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**Gordan S. KARAMAN, Biological Institute, Titograd**

# REVISION OF THE NIPHARGUS ORCINUS-GROUP, PART. I. (FAM. NIPHARGIDAE)

## (CONTRIBUTION TO THE KNOWLEDGE OF THE AMPHIPODA 130)*

REVIZIJA NIPHARGUS ORCINUS-GRUPE, I DIO (FAM. NIPHARGIDAE)
(130. PRILOG POZNAVANJU AMPHIPODA)

**Abstract**

The revision of the *Niphargus orcinus* — group of species (Fam. *Niphargidae)* in Yugoslavia is provided and the first part of that study is given here. The following taxons are studied and presented: *Niphargus orcinus* Joseph 1869, *arbiter,* n. sp., *bilecanus* S. Karaman 1953, *croaticus* Jurinac 1887, *hercegovinensis* S. Karaman 1950, *kolombatovici* S. Karaman 1950, *kusceri* S. Karaman 1950, *longiflagellum* S. Karaman 1950, *podgoricensis* S. Karaman 1934, *salonitanus* S. Karaman 1950, *steueri* Schellenberg 1935, *trullipes* Sket 1958, *vjeternicensis* S. Karaman 1932.

*Niphargus croaticus* Jurinac 1887 is newly redescribed and figured, and a new species, *N. arbiter,* n. sp. from Croatia is described (=*N. croaticus* sensu auct.). The subspecies: *hercegovinensis* S. Kar. 1950, *longiflagellum* S. Kar. 1950 and *vjeternicensis* S. Kar. 1932 are removed to the specific rank. The taxons *bilecanus* S. Kar. 1953 and *kusceri* S. Kar. 1950 are removed to the species *N. vjeternicensis* S .Kar., and the taxonomic problems and the validity of these taxons are discussed.

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**Izvod**

Revizija *Niphargus orcinus* — grupe vrsta (fam. *Niphargidae)* podzemnih *Amphipoda* u Jugoslaviji je napravljena i prvi dio te studije je prezentiran ovdje. Slijedeći taksoni su studirani i ovdje prezentirani: *Niphargus orcinus* Joseph 1887, *hercegovinensis* S. Karaman 1950, *kolombatovici* S. Karaman 1950, *kusceri* S. Karaman 1950, *longiflagellum* S. Karaman 1950, *podgoricensis* S. Karaman 1934, *salonitanus* S .Karaman 1950, *steueri* Schellenberg 1935, *trullipes* Sket 1958, *vjeternicensis* S. Karaman 1932.

*Niphargus croaticus* (Jurinac 1887) je ponovo opisan i nacrtan, i opisana je nova vrsta za nauku iz Hrvatske, *Niphargus arbiter,* n. sp. (=*N. croaticus,* sensu auctorum). Podvrste: *hercegovinensis* S. Kar. 1950, *longiflagellum* S. Kar. 1950 i *vjeternicensis* S. Kar. 1932 su podignute u rang vrsta. Taksoni *bilecanus* S. Kar. 1953 i *kusceri* S. Kar. 1950 su prebačeni u vrstu *N. vjeternicensis* S. Kar. i njihove taksonomske odlike i taksonomski status su analizirani.

## INTRODUCTION

During our investigations of the fauna of Amphipoda in Yugoslavia, the study of *Niphargus orcinus*-group (= Sbg. *Orniphargus* S. Kar. 1950) was provided. As this group of species is presented by nuuerous taxons, only the first part of this study is presented here, considering 13 taxons described and figured. The other members of *N. orcinus*-group and the key to the species is presented in the second part (in preparation).

Acknowledgments: I am thankful to prof. Dr. H. E. Gruner from Museum of Natural History in Berlin (GDR), Dr. Nikola Tvrtković from the Museum of Natural History in Zagreb, prof. Dr. Romana Lattinger from the University of Zagreb (Zoological Institute) and to Dr. Christa Deeleman-Reinhold from Ossendrecht (Holland) for the great assistance in the collecting of part of material used in this study.

## NIPHARGUS ORCINUS — group of species (Sbg. Orniphargus S. Kar.)

Among numerous *Niphargus* species in Yugoslavia, one of the most attractive and interesting one is the *Niphargus orcinus*-group of species. This group is consisting of relatively very large specimens, exceeding often 25 mm in lenght, all endemic. Most of them are living in relatively small areas in Yugoslavia, and only several members of this group are known in other countries (Italy, Greece, USSR).

Already Stanko Karaman, known yugoslav scientist, noticed (1950) the common characters of all these taxons, removing all of them to the distinct group, subgenus *Orniphargus* S. Karaman 1950.

The taxons belonging to this group in Yugoslavia are: *arbiter*, n. sp., *bilecanus* S. Karaman 1953, *croaticus* Jurinac 1887, *hercegovinensis* S. Karaman 1950, *kolombatovici* S. Karaman 1950, *kusceri* S. Karaman 1950, *longiflagellum* S. Karaman 1950, *macedonicus* S. Karaman 1929, *orcinus* Joseph 1869, *pachytelson* Sket 1960, *pellagonicus* S. Karaman 1943, *podgoricensis* S. Karaman 1934, *redenseki* Sket 1959, *rejici* Sket 1958, *salonitanus* S. Karaman 1950, *stenopus* Sket 1960, *steuri* Schellenberg 1935, *subtypicus* Sket 1960, *trullipes* Sket 1958, *vjeternicensis* S. Karaman 1932.

As there are known over 160 taxons within the genus *Niphargus*, several subgenera were created by some authors: *Phaenogammarus* Dudich 1941, *Stygoniphargus* S. Karaman 1950, *Supraniphargus* S. Karaman 1950, *Jovaniphargus* S. Karaman 1960, *Stygodytes* Absolon 1927 and *Protoniphargopsis* Sket 1957.

But, each of these subgenera was created for certain group of species provided with common characters, without taking in consideration all other species of this genus and their characteristics. For this reason, some of these subgenera are not well defined from other subgenera and species: there are several subgenera on the one side, and all other mass of species outside of subgenera, on the other side. Well definition and valuation of subgenera should be possible only when all species of genus *Niphargus* will be removed to the different distinct subgenera.

*Niphargus orcinus*-group of species is one natural well defined group collected under the name of Subgenus *Orniphargus* S. Karaman 1950, with the following diagnosis: Body stout, large, up to 30 mm long, often spiniferous along dorsoposterior margin of metasomsegments; gnathopods relatively large, with dactyl bearing a row of setae along outer margin. Antenna 1 often with more than one aesthetacsc on flagellar segments, coxae moderate, uropods 1—3 undifferenziated in males, mouthparts, pereopods, telson and epimere normal. Males similar to females or hardly different.

Type-species: *Niphargus orcinus* Joseph 1869.

Description: Rostrum absent, antennae normal, flagellar segments of antenna 1 with one or several aesthetascs each. Peduncular segments of antenna 1 of various lenght, never shield-shaped. Mouthparts normal Gnathopods 1—2 with elevated number of slender corner spines near or behind main corner long spine, dactyl of gnathopods with a row of setae at outer margin. Mesosomsegments smoth, metasomsegments 1—3 usually with spines or numerous setae at dorsoposterior margin, urosomites with elevated number of spines, urosomite 3 often smooth. Epimeral plates normal to rather produced, pleopods with 2 or more retinacula each. Flagellum of antenna 2 short to long. Dactyl of pereopods 3—7 normal, rarely with elevated number of spines at inner margin or elevated number of plumose setae at outer margin.

Uropods 1—3 similar in males and females, undifferenziated, telson with short or long lateral plumose setae. Oostegyts broad, coxal gills occur on thoracal segments 2—6.

## NIPHARGUS ORCINUS
Joseph 1869 (1882)

fig.: I—IV

*Niphargus orcinus* Joseph 1869:52; Joseph 1881:34(262); Joseph 1882:7(61); Carausu, Dobreanu, Manolache 1955:298, fig. 277.

*Niphargus orcinus orcinus* S. Karaman 1932:210, fig. 17, 18a; Schellenberg 1935:211; S. Karaman 1972:5; S. Karaman 1974:21.

*Orniphargus orcinus orcinus* S. Karaman 1950a:122, fig. 1—13; S. Karaman 1950b:140.

Description: Female ovig. 25 mm: Body stout, mesosomsegments smooth, metasomsegments 1—3 each with a row of 5—10 spines and up to 13 setae along dorsoposterior margin (fig. I, 5). Urosomites 1—2 each with 2—4 spines on each dorsolateral side, urosomite 3 smooth (fig. I, 8).

Rostrum short, lateral cephalic lobes subrounded (fig. I, 1). Antenna 1 slightly shorter than body (18:25), peduncular segments

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Fig. I. *Niphargus orcinus* Jos., Križna jama, female 25 mm: 1= head; 2—3= antenna 1; 4=antenna 2; 5=metasomsegment 3; 6=maxilla 1; 7=maxilliped; 8= urosome with uropods 1—2; 9=mandibular palp.

Sl. I. *Niphargus orcinus* Jos., Križna jama, ženka 25 mm: 1=glava; 2—3= antena 1; 4=antena 2; 5=metazomalni segment 3; 6=maksila 1; 7=maksiliped; 8=urozom sa uropodima 1—2; 9=mandibularni palp.

Fig. II. *Niphargus orcinus* Jos., Križna jama, female 25 mm: 1—3=gnathopod 1; 4—6=gnathopod 2.

Sl. II. *Niphargus orcinus* Jos., Križna jama, ženka 25 mm: 1—3=gnatopod 1; 4—6=gnatopod 2.

Fig. III. *Niphargus orcinus* Jos., Križna jama, female 25 mm: 1=labium; 2=maxilla 2; 3—4=pereopod 3; 5=coxa 4; 6=dactyl of pereopod 4; 7—8= pereopod 5; 9=uropod 3.

Sl. III. *Niphargus orcinus* Jos., Križna jama, ženka 25 mm: 1=labium; 2= maksila 2; 3—4=pereopod 3; 5=koksa 4; 6=daktil pereopoda 4; 7—8=pereopod 5; 9=uropod 3.

Fig. IV. *Niphargus orcinus* Jos., Križna jama, female 25 mm: 1—2=pereopod 6; 3—4=pereopod 7; 5=epimeral plates 1—3; 6=telson.

Sl. IV. *Niphargus orcinus* Jos., Križna jama, ženka 25 mm: 1—2=pereopod 6; 3—4=pereopod 7; 5=epimere 1—3; 6=telzon.

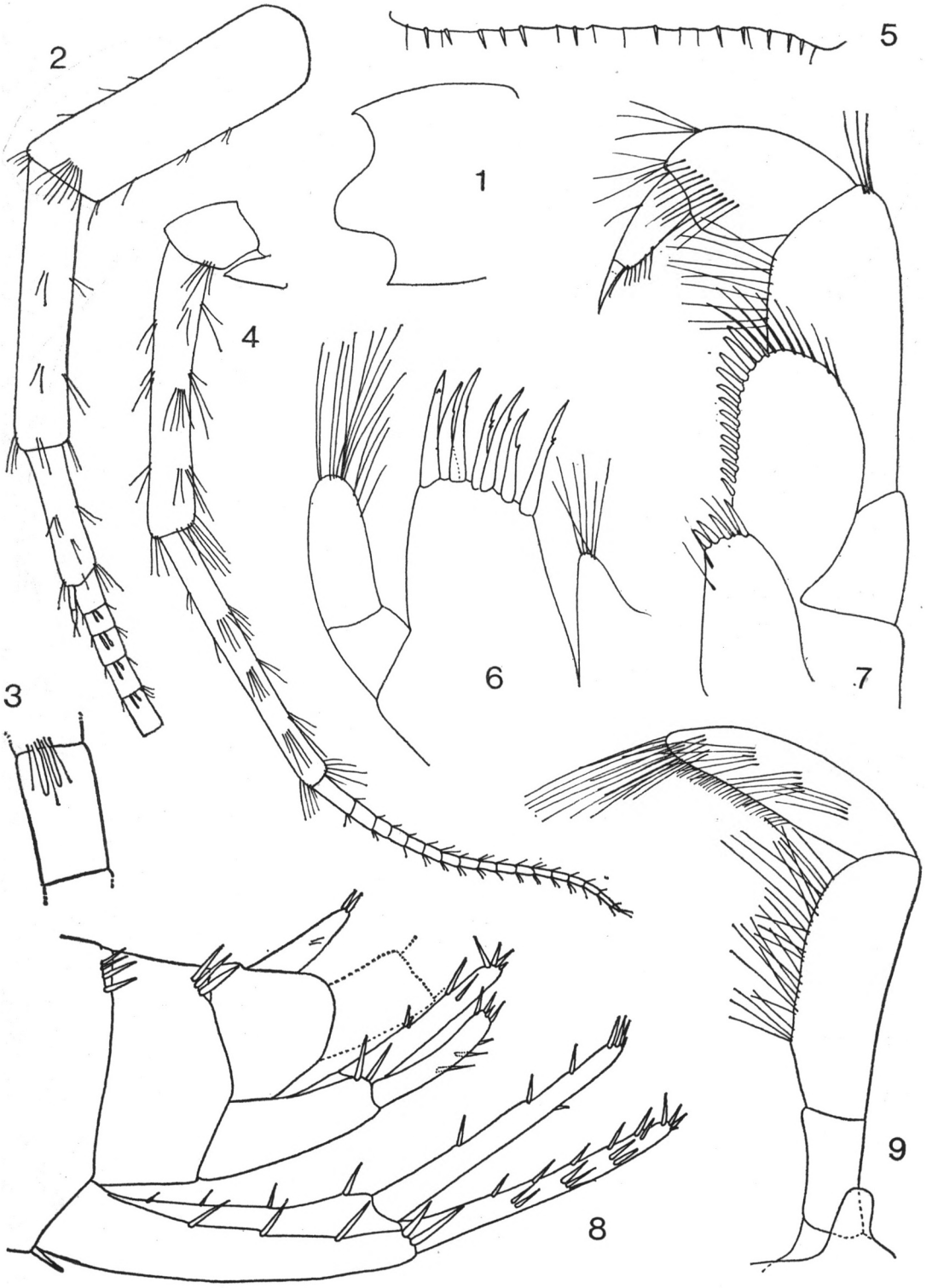


Fig. I.

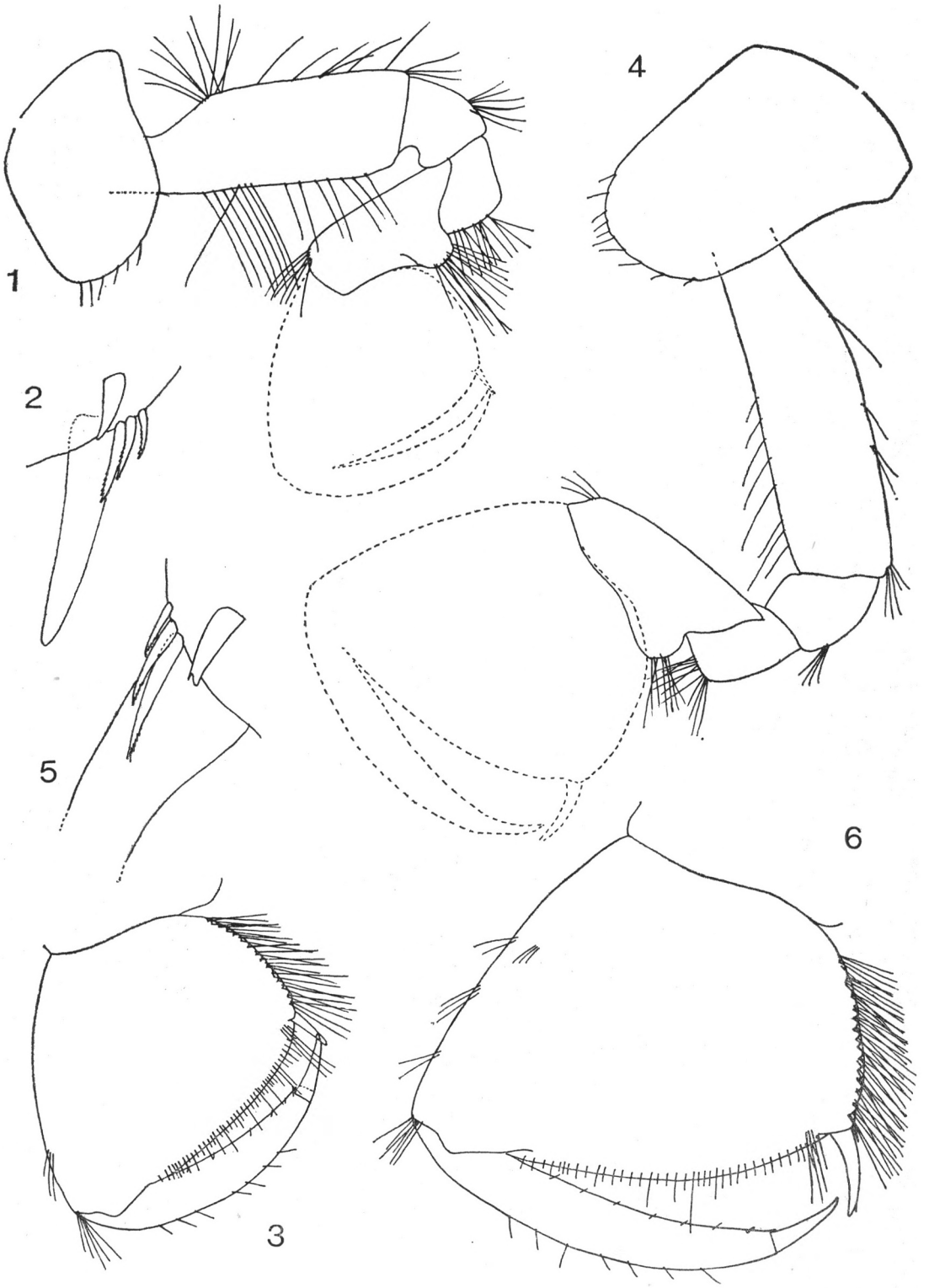


Fig. II.

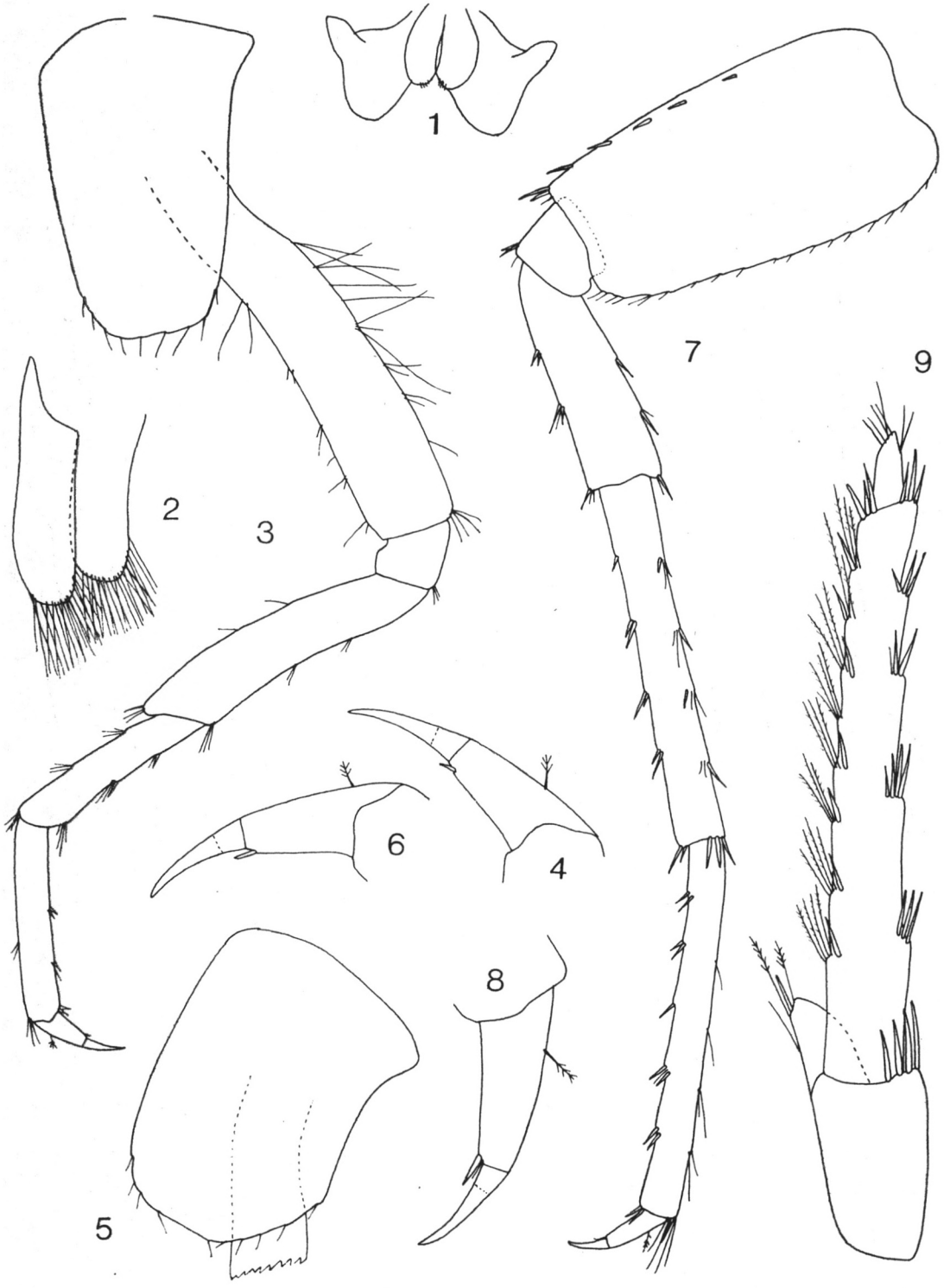


Fig. III.

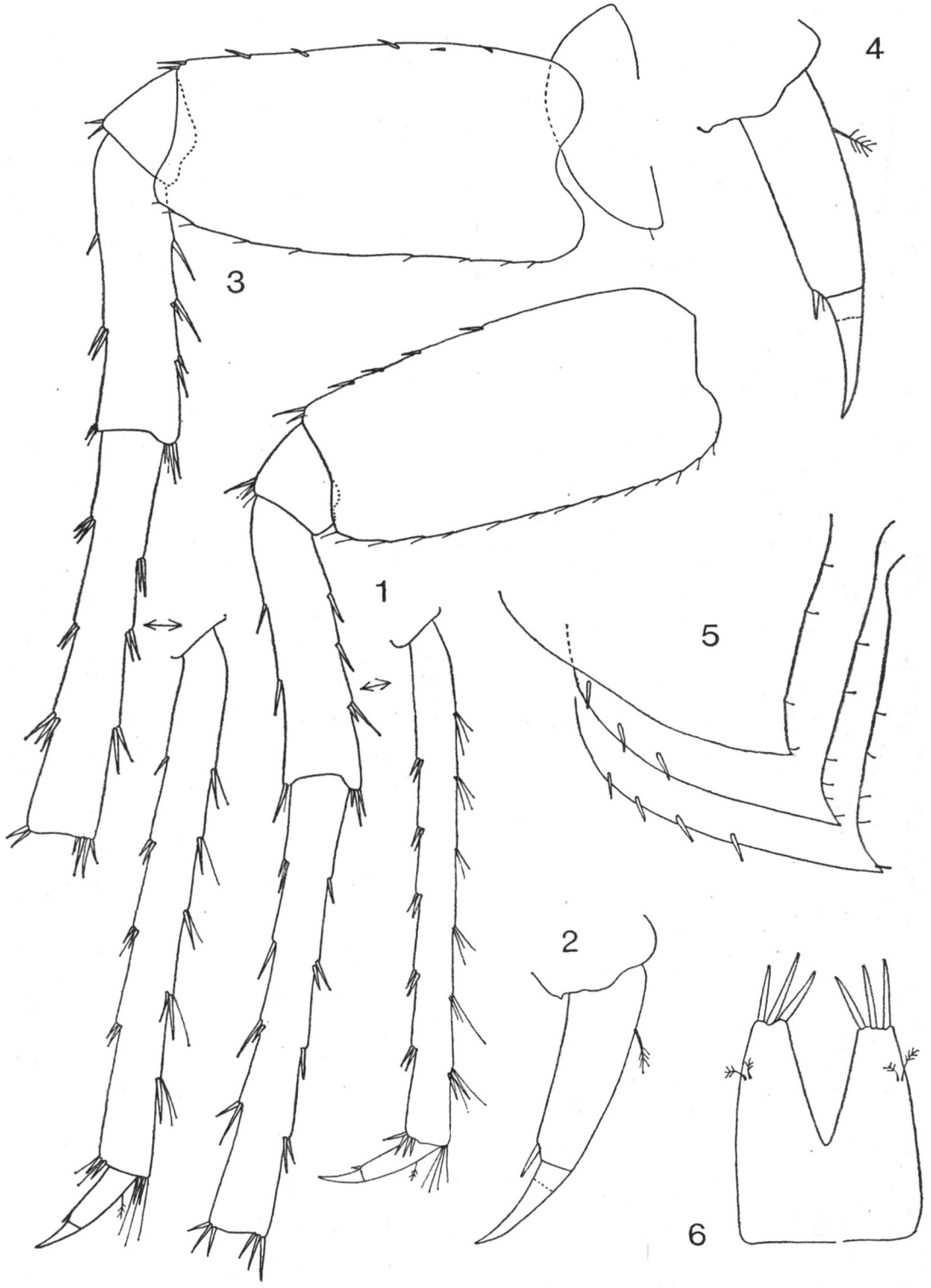


Fig. IV.

