ind., st. 28, 26 IX 1990; 1 ind., st. 35, 28 IX 1990;

1 ind., st. 50, 25 IX 1990; 2 inds., st. 56, 9 VIII 1990; 1 ind., st. 71, 7 VIII 1990; 3 inds., st. 97, 14 X 1990; 2 inds., st. 99, 14 X 1990; 2 inds., st. 101, 14 X 1990; 15 inds., st. 119, 27 IX 1990; 2 inds., st. 143, 10 VI 1990; 1 ind., st. 146, 26 V 1990; 1 ind., st. 180, 15 IV 1990; 1 ind., st. 196, 24 VII 1990.

Description: Lorica outline oval to circular; dorsal sinus U-shaped; ventral sinus very large and subrhomboid in outline. Lorica widest at about (ex. 2/3) distance from anterior end. Lorica egg-shaped, but somewhat broader posteriorly in dorsal view; possessing slight excavation at either side of near posterior end laterally, the posterior one being at the summit of a slight projection formed by the lorica curving outwards laterally. Ventral plate with deep anterior and posterior openings of half-ellipse form.

Distribution: Cosmopolitan.

6. *Lepadella patella patella* (O.F. Müller, 1786)

(Pl. II, Fig. 2)

Brachionus patella Müller, 1786 (p. 341, pl. 48, figs. 15-19).

Metopidia bractea: Hudson and Gosse, 1886 (Vol. 2, p. 109).

Metopidia emarginata: Hudson and Gosse, 1889 (p. 46, pl. 34, fig. 6).

Lepadella patella: Harring, 1913 (p. 64); Harring, 1916 (p. 539, pl. 90, figs. 1-12); Hauer, 1938 (p. 531, Abb. 54a-b); Wulfert, 1939 (p. 611, fig. 23a-c); Berzins, 1943 (p. 231, figs. 3-4); Yamamoto, 1952c (p. 87, fig. 107); Chengalath *et al.*, 1973 (p. 52, fig. 98); Chengalath, 1975 (p. 904, figs. 26-32); Mamaril and Fernando, 1978 (pp. 125-126, figs. 3, 54-55); Sharma and Sharma, 1987 (p. 18, figs. 12-13); Koste and Shiel, 1989 (p. 133, fig. 7:1).

Lepadella patella patella: Koste, 1978 (pp. 183-184, T. 59: 2a-p, 4a-i).

Material examined: 12 inds., st. 1, 28 X 1990; 12 inds., st. 2, 29 X 1990; 1 ind., st. 6, 28 X 1990; 3 inds., st. 8, 28 X 1990; 9 inds., st. 13, 28 X 1990; 5 inds., st. 14, 27 X 1990; 2 inds., st. 15, 27 X 1990; 11 inds., st. 18, 30 X 1990; 4 inds., st. 19, 30 X 1990; 8 inds., st. 20, 30 X 1990; 20 inds., st. 21, 13 X 1990; 76 inds., st. 22, 26 IX 1990; 1 ind., st. 24, 26 IX 1990; 1 ind., st. 26, 26 IX 1990; 17 inds., st. 28, 26 IX 1990; 12 inds., st. 29, 26 IX 1990; 2 inds., st. 30, 27 IX 1990; 2 inds., st. 34, 28 IX 1990; 1 ind., st. 36, 27 IX 1990; 1 ind., st. 38, 27 IX 1990; 2 inds., st. 40, 24 IX 1990; 2 inds., st. 42, 24 IX 1990; 1 ind., st. 50, 25 IX 1990; 5 inds., st. 76, 13 X 1990; 3 inds., st. 81, 13 X 1990; 22 inds., st. 82, 13 X 1990; 4 inds., st. 84, 15 X 1990; 17 inds., st. 91, 15 X 1990; 1 ind., st. 99, 14 X 1990; 2 inds., st. 119, 27 IX 1990; 1 ind., st. 124, 5 IV 1990; 2 inds., st. 135, 27 V 1990; 1 ind., st. 152, 1 XI 1990; 1 ind., st. 152, 7 XI 1990; 1 ind., st. 152, 21 XI 1990; 5 inds., st. 161, 27 VII 1990; 1 ind., st. 176, 15 IV 1990.

