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NEW DATA ON GENUS *NIPHARGUS* SCHIÖDTE, 1849 (FAM. NIPHARGIDAE) FROM ITALY AND MACEDONIA (CONTRIBUTION TO THE KNOWLEDGE OF THE AMPHIPODA 272)

SUMMARY

Two members of the genus *Niphargus* Schiödte, 1849 (Family Niphargidae) are treated. The species *Niphargus orbis*, sp. n. is described and figured from the subterranean waters of the springs in Rio di Valle, Alpi Ligure, Italy, previously mentioned (1993) under the name of *N. rhenorhodanensis* Schellenberg, 1937 from the same locality. The differences between both species are analysed.

The species *Niphargus osogovensis* S. Karaman, 1959, known and partially described from the springs in Osogovo Mountain in Macedonia, is redescribed and figured more in detail from the type-locality based on typical material, and the taxonomical position of this species within the genus *Niphargus* is discussed.

Key words: Amphipoda, *Niphargus orbis*, *osogovensis*, new species, taxonomy, Italy, Macedonia, Niphargidae.

INTRODUCTION

The subterranean genus *Niphargus* Schiödte, 1849 (Amphipoda, fam. Niphargidae) consists of over 300 known species and subspecies in the subterranean waters of Europe and Near East, all the way to Iraq. This genus, which probably originated in the Sea, settled the subterranean freshwaters several times in various geological ages, and is very common in all clean subterranean waters. The populations of this genus are still being segregated and new taxa are being created.

Various populations of this genus have been observed and described as various new species, often based on very scarce or incomplete material. On the other hand, the scarce knowledge of biology and ecology of these animals in very variable subterranean conditions, creates the possibility of overlooking some cryptic species very similar but distinct from each other, or considering some pseudocryptic taxa as distinct species. The introduction of new molecular and genetic analyses in the taxonomy of this genus, combined with morphological taxonomy, will help to better recognise the status of some taxa. Our present studies are based on the morphological taxonomy.

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MATERIAL AND METHODS

The samples of *Niphargus* were preserved in 70% ethanol. The specimens were examined and dissected in the mixture of glycerin and water, using a Wild M 20 stereomicroscope. Later, the dissected specimens were transferred onto slides with Faure liquid used for final preservation. The advantage of Faure liquid is that it is possible to dissolve the liquid on slides using normal water, and remove the dissected pieces for further studies. The body length of examined specimens was measured by tracing individual's mid-trunk lengths (tip of the rostrum to end of the telson) and drawings were made using a camera lucida attachment and manually inked. Some morphological terminology and setae formulae follow G. Karaman's terminology (Karaman, G. 1969; 2012).

TAXONOMICAL PART

NIPHARGUS ORBIS sp. n.

Figs. 1-5, 6A-C

Niphargus rhenorhodanensis Karaman, G. 1993: 242, fig. 118;
 nec *Niphargus longicaudatus rhenorhodanensis* Schellenberg, 1937c: 164, fig. 3; Schellenberg, 1942: 71, fig. 52;
 nec *Niphargus rhenorhodanensis* Ginet, 1985: 228, figs. 1-8; G. Karaman & Ruffo, 1986: 530.

MATERIAL EXAMINED: ITALY: LIGURIA:

S-4088= Liguria, Alpi Ligure, Calizzano, Rio di Valle, m. 900, temp. water 8°C, 5 exp. , 1.10.1976 (leg. Ravizza).

DIAGNOSIS. Body slender, lateral cephalic lobes short, subrounded; epimeral plates 1-3 distinctly angular to slightly pointed; urosomite 1 in males and females with one seta on each dorsolateral site, urosomite 2 with 1 spine on each dorsolateral side, urosomite 3 naked.

Mandibular palpus article 1 usually naked, rarely with 2-3 setae; maxilla 1 inner plate with 1 seta, outer plate with 7 spines (most of them with 1 lateral tooth). Propodus of gnathopods 1-2 trapezoid, as large as corresponding coxa, dactylus along outer margin with row of setae. Dactylus of pereopods 3-7 with one spine at inner margin. Basipodit of pereopods 5-7 dilated, longer than broad, without distinct ventroposterior lobe. Pleopods 1-3 with 2 retinacula each, peduncle of pleopods almost naked. Uropod 1 peduncle with dorsointernal row of setae; inner ramus in males twice longer than outer one. Uropod 3 in males and females with elongated second article of outer ramus. Telson short, with distal and lateral spines, facial spines absent.

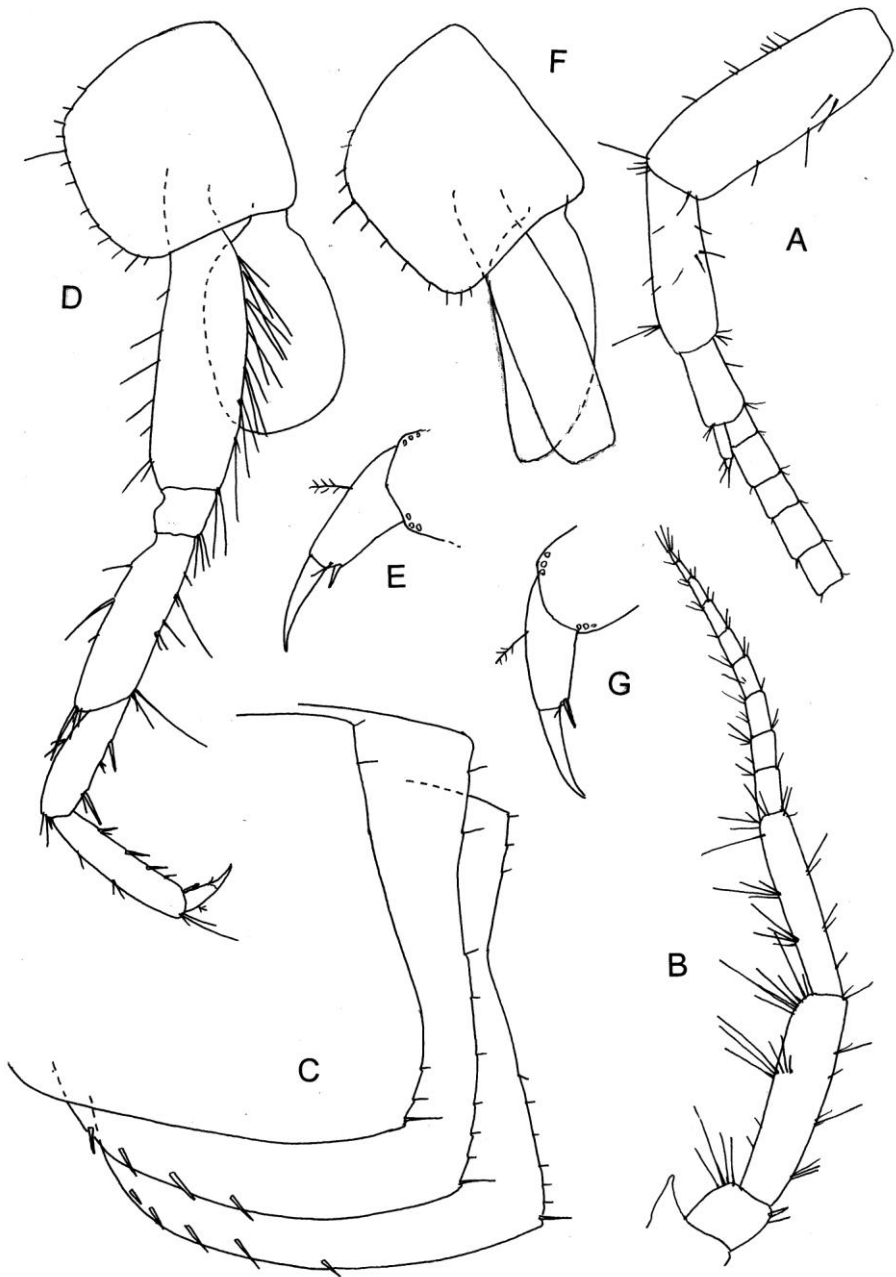


Fig. 1. *Niphargus orbis*, sp. n., Calizzano (Italy), male 6.0 mm (holotype): A= antenna 1; B= antenna 2; C= epimeral plates 1-3; D-E= pereopod 3; F-G= pereopod 4.

DESCRIPTION: MALE 6 mm (holotype): Body slender, metasomal segments 1-3 with 4-5 dorsoposterior marginal setae each (fig. 1C). Epimeral plate 1 quadrate, with slightly convex posterior margin, ventroposterior corner marked with strong seta (fig. 1C). Epimeral plate 2 quadrate, angular, with almost straight posterior margin bearing a row of short setae. Posterior margin of epimeral plate 3 inclined, ventroposterior corner distinctly angular; epimeral plate 2 with 4 subventral spines, epimeral plate 3 with 5 subventral spines (fig. 1C).

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

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

Antenna 1 exceeding half of body-length (ratio: 38: 60); peduncular articles 1-3 progressively shorter (ratio: 72: 50: 21), scarcely setose (fig. 1A); main flagellum consisting of 20 articles (most of them with one short aesthetasc); accessory flagellum short, 2-articulated (fig. 1A).

Antenna 2: peduncular article 3 short, with one bunch of distoventral setae (fig. 1B). Peduncular article 4 longer than 5 (ratio: 58: 52), both articles along ventral margin with 2-3 bunches of setae (the longest setae are distinctly longer than diameter of articles themselves); flagellum slender, longer than last peduncular article (ratio: 75: 52), consisting of 9 articles; antennal gland cone short (fig. 1B).

Mouthparts well developed. Labrum broader than long. Labium with entire outer lobes, inner lobes short, entire.

Mandibles triturative. Left mandible: incisor with 5 teeth, lacinia mobilis with 4 teeth. Right mandible: incisor with 4 teeth, lacinia mobilis bifurcate, with several unequal teeth. Mandibular palpus 3-articulated, palpus article 1 with 3 setae; article 2 slightly shorter than article 3 (ratio: 58: 63), along ventral margin with 13 setae; article 3 falciform, along margin with 18-19 D- setae and 5-6 distal E- setae, on outer face with one group of A- setae, on inner face with 4 groups of B- setae (1-2-2-1) (fig. 2D).

