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Niphargus cvetkovi sp. n., a New Species of the Genus *Niphargus* Schiødte, 1847 (Amphipoda, Niphargidae) from Bulgaria

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Abstract: A new species of the order Amphipoda and the family Niphargidae is described. *Niphargus cvetkovi* sp. n. was found in groundwaters from Bulgaria. The new species can be attributed to the *aquilex-tauri* species group and undoubtedly to the *tauri* sub-group. It resembles some species of this group, such as *N. tauri* Shellenberg, 1933; *N. jurinaci* S. Karaman, 1950; *N. kragujevensis* S. Karaman, 1950; *N. remus* G. Karaman, 1992 and *N. osogovensis* S. Karaman, 1959. The main morphological characteristics of the new species are discussed and compared with the species of tauri sub-group.

Keywords: Amphipoda, Niphargidae, *Niphargus,* new species, groundwater, Bulgaria

Introduction

The subterranean amphipods of the family Niphargidae from Bulgaria are represented by the genera *Niphargopsis* Chevreux, 1922 and *Niphargus* Schiødte, 1847. The genus *Niphargopsis* is represented by one species*, N. trispinosus* Dancau, 1959, found from one locality in North-western Bulgaria (Andreev 2001). The studies on the genus *Niphargus* are insufficient and incomplete as opposed to its high species richness with more than 300 species (Väinöla *et al.,* 2008). They inhabit almost all of Europe, including England and Ireland, and a considerable part of Asia Minor.

The earliest data on *Niphargus* from Bulgaria were reported by Fage (1926), who described the new species *N. bureschi* Fage, 1926 and recorded *N. puteanus* Koch, 1836. Later, Karaman & Karaman (1959) presented new data on the genus, describing four new species: *N. vlkanovi, N. pecarensis, N. georgievi* and *N. cepelarensis.* Andreev (1966) reported a new species, *N. toplicensis*, from an underground water source in South-western Bulgaria. Andreev (1972) reported *N. dobrogicus* Dancau, 1964 from North-eastern Bulgaria. Later Dancau, Andreev (1973) found and described the new species *N. melticensis*. Karaman (1973a) recorded a new species for the subterranean fauna of Bulgaria: *Niphargus valachicus* Dobreanu & Manolache, 1933. Andreev (2001) described a new species, *Niphargus bulgaricus* from two localities along the Bulgarian part of the Black Sea coast. Until now, there have been recorded 11 species and subspecies of the genus *Niphargus* have been recorded from Bulgaria.

Niphargus cvetkovi sp. n.

Material examined: The new species was found in a water source "Cheshma Gorgoritsa" near the village of Novi Han, east of Sofia. The material was collected by tying a net for a few days onto a pipe which exits the water source. The specimens were collected in the period from 19.11.2005 to 15.04.2006, as follows: 27.11.2005 (15 ♂, 11 ♀); 24.12.2005, (8 ♂, 60 ♀); 18.01.2006 (5 ♂, 12 ♀); 28.01.2006 (12 ♂, 18 ♀); 14.02.2006 (10 ♂, 9 ♀); 15.04.2006 (28 ♂, 47 ♀). Leg. Milena Pavlova and Lyubomir Kenderov. The slide preparations of the holotype and paratypes, as well as some of the individuals are deposited in the collections of the National Museum of Natural History in Sofia. Other individuals (paratypes) are deposited it the collections of the University of Sofia

