

Mesocyclops yesoensis sp. nov., *M. leuckarti* and *M. pehpeiensis*
(Crustacea: Copepoda: Cyclopoida) from Hokkaido, Northern Japan

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Abstract. A new species of cyclopoid copepod, *Mesocyclops yesoensis* is described from Hokkaido, northern Japan. The new species differs from *M. leuckarti* in its course of pore-canal and leg 6. *Mesocyclops leuckarti* and *M. pehpeiensis* are recorded for the first time from Hokkaido.

Key words: Taxonomy, copepods, *Mesocyclops*, new species, Japan.

Introduction

Defaye and Kawabata (1993) and Kawabata and Defaye (1994) pioneered re-examination of *Mesocyclops* species in Japan. Ueda *et al.* (1996) reported the occurrence of *Mesocyclops dissimilis* Defaye & Kawabata, 1993, and *M. ruttneri* Kiefer, 1981, from Kyushu. Ueda and Ishida (1997) recorded *M. ruttneri* and *M. thermocyclopoides* Harada, 1931 from Okinawa. Holynska (1997) summarized the distribution of *M. dissimilis* and *M. woutersi* Van de Velde 1987 in Honshu and the Ryukyu Is (Iriomote and Ishigaki Is.). I have examined thoroughly the specimens of the genus from Hokkaido in my own collection and materials newly obtained. As a result, I determined the occurrence of three species, *i. e.* *M. leuckarti* (Clause, 1857), *M. pehpeiensis* Hu, 1943 (Guo Xiaoming synonymized *M. ruttneri* Kiefer, 1981 with *M. pehpeiensis* in his unpublished manuscript: personal communication from M. Holynska in January 1999), and a new species described herein, and their distribution ranges. The results are presented in this paper.

Material and Methods

All specimens of *Mesocyclops* species from Hokkaido in my collection were examined. The

localities of the specimens examined are shown in Fig. 3. For the description of new species, sufficient numbers of the specimens were sampled from a roadside ditch in Yoichimachi, in July of 1996. The specimens were checked for the diagnostic characters, and measured for the following characteristics: body length; length/width of the caudal rami; medial/lateral terminal spines of P4 enp3. Drawings and measurements were made either in glycerin before dissection, or in gum-chloral medium after dissection with the aid of a drawing tube and an objective micrometer or a hand-made scale equivalent to the micrometer on a drawing table. High magnification lenses mainly used were $\times 60$ (dry) and $\times 40$ (phase contrast). Body lengths were taken from the anterior rim of the rostrum to the end of the caudal rami. The type specimens are deposited in the National Science Museum, Tokyo (NSMT), and the United States National Museum of Natural History (USNM).

Abbreviations used are as follows: A1, antennule; A2, antenna; P1-P6, first to sixth leg; exp1-exp3, first to third article of exopod; enp1-enp3, first to third article of endopod; L/W, ratio of length to maximum width.

Taxonomic Account and Distribution

Mesocyclops yesoensis sp. nov.

(Figs 1-2)

Material examined. Holotype ♀ dissected on 1 slide, NSMT-Cr 12504; paratypes: 2 ♂♂, dissected on 1 slide, NSMT-Cr 12505; 1 ♀, dissected on 1 slide, NSMT-Cr 12506; 25 ♀♀, undissected specimens preserved in 70% ethanol, USNM 288023. All from a roadside ditch in Asahicho, Yoichi-machi, 16 July 1996. Other dissected specimens: 1 ♀, Lakes Shiretoko-goko, 12 July 1986. 3 ♀♀, Lake Junsainuma, 30 June 1991. 18 ♀♀, type locality, April and July 1991 and 1996. 2 ♀♀, Ponkutosan Stream, 10 September 1995. 2 ♀♀, Lake Shinsen-numa, 28 July 1986.

Female (holotype). Morphology similar to that of *Mesocyclops leuckarti* as redescribed by Van de Velde (1984), Dahms and Fernando (1994), and Mirabdullayev (1996), except as noted in following description.

Body Length of holotype 1.23 mm; of 26

paratypes 1.14-1.35 mm, mean 1.22 mm; of other 17 specimens 1.20-1.56 mm, mean 1.39 mm [cf. *M. leuckarti* from type locality, mean 1.0 mm (Van de Velde); from Uzbekistan, 0.875-1.135 mm (Mirabdullayev)]. L/W of genital double-somite of holotype 1.27, and of dissected paratype 1.29.

Receptaculum seminis as shown in Fig. 1c. Course of pore-canal sinuously curved (cf. *M. leuckarti* inwardly-directed).

L/W of caudal rami of holotype and dissected paratype 3.5 and 3.4, respectively; of other 12 specimens 3.2-3.9, mean 3.6 (cf. of *M. leuckarti* from type locality, 3.4). Bases of lateral and lateral terminal setae with spinules (Fig. 1e). Lengths of caudal setae of holotype in μm : lateral 50, dorsal 75, medialmost to lateralmost terminal 280, 690, 460, 80.

