ЦРНОГОРСКА АКАДЕМИЈА НАУКА И УМЈЕТНОСТИ
ГЛАСНИК ОДЈЕЉЕЊА ПРИРОДНИХ НАУКА, 20, 2014.

ЧЕРНОГОРСКАЯ АКАДЕМИЯ НАУК И ИСКУССТВ
ГЛАСНИК ОТДЕЛЕНИЯ ЕСТЕСТВЕННЫХ НАУК, 20, 2014

THE MONTENEGRIN ACADEMY OF SCIENCES AND ARTS
GLASNIK OF THE SECTION OF NATURAL SCIENCES, 20, 2014.

UDK 595.371(497.5)

Gordan S. Karaman[*]

ON TWO POORLY KNOWN SUBTERRANEAN SPECIES OF THE FAMILY NIPHARGIDAE FROM CROATIA (CONTRIBUTION TO THE KNOWLEDGE OF THE AMPHIPODA 268)

Abstract

Two poorly known subterranean species of the family Niphargidae (Crustacea, Amphipoda) from Croatia are studied. The species *Niphargus medvednicae* was described very briefly by Stanko Karaman (1950) as *N. tauri medvednicae*, ssp. n. from the spring on Medvednica Mt. near Zagreb, and the most of taxonomical characters of this taxon were unknown. We redescribed and figured this taxon here more in detail, based on the original paratype and holotype material, and elevated it to the specific rank.

The species *Niphargus buturovici* S. Karaman, 1958, was known from type locality only (Baba pećina Cave on Biokovo Mt. in Dalmatia). This species is now found in Jama Zečica Cave on Biokovo Mt. also, and its taxonomical characters and position regarding other known taxa of this genus are discussed.

Key Words: Amphipoda, *Niphargus*, *medvednicae*, *buturovici*, taxonomy, subterranean, Croatia

[*] Montenegrin Academy of Sciences and Arts, Podgorica, Crna Gora. E-mail: karaman@t-com.me

DVIJE SLABO POZNATE PODZEMNE VRSTE IZ FAMILIJE NIPHARGIDAE IZ HRVATSKE (268. PRILOG POZNAVANJU AMPHIPODA)

Apstrakt

Proučavane su dvije slabo poznate podzemne vrste iz familije Niphargidae (Crustacea Amphipoda) iz Hrvatske. Vrsta *Niphargus medvednicae* je bila opisana vrlo kratko od Stanka Karamana (1950) pod imenom *Niphargus tauri medvednicae*, ssp. n., iz izvora na planini Medvednici kod Zagreba, i većina taksonomskih odlika tog taksona je bila nepoznata. Opisali smo i nacrtali ponovo taj takson u ovom radu mnogo detaljnije na osnovu originalnog materijala paratipova i holotipa, i podigli smo je na nivo zasebne vrste.

Vrsta *Niphargus buturovici* (S. Karaman, 1958), bila je opisana i poznata samo iz tipičnog lokaliteta (Baba pećina na planini Biokovo u Dalmaciji). Sada je ta vrsta otkrivena u jednoj drugoj pećini Jama Zečica, također na planini Biokovo, i njeni taksonomski karakteri i položaj u odnosu na druge poznate vrste tog roda su razmatrani.

Ključne riječi: Amphipoda, *Niphargus*, *medvednicae*, *buturovici*, taksonomija, podzemni, Hrvatska

INTRODUCTION

Tanks to its specific geographical position, presence of large karstic area with all kind of karstic phenomena (caves, springs, subterranean lakes, etc.), very diversified ecological conditions in various parts of Croatia, geological history, etc., the fauna of the subterranean Amphipoda in Croatia is very rich and still only partially discovered.

The study of the subterranean members of the family Niphargidae in Croatia started in 1887, when Jurinac discovered and described a new species *Eriops Croatica* n. sp. from the cave near Mrežnica river, removed next year (1888) by him to the genus *Niphargus* Schiödte, 1849, as a distinct species *Niphargus croaticus*. Later numerous new species of this genus in Croatia have been discovered by various authors (Karaman S., Sket, B., Gottstein, S., Karaman, G., etc.).

Recently Croatian Biospeleological Society organized numerous investigations of the subterranean fauna in Croatia and adjacent regions,

and various samples of Amphipoda have been discovered and collected in the caves, among them some samples treated in this work.

MATERIAL AND METHODS

The collected material was preserved in the 70% ethanol. The specimens were dissected using a WILD M20 microscope and drawn using camera lucida attachment. All appendages were temporarily submersed in the mixture of glycerin and water for study and drawing. Later, all appendages have been transferred to Liquid of Faure on permanent slides. The body-length of examined specimens were measured by tracing individual's mid-trunk lengths (from tip of head to end of telson) using camera lucida. All illustrations were inked manually.

TAXONOMICAL PART

Family Niphargidae

NIPHARGUS MEDVEDNICAE S. Karaman, 1950
Figs. 1–6

Niphargus tauri medvednicae Karaman, S., 1950: 91, figs. 11–13; Karaman, S., 1959: 174; Karaman, G., 1972: 6; Karaman, G., 1974: 27; Barnard, J. & Barnard, C., 1983: 696; Karaman, G. & Ruffo, 1986: 533.

DIAGNOSIS. Small species, relatively slender, with short articles; epimeral plates 1–2 quadrate, epimeral plate 3 slightly more acute. Inner plate of maxilla 1 with one seta, outer plate with 7 spines. Inner plate of maxilliped with 3 distal spines, outer plate exceeding half of palpus article 2.

Coxae 1–4 short. Gnathopods 1–2 with trapezoid propodus as large as corresponding coxae; dactylus of gnathopods with one median seta along outer margin. Dactylus of pereopods 3–7 moderately slender, with one spine or spine-like seta along inner margin. Article 2 of pereopods 5–7 narrowed, with marked ventroposterior short lobe. Pleopods with elevated number of retinacula. Uropod 1 with almost equal rami but outer ramus with tendency to be longer than inner one. Uropod 3 elongated, with elongated second article of outer ramus. Telson short, obtuse distally, deeply incised; each lobe with 3–4 distal spines as well as with 1–2 spines along outer margin of each lobe. Coxal gills on gnathopod 2 and

pereopod 4 elongated. Urosomite 1 with 1 seta, urosomite 2 with 1, rarely 2 spines on each dorsolateral side.

MATERIAL EXAMINED: CROATIA: Sp. 144= Medvednica Mt. near Zagreb, spring under St. Jakov, Sljeme, 22.4.1948, several specimens (holotype and paratypes) (leg. D. Rucner). Holotype (male 5.0 mm) and paratypes are deposited in KARAMAN`s Collection in Podgorica, Crna Gora under No. Sp. 144.

