Arthropoda Selecta 33(1): 76–86

A new species of the genus *Uralocrangonyx* Marin et Palatov, 2022 (Amphipoda: Crangonyctidae) from the Zhiguli Mountains, Samara Area, Russia

Новый вид рода *Uralocrangonyx* Marin et Palatov, 2022 (Amphipoda: Crangonyctidae) из Жигулевских гор, Самарская область, Россия

Ivan N. Marin[1*], Dmitry M. Palatov[2]
И.Н. Марин[1*], Д.М. Палатов[2]

A.N. Severtsov Institute of Ecology and Evolution of RAS, Moscow 119071 Russia.
Институт экологии и эволюции им. А.Н. Северцова РАН, Москва 119071 Россия.
Ivan Marin https://orcid.org/0000-0003-0552-8456. E-mail: coralliodecapoda@mail.ru
Dmitry Palatov https://orcid.org/0000-0002-8826-9316. E-mail: triops@yandex.ru
* corresponding author

KEY WORDS: diversity, Crustacea, Amphipoda, Crangonyctidae, new species, subterranean, Volga, Samara, Russia.

КЛЮЧЕВЫЕ СЛОВА: разнообразие, Crustacea, Amphipoda, Crangonyctidae, новый вид, подземные, Волга, Самара, Россия.

ABSTRACT. A new stygobiotic species of the genus *Uralocrangonyx* Marin et Palatov, 2022 (Crustacea: Amphipoda: Crangonyctidae) is described from a spring located in the Zhiguli Mountains, Samara Area, Russia, which significantly expands the known distribution of the genus to the west. The distinctive morphological differences between the two known species of the genus, such as the number of denticles on the apical comb-spines of the outer lobe of maxilla I, the shape of epimeral plates II–III, basi of pereopods V–VII and rami of uropods I–III, as well as the species distribution are discussed in the article.

How to cite this paper: Marin I.N., Palatov D.M. 2024. A new species of the genus *Uralocrangonyx* Marin et Palatov, 2022 (Amphipoda: Crangonyctidae) from the Zhiguli Mountains, Samara Area, Russia // Arthropoda Selecta. Vol.33. No.1. P.76–86. doi: 10.15298/arthsel.33.1.07

РЕЗЮМЕ. Новый стигобионтный вид из рода *Uralocrangonyx* Marin et Palatov, 2022 (Crustacea: Amphipoda: Crangonyctidae) описан из родника, расположенного в Жигулевских горах, Самарская область, Россия, что значительно расширяет известное распространение рода на запад. Отличительные морфологические различия между двумя известными видами рода, такие как количество зубчиков на верхушечных гребенчатых отростках наружной доли максиллы I, форма эпимеральных пластин II–III, базисов переопод V–VII и ветвей уропод I–III, а также распространение видов обсуждаются в статье.

Introduction

The Holarctic family Crangonyctidae (Crustacea: Amphipoda) is represented by a very ancient group of amphipods that appeared at the beginning of the Cretaceous in Laurasia [Copilaş-Ciocianu *et al.*, 2019], while the modern representatives of the main clades are scattered across the divergent areas of Nearctic [Holsinger, 1986; Koenemann, Holsinger, 2001; Zhang, Holsinger, 2003; Cannizzaro, Savicki, 2019; Gibson *et al.*, 2021; Cannizzaro *et al.*, 2021] and Palaearctic [Sidorov, Holsinger, 2007; Svavarsson, Kristjánsson, 2006; Copilaş-Ciocianu *et al.*, 2019; Palatov, Marin, 2020, 2021; Marin, Palatov, 2021a, 2023; Marin *et al*., 2023]. The known diversity of the family in the Palearctic is currently presented by 50 known species from 10 described genera [Marin, Palatov, 2023; Marin *et al.*, 2023].

The stygobiotic amphipod *Crangonyx chlebnikovi* Borutzky, 1928 (Crustacea: Amphipoda: Crangonyctidae) was described from the Great Mechka Cave (57°36′36.0″N 56°37′13.0″E), located at Kungur District of the Southern Ural, Russia [Borutzky, 1928]. Lately, the subspecies *Crangonyx chlebnikovi maximovitshi* Pankov et Pankova, 2004 was additionally described from the neighboring Kungur (Ice) Cave (57°26′28.1″N 57°00′20.9″E) [Pankov, Pankova, 2004], but was synonymized with *C. chlebnikovi* by Sidorov *et al*. [2010]. Based on unique morphology of the species within the family Crangonyctidae, Marin & Palatov [2022] transferred *C. chlebnikovi* to a newly erected monotypic genus, *Uralocrangonyx* Marin et Palatov, 2022. Currently, this stygobiotic monotypic genus is known exclusively from large cave water reservoirs (lakes) of Kungur, Orda and Suksun districts of Perm Krai, the Southern Ural, Russia (see Fig. 1) [Sidorov *et al.*, 2010, 2012; Marin, Palatov, 2022], while there are no records of this species from springs or wells.