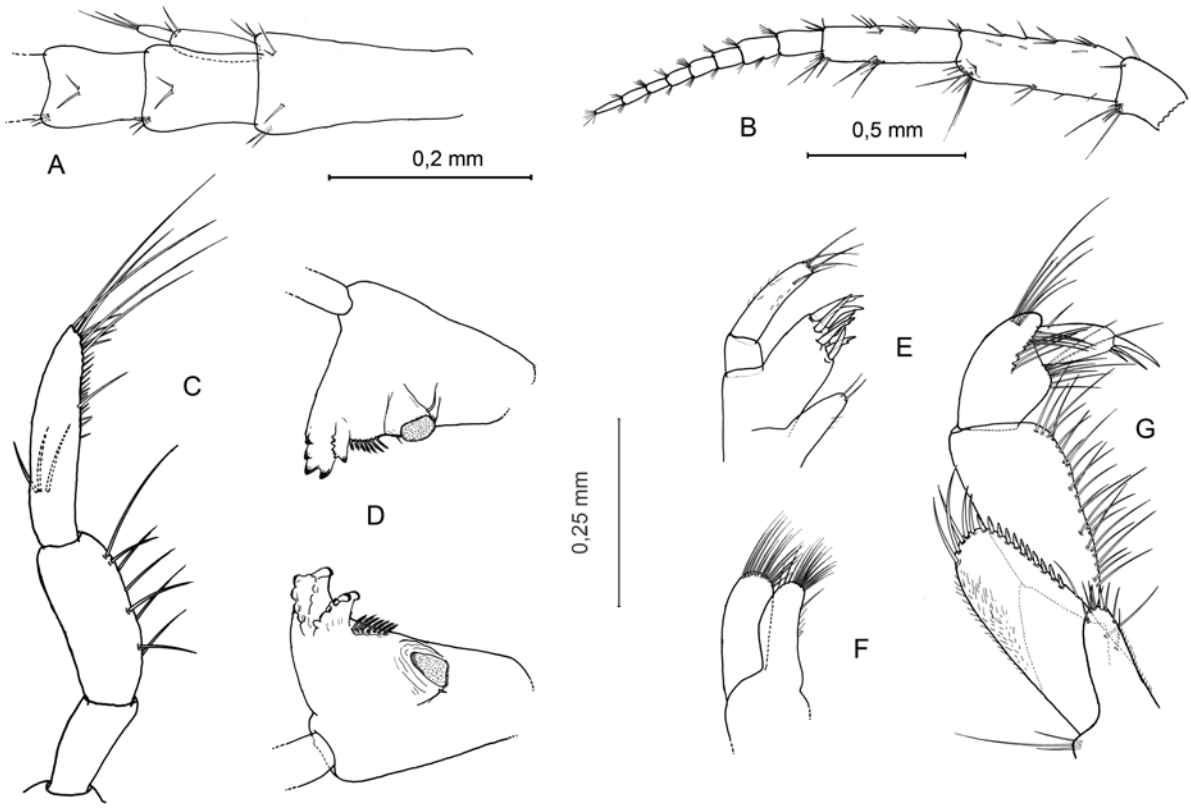

Fig. 1. *Niphargus cvetkovi* sp. n., holotype ♂: A – antenna I, accessory flagellum; B – antenna II; C – mandibular palp; D – left and right mandibula; E – maxilla I; F - maxilla II; G – maxilliped

(Department of General and Applied Hydrobiology) and University of Ljubljana (Slovenia).

Description: Holotype: male with a length of 9 mm. Paratypes: 235 individuals, *i.e.* 74 ♂, and 161 ♀.

Somatic characters: highly elongated, very fine and slender body. Rostrum (Fig. 2A) well developed. Coxal plates I–V (Fig. 3A-E) rectangular, rounded, wider than long, with short fine setae in the ventro-posterior corner. All body segments (including first urosomite) without dorsolateral spines. First and second urosomites with one fine seta on each side dorsolaterally.

Appendices: Antenna I slightly setose (Fig. 1A). Antenna I nearly half as long as body. Base of antenna consisting of three articles; first article longest; ratio between the three articles 3 : 2 : 1. Flagellum composed of 20 articles, armed with 2-4 fine setae distally. Additional flagellum consistings of two articles exceeding length of first article of the mainm flagellum.