DESCRIPTION. FEMALES up to 6.5 mm long. Body moderately slender; metasomal segments 1–3 with 2–4 dorsolateral posterior setae each (fig. 1G).

Epimeral plates 1–2 quadrate, with well marked ventroposterior corner bearing one strong spine-like seta, and with poorly convex posterior margin bearing 2–3 marginal setae (fig. 1G). Epimeral plate 3 with nearly straight but slightly inclined posterior margin bearing 5 lateral setae. Epimeral plates 2 and 3 with 2 subventral spines each (fig. 1G).

Urosomite 1 on each dorsolateral side with 1 seta (fig. 3F); urosomite 2 on each dorsolateral side with 1, rarely 2 spines; urosomite 3 naked. Urosomite 1 on each ventroposterior side with one small spine near basis of uropod 1 peduncle (fig. 3F).

Head with short rostrum and short subrounded lateral cephalic lobes, eyes absent.

Antenna 1 reaching or hardly exceeding half of the body; peduncular articles 1–3 progressively shorter (ratio: 60: 45: 26), scarcely setose (fig. 1A). Main flagellum consisting of 16–17 articles, most of them with one short aesthetasc reaching ½ to 2/3 of articles themselves. Accessory flagellum 2-articulated, short, but exceeding half of third peduncular article.

Antenna 2 slender, peduncular article 3 short, with several distal long setae (fig. 1B); peduncular article 4 along both margins with several short setae and longer distal setae; peduncular article 5 shorter than 4, with lateral and distal several setae (fig. 1B); flagellum slender, consisting of 7–8 articles, scarcely setose (fig. 1B). Antennal gland cone short.

Labrum broader than long, entire, convex distally (fig. 4A).

Labium with entire convex outer lobes, inner lobes short but well developed (fig. 3A).

Mandible: molar triturative. Right mandible: molar with one long subdistal seta, incisor with 4 teeth, lacinia mobilis bifurcate, serrate, ac-

companied by 5 rakers. Left mandible: molar without long seta, incisor with 5 teeth, lacinia mobilis with 4 teeth, accompanied by 7 rakers. Mandibular palpus 3-articulate: first article naked; second article with 7 setae (fig. 1C); palpus article 3 as long as article 2, along margin with 12 D-setae and 4–5 distal long E-setae; on outer face appears one bunch of 2 A-setae, on inner face appear 2–3 single B-setae (fig. 1C).

Maxilla 1: inner plate with 1 seta; outer plate with 7 spines (5 spines with one lateral tooth,1 spine with 3 lateral teeth, one spine with 5 lateral teeth (fig. 1E); palpus 2-articulated, nearly reaching the tip of outer plate-spines, provided with 7 setae (fig. 1D).

Maxilla 2: both plates with marginal setae only.

Maxilliped: inner plate short, with 3 distal smooth lanceolate spines accompanied by single setae (fig. 1F). Outer plate much exceeding half of second palpus article and bearing along inner margin row of lanceolate smooth spines (fig. 1F). Palpus article 2 along inner margin with numerous setae; article 3 with one bunch of distal setae along outer margin; article 4 with one median seta along outer margin and with 2 setae along inner margin near the basis of the nail (fig.1F).

Coxae 1–4 relatively short, scarcely setose, setae mainly very short, but single longer setae are present also. Coxa 1 broader than long (=high) (ratio: 40: 32), with subrounded ventroanterior corner (fig. 2A). Coxa 2 as long as broad, strongly convex ventrally (fig. 2D). Coxa 3 slightly longer than broad (ratio: 49: 45), with ventroanterior corner more rounded than ventroposterior corner (fig. 3B). Coxa 4 as long as broad, with ventroanterior corner more rounded than ventroposterior corner, posterior margin slightly concave (fig. 3D).

Coxae 5–7 progressively smaller. Coxae 5–6 bilobed, with rounded anterior lobe bearing single marginal setae and shallow posterior lobe (fig. 4B, D). Coxa 7 entire, with convex ventral margin (fig. 4F).

Gnathopods 1–2 of moderate size, its propodus nearly as large as the corresponding coxae (fig. 2A). Gnathopod 1 is slightly smaller than gnathopod 2, its article 2 with long setae along anterior and posterior margin (fig. 2A); article 3 along posterior margin with one bunch of setae; article 5 shorter than article 6 (ratio: 62: 80), with one distal bunch of setae along anterior margin and numerous setae along posterior margin (fig. 2A). Article 6 (propodus) trapezoid, slightly longer than broad (ratio: 80: 66), bearing along posterior margin 4 transverse groups of setae (fig. 2B); palm convex, inclined half of propodus-length, defined on outer face by

one strong corner S-spine accompanied laterally by 2 serrate slender L-spines and 2 facial M-setae (fig. 2C), on inner face by one strong short subcorner R-spine. Dactylus almost exceeding posterior margin of propodus, with one median seta along outer margin and 4–5 short setae along inner margin (fig. 2B).

Gnathopod 2: article 2 along both margins with long setae (fig. 2D); article 3 along posterior margin with one bunch of setae; article 5 shorter than article 6 (ratio: 77: 90), with one distal bunch of setae along anterior margin (fig. 2D), and numerous setae along posterior margin. Article 6 (propodus) trapezoid, slightly longer than broad (ratio: 90: 80), with 5 transverse groups of setae along posterior margin (fig. 2E). Palm convex, inclined hardly over half of propodus-length, defined on outer face by one strong corner S-spine accompanied laterally by 2 serrate slender L-spines and 2 facial long M-setae (fig. 2F), on inner face by one short strong subcorner R-spine (fig. 2F). Dactylus almost exceeding posterior margin of propodus, with one strong median seta at outer margin and with 4 short setae along inner margin (fig. 2E).

Pereopods 3–4 moderately slender, poorly setose. Pereopod 3: article 2 along posterior margin with long setae, along distoanterior margin with short setae (fig. 3B). Articles 4–6 of unequal length (ratio: 48: 28: 42); article 4 along posterior margin with several setae up to as long as the diameter of article; article 5 with 2–3 setae along posterior margin; article 6 along posterior margin with 4 single short spines accompanied by 1 short seta (fig. 3B). Dactylus moderately slender, with one spine-like seta and one short seta near basis of the nail; one median plumose setae appears along outer margin (fig. 3C); nail slightly shorter than pedestal (ratio: 30: 37).

Pereopod 4 similar to pereopod 3, but with slightly shorter setae. Articles 4–6 of unequal length (ratio: 42: 27: 40), bearing short setae (fig. 3D). Dactylus like that of pereopod 3, with one spine-like seta and one short seta at inner margin near basis of the nail; one median plumose seta appears along outer margin; nail shorter than pedestal (ratio: 43: 30) (fig. 3E).