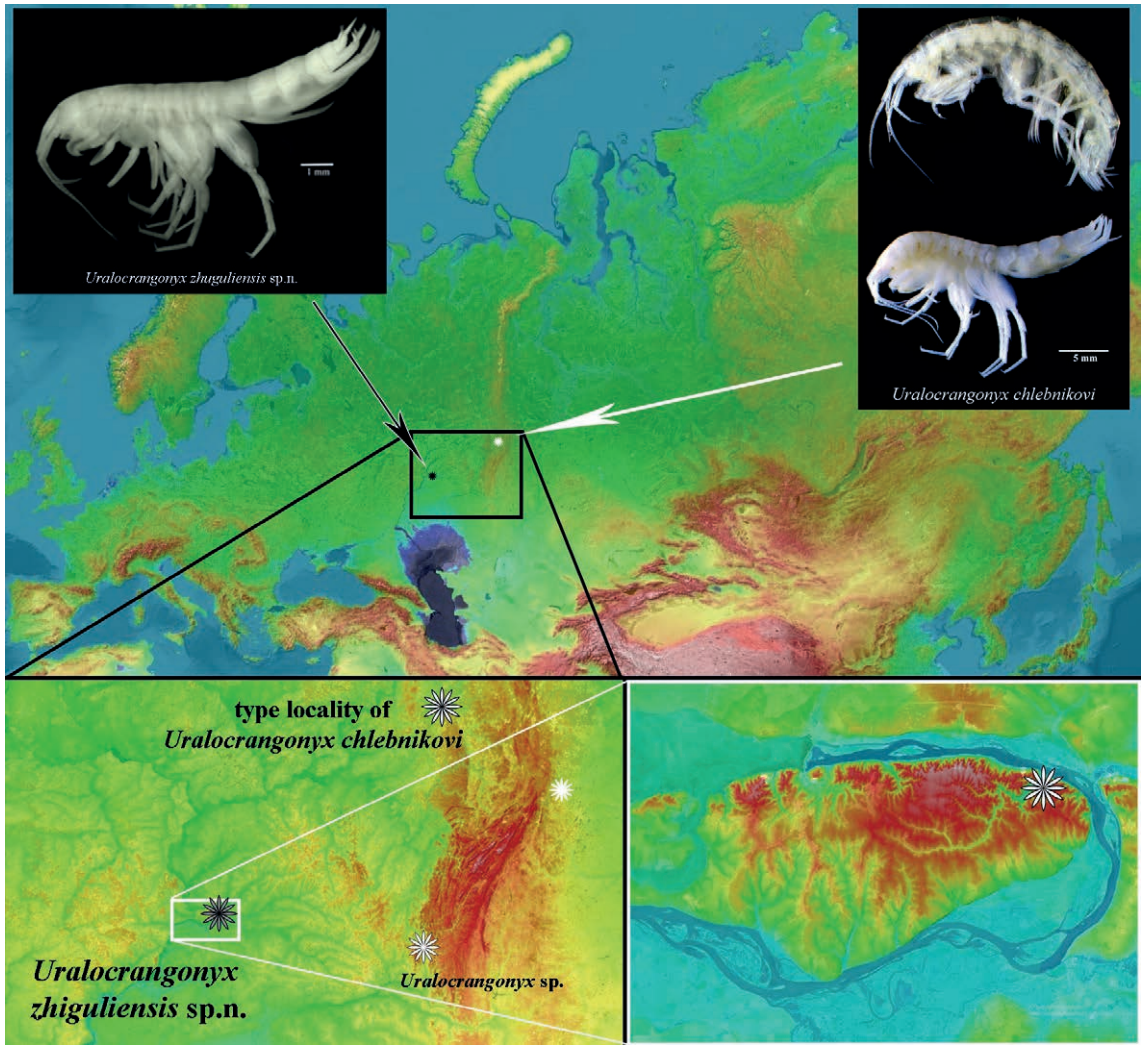

Fig. 1. The map of distribution and general lateral view of *Uralocrangonyx zhiguliensis* sp.n. and *U. chlebnikovi* (Borutzky, 1928) (fixed in ethanol). White asterisks show the known, but unpublished record of blind underground crustaceans in Chelyabinsk and Ufa areas of the Southern Ural, which presumably belong to the genus *Uralocrangonyx*. Topographic maps are taken from topographic-map.com.

Рис. 1. Карта распространения и общий вид *Uralocrangonyx zhiguliensis* sp.n. и *U. chlebnikovi* (Borutzky, 1928) (фиксированные в спирте). Белые звездочки показывают также известные, но неопубликованные находки слепых подземных ракообразных в районе Челябинска и Уфы на Южном Урале, которые предположительно относятся к роду *Uralocrangonyx*. Топографические карты взяты с сайта topographic-map.com.

Moreover, there are several popular reports on blind cave crustaceans near Ufa in Bashkiria and Chelyabinsk Area of the Southern Ural (see Marin & Palatov [2022]). These areas are remote from the type locality of *U. chlebnikovi* in the Perm region, and thus, might indicate the presence of an undescribed species, possibly, also referring to the genus *Uralocrangonyx*. The stygobiotic/subterranean fauna of the entire region of the southern Urals and adjacent mountainous regions has been very poorly studied, therefore new unexpected findings are very likely.

In this article, we present a morphological description of a new species of the genus *Uralocrangonyx*, which was discovered in a mountainous spring, quite far, about 630 km in a straight line, from the previously known distribution area of the genus in the Southern Urals. This record significantly expands the geographical distribution of the genus to the west, as well as it provides ecological data that species of the genus can also live in fairly spatially narrow spring biotopes, and not only in large volumes of cave waters.

Material and methods

Amphipods were collected with a hand net in several spring water resources in the Zhiguli Mountains, Samara Area, Russia (see Fig. 1). After sampling, the specimens were fixed in 90% solution of ethanol. The body length (bl., in mm), the dorsal length from the distal margin of head to the distal margin of telson, without uropod III and both antennas, is used as a standard measurement. The type material is deposited in the collection of Zoological Museum of Moscow State University, Moscow, Russia (ZMMU).

Photographs were taken with a digital camera attached to an Olympus CX21 microscope. The scanning electron microscopic (SEM) images were taken using the Vega3 Tescan electron microscope in the Yu.A. Orlov Paleontological Museum of the Paleontological Institute of the Russian Academy of Sciences, Moscow. For a visual representation of the distribution of the studied species, topographic (elevation/terrain) maps are used, presented online at topographic-map.com.

Results

TAXONOMIC PART

Order Amphipoda Latreille, 1816
Infraorder Gammarida Latreille, 1802
Family Crangonyctidae Bousfield, 1973
Uralocrangonyx Marin et Palatov, 2022

***Uralocrangonyx zhiguliensis* sp.n.**
Figs 2–6.

MATERIAL EXAMINED. Holotype ♀, bl. 9.0 mm, ZMMU Mb-1265, Russian Federation, Samara Area, Zhiguli Mountains, Shiryaevo, 53°24’33.5”N 50°00’47.4”E, in a small mountainous spring (Vinniy Spring), hand net sampling, 15.08.2023, coll. I. Marin & D. Palatov.

Paratype ♀, bl. 7.5 mm, ZMMU Mb-1266, same locality as for the holotype.

DIAGNOSIS. Relatively large-sized species, with only females known. *Body* unpigmented, smooth. *Eyes* absent. *Head* with bluntly produced anterolateral lobe and moderate inferior antennal sinus. *Laterallia* with 12 strong pectinate setae. *Antenna I* with slender aesthetascs and 2-segmented accessory flagellum (distal article significantly shorter than basal). *Pereonal segments* II–III without sternal gill/processes. *Gnathopod I* slightly smaller than Gn II, both with teardrop-shaped propodus (palm); ventral palmar margin of both gnathopods armed with two deep rows of notched robust setae (teeth) along the entire length; Gn II with deep ventroproximal cavity. *Pleon* with free urosomites. *Pleopods* with 6–7 hooks in retinacles. *Uropod III* with outer ramus about 2.5 times as long as wide, rather wide, with several clusters of marginal and a tuft of distal setae. *Telson* entire, rectangular, wider than long, with marginal clusters of spines.

ETYMOLOGY. The new species is named after the area where it was discovered, the Zhiguli Mountains, Samara region, Russia.

DESCRIPTION. Female ♀ 9.0 mm long, body unpigmented, troglomorphic. Inter-antennal lobe wide, bluntly produced anteriorly (Fig. 6*a*); eyes absent.

Antenna I (Fig. 2*a*): about 60% of the body length, 1.7X longer than antenna II; primary flagellum with 26–27 articles, with aesthetascs, basal articles shorter than distal ones; accessory flagellum 2-articulated, with basal article about 3 times longer than distal article (Fig. 2*b*).

Antenna II (Fig. 2*c*): gland clone distinct, elongate; peduncle 2X longer than flagellum, with several thin setae tightly covering articles III and IV, peduncular article IV subequal to article V in length, covered with stiff setae; flagellum 8-articulated, calceoli absent.

Mandible (Fig. 3*c, e*): left mandible with incisor 5-dentate, *lacinia mobilis* 5-dentate, with 8–9 robust plumose accessory setae (Fig. 3*d*); molar process with 1 long seta; right mandible with incisor 5-dentate, *lacinia mobilis* bifurcate, both lobes with numerous protuberances (Fig. 3*f*), underlying with a row of 6 robust plumose setae; molar process similar to left mandible, with 1 long setae; palp 3-articulated, article II about 2.5X as long as wide, equal to article III, with numerous setae; article III elongated, with convex posterior margin, with 3 A-setae, 2 B-setae, 3 C-setae, 17 separate D-setae and 7 E-setae, outer lateral margin densely covered with small setae (Fig. 6*g*).