Maxilla 1: inner plate with 1 seta; outer plate with 7 spines [6 spines with 1 lateral tooth, one spine with 5 teeth]; palpus almost reaching tip of outer plate spines, provided with 6 setae (fig. 2A).

Maxilla 2: both plates with marginal setae only.

Maxilliped: inner plate short, with 3 distal smooth spines accompanied by single setae; outer plate reaching half of palpus article 2; palpus article 4 along outer margin with one median seta, and along inner margin with 2 setae near basis of the nail (fig. 2B).

Coxae 1-4 relatively short, with row of marginal short setae and one ventroanterior longer seta. Coxa 1 broader than long (high) (ratio: 45: 39), with subrounded ventroanterior margin and 13 marginal setae (the longest seta is attached at ventroanterior corner) (fig. 3A).

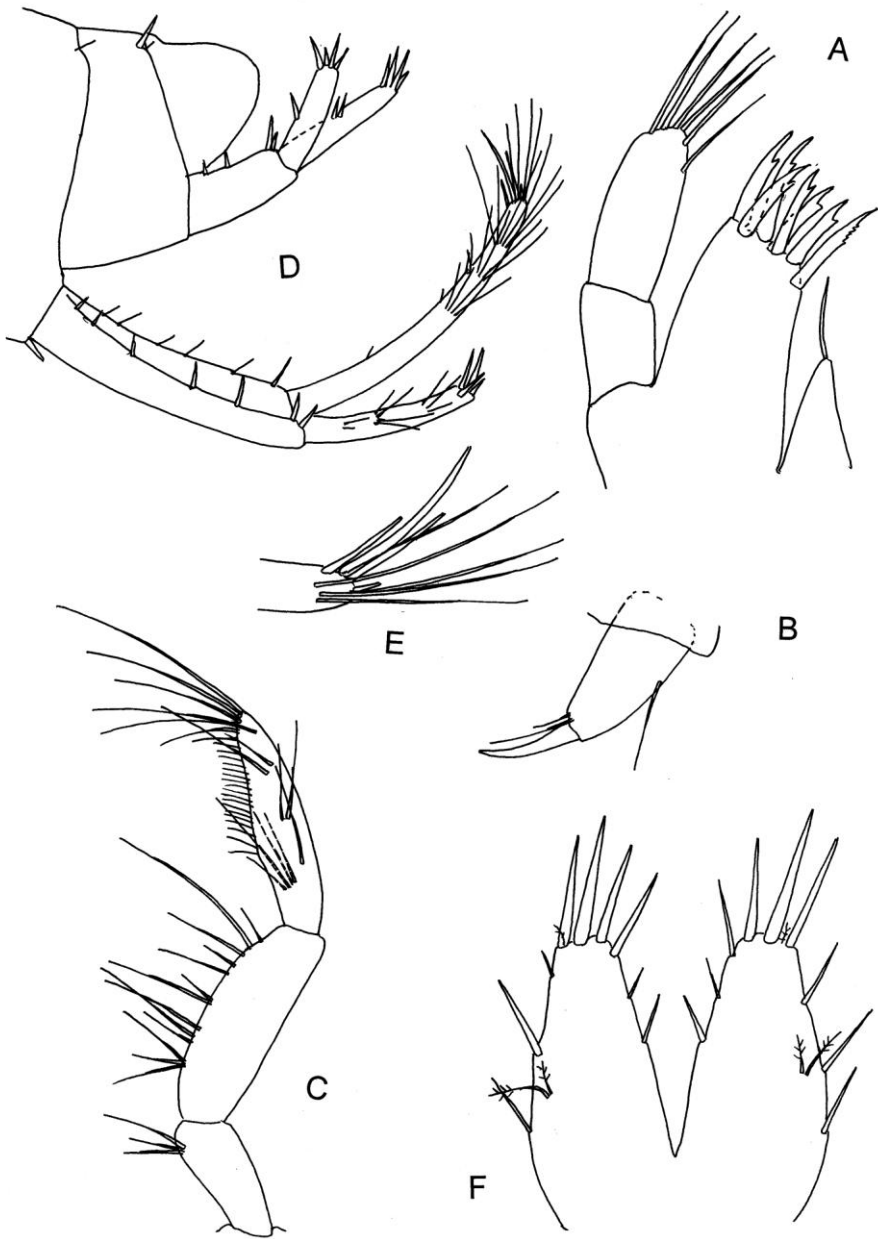


Fig. 2. *Niphargus orbis*, sp. n., Calizzano (Italy), male 6.0 mm (holotype): A= maxilla 1; B= distal part of maxilliped palpus; C= mandible palpus; D= urosome with uropods 1-2; E= distal part of uropod 1 inner ramus; F= telson

Coxa 2 nearly as long as broad (fig. 3D), bearing along ventral margin 13-14 setae. Coxa 3 nearly as long as broad, with nearly 13 marginal setae (fig. 1D). Coxa 4 slightly broader than long (ratio: 57: 52), along margins with 12-13 short setae (fig. 1F).

Coxae 5-7 progressively shorter. Coxae 5 and 6 with subrounded anterior lobe, coxa 7 entire, convex.

Gnathopods 1-2 relatively small, gnathopod 1 is smaller than gnathopod 2 (fig. 3A, D). Gnathopod 1: article 2 short and slightly dilated, along anterior and posterior margin with many setae not exceeding the diameter of article 2 (fig. 3A); article 3 along posterior margin with one bunch of setae; article 5 shorter than article 6 (ratio: 35: 43), along anterior margin with one distal bunch of setae. Article 6 (propodus) trapezoid, slightly longer than broad (ratio: 88: 69), along posterior margin with 6 transverse rows of setae (fig. 3B); palm almost straight, inclined nearly half of propodus-length, defined on outer face by one strong corner S- spine accompanied laterally by 3 serrate L-spines and row of 5 facial M- setae (fig. 3C), on inner face by one slightly elongated R-spine (fig. 3C). Dactylus reaching posterior margin of article 6, along outer margin with row of 6 median setae, along inner margin with row of short setae (fig. 3C).

Gnathopod 2: article 2 along anterior and posterior margin with row of setae not exceeding the diameter of article itself (fig. 3D); article 3 along posterior margin with one bunch of setae (fig. 3D); article 5 (carpus) slightly shorter than article 6 (ratio: 43: 50), along anterior margin with one median and one distal bunch of setae. Article 6 (propodus) trapezoid, slightly longer than broad (ratio: 92: 82), along posterior margin with 8 transverse rows of setae (fig. 3E); palm almost straight, inclined nearly half of propodus- length, defined with one strong corner S- spine accompanied laterally by 2 serrate L- spines and row of 5 facial M- setae, along inner face by one elongated subcorner R-spine (fig. 3F). Dactylus reaching posterior margin of article 6, with 6 median setae along outer margin, and row of short setae along inner margin (fig. 3E).

Pereopods 3-4 moderately slender, similar to each other. Pereopod 3: article 2 along anterior margin with row of single setae, along posterior margin with several bunches of setae (fig. 1D). Articles 4-6 of unequal length (ratio: 50: 38: 43); article 4 along anterior margin with single setae or spine-like setae, along posterior margin with setae (the longest setae are longer than diameter of article itself); article 5 along posterior margin with 2 spines and single short setae (fig. 1D); article 6 along posterior margin with several single spines; dactylus short and strong, along inner margin with one spine near basis of the nail, and along outer margin with one median plumose seta (fig. 1E); nail is shorter than pedestal (ratio: 27: 37).

Pereopod 4 like pereopod 3, dactylus with one spine along inner margin near basis of the nail, along outer margin with one median plumose seta (fig. 1G).