Pereopod 5 remarkably shorter than pereopods 6–7, with article 2 longer than broad (ratio: 65: 50), bearing along anterior margin with 4 strong spine-like setae, along posterior convex margin with 7–8 short setae, ventroposterior lobe short (fig. 4B). Articles 4–6 of unequal length (ratio: 41: 41: 47), along posterior margin with several longer spines (fig.

4B). Article 6 along posterior margin with long slender spines, along anterior margin with long distal setae. Dactylus moderately slender, with one slender spine at inner margin near basis of the nail, and with one plumose median seta along outer margin; nail rather shorter than pedestal (ratio: 27: 40) (measured always at outer margin) (fig. 4C).

Pereopod 6: article 2 almost linear, dilated, much longer than broad (ratio: 81: 40), with straight posterior margin bearing 7–8 marginal setae; along anterior margin appears a row of 7 strong marginal spine-like setae; ventroposterior lobe short but visible (fig. 4D). Articles 4–6 of unequal length (ratio: 50: 60: 80), bearing along both margins slender long spines (fig. 4D). Dactylus relatively slender, along inner margin with one slender spine near basis of the nail (fig. 4E), along outer margin with one median plumose seta; nail shorter than pedestal (ratio: 60: nearly 30, distal part missing) (fig. 4E).

Pereopod 7 nearly as long as pereopod 6, with basipodit (article 2), almost linear, much longer than broad (ratio: 80: 45), along anterior slightly convex margin with 5–6 longer strong spine-like setae (fig. 4F), along posterior, hardly medially concave margin, with 8–9 setae, ventroposterior lobe short (fig. 4F). Articles 4–6 of the unequal length (ratio: 52: 65: 94), bearing along both margins short or longer spines (the longest spines are slightly longer than diameter of the articles) (fig. 4F). Dactylus slender, along inner margin with one spine near basis of the nail, along outer margin with one median plumose seta (fig. 4G); nail much shorter than pedestal (ratio: 32: 60).

Pleopods 1–3 with elevated number of retinacula, 3 retinacula in female of 5.1 mm. Peduncle of pleopod 1 along anterior margin with 2 strong setae (fig. 4H); peduncle of pleopod 2 naked (fig. 4J); peduncle of pleopod 3 at posterior margin with one strong spine-like seta (fig. 4J).

Uropods 1–3 relatively short. Uropod 1: peduncle with dorsoexternal row of spines and dorsointernal row of setae or spine-like setae, occasionally 1 spine (except distal spine) (fig. 3F). Rami shorter than peduncle, with 1–2 lateral and 4–5 distal spines each; outer ramus is very poorly longer than inner one (fig. 3F).

Uropod 2: peduncle with dorsoexternal and distal spines (fig. 3F); rami of equal length, with 5 distal long spines; along inner ramus is attached one lateral spine (fig. 3F).

Uropod 3 elongated. Peduncle nearly twice as long as broad, with distal spines (fig. 1H). Inner ramus short, scale-like, with distal spine and

seta; outer ramus 2-articulated: first article over two times longer than second article (ratio: 112: 41), bearing along both margins a bunches of spines (fig. 1H); second article with 3 distal setae;

Telson short, incised over 5/6 of telson-length; lobes obtuse distally, bearing 3–4 distal long spines each (the longest spines exceeding half of telson-length), as well as 1–2 spines along outer margin (figs. 3G, H; 6G); facial and inner marginal spines absent. A pair of short plumose setae appears near the external middle of each lobe (fig. 3G, H).

Coxal gills narrow, elongated and slightly recurved on gnathopod 2 and pereopod 4, exceeding ventral tip of corresponding article 2 (figs. 2D, 3D), shorter and more ovoid on pereopod 3, 5 and 6 (figs. 3B, 4B, D).

Oostegites broad, with marginal setae (fig. 3B).

MALE 5.0 mm long (evidently not of maximal length) (paratype): Rather similar to the females, including head, antennae, mouthparts, coxal gills. Metasomal segments with 4 dorsoposterior marginal setae each (fig. 6A). Epimeral plates 1–2 quadrate, with hardly convex posterior margin bearing 3–4 setae each and defined ventroposterior corner. Epimeral plate 3 with slightly acute ventroposterior corner defined by strong slender spine and with inclined posterior margin bearing 3 posterior setae (fig. 6A). Epimeral plates 2–3 with 2 subventral spines each (fig. 6A).

Urosomite 1 on each dorsolateral side with one seta (fig. 6F). Urosomite 2 on each dorsolateral side with 1 spine; urosomite 3 naked (fig. 6F). Urosomite 1 on each posteroventral side with one strong spine-like seta near basis of uropod 1 peduncle (fig. 6F).

Coxae 1–4 short, bearing several longer setae each. Coxa 1 broader than long (ratio: 35: 30), with subrounded ventroanterior corner (fig. 5A). Coxa 2 hardly broader than long (ratio: ratio: 45: 43) (fig. 5C). Coxa 3 nearly as long as broad (fig. 5E). Coxa 4 as long as broad, without posterior excavation (fig. 5G). Coxae 5–7 like these in females.

Gnathopod 1 slightly smaller than gnathopod 2, both with propodus nearly as large as corresponding coxa. Gnathopod 1: article 3 with one group of posterior marginal setae; article 5 shorter than article 6 (ratio: 62: 80), with one distoposterior bunch of setae (fig. 5B). Propodus trapezoid, slightly longer than broad (ratio: 80: 67), along posterior margin with 3 transverse rows of setae (fig. 5B). Palm convex, inclined slightly over half of propodus-length, defined on outer face by one strong corner S-spine accompanied laterally by 2 slender L-spines and 3 facial M-setae (fig. 5B),

on inner margin with one strong short subcorner R-spine. Dactylus almost exceeding posterior margin of propodus, along outer margin with one median strong seta, along inner margin with 4–5 short setae (fig. 5B).

Gnathopod 2: article 2 along posterior margin with long seta (fig. 5C); article 3 with one distal bunch of setae at posterior margin; article 5 shorter than article 6 (ratio: 37: 42) (fig. 5C). Propodus (article 6) trapezoid, slightly longer than broad (ratio: 89: 79), along posterior margin with 5 transverse rows of setae (fig. 5D). Palm convex, inclined nearly 2/3 of propodus-length, defined on outer face by one strong corner S-spine accompanied laterally by 2 slender L-spines and 3 facial setae (fig. 5D), on inner face by one strong short subcorner R-spine. Dactylus almost exceeding posterior margin of propodus, with one strong median seta at outer margin and with 4–5 setae along inner margin (fig. 5D).