Upper lip (labrum) (Fig. 3*a*): suboval, elongated, apical margin with numerous fine setae.

Lower lip (labium) (Fig. 3*b*): with inner lobes poorly developed, vestigial.

Lateralia (Fig. 3*g*) with 12 serrated teeth.

Maxilla I (Fig. 3*h*): inner plate with 10 plumose marginal setae, outer plate with 7 apical comb-spines (Fig. 3*i*); palp 2-articulated, distal article pubescent, with 9 robust apical stiff setae and 2–3 simple setae subapically.

Maxilla II (Fig. 3*j*): inner and outer plates covered in pubescent stiff setae; outer plate subequal than inner plate in length, almost not narrowing distally, with numerous apical setae; inner plate narrowing distally, with group of dense long setae on apex, with oblique row of 8–9 long plumose stiff setae.

Maxilliped (Fig. 3*k*): inner plate shorter than outer plate, armed with 3 strong stout blunt spines on apical margin accompanied with 1 plumose and submarginal setae; outer plate with numerous simple setae; palp 4-articulated, articles covered with numerous setae, article III setaceous with numerous marginal/submarginal setae on lateral margin; dactylus with 1 outer and 2 thin inner setae.

Gnathopod I (Figs 2*d, e*; 6*d, f*): slightly smaller than gnathopod II; coxal plate suboval, distally bluntly rounded, with rounded corners and with 5–6 apical setae; basis stout, swollen, about 2X longer than wide, with numerous anterior and posterior long setae; ischium wider than long; merus almost quadrate in shape, about as long as wide, about 1.5X than ischium in length, with numerous serrated setae in inner margin; carpus close to triangular in shape, with bluntly produced distoventral projection covered with numerous serrated setae; propodus (Fig. 6*c*) teardrop-shaped, widening posteriorly and tapering distally, about 1.5X longer than broad, with distal margin oblique, armed with double row of inner and outer bifurcate robust setae, proximal groove (depression) feebly developed (Fig. 6*d*), palmar corner with 5–6 strong bifurcated spiniform setae (Fig. 2*e*); dactylus long and simple, sable-like, with 4 simple setae along anterior margin.

Gnathopod II (Figs 2*f, g*; 6*f, e*): coxal plate suboval, bluntly rounded distally, with rounded corners and with 7–8 apical setae; basis elongated, about 3X longer than wide, with numerous anterior and posterior long setae; ischium as long as wide; merus quadrate in shape, about as long as wide, about equal to ischium in length, with numerous serrated setae in inner margin; carpus close to triangular in shape, with bluntly produced distoventral projection covered with numerous serrated setae; propodus (Fig. 6*e*) teardrop-shaped, significantly widening posteriorly and tapering distally, about 2.1X longer than broad, with distal margin oblique, armed with double row of inner and outer bifurcate robust setae, proximal groove (depression) well developed and deep (Fig. 6*f*), palmar corner with 3–4 strong bifurcated spiniform setae (Fig. 2*e*); dactylus long and simple, sable-like, with 4 simple setae along anterior margin.

Pereopod III (Fig. 4*a*): coxal plate oval, bluntly produced distally, with 10 simple and 3 spiniform setae along margins; basis elongated, about 4.4X longer than wide, with numerous anterior and posterior long setae; ischium quadrate, as long as wide; merus about 4.0X longer than wide, about 1.4X longer than carpus; carpus about 4.1X longer than wide, with spines along posterior margin, anterior margin with 1 small median setae; propodus about 5.0X longer than wide, about 1.2X longer than carpus, with 6 double setae along posterior margin and

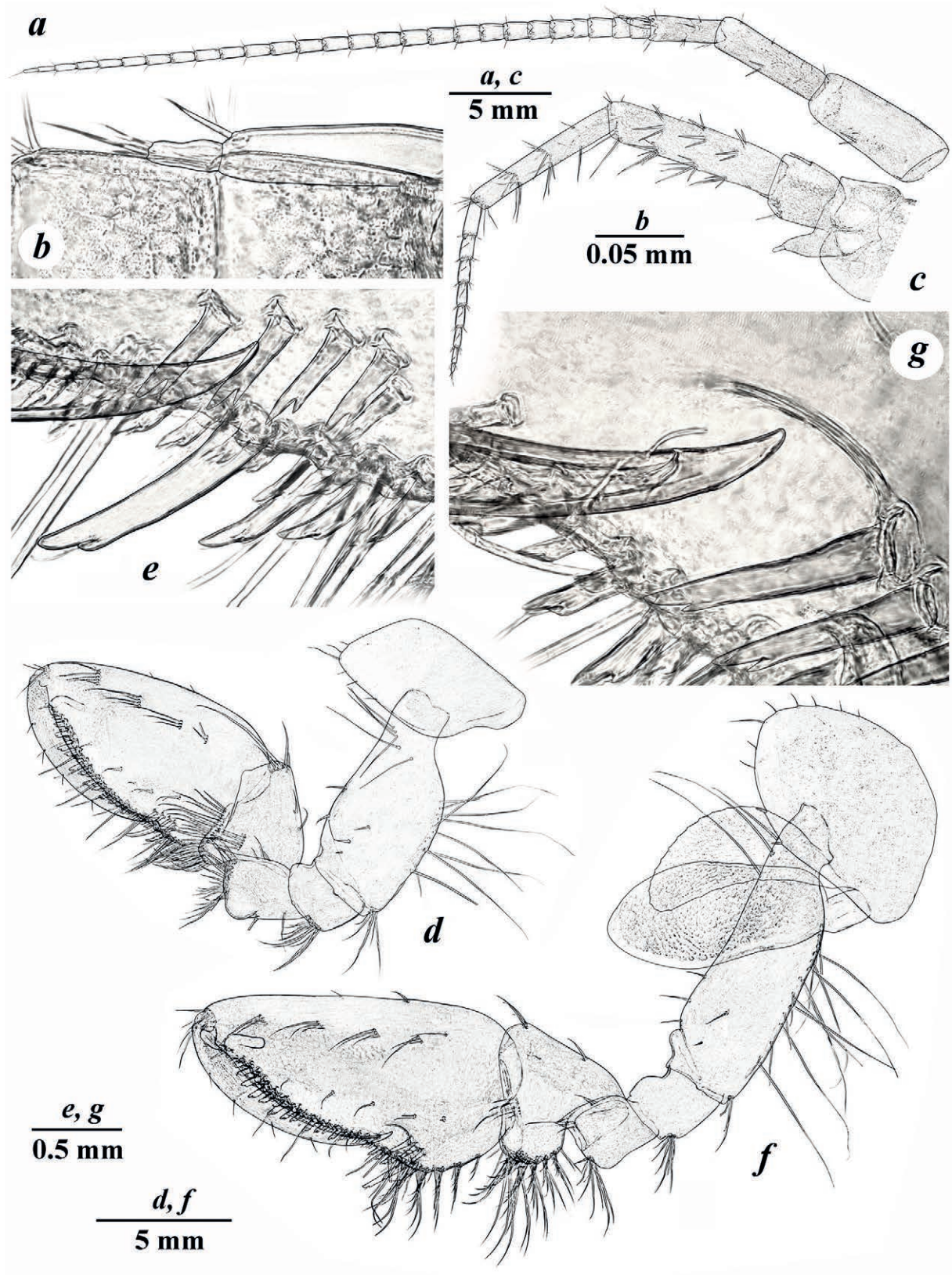

Fig. 2. *Uralocrangonyx zhiguliensis* sp.n., ♀: *a* — antenna I; *b* — accessory flagellum of antenna I; *c* — antenna II; *d* — gnathopod I; *e* — distoventral corner of propodus (chela) of GnI; *f* — gnathopod II; *g* — distoventral corner of propodus (chela) of GnII.