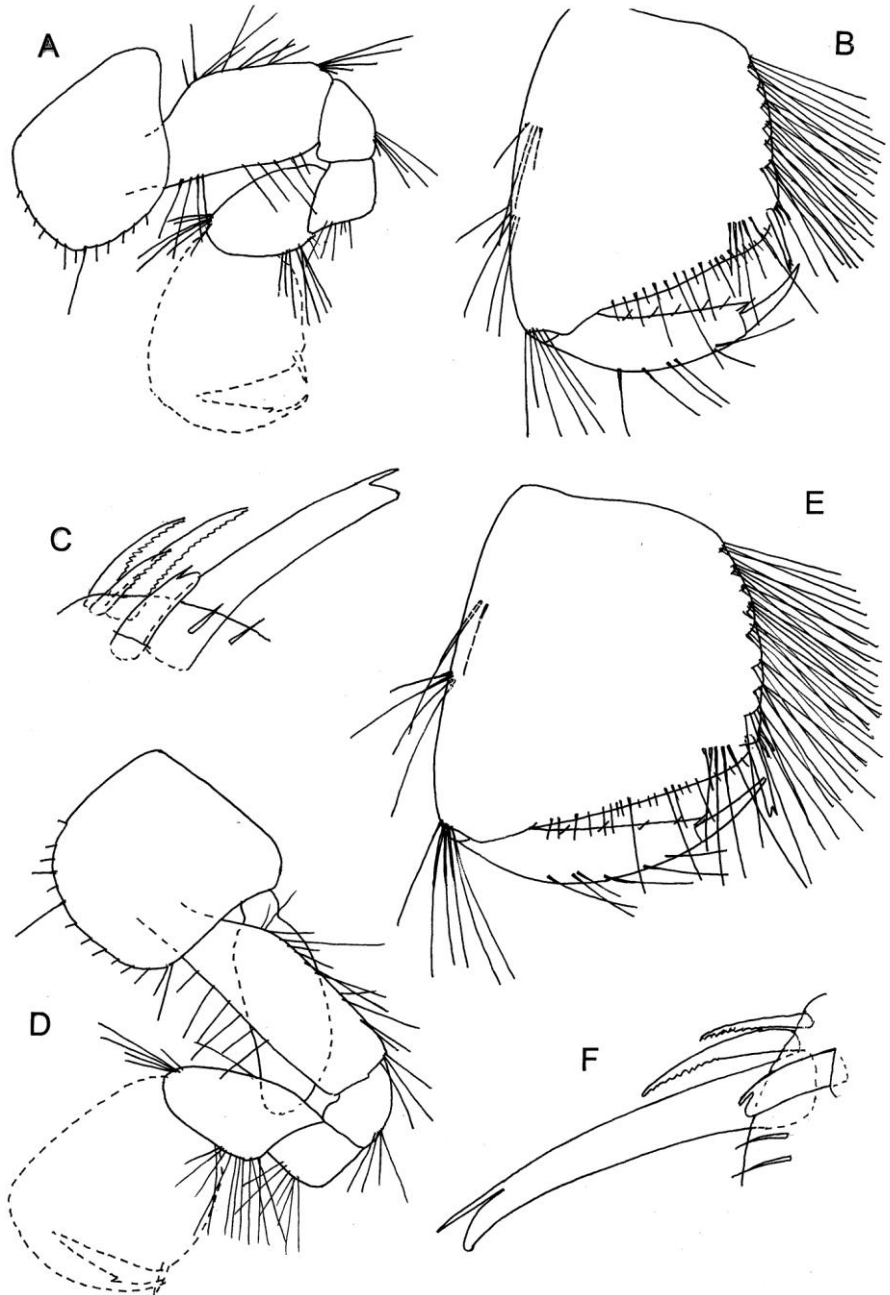


Fig. 3. *Niphargus orbis*, sp. n., Calizzano (Italy), male 6.0 mm (holotype): A-B= gnathopod 1, outer face; C= corner of gnathopod 1 propodus, inner face; D-E= gnathopod 2, outer face; F= corner of gnathopod 2 propodus, inner face.

Pereopods 5-7 progressively longer, with relatively slender dactylus, pereopod 5 much shorter than 6 and 7 (fig. 4A, C, E). Pereopod 5: article 2 longer than broad (ratio: 66: 44), with a row of spine-like setae along anterior margin and up to 14 short setae along posterior margin; ventroposterior lobe not developed (fig. 4A); articles 4-6 of different length (ratio: 37: 41: 45), articles 4-5 along posterior margin with short spines; article 6 along anterior margin with short spines; dactylus much shorter than article 6 (ratio: 20: 45), along inner margin with strong spine, along outer margin with one median plumose seta; nail shorter than pedestal (ratio: 22: 42).

Pereopod 6: article 2 longer than broad (ratio: 81: 56), along anterior margin with a row of spine-like setae, along posterior margin with up to 19 short setae, ventroposterior lobe not developed (fig. 4C); articles 4-6 of unequal length (ratio: 52: 70: 81), articles 5-6 along anterior and posterior margin with several bunches of short spines each; dactylus much shorter than article 6 (ratio: 32: 81), with one strong spine and lateral seta at inner margin near the basis of the nail, along outer margin with one median plumose seta, nail much shorter than pedestal (ratio: 34: 71) (fig. 4D).

Pereopod 7: article 2 longer than broad (ratio: 92: 56), with short spine-like setae along convex anterior margin and with convex posterior margin bearing up to 16 short setae, ventroposterior lobe not distinct (fig. 4E); articles 4-6 of different length (ratio: 48: 70: 93), along both margin with short spines and setae; dactylus much shorter than article 6 (ratio: 30: 92), with one strong spine and lateral seta at inner margin near the basis of the nail, and with one median plumose seta at outer margin (fig. 4F); nail much shorter than pedestal (ratio: 35: 71).

Pleopods 1-3 with scarcely setose peduncle bearing 2 retinacula each.

Uropod 1: peduncle shorter than inner ramus, bearing a row of dorsoexternal spines and dorsointernal row of setae (except distal spine) (fig. 2D), tubercle on peduncle not developed. Outer ramus much shorter than peduncle, bearing 3 bunches of lateral setae and distal spines (fig. 2D); inner ramus nearly twice longer than outer ramus, with row of lateral and distal spines, as well as with 3-4 bunches of facial and distal simple setae (fig. 2D).

Uropod 2: inner ramus slightly longer than outer one, both rami with short lateral and distal spines (fig. 2D).

Uropod 3 long and narrow, peduncle remarkably longer than broad (ratio: 44: 20), with lateral short setae and distal short spines (fig. 4G); inner ramus scale-like, short, but more than twice longer than broad, with 2-3 lateral bunches of short spines and distal setae (fig. 4G); outer ramus 2-articulated: first article slightly longer than second article, bearing along both margins single or paired short spines, accompanied along inner margin with single short setae (fig. 4G); second article slightly shorter than first one (ratio: 105: 131), along both margins and tip with short setae only.

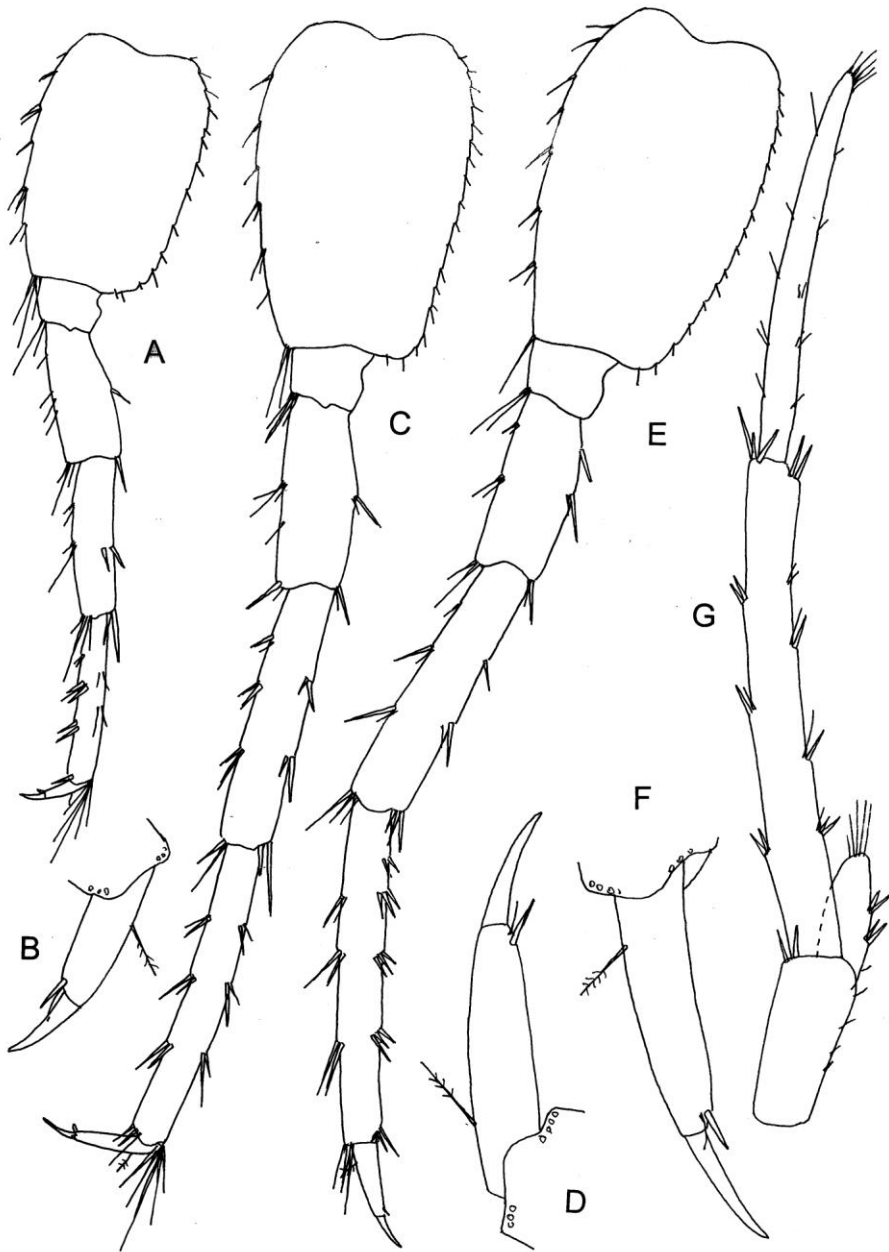


Fig. 4. *Niphargus orbis*, sp. n., Calizzano (Italy), male 6.0 mm (holotype): A-B= pereopod 5; C-D= pereopod 6; E-F= pereopod 7; G= uropod 3.

Telson short, nearly as long as broad, slightly gaping; each lobe with 3-4 distal spines; single spines are attached along inner and outer margin of each lobe (fig. 2F), facial spines absent. A pair of short plumose setae is attached near the middle of each lobe.

Coxal gills on gnathopod 2 and pereopod 4 are narrowed, but not exceeding ventral tip of corresponding article 2 (figs. 3D, 1F). Coxal gills on pereopod 3, 5 and 6 are shorter (fig. 1D).

FEMALE ovig. 5.3 mm with setose oostegites (paratype): Rather similar to the males, metasomal segments 1-3 with 4-5 dorsoposterior marginal setae each (fig. 6A). Epimeral plate 2 distinctly angular, with nearly transverse posterior margin bearing a row of short setae (fig. 6A); epimeral plate 3 slightly pointed, with inclined posterior margin bearing a row of short setae; epimeral plates 2 and 3 with 4 subventral spines each (fig. 6A).

Urosome segment 1 on each dorsolateral side with 1 seta, urosome segment 2 on each dorsolateral side with 1 spine (fig. 5G), urosome segment 3 naked.

Antennae 1-2 like these in males. Antenna 1: main flagellum with 16-19 articles (most of them with one aesthetasc). Antenna 2 flagellum with 9 articles.

Mandibular palpus article 1 naked. Maxilla 1 inner plate with 1 seta, outer plate with 5 spines bearing 1 lateral tooth each, one spine with 2 teeth, one spine with 3-4 teeth; palpus with 8 setae.