1—2 subequal long, segment 3 reaching or slightly exceeding half of ped. segment 2 (fig. I, 2); main flagellum with up to 50 articles bearing usually 2 short aesthetascs each (fig. I, 3), accessory flagellum short, 2 — segmented.

Antenna 2: peduncular segments 4—5 nearly subequal long (fig. I, 4), flagellum slender, up to 17-articulate, slightly exceeding the lenght of ped. article 5. Antennal gland cone short.

Labrum entire, convex to straight at anterior margin, labium with well developed inner lobes (fig. III, 1). Maxilla 1: inner plate with up to 6 setae, outer plate with 7 spines (6 spines bearing 1 lateral tooth, one spine with 2 teeth), palp with up to 15 distal setae (fig. I, 6). Maxilla 2: both plates with distal setae only (fig. III, 2).

Maxilliped: inner plate with 4 distal spines, outer plate reaching nearly half of second palp segment, palp article 4 with a row of setae along inferior margin (fig. I, 7).

Mandible: palp article 2 with up to 30 setae, palp article 3 with 1 group of A-setae, 4—5 groups of B-setae, up to 30 D-setae and up to 10 E-setae (fig. I, 9).

Coxae moderate, coxa 1 with subrounded ventroanterior corner (fig. II, 1) coxa 4 practically unlobed (fig. III, 5), all with short setae at ventral margin (fig. II, 1, 4; III, 3, 5), coxa 5 distinctly shorter than 4.

Gnathopods 1—2 relatively large, their segment 6 is remarkably larger than respective coxae, gnathopod 2 remarkably larger than 1.

Gnathopod 1: segment 5 with distinct median bulbe at posterior margin; segment 6 as long as broad, with numerous groups of setae at posterior margin (fig. II, 1, 3), palm inclinated 3/5 of propodus-lenght, defined by one strong corner spine accompanied laterally by 3 slender serrate spines (fig. II, 2) on outer margin and by 1 short subcorner spine on inner face. Dactyl with a row of 7—9 single setae at outer margin.

Gnathopod 2: articles 5 and 7 like these in gnathopod 1. Article 6 hardly broader than long, its palm inclinated 3/5 to 2/3 of propodus-lenght (fig. II, 4—6), defined by 1 strong corner spine accompanied laterally by 3 slender serrate spines often sitting partially behind strong corner spine (fig. II, 5).

Pereopods 3—4 slender and long, with dactyl reaching half of article 6, nail is slightly shorter than the remaining part of dactyl (fig. III, 3, 4, 6).

Pereopods 5—7 slender and long, pereopod 7 much exceeding posterior tip of uropods. Article 2 (basis) of pereopods 5—7 slightly less than twice longer than broad, linear, with short ventroposterior lobe increasing toward pereopod 7 (fig. III, 7, 8; IV, 1—4). Dactyl of pereopods 5—7 short, bearing one seta at outer margin.

Pleopods 1—3 each with 2 retinacula. Epimeral plates 1—3 sharply pointed and produced (fig. IV, 5). Rami of uropod 1 subequal, bearing spines along margins and tip, setae absent.

Uropod 2: inner ramus is distinctly longer than outer one, outer ramus is recurved; both rami with spines only (fig. I, 8). Uropod 3 relatively short and strong, second segment short, first segment of outer ramus with bunches of, plumose setae at inner margin (fig. III, 9).

Telson slightly longer than broad, incised more than half of its length (fig. IV, 6), each lobe with 3 distal spines and a pair of short lateral plumose setae. Oostegyts broad.

Males almost similar to the females, with short uropod 3 and undifferenziated uropods 1—2.

Variability: Corner spine on gnathopods 1—2 can be longer or shorter; three slender toothed spines on palm of gnathopod 2 are attached laterally or partially behind corner spine, these on gnathopod 1 always laterally. The number of spines and setae on metasomsegments and urosome is rather variable.

The stable characters are the absence of lateral and dorsal spines on telson, shape of articles of antenna 1, lenght of flagellum of antenna 2, absence of spines on urosomite 3 etc.

Material examined: Slovenia: Križna jama-cave, E. of Postojna, several samples.

Localities cited: Križna jama; Podpeška jama; Zijavnica; (S. Karaman 1932, 1950), Mrzla jama-cave (Joseph 1869, 1882).

Loc. typ.: Križna jama-cave.

## NIPHARGUS LONGIFLAGELLUM

S. Karaman 1950 (new rank)

fig.: V, VI, VII 1—6

*Orniphargus orcinus longiflagellum* S. Karaman 1950:131, fig. 47—51.

*Niphargus orcinus longiflagellum* G. Karaman 1972:5; G. Karaman 1974:21.

Description: Females up to 19 mm, males 12 mm. Body stout, metasomsegment 1 with setae, metasomsegments 2—3 each with several spines intermixed with setae. Urosomites 1—2 each with 3—4 spines on each side, urosomite 3 smooth (fig. V, 5).

Antenna 1 reaching 2/3 to 3/4 of body, peduncular segments 1—3 progressively shorter, althought ped. segment 2 is only hardly

shorter than segment 1; ped. segment 3 relatively long, exceeding 2/3 of peduncular segment 2 (fig. VII, 1); main flagellum up to 45-articulate (female 19 mm), flagellar articles with 1 aesthetasc each. Accessory flagellum relatively long, 2-articulate, reaching or exceeding half of ped. segment 3 (fig. VII, 1, 2, 6).

Antenna 2 slender, moderately setose (fig. VII, 4), ped. article 4 hardly shorter than 5; flagellum slender, reaching or exceeding the length of ped. article 5, consisting of up to 14 articles.

Mouthparts normal. Maxilla 1: inner plate with 4 setae, outer plate with 7 spines (6 spines with 1 lateral tooth, one spine with 3 teeth), palp with up to 9 setae (fig. VII, 3). Maxilliped: inner plate with 4+1 spines, outer plate reaching half of palp article 2; palp article 4 without medial setae at inner margin (fig. VI, 9).

Mandible: palp article 2 with up to 13 setae, article 3 with 32—36 D-setae, 5—6 E-setae, 1 group of A-setae on outer face and 5 groups of B-setae on inner face (fig. VII, 5).

Coxae relatively long, longer than broad (fig. V, 1, 3); gnathopods 1—2 moderate, gnathopod 2 slightly larger than 1.

Gnathopod 1: segment 6 hardly broader than long, quadrate, palm poorly inclinated, defined by 1 strong corner spine accompanied by 5 slender toothed spines attached laterally (fig. V, 3—4) and one short subcorner spine. Dactyl reaching the width of segment 6, bearing a row of single setae on outer margin (fig. V, 3).

Gnathopod 2: segment 6 quadrate, slightly broader than long (fig. V, 1, 6), palm poorly inclinated, defined by 1 strong corner spine accompanied laterally by 4 slender toothed spines (fig. V, 1—2) and by one short subcorner spine; dactyl reaching the width of segment 6, with a row of setae on outer margin.

Pereopods 3—4 normal, dactyls short (fig. VI, 6—7) with long nail bearing one seta on inner margin.

Pereopods 5—7 relatively stout, their segment 2 large, ovoid, poorly crenelated at posterior margin and with remarkably convex anterior margin, ventroposterior lobe well developed (fig. VI, 1, 3, 4, 11); dactyls short, with nail shorter than the remaining part of dactyl, bearing 1 plumose seta on outer margin and 0—1 seta on inner margin (fig. VI, 2, 5). Pleopods with 2 retinacula each. Epimeral plates 1—3 poorly to moderately pointed (fig. VI, 8).

Uropod 1: rami subequal, without plumose setae (fig. V, 5). Uropod 2: inner ramus remarkably longer than outer one, both without plumose setae. Uropod 3 moderate, like that in *N. salonitanus* or *N. arbiter*.

Telson nearly as long as broad, deeply incised (fig. VI, 10, 12), each lobe with 3 distal spines and 0—1 dorsal spine, a pair of short plumose setae occurs in the middle of each lobe.

Oostegyts broad, coxal gills occur on thoracal segments 2—6.

Male: uropods 1—3 like these in females.

Variability: the number of spines and setae on metasom-segments is variable.

The specimens from Dacarica cave are similar to these from Podpeč-cave.

Material examined: Slovenia: Podpeška jama-cave, Oct. 2, 1927, one spec.;-ibid., Dec. 24, 1926, holotype and paratypes; — cave Dacarica, August 30, 1927, one spec. accompanied by *Niphargus* sp. *(N. stygius gr.)*.

Localities cited: Podpeška jama-cave; Dacarica cave (S. Karaman 1950).

Holotype: female 19 mm. Holotype and paratypes are deposited in Karaman's collection in Titograd.

Remarks: *Niphargus longiflagellum* remarkably differs from other members of this group by shape of gnathopods, segment 2 of pereopods 5—7, etc.

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Fig. V. *Niphargus longiflagellum* S. Kar., Podpeška jama, male 12 mm: 1—2=gnathopod 2; 3—4=gnathopod 1; 5=urosome with uropods 1—2; 6=gnathopod 2, female 19 mm.

Sl. V. *Niphargus longiflagellum* S. Kar., Podpeška jama, mužjak 12 mm: 1—2=gnatopod 2; 3—4=gnatopod 1; 5=urozom sa uropodima 1—2; 6=gnatopod 2, ženka 19 mm.

Fig. VI. *Niphargus longiflagellum* S. Kar., Podpeška jama, male 12 mm: 1—2=pereopod 7; 3=pereopod 6; 4—5=pereopod 5; 6=dactyl of pereopod 4; 7=dactyl of pereopod 3; 8=epimeral plates 1—3; 9=dactyl of maxilliped palp; 10=telson; 11=pereopod 7, female 19 mm; 12=telson, female 19 mm.

Sl. VI. *Niphargus longiflagellum* S. Kar., Podpeška jama, mužjak 12 mm: 1—2=pereopod 7; 3=pereopod 6; 4—5=pereopod 5; 6—7=daktil pereopoda 4 i 3; 8=epimere 1—3; 9=daktil palpa maksilipeda; 10=telzon; 11=pereopod 7, ženka 19 mm; 12=telzon, ženka 19 mm.

Fig. VII. *Niphargus longiflagellum* S. Kar., Podpeška jama, male 12 mm: 1—2=antenna 1; 3=maxilla 1; 4=antenna 2; 5=mandibular palp; 6=antenna 1, female 19 mm.

*Niphargus salonitanus* S. Kar., Solin, female 18 mm: 7=dactyl of maxilliped palp; 8=maxilla 1; 9=telson; 10=telson, female 12 mm from Čapljina.

Sl. VII. *Niphargus longiflagellum* S. Kar., Podpeška jama, mužjak 12 mm: 1—2=antena 1; 3=maksila 1; 4=antena 2; 5=mandibularni palp; 6=antena 1, ženka 19 mm; *Niphargus salonitanus* S. Kar., ženka 18 mm: 7=daktil palpa maksilipeda; 8=maksila 1; 9=telzon; 10=telzon, ženka 12 mm iz Čapljine.

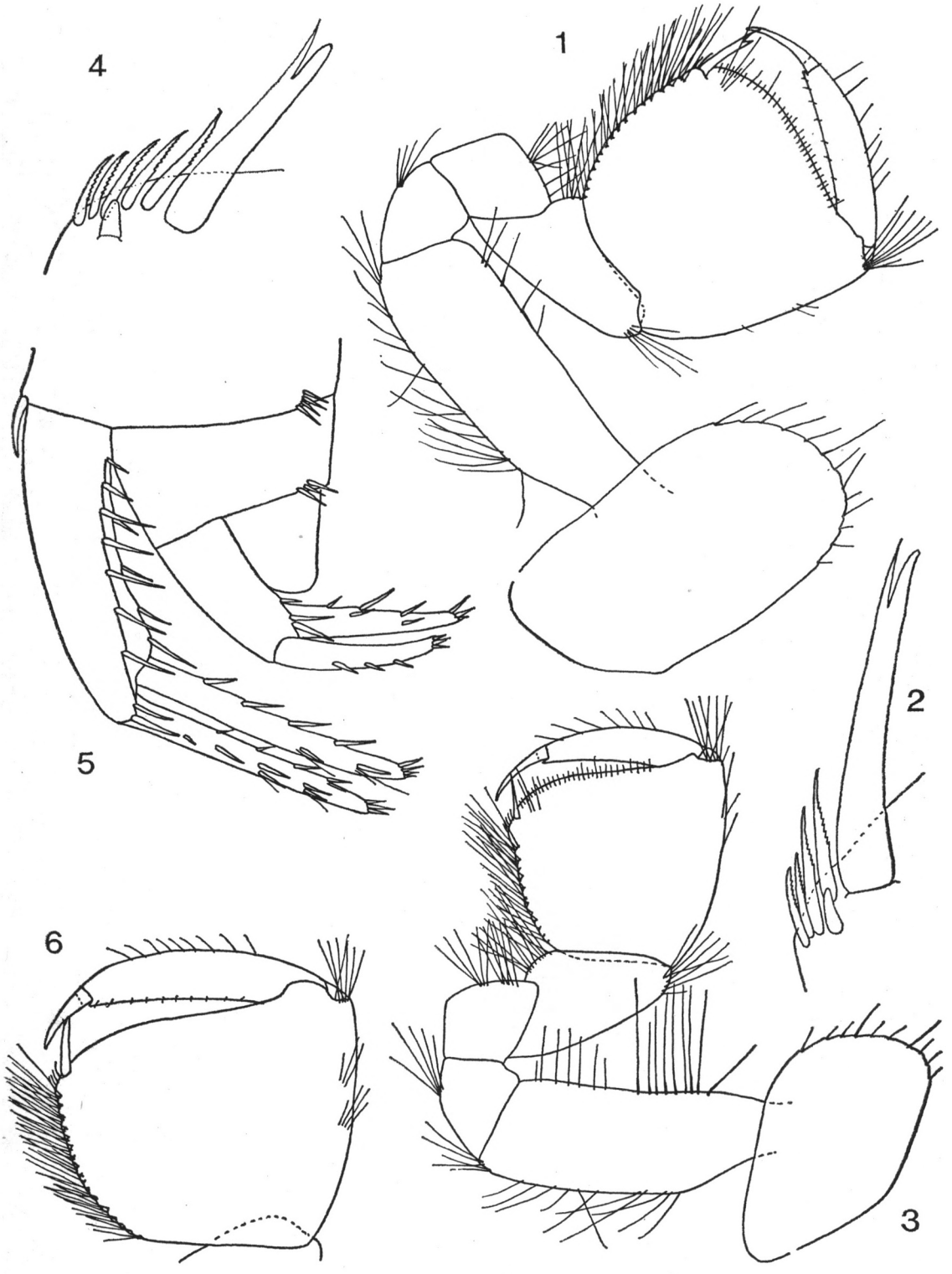


Fig. V.

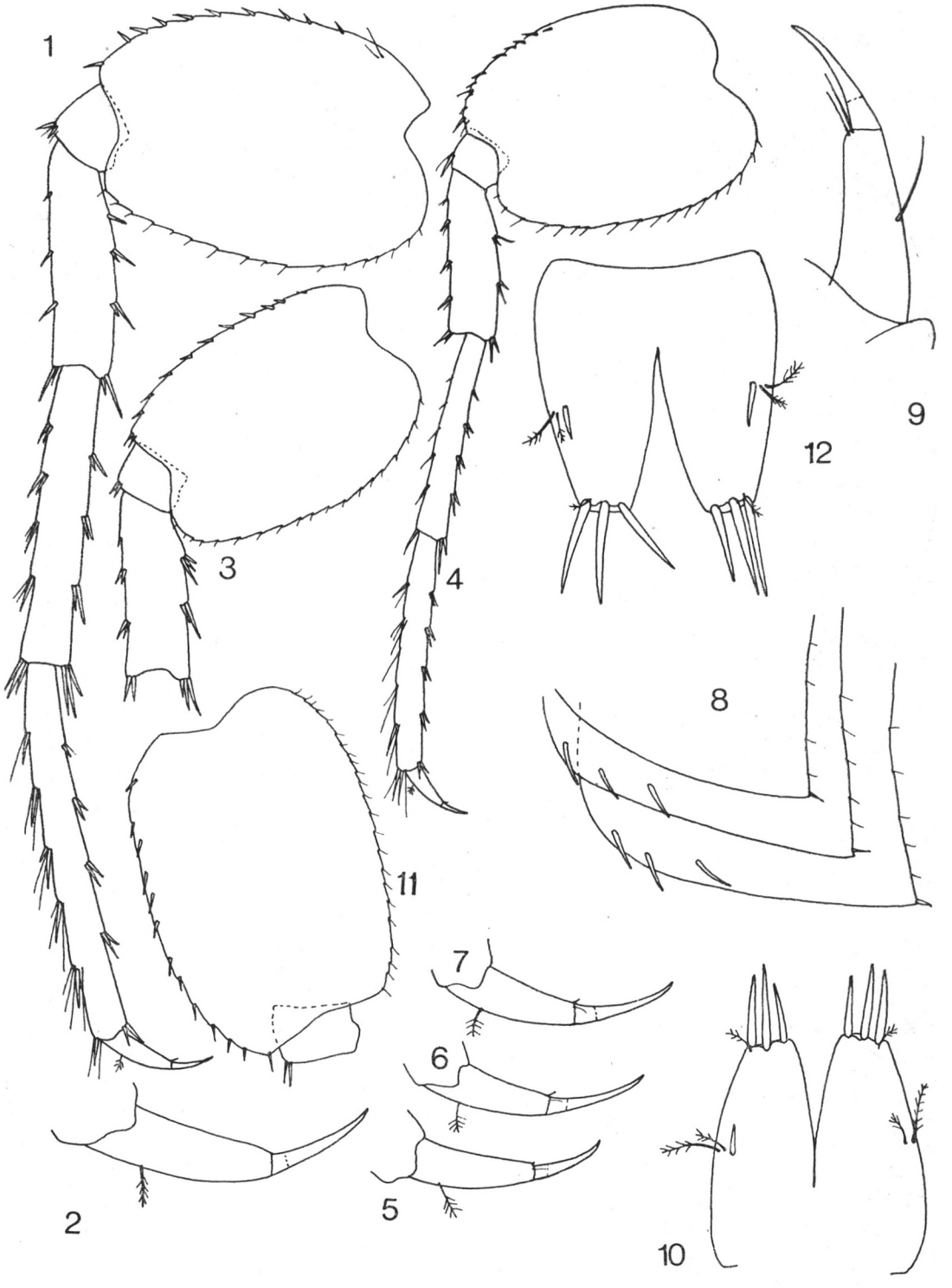


Fig. VI.

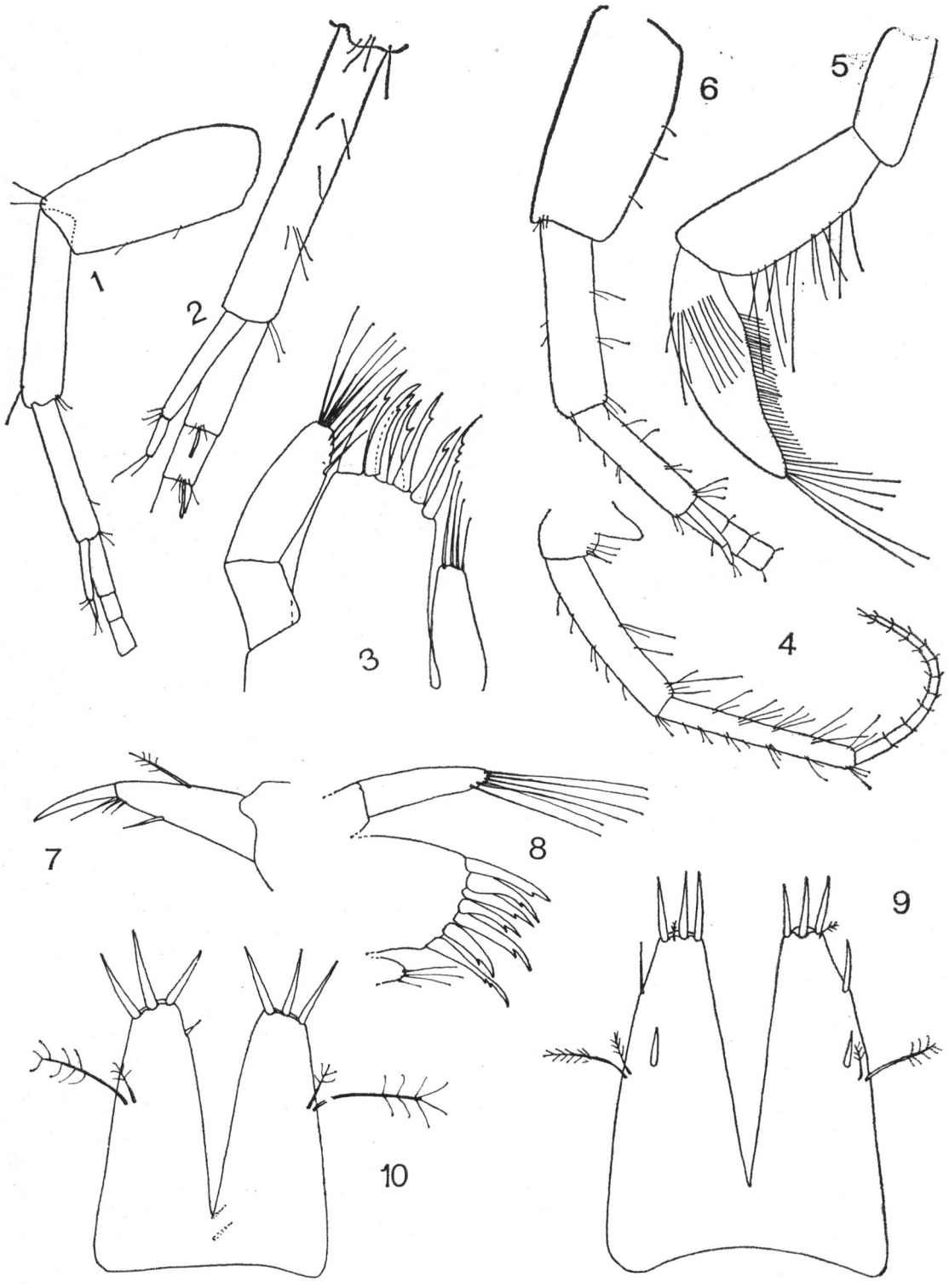


Fig. VII.

## NIPHARGUS SALONITANUS

S. Karaman 1950

fig.: VII 7—9; VIII, IX

*Orniphargus salonitanus* S. Karaman 1950b:137, fig. 62—72; S. Karaman 1953:143, fig. 144.

*Niphargus salonitanus* G. Karaman 1972:6; G. Karaman 1974:24.

Description: Female 18 mm ovig,: Body stout, metasom-segments 1—3 each with a row of dorsoposterior marginal setae, rather accompanied by spines (10—15 setae on each segment), urosomites 1—2 each with 3—5 spines on each side, urosomite 3 smooth (fig. IX, 12).

Head like that in *N. orcinus*. Antenna 1 reaching up to 2/3 of body, peduncular segments 1—3 slender, ped. segment 2 as long as or hardly shorter then segment 1 (fig. VIII, 3), peduncular segment 3 long, reaching almost 2/3 of segment 2 (fig. VIII, 3); main flagellum consisting of up to 45 segments, each segment with 1, rarely 2 aesthetascs. Accessory flagellum short, 2-segmented (fig. VIII, 3).