Рис. 2. *Uralocrangonyx zhiguliensis* sp.n., ♀: *a* — антенна I; *b* — дополнительный жгутик антенны I; *c* — антенна II; *d* — гнатопода I; *e* — дистовентральный угол проподуса (клешни) GnI; *f* — гнатопода II; *g* — дистовентральный угол проподуса (клешни) GnII.

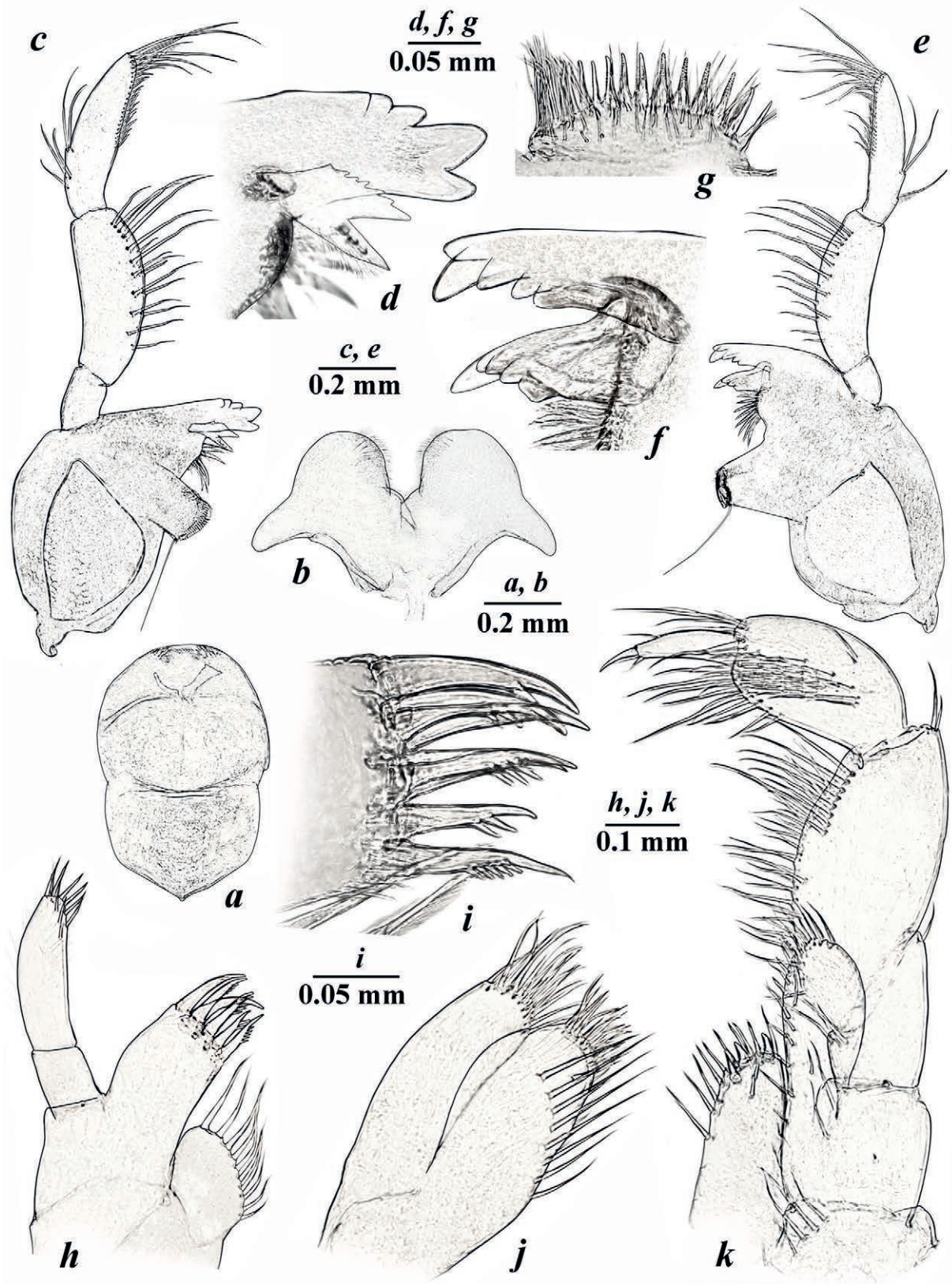

Fig. 3. *Uralocrangonyx zhiguliensis* sp.n., ♀: *a* — labrum (upper lip); *b* — labium (lower lip); *c*, *e* — mandible; *d*, *f* — incisor process and *pars incisiva* of mandible; *g* — lateralia; *h* — maxilla I; *i* — same, distal margin of outer lobe; *j* — maxilla II; *k* — maxilliped.

Рис. 3. *Uralocrangonyx zhiguliensis* sp.n., ♀: *a* — верхняя губа; *b* — нижняя губа; *c*, *e* — мандибула; *d*, *f* — режущий отросток и *pars incisiva* (резец) мандибулы; *g* — латералия; *h* — максилла I; *i* — то же, дистальный край наружной доли; *j* — максилла II; *k* — максиллипед.