Coxae 1-4 relatively short, but slightly longer than these in males. Coxa 1 hardly broader than long (ratio: 42: 41), with 16 short marginal setae (fig. 5C); coxa 2 distinctly longer than broad (ratio: 56: 41), with 10 short marginal setae (fig. 5D); coxa 3 longer than broad (ratio: 63: 51), with 14 short marginal setae (fig. 5E); coxa 4 slightly longer than broad (ratio: 66: 56), with 13 short marginal setae (one ventroanterior corner seta is rather longer).

Gnathopods 1-2 relatively small, propodus not larger than corresponding coxa, with articles 3-5 like these in males; palm of article 6 with corner and subcorner spines and setae like these in males (but with 4 facial M-setae only). Gnathopod 1 propodus trapezoid, longer than broad (ratio: 88: 71), along posterior margin with 5 transverse rows of setae; palm slightly convex, inclined almost to the half of propodus-length; dactylus with 5 median setae along outer margin (fig. 5A).

Gnathopod 2 propodus trapezoid, longer than broad (ratio: 90: 77), along posterior margin with 7 transverse rows of setae; palm inclined nearly half of propodus-length, slightly convex; dactylus with 6 median setae along outer margin (fig. 5B).

Dactylus of pereopods 3-7 strong, with one strong spine at ventral margin near basis of the nail and one median plumose seta along outer margin. Article 2 of pereopods 5-7 like these in males (fig. 6B).

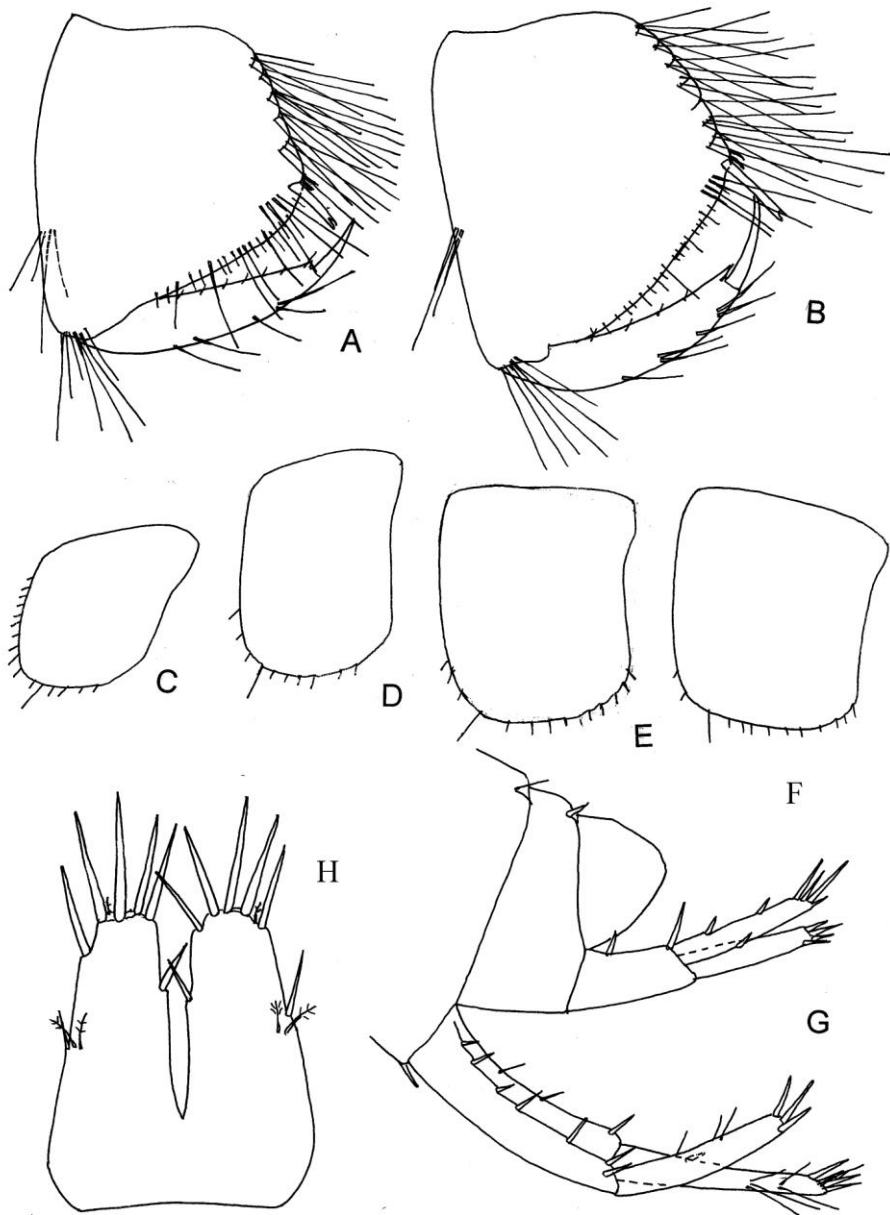


Fig. 5. *Niphargus orbis*, sp. n. , Calizzano (Italy), female 5.3 mm (paratype): A= gnathopod 1 propodus; B= gnathopod 2 propodus; C= coxa 1; D- coxa 2; E= coxa 3; F= coxa 4; G= urosome with uropods 1-2; H= telson.

Uropod 1 with dorsoexternal row of spines and dorsointernal row of setae (except distal spine) (fig. 5G); inner ramus poorly to distinctly longer than outer ramus, both rami with several facial setae (fig. 5G).

Uropod 2 with almost equal rami or inner ramus hardly longer than outer one, both rami with lateral and distal spines.

Uropod 3 elongated, peduncle longer than broad (ratio: 37: 20), with distal spines (fig. 6C); inner ramus short, scale-like, with distal bunch of setae; outer ramus 2-articulated, first article along both margins with 4 bunches of setae, and along inner margin with single short plumose setae (fig. 6C); second article elongated, but much shorter than first article (ratio: 49: 110), along both margins with lateral and distal simple setae (fig. 6C).

Telson short, slightly longer than broad (ratio: 70: 60), deeply incised (fig. 5F); each lobe with 4-5 distal spines and with one spine along outer and inner margin; a pair of short plumose setae is attached nearly the middle of each lobe.

Coxal gills like these in males. Oostegites broad, setose.

VARIABILITY. Mandibular palpus article 1 usually without setae. Inner plate of maxilla 1 rarely with 2 setae; outer plate of maxilla 1 exceptionally with 8 spines. Palm of propodus in gnathopod 1 with 2-3 L- spines. Peduncle of pleopod 3 usually smooth or with 1 seta, exceptionally with 1 spine and 2 setae.

Loc. typ.: Rio di Valle, 900 m a.s.l. (Calizzano, Savona), N Italy).

LOCALITIES CITED: Karaman, G. 1993 mentioned several localities of this species from Italy:

Lombardia: Laghetto delle Streghe (Premeno, Novara; Liguria: Rio di Valle, 900 m a.s.l. (Calizzano, Savona); Passo del Melogno, spring (Savona); Grotta "Arma Pollera, 24 Li (Finale Ligure, Savona); Rio Franchella, 100 m. a.s.l.(Melogno, Savona); Bardinetto, Savona; Voltri (Genova); Grotta Tana da Basua, 55 Li (Toirano, Savona). Unfortunately I have not in hands these samples mentioned in monograph of Karaman, G. (1993) (except these from Rio di Valle), to confirm these other determinations.

DERIVATIO NOMINIS: From the Latin "orbis" meaning "circle", alluding to the various similar uncertain *Niphargus* taxa.

REMARKS.

Karaman, G. described this species (1993) from Rio di Valle, Calizano, under the name *Niphargus rhenorhodanensis* Schell. 1937, because of the scarce description of *N. rhenorhodanensis* made by Schellenberg (1937) from Ougney (Jura) and Rümmingen (Germany), including 2 figures of telson only. Later (1942) he repeated short description including figure of gnathopod 2 and telson from Rümmingen. Karaman, G. (1993) proposed Rümmingen a Nord of Lorrach (Germany) as the type locality.

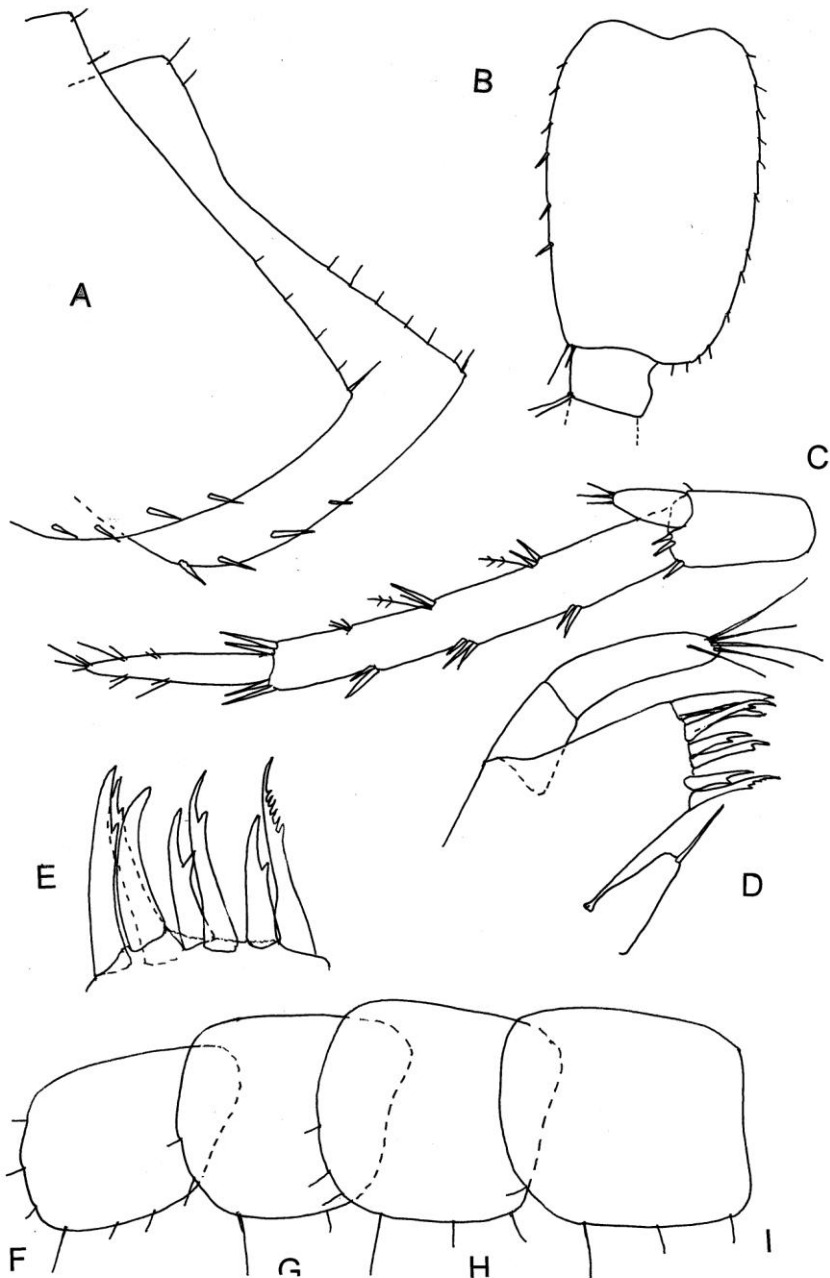


Fig. 6. *Niphargus orbis*, sp. n., Calizzano (Italy), female 5.3 mm (paratype): A= epimeral plates 2-3; B= pereopod 7 basipodit; C= uropod 3; *Niphargus osogovensis* S. Kar. 1959, Osogovo Mt., male 6.0 mm (paralectotype): D-E= maxilla 1; F= coxa 1; G= coxa 2; H= coxa 3; I= coxa 4.

