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A REDESCRIPTION OF *THERMOCYCLOPS UENOI* (CRUSTACEA, COPEPODA)

I. M. Mirabdullayev¹, H. Ueda²

¹Institute of Zoology, Tashkent, 700095 Uzbekistan

E-mail: hydrobio@zool1.silk.org

²Center for Marine Environmental Studies, Ehime University, Bunkyo-cho 3, Matsuyama, Ehime 790-8577, Japan

E-mail: hueda@dpc.ehime-u.ac.jp

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A Redescription of *Thermocyclops uenoi* (Crustacea, Copepoda). Mirabdullayev I. M., Ueda H. — *Thermocyclops uenoi* Ito, 1952, a poorly known groundwater species is redescribed based on the materials of collection Dr. T. Mizuno. A key to Japanese species of the genus *Thermocyclops* is provided.

Key words: Copepoda, *Thermocyclops uenoi*, groundwater fauna, Japan.

Переописание *Thermocyclops uenoi* (Crustacea, Copepoda). Мирабдуллаев И. М., Уэда Х. — *Thermocyclops uenoi* Ito, 1952, малоизвестный подземный циклоп, переописан по материалам коллекции Т. Мицуно. Составлена таблица для определения видов рода *Thermocyclops* фауны Японии.

Ключевые слова: Copepoda, *Thermocyclops uenoi*, фауна грунтовых вод, Япония.

Introduction

Genus *Thermocyclops* Kiefer, 1927 is one of the most important among Cyclopidae. Its representatives inhabit various biotopes of various continental waterbodies, often dominating plankton communities.

There are 3 species of the genus *Thermocyclops* known from Japan: *Thermocyclops taihokuensis* Harada, 1931, *T. crassus* (Fischer, 1853), *T. uenoi* Ito, 1954 (Ito, Miura, 1973; Ueda, Ishida, 1997).

The last species was first described by Ito (1952) from a well in Sashiki Town, Kumamoto Prefecture, Kyushu. It is one of the most poorly known species in the genus. Subsequent records of this species were made only from a well in Sasaguri Town, Fukuoka Prefecture, Kyushu (Ito, 1957) and from wells in Tomogashima Island in the Seto Inland Sea, Wakayama Prefecture (Mizuno, 1957). Dr. T. Mizuno kindly gave one (HU) of us all his samples that he collected during his study. We found *T. uenoi* in his collection from Tomogashima Island and redescribe it in this note.

Material

Ten females and 3 males from a well in Tomogashima Island, Japan. 21.11.1954. Mizuno's collection. All drawings have been made using a camera lucida. Designation of furcal setae are given according Dussart and Defaye (1995).

Results

Thermocyclops uenoi Ito, 1952 (fig. 1–24)

Female. Body length 950–1100 μm . Body widest at cephalothorax (fig. 1). Lateral sides of fifth toracic somite without ornamentation (fig. 2). Genital somite about as long as wide. Well developed lateral wings of receptaculum seminis slightly curved posteriorly (fig. 2). Anal somite with well developed operculum and 2 groups of 12–16 spinules on posterior ventral margin (fig. 3–4).

Furcal rami 3.5–4.3 times as long as wide, with 4 groups of hairs on inner surface (fig. 4). Implantations of Me and Te furcal setae not provided with spinules. Me

