First record of the water flea Coronatella (Ephemeralona) elegans (Kurz, 1875) (Cladocera: Anomopoda) in Russia

Певная находка ветвистоусого ракообразного Coronatella (Ephemeralona) elegans (Kurz, 1875) (Cladocera: Anomopoda) в России

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ABSTRACT: Coronatella (Ephemeralona) elegans (Kurz, 1875), previously known from temporary waters of Central Europe and the Mediterranean is found for the first time in Russia, on the Taman’ Peninsula and in the Republic of Kalmykia, at a distance of about 1400 and 2000 km respectively from its easternmost locality in Europe. Morphology of parthenogenetic females, ephippial females and males of the found population is studied. Our data show the importance of sampling of temporary waterbodies for full evaluation of local Cladocera fauna.

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Introduction

Cladocera is one of the most common groups of microcrustaceans (with diversity comparable to that of Copepoda and Ostracoda), inhabiting various continental water bodies. It is the dominant group in planktonic, benthic and littoral communities [Dumont, 1994; Dumont, Negrea, 2002; Forró et al., 2008; Kotov, 2013].

Today the fauna of cladocerans is intensively studied in different continents, especially in Europe [Alonso, 1996; Hudec, 2000]. Information on the fauna of cladocerans in the European part of Russia is considered to be much more detailed in comparison with Eastern Siberia and Far East [Kotov, 2016; Garibian et al., 2019]. Studies of the cladocerans of European Russia are usually parts of large works devoted to large families: Sididae [Korovchinsky, 2004], Macrothricidae [Smirnov, 1992], Ilyocryptidae [Kotov, Štifter, 2006], Eury cercidae [Kotov, Bekker, 2016] and Cymbidoridae [Smirnov, 1971, 1996]. The most complete and updated key for the cladoceran taxa of the Palaearctic was published recently [Rogers et al., 2019].

But still there are several problematic groups with insufficiently developed taxonomy which need to be revised even in European Russia, such as Daphnia O.F. Muller, 1785, Moina Baird, 1850 or Diaphanosoma Fischer, 1850 [Korovchinsky, 2004; Kotov, 2015; Bekker et al., 2016]. One of these groups to be revised is Alona s.lato, an artificial taxon formed as a “store” of convergently similar taxa of the Aloninae with un-
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Fig. 1. *Coronatella* (*Ephemeralona*) *elegans* (Kurz, 1875) from roadside ditch near Malye Derbety, Republic of Kalmykia, European Russia, adult parthenogenetic female: A — lateral view, B — head pores, C, D, E — valves armature, F — labrum, G — antenna I, H — antenna II, J, K — postabdomen. Scale 0.1 mm (A, C, H), 0.05 mm (B, D–G, I–K).

Рис. 1. *Coronatella* (*Ephemeralona*) *elegans* (Kurz, 1875) из канавы в районе пос. Малые Дербеты, Республики Калмыкия, европейская часть РФ, взрослая партеногенетическая самка: A — вид сбоку, B — головные поры, C, D, E — вооружение створок, F — лябрум, G — антенна I, H, I — антенна II, J, K — постабдомен. Масштаб 0,1 мм (A, C, H), 0,05 мм (B, D–G, I–K).

clear affinities [Van Damme et al., 2010]. Two decades ago, *Alona* Baird, 1850 was considered as one of the largest genera in Russia, with 13 species found in the country [Sinev, 2002]. Four new species of *Alona s.lato* were recently described from Russia [Sinev, 1999; Sinev et al., 2009, 2020]. But recently, the generic status of many species-groups of *Alona s.lato* changed — species of the *costata*-group, including *A. costata* and *A. rustica*, were separated into the genus *Flavalona* Sinev et Dumont, 2016 [Sinev, Dumont, 2016], species of the *pulchella*-group, including *A. karelica* were placed into *Ovalona* Van Damme et Dumont, 2008 [Sinev, 2015], species of the *protzi*-group, including *A. protzi* and *A. labroza* separated into *Phreatalona* Van Damme, Brancelj et Dumont, 2009 [Van Damme et al., 2009]. The genus *Coronatella* Dybowski et Grochowski, 1894 was re-established for species of the *rectangula*-group, in-
Fig. 2. Coronatella (Ephemeralona) elegans (Kurz, 1875) from roadside ditch near Malye Derbety, Republic of Kalmykia, European Russia: A, B — adult parthenogenetic female, C — ephippial female, D–H — adult male. A — limb I, B — limb III exopodite, C — lateral view, D — lateral view, E — labrum, F — antenna I, G — postabdomen, H — limb I. Scale 0.1 mm (C, D), 0.05 mm (A, B, E–H).