Pereopods 3–4 like these in females, with article 2 bearing long setae along posterior margin (fig. 5E, G). Pereopod 3: articles 4–6 of unequal length (ratio: 47: 30: 42), scarcely setose (fig. 5E). Dactylus along inner margin with slender spine near basis of the nail and with one median plumose seta at outer margin (fig. 5F); nail nearly as long as pedestal.

Pereopods 5–7 like these in females, with narrowed article 2 having marked ventroposterior lobe and several setae along posterior margin (fig. 6B). Dactylus of pereopod 7 along inner margin with one spine, along outer margin with one median plumose seta (fig. 6C); nail remarkably shorter than pedestal (ratio: 25: 60).

Pleopods with elevated number of retinacula (usually 3).

Uropods 1–2 short. Uropod 1: peduncle longer than rami, bearing dorsoexternal row of spines and dorsointernal row of setae (except distal spine) (fig. 6F); inner and outer ramus of equal length, with tendency toward longer outer ramus; both rami with single lateral and 4–5 long distal spines (fig. 6F).

Uropod 2: peduncle with lateral and distal spines. Rami of equal length, with 4–5 distal spines each (fig. 6F).

Uropod 3 elongated, with peduncle nearly twice as long as broad, with distal spines (fig. 6D). Inner ramus short, scale-like, with 2 distal spines. Outer ramus 2-articulated, article 1 much longer than article 2 (ratio: 115: 51), with several short spines and single short setae along margins and tip (fig. 6D); second article with distal 3 simple setae.

Telson short, nearly as long as broad or slightly longer than broad, incised nearly 5/6 of telson-length, obtuse distally; each lobe with 3 distal

long spines as well as with 1 spine along outer margin of each lobe (fig. 6E), facial spines absent; a pair of short plumose setae is attached in the middle of external margin of each lobe (fig. 6E).

Coxal gills on gnathopod 2 and pereopod 4 long and slightly recurved, exceeding ventral tip of corresponding article 2 (fig. 5C, G); coxal gills on pereopods 3, 5 and 6 are shorter and more ovoid. (fig. 5E).

VARIABILITY. Telson usually slightly longer than broad or almost as long as broad. Stanko Karaman figured (1950, fig. 12) lobes of telson of male 5.0 mm with 2–3 distal spines and 1–2 outer lateral spines.

Uropod 3 article 2 of outer ramus probably in adult males as long as first article, in our specimens (non adult) second article is remarkably shorter.

LOCUS TYPICUS: spring under St. Jakov, Sljeme, Medvednica Mt. near Zagreb, Croatia.

REMARKS AND AFFINITIES.

Niphargus medvednicae belongs to the *Niphargus aquilex* group of species living mainly in the small slowly running subterranean waters. Numerous taxa have been discovered and described from this group by various authors over central and eastern Europe, and usually most of them have one relatively limited areal of distribution (*Niphargus andropus* Schellenberg, 1940, *N. affinis* Dobreanu et al., 1953, *N. bihorensis* Schellenberg, 1940, *N. effosus* Dudich, 1943, *N. ruffoi* G. Karaman, 1976, *N. somesensis* Motas et al., 1948, etc.), but *N. medvednicae* distinctly differs from all of these taxa. Numerous of these taxa are described very briefly and incomplete, and the detailed relations among them is not possible to resolve without detailed redescription of them.

Schellenberg described *Niphargus aquilex tauri*, ssp. n. (1933) from Taurus Mt. in Asia Minor, and many species, later described from Europe, have been considered erroneously as a subspecies of this species. By this way, S. Karaman described from Croatia (1950) a new subspecies *Niphargus tauri jurinaci* from Crni Lug, W. of Ogulin (now a distinct taxon, *Niphargus jurinaci*, Karaman, S., 1950), and *N. tauri medvednicae*, n. ssp., belonging to the same group of species. *N. jurinaci* differs remarkably from *medvednicae* by subrounded epimeral plates 1–3, by absence of lateral spines on telson-lobes, slender dactylus of pereopods 3–7, etc.

From Croatia is known also *Niphargus lattingerae* G. Karaman, 1983 from warm subterranean thermal waters (spring) in the bed of torrent Dolje on the foot of Medvednica Mt. near Zagreb, Croatia (Sutlinska vrela, 24°C), but this species differs from *N. medvednicae* by presence of very strong ventroposterior spine on each side of urosomite 1 near basis of uropod 1 peduncle, by lower number of retinacula, etc.

From Serbia S. Karaman described (1950) *Niphargus tauri kragujevensis* from the springs in Kragujevac (previously described and figured in 1943 under the name *N. aquilex tauri* Schell.), but this species differs from *N. medvednicae* by shape of epimeral plates, gnathopods, uropods 1–3, etc.

From Macedonia are known several small species of this group (always this group is still artificial), including *Niphargus parvus* S. Karaman, 1943A from the subterranean waters near Skopje (Singjeličevo), but this species differs by presence of only 2 retinacula on pleopods 1–3, by telson, uropod 3, etc.

NIPHARGUS BUTUROVICI S. Karaman, 1958

Niphargus buturovici Karaman, S., 1958: 11, figs. 1–11; Karaman, G., 1972: 5; Karaman, G., 1974: 16; Karaman, G. & Ruffo, 1986: 523; Karaman, G., 1991: 112, figs. 5H-K; 6, 7.

MATERIAL EXAMINED: CROATIA:

Sp. 326= Baba pečina Cave, Biokovo Mt., Dalmatia, 22.7.1954, paratypes (leg. A. Buturović).

R-20= Jama Zečica Cave, Biokovo, 24.6.2007, 4 exp. (leg. J. Bedek);

R-34= Jama Zečica Cave, Biokovo, 24.6.2007, 5 exp. (leg. M. Lukič);

R-135= Jama Zečica Cave, Zečica, Biokovo, 1 juv., 26.5.2004 (leg. P. Rade).

LOCUS TYPICUS: Baba pečina-Cave, Biokovo Mt., Dalmatia, Croatia. Holotype and paratypes are preserved in KARAMAN`s Collection in Podgorica, Crna Gora (Montenegro).

REMARKS.

Stanko Karaman described (1958) a new species, *Niphargus buturovici* from the cave Baba on Biokovo Mt. in Dalmatia, Croatia, based on material collected by Dr. A. Buturović from Sarajevo.

Karaman, G. redescribed (1991) this species based on typical material from KARAMAN`s Collection and described another similar species, *Niphargus aulicus*, sp. n., from Drinovčuša Jama Cave in Mosor Mt. in Dalmatia, Croatia.

