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A Taxonomic Study of Order Arcellinida (Protozoa: Sarcomastigophora: Rhizopoda) from Korea (II)

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ABSTRACT

Eight species of the freshwater Arcellinida (Protozoa: Sarcomastigophora: Rhizopoda) are described from South Korea: *Centropyxis aerophila, Bullinularia garacilis, Netzelia oviformis, Nebela caudata, N. collaris, N. lageniformis, Difflugia lanceolata,* and *D. wailesi.* They are newly recorded from Korea

Key words: taxonomy, Arcellinida, Protozoa, Korea.

The Arcellinida inhabiting the freshwater in South Korea was investigated by scanning electron microscope. Samples were collected from May 1989 to July 1993. These Protozoa from Korea were reported by Chung and Choi (1989), Chung and Kang (1991) and Chung *et al.* (1991, 1992). The present study continued from Chung *et al.* (1992), and adds eight species to the Korean Arcellinida fauna.

SYSTEMATIC ACCOUNT

Superclass Rhizopoda von Sievold, 1845 根足蟲上綱
Class Lobosea Carpenter, 1861 葉狀根足蟲綱
Order Arcellinida Kent, 1880 有殼葉狀根足蟲目
Family Centropyxidae Jung, 1942 베레모벌레科
Genus Centropyxis Stein, 1859 베레모벌레屬

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1. *Centropyxis aerophila* Deflandre, 1929 꼬마베레모벌레(신칭) **(Pl. 1, Figs. B, D)**

Centropyxis aerophila Deflandre, 1929 [cited from Ogden and Hedley, 1980, p. 48]; Ogden and Hedley, 1980, p. 48, pl. 13; Ogden, 1984a, p. 243; Mizuno and Takahashi, 1991, p. 346.

Material examined. Mt. Chiri, 2 inds., 17 Sep. 1991; Mt. Halla, 2 inds., 26 Jul. 1992.

Description. Shell yellow or brown. Shape oval with flattened apertural region, in lateral view beret-shape with spherical dorsal region, tapering sharply near aperture. Shell surface rough with extraneous material, except around aperture and apertural rim. Aperture invaginated, oval in shape, sub-terminal with smooth rim. Length of shell 55-71 μm, breadth 49-54 μm, depth 42-54 μm; diameter of aperture 25-31 μm.

Distribution. Cosmopolitan.

Remarks. This species is similar to *C. platystoma* and *C. constricta*, but can be distinguished by the nonconstricted neck and the rough surface.

Family Plagiopixidae Bonnet, 1959 합죽이벌레科(신칭)

Genus Bullinularia (Penard, 1907) 합죽이벌레屬(신칭)

2. *Bullinularia gracilis* Thomas, 1959 합죽이벌레(신칭) **(Pl. 1, Figs. A, C)**

Bullinularia gracilis Thomas, 1959 [cited from L tenegger and Foissner, 1991, p. 2]; Lütenegger and Foissner, 1991, p. 2, figs. 1-8.

Material examined. Mt. Chiri, 2 inds., 17 Sep. 1991; Mt. Sŏlak, 1 ind., 19 Jul. 1992.

Description. Shell dark brown. Shape oval or circular, almost hemispherical in lateral view. Shell surface of ventral side smooth, structureless, covered by thin, fragile layer, but posterior margin and dorsal side rough with extraneous materials. Aperture in vaginated narrow, elongated slit, obscured by anterior lip. Diameter of shell 132-145 μm, breadth 157-168 μm, depth 85-100 μm; length of aperture 66-75 μm.

Distribution. Cosmopolitan.

Family Lesquereusiidae Jung, 1942 또아리벌레科

Genus *Netzelia* Ogden, 1979 산딸기벌레屬

3. *Netzelia oviformis* (Cash, 1909) 세모입딸기벌레(신칭) **(Pl. 2, Fig. B)**

Difflugia lobostoma: Leidy, 1879, p. 112, pl. XV, figs. 16-17.