Ginet (1985) redescribed this species based on the specimens from original Schellenberg's samples from Ougney and Dijon (France) and from Rümmingen (Germany).

Based on these detailed redescription, *N. rhenorhodanensis* from Rümmingen and from Ougney differs remarkably from our Italian sample [Rio di Valle, 900 m a.s.l. (Calizzano, Savona)] by larger body-size, by presence of facial spines on telson, by presence of 2 setae on inner plate of maxilla 1, by presence of dorsointernal row of spines on peduncle of uropod 1 in males and only slightly longer inner ramus of uropod 1 than outer one (on fig. 2G and 5C of Ginet), by broader and less inclined propodus of gnathopods 1-2, etc.

Related species in Italy: Several species known from Italy are rather related to our species but differ distinctly from *N. orbis* by inner ramus of uropod 1: *Niphargus lessiniensis* Stoch, 1998 [loc. typ.: Cave named "Grotta A del Ponte di Veja" (cadastre number 117 VNR), Veja (Lessinian mountains), S. Anna d'Alfaedo, province of Verona]; *N. tridentinus* Stoch 1998 [loc. typ.: Cave named "Grotta della Bigonda" (cadastre number 243 VT/TN), Grigno, Valsugana, province of Trento]; *N. julius* Stoch 1997 [ex *N. d'anconai* S. Kar. 1954] [Loc. typ.: grotta Nuova di Villanova, Fr 323].

On the other hands, *N. montellianus* Stoch 1998 [loc. typ.: Cave named "Tavaran Grande" (cadastre number 69 V/TV), Santa Croce (Montello), Nervesa della Battaglia, province of Treviso] differs by higher number of distal setae on inner lobe of maxilla 1, subrounded epimeral plates, by antenna 1 peduncular article 3 long, telson with facial spines, etc.

On the eastern coast of the Adriatic Sea, on the Dinarid Mt chain, there are various species more or less similar to our species, but their relations are still unclear: *N. vinodolensis* Fiser, Sket, Stoch 2006 [loc. typ.: Cerovići, Vinodol, 30 km SE of Rijeka, Croatia] differs by telson with facial spines, etc.

There are several very scarcely described taxa belonging to the *N. longicaudatus* complex and *N. stygius* complex from central and western Europe, and the exact relationship between *N. orbis* and these taxa, still poorly described, is not possible establish based on existing published data.

NIPHARGUS OSOGOVENSIS S. Karaman, 1959

Figs. 6D-I, 7-11

Niphargus tauri osogovensis S. Karaman, 1959: 170, figs. 1-12; G. Karaman, 1972: 6; G. Karaman, 1974: 27; Barnard & Barnard, 1983: 696; G. Karaman & Ruffo, 1986: 533;

Niphargus osogovensis G. Karaman, 1998: 27.

MATERIAL EXAMINED: MACEDONIA: Sp. 499, Osogovo Mt, spring, 1955, several spec. (lectotype and paralectotypes) (leg. T. Petkovski & M. Georgievski).

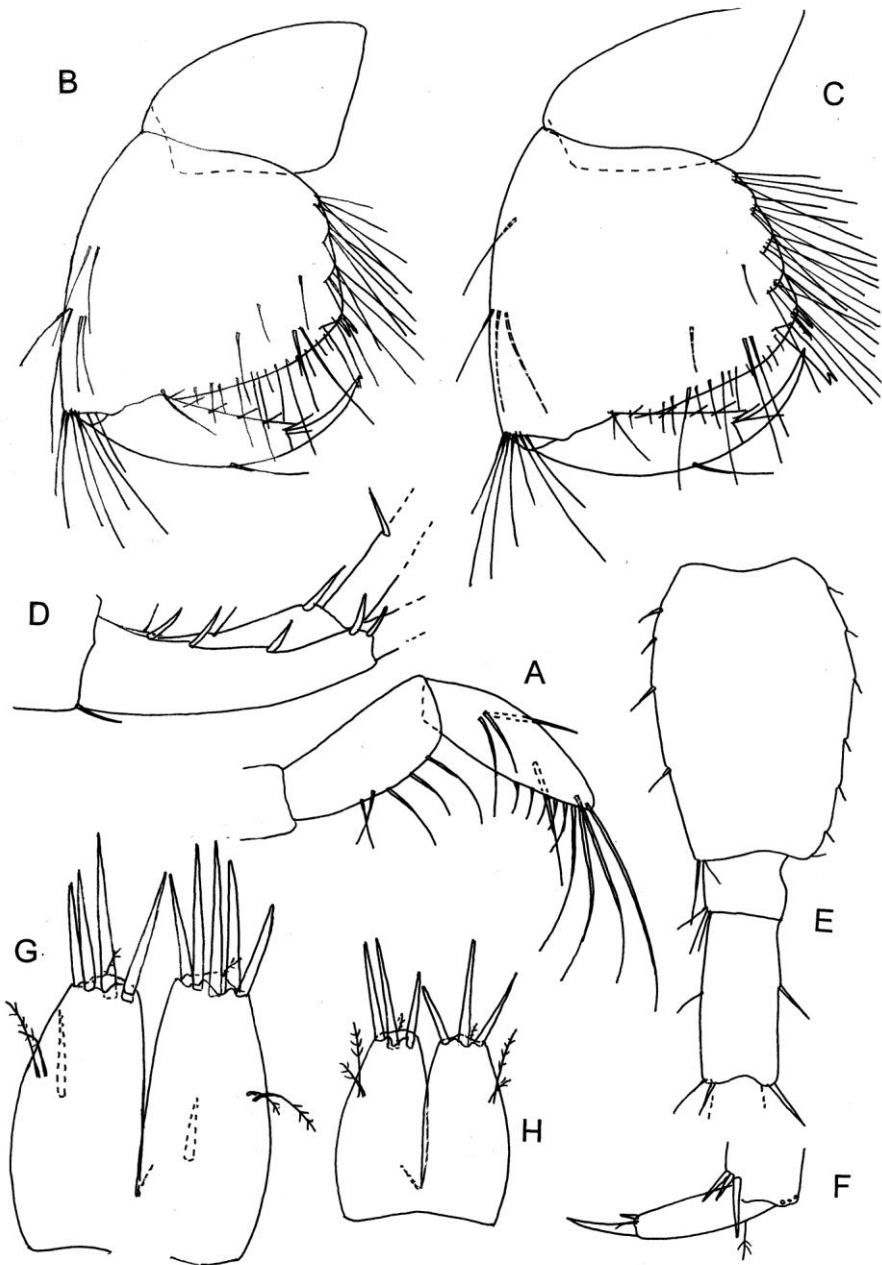


Fig. 7. *Niphargus osogovensis* S. Kar. 1959, Osogovo Mt., male 6.0 mm (paralectotype): A= mandibular palpus, outer face; B= gnathopod 1 propodus; C= gnathopod 2 propodus; D= uropod 1 peduncle; E-F= pereopod 7; G= telson; H= telson, male 4.0 mm.

DESCRIPTION: FEMALE 6 mm ovig. (lectotype): Body relatively slender, metasomal segments 1-3 with 2-4 dorsoposterior marginal short setae (fig. 10F); epimeral plates 1-3 distinctly subrounded with convex posterior margin (fig. 10F); epimeral plates 2-3 with several subventral spines each (fig. 10F).

Urosomite 1 on each dorsolateral side with 1 seta, urosomite 2 on both dorsolateral sides with 1 spine (fig. 10G); urosomite 1 on each ventroposterior corner with 1 ventral slender spine near basis of uropod 1 peduncle (fig. 10G).

Head with short lateral cephalic lobes and ventroanterior sinus (fig. 8A). Antenna 1 nearly reaching half of body size, peduncular articles 1-3 progressively shorter (ratio: 56: 40: 21), main flagellum with 15 articles (most of them with 1 aesthetasc reaching 1/2 to 3/4 of the article itself); accessory flagellum 2-articulated, short (fig. 8B).

Antenna 2 peduncular article 4 slightly longer than article 5 (ratio: 52: 41), flagellum with 7 articles; antennal gland cone short (fig. 8C).

Labrum entire, broader than long. Labium with well developed inner lobes, outer lobes entire.

Right mandible with triturative molar provided with long subdistal seta (fig. 10A), left mandible without that seta. Right mandible: incisor with 4 teeth accompanied by 6 rakers, lacinia mobilis with several teeth (fig. 10A). Left mandible: incisor with 5 teeth, lacinia mobilis with 4 teeth, accompanied by 7 rakers. Mandibular palpus article 1 naked; palpus article 2 with 6-7 setae (fig. 8D); palpus article 3 hardly longer than article 2 (ratio: 72: 67), with 7-8 D-setae, 4 long E-setae, one group of 2 A-setae and 2 single B-setae (fig. 8D).