Antenna II (Fig. 1B) reaching 2/3 of body length. First peduncular article short, second and third articles longer and nearly equal (ratio between articles 1 : 2.7 : 2.3). Articles less setosed: second article with four groups of setae; third article with two groups of setae. Third article with well-developed group of three long and four short setae distally. Flagellum composed of eight articles, provided distally with two groups of short setae.

Mouthparts: Labrum typical, longer than wide. Labium (Fig. 2B): internal lobus shorter than external; external lobus armed with two rows of fine setae.

Mandible (Fig. 1C): second article of mandibular palpus twice as longer than as first article. Inner edge of second article armed with eight setae. Third article longer than second article (ratio 1 : 1.4). Apical part of third article armed with group of six long E-setae, some of them as long as article. Inner edge armed with 18 short and fine D-setae. On theinner face, one bunch of three B-setae present; on the outer face, no A-setae. Both mandibles with differently shaped pars incisiva (Fig. 1.D) and lacinia mobilis. Left mandible with six teeth on pars incisiva and well-developed teeth on lacinia mobilis. Right mandible with fine teeth on pars incisiva; lacinia mobilis with finely serrated inner edge.

Maxilla I (Fig. 1E): internal lobus shorter than external lobus; bearing two apical setae. External lobus with seven distal spines, with one tooth each. Maxillary palpus longer than external lobus, with

four distal and one subdistal setae. Lateral margin and outer surface of palpus with short, fine setae. Maxilla II (Fig. 1F): both lobi of same length, each with 14 long distal setae. Margin of inner lobus with one long seta and one row of short, fine setae.

Maxilliped (Fig. 1G): internal lobus reaching half of length of external lobus; provided with three long distal setae, two distal spines and two long subdistal setae. External lobus reaching half of length of second article of the palpus; equipped with five long distal setae. Internal margin with 11 subdistal short strong spines. Second article of the palpus with 26 long setae on the inner margin. Third article of the palpus armed with group of six long subdistal setae, some of them significantly longer than article. Inner side provided with group of four long setae. At the basis of fourth article, group of eight long setae. Last article bearings one seta near basis of outer margin. Dactylus slender, with two setae at basis.

Gnathopods similar, with irregular rectangular shape. Gnathopod II larger than first one, armed with more spines and setae.

Gnathopod I (Fig. 2E,G): basipodite strongly developed, as long as total length of articles 3, 4 and 5. Anterior margin with nine long spines exceeding width of article. Posterior margin provided with

