

Systematic Study on the Tardigrades from Korea: New Records of Five Tardigrade Species from Korea

Moon, Seung Yeo and Kim, Won

(Department of Molecular Biology, College of Natural Science, Seoul National University,
Seoul 151-742, Korea)

한국산 완보류의 계통분류학적 연구 : 한국산 완보류 5 미기록 종

문 승 여 · 김 원

(서울대학교 자연과학대학 분자생물학과)

적 요

1985년 8월부터 1991년 7월까지 남한의 여러 지점에서 채집된 완보류를 조사한 결과 이 중 7개 지역에서 *Cornechiniscus lobatus*, *Pseudechiniscus junitae*, *Hypsibius microps*, *Diphascocon prosirostre*, *Itaquascon trinacrae*의 5종의 한국미기록 종이 발견되었다. 본 미기록 종들에 대하여 기재하고 도판을 작성하였다.

Key words: taxonomy, Tardigrada, new records, Korea

INTRODUCTION

The taxonomic studies of Tardigrada from the Korean peninsula were begun in 1970s by two foreign investigators (Iharos, 1971; Dastych, 1974) since Marcus (1936) recorded two species from North Korea in his monograph. Iharos (1971) reported ten species of North Korean Tardigrada, and Dastych (1974) recorded twenty-one more species from that region. Thereafter, however, Korean Tardigrada had not been studied for many years until twenty-four tardigrade species were recognized from South Korea in recent years (Kim and Moon, 1988; Moon and Kim, 1988; Moon *et al.*, 1989; Moon and Kim, 1990).

The present taxonomic study on the Korean fauna is based on material from various sites in South

The present study was supported by Daewoo Research Fund, S.N.U., 1991.

Korea. The material includes samples of dried mosses and lichens collected for the years 1985-1991. This investigation revealed five species of Tardigrada which have remained unknown to Korea so far. Excepting for the reiterated species recorded in both North and South Korea, total forty-nine species of Tardigrada are now known to Korean peninsula by adding the five more species reported in this paper.

SYSTEMATIC ACCOUNT

Phylum Tardigrada

Class Heterotardigrada Marcus, 1927

Order Echiniscoidea Marous, 1927

Family Echiniscidae Thulin, 1928

Genus *Cornechiniscus* Maucci and Ramazzotti, 1981

1. *Cornechiniscus lobatus* (Ramazzotti, 1943)

(Fig. 1)