The specimens from Jama Zečica Cave agree completely with the specimens known from Baba pečina Cave, but the collected specimens from Zečica Cave are rather longer, up to 11 mm long (female with oostegites).

Except the shape of uropod 3, other characters are rather similar in both sexes. Urosomite 1 with 1 seta on each dorsolateral side; urosomite 2 with 2 spines on each dorsolateral side; urosomite 3 naked.

Antenna 1 shorter than half of body (ratio: 4: 11), peduncular articles 1–3 progressively shorter, scarcely setose; main flagellum with 18 articles. Antenna 2: peduncular article 4 slightly longer than article 5, with 2 bunches of setae along ventral margin; article 5 along ventral margin with 3 bunches of setae nearly as long as diameter of article itself; flagellum only slightly longer than last peduncular article, consisting of 8–9 articles.

Epimeral plate 1 rather shorter than epimeral plates 2 and 3, with slightly concave ventral margin. Epimeral plate 3 is more or less acute.

Peduncle of pleopod 1 with 2 strong distoanterior setae and one distoposterior seta; peduncle of pleopod 2 with 2 distoanterior stronger setae and 1 distoposterior seta; peduncle of pleopod 3 bearing with 3 setae along posterior margin (in lateral view).

Uropod 1 with dorsoexternal row of spines and dorsointernal row of setae (except distal spine); rami of equal length or inner ramus very hardly longer, bearing lateral and distal short spines.

Uropod 2: rami of equal length or inner ramus hardly longer, bearing lateral and distal spines. Uropod 3 always with very short second article of outer ramus.

Uropod 3 (first article of outer ramus) in male is remarkably longer than that in females, and second article of outer ramus is very short in both sexes. Telson provided with distal and lateral spines, like these in females.

N. aulicus Karaman, G., 1991 from Mosor Mt. is rather similar to *N. buturovici*, especially by the shape of uropod 3, but differs from later by obtuse epimeral plate 3, shape of gnathopods 1–2, elevated number of setae on inner plate of maxilla 1, by absence of lateral spines on telson, etc.

ACKNOWLEDGEMENTS. I am thankful to the Dr. Roman Ozimec from Zagreb for the loan of material used in this study, as well as to the members of the Croatian Biospeleological Society (CBSS): Jana Bedek, Marko Lukič and P. Rade, who collected the material of Amphipoda from the caves in Biokovo, Croatia.

This study was supported by the Montenegrin Academy of Sciences and Arts in Podgorica, Crna Gora (Montenegro).

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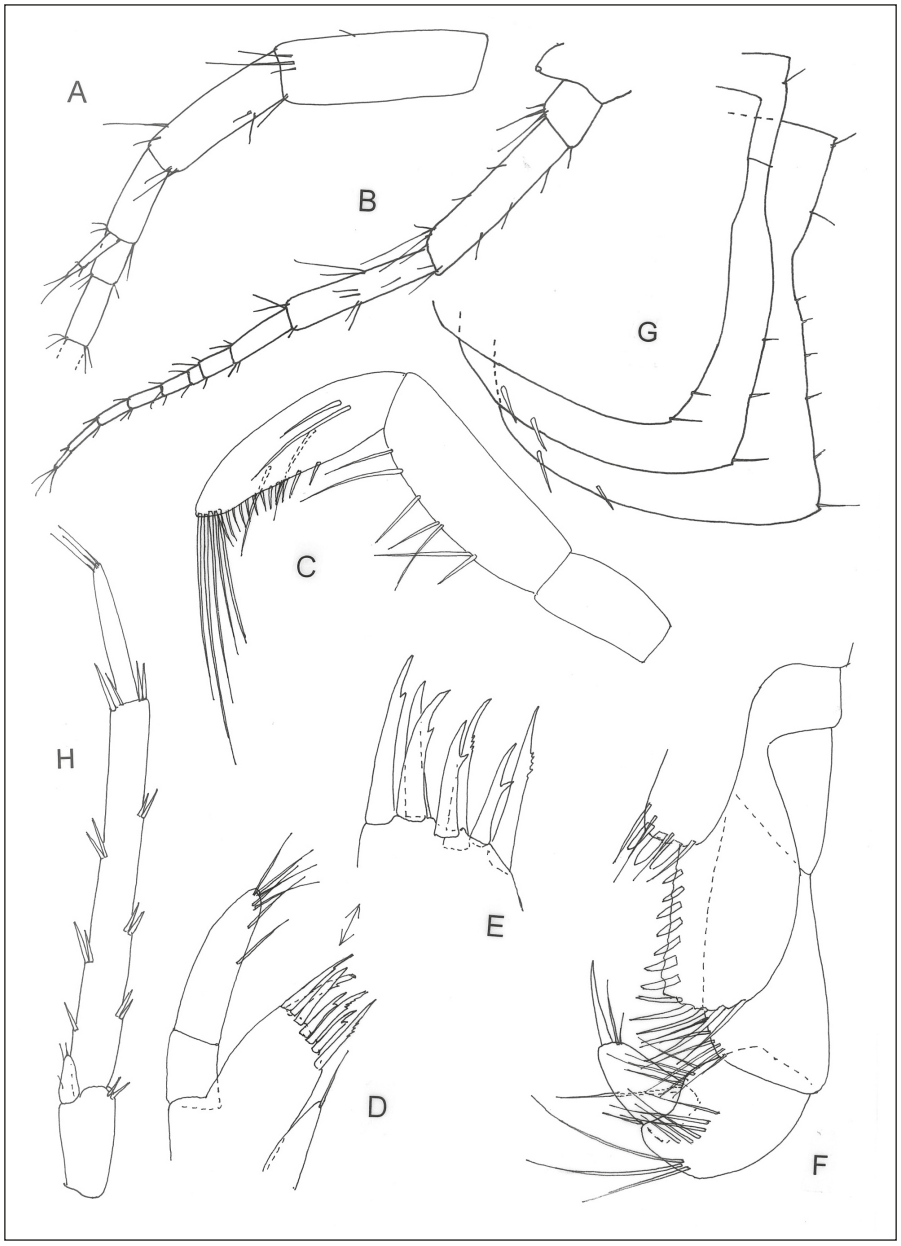

Fig. 1. *Niphargus medvednicae* S. Kar., 1950, Medvednica, female 5.1 mm (paratype). A= antenna 1; B= antenna 2; C= mandibular palpus; D= maxilla 1; E= distal part of maxilla 1; F= maxilliped; G= epimeral plates 1–3; H= uropod 3.