Maxilla 1: inner plate short, with 1, occasionally 2 setae (fig. 8E); outer plate with 7 spines (4 spines with 1 lateral tooth each, one spine smooth, one spine with 2 teeth, one spine with several teeth) (fig. 8F); palpus almost reaching tip of spines of outer plate, with 4-5 distal setae (fig. 8E).

Maxilla 2 with marginal setae only.

Maxilliped: inner plate short, with 3 smooth distal spines; outer plate almost reaching 2/3 of second palpus article, with smooth spines along inner margin (fig. 8J); palpus article 4 along inner margin with 2 setae near the basis of the nail, and with one median seta along outer margin (fig. 8J).

Coxae 1-4 relatively short. Coxa 1 broader than long (ratio: 41: 32), with subrounded ventroanterior corner (fig. 9A); coxa 2 slightly longer than broad (ratio: 45: 41) (fig. 9D); coxa 3 as long as broad (fig. 10B); coxa 4 not lobed, slightly broader than long (high) (ratio: 51: 46) (fig. 10D). Coxae 5-7 progressively smaller, coxae 5 and coxa 6 with subrounded anterior lobe (fig. 11A, C); coxa 7 entire (fig. 11E).

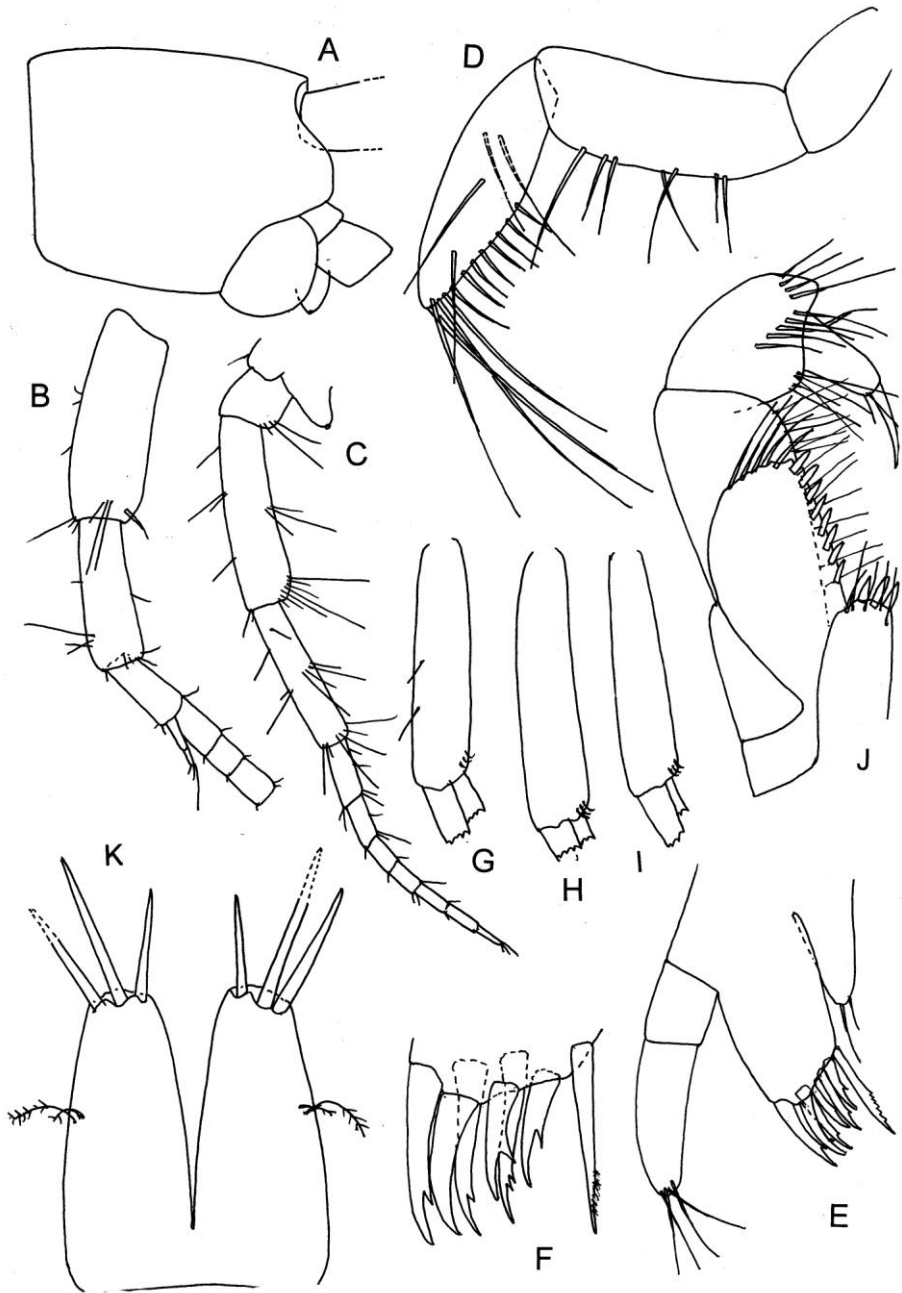


Fig. 8. *Niphargus osogovensis* S. Kar. 1959, Osogovo Mt., female 6.0 mm (lectotype): A= head; B= antenna 1; C= antenna 2; D= mandibular palpus, inner face; E-F= maxilla 1; G-I= peduncle of pleopods 1-3; J= maxilliped; K= telson.

Gnathopods 1-2 relatively small, with article 6 nearly as large as the corresponding coxa, gnathopod 2 slightly larger than 1. Gnathopod 1: article 3 along posterior margin with one bunch of setae (9A); article 5 slightly shorter than 6 (ratio: 30: 40). Article 6 (propodus) trapezoid, slightly longer than broad (ratio: 92: 80), with 3 transverse groups of setae along posterior margin (fig. 9B); palm slightly convex, inclined slightly less than half of propodus -length, defined on outer face by 1 strong corner S- spine accompanied laterally by 3 slender toothed L- spines and 2 facial M- setae, on inner face by 1 short subcorner R- spine (fig. 9C); dactylus reaching posterior margin of propodus, with 1 seta at outer margin (fig. 9B).

Gnathopod 2: article 3 along posterior margin with one bunch of setae (fig. 9D); article 5 hardly shorter than 6 (ratio: 38: 40); article 6 (propodus) trapezoid, hardly longer than broad (ratio: 92: 90), with 4 transverse groups of setae along posterior margin (fig. 9E); palm convex, inclined slightly over 1/3 of propodus- length, defined on outer face by 1 strong corner S- spine accompanied laterally by 2 slender L- spines and 2 facial M- setae, on inner face by 1 short subcorner R- spine (fig. 9F); dactylus reaching posterior margin of propodus, bearing one median seta along outer margin (fig. 9E).

Pereopods 3-4 relatively slender. Pereopod 3: articles 4-6 of unequal length (ratio: 41: 30: 38) (fig. 10B), dactylus not reaching half of article 6 (ratio: 17: 37), with 1 distinct spine at inner margin near basis of the nail (fig. 10C), nail nearly as long as pedestal) (fig. 10C).

Pereopod 4 is similar to pereopod 3 (fig. 10D), with one strong spine at inner margin near basis of the nail (fig. 10E) and 1 plumose seta at outer margin.

Pereopods 5-7 of unequal length (fig. 11A, C, E). Pereopod 5: article 2 slightly longer than broad (ratio: 55: 40), along anterior margin with several spine-like setae, along posterior margin with 6-7 short setae only (fig. 11A), ventroposterior dilatation only marked; articles 4-6 of unequal length (ratio: 35: 35: 42); dactylus slender but short, along inner margin with one spine near basis of the nail, along outer margin with one median plumose seta (fig. 11B), nail shorter than pedestal (ratio: 24: 36).

Pereopod 6: article 2 remarkably longer than broad (ratio: 72: 42), with row of spine like setae along anterior margin and with 6-7 short setae along posterior margin, ventroposterior lobe not distinct (fig. 11C); articles 4-6 of unequal length (ratio: 40: 57: 70), bearing short spines along both margins; dactylus slender, but much shorter than article 6 (ratio: 26: 70), along inner margin with one strong spine near basis of the nail, and one median plumose seta along outer margin (fig. 11D), nail much shorter than pedestal (ratio: 28: 47).