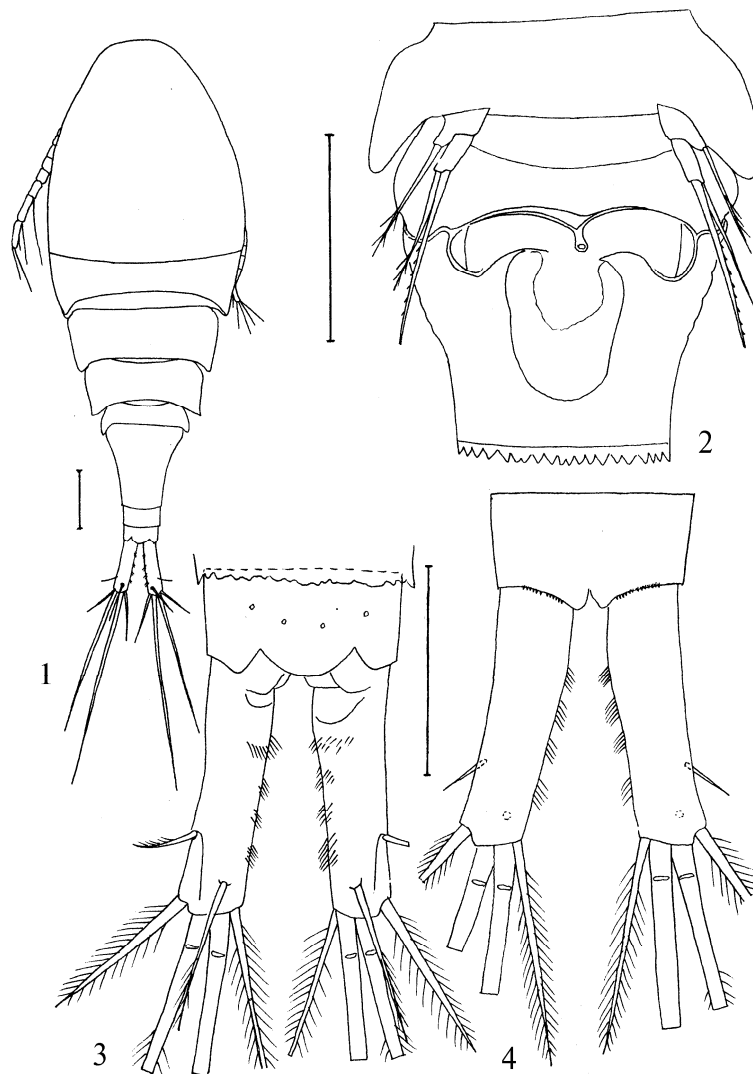


Fig. 1-4. *Thermocyclops uenoi*, ♂: 1 — habitus; 2 — last thoracic and genital somites; 3 — furcal ramus ventrally; 4 — furcal ramus dorsally. Scales: 100 μ m.

Рис. 1-4. *Thermocyclops uenoi*, ♂: 1 — габитус; 2 — последний торакальный и генитальный сегменты; 3 — фурка с брюшной стороны; 4 — фурка со спинной стороны. Масштаб: 100 мкм.

is situated at 69–70% of length of furcal rami. Ti about as long as furcal rami and significantly longer than Te and Sd furcal setae (fig. 4). Tips of Tmi are straight.

Antennules relatively short, reaching the middle of second thoracic somite, 17-segmented, armored as follows (segment number in Roman numerals, setal number in arabic numerals, sp = spine): I(8)—II(4)—III(2)—IV(6)—V(4)—VI(1+sp)—VII(2)—VIII(1)—IX(1)—X(0)—XI(1)—XII(1+aesth)—XIII(0)—XIV(1)—XV(2)—XVI(2+aesth)—XVII(8+aesth) (fig. 5). Last antennular segment about as long as the penultimate segment. Lateral setae of the last segment is situated at middle of length of the segment. Aesthetasc on 12th segment long, protruding beyond distal margin of 14th segment. Last and penultimate segments bear hyaline membranes. Basipodite of antenna bearing 3 setae. Its ornamentation as on figures 6, 7. There are rows and fields of tiny spinules on caudal side of basipodite. The endopod is 3-segmented. Its first segment is armed with 1 outer seta at midlength and bears a row of spinules at the outer margin. Second