Description: Outline of lorica varying from nearly circular or oval. Dorsal sinus broadly U-shaped and its depth about one-half width. Ventral sinus approximately V-shaped, its sides slightly out-curved and posterior angle rounded. Toes about one-third the length of lorica, slightly decurved and tapering to fine points. Width of anterior opening about one-fourth length of lorica. Foot fairly stout; first and second segments very short and of equal length; third segment more or less longer and having sensory pit on its dorsal side. Total length of body 108-118 μ ; lorica 92-100 μ long and 60-68 μ width; dorsal sinus 12-14 μ deep; ventral sinus 16-18 μ deep; foot opening 25-30 μ long and 15-18 μ wide; foot 22-24 μ long; last segment of foot 8-10 μ long; toes 20-25 μ long.

Remarks: In comparison with the specimens described by Harring (1916) and Koste and Shiel (1989), Korean specimens were somewhat smaller, and the body was wider anteriorly. Harring (1916) described in detail many forms of this species. In the present study, rounded form of lorica did not appear.

Distribution: Cosmopolitan.

7. *Lepadella patella* f. *oblonga* (Ehrenberg, 1834) (Pl. III, Fig. 1)

Squamella oblonga Ehrenberg, 1834 (p. 220; cited from Koste, 1978).

Metopidia oblonga: Hudson and Gosse, 1889 (p. 47, pl. 34, fig. 5); Collin *et al.*, 1912 (p. 191, fig. 378).

Metopidia collaris similis: Stokes, 1896 (p. 20, pl. 7, fig. 5).

Lepadella oblonga: Haring, 1913 (p. 64); Yamamoto, 1950a (p. 192, fig. 38); Chengalath, 1975 (p. 904, figs. 18-20).

Lepadella patella f. *oblonga*: Koste, 1978 (p. 184, T. 59: 1a-e); Koste and Shiel, 1989 (p. 135, fig. 7:4).

Material examined: 2 inds., st. 15, 27 X 1990; 1 ind., st. 44, 24 IX 1990; 9 inds., st. 50, 25 IX 1990; 1 ind., st. 76, 13 X 1990; 2 inds., st. 82, 13 X 1990; 3 inds., st. 84, 15 X 1990; 3 inds., st. 91, 15 X 1990; 1 ind., st. 143, 10 VI 1990; 2 inds., st. 152, 26 VII 1990; 1 ind., st. 180, 15 IV 1990.

Description: Lorica outline resembles *L. patella patella*, it is widest in the middle. Lateral corners of foot-opening reflexed dorsally. The lorica is evenly in outline, depressed, the ventrum slightly concave, the dorsum arched, frontal angles acuminate, not produced into spinous processes; dorsal posterior border very slightly concave; posterior ventral margin deeply excised, the lateral borders of the excision diverging or parallel; collar-like frontal band usually present.

Distribution: Cosmopolitan.

8. *Lepadella elliptica* Wulfert, 1939 (Pl. III, Fig. 2)

Lepadella elliptica Wulfert, 1939 (p. 609, fig. 21); Koste, 1978 (p. 185, T. 59: 5a-c); Koste and Shiel, 1989 (p. 131, fig. 5:7).

Material examined: 1 ind., st. 36, 27 IX 1990; 9 inds., st. 50, 25 IX 1990.

Description: Lorica elongate, hemispherical in cross-section. Head aperture with shallow U-shaped dorsal sinus and deep V-shaped ventral sinus, latter with accompanying parallel-bordered lateral cuticular pleats; distal foot-segment conspicuously long, tapering slightly to base of toes; toes considerably long, curved ventrally. Total length of body 130-135 μ ; lorica 88-94 μ long and 55-60 μ wide; dorsal sinus 6-8 μ and ventral sinus 16-20 μ deep; foot opening 22-26 μ long and 11-14 μ wide; foot 31-34 μ long; last segment of foot 15-18 μ long; toes 25-30 μ long.

Remarks: The loricas of Korean specimens were more elongated than those of the species described by Wulfert (1939) and Koste (1978), but the width of lorica is narrower than the original description. Length of foot and of first segment were similar to those described originally.

Distribution: Australia, Germany, Korea.