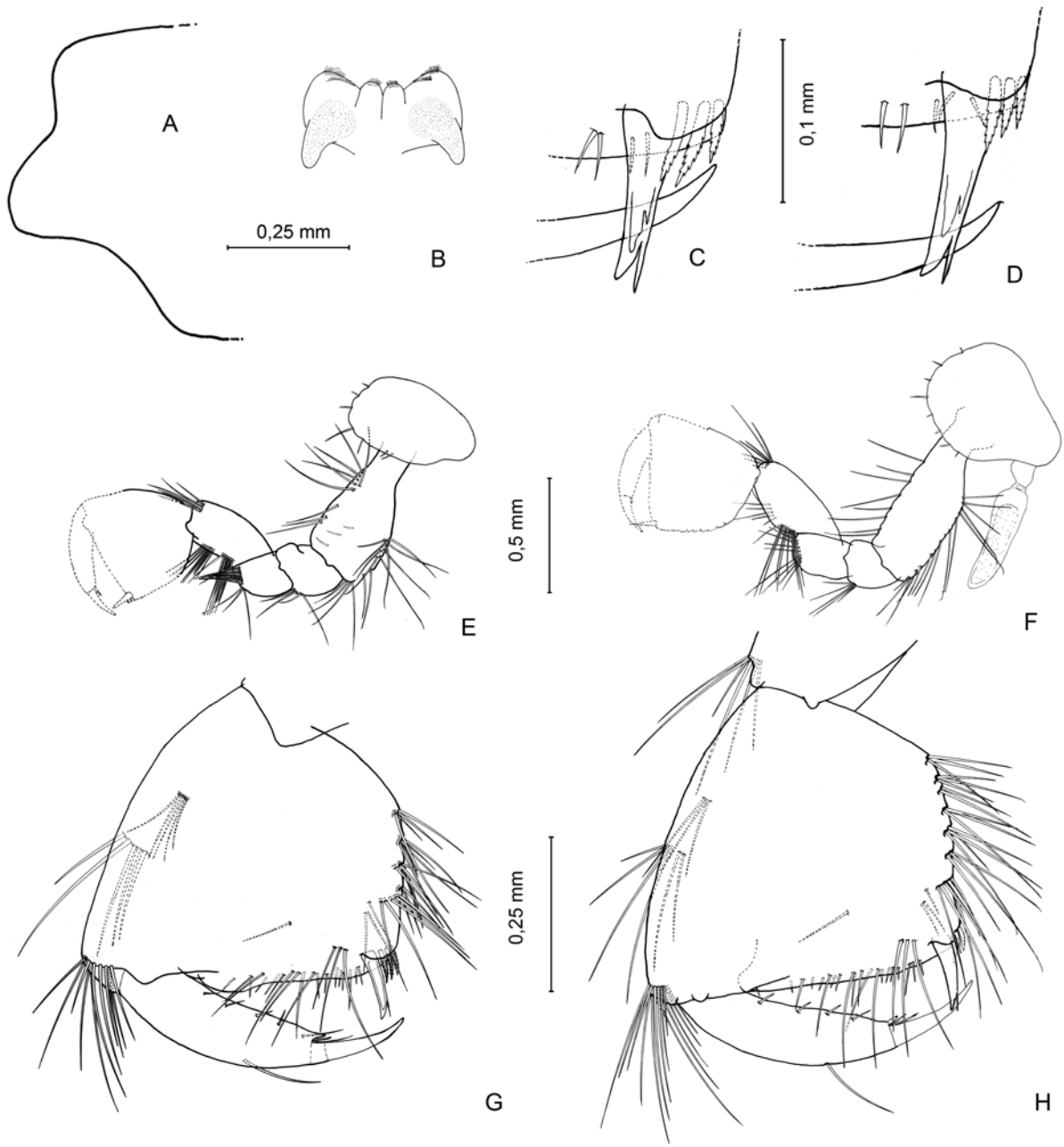

Fig. 2. *Niphargus cvetkovi* sp. n. holotype ♂: A – rostrum; B – labium; C – palmar corner of gnathopod I; D – palmar corner of gnathopod II; E – gnathopod I; F – gnathopod II; G – propodus of gnathopod I; H – propodus of gnathopod II

eleven long distal and four subdistal setae. Ischium with four long distal setae on itsthe posterior margin. Merus with eleven setae on its distal margin. Carpus shorter than propodus. Anterior margin of carpus with two groups of five apical setae. Posterior margin with sixteen setae divided into two groups of eight setae. Inner side of propodus with one group of four spines and two groups of three spines; its posterior margin armed with five groups of setae. Dactylus with one long seta on the anterior margin and five short setae on interior margin; palmar margin equipped with nineteen setae; palmar corner bearing one strong S-spine, three shorter serrated L-spines, one R-spine and three facial M-setae.

Gnathopod II (Fig. 2F,H): Basipodite strongly developed, expanded in its distal part; provided with eight long setae along anterior margin, twelve setae along the posterior margin and one group of three distal setae. Ishium and merus each with distal group of setae on the posterior margin, composed of five, respectively six setae. Carpus shorter than propodus, with six distal setae along anterior margin and row of fourteen long setae located on posterior margin. Propodus wider than long; itshigh anterior margin provided with one group of six setae and one group of three setae; posterior margin with seven groups of setae, the last of which almost reaches the palmar corner; palmar margin almost straight, slightly oblique and bearing 20 setae. Dactylus with one spine on the outer side and four spines on internal margin. Palmar corner with one strong S-spine, three shorter serrated L-spines, one R-spine and four facial M-setae.

