

First record of *Diacyclops languidus* (Sars, 1863) (Copepoda: Cyclopoida) from Central Asia

Находка *Diacyclops languidus* (Sars, 1863) (Copepoda: Cyclopoida) в Центральной Азии

Iskandar M. Mirabdullayev¹, Ersain B. Tayzhanov²,
Abdulahmet R. Kuzmetov²

И.М. Мирабдуллаев¹, Е.Б. Тайжанов², А.Р. Кузметов²

¹ Institute of Zoology, Tashkent, 700095 Uzbekistan. E-mail: iskandar@tps.uz
Институт зоологии АН РУз., Ташкент, 100095 Узбекистан.

² International Kazakh-Turkish University, Turkestan, 487010 Kazakhstan. E-mail: ersayin20@rambler.ru
Международный казахско-турецкий университет, Туркестан, 487010 Казахстан.

KEY WORDS: *Diacyclops languidus*, Central Asia, identification, distribution.

КЛЮЧЕВЫЕ СЛОВА: *Diacyclops languidus*, Центральная Азия, определение, распространение.

ABSTRACT. First record of *Diacyclops languidus* (Sars, 1863), poor-known in Central Asia cyclopoid, is presented based on specimens found in a rice field in the vicinity of Kzyl-Orda (South-Kazakhstan Province), Lake Karateren (Karakalpakistan), and in fish pond of Tashkent Province. A key to species of the genus *Diacyclops* Kiefer in Central Asia is provided.

РЕЗЮМЕ. Приводится иллюстрированное описание *Diacyclops languidus* (Sars, 1863), плохо изученного в Центральной Азии вида циклопов, обнаруженного в рисовых чеках в окрестностях г. Кзыл-Орда (Южно-Казахстанская обл.), в озере Каратерень в Каракалпакстане и в рыбноводном пруду в Ташкентской области. Приведен определительный ключ видов рода *Diacyclops* фауны Центральной Азии.

Introduction

Diacyclops languidus (Sars, 1863) is widely distributed in Europe. According to F. Stoch & P. Pospisil [2000] all Asian records of this species are to be treated with caution. The only record of this species in Central Asia [Sharapova & Orlova, 1975] was not documented by any description or illustration. In the present paper the first description of the morphology of *D. languidus* from Uzbekistan and Kazakhstan is provided.

Material and methods

Material examined:

— Kazakhstan: rice field, vicinity of the town of Kzyl-Orda, South-Kazakhstan region, June 2006; 2 females.

— Uzbekistan: Lake Karatereng, Karakalpakistan, April 2000; 1 female. Salinity of the lake 3.010 ppt.

— Uzbekistan: fishpond, “Balikchi” Fish Farm, Tashkent Province, June 1992; 1 female. Salinity of the pond 0.940 ppt.

All drawings were made using a drawing tube. The description is based on a specimen from Kazakhstan.

Abbreviations: aesth — aesthetasc; Enp — endopodite; Fu — furca; L — length; Mxp — maxilliped; P1–P5 — legs 1–5; Sd — dorsal furcal seta; Te — outermost apical furcal seta; Ti — innermost apical furcal seta; W — width.

Results

Diacyclops languidus (Sars, 1863)
Figs 1–16.

DESCRIPTION. Female. Body length: 820–840 μm. Body widest at cephalothorax (Fig. 1). Genital double-segment broadly rounded in its anterior part. Distal margin of anal segment with spinules ventrally (Figs 2–4).

