

Systematic Account on Three Freshwater Cyclopoid Copepods from Korea

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요 약

1신종을 포함하여 3종의 담수산 검물벼룩이 한국의 동물상에 추가된다: *Ochridacyclops coreensis* n. sp, *Itocyclops yezoensis* (Ito, 1954), *Cyclops kikuchii* Smirnov, 1932 *Ochridacyclops*속과 *Itocyclops*속은 한국에서 처음으로 기록되는 속이다. 과거에 *Cyclops vicinus* Uljanin으로 보고되었던 참검물벼룩은 *Cyclops kikuchii*의 오동정이었기에 정정한다. 본 발표에서는 신종을 기재하고, 위의 3종에 대하여 근연종과의 형태적 형질 비교 및 종내 변이성 등에 관한 분류학적 고찰을 수행하고자 한다.

I. INTRODUCTION

The freshwater cyclopoid copepod fauna of Korea comprises total 31 species of 13 genera in the family Cyclopidae: since Kim and Chang (1989) first recorded 25 species or subspecies of 12 genera taxonomically from the various freshwater bodies in Korea, Yoo and Lim (1989) reported two estuarine cyclopoid species from Youngsan Lake, and then Chang et al. (1998) added four new records to Korean fauna during the study on the distribution of mountainous cyclopoids in Korea.

Recently, the authors have accomplished the faunistic researches on the freshwater cyclopoid copepods, especially inhabiting the ground waters or the so-called 'cryptic' microhabitats (Reid, 1986) like temporary pools in the mountain area. As a provisional result of the researches, we confirmed three cyclopoid species including a new species. So, we deal with the systematic account on them here.

II. MATERIALS AND METHODS

Materials examined in the present study were collected from the littoral zone of various freshwaters like rivers, reservoirs, ponds, ricefields, temporary pools, wells, springs, trickles, and so on since the year of 1987.

Specimens were mounted in lactophenol on H-S slide, and observed and photographed using a differential interference contrast microscope (Olympus BX-50) equipped with Nomarski optics. All drawings and measurements were made with the aid of a camera lucida.

III. SYSTEMATIC ACCOUNTS

Family Cyclopidae Sars, 1913

1. *Ochridacyclops coreensis* Chang, n. sp.

Material examined. Holotype: ♀, spring near Kangnung National University, 15 Jan 1991 (C. Y. Chang, S. J. Song and J. H. Choi). Paratype: spring near Cheonunsa Temple, Chungju-shi, 31 May 1991 (S. H. Kim).

Additional materials examined. 3♂♂, 8♀♀ (1 ovi.), spring near Kangnung National University, 23 Sep. 1993 (C. Y. Chang); 1♀, 1♂, same locality, 2 Jan. 1991 (C. Y. Chang); 1♀, same locality, 7 May 1993 (C. Y. Chang); 1♀, spring, Chungyang, Gyeongbuk Province, 5 May 1987 (C. Y. Chang).

Diagnosis. Body 0.66 mm long; seminal receptacle similar to that of *Eucyclops*; caudal rami nearly parallel, 2.17 times as long as wide; lateral seta at distal quarter of outer margin of ramus nearly same in length with outer seta; inner apical seta a little longer than outer apical one; antennule of 12 segments; thoracic legs 1-4 three-segmented; spinous or setal ornamentation of legs 1-4 as follows:

	Coxa	Basis	Exp	Enp
Leg 1	0-1	1-1	I-1; I-1; III,5	0-1; 0-1; 1,I,4
Leg 2	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-1; 1,I,4
Leg 3	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,I,4
Leg 4	0-1	1-0	I-1; I-1; II,I,5	0-1; 0-2; 1,II,2

Habitat. Type specimens were collected from small springs, locating at the foothills, together with *Canthocamptus* or *Bryocamptus* harpacticoids.

Remarks. The present new species is closely related with *O. nipponensis* in having 12-segmented antennule and short caudal rami. However, *O. coreensis* is clearly differentiated from *O. nipponensis* by the number of medial setae on the

endopodal segments of legs 1-2, that is, normally two as in *O. nipponensis*, while only one in this new species. Moreover, *O. coreensis* shows the morphological discrepancies from *O. nipponensis* in having the relatively longer caudal rami (2.8 times as long as broad, while 2.5 times in *O. nipponensis*), and the long dorsal caudal seta (two times longer than T_0 , while only a little longer in *O. nipponensis*).