9. *Lepadella acuminata acuminata* (Ehrenberg, 1834) (Pl. III, Fig. 3)

Metopidia acuminata Ehrenberg, 1834 (p. 210; 1838, p. 477, pl. 59, fig. 10; cited from Haring, 1916); Collin *et al.*, 1912 (p. 188, fig. 371); Olofsson, 1917 (p. 282, fig. 12); Hudson and Gosse, 1886 (vol. 2, p. 107, pl. 25, fig. 9).

Lepadella acuminata: Haring, 1913 (p. 63); Haring, 1916 (p. 546, pl. 92, figs. 4-8); Yamamoto, 1950a (p. 192, fig. 36); Chengalath, 1975 (p. 901, figs. 1-3); Mamaril and Fernando, 1978 (p. 125, fig. 52); Sharma and Sharma, 1987 (p.16, figs. 2-3); Koste and Shiel, 1989 (p. 128, fig. 4:1).

Lepadella acuminata acuminata: Koste, 1978 (p. 189, T. 63: 5a-w).

Material examined: 1 ind., st. 2, 29 X 1990; 2 inds., st. 15, 27 X 1990; 1 ind., st. 20, 30 X 1990; 4 inds., st. 29, 26 IX 1990; 1 ind., st. 75, 5 IV 1990; 1 ind., st. 77, 13 X 1990; 1 ind., st. 78, 13 X 1990; 1 ind., st. 81, 13 X 1990; 2 inds., st. 91, 15 X 1990; 2 inds., st. 97, 14 X 1990; 1 ind., st. 102, 25 IX 1990; 1 ind., st. 128, 5 IV 1990; 7 inds., st. 135, 27 V 1990; 4 inds., st. 136, 27 V 1990; 1 ind., st.

142, 10 VI 1990; 1 ind., st. 155, 29 IV 1990; 1 ind., st. 161, 27 VII 1990; 2 inds., st. 180, 15 IV 1990.

Description: Body usually oval in outline, width about three-fourths of length. Posteriorly lorica prolonged into pointed projection. Dorsal plate strongly convex and evenly rounded; it may be approximately paralleled at its base by two short, slightly convergent ridges, which do not reach the end of the lorica. Ventral plate almost flat.

Anterior dorsal sinus not very deep. Anterior lateral edges of lorica somewhat pointed. Foot groove about one-third length of lorica and oval shaped. Foot stout and last foot segment longer than rest. Toes long and straight.

ABSTRACT

The systematic study of freshwater rotifers was conducted on the materials collected from 197 sites in South Korea. As a result, 9 species of Family Colurellidae were identified, 4 species (1 species and 3 subspecies) of which are new to the Korea fauna: *Colurella uncinata uncinata*, *Squatinella rostrum rostrum*, *Lepadella patella patella*, and *L. elliptica*.

Total 165 species representing 13 families and 40 genera are now recorded by adding the species described in the present paper.

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REFERENCES

- Anderson, H. H. and J. Shephard, 1892. Notes on Victorian rotifers. Proc. Roy. Soc. Victoria, Melbourne, n. ser., 4: 69-80, pls. 12-13.
- Berzins, B., 1943. Systematisch-faunistisches Material über Rotatorien Lettlands. Folia Zool. Hydrobiol. Riga, 12: 218-244.
- Chengalath, R., C. H. Fernando and W. Koste, 1973. Rotifera from Sri Lanka (Ceylon) II. Further Studies on the Eurotatoria Including New Records. Bull. Fish. Res. Stn., Sti., Lanka (Ceylon), 24: 29-62.
- Chengalath, R., 1975. Littoral Rotifera of Ontario the genus *Lepadella* Bory de St. Vincent. Can. J. Zool. 54: 901-907.
- Cho, K. S., D. H. Cho and K. M. Yoon, 1978. Biological studies on the effects of sewage disposal of Chunchon Cities on the physico-chemical water quality of the Uiam Reservoir. Kor. J. Lim., 11. 3-4: 7-24. (In Korean)
- Chung, C. E., H. B. Yoo and S. Y. Kim, 1990. A new record of the 3 species on freshwater Rotifera in Korea. Kor. J. of Lim., 23(4): 279-285.
- Chung, C.E., H.B. Yoo and S.Y. Kim, 1991. Freshwater Rotifera of Korea I. Family Lecanidae (Rotifera: Monogononta). Kor. J. of Lim., 24 (3): 207-225.
- Collin A., H. Dieffenbach, R. Sachse and M. Voigt, 1912. Rotatoria und Gastrotricha. Süsswasser fauna Deutschlands. H. 14. pp. 272.
- Ehrenberg, C. G., 1831. Hemprich et Ehrenberg Symbolae physicae. Animalia evertebrata, exclusis Insectis, percensuit Dr. C. G. Ehrenberg. (Berolini) (Text unpaginated.) (cited from Haring, 1913).
- Ehrenberg, C. G., 1832. Über die Entwicklung und Lebensdauer der Infusionstiere, nebst ferneren Beiträgen zu einer