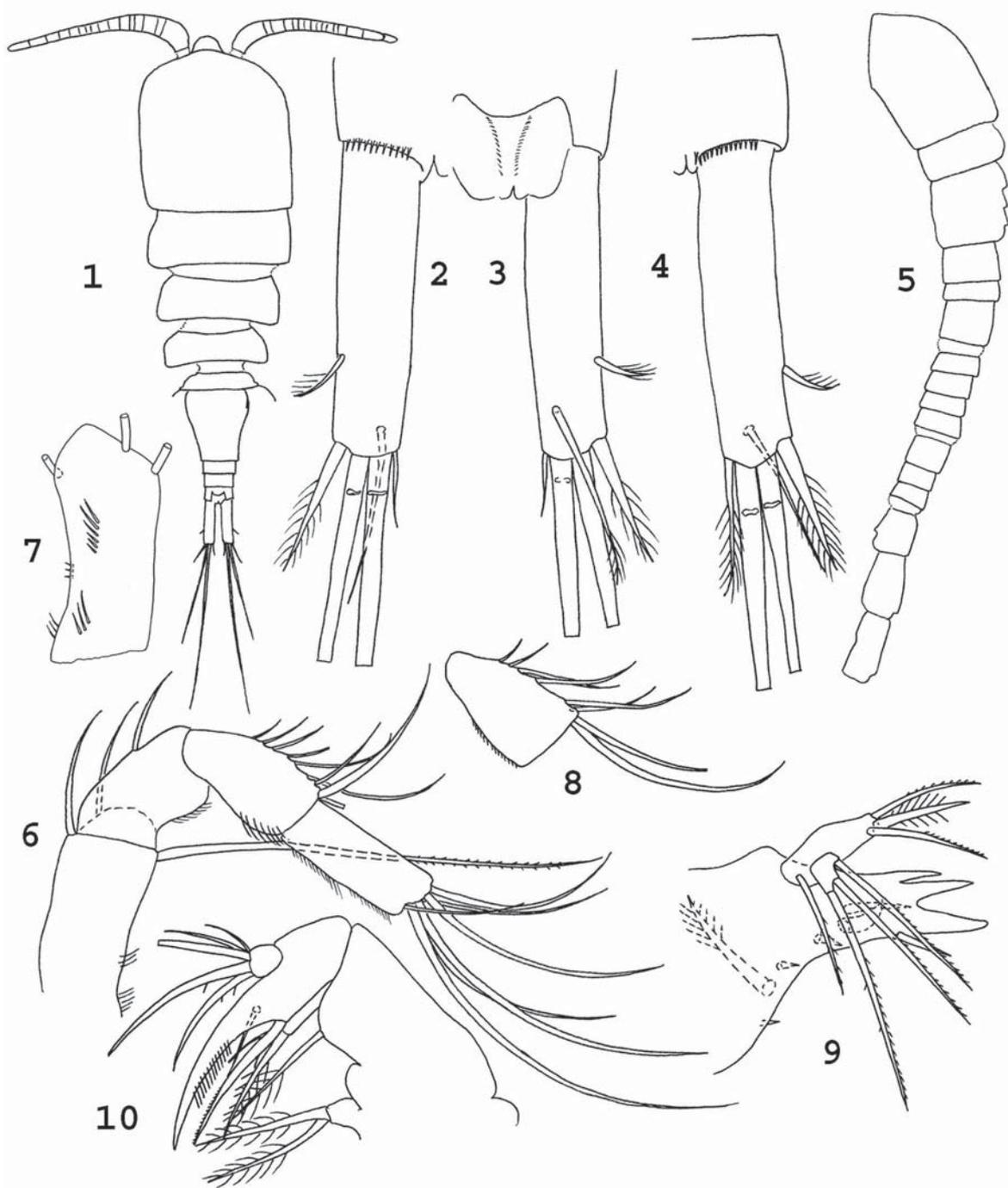
Furcal rami parallel, without hairs on inner margin, 4.3 times as long as wide (Figs 2–3). Implantations of Te and lateral furcal seta not provided with spinules. Setation of terminal furcal setae homonomous. Ti significantly shorter than Te, Sd and furcal rami (Table 1).

Antennule short, reaching distal margin of first thoracic somite, 16-segmented (Fig. 5), setal armature as follows: 8+spinules, 4, 8, 3+spine, 1+spine, 2, 1, 1, 0, 1, 1+aesth, 0, 1, 2, 2+aesth, 7+aesth.

Antenna as on Fig. 6, 4-segmented. Basis bearing 1 outer (exopodal) and 2 inner setae. Endopod 3-segmented; first segment armed with 1 inner seta inserted at midlength and a row of spinules along the outer margin. Second segment of endopodite bearing 8–9 setae, third segment bearing 7 setae terminally and a discontinuous row of spinules on external margin. Caudal side of basis bearing several long spinules on medial rim and 2 short rows of spinules on basal and middle part of the segment, respectively (Fig. 7).

Labrum with 13 teeth.

Mandible: as common for the genus; mandibular palp with 2 long and 1 short setae.



Figs 1–10. *Diacyclops languidus* (Sars, 1863), female; 1–3, 5–7, 9–10 — Kazakhstan; 4, 8 — Uzbekistan: 1 — habitus; 2 — furcal rami ventrally; 3 — furcal rami dorsally; 4 — furcal rami ventrally; 5 — antennule; 6 — antenna, frontal side; 7 — basis of antenna, caudal side; 8 — Enp2 of antenna; 9 — maxillula; 10 — maxilla.