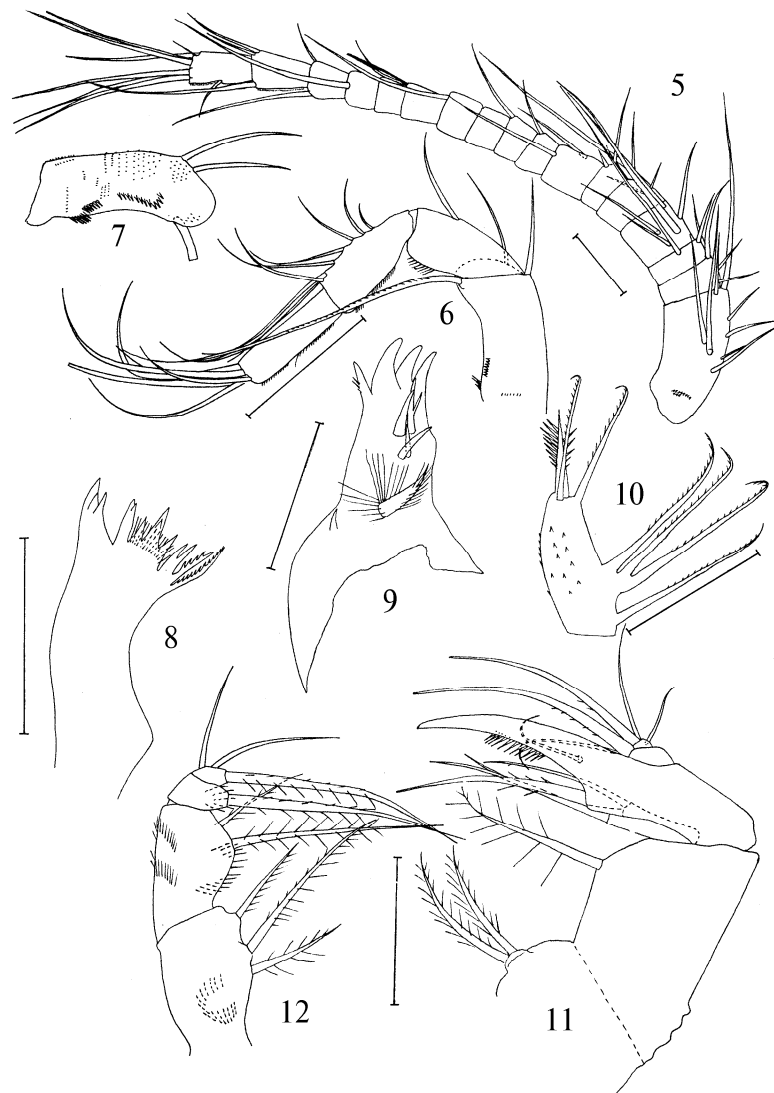


Fig. 5–11. *Thermocyclops uenoi*, ♂: 5 — antennule; 6 — antenna, frontal side; 7 — basipodite of antenna, caudal side; 8 — mandible; 9 — maxillule; 10 — maxillular palp; 11 — maxilla; 12 — maxilliped. Scales: 50 μ m.

Рис. 5–11. *Thermocyclops uenoi*, ♂: 5 — антеннула; 6 — антенна, фронтальная сторона; 7 — базиподит антенны, каудальная сторона; 8 — мандибула; 9 — максилула; 10 — щупик максилулы; 11 — максилла; 12 — максиллипеды. Масштаб: 50 мкм.

segment of antenna bearing 9 setae and third segment bearing 7 setae terminally and row of spinules on outer rim.

Morphology of mandible and maxillule as on figures 8, 9. Maxillular palp bearing tiny spinules on outer side (fig. 10). Maxilla with praecoxa, coxa, basis and 2-segmented endopod. Shortest seta of movable endite of coxa is 0.7–0.8 times as long as the longest seta (fig. 11). Maxilliped with syncoxa, basis, and 2-segmented endopod (fig. 12). Length ratio between two shortest setae is 1.20–1.25.

Thoracic legs with 3-segmented rami. Spine formula of exopodis P1–P4: 2.3.3.3; setae formula: 4.4.4.4 (fig. 13–16). Inner margin of P1 basipodite with long seta reaching P1enp3. Inner margins of P1–P3 basipodites bearing setules, these of P4 devoid of setules but bearing tiny spinules on caudal surface. Connecting plate of P1 with smooth surface. Connecting plates of P2–P4 bear long spinules on caudal surface.