Difflugia oviformis Cash and Hopkinson, 1909, p. 52, pl. xx, figs. 8-12; Ogden and Hedley, 1980, p. 150, pl. 64.

Netzelia oviformis: Ogden, 1979, p. 206.

Material examined. Ch'ŏngwŏn, 4 inds., 15 Jul. 1990.

Description. Shell light brown, hyaline, ovoid elongated in lateral view, circular in transverse section with broadly-rounded crown. Shell surface smooth with variable sandgrains and diatom shells bounded by cement matrix. Aperture 3-5 lobed rim, surrounded by thick collar of organic cement. Length of shell 78-110 μm, breadth 53-68 μm; diameter of aperture 20-31 μm.

Distribution. Cosmopolitan.

Remarks. This rare species was collected from water-weed in pond or lake. This is similar to *Difflugia lobostoma* in size and shape, but one can be distinguished from another by the apertural collar of organic material or the shell surface covered with cemented materials.

Family Hyalospheniidae Schulze, 1877 투명벌레科

Genus *Nebela* Leidy, 1875 병벌레屬

4. *Nebela caudata* Leidy, 1876 뿔병벌레(신칭) (Pl. 2, Figs. A, C)

Nebela caudata Leidy, 1876 [cited from Leidy, 1879, p. 160]; Leidy, 1879, p. 160, pl. xxvi, figs. 1-24; Cash and Hopkinson, 1909, p. 124, fig. 98.

Material examined. Mt. Chiri, 1 ind., 17 Sep. 1991; Mt. Sŏlak, 1 ind., 19 Jul. 1992.

Description. Shell compressed oval in shape, with 4-5 blunt, clavate processes projecting from lateral border and dorsal summit. Shell surface covered with variable sized circular and elliptic platelets. Aperture transversely with circular platelets. Length of shell with processes 82-90 μm, breadth 58-61 μm, depth 30-33 μm; diameter of aperture 15-17 μm; diameter of shell platelets 3-8 μm.

Distribution. Cosmopolitan.

Remarks. This apparently scarce testacean is similar to *N. collaris*, being transparent and colourless, but one can be distinguished from another by the processes and less distinct surface.

5. *Nebela collaris* (Ehrenberg, 1848) Leidy, 1879 목도리병벌레(신칭) (Pl. 2, Figs. E, F)

Difflugia collaris Ehrenberg, 1848 [cited from Leidy, 1879, p. 145].

Nebela collaris Leidy, 1879, p. 145, pl. xxii, figs. 1-10, 13-15, 17-20, pl. xxiv, fig. 11; Cash and Hopkinson, 1909, p. 93, pl. xxv, figs. 4-7; Kudo, 1954, p. 489, fig. 207d; Heal, 1963, p. 351, figs. 1, 6d-i; Ogden and Hedley, 1980, p. 94, pl. 36.

Material examined. Mt. Halla, 5 inds., 26 Jul. 1992.

Description. Shell colorless, pyriform in narrow lateral view, longer than width in wide view. Crown broadly convex, oblong. Shell surface composed of circular or oval shell-plates cemented with organic materials and not overlapping. Aperture transversely oval, with apertural rim of organic cement. Length of shell 135-180 μm, breadth 65-109 μm; diameter of aperture 22-44 μm; diameter of shell plates 3-4 μm in small size, 9-10 μm in large size.

Distribution. Cosmopolitan.

Remarks. This species has many varieties in size and shape (Heal, 1963), and makes the test without shell plates when it is cultured without small testacean (Ogden and Hedley, 1980).

6. *Nebela lageniformis* Penard, 1890 큰목병벌레(신칭) (Pl. 1, Fig. E)

Nebela lageniformis Penard, 1890 [cited from Cash and Hopkinson, 1909, p. 102)]; Cash and Hopkinson, 1909, p. 102, pl. xxv, figs. 12-14; Ogden, 1984, p. 256, figs. 43-47.