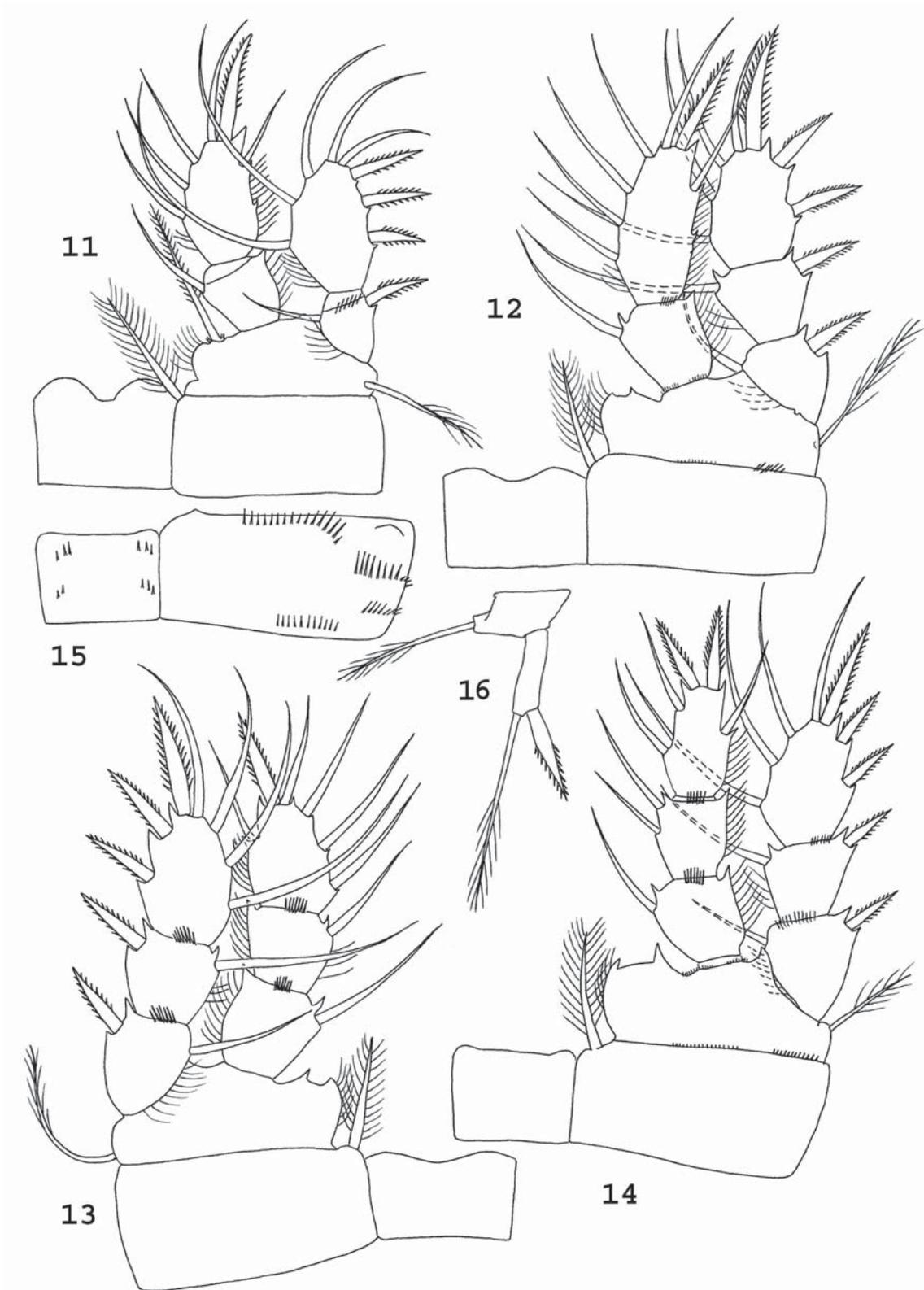
Рис. 1–10. *Diacyclops languidus* (Sars, 1863), самка; 1–3, 5–7, 9–10 — Казахстан; 4, 8 — Узбекистан. 1 — общий вид; 2 — фурка, вентральная сторона; 3 — фурка, дорсальная сторона; 4 — фурка, вентральная сторона; 5 — антеннула; 6 — антенна, передняя сторона; 7 — базиподит антенны, задняя сторона; 8 — Enp2 антенны; 9 — максиллула; 10 — максилла.