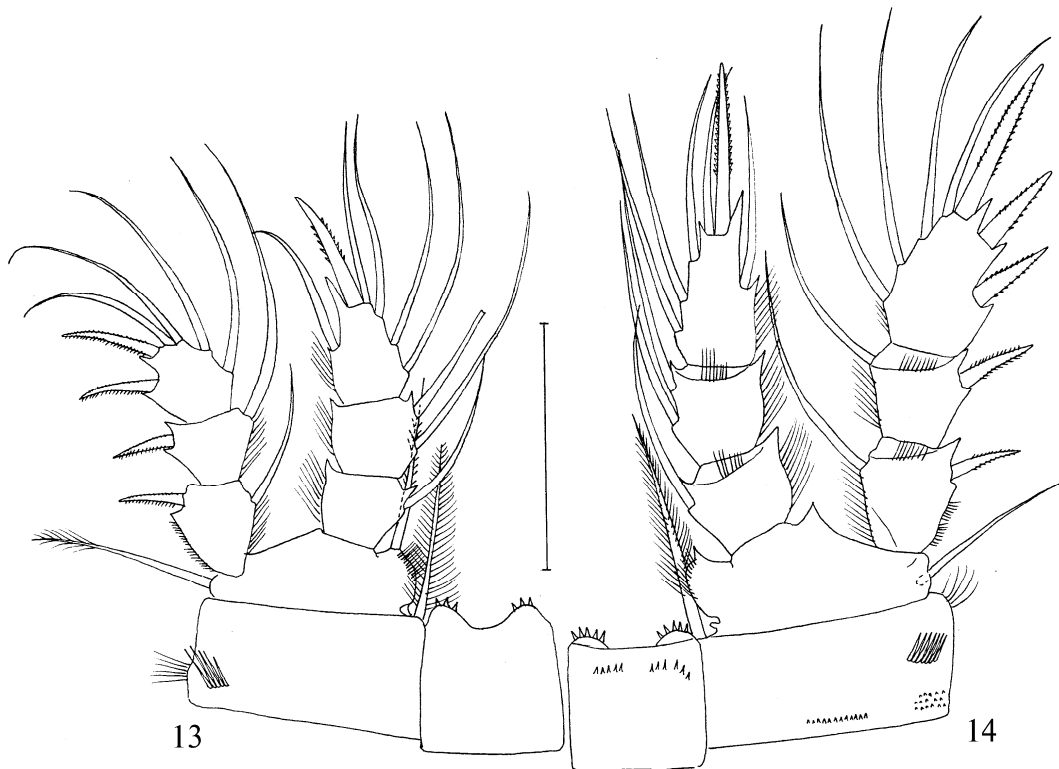


Fig. 13–14. *Thermocyclops uenoi*, ♂: 13 — P1; 14 — P2. Scale: 100 μm .

Рис. 13–14. *Thermocyclops uenoi*, ♂: 13 — P1; 14 — P2. Масштаб: 100 мкм.

Connecting plates of P1–P3 bearing low rounded prominences armed with 3–7 spinules. Coupler of P4 without prominences but bearing at its place 3 spinules on frontal surface. Inner spine of P4enp3 slightly shorter than the segment and 1.4–1.6 times longer than outer spine.

P5 of morphology typical for the genus *Thermocyclops* (fig. 2). Inner spine of second segment of P5 1.5–1.6 times as long as outer seta.

Male. Body length 860 μm . Anal somite with well developed operculum and many spinules on posterior ventral margin (fig. 18). Furcal rami 4.3 times as long as

Table 1. Data of measurements of *Thermocyclops uenoi*

Таблица 1. Основные промеры *Thermocyclops uenoi*

Data	Mizuno collection Tomogashima Isl.*		Ito, 1954 min±max	Ito, 1957** min±max
	min±max	x		
Body length, μm	950–1100	1040	750–1200	1200–1290
Caudal rami L/W	4.00–4.30	4.19	3.50–4.60	3.70–4.10
Ti/caudal rami L	0.90–1.02	0.95		
Ti/Tmi	0.26–0.28	0.27		0.25–0.31
Ti/Te	0.35–0.38	0.36		0.36–0.39
Ti/Te	1.36–1.54	1.45	1.30–1.80	1.40–1.50
Ti/Sd	1.62–1.84	1.62		1.59–1.80
P4enp3 L/W	2.33–2.60	2.46	2.00–2.70	2.10–2.50
P4enp3 med.sp/L	0.87–0.96	0.93	0.88–0.95	0.89–1.00
P4enp3 med.sp/lat.sp	1.38–1.55	1.46	1.40–1.80	1.40–1.50
P5 med.sp/lat.seta	1.50–1.59	1.53		

* n=10

** n=5

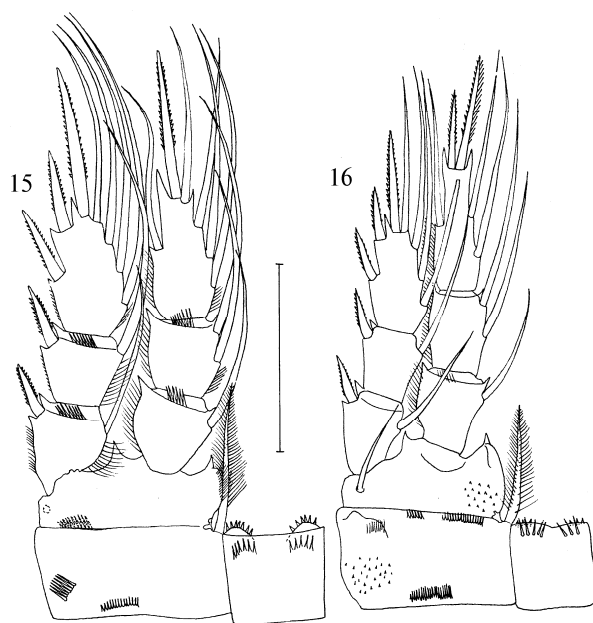


Fig. 15–16. *Thermocyclops uenoi*, ♂; 15 — P3; 16 — P4. Scale: 100 μ m.