Antenna 2 slender, peduncular segments 4—5 nearly subequal (fig. VIII, 4), flagellum slender, reaching the lenght of ped. segment 5, consisting of up to 15 articles; antennal gland cone short.

Mouthparts normal. Maxilla 1: inner plate with 4 setae, outer plate with 7 spines: 6 spines each with one lateral tooth, inner spine (1) with 2 lateral teeth (fig. VII, 8), palp with 6 distal setae.

Maxilliped: inner plate with 4+1 spine, outer plate reaching or hardly exceeding half of palp article 2; palp article 4 with nail shorter than the remaining part of article (fig. VII, 7), bearing

Fig. VIII. *Niphargus salonitanus* S. Kar., Solin, female 18 mm: 1=uropod 3; 2=mandibular palp; 3=antenna 1; 4=antenna 2; 5—6=gnathopod 1; 7—8=gnathopod 2; 9—10=corner spines of gnathopods 1—2, female 12 mm from Čapljina.

Sl. VIII. *Niphargus salonitanus* S. Kar., Solin, ženka 18 mm: 1=uropod 3; 2=mandibularni palp; 3=antena 1; 4=antena 2; 5—6=gnatopod 1; 7—8=gnatopod 2; 9—10=ugaoni trnovi gnatopoda 1 i 2, ženka 12 mm iz Čapljine.

Fig. IX. *Niphargus salonitanus* S. Kar., Solin, female 18 mm: 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7—8= dactyl and coxa of pereopod 3; 9—10=dactyl and coxa of pereopod 4; 11=epimeral plates 1—3; 12=urosome with uropods 1—2.

Sl. IX. *Niphargus salonitanus* S. Kar., Solin, ženka 18 mm: 1—2=pereopod 7; 3—4 pereopod 6; 5—6=pereopod 5; 7—8=daktil i koksa pereopoda 3; 9—10=daktil i koksa pereopoda 4; 11=epimere 1—3; 12=urozom sa uropodima 1—2.

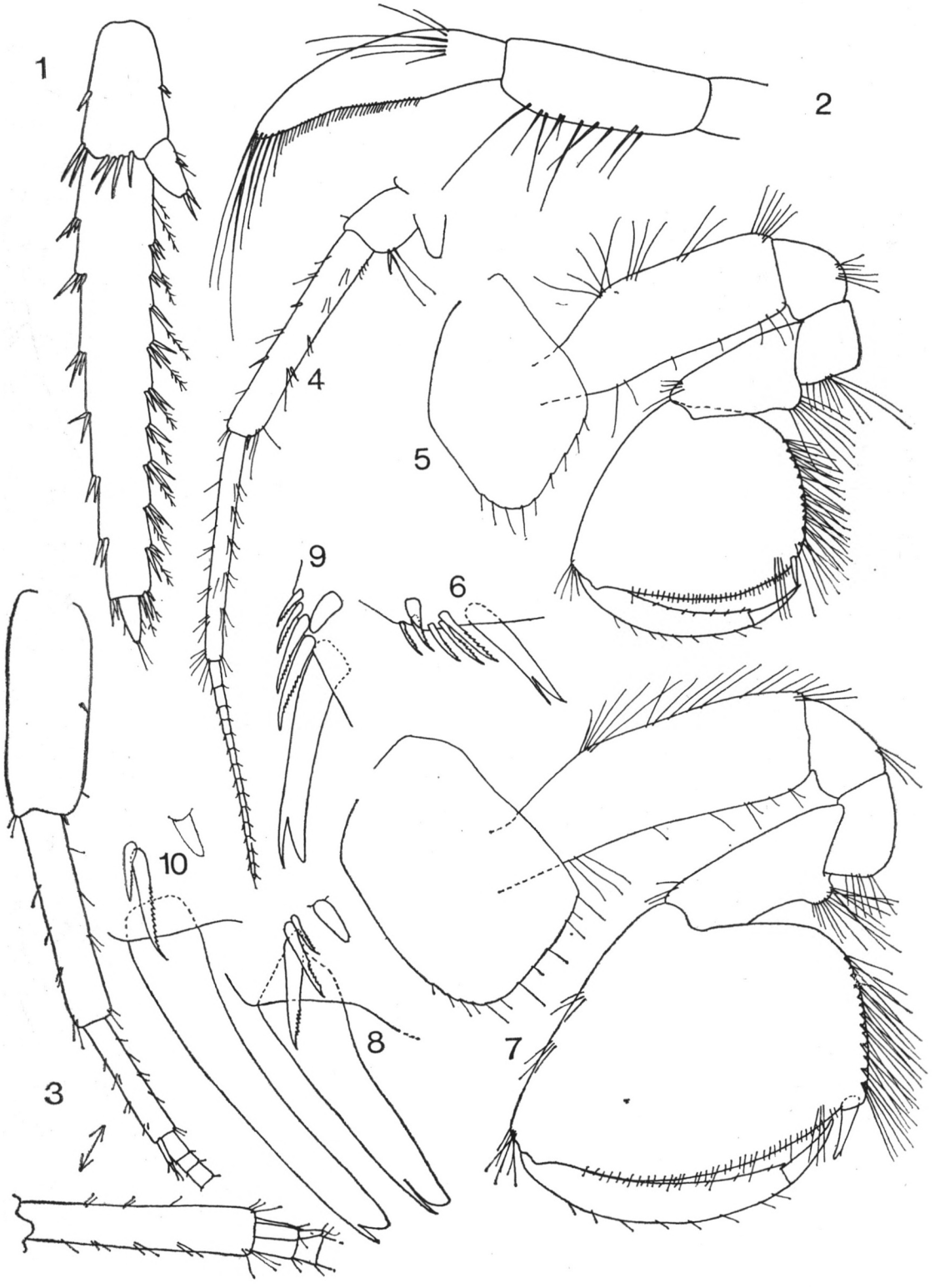


Fig. VIII.

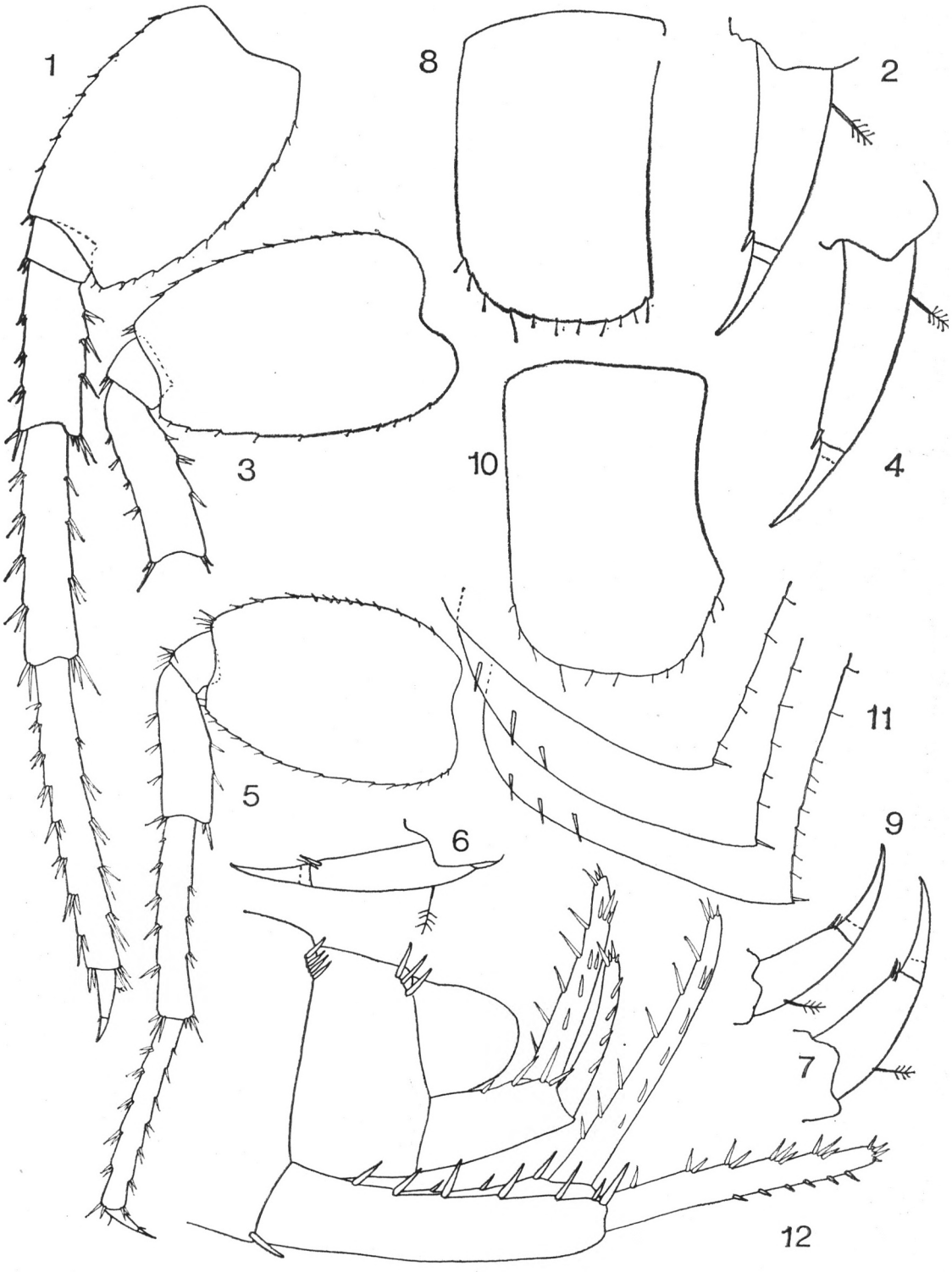


Fig. IX.

at inner margin one medial seta and one plumose seta on outer margin.

Mandible: palp article 2 with up to 11 setae (fig. VIII, 2), article 3 with one group of A-setae, 5—6 groups of B-setae, up to 40 D-setae and 7—9 E-setae.

Coxae 2—4 distinctly longer than broad; coxa 1 nearly as long as broad (fig. VIII, 5, 7; IX, 8, 10), subrounded anteroventrally.

Gnathopods 1—2 large, gnathopod 2 remarkably larger than 1. Gnathopod 1: Segment 6 hardly broader than long, trapezoid, palm inclinated up to half of segment 6-lenght, defiined by one strong corner spine accompanied laterally by 5 slender toothed spines and by one short subcorner spine (fig. VIII, 5—6); dactyl reaching the posterior margin of segment 6, bearing a row of single short setae on outer margin.

Gnathopod 2: segment 6 hardly broader than long, inclinated 2/3 of segment 6-lenght, palm defined by one strong corner spine accompanied by 3 short slender toothed spines attached behind the corner spine (fig. VIII, 7—8, 10); dactyl not reaching the posterior margin of segment 6, bearing a row of short setae on outer margin.

Pereopods 3—4 normal, with short dactyls bearing 1 plumose seta on outer margin and one slender spine on inner margin (fig. IX, 7, 9).

Pereopods 5—7 stout, segment 2 ovoid, large, much less than 1.5 times longer than broad, ventroposterior lobe short, ventroanterior lobe absent (fig. IX, 1, 3, 5), segments 3—6 not elongated, spinose; dactyls short, bearing one plumose seta on outer margin and one short spine and 0—1 seta on inner margin (fig. IX, 2, 4, 6).

Epimeral plates 1—3 poorly pointed (fig. IX, 11). Pleopods 1—3 with 2 retinacula each. Uropod 1: rami subequal or inner ramus is hardly longer than outer one, plumose setae absent (fig. IX, 12). Uropod 2: inner ramus is much longer than outer one, outer ramus recurved (fig. IX, 12), both rami without plumose setae.

Uropod 3 moderate, with plumose setae along inner margin accompanied by spines (fig. VIII, 1). Telson longer than broad, tapering distally, deeply incised (fig. VII, 9, 10), each lobe with 3 short distal spines and 0—1 marginal and/or dorsal spine. A pair of long plumose setae appears in the middle of each lobe.

Coxal gills occur on thoracal segments 2—6. Oostegyts broad.

Males like females, with unmodifiied uropods 1—3.

Variability: Telson on specimens from Solin is with or without dorsal spines, epimeral plates are more or less pointed. The specimens from Cavtat are with 2 setae on inner plate of maxilla 1 and on metasomsegments 1—3 with setae accompanied by small spines, corner spines on gnathopods are longer.

The specimens from Neretva river are with setae on metasomsegments, slightly shorter flagellum of antennae 1—2.

Material examined: Spring in Solin near Split, 27 Jan., 1949 (holotype and paratypes) (leg. S. Karaman); ibid., April, 1948, 2 spec. (leg. S. Karaman); — cave Šipun near Cavtat, May, 29, 1970, one spec. accompanied by *Hadzia fragilis* S. Kar. and *Salentinella angelieri* D. D. & R.; ibid., 1950 (leg. S. Karaman);

— Neretva river near Počitelj, Sept. 1, 1982, many spec. accompanied by *N. st. kolombatovici* S. Kar. (leg. G. Karaman);

— Neretva river near Čapljina, Aug. 31, 1982, many spec. accompanied by *N. st. kolombatovici* (leg. Ivica & Gordan Karaman).

Localities cited: Solin, near Jadro river, Split region (S. Karaman 1950); Cavtat, cave Šipun (S. Karaman 1953).

Loc. typ.: Solin.

Holotype: female juv. 10 mm. Holotype and paratypes are deposited in Karaman's Collection in Titograd.

Accompanied species of Amphipoda: *Niphargus st. kolombatovici, Hadzia fragilis, Salentinella angelieri.*

Remarks: *N. salonitanus* is very allied to *N. arbiter,* but differs from later by shape of coxa 1, telson, etc.

**NIPHARGUS ARBITER**

n. sp.

fig.: X—XII

*Orniphargus croaticus* S. Karaman 1950:133, fig. 52—61.

Description: Female ovig. up to 22 mm: Body stout, metasomsegments 1—3 each at dorsoposterior margin with numerous short spines intermixed with setae (fig. XII, 5). Urosomite 1 on each side with 3—4 spines, urosomite 2 on each side with 4—5 spines, urosomiite 3 smooth (fig. XII, 3). Head like that of N. orcinus.

Antenna 1 hardly exceeding half of body, peduncular segments 1—3 progressively shorter, but relatively long; ped. segment 2 slender, (at first glance looks like to be longer than segment 1 but

Fig. X. *Niphargus arbiter,* n. sp., Pećina Selo, female 22 mm: 1—2=gnathopod 1; 3—4=gnathopod 2; 5=coxa 3; 6=coxa 4.

Sl. X. *Niphargus arbiter,* n. sp., Pećina Selo, ženka 22 mm: 1—2=gnatopod 1; 3—4=gnatopod 2; 5=koksa 3; 6=koksa 4.

Fig. XI. *Niphargus arbiter,* n. sp., Pećina Selo, female 22 mm: 1—2=dactyl of pereopods 3—4; 3—4=pereopod 5; 5—6=pereopod 6; 7—8=pereopod 7; 9=dactyl of maxilliped palp; 10=antenna 1; 11=antenna 2.

Sl. XI. *Niphargus arbiter,* n. sp., Pećina Selo, ženka 22 mm: 1—2=daktil pereopoda 3—4; 3—4=pereopod 5; 5—6=pereopod 6; 7—8=pereopod 7; 9=daktil palpa maksilipeda; 10=antena 1; 11=antena 2.

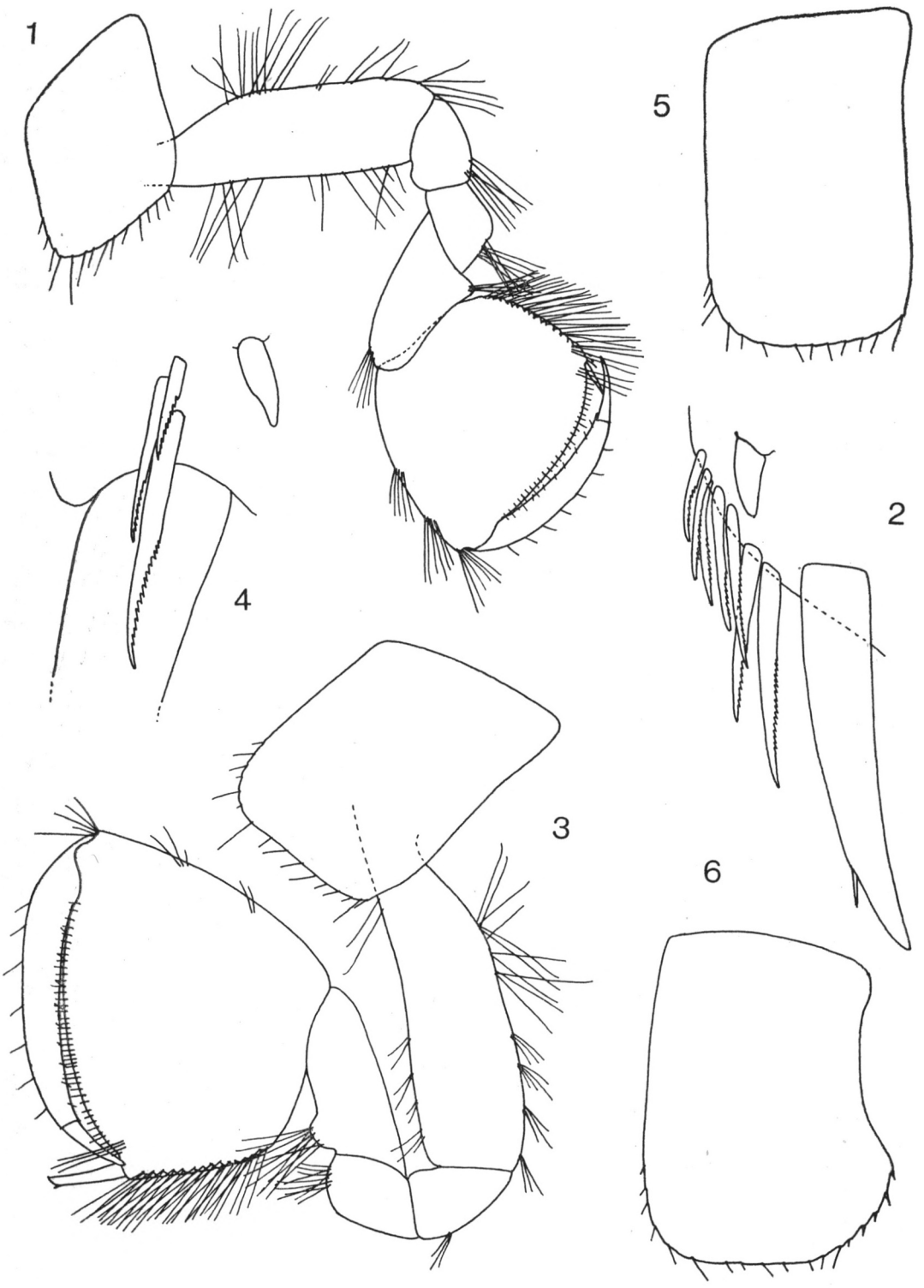


Fig. X.

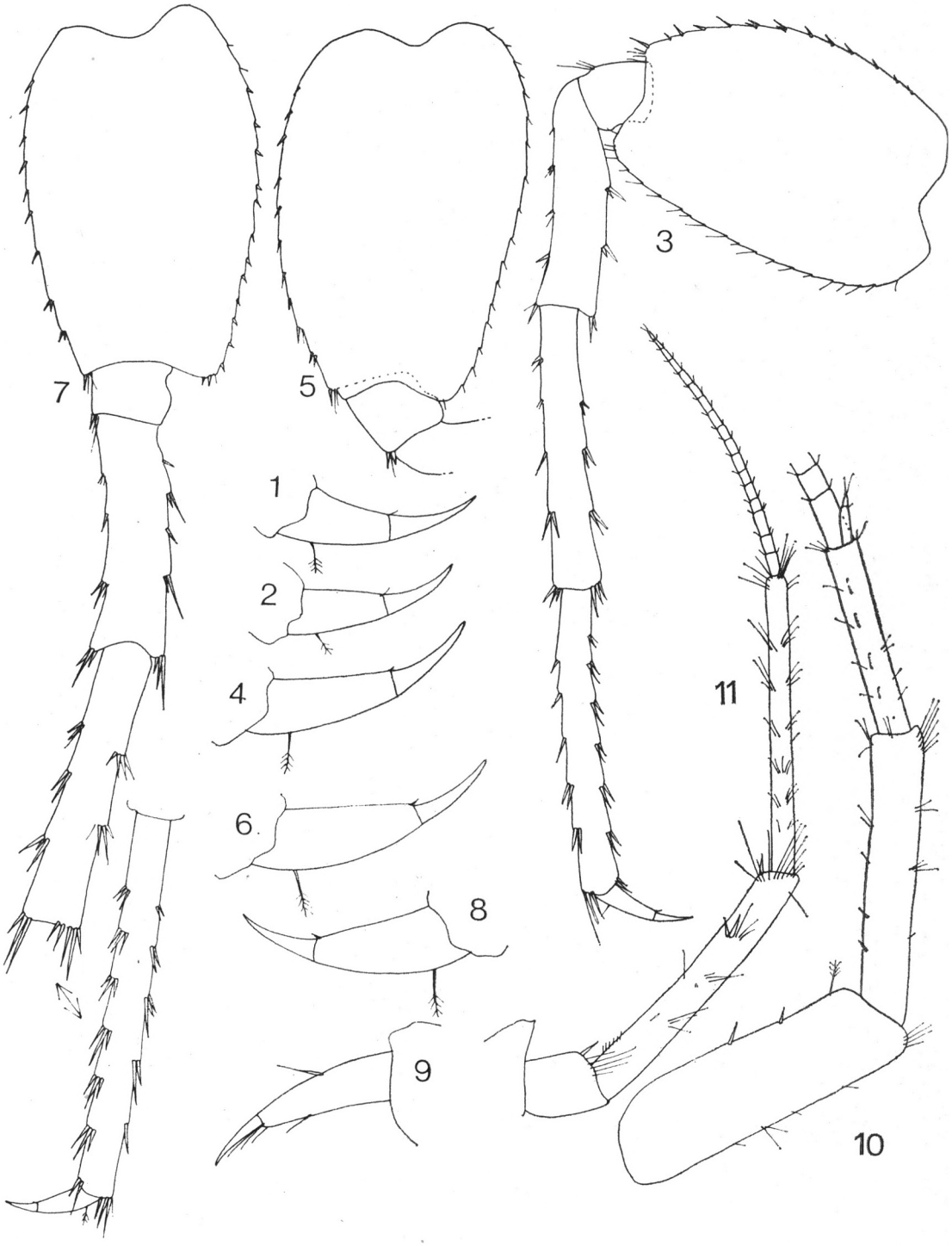


Fig. XI.

segment 1 is longer than 2), ped. segment 3 long, much exceeding half of ped. article 2 (fig. XI, 10). Main flagellum up to 46-articulate: proximal articles with 2 aesthetascs, distal one with one aesthetasc only. Accessory flagellum short, 2-segmented (fig. XI, 10).

Antenna 2: slender, peduncular segments 4—5 subequal nearly, flagellum up to 14-articulate, as long as or hardly shorter than ped. segment 5 (fig. XI, 11), antennal gland cone short.

Mouthparts normal. Maxilla 1: inner plate with 4 setae, outer plate with 7 spines (5—6 spines with 1 lateral tooth, 1—2 spines with 2 lateral teeth each), palp with 5—6 distal setae (fig. XII, 7).

Maxilliped: inner plate with 4 distal spines, outer plate reaching half of palp article 2, palp article 4 with short nail and with or without median short seta on inner margin (fig. XI, 9) and with 1 seta on outer margin.

Mandible: palp article 2 with up to 13 setae, palp article 3 with up to 43 D-setae, 5—6 E-setae, 1 group of A-setae and 5—6 groups of B-setae (fig. XII, 2), third segment is much longer than second one.

Coxae moderate, coxa 1 hardly longer than broad, with subacute ventroanterior corner (fig. X, 1), coxae 2—4 longer than broad (fig. X, 3, 5, 6).

Gnathopods 1—2 large, gnathopod 2 much larger than 1. Gnathopod 1: segment 6 trapezoid, hardly broader than long; palm inclinated half of segment 6-length, defined by 1 strong corner spine accompanied laterally by 5—6, rarely 7 slender toothed spines and with 1 short subcorner spine (fig. X, 1, 2); dactyl reaching the posterior margin of segment 6, bearing a row of short single setae at outer margin (fig. X, 1).