Maxillula as in Fig. 9.

Maxilla as in Fig. 10. Endopodite 2-segmented (not shown on Fig. 10).

Natatory legs. Exopodites of P1 two-segmented, those of P2–P4 three-segmented (Figs 11–14). Endopodites of

P1–P2 two-segmented, those of P3–P4 three-segmented. Spine formula 3.3.3.3. Setae formula 5.4.4.4. Intercoxal plates of P1–P3 without ornamentation, that of P4 with spinules on caudal side (Fig. 15). Coxa P4 with 4 rows of spinules on caudal side (Fig. 15). Inner edges of basis of P1–P4 with



Figs 11–16. *Diacyclops languidus* (Sars, 1863), female, Kazakhstan: 11 — P1; 12 — P2; 13 — P3; 14 — P4, frontal side; 15 — coxa and intercoxal plate of P4, caudal side; 16 — P5.

Рис. 11–16. *Diacyclops languidus* (Sars, 1863), самка; Казахстан: 11 — P1; 12 — P2; 13 — P3; 14 — P4, передняя сторона; 15 — коксоподит и соединительная пластинка P4, задняя сторона; 16 — P5.

Table 1. Data of measurements of females of *Diacyclops languidus* (data in parentheses were taken from published drawings).
Таблица 1. Данные измерений самок *Diacyclops languidus* (значения в скобках получены из опубликованных рисунков).

	Kazakhstan, Kzyl-Orda	Uzbekistan, L. Karateren	Monchenko (1974)	Einsle (1993)	Ishida (2002)
Body length, μm	820–840	860	760–980	500–800	600–800
Furca L/W	4.3	4.1	3.8–5.2	4.0–5.0	(3.4)
Ti/L furca	0.25–0.26	0.37	(0.3)	(0.23)	(0.25)
Ti/Te	0.56–0.62	0.81	(0.67)	(0.68)	(0.75)
Ti/Sd	0.44–0.50	0.86	(0.65)	(0.55)	(0.8)
P4Enp3:					
L/W	1.48–1.68	1.73	1.5–2.0	(1.5)	(1.5)
Inner sp./L	0.74–0.75	0.74	0.5–0.7	(0.75)	(0.75)
Inner sp./outer sp.	1.0	1.0	1.0–1.2	(1.4)	(1.1)

setules. Inner distal edge of basis of P4 with characteristic notch. Apical inner edge of basis P1 with a long spine of homonomous ornamentation, reaching half-length of Enp2. Enp3P4 1.68 times as long as wide. Inner apical spine 0.75 times as long as segment and about as long as outer spine.

P5 consisting of 2 segments. Basal segment with long outer seta. Free segment with long apical seta and inner apical spine (Fig. 16).

VARIABILITY. The specimen from Lake Karateren (Uzbekistan) is in general similar to the specimen from Kazakhstan. However, its Ti is markedly longer (Fig. 4; Table 1), and the second endopodite of antenna bears 8 setae (Fig. 8). It is not clear, if these differences are of taxonomic significance or are related to inter- or intra-population variability.

TAXONOMIC REMARKS. The taxonomic structure of the *Diacyclops languidus* species complex is obscure [Pesce, 1994]. A lack of sufficient detail in the original description poses several problems for species identification [Stoch, 2001]. Published descriptions and illustrations of forms attributed to *D. languidus* often differ in taxonomically important morphological details. For instance, U. Einsle [1993] reported *D. languidus* with a significantly shorter outer apical spine of the P4Enp3 and with 1 row of setules on the intercoxal plate of the P4. As illustrated by T. Ishida [2002] *D. languidus* from Japan has relatively short furcal rami (Table 1), spinules at the implantation of the Te, and 2 rows of setules on the intercoxal plate of the P4. V.I. Monchenko [1974] did not illustrate nor mention any ornamentation of the intercoxal plate of the P4.

ECOLOGY. A freshwater species inhabiting small, shallow, often ephemeral waterbodies.

DISTRIBUTION. According to G.L. Pesce [1994] *Diacyclops languidus* is a cosmopolitan species. It was reported from Europe, Japan, Sri Lanka, North America [Dussart & Defaye, 1985; Ishida, 1992]. However, many records are questionable or erroneous and require confirmation.