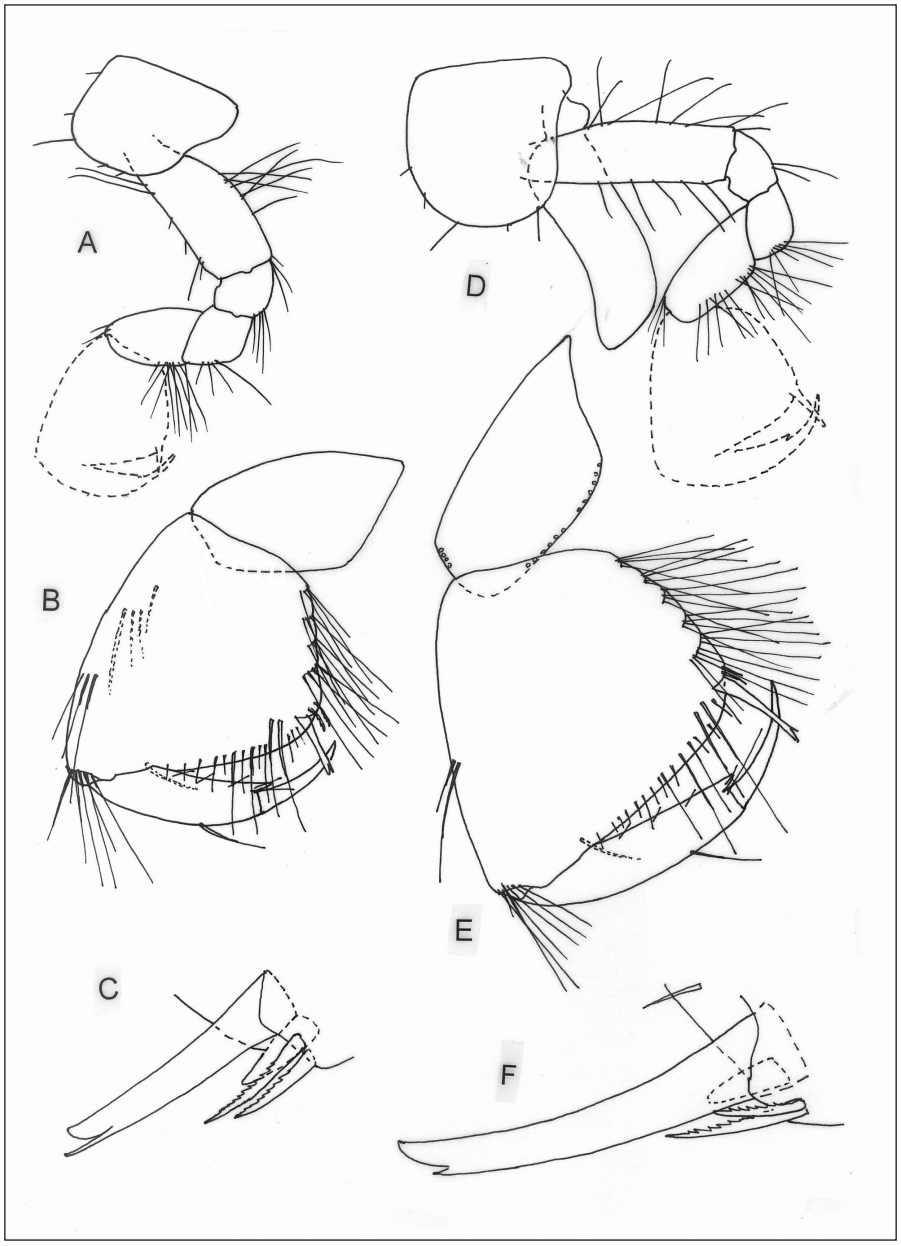

Fig. 2. *Niphargus medvednicae* S. Kar., 1950, Medvednica, female 5.1 mm (paratype). A= gnathopod 1; B= propodus of gnathopod 1; C= corner of gnathopod 1 propodus; D= gnathopod 2; E= propodus of gnathopod 2; F= corner of gnathopod 2 propodus.