Gnathopod 2: segment 6 broader than long, palm inclinated up to 2/3 of segment 6-lenght; palmar corner spine strong, sitting on the elevation, accompaned by 3 slender toothed spines sitting behind corner spine (fig. X, 3—4); dactyl not reaching posterior margin of segment 6, bearing a row of short single setae on outer margin (fig. X, 3).

Pereopods 3—4 normal, with short dactyl bearing one plumose seta on outer margin and 0—1 short seta on inner margin (fig. XI, 1—2).

Pereopods 5—7 long, with segment 2 large, longer than broad, having short ventroposterior lobe (fig. XI, 3, 5, 7); anterior margin of segment 2 remarkably convex in pereopod 5, more straight in pereopods 6—7. Posterior margin of segment 2 can be sometimes with short spines. Dactyl of pereopods 5—7 short, bearing one spine-like seta on inner margin and one plumose seta on outer margin (fig. XI, 4, 6, 8).

Pleopods with 2 retinacula each. Epimeral plates 1—3 moderately produced, acute, ep. plates 2—3 each with 4—5, rarely only 3 spines (fig. XII, 1).

Uropod 1 with subequal rami, plumose setae absent (fig. XII, 3). Uropod 2: inner ramus remarkably longer than outer one, outer ramus recurved; both rami without plumose setae (fig. XII, 3).

Uropod 3 relatively short, along inner margin with single or pairs of plumose setae accompanied by spines (fig. XII, 4).

Telson longer than broad, deeply incised: each lobe with 5—8 distal spines and 0—1 dorsal spine; a pair of long plumose setae appears near the middle of each lobe (fig. XII, 6).

Oostegyts broad, coxal gills occur on thoracal segments 2—6.

Males like females but bearing slightly stronger gnathopods. Uropod 1—3 like these in females.

Variability: Each lobe of telson bearing 5 or more spines, dorsal spines on telson are often absent. The stable characters are the absence of spines on urosomite 3, long third ped. segment of antenna 1 and short accessory flagellum, position of corner spines on gnathopods, long plumose setae on telson, etc.

Material examined: Croatia: — watercave near Pećina Selo (Otočac, Lika), July 31, 1966, 2 spec. (leg. C. Deeleman);

— cave Pećina by Pećina Selo near Otočac, Lika, July 28, 1965, 3 spec. intermixed with *Niphargus croaticus* (leg. C. Deeleman);

— Crna pećina-cave near Rakovica, Lika, August 7, 1964, 2 spec. (leg. C. Deeleman);

— waterpot in Klanac, Lika, 6 m depth, July 27, 1964, 3 spec. (leg. C. Deeleman);

— Sopot cave, Severin na Kupi, August 30, 1966, one spec. (leg. C. Deel.);

— Zelena pećina-cave, Bunić, Krbavsko polje, July 19, 1966, 1, spec. intermixed with *Niphargus croaticus* Jur. (leg. C. Deeleman);

— Čurković pećina-cave, Otišić, July 14, 1965, 1 spec. intermixed with *Niphargus st. kolombatovici* (leg. C. Deeleman);

— Slunj, 3 spec. (data?) (leg. D. Rucner), intermixed with *N. st. kolombatovici;*

— spring of Mrežnica river near Primišlje, 1 spec. (leg. I. Matoničkin);

— spring of Mrežnica river, August, 1939, slides (leg.?);

— ibid., 1940 (leg. D. Rucner), on slides.

Localities cited: spring of Mrežnica river, Croatia (S. Karaman 1950 sub *N. croaticus).*

Loc. typ.: cave near Pećina Selo (Otočac, Lika).

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Fig. XII. *Niphargus arbiter,* n. sp., Pećina Selo, female 22 mm: 1=epimeral plates 1—3; 2=mandibular palp; 3=urosome with uropods 1—2; 4=uropod 3; 5=metasomsegments 1—3; 6=telson; 7=maxilla 1.

Sl. XII. *Niphargus arbiter,* n. sp., Pećina Selo, ženka 22 mm: 1=epimere 1—3; 2=mandibularni palp; 3=urozom sa uropodima 1—2; 4=uropod 3; 5=metazomalni segmenti 1—3; 6=telzon; 7=maksila 1.

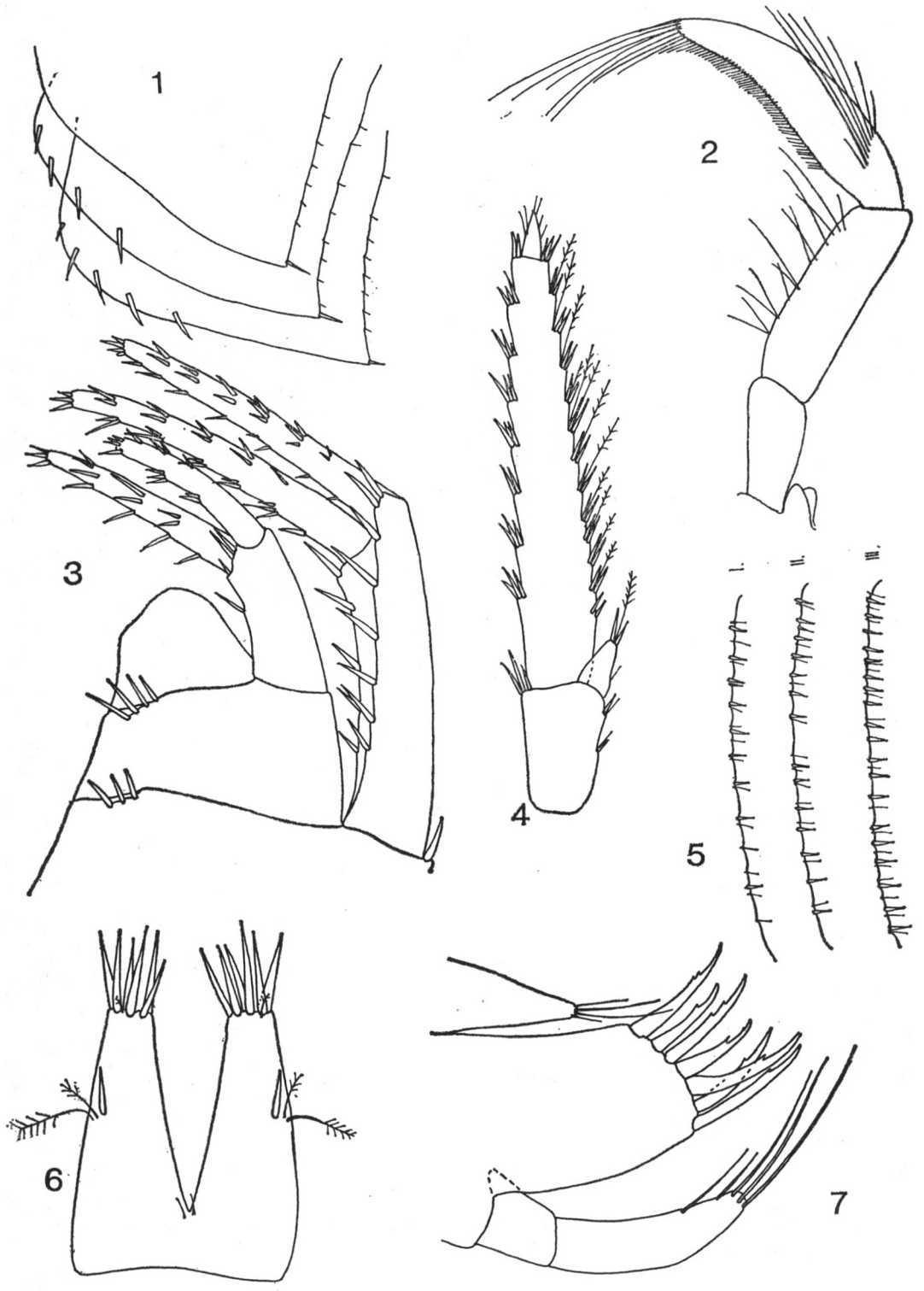


Fig. XII.

Holotype: female ovig. 18 m. Holotype and paratype are deposited in Karaman's collection in Titograd.

Accompanied species of Amphipoda: *Niphargus st. kolombatovici, N. croaticus.*

Remarks: *Niphargus arbiter* is very allied to *N. salonitanus* (shape of gnathopods, antennae, pereopods, uropods) but *N. salonitanus* differs from *arbiter* by poorly spinose telson, poorly armature of dactyl of pereopods 5—7, less spinose metasomsegments, smaller body, etc.

We can not exclude the possibility that *arbiter* can be a subspecies of *N. salonitanus,* but untill now no transitive specimens between both species are discovered.

**NIPHARGUS CROATICUS**

(Jurinac 1887)

fig.: XIII—XV

*Eriopis Croatica* Jurinac 1887:3(16), fig. 1—12a.

*Niphargus Croaticus* Jurinac 1888:29, fig. 1—12a.

*Niphargus croaticus* Schellenberg 1935:211.

*Niphargus croaticus croaticus* G. Karaman 1972:5; G. Karaman 1974:16.

nec *Orniphargus croaticus* S. Karaman 1950:133, fig. 52—61 (=*N. arbiter)*

Description: female ovig. up to 24 mm: Body moderately stout; mesosomsegments smooth, exceptionally on last mesosomsegment 2 short dorsoposterior spines were observed. Metasomsegment 1—3 each with a row of up to 20 dosoposterior spines intermixed with single setae; often the number of spines is lower than the number of setae.

Urosomite 1 with 3—5 spines on each side (fig. XIII, 6); urosomite 2 on each side with 3—6 spines; urosomite 3 with 2—3, rarely only one spine on each side (fig. XIII, 6).

Rostum short, lateral lobes short (fig. XIV, 7). Antenna 1 as long as or rather shorter than body: preduncular segments 1—3 progressively shorter (fig. XIII, 2), peduncular segment 3 slightly exceeding half of ped. article 2; main flagellum with numerous articles bearing 1—2 aesthetascs each (fig. XIII, 2), accessory flagellum short, 2-segmented.

Antenna 2: peduncular article 4 shorter than 5 (fig. XIII, 1), bearing a bunches of setae accompanied by single spines; flagellum stout and very short, up to 9-articulate, much shorter than ped. article 5.

Mouthparts normal: labium with well developed inner lobes. Maxilla 1: inner plate with 2 setae, outer plate with 7 spines (6 spines with 1 lateral tooth each, one spine with 3 lateral teeth), palp with up to 12 setae.

Maxilliped: inner plate short, with 4 distal spines, palp with 1 bunch of 3 setae on outer margin and without median seta on inner margin (fig. XIII, 3). Mandible: palp article 2 with up to 25 setae, palp article 3 with up to 47 D-setae, 8—9 Esetae, 1 group of A-setae and 5 groups of B-setae (fig. XV, 9).

Coxae moderate, longer than broad, coxa 1 pointed anteroventrally (fig. XIV, 1, 4, 8, 9), coxa 4 with poorly marked ventroposterior lobe, coxa 5 distincly shorter than 4.

Gnathopods 1—2 relatively small, gnathopod 1 hardly smaller than 2. Gnathopod 1: segment 6 slightly longer than broad, hardly longer than coxa 1 (fig. XIV, 1); palm inclinated 3/5 of segment 6-length, defined by one strong corner spine accompanied laterally by 4 slender corner spines (fig. XIV, 3) and by one short subcorner spine. Dactyl reaching posterior margin of segment 6, bearing a row of bunches of setae on outer margin (1—3 setae in each bunch) (fig. XIV, 2).

Gnathopod 2: segment 6 shorter than coxa 2 (fig. XIV, 4), nearly as long as broad, palm inclinated 2/5 of segment 6-length (fig. XIV, 5), defined by one strong corner spine accompanied laterally by 4 slender toothed spines and one short subcorner spine (fig. XIV, 6); dactyl reaching posterior margin of segment 6, bearing a row of bunches of setae on outer margin (fig. XIV, 5).

Pereopods 3—4 normal, with short dactyls bearing nail shorter than the remaining part of dactyl; 0—1 short seta appears at inferior margin of each dactyl and one plumose seta on outer margin (fig. XV, 7, 8).

Pereopods 5—7 very long and slender, their segment 2 linear, 2—3 times longer than broad, with straight or concave posterior margin, ventroposterior lobe absent, anterior margin straight (fig.

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Fig. XIII. *Niphargus croaticus* (Jur.), spring of Mrežnica, female 24 mm: 1—2=antennae 2 and 1; 3=dactyl of maxilliped palp; 4=epimeral plates 1—3; 5=telson; 6=urosome with uropods 1—2; 7=uropod 3; 8=telson, female 15 mm from Bunić; 9=telson, female 19 mm from Bunić.

Sl. XIII. *Niphargus croaticus* (Jur.), izvor Mrežnice, ženka 24 mm: 1—2= antene 2 i 1; 3=daktil palpa maksilipeda; 4=epimere 1—3; 5=telzon; 6= urozom sa uropodima 1—2; 7=uropod 3; 8=telzon, ženka 15 mm iz Bunića; 9=telzon, ženka 19 mm iz Bunića.

Fig. XIV. *Niphargus croaticus* (Jur.), spring of Mrežnica, female 24 mm: 1—3=gnathopod 1; 4—6=gnathopod 2; 7=head; 8=coxa 3; 9=coxa 4.

Sl. XIV. *Niphargus croaticus* (Jur.), izvor Mrežnice, ženka 24 mm: 1—3= gnatopod 1; 4—6=gnatopod 2; 7=glava; 8=koksa 3; 9=koksa 4.

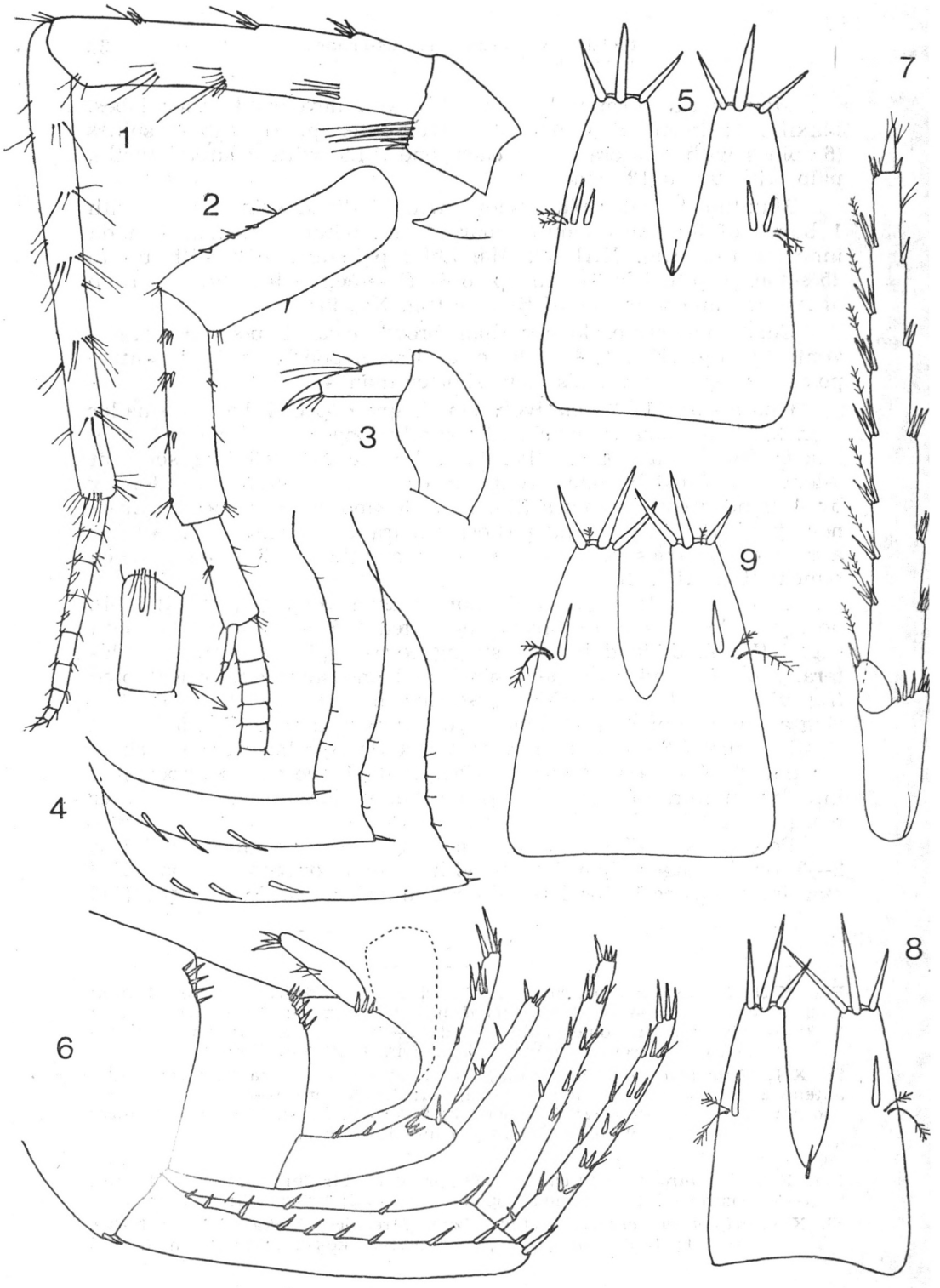


Fig. XIII.

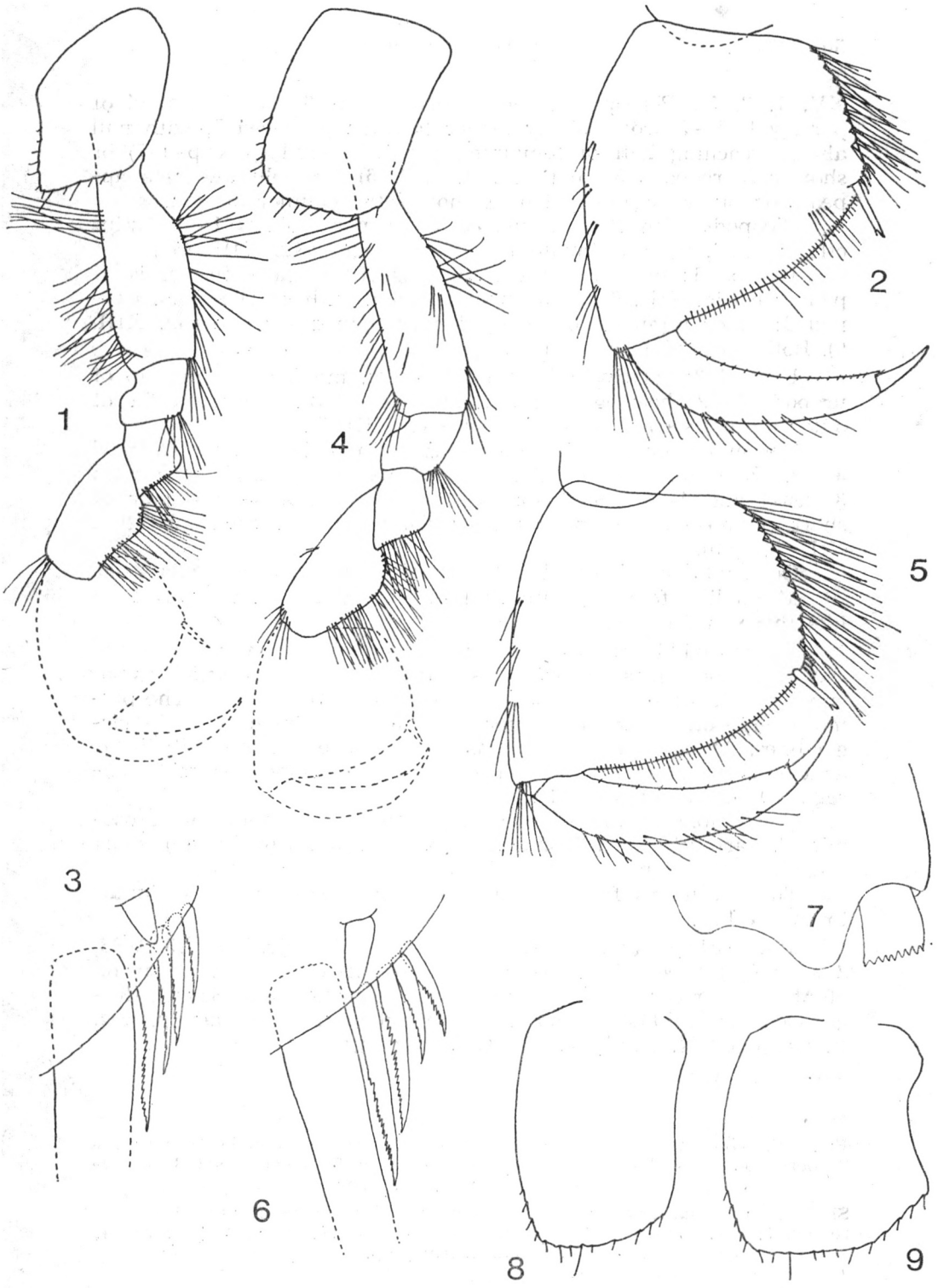


Fig. XIV.

XV, 1, 3, 5). Pereopod 5 mch shorter than 6 and 7. Dactyl of pereopods 5—7 progressively longer towards pereopod 7, with nail almost reaching half of remaining part of dactyl (pereopod 7) or shorter (pereopods 5—6) (fig. XV, 2, 4, 6), one plumose seta appears on outer margin and 0—1 short seta on inner margin.

Pleopods with 2 retinacula each. Epimeral plates 1—3 distinctly pointed, with bisinuate posterior margin (fig. XIII, 4).

Uropod 1: one very short spine is sitting near the basis of peduncle (fig. XIII, 6), rami subequal long, with short spines. Uropod 2: inner ramus is distinctly longer than outer one (fig. XIII, 6). Both rami of uropods 1—2 without plumose setae.

Uropod 3: relatively long and narrow, much exceeding tip of uropods 1—2, bearing single plumose setae on inner margin of outer ramus; second segment short (fig. XIII, 7).

Telson longer than broad, reaching tip of peduncle of uropod 3 (fig. XIII, 6), incised 1/2 to 2/3 of its length; each lobe with 3 distal and 1—3 dorsal spines, lateral spines absent; a pair of short plumose setae appears near the middle of each lobe (fig. XIII, 5, 8, 9).

Oostegyts broad, coxal gills occur on thoracal segments 2—6.

Males like females, with shallow incised telson, uropods 1—3 like these in females.

Variability: Depth of incision of telson is variable: often the large specimens are with less incised telson and smaller specimens with more deeply incised telson (fig. XIII, 5, 8, 9). The plumose setae on telson are longer in smaller specimens than in larger ones. Already small specimens of 14 mm length are with linear article 2 of pereopods 5—7. The number of spines on metasom-segments es rather variable.

The stable characters are the presence of spines on urosomite 3, narrow uropod 3, shape of epimeral plates (bisinuate), short flagellum of antenna 2, etc.

The specimens from all mentioned localities are very similar to each other.

Material examined: Croatia: — Zagorje, Aug. 25, 1883, 2 spec (paratypes) (leg. Jurinac); — spring of cave near spring of Mrežnica river in Desmerice village, Zagorje, near Sovjak draga, October 7, 1982, one spec. intermixed with *Niphargus* sp. (leg. R. Lattinger, N. Tvrtković and G. Karaman);

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Fig. XV. *Niphargus croaticus* (Jur.), spring of Mrežnica female 24 mm: 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7=pereopod 3; 8=pereopod 4; 9=mandibular palp.

Sl. XV. *Niphargus croaticus* (Jur.), izvor Mrežnice, ženka 24 mm: 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7=pereopod 3; 8=pereopod 4; 9=mandibularni palp.