Five species of the genus *Diacyclops* Kiefer, 1927 have been recorded in Central Asia: *Diacyclops bisetosus* (Rehberg, 1880), *D. bicuspidatus* (Claus, 1957), *D. odessanus* (Schmankevitch, 1875) [Dobrokhotova, 1975; Monchenko, 1974; Mukhamediev, 1986; Rylov, 1948], *D. languidoides* (Lilljeborg, 1901) [Stuge & Lopatin, 2002], *Diacyclops languidus* (Sars, 1863) [Sharapova & Orlova, 1975].

KEY TO SPECIES OF THE GENUS DIACYCLOPS KIEFER IN CENTRAL ASIA:

1. Endopodites of P1–P2 2-segmented 2
- Endopodites of P1–P2 3-segmented 3
2. Antennules 16-segmented *Diacyclops languidus*

- Antennules 11-segmented *Diacyclops languidoides*
- 3. Inner spine of Enp3P4 longer than outer spine; antennules 17-segmented *Diacyclops bisetosus*
- Inner spine of Enp3P4 shorter than outer spine 4
- 4. Antennules 17-segmented *Diacyclops bicuspidatus*
- Antennules 14-segmented *Diacyclops odessanus*

ACKNOWLEDGMENTS. Dr J.W. Reid (USA), Dr E. Krupa (Kazakhstan) and anonymous reviewers are thanked for helpful suggestions.

References

- Dobrokhotova O.V. 1975. [Distribution of Cyclopoida in waterbodies of Kazakstan and its significance in transmission of cestodiasis of fishes and birds] // *Ekologia parazitov vodnikh zhivotnikh*. Alma-Ata: Izd. Nauka Kazak. SSR. P.108–141 [in Russian].
- Dussart B., Defaye D. 1985. Répertoire mondial des copépodes Cyclopoïdes. Paris/Bordeaux: Editions CNRS. 228 pp.
- Einsle U. 1993. Crustacea Copepoda. Calanoida und Cyclopoida // *Süßwasserfauna von Mitteleuropa*. Bd. 8/4. H. 1. Stuttgart: Gustav Fischer Verlag. 209 S.
- Ishida T. 1992. Cyclopoid and harpacticoid copepods (Crustacea) from southeastern Alaska, USA // *Proceedings of the Biological Society of Washington*. Vol.105. P.249–254.
- Ishida T. 2002. Illustrated fauna of the freshwater cyclopoid copepods of Japan // *Bulletin of the Biogeographical Society of Japan*. Vol.57. P.37–106.
- Monchenko V.I. 1974. [Cyclopidae] // *Fauna Ukraini*. Vol.27. No.3. 450 pp. [in Ukrainian].
- Mukhamediev A.M. 1986. [Crustaceans of waters of the Ferghana Valley]. Tashkent: Fan. 160 p. [in Russian].
- Pesce G.L. 1994. The genus *Diacyclops* Kiefer in Italy: a taxonomic, ecological and biogeographical up-to-date review (Crustacea Copepoda Cyclopidae) // *Arthropoda Selecta*. Vol.3. No.3–4. P.13–19.
- Rylov V.M. 1948. [Crustacea, Freshwater Cyclopoida] // *Fauna SSSR*. Vol.3. No.3. 318 p. [in Russian].
- Sharapova L.I., Orlova N.R. 1975. [Main traits of communities of zooplankton in Kapchagay Reservoir in the first years of its filling] // *Biologicheskie nauki*. Alma-Ata. No.9. P.16–28 [in Russian].
- Stoch F. 2001. How many species of *Diacyclops*? New taxonomic characters and species richness in a freshwater cyclopoid genus (Copepoda, Cyclopoida) // *Hydrobiologia*. Vol.453/454. P.523–531.
- Stoch F., Pospisil P. 2000. Redescription of *Diacyclops disjunctus* (Thalwitzer, 1927) from Austria, with remarks on the *Diacyclops languidus*-group in Europe (Copepoda, Cyclopoida, Cyclopidae) // *Crustaceana*. Vol.73. P.469–478.
- Stuge T.S., Lopatin O.E. 2002. [On zooplankton biodiversity of waterbodies in the middle of the River Irtysh] // *Zoologicheskie issledovaniya v Kazakhstane*. Almaty. P.184–186 [in Russian].