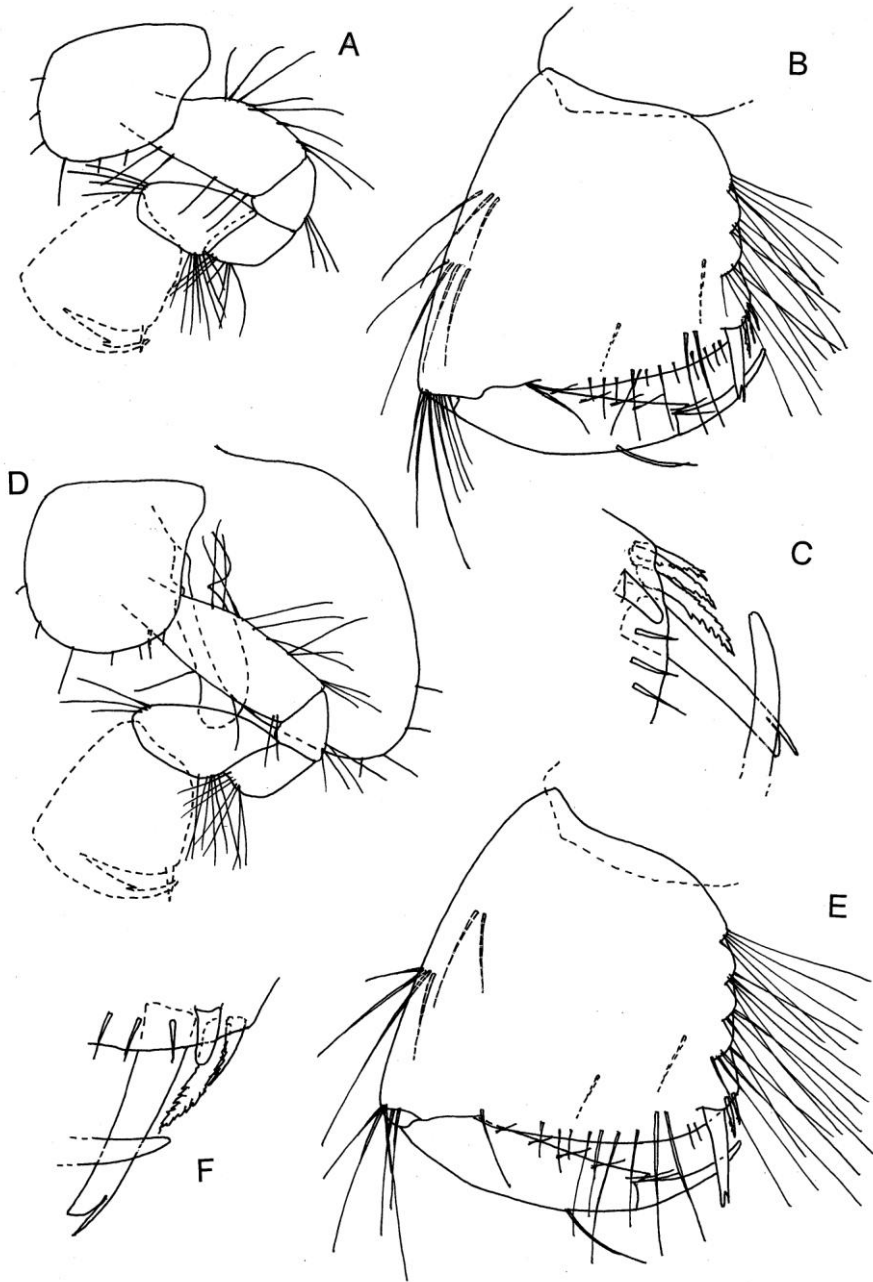


Fig. 9. *Niphargus osogovensis* S. Kar. 1959, Osogovo Mt., female 6.0 mm (lectotype): A-B= gnathopod 1 propodus, outer face; C= corner of gnathopod 1 propodus, inner face; D-E= gnathopod 2 propodus, outer face; F= corner of gnathopod 2 propodus, inner face.

Pereopod 7: article 2 longer than broad (ratio: 80: 50) with visible shallow ventroposterior lobe, along anterior margin are attached several spine-like setae, along convex posterior margin appear nearly 7 short setae (fig. 11E); articles 4-6 of unequal length (ratio: 45: 58: 81); dactylus slender but much shorter than article 6 (ratio: 27: 80), along inner margin with one strong spine, along outer margin with one median plumose seta (fig. 11F).

Pleopods 1-3 usually with 3 retinacula each; peduncle of pleopod 1 with 2 anterior marginal setae (fig. 8G), peduncle of pleopods 2-3 smooth at both margins (fig. 8H, I).

Uropod 1: peduncle with row of strong dorsoexternal spines and row of dorsointernal setae (except distal spine), inner ramus only slightly longer than outer one, with lateral and distal spines (fig. 10G); outer ramus with lateral bunch of setae and distal short spines (fig. 10G).

Uropod 2: inner ramus hardly longer than outer one, both rami with distal 4-5 spines (fig. 10G).

Uropod 3 slender; peduncle longer than broad, with distal spines (fig. 11G); inner ramus scale-like, short, with distal spine; outer ramus 2-articulated: first article along both margins with slender spines, plumose setae absent; second article remarkably shorter than first one (ratio: 41: 105), bearing a bunch of distal setae only (fig. 11G).

Telson relatively short, deeply incised, slightly longer than broad (ratio: 80: 70); each lobe with 3 distal spines; a pair of short unequal plumose setae are attached hardly above the middle of each lobe (fig. 8K).

Coxal gills moderately long (figs. 9D; 10B, D; 11A, C), gills on gnathopod 2 recurved, hardly reaching tip of article 2 (fig. 9D); gills on pereopod 4 reaching ventral tip of article 2 (fig. 10D); coxal gills on pereopods 3, 5, and 6 are shorter.

Oostegites broad, much exceeding distal tip of corresponding article 2 (figs. 9D; 10B) and bearing several setae each.

MALE 6 mm on slide of S. Karaman (paralectotype): Mainly like the females. Epimeral plates 1-3 like these in females; Urosomite 1 probably with 1 seta on each dorsolateral side, urosomite 2 with 1 spine on each dorsolateral side; urosomite 1 ventrally with 1 slender short spine or almost spine-like seta near basis of uropod 1 peduncle (fig. 7D).

Main flagellum of antenna 1 with 17 articles (most of them with 1 aesthetasc reaching 1/2 -2/3 of article itself). Flagellum of antenna 2 with 8 articles.

Mandibles like these in females. Mandibular palpus article 2 shorter than article 3 (ratio: 44: 55); palpus article 2 with 5 setae; palpus article 3 with 5 D-setae, 4 distal long E-setae, on outer face with one bunch of 2 A-setae, on inner face by 2 single B-setae (fig. 7A).

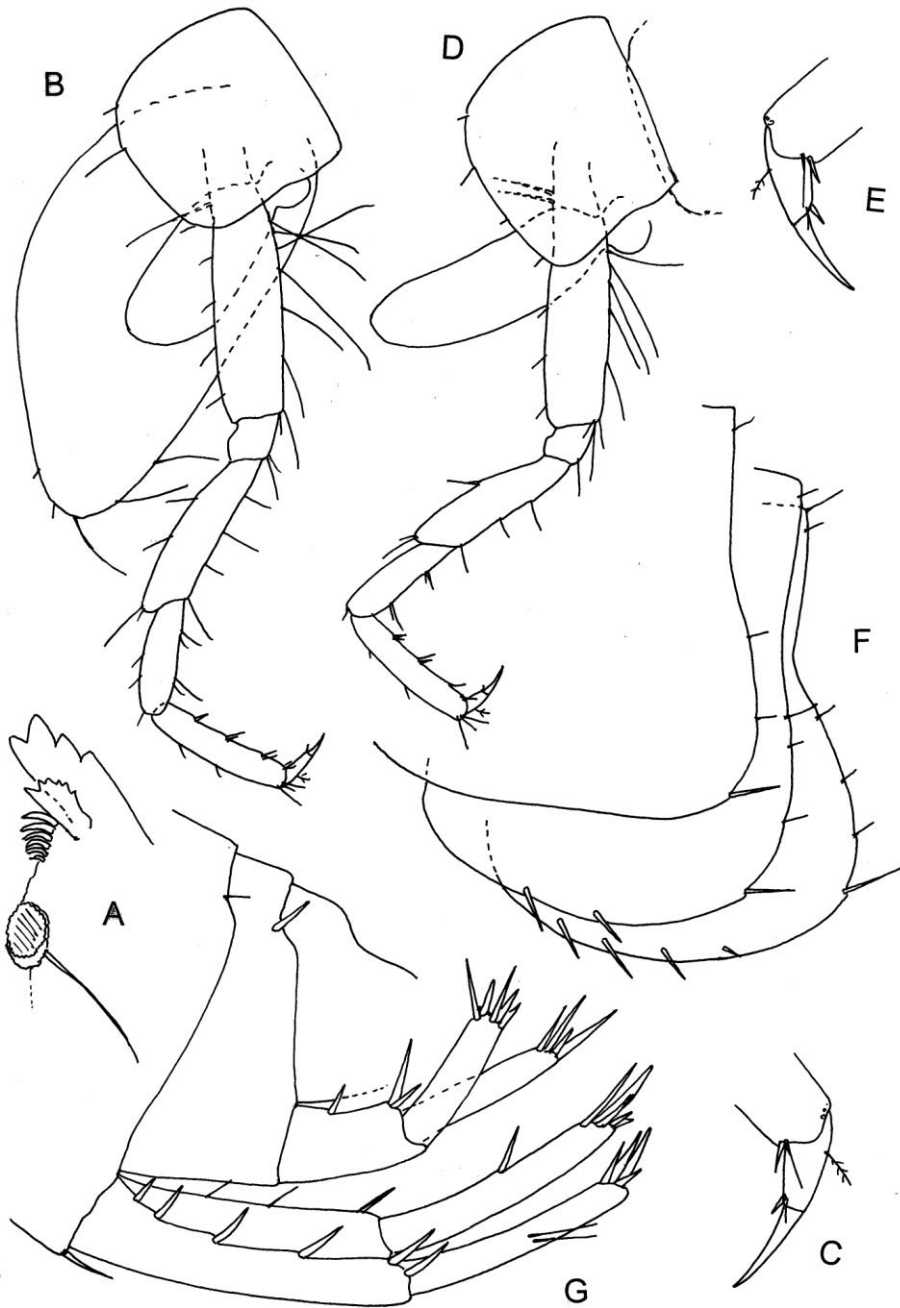


Fig. 10. *Niphargus osogovensis* S. Kar. 1959, Osogovo Mt., female 6.0 mm (lectotype): A= right mandible molar, incisor and lacinia mobilis; B-C= pereopod 3; D-E= pereopod 4; F= epimeral plates 1-3; G= urosome with uropods 1-2.

Maxilla 1: inner plate with 1 seta (fig. 6D); outer plate with 7 spines (5 spines with 1 lateral tooth, one spine is smooth, one spine is several teeth (fig. 6E).

Coxae 1-4 slightly broader than long (=high). Coxa 1 broader than long (ratio: 55: 42) (fig. 6F), with subrounded ventroanterior corner; coxa 2 subrounded but slightly broader than long (ratio: 60: 52) (fig. 6G); coxa 3 slightly broader than long (ratio: 61: 55) (fig. 6H); coxa 4 distinctly broader than long (ratio: 63: 55), without ventroposterior lobe (fig. 6 I).