Pereopods III–VII (Fig. 3A - J): pereopod III longer than pereopods IV and V. Pereopod VI shorter than pereopod VII. Coxal plates of PV–PVII notably wider than long, with deeply incised posterior margin. Coxal plate on PVII with oval rounded ventral margin. Basipodites of PIII and PIV narrow; their anterior margins equipped with seven long setae each; posterior margins with nine and seven long setae, respectively, most of which twice as longer than width of article. Basipodites of PV–PVII almost twice as long as wide; their anterior and posterior margins provided with relatively short setae; remaining articles of PV–VII with two - four strong and short spines on the anterior and posterior margins. Ischium short, with one or two distal setae. Meropodites and carpopodites with two - five setae on anterior margins and two - four setae on posterior margins. Each dactylus bearing one seta on outer margin and four setae on inner margin.

Pleopods I–III bearing five retinacles each (Fig. 3K). Some paratypes armed with four to six retinacles.

Uropod I (Fig. 4A): peduncle shorter than the exopodite or endopodite, provided with nine setae at basis and two distal setae. Exopodite and endopodite almost equal in length. Outer ramus with three groups of spines in dorsolateral part, and three long and two short distal spines. Inner ramus with three long and two short distal spines. Lateral sides smooth, without spines.

Uropod II (Fig. 4B): peduncle equal in length to the inner ramus (endopodite) and longer than outer ramus (exopodite); bearing two groups of dorsolateral setae as well as two long and two short distal spines. Outer ramus reaching 3/5 of length of internal ramus. Outer ramus with three groups of two setae each on anterior margin, and three long and two short distal spines. Inner ramus without setation, with two long and three short distal spines.

Uropod III well differentiated (Fig. 4C). Peduncle very short, not reaching half of length of first article of theexopodite. Endopode much shorter than first article of the exopodite (ratio 1 : 6.5), with two short distal setae. Exopodite bi-articulated, with almost equal length of first and second articles. Basal (first) article bearing two groups of fine setae on both sides. Distal article bearing three groups of thin setae on the outer side, and six long distal setae.

Epimeral plates with almost parallel anterior and posterior sides, broadly rounded (Fig. 4E). Posterior margins bearing one row of six short fine setae. Ventral margin of second and third epimeres with four fine spines.

Telson (Fig. 4D): longer than broad; deeply incised, almost to its base. Lobes with almost parallel, slightly convex sides, each bearing one fine plumose seta and one very small seta. Each lobe with two distal spines, three or four long strong distal setae and three long dorsolateral setae.

Sexual dimorphism: The comparison of the holotype and some male paratypes with females showed some differences in the general appearance of the body, which in females is more solid and thickset (Fig. 5). Coxal plates in females are longer than wide. Antenna I in males reaches 1/2 of the body length, while in the female it is less than 1/3. Pereopods of males and females differ notably in their length. In males, the longest seventh pereopod reaches only 1/3 of the body length, while in females the sixth pereopod reaches 1/2 of the body length. Uropod III (Fig. 4G) in females is undifferentiated. Uropods I, II in females (Fig. 4F) different from those of males. Inner and outer rami of uropod I almost equal. Inner ramus of uropod II shorter than outer ramus. Pleopods with four to five articles of flagellum, while in males with up to 10-12 segments.