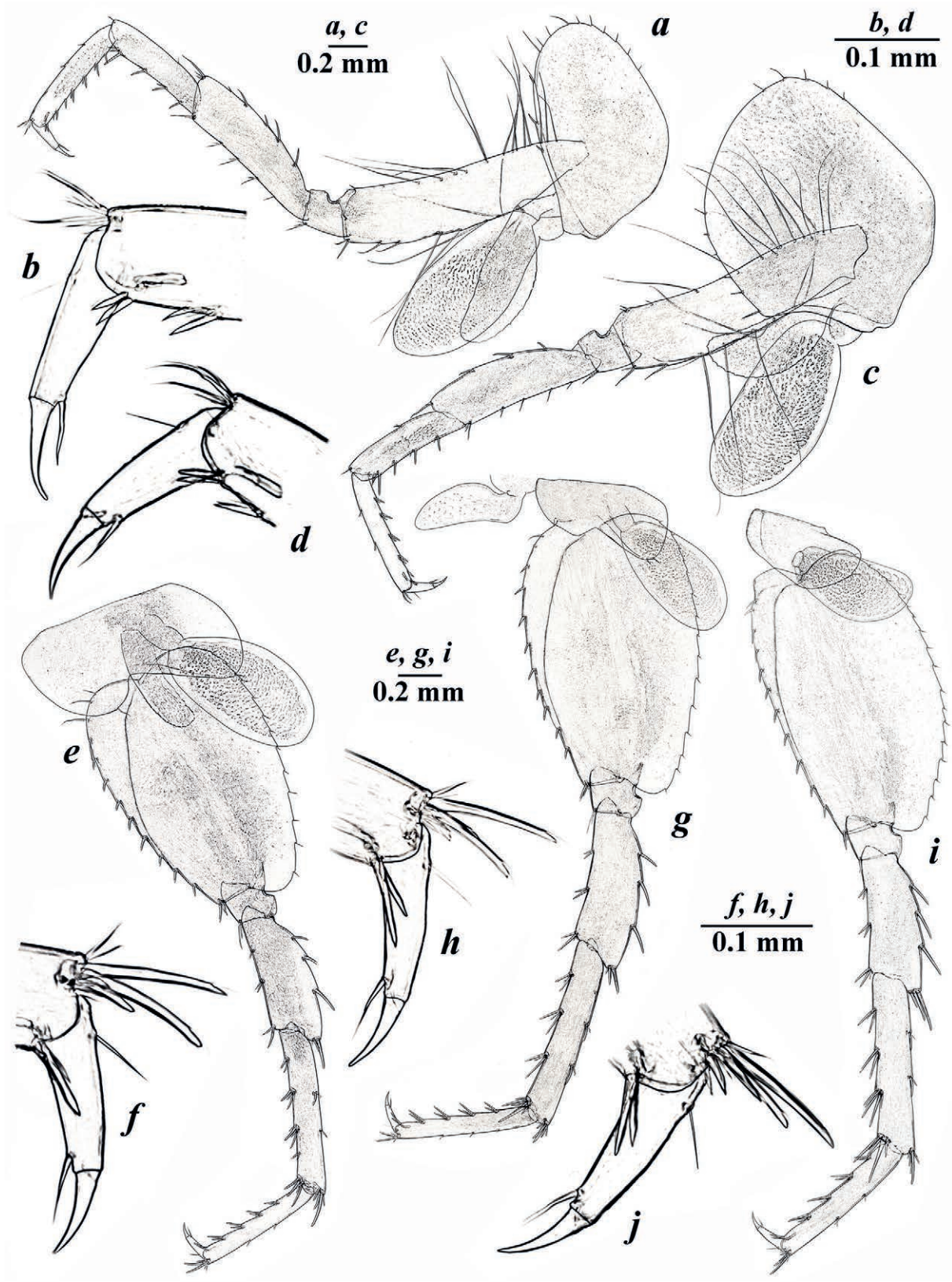

Fig. 4. *Uralocrangonyx zhiguliensis* sp.n., ♀: *a* — pereopod III; *b* — dactylus of PIII; *c* — pereopod IV; *d* — dactylus of PIV; *e* — pereopod V; *f* — dactylus of PV; *g* — pereopod VI; *h* — dactylus of PVI; *i* — pereopod VII; *j* — dactylus of PVII.

Рис. 4. *Uralocrangonyx zhiguliensis* sp.n., ♀: *a* — переопода III; *b* — дактилус PIII; *c* — переопода IV; *d* — дактилус PIV; *e* — переопода V; *f* — дактилус PV; *g* — переопода VI; *h* — дактилус PVI; *i* — переопода VII; *j* — дактилус VII.

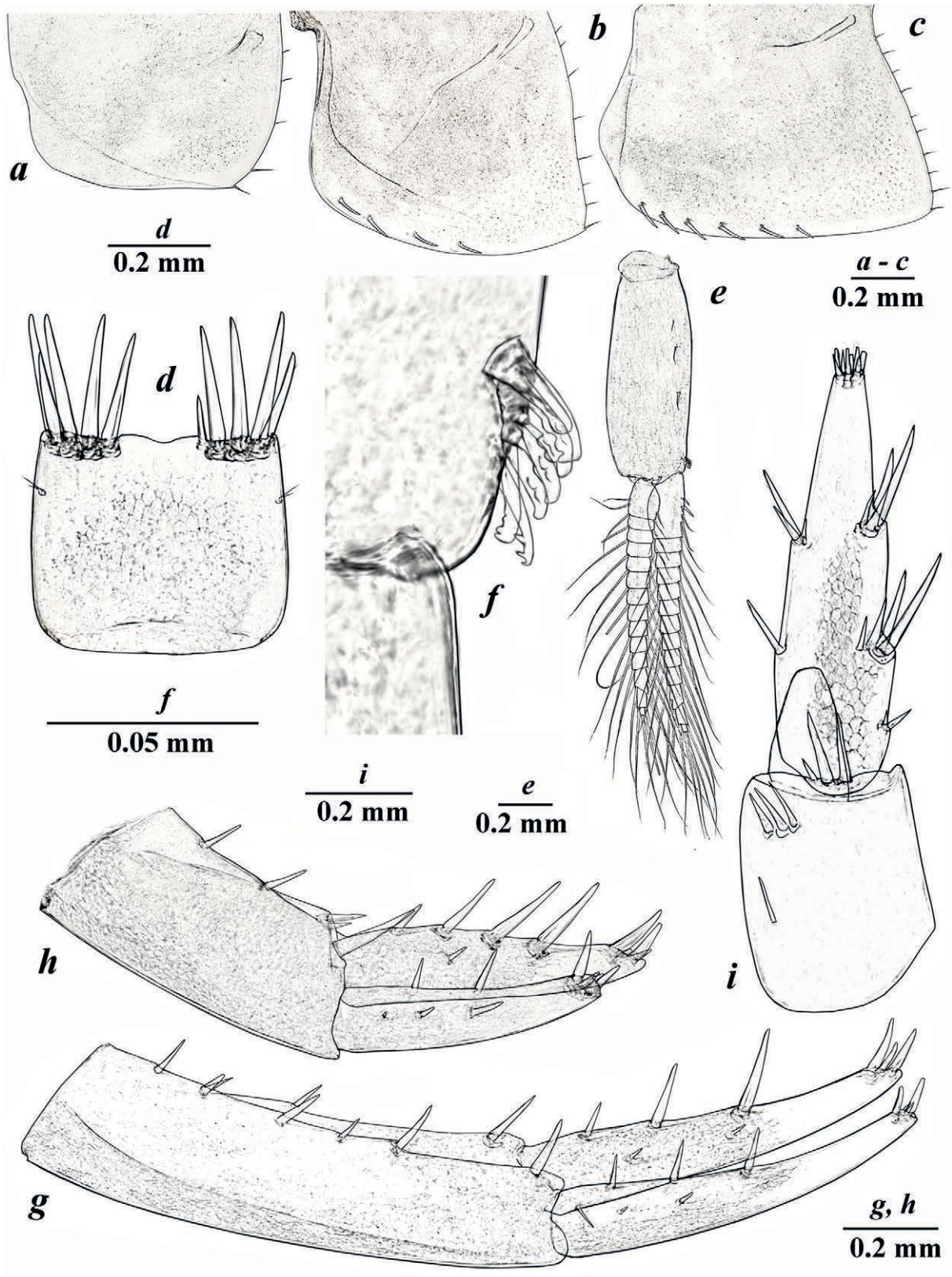

Fig. 5. *Uralocrangonyx zhiguliensis* sp.n., ♀: *a–c* — epimeral plates I–III; *d* — telson; *e* — pleopod III; *f* — retinacula of pleopod III; *g* — uropod I; *h* — uropod II; *i* — uropod III.

Рис. 5. *Uralocrangonyx zhiguliensis* sp.n., ♀: *a–c* — эпимеральные пластинки I–III; *d* — тельсон; *e* — плеопода III; *f* — ретинакула плеоподы III; *g* — уропода I; *h* — уропода II; *i* — уропода III.