- Vergleichung ihrer organischen Systeme. Abh. Akad. Wiss. Berlin, for 1831, pp. 1-154 (cited from Harring, 1913; Ahlstrom, 1940; Koste, 1978).
- Ehrenberg, C. G., 1834. Dritter Beitrag zur Erkenntniss grosser Organisation in der Richtung des kleinsten Raumes. Abh. Akad. Wiss., Berlin (for 1833), pp. 145-336, pls. 1-11 (cited from Hudson and Gosse, 1886; Harring, 1913).
- Fernando, C. H. and N. P-Zankai, 1981. The Rotifera of Malaysia and Shingapore with remarks on some species. *Hydrobiologia*, 78: 205-219.
- Gosse, P. H., 1851. A catalogue of Rotifera found in Britain, with descriptions of five new genera and thirty-two new species. *Ann. Mag. Nat. Hist. ser. 2*, 8: 197-203.
- Hada, Y., 1936. The plankton of Lake Seiko, Suigen in autumn. *Chosen Nat. Hist. Soc. J.*, 2: 1-11. (In Japanese)
- Hanley, J., 1949. The narcotisation and mounting of Rotifera. *Microscope*, 7: 154-159.
- Harring, H. K., 1913. Synopsis of the Rotatoria. *Bull. U.S. Natl. Museum*, 8: 1-226.
- Harring, H. K., 1916. A revision of the Rotatorian genera *Lepadella* and *Lophocharis* with descriptions of five new species. *Proc. U. S. Natl. Museum*, 5: 527-568.
- Hauer, J., 1924. Zur Kenntnis des Rotatorien genus *Colurella* Bory de St. Vincent. *Zool. Anz.*, 59: 177-189.
- Hauer, J., 1938. Die Rotatorien von Sumatra, Java und Bali nach den Ergebnissen der Deutschen Limnologischen Sundae Expedition. *Arch. Hydrobiol., Suppl.*, 15, 3-4: 507-602.
- Hudson, C. T. and P. H. Gosse, 1886. The Rotifera or wheel-animalcules. London. Longmans, Green & Co. 2 vols. 128 and 144 pp. 30pls.
- Hudson, C. T. and P. H. Gosse, 1889. The Rotifera or Wheel-Animalcules, both British and foreign. *Suppl. London*: 1-64.
- Kang, S. W., 1969. The zooplanktons of Uiam lake. *Korean J. Limn.*, 2: 39-43.
- Kim, H. S. and K. B. Park, 1969. Studies on the pollution and zooplankton of the Han River as the source of the water supply for producing good quality water. *The Research of Ministry of Science and Technology*, 69-34, Part 1: 25-44.
- Koch-Althaus, B., 1963. Systematische und ökologische Studien an Rotatorien des Stechlinsees. *Limnologica (Berlin)*, 1 (5): 375-456.
- Koste, W., 1978. Die Rädertiere Mitteleuropas. Überordnung Monogononta. Begründet von M. Voigt. I. Textbd. VIII + 673 pp.; II + 476 pp. mit 234 Tafeln, Stuttgart.
- Koste, W. and R. J. Shiel, 1989. Rotifera from Australian inland waters. IV. Colurellidae (Rotifera: Monogonota). *Trans. R. Soc. S. Aust.*, 113, (3): 119-143.
- Mamaril, A. C. and C. H. Fernando, 1978. Freshwater Zooplankton of the Philippines (Rotifera, Cladocera and Copepoda). *Nat. Applied Sci. Bull.*, 30, (4): 109-221.
- Müller, O. F., 1773. Vermium terrestrium et fluviatilium, seu animalium infusorium, etc. Quarto. I, part 1, pp. 1-135, Infusoria.
- Müller, O. F., 1786. Animalcula Infusoria fluviatilia et marina. Quarto, Hauniae, 367pp.
- Olofsson, O., 1917. Süßwasserentomotraken und Rotatorien von der Murmanküste und aus dem nördlichsten Norwegen. *Zool. Bidr. Uppsala*, 5: 259-294.
- Sato, T., 1939. Potamoplankton of the River Hang-gang in early winter. *Jap. J. Limnol.*, 10: 128-130 (In Japanese).
- Schmarda, L. K., 1846. Kleine Beiträge zur Naturgeschichte der Infusorien. (Vienna.) (cited from Koste, 1978).
- Sharma, B.K. and S. Sharma, 1987. On species of genus *Lepadella* (Eurotatoria: Monogononta: Colurellidae) from North-Eastern India, with remarks on Indian taxa. *Hydrobiologia*, 147: 15-22.
- Song, M. O., 1989. A list of Korean freshwater Rotifera. *Korean J. Syst. Zool.*, 5, (2): 257-268.
- Song, M. O. and H. S. Kim, 1989. Monogonont Rotifers (Monogonota: Rotifera) inhabiting several lowland swamps in Kyongsangnam-do, Korea. *Korean J. Syst. Zool.*, 5 (2): 139-157.
- Stemberger, R. S., 1979. A guide to rotifers of the Laurentian Great Lakes. U. S. Environmental Protection Agency,