Gnathopod 1 poorly smaller than gnathopod 2, its article 5 shorter than 6 (ratio: 64: 77). Article 6 trapezoid, hardly longer than broad (ratio: 77: 72), bearing along posterior margin 3 transverse rows of setae (fig. 7B); palm inclined nearly half of propodus length; palm defined on outer face by 1 strong corner S- spine accompanied laterally by 2 slender toothed L- spines and 2 facial M- setae, on inner face with 1 subcorner R- spine.

Gnathopod 2: article 5 shorter than 6 (ratio: 75: 81); article 6 trapezoid, nearly as long as broad; palm inclined nearly 2/5 of propodus-length, corner spines and dactylus like these in females (fig. 7C).

Pereopods 3-7 like these in females. Basipodit of pereopod 7 longer than broad (ratio: 78: 53), with poorly marked ventroposterior dilatation (fig. 7E), dactylus with one spine along inner margin near basis of the nail (fig. 7F), nail much shorter than pedestal (fig. 7F).

Pleopods 1-3 with 4 retinacula each. Peduncle of pleopod 1 with one seta at anterior margin; peduncle of pleopods 2-3 naked.

Uropods 1-3 damaged or missing, and consequently the shape of uropod 1 and uropod 3 in adult males is unknown, except the peduncle of uropod 1 having dorsoexternal row of spines and dorsointernal row of setae (fig. 7D). Based on the shape of uropod 3 in females, probably second article of uropod 3 is elongated.

Telson is longer than broad (ratio: 77: 68), deeply incised, having 4-5 distal spines on each lobes; a pair of short unequal plumose setae is attached near the middle on each lobe (fig. 7G); at opposite face appear 2 facial spines also (probably one aberrant case).

VARIABILITY.

Mandibular palpus article 3 with 5-8 D-setae; telson only exceptionally with spines sitting on opposite face of telson. The juvenile male of 4 mm is with 3 distal spines on each lobe of telson (fig. 7H).

Spines on outer plate of maxilla 1 is poorly variable: 6-1-1-1-0-1-1 to 6-1-2-1-1-0-1 .

Pleopods with 3-4 retinacula each. Palm of article 6 in gnathopod 1 bearing 2-3 slender L- spines sitting near strong corner S- spine.

Lectotype: female 6 mm. Lectotype and paralectotypes are deposited in KARAMAN`S Collection in Podgorica, Crna Gora.

LOC. TYP.: small springs on Osogovo Mt., Macedonia.

LOCALITIES CITED: known only from type-locality.

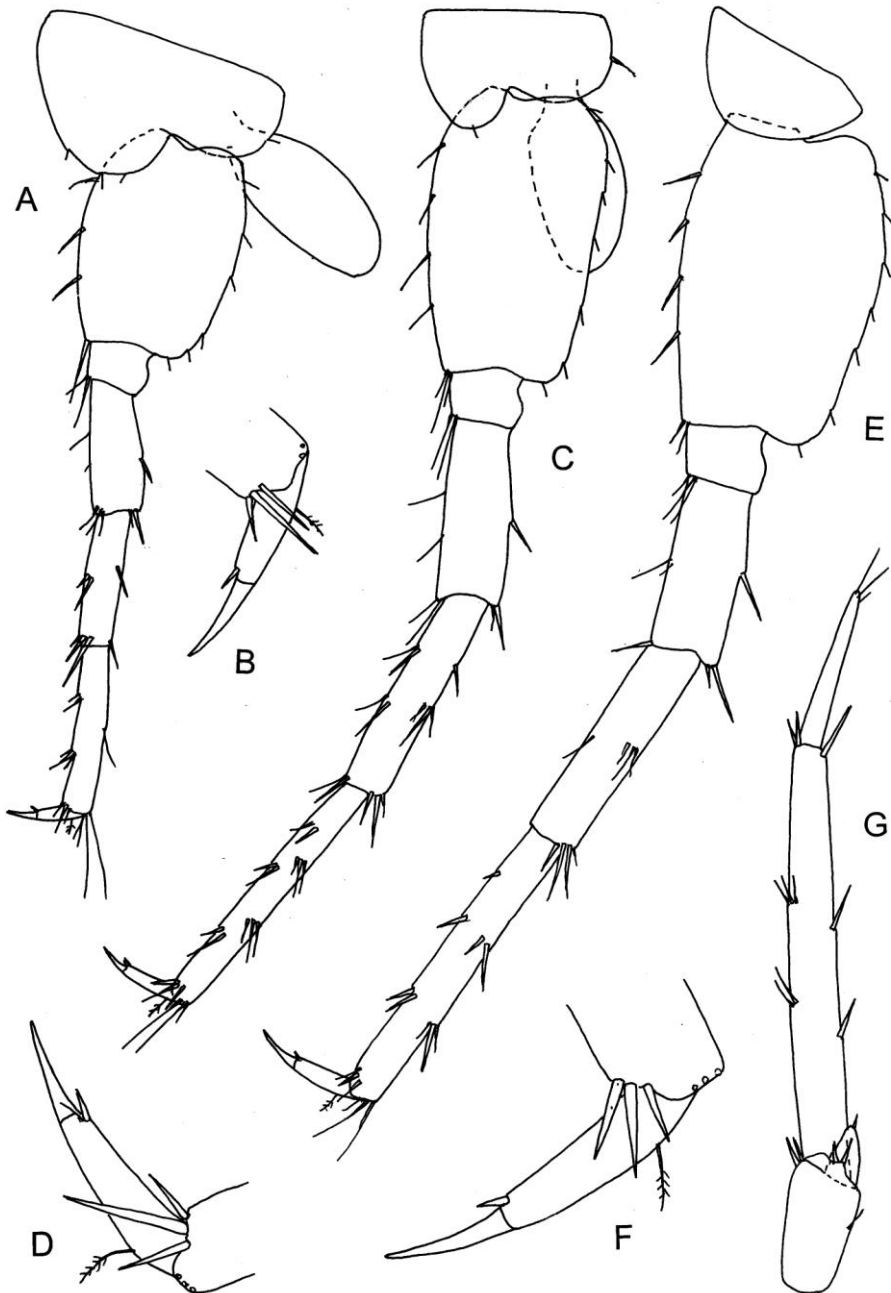


Fig. 11. *Niphargus osogovensis* S. Kar. 1959, Osogovo Mt., female 6.0 mm (lectotype): A-B= pereopod 5; C-D= pereopod 6; E-F= pereopod 7; G= uropod 3.

REMARKS AND AFFINITIES:

Unknown some taxonomical characters of adult males (uropods 1-3, urosomites 1-2, etc) made rather uncertain the taxonomical position of this species. But, based on the shape of the adult females, *N. osogovensis* differs distinctly from many *Niphargus* taxa having subrounded epimeral plates and bearing one outer marginal seta on dactylus of gnathopods 1-2.

N. kragujevensis kragujevensis S. Karaman, 1950 differs from *N. osogovensis* (based on females only) by subequal rami of uropod 1, dactylus of pereopods 3-7 with seta at inner margin, inner plate of maxilliped with 2 spines only, gnathopod 2 of "kochianus" type, etc.

N. kragujevensis remus G. Karaman, 1992, differs from *N. osogovensis* by presence of seta on inner margin of dactylus in pereopods 3-4, by telson with dorsolateral spines, more narrow basipodit of pereopod 7, by inner plate of maxilliped with 2 distal spines only, by uropod 1 with outer ramus hardly longer than inner one, etc.

N. ruffoi G. Karaman, 1976 and *N. forroi* G. Karaman, 1986 differs by 2 retinacula only.

N. carniolicus Sket, 1960 differs by "kochianus type" of gnathopods 1-2, by dactylus of pereopods 3-7 with inner seta, telson with lateral spines, etc.

The species *N. jurinaci* S. Karaman 1950 known from the spring in Crni Lug, Ogulin reg., Croatia, is very similar to *N. osogovensis*, although it differs by various minor known differences: dactylus of pereopods 3-7 bearing 1 seta along inner margin, shorter propodus of gnathopods 1-2 with more oblique palm in females, by more narrow article 2 of pereopods 7 in males (gnathopods 1-2 in males like these of *N. jurinaci*), by peduncle of pleopod 3 with 1-2 posterior median setae, by mandibular palpus article 3 with 9-10 D-setae (4-8 in *osogovensis*), etc. Evidently, further studies on new material and localities of both species will establish the real taxonomical positions of these two taxa.

CONCLUSIONS

The new species *Niphargus orbis*, sp. n. from the subterranean waters of Alpi Ligure in Italy is described. This species was mentioned in previous papers (1993) under the name of the known species *Niphargus rhenorhodanensis* Schellenberg, 1937 from France and Germany. As many species of the genus *Niphargus* from Central and Western Europe are very poorly described and scarcely figured, there is always a possibility that some newly described species can belong to one of the formerly poorly described species.

Niphargus osogovensis S. Karaman, 1959, redescribed here in more detail, seems to be very similar to the species *Niphargus jurinaci* S. Karaman, 1950 from the Ogulin region of Croatia, and further studies based on new material and new samples will show the real taxonomical relations between these two species.

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**NOVI PODACI O RODU *NIPHARGUS* SCHIÖDTE, 1849 (FAMILIJA
NIPHARGIDAE) IZ ITALIJE I MAKEDONIJE
(272. Prilog poznavanju Amphipoda)**

SAŽETAK

U radu su tretirana dva predstavnika roda *Niphargus* Schiödte, 1849 (familija Niphargidae). Vrsta *Niphargus orbis*, sp. n. opisana je i ilustrovana iz podzemnih voda izvora u Rio di Valle, Alpi Ligure u Italiji, ranije citirana (1993) pod imenom *Niphargus rhenorhodanensis* Schellenberg, 1937 iz istog lokaliteta. Analizirane su razlike između obiju vrsta.

Vrsta *Niphargus osogovensis* S. Karaman, 1959 poznata i djelimično opisana iz izvora na Osogovskim planinama u Makedoniji, ponovno je detaljnije opisana i ilustrovana na osnovu tipičnog materijala iz istog lokaliteta. Taksonomski položaj ove vrste unutar roda *Niphargus* je analiziran.

Ključne riječi: Amphipoda, *Niphargus orbis*, *osogovensis*, nova vrsta, taksonomija, Italija, Makedonija, Niphargidae