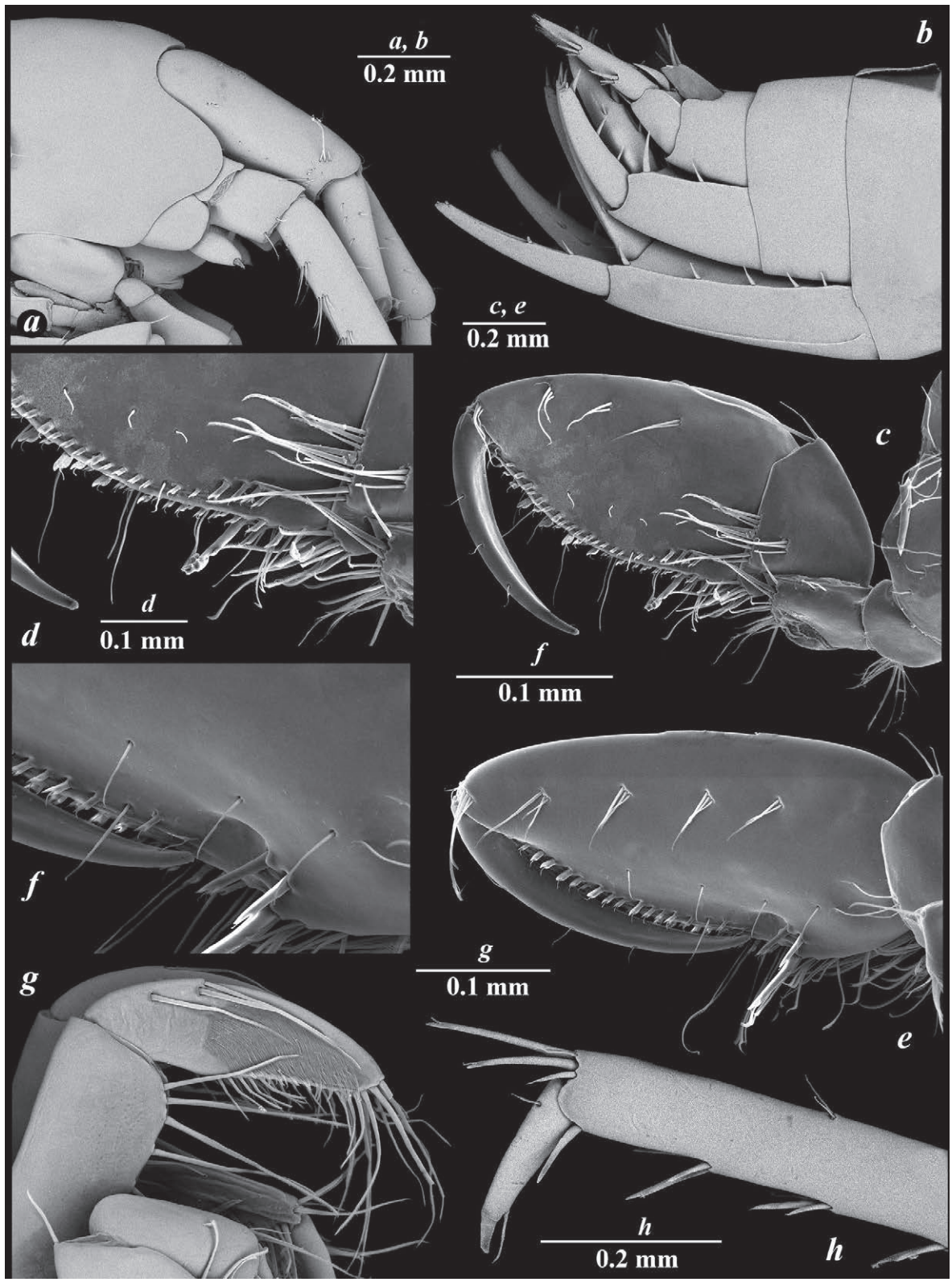

Fig. 6. SEM photographs of *Uralocrangonyx zhiguliensis* sp.n.: *a* — head; *b* — urosomal segments; *c* — gnathopod I; *d* — distoventral corner of chela of GnI; *e* — gnathopod II; *f* — distoventral corner of propodus (chela) of GnII; *g* — distal segment of mandibular palp; *h* — dactylus of pereopod VII.

Рис. 6. СЭМ фотографии *Uralocrangonyx zhiguliensis* sp.n.: *a* — голова; *b* — уросомальные сегменты; *c* — гнатопода I; *d* — дистовентральный угол проподуса (клешни) GnI; *e* — гнатопода II; *f* — дистовентральный угол клешни GnII; *g* — дистальный сегмент мандибулярного щупика; *h* — дактилус переоподы VII.

couple of strong setae in distoventral angle, anterior margin with 2 small setae; dactylus (Fig. 4*b*) slender, about 0.4X of length of propodus, with single long plumose seta on outer margin and stout long seta on distal corner of inner margin.

Pereopod IV (Fig. 4*c*): mostly similar to pereopod III; coxal plate mostly rounded, slightly wider than long, with 11 marginal setae; basis elongated, about 4.4X longer than wide, with numerous anterior and posterior long setae; ischium quadrate, as long as wide; merus about 3.7X longer than wide, about 1.4X longer than carpus; carpus about 4.2X longer than wide, with spines along posterior margin; propodus about 6.3X longer than wide, approximately equal carpus in length, with 6 double setae along posterior margin and couple of strong setae in distoventral angle; dactylus (Fig. 4*d*) slender, about 0.37X of length of propodus, with single long plumose seta on outer margin and stout long seta on distal corner of inner margin.

Pereopod V (Fig. 4*e*) mostly similar to pereopods VI–VIII: coxal plate large, bilobate, with distinct bluntly rounded anterior and posterior lobes, both lobes with 1 seta; basis with posterior margin slightly convex, armed with row of short spine-like setae, with feebly marked bluntly produced distal corner, anterior margin slightly convex, with row of strong small setae; ischium quadrate, as long as wide, unarmed; merus relatively stout, about 2.7X longer than wide, about 1.1X shorter than carpus, with strong spines along anterior margin, and smaller setae along posterior margin; carpus elongated, about 6.3X longer than wide, with spines along posterior margin, anterior margin with several small setae; propodus about 6.9X longer than wide, equal to carpus, with 5 double setae along posterior margin and couple of strong setae in distoventral angle; dactylus (Fig. 4*f*) slender, about 0.3X of length of propodus, with single long plumose seta on outer margin and stout long seta on distal corner of inner margin.

Pereopod VI (Fig. 4*g*): coxal plate medium, bilobate, with distinct bluntly rounded anterior and posterior lobes, both lobes with 1 seta; basis with posterior margin slightly convex, armed with row of short setae, with feebly marked bluntly produced distal corner, anterior margin slightly convex, with row of strong small spine-like setae; ischium almost quadrate, about as long as wide, unarmed; merus relatively stout, about 3.0X longer than wide, about 1.1X shorter than carpus, with strong spines along anterior margin, and smaller setae along posterior margin; carpus elongated, about 6.0X longer than wide, with spines along posterior margin, anterior margin with several small setae; propodus about 6.9X longer than wide, equal to carpus, with 5 double setae along posterior margin and couple of strong setae in distoventral angle; dactylus (Fig. 4*h*) slender, about 0.3X of length of propodus, with single long plumose seta on outer margin and stout long seta on distal corner of inner margin.