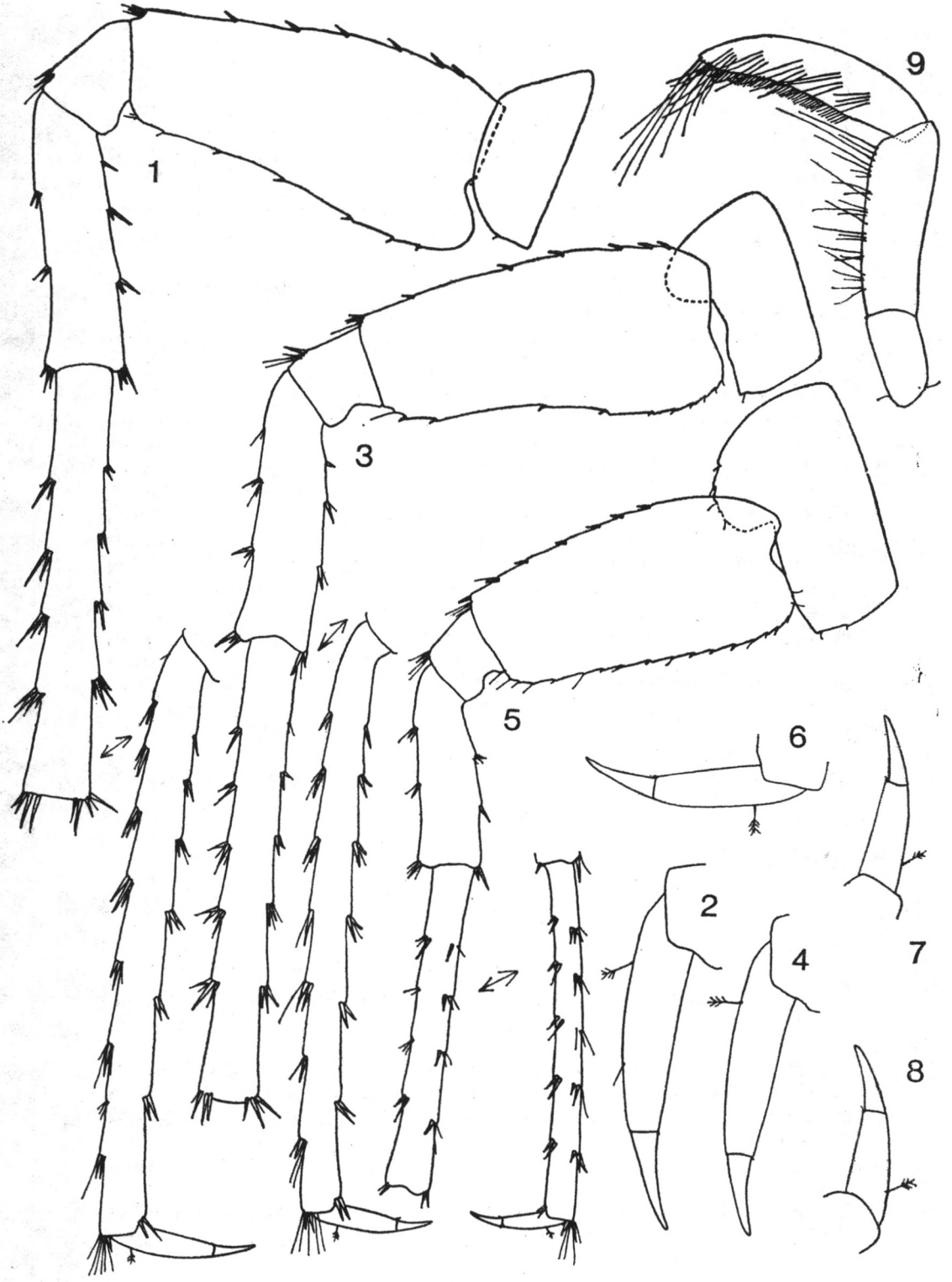


Fig. XV.

— cave Pećina near Pećina Selo (Otočac, Lika), July 28, 1965, 6 spec. intermixed with *N. arbiter* (leg. C. Deeleman);

— Zelena pećina-cave near Bunić (Krbavsko polje, Lika), July 19, 1966, 3 spec. (leg. C. Deeleman), accompanied by *N. arbiter.*

Localities cited: cave near spring of Mrežnica river, near Zagorje, on foot, of Sovjak Mt. (± Sovjak draga), Croatia (Jurinac 1887).

Loc. typ.: spring of cave near spring of Mrežnica river in Desmerice village, Zagorje, near Sovjak draga (Croatia).

Holotype: male 20 mm. Holotype and paratype are deposited in Museum of Natural History in Zagreb.

Accompanied species of Amphipoda: *Niphargus arbiter, Niphargus* sp.

Remarks: Jurinac described this species from one cave near spring of Mrežnica river near Zagorje village, on food of Sovjak Mt., giving a very good figures of entire animal and of some body-parts. *S. Karaman* (1950) erroneusly described from one other cave near spring of Mrežnica river one other *Niphargus* species under the name *Niphargus croaticus* Jurinac, mentioning that his and Jurinac's figures doesn't agree completely to each other (shape of telson, flagellum of antenna 2, segment 2 of pereopods 5—7, etc.) because of not correct figures of Jurinac. But, rearly, Jurinac described and figured very well his species with many details overlooked later by other authors (urosomite 3 with spines, short flagellum of antenna 2, slender dactyl and basis of pereopods 5—7, poorly excavated telson in males, etc.).

Based on these facts, Karaman's *N. croaticus* represents one other new species, mentioned here as *Niphargus arbiter,* n. sp.

**NIPHARGUS STEUERI STEUERI**

Schellenberg 1935 (new rank)

fig. XVI—XVIII

*Niphargus orcinus steueri* Schellenberg 1935:211; Schellenberg 1936:28; S. Karaman 1950a:136; G. Karaman 1972:5; G. Karaman 1974:22.

Description: Female ovig. up to 25 mm: Body stout, mesosomsegments smooth, metasomsegments 1—3 each with up to 25 short spines along dorsoposterior margin, intermixed sometimes with single short setae (fig. XVIII, 9). Urosomites 1—2 semicarinate dorsally, each with 4 spines on each side (fig. XVII, 8), urosomite 3 smooth.

Head with short rostrum, lateral cephalic lobes subrounded (fig. XVII, 1). Antena 1 very long, reaching or slightly exceeding

the length of body (1:1 or 15:17); peduncular segments 1—3 progresively shorter, poorly setose, segment 3 exceeding 2/3 of segment 2 (fig. XVII, 5). Main flagellum slender and long, consisting of up to 75 articles, articles prevalently with 1, rather 2 short aesthetascs each (fig. XVII, 6).

Antenna 2 slender, peduncular segment 5 much longer than 4; flagellum very short, stout, much shorter than article 5, consisting of up to 9 articles (fig. XVII, 7). Antennal gland cone short.

Mouthpars normal. Labrum entire, ovoid. Labium with well developed inner lobes. Maxilla 1: inner plate with 5—6 setae (fig. XVI, 7), outer plate with 7 spines (inner spine with several lateral teeth, 2 spines with 2 lateral teeth, 4 spines with 1 lateral tooth), palp with up to 14 setae.

Maxilla 2: both plates with distal setae only. Maxilliped: inner plate with 4 distal spines, outer plate reaching nearly half of second palp segment; palp article 4 with 1—2 bunches of setae on outer margin and with a row of several single setae along inner margin (fig. XVII, 2, 3). Mandible: incisor toothed, molar triturative, palp segment 2 with up to 22 setae, palp segment 3 with 1 group of A-setae, 5 groups of B-setae, up to 30 D-setae and 9—10 E-setae.

Coxae moderately long, coxae 1—4 distinctly longer than broad; coxa 1 with subacute ventroanterior corner (fig. XVI, 2), coxa 4 with well developed ventroposterior lobe (fig. XVI, 5, 8, 9). Coxae 5—7 progressively shorter, coxae 5—6 with posterior lobe much larger than inner one, coxa 7 partically unlobed (fig. XVIII, 3, 5, 7).

Gnathopods 1—2 relatively small, shorter than coxae 1—2, gnathopod 1 slightly smaller than 2. Gnathopod 1: segment 6 slightly longer than, broad (fig. XVI, 1, 2), palm inclinated more than half of propodus-length, defined by one strong corner spine accompanied laterally by 5—6 slender toothed spines and one short subcorner spine (fig. XVI, 3); dactyl reaching the posterior margin of segment 6, bearing a row of single setae on outer margin.

Fig. XVI. *Niphargus steueri steueri* Schell., Pula, Female 24,5 mm: 1—3=gnathopod 1; 4—6=gnathopod 2; 7=maxilla 1; 8—9=coxae 3—4.

Sl. XVI. *Niphargus steueri steueri* Schell., Pula, ženka 24,5 mm: 1—3=gnatopod 1; 4—6=gnatopod 2; 7=maksila 1; 8—9=kokse 3—4.

Fig. XVII. *Niphargus steueri steueri* Schell., Pula, Female 24,5 mm: 1=head; 2—3=dactyl of maxilliped palp; 4=uropod 3; 5—6=antenna 1; 7=antenna 2; 8=urosome with uropods 1—2; 9=telson.

Sg. XVII. *Niphargus steueri steueri* Schell., Pula, ženka 24,5 mm: 1=glava; 2—3=daktil palpa maksilipeda; 4=uropod 3; 5—6=antena 1; 7=antena 2; 8=urozom sa uropodima 1—2; 9=telzon.

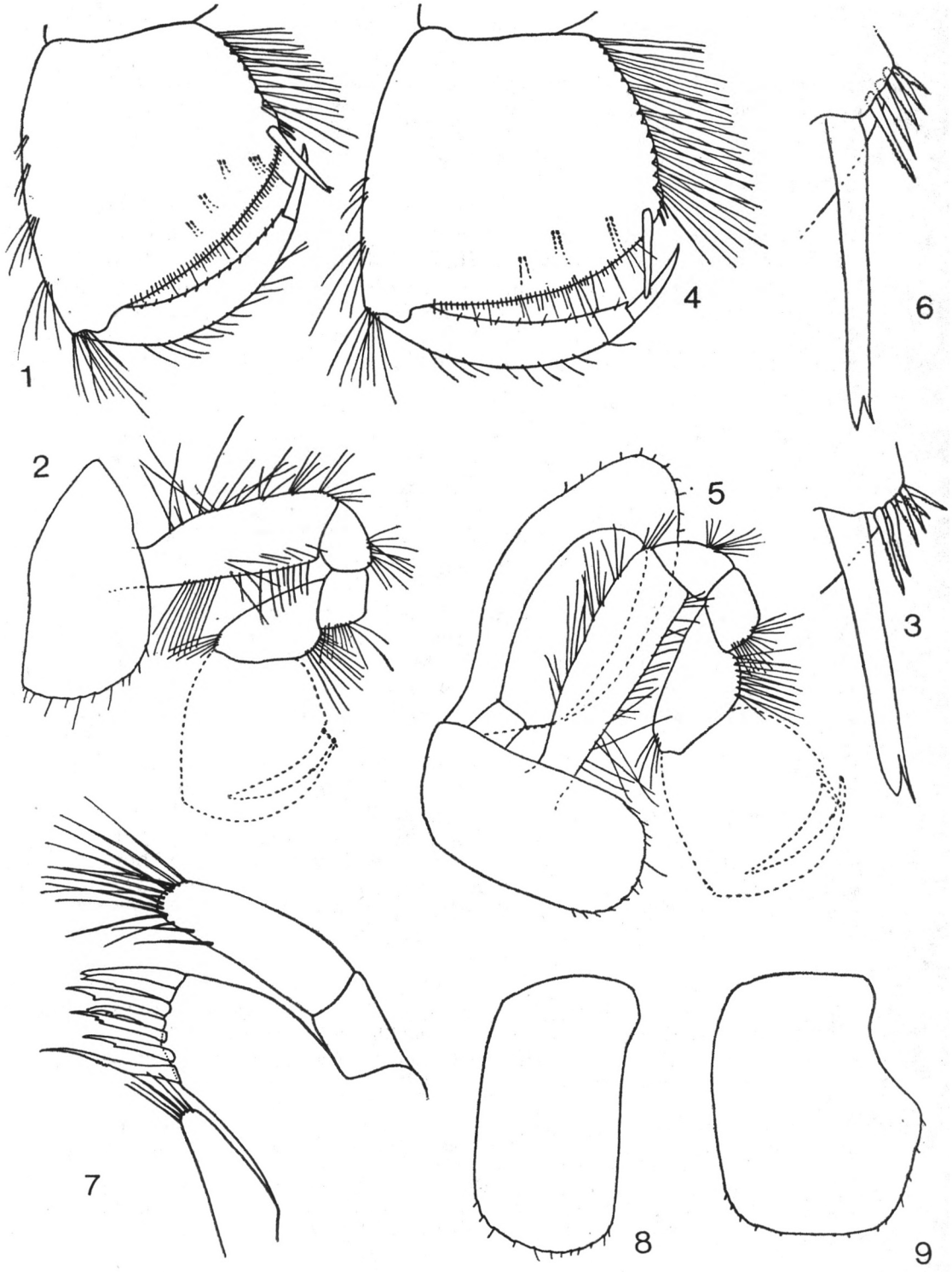


Fig. XVI.

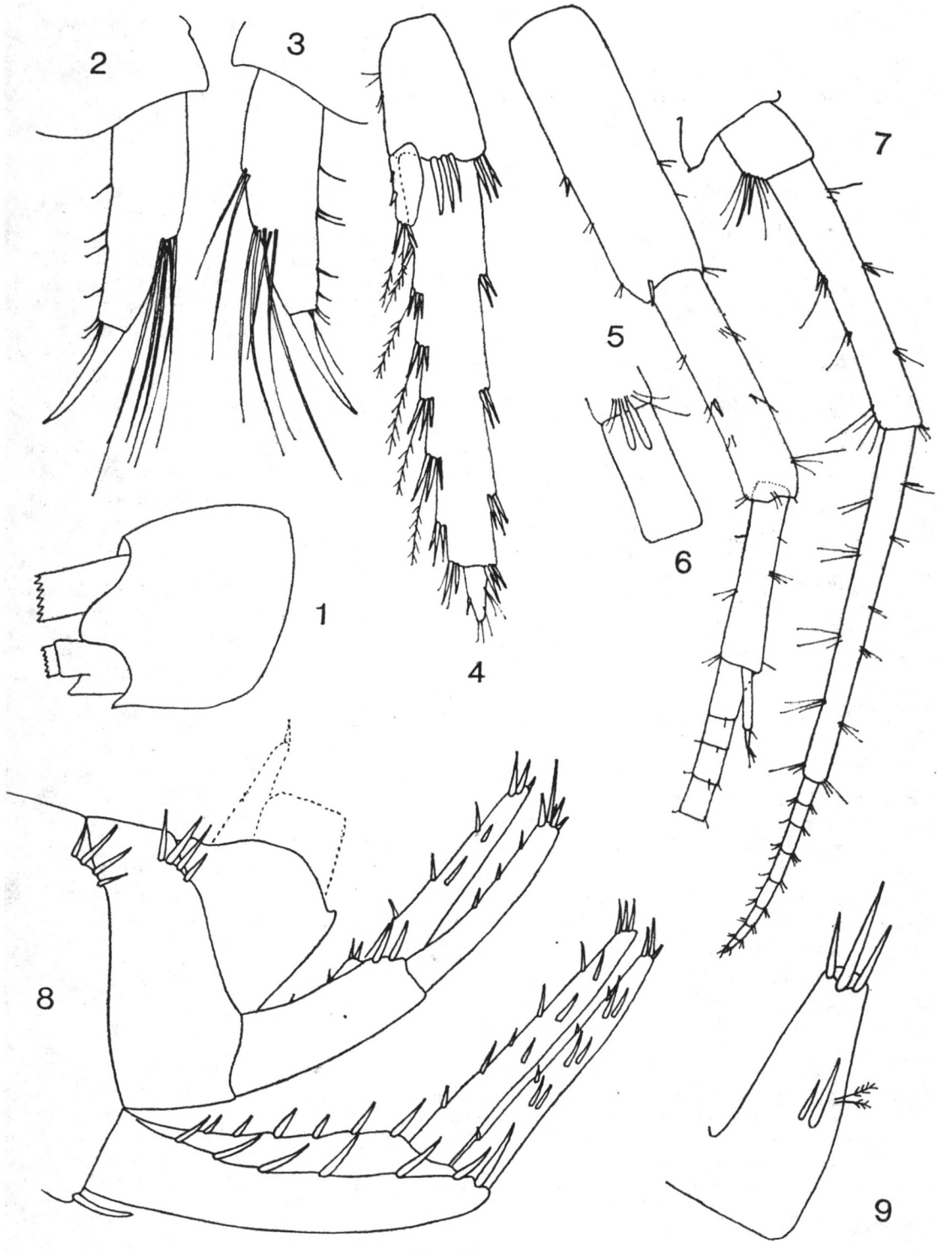


Fig. XVII.

Gnathopod 2: segment 6 nearly as long as broad, palm defined by one strong spine accompanied laterally by 5 slender toothed spines and by one short subcorner spine (fig. XVI, 6), dactyl reaching posterior margin of segment 6, bearing a row of single setae on auter margin.

Pereopods 3—4 slender, with slender dactyl reaching nearly half of segment 6-length; nail with short spine-like seta on inner margin and one plumose seta on outer margin (fig. XVIII, 1, 2).

Pereopods 5—7 slender, with segment 2 ovoid, bearing short ventroposterior lobe, ventroanterior margin of segment 2 convex, especially on pereopod 5 (fig. XVIII, 3, 5, 7); dactyl of pereopods 5—7 short, bearing one short spine on inner margin and one plumose seta on outer margin (fig. XVIII, 4, 6, 8).

Pleopods with 2 retinacula each. Epimeral plates 1—3 sharply pointed and produced (fig. XVIII, 10), ep. plate 2 with convex ventral margin.

Uropod 1: strong spine appears near the basis of peduncle (fig. XVII, 8), rami subequal. Uropod 2: rami nearly subequal or outer ramus slightly shorter and recurved. Plumose setae on rami of uropods 1—2 absent. Uropod 3 relatively short (fig. XVII, 4), inner margin of outer ramus wits a row of single plumose setae accompanied by spines, second segment short.

Telson exceeding tip of peduncle of uropod 3, deeply incised, longer than broad (fig. XVII, 9), each lobe with 3 distal and 2 dorsal spines; a pair of short plumose setae appears in the middle of each lobe.

Coxal gills ovoid, on thoracal segments 2—6, oostegyts broad.

Males probably like females, with short uropod 3. Single male in our hand was only 10.3 mm long.

Variability: Antenna 1 as long as or longer than body. Lobes of telson from specimen of Cuvé with 5 distal spines. The number of metasomsegment-spines is smaller in smaller specimens. Pereopod 7 is shorter in smaller specimens.

The single juv. male in our hand (Rovinj) of 10.3 mm length, was with broad segment 2 of pereopods 5—7 like that in females and with epimeral plates 2 very convex, telson was with 3 distal spines on each lobe, no dorsal or lateral spines.

Material examined: (Berlin Museum Coll.): — № 24710, 2 ovig. female, paratype of 15 mm and holotype of 24,5 mm from

Fig. XVIII. *Niphargus steueri steueri* Schell., Pula, Female 24,5 mm: 1—2= dactyl of pereopods 3—4; 3—4=pereopod 5; 5—6=pereopod 6; 7—8=pereopod 7; 9=metasomsegment 3; 10=epimeral plates 1—3.

Sl. XVIII. *Niphargus steueri steueri* Schell., Pula, ženka 24,5 mm: 1—2= daktil pereopoda 3—4; 3—4=pereopod 5; 5—6=pereopod 6; 7—8=pereopod 7; 9=metazomalni segment 3; 10=epimere 1—3.

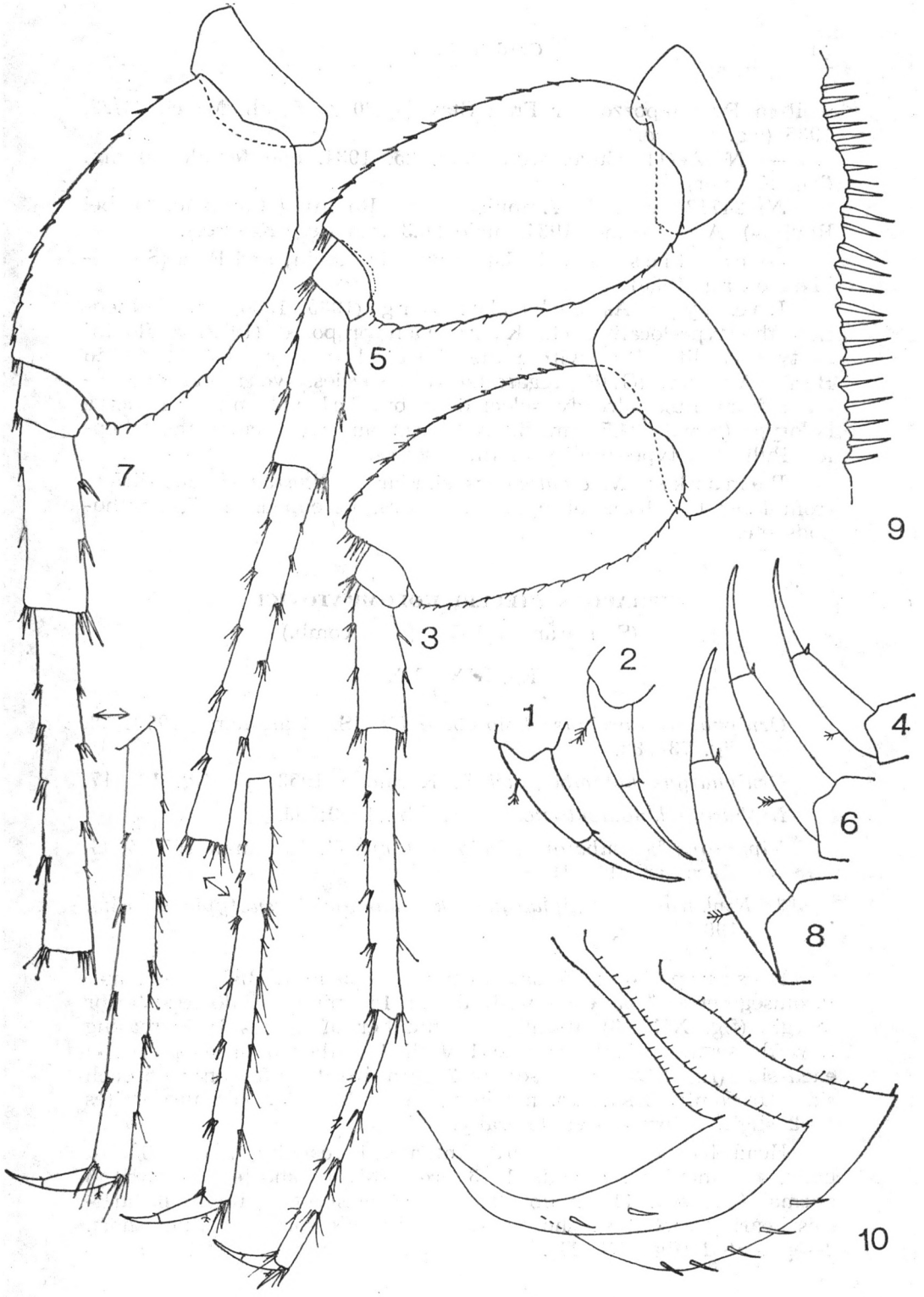


Fig. XVIII.

well in Pula (»pozzo der Frau Stave«), 20 m depth, March 21/22, 1935 (leg. Kramer);

— № 24711, Cuvé, well, Nov. 25, 1934, one female 20 mm (leg. Kramer);

№ 24712, well I, Ampulea near Rovinj (»Campolongo bei Rovinj«), April—June, 1934, male 20.3 mm (leg. Kramer).

Localities cited: Istra: wels in Rovinj and Pula (Schellenberg 1936).

Loc. typ.: As Schellenberg (1935, 1936) didin't mention the type-locality, G. Karaman proposed (1972) a Rovinj as type-locality. But, within the Schellenberg's material in Berlin Museum (GDR) regarding this species, we found one female from Pula already selected (? by Schellenberg) as a holotype (female 24.5 mm, figured here), and we decided the accepted Puli as a type-locality of this species.

Remarks: *N. croaticus* is similar to *N. steueri,* but differs from later by shape of epimeral plates, pereopods 5—7, gnathopods etc.

## NIPHARGUS STEUERI KOLOMBATOVICI

(S. Karaman 1950) (new comb.)

fig. XIX—XX

*Orniphargus orcinus kolombatovići* S. Karaman 1950:138, fig. 73—82.

*Orniphargus kolombatovići* S. Karaman 1953:147, fig. 12—17.

*Niphargus kolombatovići* Straškraba 1959:309.

*Niphargus kolombatovici kolombatovici* G. Karaman 1972:5; G. Karaman 1974:19.

? *Niphargus (Orniphargus) kolombatovići subtypicus* Sket 1960:73, fig. 4.