Ohio, 185pp.

Stokes, A. C., 1896. Some new forms of American Rotifera. Ann. Mag. Nat. Hist. 6. ser., **18**: 17-27.

Turner, P. N., 1986. Some rotifers from Republic of Korea. Hydrobiologia, **137**: 3-7.

Wulfert, K., 1939. Beitrage zur Kenntnis der Radertierfauna Deutschlands. IV. Die Radertiere der Saale-Elster Niederung bei Merseburg in ökologisch-faunistischer Beziehung. Arch. Hydrobiol., **35**: 563-624.

Wulfert, K., 1942. Neue Rotatorienarten aus deutschen mineralquellen. Zool. Anz., **137**: 187-200.

Wulfert, K., 1966. Rotatorien aus dem Stausee Ajwa und der Trinkwasser-Aufbereitung der Stadt Baroda (Indien). Limnologia, Berlin, 4, (1): 53-93.

Yamamoto, K., 1950a. The rotifer fauna of Japanese inland waters. IV. Jap. J. Limnol., **14**: 189-194 (In Japanese).

Yamamoto, K., 1950b. The rotifer fauna of Japanese inland waters. V. Jap. J. Limnol., **15**: 42-50 (In Japanese).

Yamamoto, K., 1952c. The rotifer fauna of Japanese inland waters. IX. Jap. J. Limnol., **16**: 81-91 (In Japanese).

Yamamoto, K., 1953. Preliminary studies on the rotatorian fauna of Korea. Pacif. Sci., **7**, (2): 151-164.

金勳洙, 尹聖明, 辛萬鈞, 1987. 서울 지역 漢江下流의 底棲動物. 漢江生態系 調查研究報告書. pp. 213-264 (In Korean).

水野壽彦, 姜壽遠, 曹圭松, 1980. 韓國における環境變遷史. 文部省「海外學術調査」. pp.63-88 (In Japanese).

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EXPLANATION OF PLATES

Plate I

Fig. 1. *Colurella adriatica adriatica*: 1a, 1b, lateral view; 1c, dorsal view; 1d, ventral view; e, lateral view (corona extended).

Fig. 2. *Colurella uncinata uncinata*: 2a, lateral view; 2b, lateral view showing posterior end.

Fig. 3. *Colurella uncinata* f. *bicuspidata*: 3a, dorsal view; 3b, ventral view; 3c, lateral view; 3d, 3e, ventral view (corona extended).

Plate II

Fig. 1. *Squatinella rostrum rostrum*: 1a, dorsal view; 1b, ventral view; 1c, lateral view.

Fig. 2. *Lepadella patella patella*: 2a, dorsal view; 2b, ventral view; 2c, ventral view (corona extended).

