

한국동물분류학회지 특간제 3 호  
(金熏洙 教授 古稀 紀念號)

**The Korean Journal of Systematic Zoology**  
Special Issue No. 3: 39-44 (October 30, 1992)

## New Records of Two Tardigrade Species from Korea

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한국산 완보류 2 미기록 종

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### 적 요

1985년 8월부터 1987년 7월 사이에 남한에서 채집된 *Doryphoribius zappalai* 와 *Parhexapodibius pilato* 2종의 한국미기록 종을 보고한다. 본 *Doryphoribius* 속 및 *Parhexapodibius* 속은 그동안 한국에서 발표되지 않은 속들이다. 이 미기록 종들에 대하여 상세히 기재하였다.

Key words: taxonomy, tardigrades, new records, Korea.

Two tardigrade species which have not been reported from Korea are described in this paper. The scheme of classification was based on that given by Pilato (1969, 1982).

Phylum Tardigrada  
Class Eutardigrada  
Order Parachela Schuster, Nelson, Grigarick, and Christenberry, 1980  
Family Hypsibiidae Pilato, 1969  
Subfamily Hypsibiinae Pilato, 1969  
Genus *Doryphoribius* Pilato, 1969

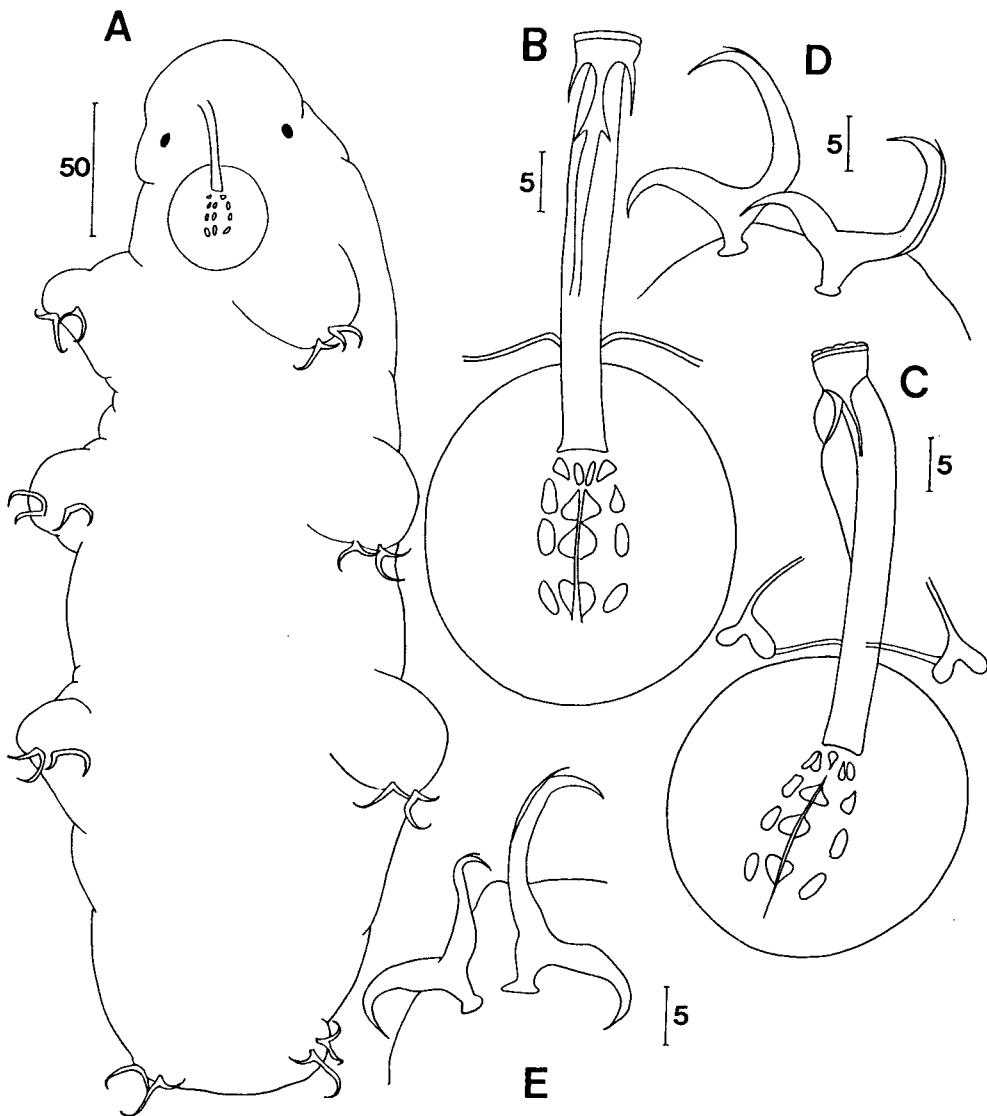
**1. *Doryphoribius zappalai* Pilato, 1971**

(Fig. 1)

*Doryphoribius zappalai* Pilato, 1971a (pp. 145-149, figs. 1-2); Pilato, 1971b (p. 127); Bertolani, 1982 (p. 83, fig. 46); Ramazzotti and Maucci, 1983 (pp. 324-325, figs. 324-325).