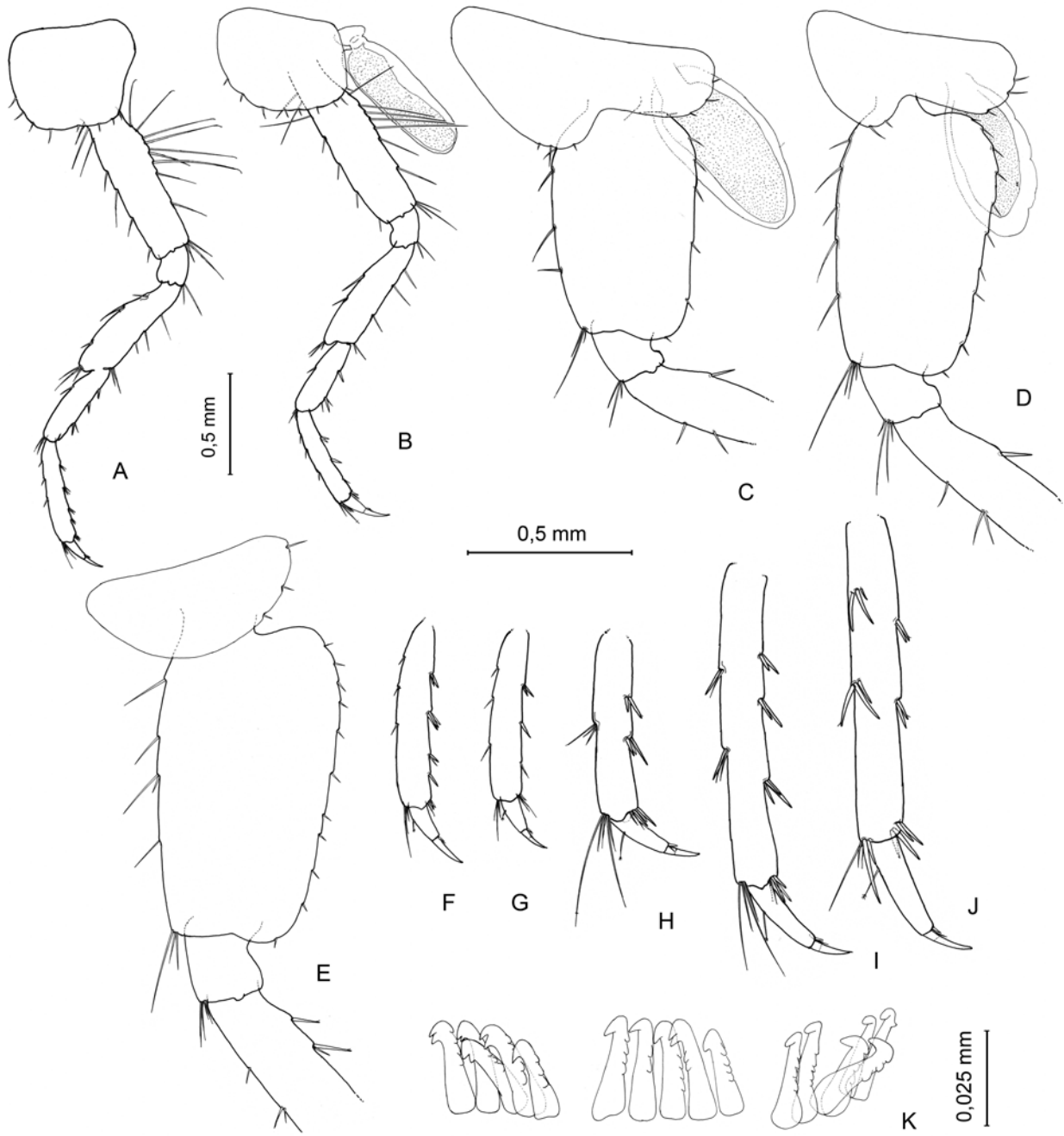

Fig. 3. *Niphargus cvetkovi* sp. n. holotype ♂: A – E pereopods 3, 4, 5, 6, 7; F – J dactylus of PIII–VII; K – retinacles of pleopods I–III

Retinacles of all pereopods only three in females, while in males between four to six. Telson (Fig. 4H) with similar shape to the one of males, but the lobes are armed with three distal spines, one subdistal spine and one lateral plumose seta.