Description: Female ovig up to 19 mm: Body stout, metasomsegments 1—3 each with up to 15 spines at dorsoposterior margin (fig. XIX, 8), usually the number of spines is increasing towards segment 3. Urosomite 1 with 4, rather 3 or 5 spines on each side (fig. XIX, 9), urosomite 2 with 4, rather 5 spines on each side. Urosomite 3 smooth, not kompressed laterally, but urosomites 1—2 slightly compressed laterally.

Head like that in *steueri.* Antenna 1 reaching 2/3 to 3/4 of body, peduncular segments 1—3 progressively shorter, segment 3 normal (fig. XX, 11); main flagellum consisting of up to 65 articles bearing each 1—2 short aesthetasch; accessory flagellum short, 2-segmented (fig. XX, 11).

Antenna 2: peduncular segment 4 shorter than 5, flagellum stout, always distinctly shorter than ped. article 5, consisting of up to 9 articles (fig. XX, 12).

Mouthparts normal: Maxilla 1: inner plate with 2 setae, outer plate with 7 spines (6 spines with 1 lateral tooth, one spine with 3 lateral teeth). Maxilliped: inner plate with 4—5 distal spines; outer plate reaching 2/5 of second palp article; palp article 3 lobed distally, palp article 4 with one bunch of 2—3 setae on outer margin and without median setae on inner margin (fig. XX, 10).

Mandible: second palp article with up to 26 setae, third segment with up to 35 D-setae, 6—7 E-setae, 1 group of A-setae and 5—6 groups of B-setae.

Coxae moderately long, distinctly longer than broad (fig. XIX, 1, 4; XX, 13, 14), coxa 1 with subacute ventroanterior corner.

Gnathopods 1—2 relatively small, gnathopod 1 poorly smaller than 2. Gnathopod 1: segment 6 distinctly longer than broad, palm inclinated 1/2 or slightly more of posterior margin of segment 6 (fig. XIX, 1, 2), defined by one strong corner spine accompanied laterally by 3 slender toothed spines and one short subcorner spine (fig. XIX, 3); dactyl reaching posterior margin of segment 6, bearing a row of single setae on outer margin.

Gnathopod 2: segment 6 poorly longer than broad, more quadrate; palm less inclinated (2/5 to 1/2 of propodus-length); corner and subcorner spines like these in gnathopod 1 (fig. XIX, 6); dactyl like that in gnathopod 1 (fig. XIX, 4, 5).

Pereopods 3—4 normal, with dactyl bearing one plumose seta on outer margin (fig. XX, 7, 8). Pereopods 5—7 like these in sep. *steueri,* with ovoid undistinctly lobed segment 2, posterior margin strongly crenellated (fig. XX, 1, 3, 5), dactyls with one plumose seta on auter margin and one spine on inner margin (fig. XX, 2, 4, 6, 16, 17).

Pleopods with 2 retinacula each. Epimeral plates 1—3 poorly to strongly pointed (fig. XX, 9), ep. plate 2 convex ventrally.

Uropod 1: rami subequal long (fig. XIX, 9). Uropod 2: inner ramus usually distinctly, rather hardly longer than outer one, outer ramus recurved (fig. XIX, 9). Plumose setae on rami of uropods 1—2 absent.

Uropod 3 like that in *steueri,* with a row of single plumose setae along inner margin (fig. XX, 15).

Telson deeply incised, hardly to distinctly longer than broad; each lobe with 3, occasionally 4 distal spines and with 0—2 dorsal spines; occasionally with 1 spine at inner margin (Buk near Trebinje) (fig. XIX, 7, 10). A pair of short plumose setae appears near the middle of each lobe. Oostegyts broad, coxal gills occur on segments 2—6.

Males similar to females, with short second segment of uropod 3 and undifferenziated uropods 1—2.

Variability: The armatura of telson ih rather variable (fig. XIX, 7, 10). The specimens from Neretva river are with shorter antennae and prevalently without dorsal spines on telson; the specimens from Split region are with or without dorsal spines on telson. The specimens from Otišić and Slunj are with dorsal spines on telson (fig. XIX, 7, 10). Third segment of antenna 1 peduncle is not exceeding 2/3 of segment 2 in all populations of ssp. *kolombatovici*, as well as the low number of corner slender spines on gnathopods 1—2.

Epimeral plate 2 in all populations is with more or less convex ventral margin, like that in ssp. *steueri*.

Remarks. S. Karaman established *kolombatovici* (1950) as a subspecies of *orcinus* based on relatively small specimens (up to 14 mm, adult) from vicinity of Split (food of Kozjak Mt. in Kaštel Stari) because he has not seen the specimens of *N. steueri steueri* from Istra, described very breefly by Schellenberg (1935).

We have studied Schellenberg's material of *steueri steueri* from Istra. The comparison of these specimens with specimens of *kolombatovici* from other localities along Adriatic sea-coast (some of these up to 19 mm long, Otišić), showed very high similarity between both taxons, *steueri* and *kolombatovici*. The subspecies *kolombatovici* differs from *steueri steueri* by presence of lower number of slender toothed spines near corner spine on gnathopods 1—2, by less produced epimeral plates 1—3, by slightly shorter third peduncular segment of antenna 1, by shorter antennae 1—2, smaller body size, less setoe distal segment of palp in maxilliped.

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Fig. XIX. *Niphargus steueri kolombatovici* (S. Kar.), Čurković cave, female 19 mm: 1—3=gnathopod 1; 4—6=gnathopod 2; 7=telson; 8=metasomsegment 3; 9=urosome with uropods 1—2; 10=telson, female 13 mm from Buk.

Sl. XIX. *Niphargus steueri kolombatovici* (S. Kar.), Čurković pećina, ženka 19 mm: 1—3=gnatopod 1; 4—6=gnatopod 2; 7=telzon; 8=metazomalni segment 3; 9=urozom sa uropodima 1—2; 10=telzon, ženka 13 mm iz Buka.

Fg. XIX. *Niphargus steueri kolombatovici* (S. Kar.), Čurković cave, female 19 mm: 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7—8=dactyl of pereopods 4 and 3; 9=epimeral plates 1—3; 10=dactyl of maxilliped palp; 11—12=antennae 1—2; 13—14=coxae 3—4; 15=uropod 3; 16=dactyl of pereopod 7, female 10 mm from Buk; 17=dactyl of pereopod 7, male 14 mm from Kaštel Stari.

S. XIX. *Niphargus steueri kolombatovici* (S. Kar.), Čurković pećina, ženka 19 mm; 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7—8=daktil pereopoda 4 i 3; 9=epimere 1—3; 10=daktil palpa maksilipeda; 11—12=antene 1—2; 13—14=kokse 3—4; 15=uropod 3; 16=daktil pereopoda 7, ženka 10 mm iz Buka; 17=daktil pereopoda 7, mužjak 14 mm iz Kaštel Stari.


Fig. XIX.

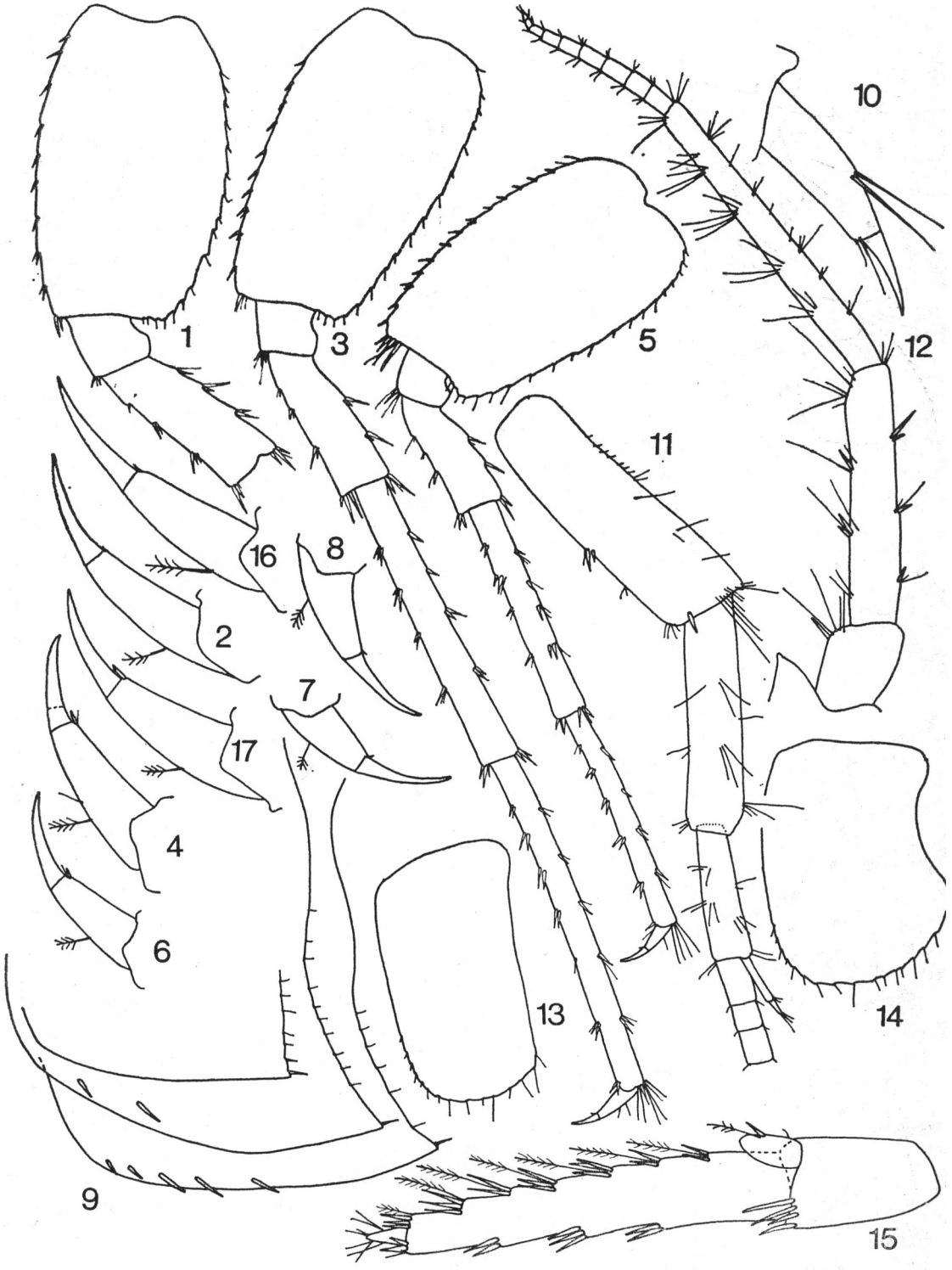


Fig. XX.

As we have not enough number of small specimens of *steueri* from Istra in hand, the variability of *steueri* regarding the size of specimens is stil unkown. But, based on relatively large specimens of *kolombatovici* in hand (up to 19 mm), we decide to leave *kolombatovici* as a distinct taxon, removing it to *steueri* as a distinct subspecies. We can not exclude the possibility that *kolombatovici* can be only one form of *steueri steueri,* but the material in hand don't permit us now to fuse both taxons into one.

Sket described (1960) *Niphargus kolombatovici subtypicus* from cave Jama pri Stolbah near Černomelj, Slovenia. Based on very scarce description and figures of this taxon, it is not possible to establish any difference between ssp. *kolombatovici* and *subtypicus.*

Material examined: — spring near Kaštel Stafilić (Split reg.), Febr. 2, 1949, 6 spec. (leg. S. Karaman);

— Kaštel Stari near Split, spring, October 1948, 10 spec. (leg. S. Karaman), paratypes; — ibid., 1949, 5 spec. intermixed with *Niphargus castellanus* S. Kar. and *Gammarus balcanicus* (leg. S. Karaman);

— spring Ričenica in Kaštel Stari, 29 Nov., 1948, 8 spec. intermixed with *Niphargus castellanus* S. Kar. (leg. S. Karaman);

— Ćurković cave, Otišić (Svilaja Mt., E. of Drniš), April 28, 1964, 4 spec. (leg. C. Deeleman); — ibid., July 14, 1965, 3 spec. intermixed with *Niphargus arbiter* (leg. C. Deeleman);

— Dragić cave, Otišić (Svilaja Mt., E. of Drniš), August 1, 1964, 1 spec (leg. C. Deeleman);

— Slunj, Croatia, 1 spec. accompanied by *N. arbiter* (leg. D. Rucner);

— Crna pećina cave, Rakovica (S. of Slunj, Croatia), 1 spec., July 5, 1966 (leg. C. Deeleman);

— Buk, Čićevo near Trebinje, August, 1951, 4 spec. (leg. S. Karaman);

— Ljelješnica cave, Bijeljani (Divin), Dabarsko polje, Nov. 6, 1967, 1 spec. (leg. C. Deeleman);

— Vjetemica cave in Popovo polje, Herzegovina, Veliko jezero, Aug. 23, 1931, 6 spec. intermixed with *N. trullipes* and *N. vjeternicensis* (leg. S. Karaman);

— spring Norino near Metković, Oct. 17, 1958, 1 spec. (leg. T. Petkovski);

— river Neretva near Čapljina, Aug. 31, 1982, many spec. intermixed with *N. salonitanus* (leg. Gordan & Ivica Karaman);

— river Neretva near Počitelj, Sept. 1, 1982, many spec. intermixed with *N. salonitanus* (leg. Gordan & Ivica Karaman).

Localities cited: spring on foot of Kozjak Mt. near Split, in Kaštel Stari (S. Karaman 1950, 1953); cave Buk near Čičevo, Popovo polje valley W. of Trebinje (S. Karaman 1953,

G. Karaman 1974); Baba cave in Popovo polje valley in Herzegovina (Straškraba 1959); Norino spring near Metković; Ljelješnica cave (G. Karaman 1974).

Loc. typ.: spring in Kaštel Stari.

Holotype: female 10 mm. Holotype and paratypes are deposited in Karaman's collection in Titograd.

Associated species of Amphipoda: *Niphargus balcanicus, N. vjeternicensis, N. castellanus, N. salonitanus, N. trullipes, N. arbiter.*

The specimens of *N. steueri kolombatovici* of 10 mm were already often with oostegytes (female).

## NIPHARGUS PODGORICENSIS

S. Karaman 1934

fig. XXI—XXII

*Orniphargus orcinus podgoricensis* S. Karaman 1934:331, fig. 4.
*Orniphargus podgoricensis* S. Karaman 1950a:128, fig. 32—39.
*Niphargus orcinus podgoricensis* Schellenberg 1935:211.
*Niphargus podgoricensis* G. Karaman 1972:6; G. Karaman 1974:23.

Description: Female ovig. up to 14.4 mm. Body stout, metasomsegments 1—3 each with a row of 10—20 dorsoposterior short marginal setae, spines absent (fig. XXII, 14). Urosomites 1—3 each with a row of spines on each side (3—6—7, or 2—5—5, etc.) (fig. XXII, 13).

Head like that in *orcinus*. Antenna 1 reaching up to 2/3 of body, peduncular segments progressively shorter from 1 to 3; peduncular segment 3 relatively long, almost reaching 2/3 of segment 2 (fig. XXI, 5), main flagellum up to 35-segmented, segments bearing 1—2 aesthetascs each; accessory flagellum short, 2-segmented (fig. XXI, 5).

Antenna 2 slender, ped. segments 4—5 subequal long, flagellum longer than ped. segment 5, up to 13-articulate, slender (fig. XXI, 6).

Mouthparts normal. Maxilla 1: inner plate with 6—7 setae, outer plate with spines bearing one lateral tooth (except inner spine), palp with up to 7 setae.

Maxilliped: inner plate with 4 distal spines, outer plate hardly reaching half of second palp segment, segment 4 with one seta on outer margin and without median setae on inner margin (fig. XXII, 9).

Mandible: palp segment 2 with up to 22 setae (fig. XXI, 9), segment 3 with up to 30 D-setae, 6—8 E-setae, 1 group of A-setae and 6—7 groups of B-setae (fig. XXI, 9).

Coxae short relatively, coxa 1 broader than long, subrounded ventroanteriorly (fig. XXI, 1), coxae 2—4 slightly longer than broad (fig. XXI, 3, 7, 8), coxa 5 shorter than 4.

Gnathopods 1—2 large, gnathopod 1 much smaller than 2. Gnathopod 1: segment 6 longer than broad (fig. XXI, 1), quadrate, palm inclinated less than half of segment 6-lenght, defined by 1 strong corner spine accompanied laterally by 4 slender toothed spines on outer face and short subcorner spine on inner face (fig. XXI, 2); dactyl reaching posterior margin of segment 6, bearing a row of single setae on outer margin.

Gnathopod 2: segment 6 hardly broader than long, palm inclinated slightly more than half of segment 6-length (fig. XXI, 3), palm defined by 1 strong corner spine accompanied by 2 slender toothed spines sitting behind corner spine, and with 1 subcorner spine (fig. XXI, 4); dactyl reaching posterior margin of segment 6, bearing a row of single setae at outer margin.

Pereopods 3—4 normal, dactyl bearing 1 plumose seta on outer margin and 1 spine on inner margin (fig. XXII, 7, 8).

Pereopods 5—7 moderately long, pereopod 5 much shorter than 7. Segment 2 of perceopods 5—7 up to 1.5 times as long as broad, without distinct ventroposterior lobe and without anterior convex margin (fig. XXII, 1, 3, 5); dactyls 5—7 short, with 1 seta on outer margin and 1 spine on inner margin (fig. XXII, 2, 4, 6).

Pleopods 1—3 normal, with 2 retinacula each. Epimeral plates 1—3 quadrate to poorly pointed (fig. XXII, 11).

Uropods 1—3 very spiniferous; uropods 1—2 with subequal rami bearing plumose setae and spines along both margins (fig. XXII, 13). Uropod 3 relatively short, bearing at inner margin single or pairs of plumose setae accompanied by groups of spines, second segment short (fig. XXII, 12).

Telson deeply incised, each lobe with up to 10 distal spines and with 1—2 groups of dorsal spines and single marginal spines (fig. XXII, 10); a pair of short plumose setae occurs near the middle of each lobe (fig. XXII, 10), lobes are stout distally.

Oostegyts broad, coxal gills occur on segments 2—6.

Males like females, with short segment 2 of uropod 3; uropods 1—2 like these in females.

Variability: The number of spines on telson is very variable but always very elevated. Epimeral plates angular to slightly pointed. The stable characters are long third ped. segment of antenna 1, absence of spines on metasomsegemnts, presence of spines on third urosomite and obtuse, heavily spinose telson.

Material examined: — spring of Ribnica river in Titograd (=Podgorica), Crna Gora (=Montenegro),many samples including paratypes, collected by Stanko and Gordan Karaman from 1932 to 1972;

— sublacustric spring near Plavnica in Skadar lake, S. of Titograd, Nov. 1972, 1 spec. (leg. G. Karaman);

— wells in village Golubovci near Titograd, August 3, 1968, 4 spec. (leg. G. Karaman);

— Morača river near Titograd, pump, July, 4, 1972, 2 spec. (leg. G. Karaman);

— spring on left bank of river Zeta between Danilovgrad and Glava Zete, Nov. 12, 1967, 2 spec. (leg. G. Karaman);

— spring on right bank of river Morača, 4 km of Titograd, Aug. 1979, 4 spec. (leg. G. Karaman).

Localities cited: spring of Ribnica river in Titograd (=Podgorica) (S. Karaman 1934, 1950); springs on riverbank of Morača and Zeta near Titograd and Danilovgrad; Golubovci, Plavnica (G. Karaman 1974).

Loc. typ.: spring of Ribnica river in Titograd (Montenegro).

Holotype: female ovig. 16 mm. Holotype and paratypes are deposited in Karaman's collection in Titograd.

Remarks: *Niphargus podgoricensis* is rather similar to *Niphargus kusceri*, but *N. kusceri* differs from *podgoricensis* by absence of spines on third urosomite, short third ped. segment of antenna 1, longer and less spiniferous telson, more spiniferous metasomsegments, etc.

Along Zeta rivers both species are present.

Fig. XXI. *Niphargus podgoricensis* S. Kar., Ribnica, female 17,4 mm: 1—2=gnathopod 1; 3—4=gnathopod 2; 5—6=antennae 1—2; 7—8=coxae 3—4; 9=mandibular palp.

Sl. XXI. *Niphargus podgoricensis* S. Kar., Ribnica, ženka 17,4 mm: 1—2=gnatopod 1; 3—4=gnatopod 2; 5—6=antene 1—2; 7—8=kokse 3—4; 9=mandibularni palp.

Fig. XXII. *Niphargus podgoricensis* S. Kar., Ribnica, female 17,4 mm: 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7—8=dactyl of pereopods 4 and 3; 9=dactyl of maxilliped palp; 10=telson; 11=epimeral plates 1—3; 12=uropod 3; 13=urosome with uropods 1—2; 14=metasomsegments 1—3.

Sl. XXII. *Niphargus podgoricensis* S. Kar., Ribnica, ženka 17,4 mm: 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7—8=daktil pereopoda 4 i 3; 9=daktil palpa maksilipeda; 10=telzon; 11=epimere 1—3; 12=uropod 3; 13=urozom sa uropodima 1—2; 14=metazomalni segmenti 1—3.

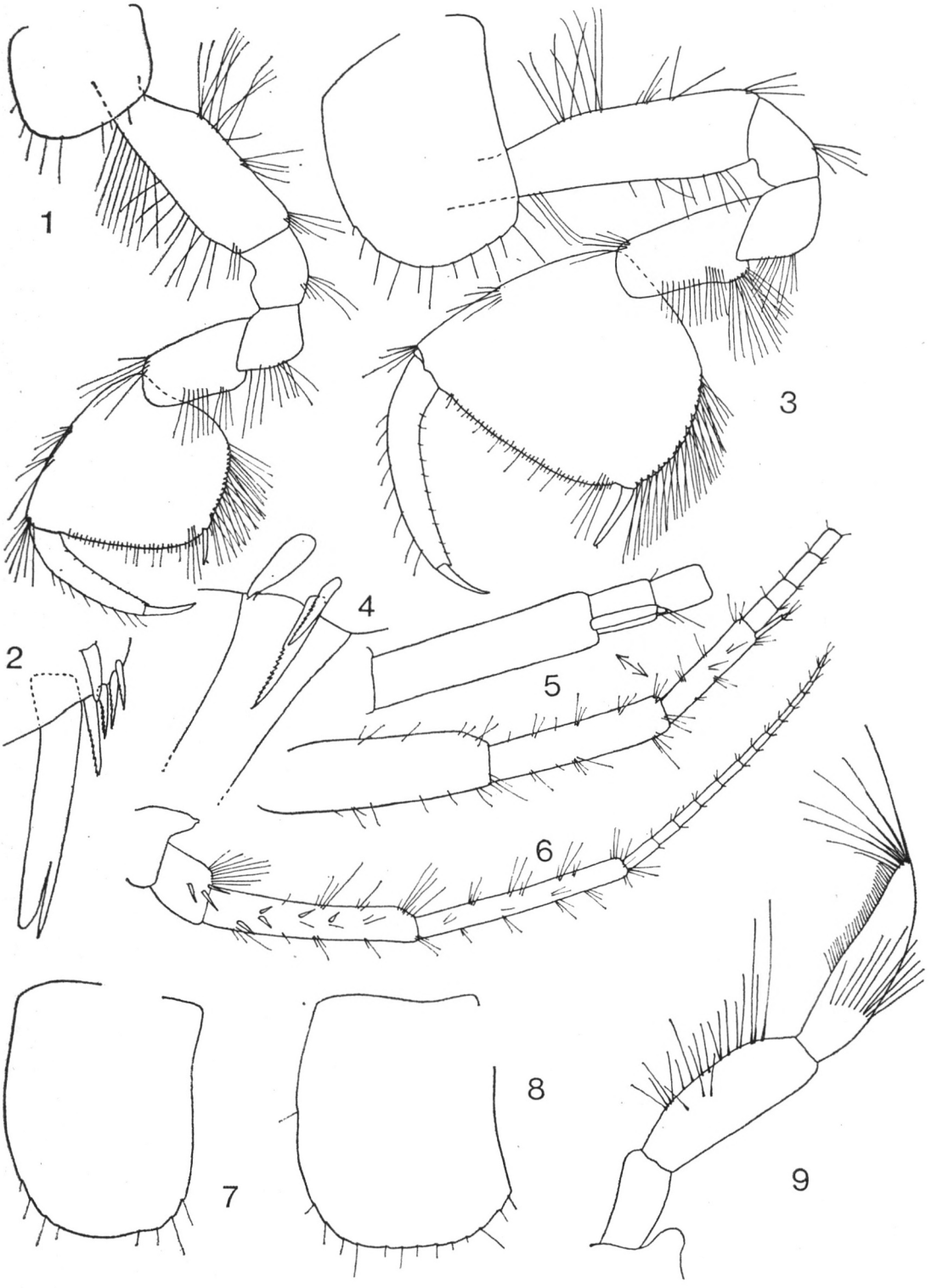


Fig. XXI.