**Material examined:** 4 specimens, campus of Seoul National University (moss), Aug. 6, 1985 (S. Y. Moon); 4 specimens, Changjŏn-dong (moss), Pusan, Aug. 19, 1985 (S. Y. Moon); 1 specimen, Kyungpook National University (pond), Apr. 1986 (S. Y. Moon); 1 specimen, Kwanaksan (stream), Apr. 4, 1986 (S. M. Yoon); 2 specimens, Pŏmŏsa (moss), May 25, 1986 (S. Y. Moon); 1 specimen, Ch'unch'ŏn-shi (moss), Jun. 6, 1986 (S. Y. Moon); 1 specimen, Shindŏk-ji (reservoir), Jul. 17, 1987 (C. Y. Chang).

**Description:** Body (Fig. 1A) yellowish, with length about 350-420  $\mu\text{m}$ . Cuticle smooth and transparent.



**Fig. 1.** *Doryphoribius zappalai* Pilato. A, whole animal, ventral view; B & C, buccopharyngeal apparatus; D, claws of second pair of legs; E, claws of fourth pair of legs. Scales in  $\mu\text{m}$ .

Eye spots rather large. Mouth subterminal, positioned rather anteroventrally. Buccal tube (Figs. 1B, C) moderately wide (about 3.4-4.0  $\mu\text{m}$ ), rigid, but slightly curved dorsally in anterior portion; length of buccal tube (measured from anterior margin of stylet sheath to basis of apophysis) about 3.3  $\mu\text{m}$  long; ventral lamina of buccal tube present; peribuccal lamellae absent. Pharyngeal bulb rather round (length: width, about 1.1: 1.0), containing well-developed apophyses and 3 short rod-like macroplacoids; first and second macroplacoids similar in length (about 2.3-3.0  $\mu\text{m}$ ) and third macroplacoid slightly longer (about 2.5-3.2  $\mu\text{m}$ ); microplacoid absent. Double claws (Figs. 1D, E) *Isohypsibius* type, rather large, and similar in size and shape; principal arm of double claw bearing two minute accessory points; principal and secondary arms of external double claw somewhat longer than those of internal double claw; claws of fourth pair of legs not greater than those of other pair of legs in size, with exception of principal arm of external claw in fourth pair of legs being slightly longer than those in other pair of legs; basal branch of double claw rather short or moderately long. Lunule surrounding base of double claw rather small; its internal outline connected to base of basal branch not well distinguished.

**Remarks:** The present species has been reported only in Italy. It was reported to occur typically in freshwater (Bertolani, 1982; Ramazzotti and Maucci, 1983). However, this species was found from both freshwater habitats and terrestrial mosses in Korea. The genus *Doryphoribius*, which is known by few species, is new to Korea.

Family Calohypsibiidae Pilato, 1969

Genus *Parhexapodibius* Pilato, 1969

## 2. *Parhexapodibius pilato* (Bernard, 1977)

(Fig. 2)

*Hexapodibius pilato*: Ramazzotti and Maucci, 1983 (p. 525, fig. 311).

*Parhexapodibius pilato*: Manicardi and Bertolani, 1987 (p. 179).

**Material examined:** 2 specimens, campus of Kyungpook National University (moss), Apr. 1986 (S. Y. Moon).

**Description:** Body (Fig. 2A) lightly yellowish or colorless, with length about 210-260  $\mu\text{m}$ . Cuticle smooth and transparent. Eye spots absent. Mouth rather subterminal, positioned rather anteroventrally. Buccal tube (Fig. 2B) moderately wide (about 3.2  $\mu\text{m}$ ), rigid, but slightly curved dorsally in anterior portion; length of buccal tube (measured from anterior margin of stylet sheath to basis of apophysis) about 28.8  $\mu\text{m}$  long; ventral lamina of buccal tube present; peribuccal lamellae absent. Pharyngeal bulb rather ovoid (length: width, about 1.2: 1.0), containing well-developed apophyses and 3 small, granular macroplacoids; first and second macroplacoids about equal in length (about 1.5-2.0  $\mu\text{m}$ ) but third macroplacoid slightly longer (about 2.0-2.3  $\mu\text{m}$ ); first macroplacoid positioned rather close to second macroplacoid, but both macroplacoids somewhat distant from third macroplacoid; microplacoid absent. Legs short and stocky (Fig. 2A). Double claws (Figs. 2C, D) reduced, minute, slender, and similar in size and shape; secondary arm of double claw inserted near base of double claw; principal arm of double claw bearing two minute accessory points. Lunule surrounding base of double claw absent. Fourth leg with only single double claw, which slightly smaller than those of other pair of legs.