Рис. 15–16. *Thermocyclops uenoi*, ♂; 15 — P3; 16 — P4. Масштаб: 100 мкм.

wide, with smooth inner surface. Implantations of Te furcal setae provided with spinules. Tips of Ti strongly curved ventrally (fig. 17).

Antennules as on figure 19. Endopodite 2 of antenna bearing 8 setae (fig. 20).

Connecting plate of P4 bearing spinules on frontal and caudal sides (fig. 21). In-

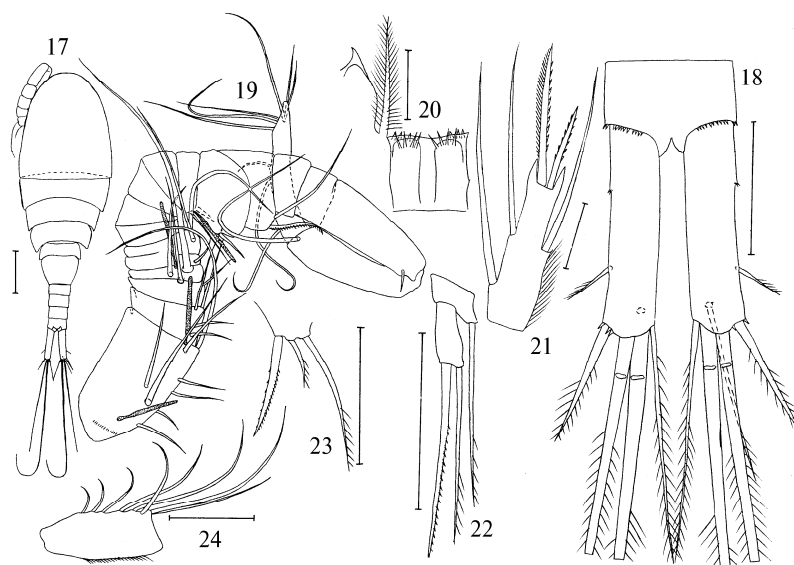


Fig. 17–24. *Thermocyclops uenoi*, ♂; 17 — habitus; 18 — furcal ramus ventrally; 19 — antennules; 20 — endopodite 2 of antenna; 21 — connecting plate of P4; 22 — P4enp3; 23 — P5; 24 — P6. Scales: 17 — 100 μ m; 18, 23, 24 — 50 μ m; 20, 21, 22 — 25 μ m.

Рис. 17–24. *Thermocyclops uenoi*, ♂; 17 — габитус; 18 — фурка с брюшной стороны; 19 — антеннула; 20 — эндоподит 2 антенны; 21 — соединительная пластинка P4; 22 — P4enp3; 23 — P5; 24 — P6. Масштаб: 17 — 100 мкм; 18, 23, 24 — 50 мкм; 20, 21, 22 — 25 мкм.

ner spine of P4enp3 1.6 times longer than outer spine (fig. 22). Inner spine of second segment of P5 slightly longer than outer seta (fig. 23). Inner spine of P6 1.4 times shorter than outer seta and about twice as long as outer seta (fig. 24).

The biometrical data are given in table 1.

Discussion

Morphology of specimens mainly studied corresponds to description given by Ito (1952, 1954). However specimens from Sasaguri Town determined by him as *T. uenoi* (Ito, 1957; Ito, Miura, 1973) differ from specimens studied by us. Females from Sasaguri Town have additional row of setules on caudal side of connecting plate of P4 (Ito, 1957: fig. 56), males have innermost spine of P6 shorter than the medial seta (Ito, 1957: fig. 63, 65).

Thermocyclops uenoi belongs to the *Thermocyclops schmeili* species group. *Thermocyclops uenoi* is probably most close to *Thermocyclops operculifer* Kiefer, 1930, differing by hairy furcal rami, longer spine-like seta on inner margin of basis of P1, relatively longer Ti furcal seta.

Thermocyclops uenoi is easily distinguished from congeners from Japan by hairy furcal rami and by morphology of connecting plate of P4.

Key for determination of the *Thermocyclops* species of Japan

Ключ для определения видов рода *Thermocyclops* из Японии

1. Female furcal rami with hairs on inner surface, P4 connecting plate without prominences.
..... *Thermocyclops uenoi*
- Furcal rami with smooth inner surface, P4 connecting plate bearing rounded prominences armed with spinules. 2
2. Tips of Tmi strongly curved, lateral wings of receptaculum seminis not curved posteriorly.
..... *Thermocyclops crassus*
- Tips of Tmi straight, lateral wings of receptaculum seminis curved posteriorly.
..... *Thermocyclops taihokuensis*

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