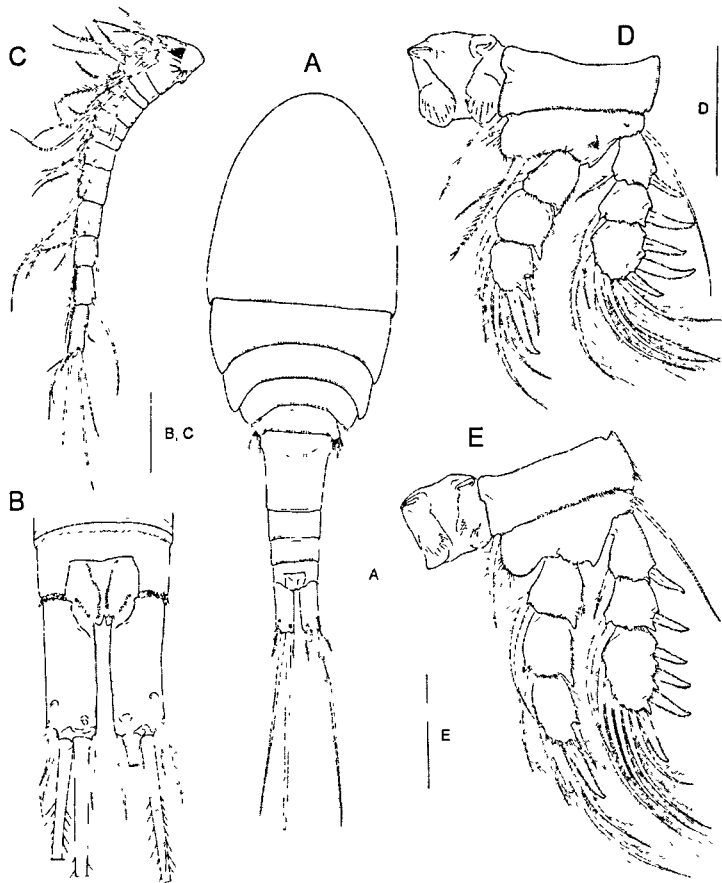


Fig 1. *Ochridacyclops coreensis* Chang, n sp A, Habitus, dorsal; B, Anal segment and caudal rami, dorsal, C, Antennule; D, Leg 1; E, Leg 2 Scale bars = 0.05 mm (B-E) and 0.1 mm (A)

2. *Cyclops kikuchii* Smirnov, 1932

Cyclops vicinus (not Uljanin, 1875): Kim and Chang, 1989, p. 239.

Cyclops kikuchii Smirnov, 1932, p. 283, figs. 1-5.

Remarks. *Cyclops kikuchii* Smirnov, 1932 was formerly known as *Cyclops vicinus* Uljanin, 1875 in Korea by Kim and Chang (1989) and other limnological studies. According to the recent revision work by Einsle (1996), *C. kikuchii* is

distinguished from *C. vicinus* in having the relatively shorter Ti (Ti:Fu=0.8-0.9:1, while 1.2:1 in *C. vicinus*), and Tmi (about twice the length of Fu, while 2.4 times in *C. vicinus*).

3. *Itocyclops yezoensis* (Ito, 1954)

Specocyclops yezoensis Ito, 1954, p. 373, figs. 1-3.

Itocyclops yezoensis: Reid and Ishida, 2000, p. 589, figs. 1-3.

Material examined. 1 ♀, well at Namae, Yangyang, 18 Oct. 1993 (C. Y. Chang); 1 ♂, 3 ♀♀ (1 ovi.), well Suryeom 2-ri, Gyeongju, 24 Jul. 1990 (C. Y. Chang); 1 ♂, 1 ♀, spring at Ponggil-ri, Gyeongju, 24 Jul. 1990 (C. Y. Chang); 1 ♂, 3 ♀♀, spring, Cheonwangsa Temple, Mt. Halla, Jeju Is., 8 May 1999 (C. Y. Chang).

Habitat. Specimens were collected from wells and springs.

Remarks. Specimens from Korea were well coincided with the original description and Reid and Ishida's (2000) redescription, except the relatively longer caudal ramus (more than 1.6 times as long as wide, while 1.4 times in Japanese specimens). The shape of anal operculum (its length and number of teeth on lateral margin) showed rather wide range of variation.

REFERENCES

- Chang, C. Y., S. M. Yoon, S. K. Lee and W. Kim, 1998. Distribution of mountainous cyclopoids in Korea. *Korean J. Environ. Biol.*, **16**(4): 299-304.
- Emsle, U., 1996. Copepoda: Cyclopoida genera *Cyclops*, *Megacyclops*, *Acanthocyclops*. SPB Publishing, Amsterdam, pp. 1-82.
- Ito, T., 1954. Cyclopoida copepods from subterranean waters. *Rep. Fac. Fish. prefect. Univ. Mie*, **1**: 372-416.
- Kim, H. S. and C. Y. Chang, 1989. Freshwater cyclopoid copepods (Cyclopoida, Cyclopidae) of Korea. *Kor. J. Syst. Zool.*, **5**(2): 225-256.
- Reid, J., 1986. Some usually overlooked cryptic copepod habitats. *In* G. Schriever, H. K. Schminke and C.-t. Shih (eds.), *Proceedings of the second international conference on Copepoda*. *Syllogeus*, **58**: 594-598. *Syllogeus*, **58**: 594-598.
- Reid, J. W. and T. Ishida, 2000. *Itocyclops*, a new genus proposed for *Specocyclops yezoensis* (copepoda: Cyclopoida: Cyclopidae). *J. Crust. Biol.*, **20**: 589-596.
- Smirnov, S., 1932. Notizen uber einige Sußwasser-Copepoden Japans. *Annot. zool. jpn.*, **13**: 283-288.
- Yoo, K. I. and B. J. Lim, 1989. Systematic Studies on the Freshwater Copepoda (Crustacea) in Lake Yongsan, Korea. *Korean J. Limnol.*, **22**(2): 127-146.