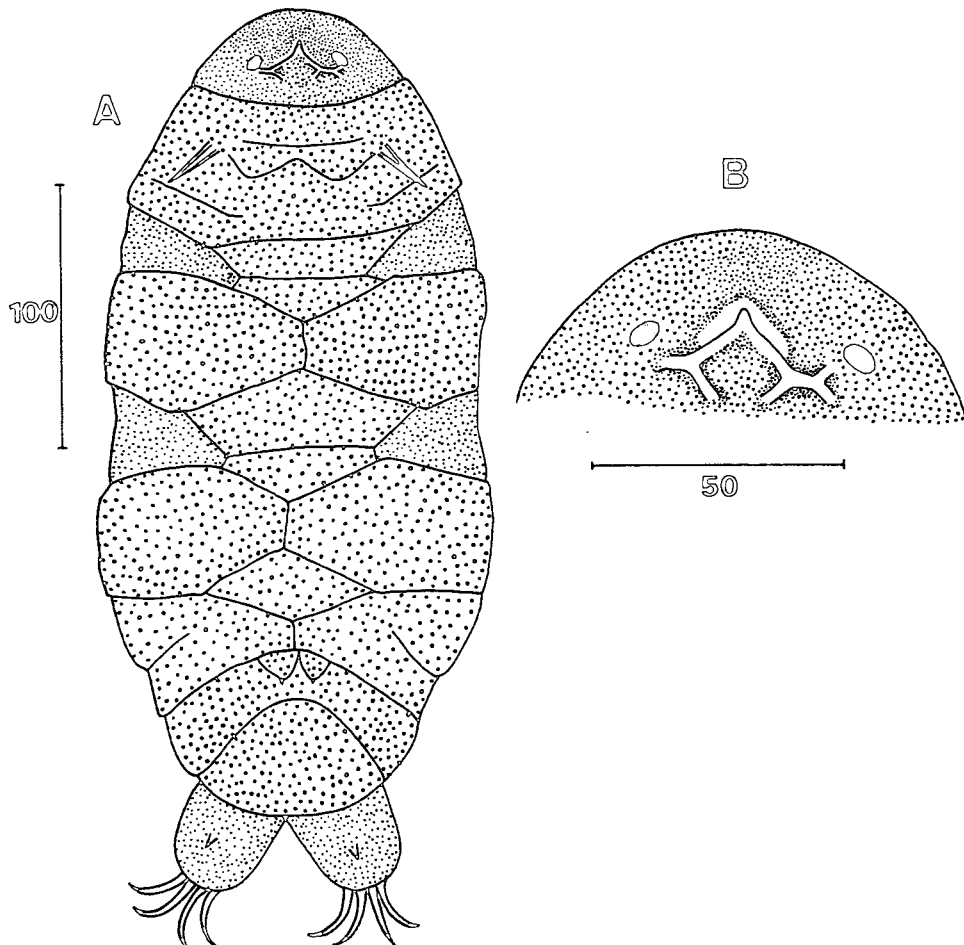


Fig. 1. *Cornechiniscus lobatus* (Ramazzotti, 1943). A, whole animal (dorsal view); B, cephalic plate (dorsal view) (scales in μm).

Pseudechiniscus cornutus f. *lobata* Ramazzotti, 1943 (cited from Ramazzotti and Maucci, 1983).

Pseudechiniscus cornutus lobatus: Ramazzotti, 1972 (pp. 631-533, figs 422-423).

Pseudechiniscus lobatus: Maucci, 1979 (p. 111, figs 1, 6, 11, 16, 19b).

Cornechiniscus lobatus: Ramazzotti and Maucci, 1983 (pp. 240-243, fig. 85).

Material examined: 7 inds, Pongwha, Sep. 1, 1987 (H.S. Kim); 6 inds, Oesong, Feb. 22, 1988 (C.Y. Chang, G.S. Min and M.O. Song); 5 inds, Up'o, Jan. 21, 1988 (C.Y. Chang, G.S. Min and M.O. Song).

Description: Body length 303-313 μ m. Body colored red or orange. Black eyespots large and rather oval. Cuticles with coarse granules randomly distributed, which interconnected by short linear bridges, forming minute reticular pattern at higher focusing. Granules on cephalic plate much smaller than those on other cuticular plates. Granulation extended to area between plates and to legs, smaller than in cuticular plates. Cuticular plates strongly sculptured and their outlines usually not smooth. First and second median plate divided transversely; third median plate undivided. Slightly relieved transverse line of W form, usually somewhat rounded posteriorly, present on scapular plate, under which smooth transverse line present with its median area not observed occasionally, so appeared laterally only. Strong horn-like lateral cirrus A. Diamond-shaped relief against cephalic plate present; superior margin of diamond distinctly processed by pointed tip medially. Pseudosegmental plate divided by median longitudinal line and partly divided by one transverse folding in each halves. Two lobes present on posterior margin of pseudosegmental plate medially; with or without one pointed process on posterior margin of each lobe. Posterior processes of lobes, when present, not always equal in length or absent in either lobe even in one individual. Terminal plate with two deep incisions connected to each other. One sharp spine present on each of first and fourth pair of legs; one papillus on each of fourth pair of legs.

Genus *Pseudechiniscus* Thulin, 1911

2. *Pseudechiniscus junitae* Barros, 1939

(Fig. 2)

Pseudechiniscus suillus francisciae Barros, 1942 (cited from Ramazzotti and Maucci, 1983)

Pseudechiniscus junitae: Ramazzotti and Maucci, 1983 (pp. 876-878, fig. 589).

Material examined: 1 ind., P'algongsan, Aug. 19, 1987; 9 inds, Pongwha, Sep. 1, 1987 (H.S. Kim); 25 inds, Tongdosa, Yangsan, Jul. 4, 1991 (S.Y. Moon).

Description: Body length 162-182 μ m. Body colored light orange. Black eyespots round or oblong, not uniform even in one individual. Cuticular plates with coarse granules randomly distributed. Granules on cephalic and scapular plate smaller than those of paired plates, even much smaller and densely distributed on area beneath transverse line of W form situated on cephalic plate. Granulation tending larger toward posterior part of body; terminal plate with denser and/or larger granules than those on any other cuticular plates. Granules on median plates usually slightly smaller than those on paired plates. Granulation extended to area between plates and to legs, smaller than that of any other cuticular plates. Cuticular plates rather strongly sculptured and their outlines usually not smooth. Cirrus A of about 18 μ m long. No other lateral or dorsal cirri present. Weakly relieved transverse line present occasionally at distance of approximately two-thirds from upper most line of scapular plate, with its median area often not observed, so appeared laterally only; granules on lower area of transverse line smaller than those of upper area of transverse line. First and second paired plate usually divided by median longitudinal line; pseudosegmental plate undivided or incompletely divided. Terminal plate with incisions laterally. Legs short; spines absent on first and fourth pair of legs.