**Remarks:** The present species has been reported only in Italy and North America. Since Pilato (1969) established the genus *Parhexapodibius* with representatives formerly assigned to the genus *Hexapodibius*, the validity of his genus has been debated, and Ramazzotti and Maucci (1983) proposed to consider

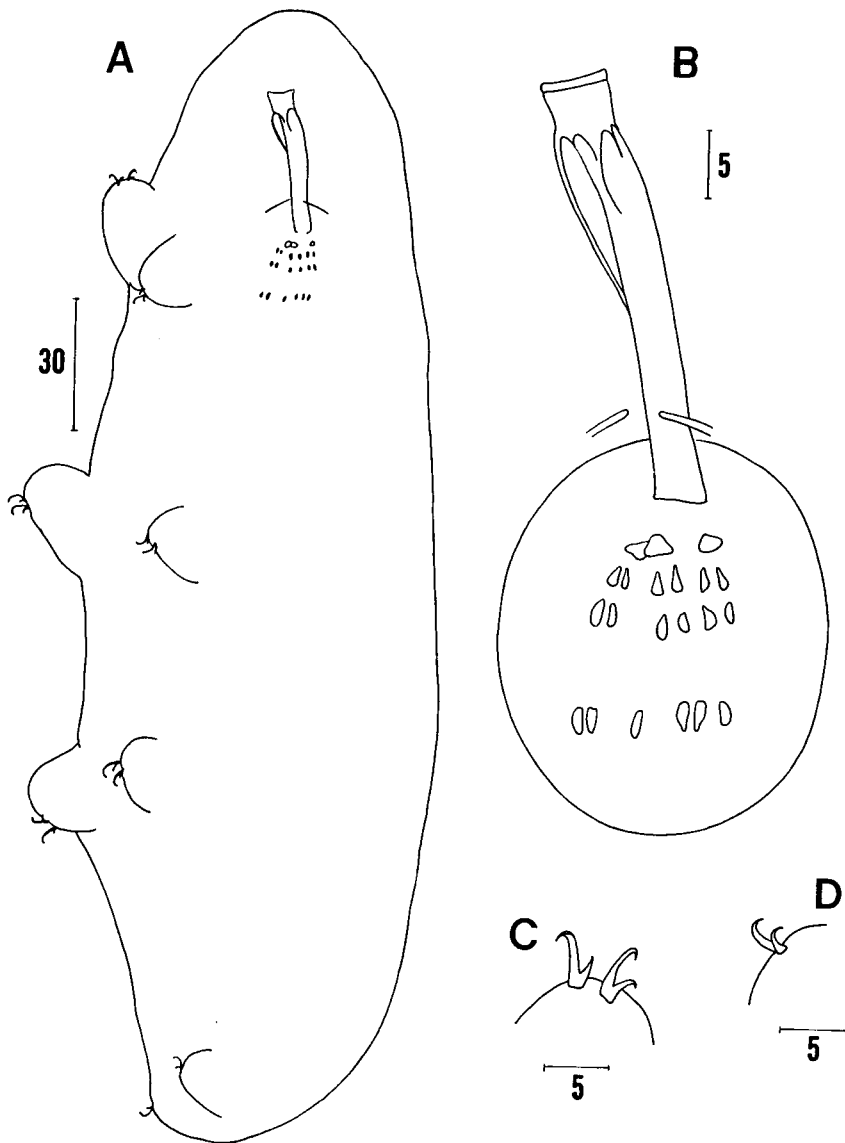


Fig. 2. *Parhexapodibius pilato* (Bernard). A, whole animal, lateral view; B, buccopharyngeal apparatus; C, claws of first pair of legs; D, claws of fourth pair of legs. Scales in  $\mu\text{m}$ .

it as a synonym of *Hexapodibius* Pilato, 1969. However, Pilato (1989) retained it as a valid genus for the following consideration: He distinguished two main phylogenetic lines in the family Calohypsibiidae. One of them includes the genus *Calohypsibius*, in which the double claws and the legs tend not to be reduced, and the other line includes the genera which exhibit the process of reduction. The latter phylogenetic line is subdivided by two evolutionary trends: one is the process of reduction affecting mostly the claws of first three pairs of legs where they become single claws by the loss of secondary branches (*Haplomacrobotus*), and the other is the process of reduction affecting mostly the claws of hind leg and also the hind leg itself, which is represented by *Haplohexapodibius*, *Hexapodibius* and *Parhexapodibius*. As the most primitive

genus in the latter evolutionary stem, *Parhexapodibius* has double claws and they are present in all legs. From the primitive stem a phylogenetic line has arisen in which the claws of the hind legs are lacking and the hind legs are reduced to be short stumps, which include the genera *Hexapodibius* and *Haplohexapodibius* (Pilato, 1989). The authors agree to his idea for distinguishing the genus *Parhexapodibius* from the genus *Hexapodibius*.

Few species are known in this genus. The present species occurred in terrestrial mosses, but has found rarely. The genus *Parhexapodibius* is new to Korea.

## ABSTRACT

Two species of tardigrades *Doryphoribius zappalai* and *Parhexapodibius pilato* are redescribed, which are newly recorded from Korea.

## ACKNOWLEDGMENTS

We thank Dr. Roberto Bertolani for identifying *Parhexapodibius pilato*. We are also grateful to Dr. Cheon Young Chang and Mr. Seong Myeong Yoon for collecting and providing the specimens of *Doryphoribius zappalai*.

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RECEIVED: 21 SEPTEMBER 1992

ACCEPTED: 10 OCTOBER 1992