Pereopod VII (Fig. 4*i*): coxal plate small, semilunar, with a single posterior seta; basis with posterior margin convex, armed with row of short setae, with feebly marked bluntly produced distal corner, anterior margin almost straight, with row of strong small spine-like setae; ischium quadrate, as long as wide, unarmed; merus relatively stout, about 2.6X longer than wide, about 1.2X shorter than carpus, with strong spines along anterior margin, and smaller setae along posterior margin; carpus elongated, about 4.8X longer than wide, with spines along posterior margin, anterior margin with several small setae; propodus about 6.0X longer than wide, equal to carpus, with 4 double setae along posterior margin and couple of strong setae in distoventral angle; dactylus (Fig. 4*j*) slender, about 0.3X of length of propodus, with single long plumose seta on outer margin and stout long seta on distal corner of inner margin.

Epimera. Epimeral plate I (Fig. 5*a*) with almost straight and smooth ventral margin, posteroventral angle non-produced, convex, with 5 small setae. Epimeral plate II (Fig. 5*b*) with ventral margin convex and armed with 4 long spines, posteroventral angle triangularly produced, posterior margin slightly convex, with 8 small setae. Epimeral plate III (Fig. 5*c*) with ventral margin slightly convex and armed with 6 relatively long spines, posteroventral angle bluntly produced, posterior margin almost straight or slightly convex, with 10 small setae.

Coxal gills on somites II–VII, somite V–VII with small pointed sternal gill. Slender, setaceous brood plates on somites II–V, decreasing in size posteriorly.

Pleopods I–III (Fig. 5*e, f*): peduncle with 6–7 strong hooks in retinacles (Fig. 5*f*); rami with 13–14 segments, respectively; basal segment of outer ramus with 2 clothes-pin setae.

Urosome (Fig. 6*b*): with free smooth segments.

Uropod I (Fig. 5*g*): peduncle about 1.4X of length of rami, with 5 dorsal robust spines on inner and outer margins each, and with 1 strong subdistal dorsal robust spine; rami equal, inner ramus with 3 long dorsal, 2 lateral spines and 1 ventral proximal spine, with 3 apical robust spines; outer ramus with 3 long dorsal and 2 lateral spines, with 4 apical robust spines.

Uropod II (Fig. 5*h*): peduncle about 0.9X of length of inner ramus, with 2–4 dorsal robust spines and 1 strong subdistal dorsal spine; outer ramus is about 80% of length of inner ramus, with 4 long dorsal, 1 smaller lateral spines and 3 apical robust spines; inner ramus with 2 long dorsal spines, 2 lateral spines and 3 apical robust spines.

Uropod III (Fig. 5*i*): small; peduncle about 1.8X shorter than ramus in length, with 4 stiff spines on distodorsal face; inner ramus short, about 3.0X times shorter than outer one; outer ramus about 3.5X longer than wide, tapering distally, with 2 groups of strong setae along lateral margins and 8 apical short robust spines.

Telson (Fig. 5*d*): subrectangular, about 1.2X wider than long; distal margin with feebly marked distal notch, each lobe armed with 5 distal long spines and some 2 small plumose submarginal setae.

BODY SIZE. The largest collected ♀ has bl. 9.0 mm.

REMARKS. The collected specimens obviously belong to the genus *Uralocrangonyx* by the characteristic features of the genus: 1) antenna I with 2-segmented accessory flagellum, distal article significantly shorter than basal one; 2) teardrop-shaped form and the armature of palm (propodi) of gnathopods I–II with the entire ventral margin armed with 2 rows of notched robust setae; 3) the presence of a deep ventroproximal cavity on the palm of gnathopods II; 4) 6–7 hooks in the retinacles of pleopods; and 5) rectangular telson with feebly marked distal notch. The combination of these features clearly separates the genus *Uralocrangonyx* from all known crangonyctid genera [Marin, Palatov, 2022].

The new species can be easily separated from *U. chlebnikovi* (see Marin & Palatov [2022]) by: 1) the smaller number of denticles on the apical comb-spines of outer lobe of maxilla I (up to 5 vs. up to 8–9 denticles); 2) more convex posterior margins of epimeral plates II and III; 3) broader basi of pereopods V–VII, which are about 1.5 times as long as wide (vs. 2.5 times); 4) stouter rami of uropods I and II, which are 4.5 times and 4 times as long as wide, respectively (vs. 7.5 and 5 times); and 5) stouter distal article of uropod III, which is 2.5 times as long as wide (vs. about 3.3 times).

DISTRIBUTION AND ECOLOGY. Stygobiotic species, which is currently known only from a single spring (Vinniy Spring, 53°24′33.5″N 50°00′47.4″E), located in the Zhiguli Mountains, Samara Area, Russia. A single specimen of *Volgonyx* aff. *dershavini* (Behning, 1928) (Crustacea: Amphipoda: Crangonyctidae) was collected in the same spring.

Discussion

The phylogenetic relationships of the genus *Uralocrangonyx* are very illusory and require detailed molecular genetic study using various genetic markers. Apparently, the genus is very ancient as it includes a number of putatively plesiomorphic features, for example, 1) a large number of hooks (6–8) in retinacles of pleopods (similar quantity is known only in *Volgonyx*); 2) morphologically similar claws of gnathopods I–II with the entire ventral margin armed with 2 rows of notched robust setae, which in this form are also present in *Amurocrangonyx*, *Bactrurus*, *Crangonyx*, *Eucrangonyx*, in some species of *Stygobromus* and partially in *Sicifera*; 3) an unusually large number of spines along the ventral edge of epimeral plates (similar number present in *Bactrurus*); 4) uropod III with a fairly well-developed exopod (*Amurocrangonyx*, *Bactrurus*, *Eucrangonyx*); and 5) free urosomites. Probably, some of these characters in the listed genera in their current state may be synapomorphic.

Among, as it seems to us, less significant phylogenetic features, it is worth noting the unusual armament of the distal segment of mandibular palp and the article III of the maxilliped in the genus *Uralocrangonyx* (see Fig. 3*k*), which is also somewhat similar to that of *Bactrurus*, as well as the shape of the telson is similar to some representatives of the genera *Bactrurus* and *Stygobromus*. Although, the shape of the telson, especially in the genus *Bactrurus*, is very variable. At the same time, the main differences of the genus *Uralocrangonyx* and its comparison with each of the described crangonyctid genera of the family are already described in detail in its description [Marin, Palatov, 2022], and the morphology of the new species does not provide any new data on this score.

The close phylogenetic relationships of the genera *Uralocrangonyx* (as *Crangonyx chlebnikovi*) and *Bactrurus*, nested within the large "*Stygobromus*" clade, were shown by Kornobis *et al*. [2011] and Copilaș-Ciocianu *et al*. [2019]. We would like to summarize that the genus *Uralocrangonyx* is definitely a relative of the genera from the "*Eucrangonyx*" and "*Bactrurus*" clades [Marin, Palatov, 2022], and very likely can be one of the basal genera in the entire family Crangonyctidae combining the morphological features of the main clades. The presence of 7–8 hooks on the retinacles of pleopods, also known in the very basal genus *Volgonyx*, suggests such basal phylogenetic position. Moreover, it is very likely that in the mountains of the Republic of Bashkortostan, also known as Bashkiria, as well as on the southern and southeastern sides of the Ural Mountains, there may still be some undescribed diversity of related taxa, as in other still poorly studied regions of the northeastern part of the Palearctic. Therefore, we will not jump to conclusions about the phylogenetic position of the genus *Uralocrangonyx* yet, since we have little data for this. We hope that a more detailed study of all species of the family using an integrative approach will allow a more detailed revision of the family and revising the issues of its origin.