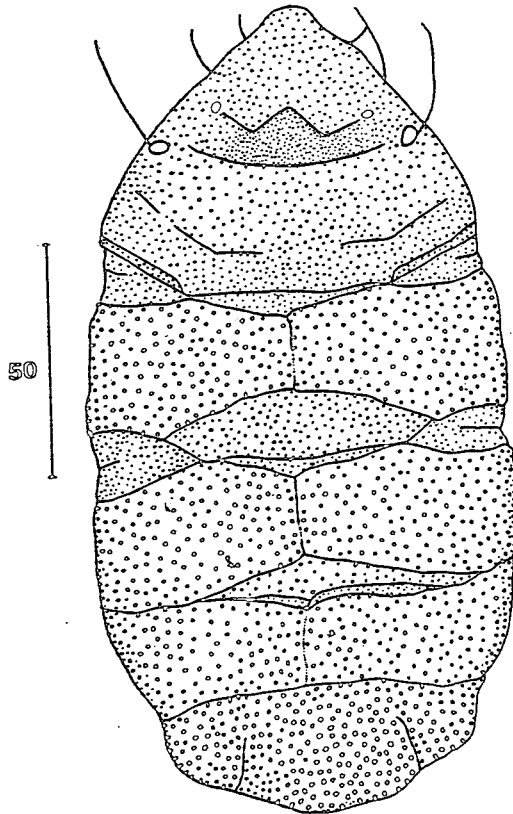


Fig. 2. *Pseudechiniscus junitae* Barros, 1939 (scales in μm).

Remarks: The present species was originally described from Brazil and has been further reported from Galapagos, Austria and Italy (Ramazzotti and Maucci, 1983). The present species is very similar to *P. suillus* (Ehrenberg, 1853) and *P. facettalis* Petersen, 1951, but it can be distinguished from *P. suillus* by its distinctly larger granules on the cuticle, strong sculpturing of cuticular plates, short legs and rather robust shape of body, and also distinguished from *P. facettalis* by the larger granules and the absence of facettings on the cephalic plate, scapular plate, terminal plate and/or paired plates. Granules on the cuticle of *P. facettalis* were observed consistently smaller than those of *P. junitae*, but larger than those of *P. suillus*. The presence of rather larger granules on the cuticle of the present species than those of *P. facettalis* is a new observation. The present species was found often together with *P. suillus* and *P. facettalis*.

P. suillus franciscae Barros, 1942 is reduced to synonym with *P. junitae* (Ramazzotti and Maucci, 1983), the former was once distinguished from *P. junitae* mainly by its smooth sculpture and oblong eyespots since both of the characters are not considered to be warrant characteristics to establish an independent species.

Class Eutardigrada Marcus, 1927

Order Parachela Schuster, Nelson and Christenberry, 1980

Family Hypsibidae Pilato, 1969

Genus *Hypsibius* Schultz, 1834

3. *Hypsibius microps* Thulin, 1928

(Fig. 3)

Hypsibius microps Thulin, 1928 (pp. 253-255, fig. 24); Ramazzotti and Maucci, 1983 (pp. 558-559, fig. 336).

Hypsibius pallidus Cuénot, 1932 (pp. 72-73, fig. 70). [Not *H. pallidus* Thulin, 1911].

Hypsibius (Hypsibius) microps: Marcus, 1936 (pp. 273-294, fig. 262); Ramazzotti, 1972 (pp. 466-467, fig. 252).

Material examined: 2 inds, Hallasan, Aug. 14, 1985 (S.Y. Moon).