Remarks and affinities: Some characters like the shape of the mouthparts, gnathopod I and II, pereopodes V–VII, epimeral plates and telson, place the new species *Niphargus cvetkovi* sp. n. undoubtedly within the *aquilex-tauri* species group (Strascraba 1972) and *tauri* sub-group. Schellenberg (1933) described *Niphargus aquilex tauri* from the Taurus Mountains in Turkey. Later, the same author (Schellenberg 1935) separates *N. aquilex tauri* as a new species, :*Niphargus tauri.* This species was the subject of many studies by experts such as S. Karaman (1950, 1959) and G. Karaman (1973b). Later, G. Karaman (1973a) described a number of new subspecies from Yugoslavia and new species for the Bulgarian fauna. The only subspecies described by Sket (1960) was also added to this group. *Niphargus cvetkovi* is close to the description of the *N. tauri tauri* Shellenberg, 1933, *N. jurinaci* S. Karaman, 1950, and *N. tauri kragujevensis*

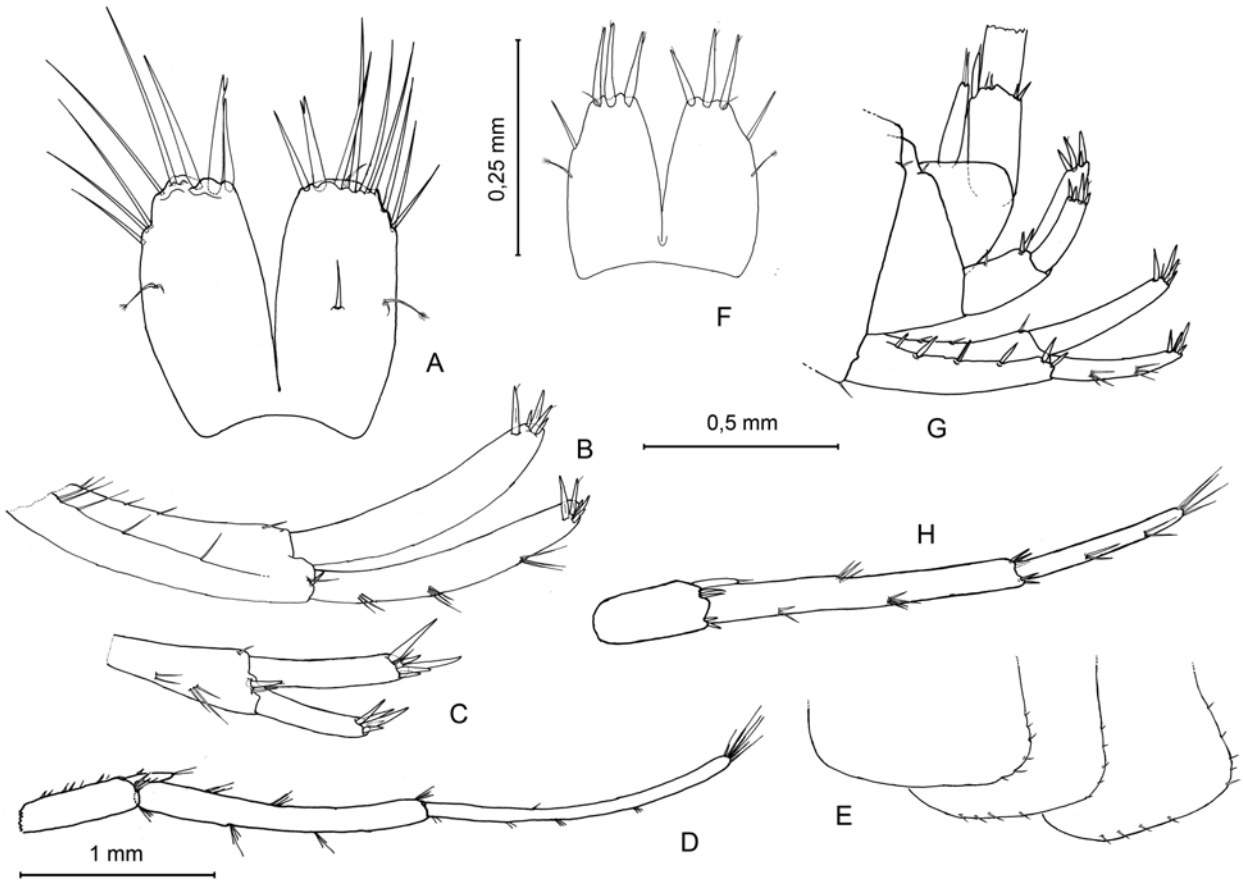

Fig. 4. *Niphargus cvetkovi* sp. n. holotype ♂, paratype ♀, 7.2 mm: A – telson; B – uropod I; C –uropod II; D – uropod III; E – epimeral plates. F – telson (female); G – uropods I, II (female); H – uropod III (female)

S. Karaman, 1950 (G. Karaman,. 1992). The new species exhibits some similarity with *N. tauri tauri* regarding the maxilliped and maxilla I (Fig. 1), number of retinacles on the pleopodites (Fig. 3), epimeral plates and uropod III (Fig. 4); however, it differs clearly in the absence of aesthetasces at antenna I, ornaments of the mandible (Fig. 1), gnathopod I and II (Fig. 2), uropod I and telson (Fig. 2). On the other hand, the new species is similar to *N. jurinaci* (Karaman, 2013a) regarding antenna II, mandible, pereopods III - VII, uropods I and II. *Niphargus cvetkovi* sp. n. differs from *N. jurinaci* in the lack of aesthetasces on antenna I, differently constituted labium, internal lobus of maxilla I (equipped with two setae on the outer corner, Fig. 