Material examined. Mt. Chiri, 1 ind., 17 Sep. 1991; Daekwanryŏng, 2 inds., 15 Jun. 1991; Mt. Halla, 5 inds., 26 Jul. 1992; Mt. Sŏlak, 2 inds., 19 Jul. 1992.

Description. Shell brown or light brown, slightly translucent. Shell flask-shaped in lateral view; with long cylindrical neck swollen midway. Shell surface covered with circular discs cemented, not overlap. Aperture oval in shape, surrounded with thin organic collar. Length of shell 125-152 μm, breadth 62-78 μm; diameter of aperture 21-23 μm.

Distribution. Cosmopolitan.

Remarks. This species is similar to *Hyalosphenia nobilis*, but can be distinguished by the aperture

covered with organic cement.

Family Difflugiidae Wallich, 1864 꽃병벌레科

Genus *Difflugia* Leclere, 1815 꽃병벌레屬

7. *Difflugia lanceolata* Penard,1890 고른표면꽃병벌레(신칭) **(Pl. 2, Fig. D)**

Difflugia pyriformis Leidy, 1879, p. 98, pl. x, fig. 17.

Difflugia lanceolata: Cash and Hopkinson, 1909, p. 31, pl. xix, figs. 9-11; Ogden and Hedley, 1980, p. 140, pl. 59; Ogden, 1983, p. 11, fig. 6.

Material examined. Dŏckjŏkdo, 2 inds., 18 Jul. 1993; Ch'ŏngwŏn, 3 inds., 15 May, 1989.

Description. Shell yellow or hyaline in color, elongate and slightly tapering to aperture, crown round without protuberances. Shell surface polished and smooth covering with siliceous angular scales. Aperture truncated and circular surrounded by organic matrix. Length of shell 110-154 μm, breadth 45-68 μm; diameter of aperture 20-27 μm.

Distribution. Cosmopolitan.

8. *Difflugia wailesi* Ogden, 1980 새알벌레(신칭) **(Pl. 1, Fig. F)**

Difflugia wailesi Ogden, 1980, p. 130, figs. 23-25; Ogden and Zivkovic, 1983, p. 360, fig. 13.

Difflugia tuberculata var. *minor*: Wailes, 1919 [cited from Ogden, 1980a, p.130].

Material examined. Mt. Chiri, 2 inds., 17 Sep. 1991.

Description. Shell colorless, slightly transparent, ovoid tapering towards aperture. Shell surface smooth outline composed of diatom frustules and some flattened particles of quartz, bound each other by organic cement. Aperture terminal, circular in shape, lobed four or five. Length of shell 73-128 μm, breadth 66-110 μm; diameter of aperture 23-30 μm.

Distribution. Cosmopolitan.

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韓國産 有殼變形蟲目 (肉質鞭毛蟲門: 根足蟲上綱)에 대한 분류학적 연구 II.