Description: Body length 206 μ m. Cuticle very thin, smooth and transparent. Body colorless, but with dark brown pigment spots randomly distributed, randomly distributed. Eyespots absent. Buccal tube very narrow (0.8 μ m in diameter) and curved posteriorly into pharyngeal bulb. Length of buccal tube about 16 μ m, ending with rather large apophyses. Pharyngeal bulb somewhat round or slightly oval with ratio of length: width of about 1.2: 1; length about 11.7 μ m and width about 10 μ m; containing apophyses and two granular macroplacoids nearly equal in length. Microplacoid absent. Mouth situated ventrally. Doubleclaws not large. Principal arms of inner and outer doubleclaws bearing accessory points, much curved especially at its terminal portion relatively. Principal arm of outer doubleclaw more elongated than that of inner doubleclaw. Claws of fourth pair of legs slightly larger than those of other three pairs of legs. Lunules at base of doubleclaws absent.

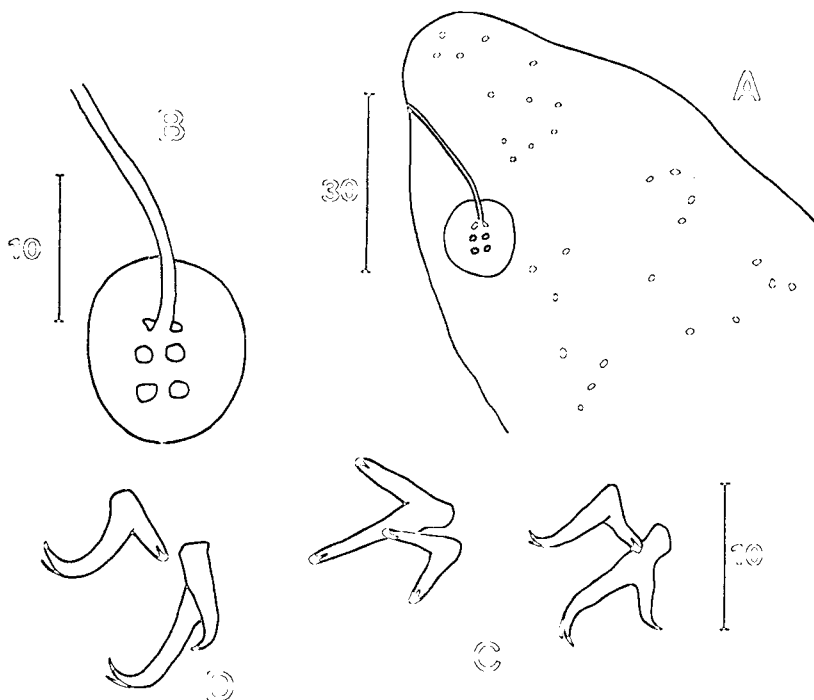


Fig. 3. *Hypsibius microps* Thulin, 1928. A, anterior part of whole animal (lateral view); B, buccal apparatus; C, claws of third pair of legs; D, claws of fourth pair of leg (scales in μ m).

Genus *Diphascon* Plate, 18894. *Diphascon prosirostre* Thulin, 1928

(Fig. 4)

Diphascon prosirostre Thulin, 1928 (p. 256, fig. 27); Ramazzotti and Maucci, 1983 (pp. 303-304, fig. 136).*Hypsibius (Diphascon) prosirosre*: Marcus, 1929 (p. 532, fig. 368); Marcus, 1936 (pp. 306-307, fig. 287); Argue, 1971 (p. 412, fig. 32); Ramazzotti, 1972 (p. 435, fig. 223); Morgan and King, 1976 (p. 114, fig. 78.).*Diphascon (Adropion) prosirostre*: Pilato, 1970 (p. 344).**Material examined:** 1 ind., Odaesan, May 1987 (S.Y. Moon).

Description: Body length 179 μ m. Cuticle smooth and transparent. Body colorless; rather slender with rather regular width, not reduced anteriorly or posteriorly. Eyespots absent. Buccal tube of *Diphascon* type, long (40 μ m), narrow (1.4-1.6 μ m), flexible and somewhat curved like S form at approximately median portion; spiral thickening around flexible portion absent. Pharyngeal bulb elongate with ratio of length: width of about 1.9: 1 (26 μ m long by 14 μ m wide); containing small apophyses and three rod-like macroplacoids with ratio of about 1: 1.2: 1.7 from first to third macroplacoid. First macroplacoid shortest (2.2 μ m), third macroplacoid longest (3.8 μ m) and second macroplacoid of 2.7 μ m long. Microplacoid absent. Length of placoid row slightly shorter than half length of pharyngeal bulb. Mouth situated terminally. Doubleclaws rather small. Claws of first pair of legs slightly smaller than those of other three pairs of legs. Lunules at base of doubleclaws absent.