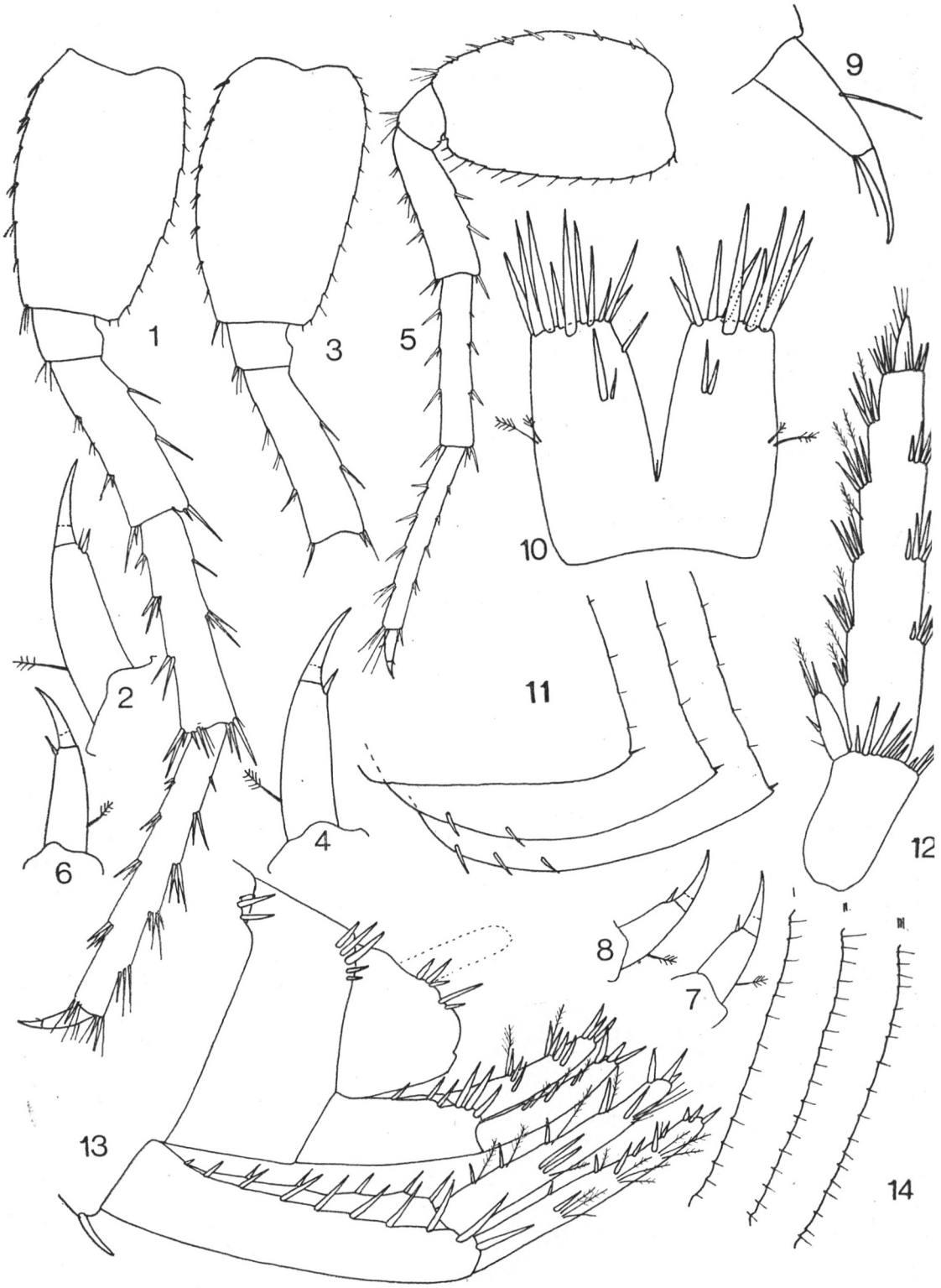


Fig. XXII.

**NIPHARGUS HERCEGOVINENSIS**

S. Karaman 1950 (new rank)

fig. XXIII—XXIV

*Orniphargus orcinus hercegovinensis* S. Karaman 1950a:126, fig. 26—28.

*Niphargus orcinus hercegovinensis* Straškraba 1959:308, fig. 5, 10; G. Karaman 1972:5; G. Karaman 1974:21.

Description: Ovig. female 20 mm: Body stout, metasom-segments 1—3 each with a row of up to 20 spines, accompanied sometimes by several short setae. Urosomites 1—3 each with several spines on each side (4—3—3, or 3—4—3, or 5—5—3 or 5——5—2) (fig. XXIV, 11).

Head like that in *podgoricensis*. Antenna 1 long, poorly shorter than body (18:20), peduncular segments 1—3 progressively shorter, ped. segment 2 hardly shorter than 1; segment 3 long and slender, almost reaching 2/3 of segment 2 (fig. XXIII, 8); main flagellum long, consisting of up to 50 articles bearing 2, rarely only 1 aesthetasc each. Accessory flagellum short, 2-segmented (fig. XXIII, 8).

Antenna 2 slender and long, ped. segment 4 hardly shorter than 5; flagellum slender, up to 16-articulate, much longer than segment 5 (fig. XXIII, 7).

Mouthparts normal. Maxilla 1: inner plate with 8—9 setae, outer plate with spines bearing prevalently one, rarely 2 lateral teeth each (fig. XXIII, 5). Maxilliped like that in podgoricensis (fig. XXIII, 6). Mandible: second segment with up to 20 setae, third segment of palp with 5—6 groups of B-setae, 1 group of A-setae, up to 38 D-setae and 7—8 E-setae.

Coxae 1—4 distinctly longer than broad (fig. XXIII, 1, 3, 9, 10), coxa 1 with subrounded ventroanterior corner.

Gnathopods 1—2 relatively large, gnathopod 1 remarkably smaller than 2. Gnathopod 1: segment 6 nearly as long as broad, palm defined by 1 strong corner spine accompanied laterally by 3 short slender toothed spines on outer face and 1 short subcorner spine on inner face (fig. XXIII, 2); dactyl reaching posterior margin of segment 6, bearing a row of single setae on outer margin (fig. XXIII, 1).

Gnathopod 2: segment 6 broader than long, palm defined by 1 strong corner spine accompanied by 2 slender toothed spines attached partially behind corner spine (fig. XXIII, 4) and with 1 short subcorner spine; dactyl reaching posterior margin of segment 6, bearing a row of setae on outer margin (fig. XXIII, 3).

Pereopods 3—4 normal, dactyl short, with 1 plumose seta on outer margin and 1 spine on inner margin (fig. XXIV, 7, 8).

Pereopods 5—7 like these in *podgoricensis*, segment 2 1.5 times as long as broad, and with angular and marked ventroposterior tooth (fig. XXIV, 1, 3, 5). Dactyls short, bearing 2 plumose setae on outer margin and 1 spine on inner margin (fig. XXIV, 2, 4, 6).

Pleopods with 2 retinacula each. Epimeral plates 1—3 with remarkably pointed and produced ventroposterior corner (fig. XXIV, 12).

Uropod 1 with subequal rami bearing at inner margin single or pairs of plumose setae accompanied by spines (fig. XXIV, 11).

Uropod 2: inner ramus slightly longer than outer one, outer ramus slightly recurved; both rami with spines and single plumose setae (fig. XXIV, 11). Uropod 3 moderately long, at inner margin with spines and many plumose setae (fig. XXIV, 9), second segment short.

Telson incised up to 2/3 of its length, each lobe with 3—4 distal spines and with 0—2 dorsal spines (fig. XXIV, 10); A pair of moderately long plumose setae appears in upper half of each lobe, lobes are not obtuse distally.

Coxal gills and oostegyts like these in *podgoricensis*.

Males like females, including uropods 1—3.

Variability: The second peduncular segment of antenna 1 can be slightly longer or shorter (cave in Popovo polje). S. Karaman figured very well the variability of armature on telson (1950). Third ped. segment of antenna 1 is always longer than that in *N. vjeternicensis*. The stable characters are the shape of antennae, presence of spines or third urosomite. On distal segments of flagellum in antenna 1 is usually only 1 aesthetasc, in proximal segments 1—2 aesthetascs.

Material examined: Herzegovina: — Zavala, Popovo polje, northern spring, 1948, 10 spec. accompanied by *N. balcanicus* (leg. S. Karaman);

— »Hercegovina«, 1956, 10 spec. (leg. T. Petkovski & M. Georgievski);

Fig. XXIII. *Niphargus hercegovinensis* S. Kar., Zavala, female 20 mm: 1—2=gnathopod 1; 3—4=gnathopod 2; 5=maxilla 1; 6=dactyl of maxilliped palp; 7=antenna 2; 8=antenna 1; 9—10= coxae 3—4.

Sl. XXIII. *Niphargus hercegovinensis* S. Kar., Zavala, ženka 20 mm: 1—2=gnatopod 1; 3—4=gnatopod 2; 5=maksila 1; 6=daktil palpa maxilipeda; 7=antena 2; 8=antena 1; 9—10=kokse 3—4.

Fig. XXIV. *Niphargus hercegovinensis* S. Kar., Zavala, female 20 mm: 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7—8=dactyl of pereopods 4 and 3; 9=uropod 3; 10=telson; 11=urosome with uropods 1—2; 12=epimeral plates 1—3.

Sl. XXIV. *Niphargus hercegovinensis* S. Kar., Zavala, ženka 20 mm: 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7—8=daktil pereopoda 4 i 3; 9=uropod 3; 10=telzon; 11=urozom sa uropodima 1—2; 12=epimere 1—3.

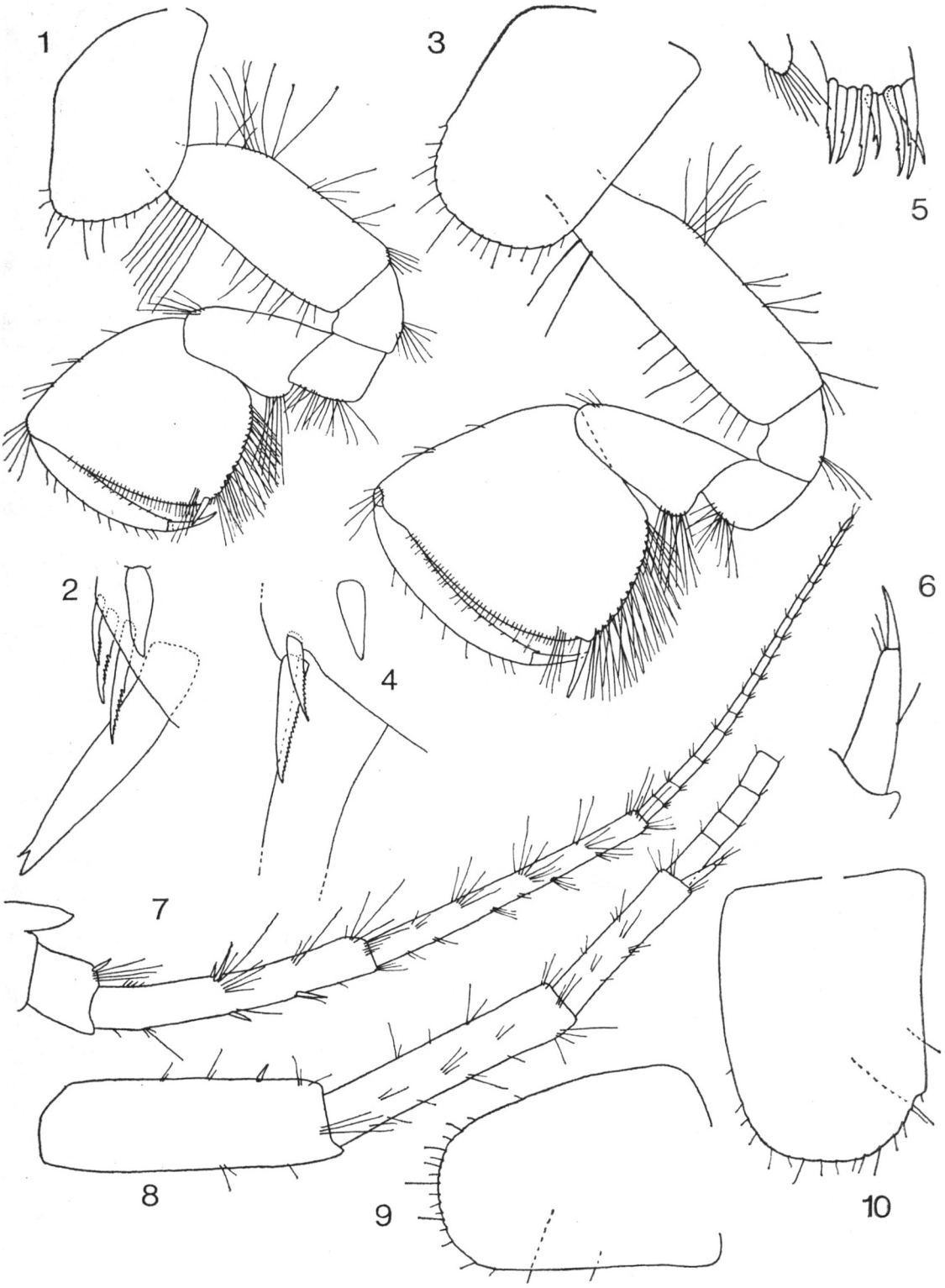


Fig. XXIII.

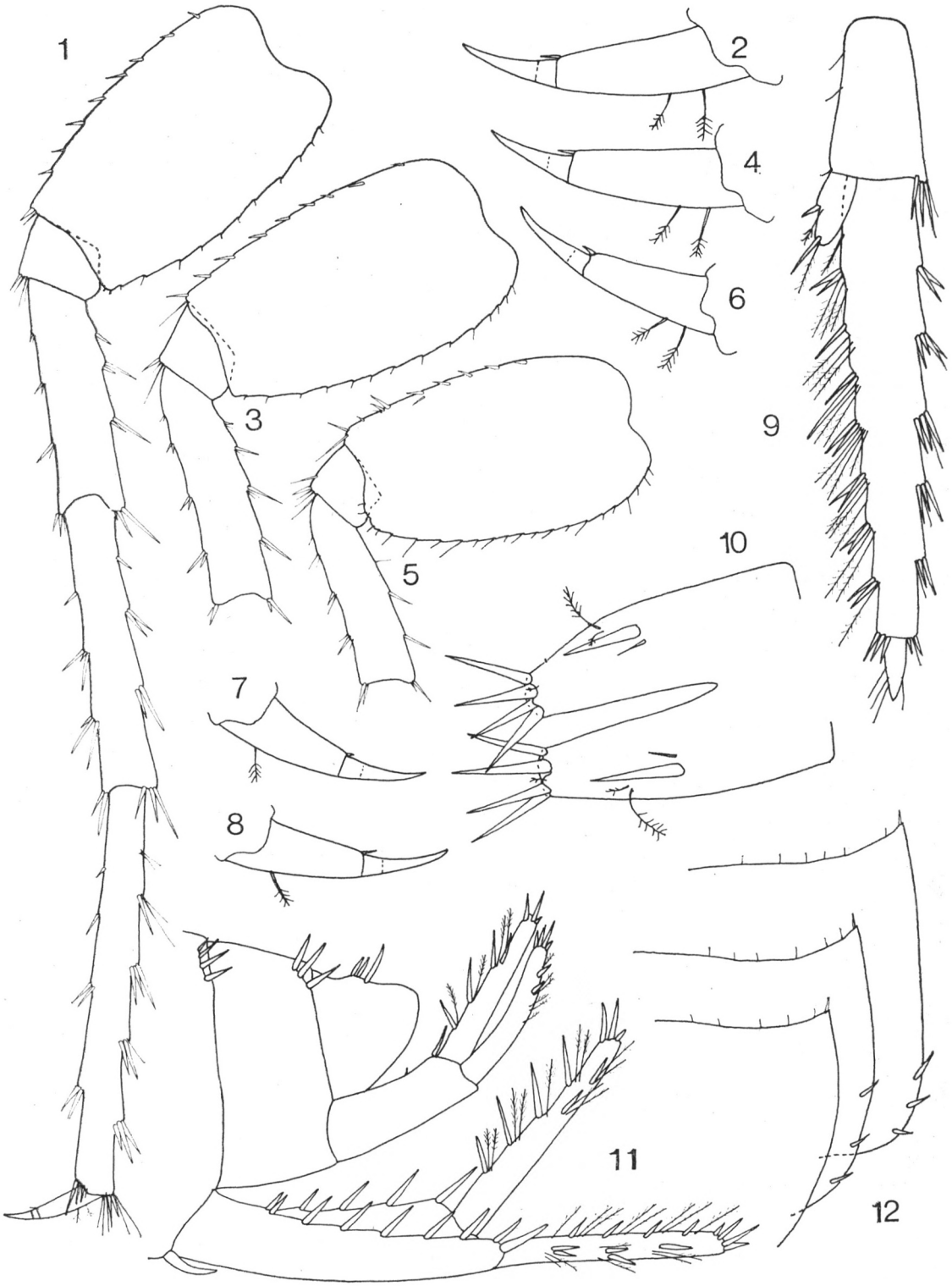


Fig. XXIV.

— cave in Popovo polje, July 1969, 3 spec. (leg. S. Šiljak);

— Vjeternica cave in Popovo polje, July 19, 1931, 4 spec. accompanied by *N. steueri kolombatovici* (leg. S. Karaman);

— spring Oko, Trebinje, 4. spec. (leg. T. Petkovski, 1957).

Localities cited: Herzegovina (S. Karaman 1950); Žira jama-cave near Turkovići (Straškraba 1959).

Loc. typ.: Northern spring in Zavala, Popovo polje.

Holotype: As this species was described without detailed locality, we selected specimen (female 20 mm) from northern spring in Zavala, Popovo polje (Herzegovina) as neotype. Neotypes are deposited in Karaman's collection in Titograd.

Remarks: *N. hercegovinensis* is very closed to *N. podgoricensis* (elongated third peduncular segment of antenna 1, presence of spines on urosomite 3, shape of gnathopods, epimeral plates, etc.). *Niphargus podgoricensis* differs from *N. hercegovinensis* by absence of spines on metasomsegments 1—3, by presence of only 1 plumose seta on outer margin of dactyl of pereopods 5—7, by more obtuse epimeral plates, by obtuse and more spiniferous telson, etc.

On the other hand, *N. hercegovinensis* is also rather similar to *N. vjeternicensis,* but differs from later in longer third peduncular segment of antenna 1, presence of spines on third urosomite, less inclinated palm of gnathopods 1—2, etc.

We can not exclude the possibility that *hercegovinensis* can be only one form of *N. podgoricensis,* but until now no transitive populations between both species were found and we consider both taxons as a distinct species.

## NIPHARGUS TRULLIPES

Sket 1958

fig. XXV, XXVI, XXVII 1—4

*Niphargus orcinus trullipes* Sket 1958:53, fig. unnumbered.
*Niphargus trullipes* G. Karaman 1972:6; G. Karaman 1974:27.

Description: male (?) 24 mm: Body stout, metasomsegments 1—3 each with a row of up to 25 strong spines, sometimes accompanied by single short setae (fig. XXV, 7). Urosomite 1 on each side with 4 spines, urosomites 2—3 on each side with 5—6 spines (fig. XXVII, 3).

Head with narrow lateral cephalic lobes (fig. XXVI, 8). Antenna 1 long, reaching the lenght of body; peduncular segments 1—3 progressively shorter, segment 3 short (fig. XXVI, 9); main flagellum consisting of up to 64 articles bearing 1—2 aesthetascs each; accesory flagellum 2-articulate, short (fig. XXVI, 9).

Antenna 2 short, peduncular segment 4 longer than 5, ped. segment 5 tapering distally (fig. XXVI, 10), flagellum remarkably shorter than ped. segment 5, stout, consisting of 12 articles; antennal gland cone short.

Mouthpirts normal. Maxilla 1: inner plate with 6 setae, outer plate with 7 spines (6 spines with 1 lateral tooth, 1 spine with 2—3 lateral teeth), palp with up to 15 setae (fig. XXVII, 4). Maxilla 2: inner plate without dorsal oblique row of setae. Maxilliped: inner plate with 4 spines, outer plate reaching 2/5 of second palp segment, palp segment 3 lobed distally, palp segment 4 with several setae at inner margin (fig. XXVI, 11).

Mandible: palp segment 3 with up to 36 D-setae, 6 E-setae, 1 group of A-setae and 5 groups of B-setae (fig. XXVII, 1).

Coxae moderate, coxa 1 as long as broad, with angular ventroanterior corner, coxae 2—4 longer than broad (fig. XXV, 1, 4, 9, 10).

Gnathopods 1—2 large, similar to each other in size and shape, although gnathopod 1 is hardly smaller than 2. Gnathopod 1: segment 6 ovoid, very inclinated, palm defined by one strong corner spine accompanied laterally by 3 slender toothed spines on outer face and one longer subcorner spine on inner face (fig. XXV, 1, 2, 3); dactyl very stout, dilated medially, with very short nail exceeding posterior margin of segment 6, bearing numerous very short setae along outer margin.

Gnathopod 2: segment 6 like that in gnathopod 1, palm defined by one strong corner spine accompanied laterally by 2 slender toothed spines on outer face and one long subcorner spine on inner face (fig. XXV, 4—6).

Pereopods 3—4 normal, with short dactyl bearing on inner margin one bunch of 1—2 spines and 2 plumose setae on outer margin (fig. XXVI, 6—7).

Fig. XXV. *Niphargus trullipes* Sket, Vjeternica cave, male (?) 24 mm: 1—3=gnathopod 1; 4—6=gnathopod 2; 7=metasomsegments 1—3; 8=epimeral plates 1—3; 9—10=coxae 3—4.

Sl. XXV. *Niphargus trullipes* Sket, Vjeternica pećina, mužjak (?) 24 mm: 1—3=gnatopod 1; 4—6=gnatopod 2; 7=metazomalni segmenti 1—3; 8=epimere 1—3; 9—10=kokse 3—4.

Fig. XXVI. *Niphargus trullipes* Sket, Vjeternica cave, male (?) 24 mm: 1—2=pereopod 7; 3=pereopod 6; 4—5=pereopod 5; 6—7=dactyl of pereopods 4 and 3; 8=head; 9—10=antennae 1—2; 11=dactyl of maxilliped palp; 12=uropod 3.

Sl. XXVI. *Niphargus trullipes* Sket, Vjeternica, mužjak (?) 24 mm: 1—2=pereopod 7; 3=pereopod 6; 4—5= pereopod 5; 6—7=daktil pereopoda 4 i 3; 8=glava; 9—10=antene 1—2; 11=daktil palpa maksilipeda; 12=uropod 3.