A1 (Fig. 2a) with irregular rows of micro-spinules on ventral side of articles 1, 4, 5, 7-10, and 12-13 (cf.

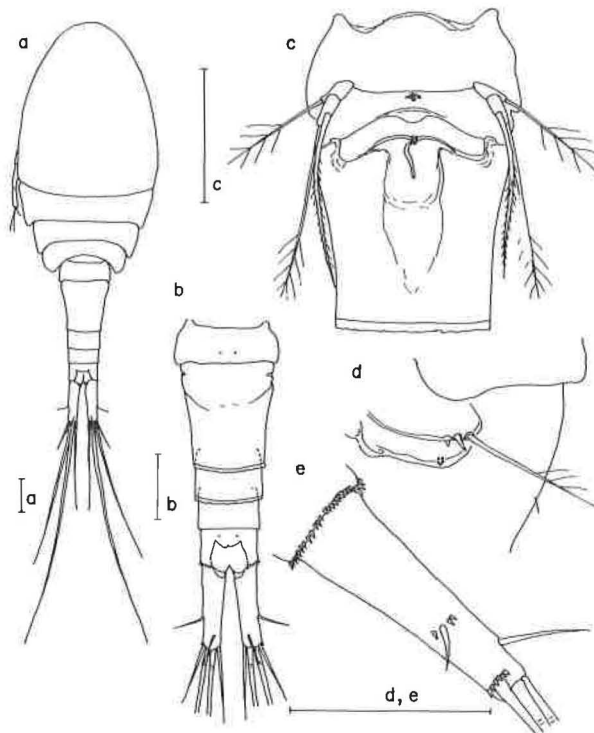


Fig. 1. *Mesocyclops yesoensis* sp. nov., holotype female: a, habitus dorsal, b, urosome, dorsal; c, 5th thoracic somite and genital double-somite, ventral; d, P 6; e, caudal ramus, lateral. Scales = 100 μm .

M. leuckarti provides same patterns, Van de Velde, fig. 5A). A2 basis (Fig. 2b, c) furnished with spinules as same as those of *M. leuckarti*. Anterior surface of maxillar coxa bare (Fig. 2d).

P1-4. Spine- and seta-formula, and armature of examined specimens same as *M. leuckarti*. Medial expansion of caudal side of P4 basis with group of distal setules, without exception. Ratios of medial/lateral terminal spines of P4 enp3 of holotype and dissected paratype 0.89 and 0.92, respectively; of 26 other specimens 0.78-0.96, mean 0.88.

P5 (Fig. 1c) similar to that of *M. leuckarti*. P6 (Fig. 1d) bearing 1 seta and 2 spines, ventralmost spine very small (cf. not very small in *M. leuckarti*).

Male (paratypes). Body Lengths of 2 paratypes 0.80 and 0.75 mm. Proportions and armament of swimming legs, P5, and caudal rami similar to female. A1 geniculate, of 16 articles.

Ethymology. For the specific epithet I propose the classical name of Hokkaido where the species is

common.

Geographical distribution. The species is distributed widely in Hokkaido (Fig. 3).

Range of habitats. The species inhabits lowland and mountain waters as ditches, ponds, high moors, shallow lakes, and stream-side pools. It seems to be allopatric with *M. pehpeiensis*, which is also common in Hokkaido.

Affinities. As mentioned above, the species is very close to *M. leuckarti*. Differences between them are seen in body length, course of pore-canal, and P6 of female.

***Mesocyclops leuckarti* (Clause, 1857)**

Material dissected on slides: 1 ♀, Lake Mikazukinuma, 12 April 1981. 5 ♀ ♀, Lake Harutori, 26 August 1997, coll. S. Hiruta. 1 ♀, ricefield, Naganuma-machi, 11 August 1998, coll. A. Numabe.