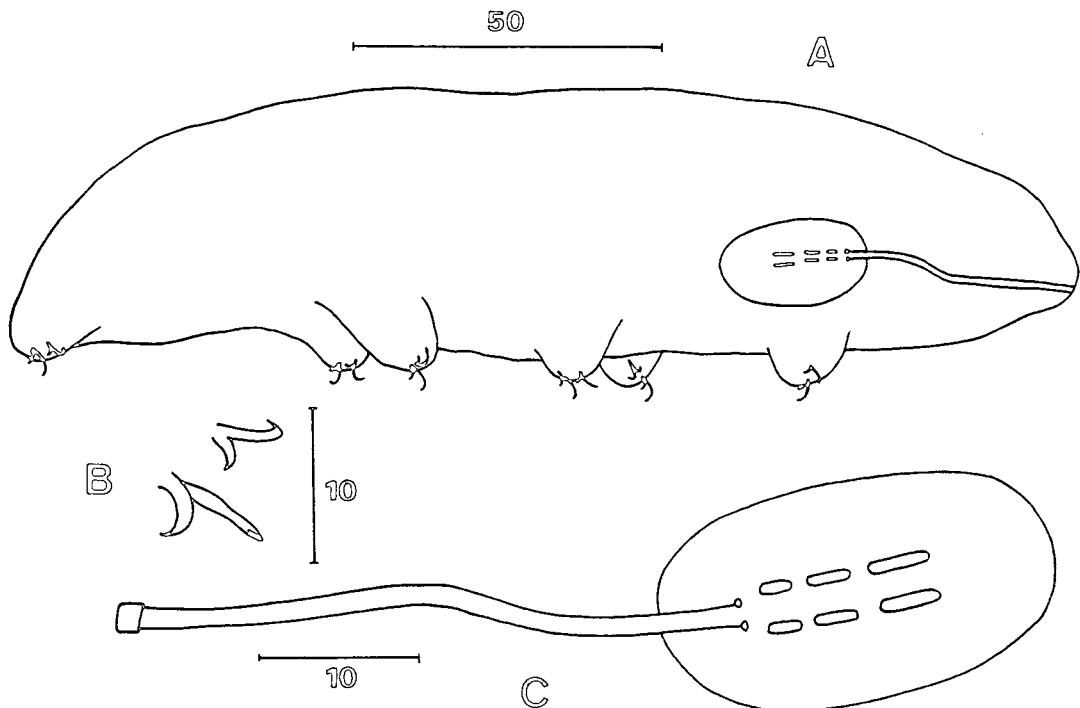


Fig. 4. *Diphascon prosirostre* Thulin, 1928. A, whole animal (lateral view); B, claws of fourth pair of leg; C, buccal apparatus (scales in μ m).

Genus *Itaquascon* Barros, 19395. *Itaquascon trinacriæ* Arcidiacono, 1962

(Fig. 5)