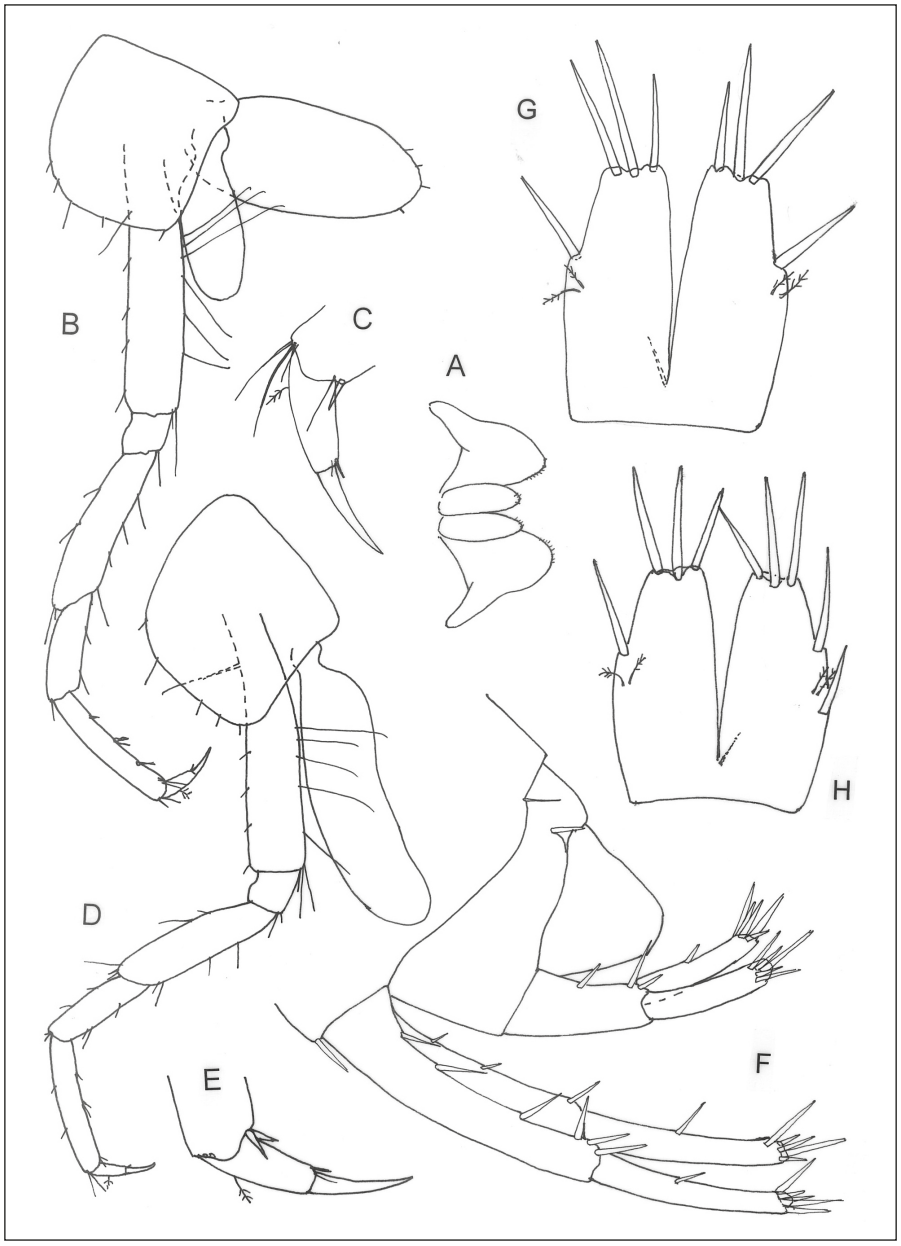

Fig. 3. *Niphargus medvednicae* S. Kar., 1950, Medvednica, female 5.1 mm (paratype). A= labium; B= pereopod 3; C= tip of pereopod 3; D= pereopod 4; E= tip of pereopod 4; F= urosome with uropods 1–2; G= telson. H= telson, female 5.0 mm.

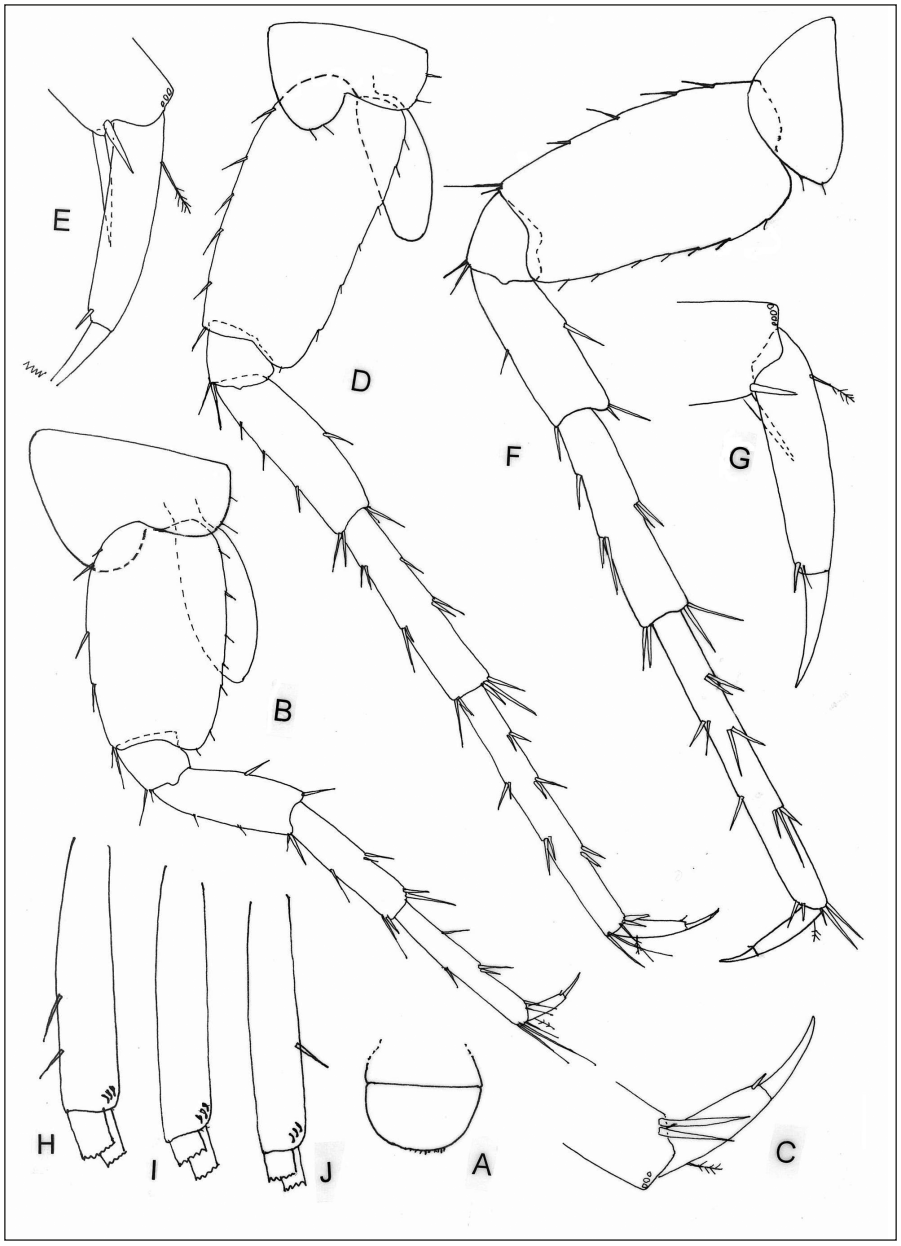

Fig. 4. *Niphargus medvednicae* S. Kar., 1950, Medvednica, female 5.1 mm (paratype). A= labrum; B-C= pereopod 5; D-E= pereopod 6; F-G= pereopod 7; H-J= peduncle of pleopods 1–3.