鄭 玩 鎬 · 崔 鎭 福
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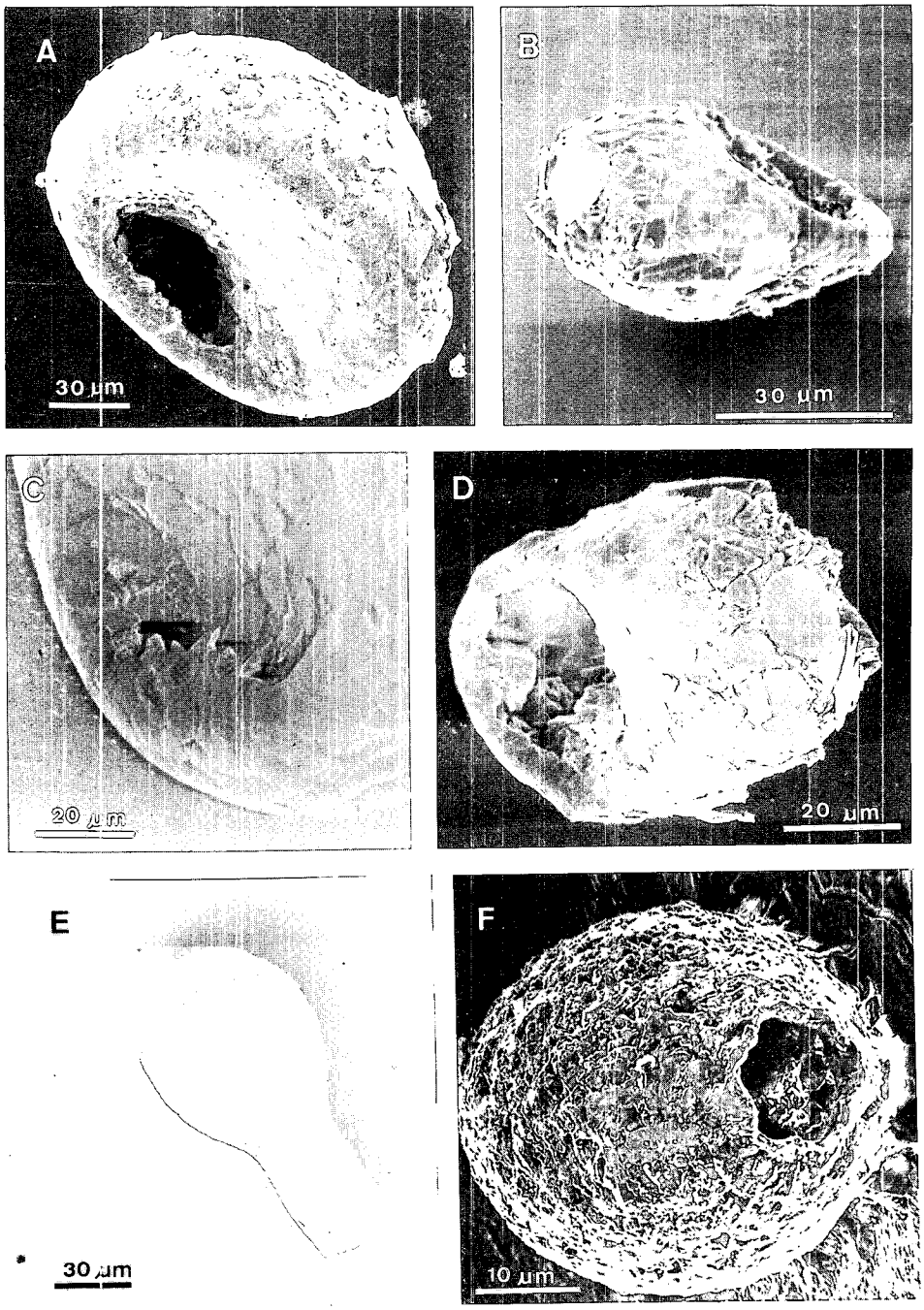
적 요