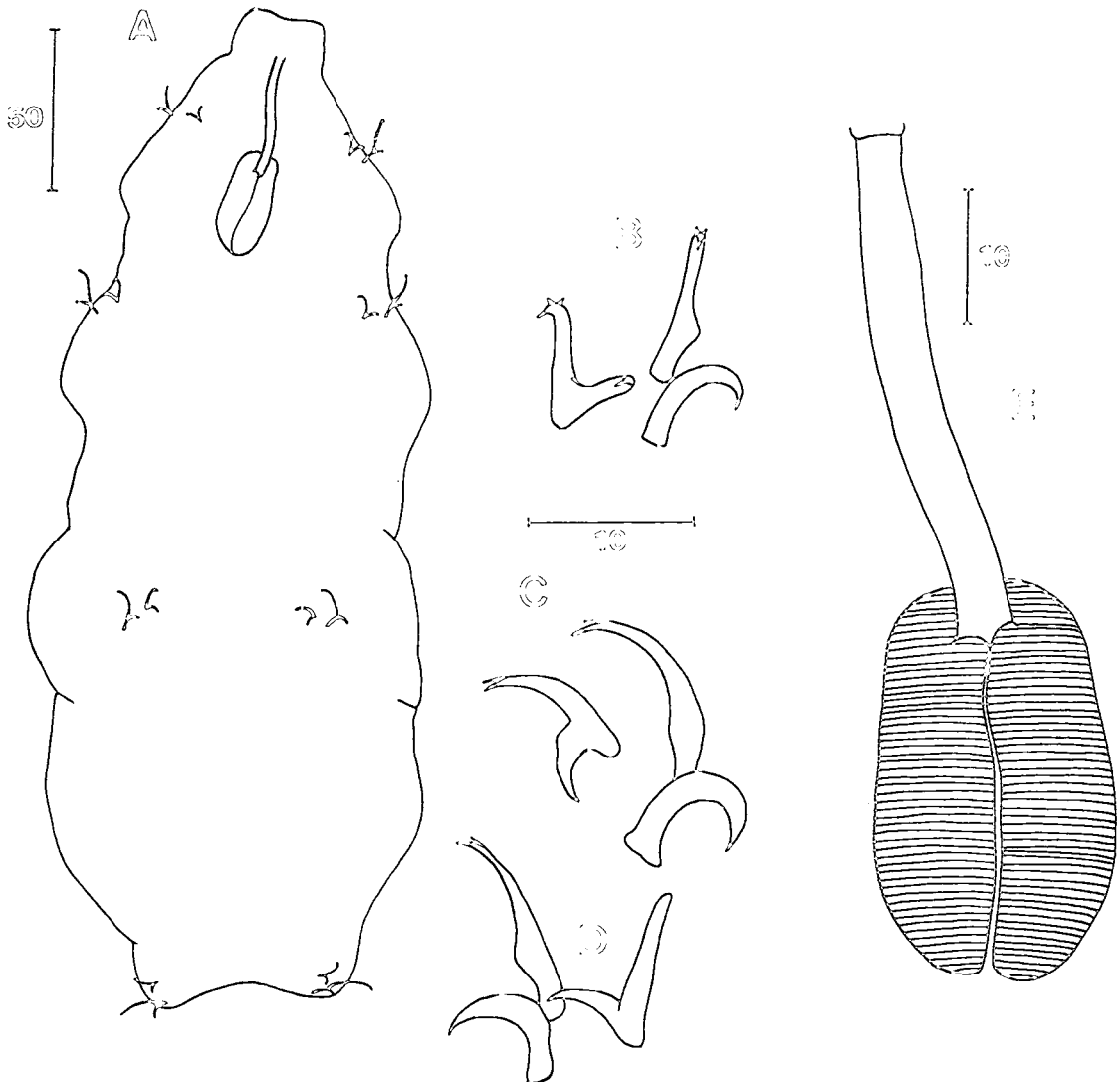
Itaquascon ramazzottii Iharos, 1966 (pp. 119-121, figs 19-21).*Itaquascon trinacriæ*: Pilato, 1969 (pp. 199-202, fig. 2); Pilato, 1970 (p. 345); Ramazzotti and Maucci, 1983 (pp. 692-693, figs 447-448).**Material examined:** 1 ind., Mudŭngsan, Kwangju, May 1988 (T.H. Yoon).**Description:** Body length 320 μ m. Cuticle thin, smooth and transparent. Body colorless and rather slender anteriorly. Eyespots absent. Buccal tube flexible and rather curved like S form through its whole length; about 37 μ m long by 9.4 μ m wide. Pharyngeal bulb lacking apophyses and placoids; thickened and appeared muscular; much elongated with ratio of length: width of about 1.7: 1; length about 30 μ m and width about

Fig. 5. *Itaquascon trinacriæ* Arcidiacono, 1962. A, whole animal (dorsal view); B, claws of first pair of leg; C, claws of third of leg; D, claws of fourth pair of leg; E, buccal apparatus (scales in μ m).

18 μ m; divided into two halves longitudinally. Mouth situated terminally. Doubleclaws somewhat diverse and of *Diphasccon* type. Principal arm of inner and outer doubleclaw bearing two accessory points and much elongated. Principal arm of outer doubleclaw more elongated than that of inner doubleclaw, somewhat protruded toward secondary arm at distance of about one-third from its base. Doubleclaws of first pair of legs slightly smaller than claws of other pair of legs which similar in size. Lunules at base of doubleclaws absent.

ABSTRACT

Five species of tardigrades collected from mosses and lichens at different localities in Korea are described, all of which are newly known to Korea: *Cornechiniscus lobatus*, *Pseudechiniscus junitae*, *Hypsibius microps*, *Diphasccon prosirostre*, *Itaquascon trinacriae*.

ACKNOWLEDGEMENTS

We thank Dr. Roberto Bertolani for checking identifying two species of Tardigrada.

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RECEIVED: 8 OCTOBER 1991

ACCEPTED: 2 NOVEMBER 1991