Remarks. Only one specimen dissected poorly on

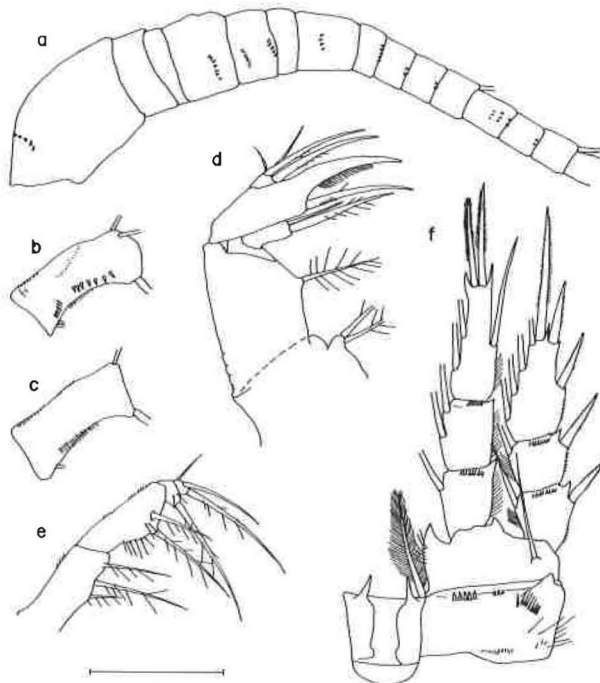


Fig. 2. *Mesocyclops yesoensis* sp. nov., holotype female: A1, 1st to 14th article, ventral, showing distribution of micro-spinules; b, A2 basis, posterior; c, A2 basis, anterior; d, maxilla, anterior; e, maxilliped, posterior; f, P4 and coupler, posterior. Scale = 100 μ m.

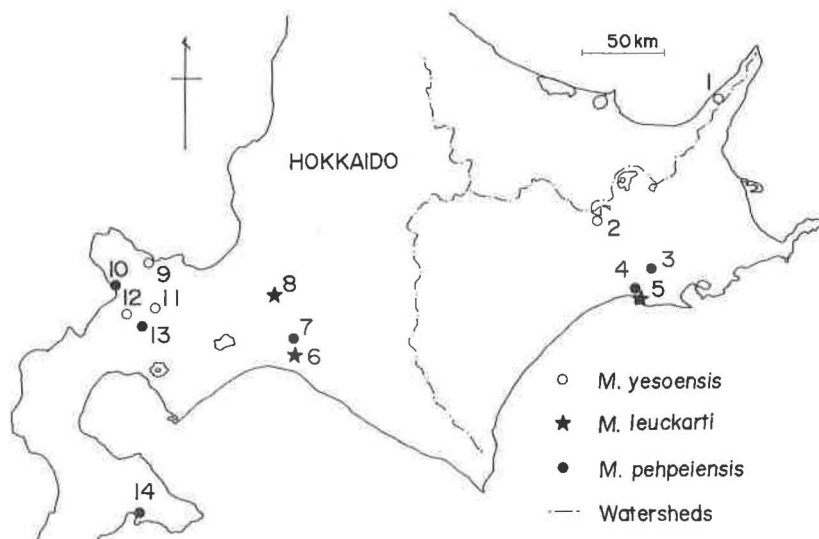


Fig. 3. A map showing localities. 1, Lakes Shiretoko-goko; 2, Lake Junsai-numa; 3, Lake Tohro; 4, Kushiro-shitsugen; 5, Lake Harutori; 6, Lake Mikazuki-numa; 7, Abira-machi; 8, Naganuma-machi; 9, Yoichimachi; 10, Horikappu River; 11, Ponkutosan Stream; 12, Lake Shinsen-numa; 13, Lake Hangetsu; 14 Hakodate-shi.

slides in the past has been identified as *M. leuckarti*. The specimen obtained from Lake Mikazuki-numa, a small shallow lake on the Pacific coast of the Ishikari Lowland (Fig. 3). Recently, the species was collected from Lake Harutori, a dishaline lake connecting to the Pacific Ocean, and ricefield in the Ishikari Lowland (Fig. 3). These are the first records from Japan. It is known from Europe to Russian Far East including the Kamchatka Peninsula (Rylov, 1948; Alekseev, 1993; Mirabdullayev, 1996; Ishida, 1998), China (Tai and Chen, 1979), and Korea (Chang *et al.*, 1998).

Mesocyclops pehpeiensis Hu, 1943

Material dissected on slides: 1 ♀, moat of the Goryoukaku Park, Hakodate-shi, 2 July 1965. 1 ♀, pond, Abira-machi, 12 May 1987. 1 ♀, Horikappu River, 19 June 1988. 14 ♀ ♀, Lake Hangetsu, 10 September 1995. 1 ♀, Lake Tohro, 21 July 1998. 3 ♀ ♀, ditch, Kushiro-shitsugen, 21 July 1998.

Remarks. The species was redescribed precisely by Reid (1993), Mirabdullayev (1996), Ueda and Ishida

(1997), and Ueda *et al.* (1997) as *M. ruttneri*. The specimens newly examined by myself are quite similar to them. This species was recorded from the Okinawa Is. (Ueda & Ishida, 1997), Kyushu (Ueda *et al.*, 1997), and Lake Kahoku-gata (Kawabata & Defaye, 1994). Ban and Ishida (unpublished data) collected it from a small lake on Rebun Is., Hokkaido (45° 27'N). It is distributed widely in Hokkaido (Fig. 3). Except for oligotrophic caldera lakes and rapidly flowing streams, the species inhabits various kinds of waters on flood plains and mountainous regions, such as ditches, pools, ponds, marshes, rivers and streams, and lakes.

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