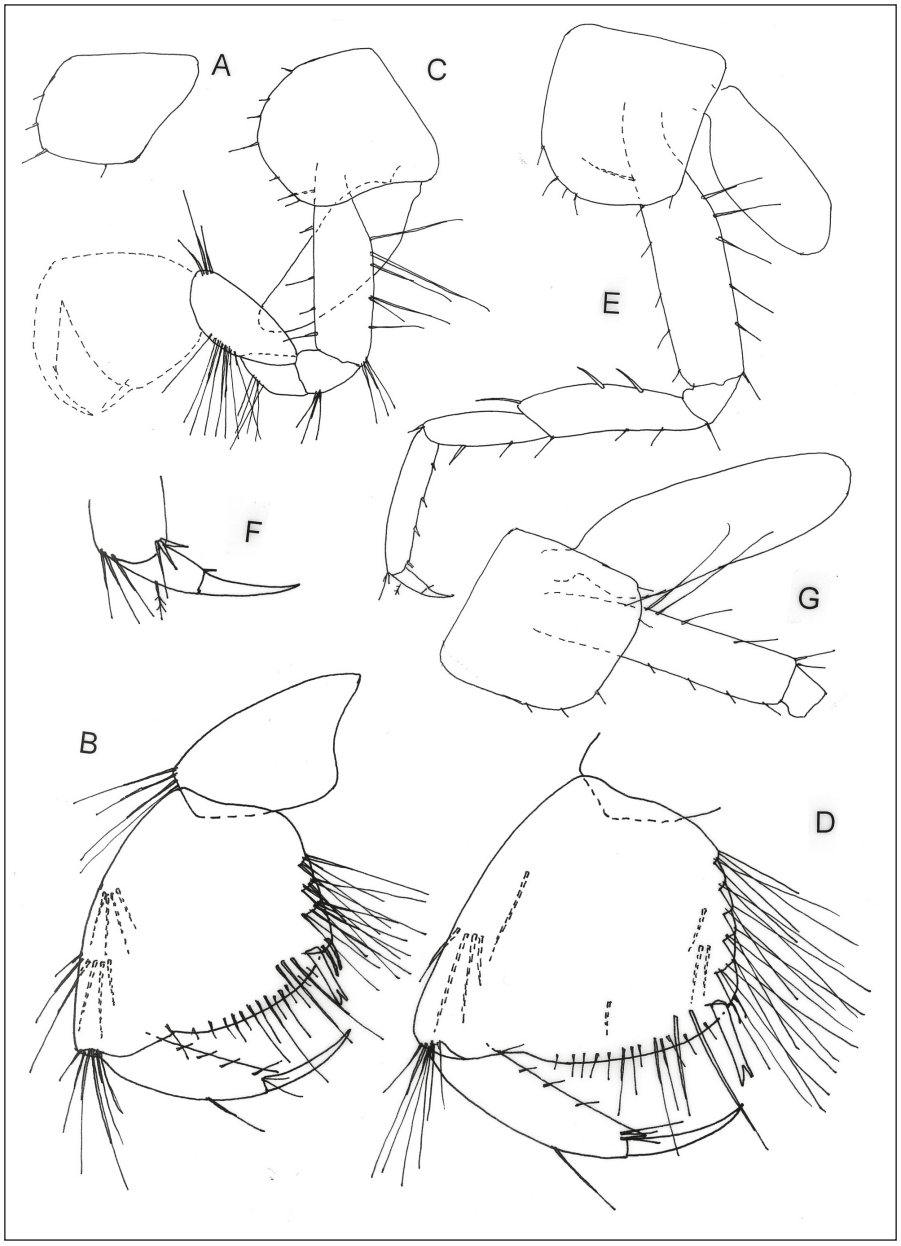

Fig. 5. *Niphargus medvednicae* S. Kar., 1950, Medvednica, male 5.0 mm (holotype). A= coxa 1; B= propodus of gnathopod 1; C= gnathopod 2; D= propodus of gnathopod 2; E= pereopod 3; F= dactylus of pereopod 3; G= proximal part of pereopod 4.

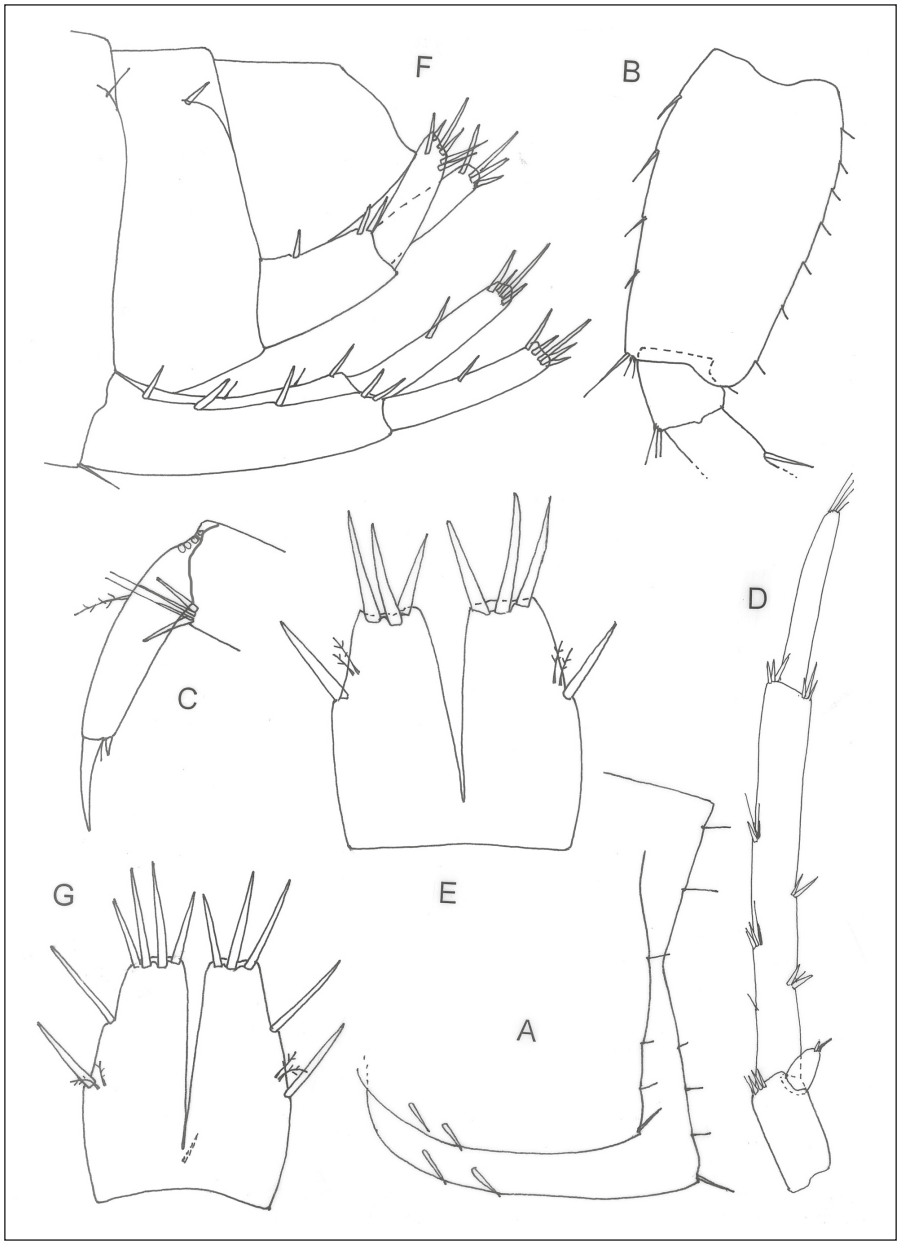

Fig. 6. *Niphargus medvednicae* S. Kar., 1950, Medvednica, male 5.0 mm (holotype). A= epimeral plates 2–3; B= basipodit of pereopod 7; C= dactylus of pereopod 7; D= uropod 4; E= telson; F= urosome with uropods 1–2. G= telson, female 6.5 mm.