Fig. 3. *Lepadella ovalis*: 3a, dorsal view; 3b, ventral view.

Plate III

Fig. 1. *Lepadella patella* f. *oblonga*: 1a, dorsal view; 1b, ventral view; 1c, ventral view (corona extended).

Fig. 2. *Lepadella elliptica*: 2a, dorsal view; 2b, ventral view; 2c, lateral view (corona extended).

Fig. 3. *Lepadella acuminata acuminata*: 3a, dorsal view; 3b, ventral view. All scale lines 50µm.

PLATE II

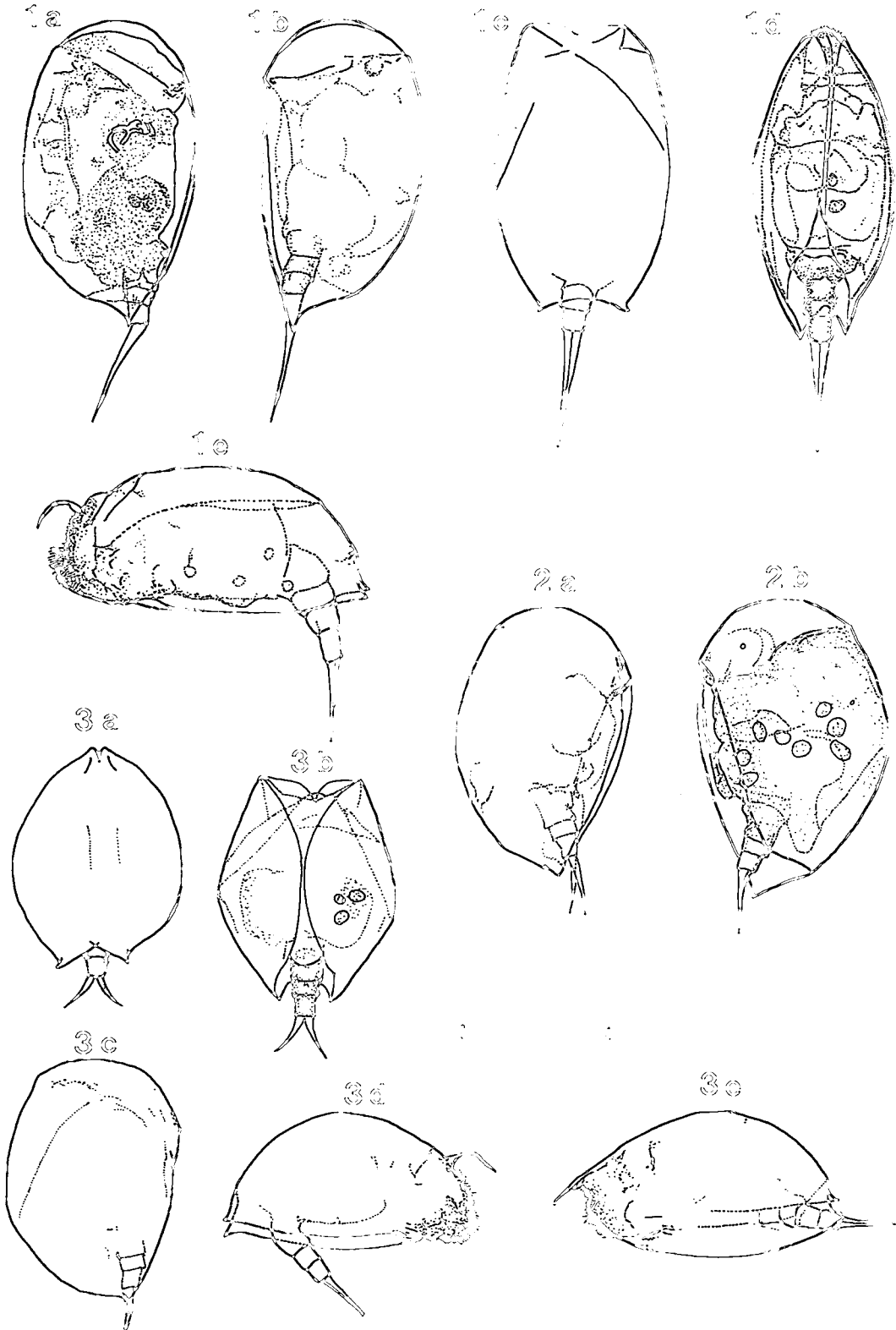


PLATE III

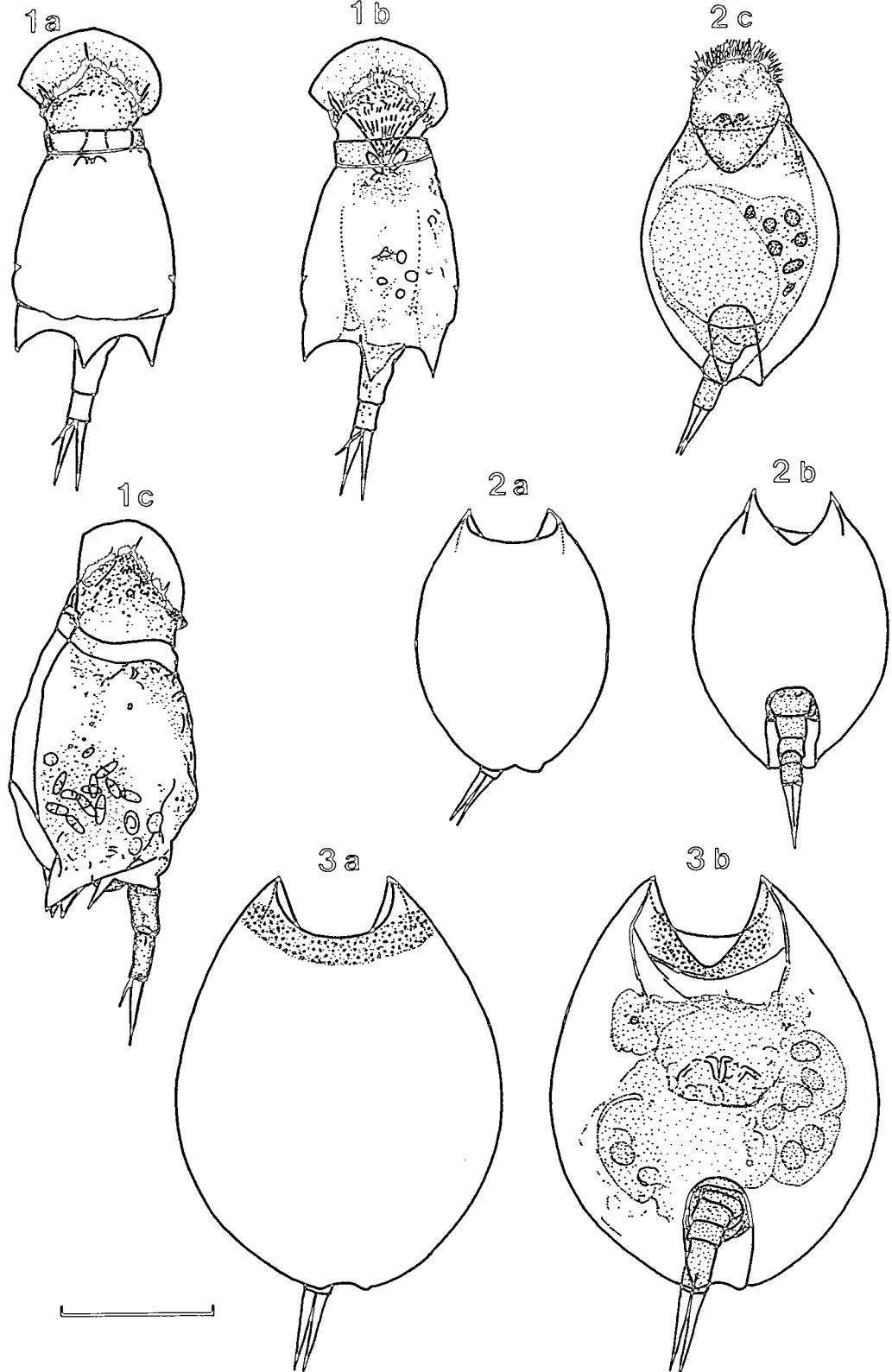


PLATE III