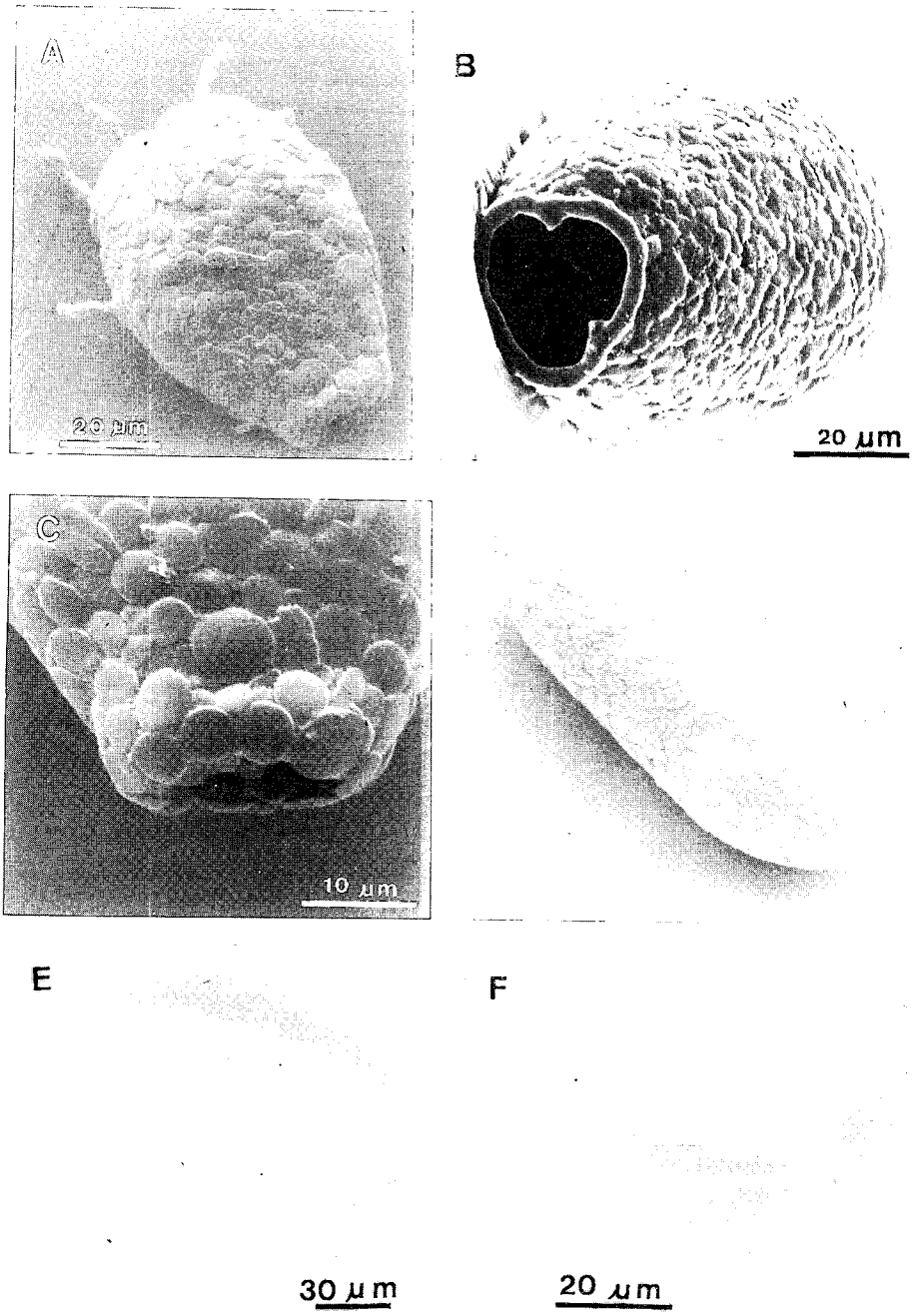
1989년 5월부터 1993년 7월까지 남한 각 지역에서 채집한 유각변형충류를 주사전자현미경(SEM)으로 동정하였다. 그 중 *Centropyxis aerophila*, *Bullinularia gracilis*, *Netzelia oviformis*, *Nebela caudata*, *N. collaris*, *N. lageniformis*, *Difflugia lanceolata*, *D. wailesi* 등 8종이 한국미기록종으로 밝혀졌다.

PLATE 1



Figs. A, C. *Bullinularia gracilis* Thomas: A, Apertural view; C, Aperture; **Figs. B, D.** *Centropyxis aerophila* Deflandre: B, Lateral view; D, Apertural view; **Fig. E.** *Nebela lageniformis* Penard; **Fig. F.** *Difflugia wailesi* Ogden

PLATE 2



Figs. A, C. *Nebela caudata* Leidy: A, Lateral view; C, Aperture; **Fig. B.** *Netzelia oviformis* (Cash) Ogden; **Fig. D.** *Difflugia lanceolata* Penard; **Figs. E, F.** *Nebela collaris* (Ehrenberg) Leidy