Material and methods

Four representatives of the genus Coronatella were noted from Russia: C. (C.) rectangula (Sars, 1862) is common in both European and Asian Russia [Sinev, 2001], C. (E.) floessneri (Sinev, Alonso et Sheveleva, 2009) and C. (E.) irinae (Sinev, Alonso et Sheveleva, 2009) are endemics of southern Siberia [Sinev et al., 2009], and East Asian species C. (C.) trachystriata (Chen, Zhang et Liu, 1994) is present in the Amur basin [Kotov et al., 2011; Garybian et al., 2019]. Analyzing the samples collected in the southern portion of European Russia, we found three remarkable populations of Coronatella (Ephemeralona) belonged to a taxon never reported from Russia before.

Material and methods

Samples were collected with a small-sized plankton net and fixed in 96% alcohol. Sample analysis was carried out using an Olympus SZ51 microscope; the material was analyzed on slides (in a drop of glycerine) using an Olympus CX41 microscope with a drawing attachment.
Results

Class Branchiopoda Latreille, 1817
Order Anomopoda Sars, 1865
Family Chydoridae Dybowski et Grochowski, 1894
Subfamily Aloninae Dybowski et Grochowski, 1894
Genus Coronatella Dybowski et Grochowski, 1894
Subgenus Coronatella (Ephemeralona) Sinev, 2020

Coronatella (Ephemeralona) elegans (Kurz, 1875) Figs 1–2.

MATERIAL EXAMINED HERE: 10 parthenogenetic females, ephippial female and adult male from a roadside ditch near Malye Derbety, Republic of Kalmykia (47.97072°N, 44.70483°E), collected on 3.05.2019 by P.G. Garibian, sample AAK-M-5433; over 200 parthenogenetic females, over 20 ephippial females, over 20 males from a temporary pool at Taman’ Penninsula west of Taman’ town, Temryuk District, Krasnodar Territory, (45.22278°N, E 36.68472°E) collected on 6.06.2009 by Y.R. Galimov, AAK M-0972; over 20 parthenogenetic females, 3 ephippial females from a pond at Taman Penninsula west of Taman’ town, Temryuk District, Krasnodar Territory, (45.2175°N, E 36.66167°E) collected in 6.06. 2009 by Y.R. Galimov, AAK M-0973. All samples kept in collection of Dr A.A. Kotov, A.N. Severtsov Institute of Ecology and Evolution, Moscow, Russia.