Compliance with ethical standards

CONFLICT OF INTEREST: The authors declare that they have no conflict of interest.

Ethical approval: No ethical issues were raised during our research.

Acknowledgements. The authors are sending their special thanks to Roman A. Rakitov (Paleontological Institute of Russian Academy of Sciences) for his help with obtaining SEM images. Authors are very thankful to Dr. Denis Copilaș-Ciocianu for careful reviewing and valuable comments to the manuscript.

References

Borutzky E.V. 1928. Materialien über die Fauna der unterirdischen Gewässer: *Crangonyx chlebnikovi* sp. n. (Amphipoda) aus den Höhlen des mittleren Urals // Zoologischer Anzeiger. Bd.77. S.253–259.

Cannizzaro A.G., Sawicki T.R. 2019. Two new species of the genus *Crangonyx* Bate, 1859 (Amphipoda: Crangonyctidae) from the St. Marks River Basin with notes on the "*Crangonyx floridanus* complex" // Zootaxa. Vol.4691. P.301–332. https://doi.org/10.11646/zootaxa.4691.4.1

Cannizzaro A.G., Daniels J.D., Berg D.J. 2021. Phylogenetic analyses of a new freshwater amphipod reveal polyphyly within the Holarctic family Crangonyctidae, with revision of the genus *Synurella* // Zoological Journal of the Linnean Society. zlab092. https://doi.org/10.1093/zoolinnean/zlab092

Copilaș-Ciocianu D., Sidorov D.A., Gontcharov A. 2019. Adrift across tectonic plates: molecular phylogenetics supports the ancient Laurasian origin of old limnic crangonyctid amphipods // Organisms Diversity & Evolution. https://doi.org/10.1007/s13127–019–00401–7

Gibson R., Hutchins B.T., Krejca J.K., Diaz P.H., Sprouse P.S. 2021. *Stygobromus bakeri*, a new species of groundwater amphipod (Amphipoda, Crangonyctidae) associated with the Trinity and Edwards aquifers of central Texas, USA // Subterranean Biology. Vol.38. P.19–45. https://doi.org/10.3897/subtbiol.38.61787

Holsinger J.R. 1986. Holarctic crangonyctid amphipods // Botosaneanu L. (ed.). Stygofauna Mundi. Leiden: Brill. P.535–549.

Koenemann S., Holsinger J.R. 2001. Systematics of the North American subterranean amphipod genus *Bactrurus* (Crangonyctidae) // Beaufortia. Vol.51. No.1. P.1–56.

Kornobis E., Pálsson S., Sidorov D.A., Holsinger J.R., Kristjánsson B.K. 2011. Molecular taxonomy and phylogenetic affinities of two groundwater amphipods, *Crangonyx islandicus* and *Crymostygius thingvallensis*, endemic to Iceland // Molecular Phylogenetics and Evolution. Vol.58. No.3. P.527–539. https:// doi.org/10.1016/j.ympev.2010.12.010

Marin I., Palatov D. 2021a. *Volgonyx* gen.n. and *Pontonyx* gen.n., two new genera of the family Crangonyctidae (Crustacea: Amphipoda) from the southeastern Europe // Arthropoda Selecta. Vol.30. No.1. P.43–61. https://doi.org/10.15298/arthsel.30.1.05

Marin I.N., Palatov D.M. 2021b. The hidden diversity of the genus *Lyurella* Derzhavin, 1939 (Crustacea: Amphipoda: Crangonyctidae): four new species from the subterranean habitats of the northwestern Caucasus, Russia // Zootaxa. Vol.5006. No.1. P.127–168. https://doi.org/10.11646/zootaxa.5006.1.17

Marin I.N., Palatov D.M. 2022. *Uralocrangonyx* gen.n. (Amphipoda: Crangonyctidae) from the Southern Ural, Russia // Arthropoda Selecta. Vol.31. No.2. P.183–195. https://doi.org/10.15298/arthsel.31.2.07

Marin I.N., Palatov D.M. 2023. A revision of the genus *Pontonyx* Palatov et Marin, 2021 (Amphipoda: Crangonyctidae), with an overview of crangonyctid diversity in the Palaearctic // Arthropoda Selecta. Vol.32. No.2. P.173–196. https://doi.org/10.15298/arthsel.32.2.04

Marin I.N., Yanygina L.V., Ostroukhova S.A., Palatov D.M. 2023. A new minute species of the genus *Palearcticarellus* Palatov et Marin, 2020 (Crustacea: Amphipoda: Crangonyctidae) from a high-altitude mountain spring of the Altai Mountains (Russia) // Arthropoda Selecta. Vol.32. No.4. P.390–398. https://doi.org/10.15298/arthsel.32.4.03

Palatov D.M., Marin I.N. 2020. A new genus of the family Crangonyctidae (Crustacea, Amphipoda) from the Palaearctic, with descriptions of two new species from the foothills of the Altai mountains // Zoologicheskyi Zhurnal. Vol.99. No.10. P.1160–1186. https://doi.org/10.31857/S004451342010013X

Palatov D.M., Marin I.N. 2021. When males and females belong to different genera: an interesting case of *Synurella/Pontonyx* (Crustacea: Amphipoda: Crangonyctidae) co-occurrence // Arthropoda Selecta. Vol.30. No.4. P.443–472. https://doi.org/10.15298/arthsel.30.4.03

Pankov N.N., Pankova N.V. 2004. [The biology of the cave amphipod, *Crangonyx chlebnikovi* Borutzky, 1928 (Gammaridae), with the description of new subspecies from Kungur Ice Cave] // Peshchery: mezhvuzovskiy sbornik nauchnykh trudov. Perm: Perm University. Vol.29–30. P.141–149 [in Russian].

Sidorov D.A., Holsinger J.R. 2007. *Amurocrangonyx*, a new genus of subterranean amphipod (Crangonyctidae) from the Russian Far East, with a redescription of the poorly known *Crangonyx arsenjevi* and comments on biogeographic relationships // Journal of Crustacean Biology. Vol.27. No.4. P.660–669. https://doi.org/10.1651/s-2817r.1

Sidorov D.A., Pankov N.N., Holsinger J.R. 2012. Distribution and ecology of the subterranean amphipod *Crangonyx chlebnikovi* Borutzky, 1928 (Crustacea: Crangonyctidae), with lectotype designation and comments on morphology of the lateral cephalic lobe // Arthropoda Selecta. Vol.21. No.2. P.149–160. https://doi.org/10.15298/arthsel.21.2.04

Sidorov D.A., Pankov N.N., Krasheninnikov A.B. 2010. A *Bactrurus*-like subterranean amphipod (Crangonyctidae) from the Ural Mountain karst region // XX International Conference of Subterranean Biology: Abstract book. Postojna, Slovenia. P.145.

Svavarsson J., Kristjánsson B.K. 2006. *Crangonyx islandicus* sp. nov., a subterranean freshwater amphipod (Crustacea, Amphipoda, Crangonyctidae) from springs in lava fields in Iceland // Zootaxa. Vol.1365. P.1–17. https://doi.org/10.11646/zootaxa.1365.1.1

Zhang J., Holsinger J.R. 2003. Systematics of the freshwater amphipod genus *Crangonyx* (Crangonyctidae) in North America // Virginia Museum of Natural History, Memoir. Vol.6. P.1–274. https://doi.org/10.25777/s8tw-2q09

Responsible editor K.G. Mikhailov