1E), differently constituted gnathopod I and II (with more groups of setae on posterior margin of the propodus, and three serrated spines on the palmar corner, Fig. 2), uropod III (with longer second article), epimeral plates (more setosed but with short setae); body length (twice as large). By the structure of the antenna I, maxilla I, pereopods III–VII, epimeral plates and the increased number of retinacles, the new species is similar to *N. kragujevensis*. But the new species may be separated

Fig. 5. *Niphargus cvetkovi* sp. n.: Male and female individuals

clearly by the different antenna II (having slightly shorter flagellum), more setosed mandibula I and maxilliped (Fig. 1), less groups of setae on posterior margins of gnathopods, slightly shorter dactylus of P V-VII, different uropods I–III and telson. From *N. remus* G. Karaman, 1992 (which is very similar to *N. kragujevensis*), the new species is different by anten-

na II, mouthparts, gnathopods (bearing three serrated L-spines on palmar corner, three facial M-spines and more groups of setae on the posterior margin, Fig. 2), uropods and telson; both species have similar dactylus of pereopods V-VII and similar shape of gnathopod II (Fig. 2H). *Niphargus cvetkovi* resembles *N. osogovensis* Karaman S., 1959 (Karaman 2013a) in terms of antenna II, propodus shape of gnathopods I-II, pereopods III-VII, while differing in missing dorsolateral spines on urosomites, missing aesthetasces on antenna I, missing A-setae and more D-setae on mandibular palpus (Fig. 1C), different maxilla I (bearing two apical setae on the inner plate, Fig. 1E), more L-spines and facial M-setae on propodus of gnathopods I-II (Fig. 2), slightly narrower basipodite of pereopod V (Fig. 3C), number of retinacles, and telson.

Etymology: The new species of *Niphargus* is named after the eminent researcher of groundwaters in Bulgaria Prof. Dr. Lyubomir Cvetkov.

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