PARTHENOGENETIC FEMALE. Length of adults 0.42–0.52 mm, height 0.29–0.35 mm. Body ovoid in lateral view, compressed laterally, without a medial keel and/or lateral outgrowth, maximum height at middle of body (Fig. 1A). Dorsal margin strongly and regularly convex, posterior margin slightly convex, postero-dorsal and postero-ventral angles visibly rounded. Ventral margin almost straight, anterior-ventral angle rounded. Valve sculpture with thick, densely located longitudinal and sometimes anastomizing doubled lines, different modes of valve re-enforcing are characteristic for benthic cladocerans [Kotov, 2006]. Ventral margin (Fig. 1C–E) with numerous setae different in size, shortest one in the middle, postero-ventral angle with numerous setules at inner side of valve margin (Fig. 1E). Head small, with a short rostrum, eye and ocellius well-developed, distance between eye and ocellius comparable to distance between ocellius and tip of rostrum. Three connected main head pores (Fig. 1B), PP about 1.7 IP, small lateral head pores located at about IP distance from midline, at the level of middle major head pore. Labrum (Fig. 1F) with a relatively large labral keel with a round apex. Postabdomen (Fig. 1J, K) relatively short and broad, distal part almost straight, dorsal and ventral margin almost parallel in anal portion, ventral portion slightly convex. Preanal margin almost straight, anal margin concave, postanal margin convex. Preanal angle well-defined, postanal angle ill-defined. Postanal margin bearing six or more clusters of simple marginal denticles, decreasing in size proximally. Anal margin with several groups of setules. Lateral side of postabdomen with about 9 fascicles of setules. Antenna I (Fig. 1G) elongated, relatively large, its tip almost reaching tip of rostrum, bearing nine aesthetascs and sensory slender setae. Antenna II (Fig. 1H, I) short, with a robust basipodite and stout branches. Antennal formula: setae 0-0-3/1-1-3, spines 1-0-1/0-0-1. Limb I (Fig. 2A) of moderate size. ODL with a single long minute setulated seta, accessory seta long. IDL with 3 setae, seta 1 reduced, seta 2 and 3 long setulated with thin spinesules. Expodite of limb II (Fig. 2B) with 6 setae of different size. Seta 3 the longest one, seta 4 slightly shorter than seta 5 armed with two types of setules in distal portion.

EHPPIAL FEMALE. Body slightly higher than parthenogenetic female (Fig. 2C). Ephippium from yellow-brown to dark-brown, covered by prominent longitudinal lines.

MALE. Body oval (Fig. 2D), more elongated than that of parthenogenetic female. labral keel (Fig. 2E) slightly shorter than that of parthenogenetic female. Postabdomen (Fig. 2G) short, slightly narrowing distally in postanal portion. Dorsal distal angle broadly rounded, postanal angle ill-defined, preanal angle well defined. Spermoduct opens ventrally at distal end of postabdomen. In place of marginal denticles are located clusters of short setules, lateral fascicles of setules same as in parthenogenetic female. Postabdominal claw shorter than female, its tip blunt, basal spine long, with cluster of long setules. Antenna I (Fig. 2F) shorter than in female, with 10 terminal and 2 lateral aesthetascs, male seta arising at 3/4 length from the distal part, about 1/4 of antenna length. Limb I (Fig. 2H) IDL with U-shaped copulatory hook. Copulatory brush seta present. IDL with two seta, seta 2 and 3 slightly shorter than in female, seta 1 is absent, male seta thick and curved.

Discussion

Morphology of the studied populations fully agrees with the recent redescriptions of Coronatella (Ephemeralona) elegans [Sinev, 2020]. It clearly differs from two other species of the subgenus found in Russia, south Siberian C. (E.) floessneri (Sinev, Alonso et Shevleva, 2009) and C. (E.) irinae (Sinev, Alonso et Shevleva, 2009) in long seta 1 on exopodite III and in male postabdomen with broad postanal portion (see Sinev et al., 2009). C. (E.) elegans inhabits temporary water bodies in Central Europe of Central Europe and Mediterranean [Smirnov, 1971; Bromley, 1993; Alonso, 1996, Flössner, 2000; Ghauuci et al., 2018; Sinev, 2020], its easternmost record from Europe is from Slovenia [Hudec, 2010], at about 1400 km from Taman’ peninsula and 2000 km from Kalmykia. Our data suggest that the species can be present in the vast arid area along the north coast of the Black Sea – South Ukraine and the southern part of European Russia. Sars [1903] reported C. (E.) elegans (as Alona elegans) from water bodies in Akmolin (now Nur-Sultan), Kazakhstan, but his drawings and description are not detailed enough to confirm population identity with C. (E.) elegans s.str. [Sinev, 2020]. Species inhabiting temporary waters frequently remain undiscovered, as the main attention of hydrobiologists is focused on economically important rivers and permanent lakes.

Our data demonstrate the importance of sampling in temporary waterbodies for full evaluation of local Cladocera fauna, especially in arid areas. Cladocera of the South European part of Russia, especially in steppe regions, are far from fully studied.

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