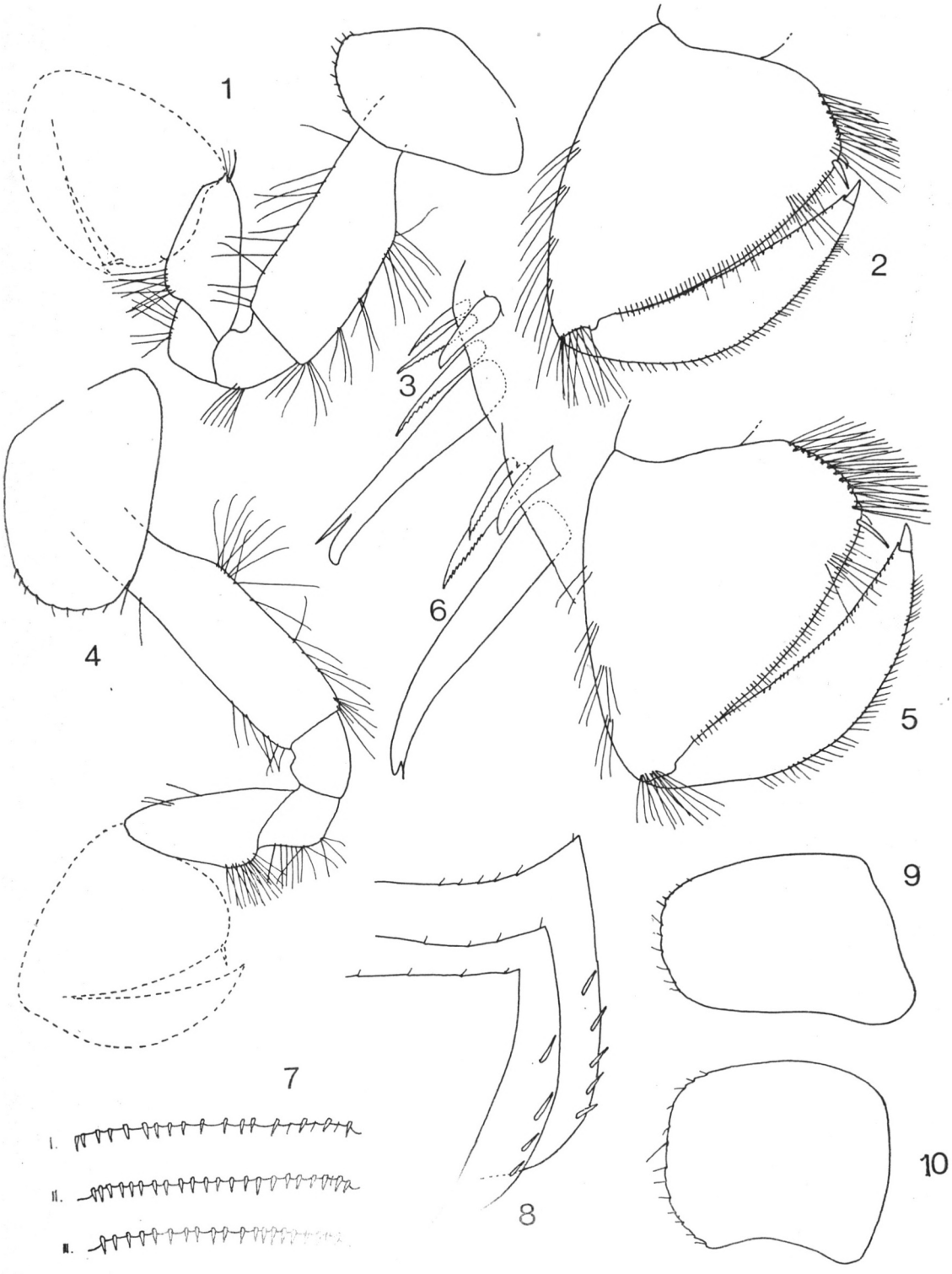


Fig. XXV.

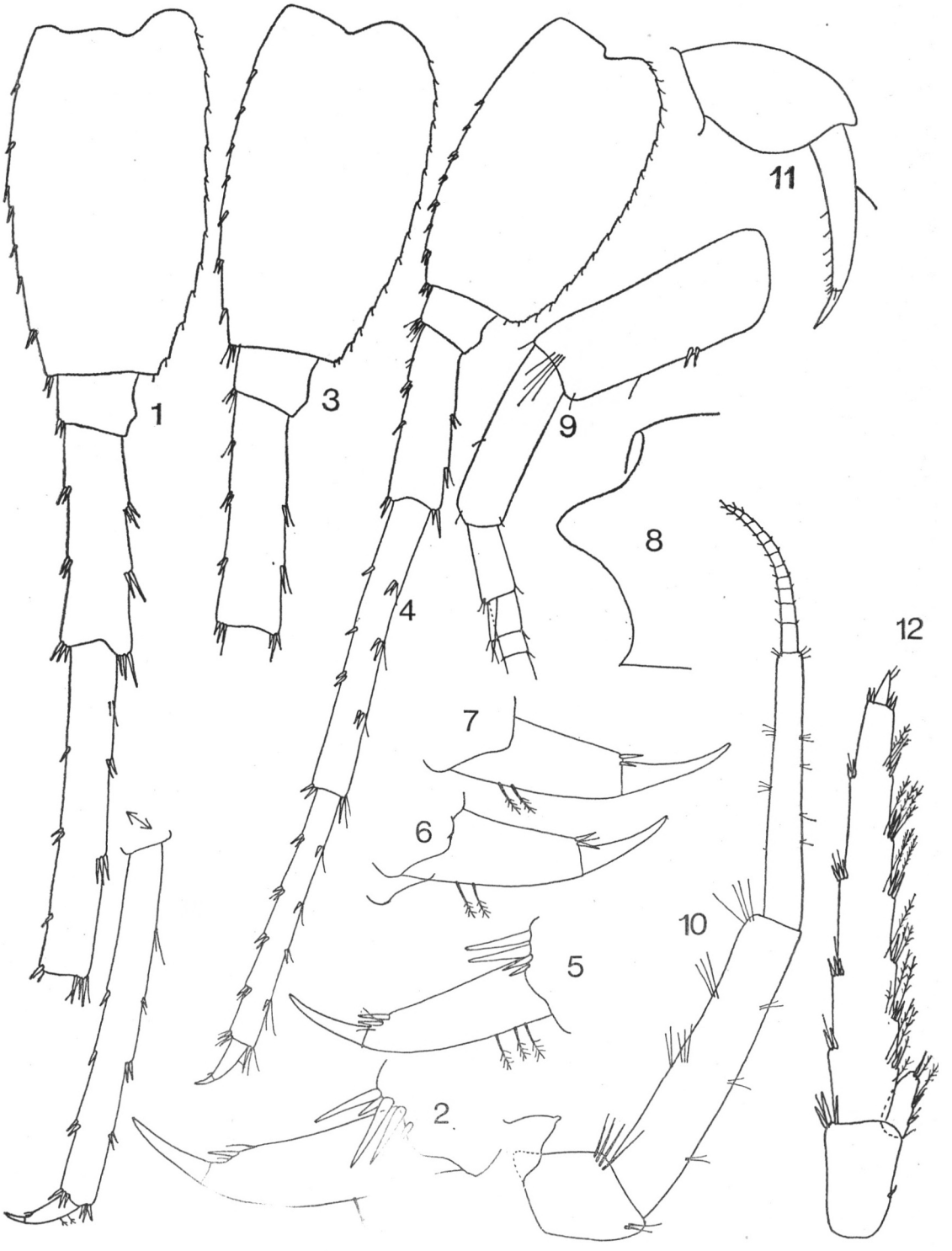


Fig. XXVI.

Pereopods 5—7 long, with segment 2 narrow, without ventroposterior lobe (fig. XXVI, 1, 3, 4), dactyls short, bearing 3 plumose setae on outer margin and one bunch of 1—2 spines on inner margin (fig. XXVI, 2, 5).

Pleopods with 2 retinacula each. Epimeral plates 1—3 normal, produced posteriorly (fig. XXV, 8).

Uropod 1: rami subequal, bearing spines and plumose setae along margins (fig. XXVII, 3). Uropod 2: inner ramus hardly longer than outer one, both rami with spines and plumose setae along margins (fig. XXVII, 3).

Uropod 3 relatively short, bearing plumose setae and spines along inner margin, second segment short (fig. XXVI, 12). Telson deeply incised, lobes tapering distally (fig. XXVII, 2), each lobe with 5 distal spines; a pair of short plumose setae appears near the middle of each lobe.

Females probably like males.

Variability: The scarce material of this species in our hand didn't permit us to establish the variability of this species.

Material examined: Herzegovina: — Vjeternica cave, Veliko jezero, August 23, 1931, 1 spec. accompanied by *N. vjeternicensis* and *N. st. kolombatovici.*

Localities cited: Vjeternica cave (Sket 1958).

Loc. typ.: Vjeternica cave, Herzegovina.

Remarks: The shape of this species is very aberrant, but based on shape and armature of antenna 2, uropods 1—2, epimeral plates, etc., *N. trullipes* belong to *N. croaticus* group of species.

## NIPHARGUS VJETERNICENSIS

S. Karaman 1932 (new rank)

This species was described (1932) by Stanko Karaman from Vjeternica cave in Herzegovina as *Niphargus orcinus vjeternicensis,* n. ssp.

Later, S. Karaman described two other similar taxons: *N. orcinus kusceri,* n. ssp. from the springs of Ljuta in Boka Kotorska (Montenegro) (1950) and *Niphargus bilecanus,* n. sp. (1953) from springs of Trebinjčica river near Bileća (Herzegovina).

After the analysis of taxonomic characteristics of these three taxons, it was clear that all of them belong to the same species, *N. vjeternicensis* S. Kar., differing very poorly to each other. We intended to fuse all three taxons into one, but because already these taxons were established, we left *kusceri* provisorily as a distinct subspecies, and *bilecanus* we removed to kusceri as a distinct forma only, untill one detailed statistical analysis of taxonomic characters of all known populations of these taxons to establish their taxonomic status.

## NIPHARGUS VJETERNICENSIS VJETERNICENSIS

S. Karaman 1950 (new rank)

fig. XXVII 5—12; XXVIII; XXIX 1—7

*Niphargus orcinus vjeternicensis* S. Karaman 1932:213, fig. 18b, c; Schellenberg 1935:211; Straškraba 1959:308; G. Karaman 1972:5; G. Karaman 1974:22.

*Orniphargus orcinus vjeternicensis* S. Karaman 1950a:125, fig. 14—25.

*Antroplotes herculeanus* Absolon 1916 (nomen nudum).

*Niphargus herculeanus* Absolon 1927:5 (nomen nudum).

Description: Female up to 22 mm ovig.: Body like that of *N. orcinus,* metasomsegments 1—3 each with a row of spines and/or setae (fig. XXVII, 7, 12). Urosomites not carinate, urosomites 1—2 with 2—4 spines on each side (fig. XXVIII, 13), urosomite 3 smooth. Head like that in *N. orcinus.*

Antenna 1 reaching 2/3 of body, peduncular segments 1—3 progressively shorter, ped. segment 3 short (fig. XXVIII, 9), main flagellum consisting of up to 50 articles bearing 2—3, rather only one aesthetasc; accessory flagellum short, 2-articulate.

Antenna 2 slender, peduncular segment 5 hardly longer than 4, flagellum slender, nearly as long as ped. segment 5, consisting of 14 articles (fig. XXVIII, 10).

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Fig. XXVII. *Niphargus trullipes* Sket, Vjeternica cave, male (?) 24 mm: 1=mandibular palp; 2=telson; 3=urosome with uropods 1—2; 4=maxilla 1; *Niphargus vjet. vjeternicensis* S. Kar., Vjeternica cave, female 22 mm: 5=maxilla 1; 6=telson; 7=metasomsegments 1—3; 8=epimeral plates 1—3; 9—10=coxae 3—4; 11=telson, male 28 mm; 12=metasomsegments 1—3, male 21 mm.

Sl. XXVII. *Niphargus trullipes* Sket, Vjeternica pećina, mužjak (?) 24 mm: 1=mandibularni palp; 2=telzon; 3=urozom sa uropodima 1—2; 4=maksila 1; *Niphargus vjet. vjeternicensis* S. Kar., Vjeternica pećina, ženka 22 mm: 5=maksila 1; 6=telzon; 7=metazomalni segmenti 1—3; 8=epimere 1—3; 9—10=kokse 3—4; 11=telzon, mužjak 28 mm; 12=metazomalni segmenti 1—3, mužjak 21 mm.

Fig. XXVIII. *Niphargus vjet. vjeternicensis* S. Kar., Vjeternica cave, female 22 mm: 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7—8=dactyl of pereopods 3—4; 9—10=antennae 1—2; 11=dactyl of maxilliped palp; 12=uropod 3; 13=urosome with uropods 1—2; 14= pereopod 7, male 28 mm.

Sl. XXVIII. *Niphargus vjet. vjeternicensis* S. Kar., Vjeternica pećina, ženka 22 mm: 1—2=pereopod 7; 3—4=pereopod 6; 5—6=pereopod 5; 7—8=daktil pereopoda 3—4; 9—10=antene 1—2; 11=daktil palpa maksilipeda; 12=uropod 3; 13=urozom sa uropodima 1—2; 14= pereopod 7, mužjak 28 mm.

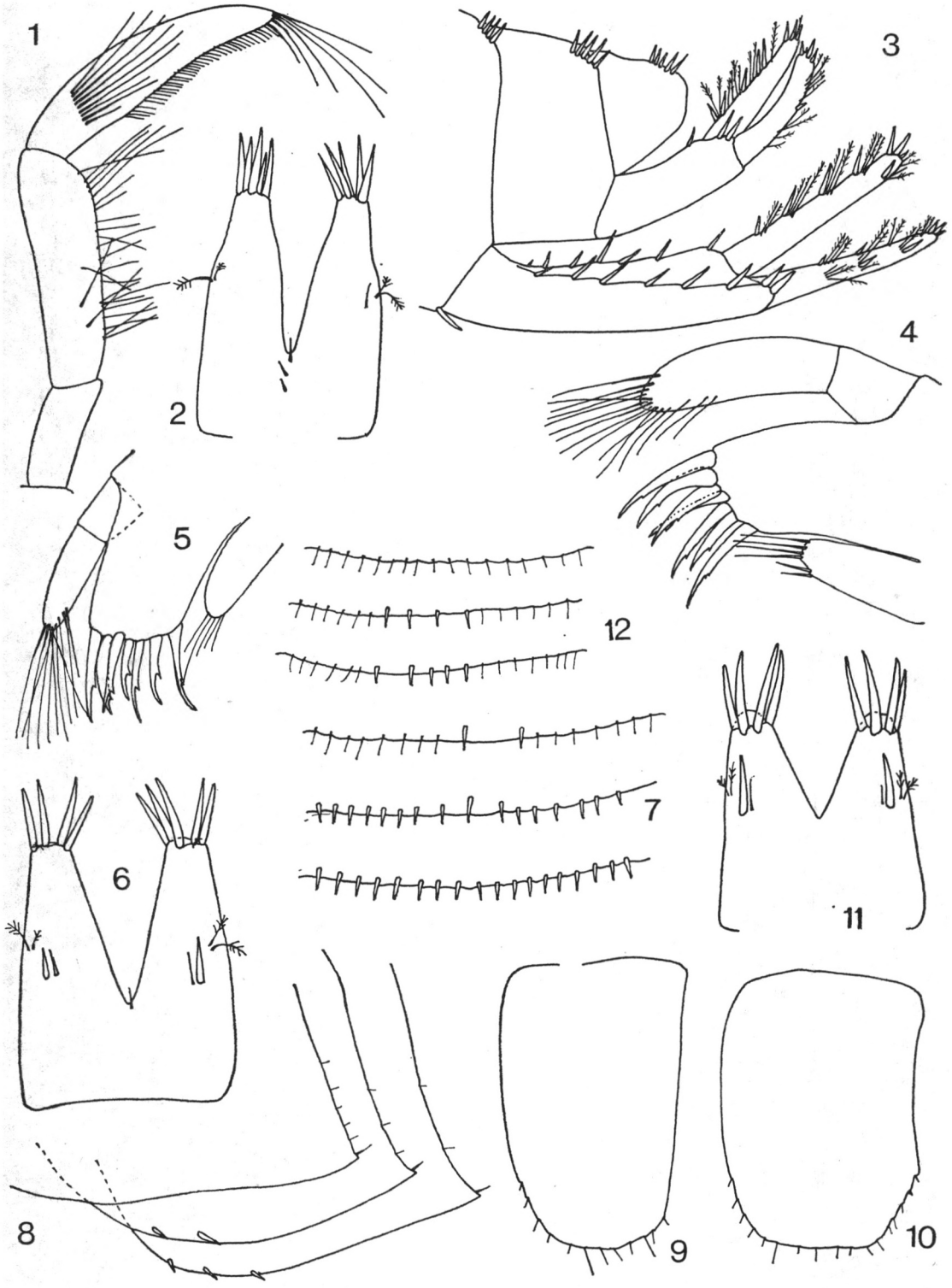
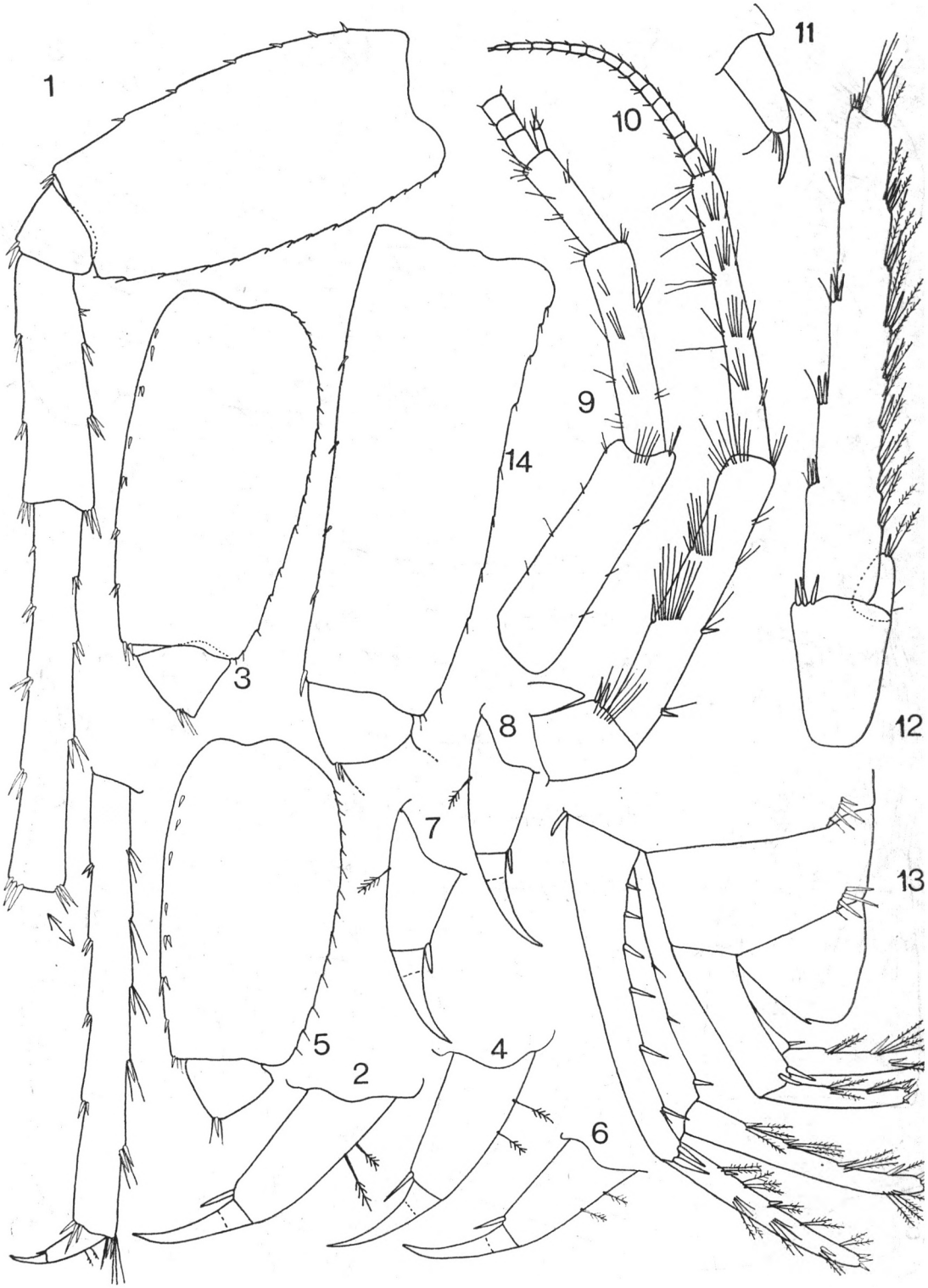



Fig. XXVII.


1
11
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6

Mouthparts normal. Maxilla 1: inner plate with 4—5 setae (fig. XXVII, 5), outer plate with 7 spines (6 spines with 1 lateral tooth, one spine with 2 teeth), palp with up to 11 setae. Maxilliped: inner plate with 5, exceptionally 6 spines; outer plate not reaching or reaching half of second palp segments; palp segment 4 with one bunch of setae on inner margin and one bunch of setae on outer margin (fig. XXVIII, 11).

Mandible: palp article 2 with up to 30 setae, palp article 3 with 1 group of A-setae, 5—6 groups of B-setae, up to 40 D-setae and 7—10 E-setae.

Coxae moderate, coxa 1 with subrounded ventroanterior corner (fig. XXIX, 1), coxae 1—4 distinctly longer than broad (fig. XXVII, 9, 10; XXIX, 1, 3).

Gnathopods 1—2 large, their segment 6 larger than coxae. Gnathopod 1: segment 6 much smaller than that in gnathopod 2 (fig. XXIX, 1, 2), palm very inclinated, defined by one strong corner spine accompanied laterally by 3—4 slender toothed spines on outer face and one short subcorner spine on inner face; dactyl reaching posterior margin of segment 6, bearing a row of single setae on outer margin.

Gnathopod 2: segment 6 very inclinated, palm defined by one strong corner spine acompanied laterally by 2—3 slender toothed spines on outer face and one short subcorner spine on inner face (fig. XXIX, 3, 4); dactyl like that in gnathopod 1.

Pereopods 3—4 slender, dactyls short, bearing one plumose seta on outer margin and one spine on inner margin (fig. XXVIII, 7, 8).

Pereopods 5—7 relatively long, pereopod 7 exceeding posterior margin of uropods 1—2. Segment 2 of pereopods 5—7 elongated, with poorly marked ventroposterior angular lobe (fig. XXVIII, 1, 3, 5); dactyls with 2, rather only one plumose seta on outer margin and with one spine on inner margin (fig. XXVIII, 2, 4, 6).

Pleopods with 2 retinacula each. Epimeral plates 1—3 with pointed ventroposterior corner, less produced than that in *N. orcinus* (fig. XXVII, 8).

Uropod 1: rami subequal or inner ramus is hardly longer than outer one, both rami with plumose setae (fig. XXVIII, 13). Uropod 2: inner ramus as long as or hardly longer than outer one, both rami with plumose setae sitting in bunches (1—3 setae in each bunch) (fig. XXVIII, 13).

Uropod 3: second segment short, inner margin of outer ramus with spines and plumose setae (fig. XXVIII, 12).

Telson incised over half of its lenght (fig. XXVII, 6), each lobe with 4—5, rarely only 3 distal spines; usually 1—2 dorsomedial spines are present, rarely absent; a pair of short plumose setae appears near the middle of each lobe.

Oostegyts broad, coxal gills on segments 2—6.

Males up to 19 mm lenght like females, these over 25 mm are with larger more inclinated gnathopods 1—2 (fig. XXIX, 5, 6), more elongated segment 2 of pereopods 5—7 (fig. XXVIII, 14), less incised telson, etc. (fig. XXVII, 11).

Variability: Already small specimens of 12 mm lenght are with setiferous rami of uropods 1—2. Metasomsegments 1—3 are more or less spiniferous, usually the number of spines is increasing toward metasomsegment 3. Rami of uropods 1—2 are subequal long or inner ramus is hardly longer than outer one. The shape of segment 6 of gnathopods 1—2, epimeral plates and article 2 of pereopods 5—7 is variable. Outer margin of dactyl in pereopods 5—7 are usually (not always) with 2 plumose setae.

The stable characters are the absence of spines on urosomite 3, presence of plumose setae on rami of uropods 1—2, shape of coxae, antennae 1—2 etc.

Material examined: Herzegovina: — Many samples from Vjeternica cave in Popovo polje (Zavala), collected from 1931 to 1981 by several authors, specimens collected together with *N. st. kolombatovici, N. trullipes;*

— Snjetnica cave, Kifino Selo, 23—24 July, 1963, 8 spec. (leg. C. Deeleman);

— spring Srđenići, Gacko polje, 23 August, 1956, 2 spec. (leg. T. Petkovski);

— spring Vrijeka, Dabarsko polje, July 20, 1956, 5 spec. (leg. T. Petkovski).

Localities cited: Vjeternica cave in Herzegovina (S. Karaman 1932, 1950; Straškraba 1959; G. Karaman 1972, 1974).

Loc. typ.: Vjeternica cave.

Holotype: Female 22 mm. Holotype and paratypes are deposited in Karaman's collection in Titograd.

Fig. XXIX. *Niphargus vjet. vjeternicensis* S. Kar., Vjeternica cave, female 22 mm: 1—2=gnathopod 1; 3—4=gnathopod 2; 5—6=gnathopods 1—2, male 28 mm; 7=coxa 3, female 21 mm from Kifino Selo.

*Niphargus vjeternicensis kusceri* (S. Kar.), spring of Bregava, female 20 mm: 8=metasomsegments 1—3; 9—10=coxae 3—4.

Sl. XXIX. *Niphargus vjet. vjeternicensis* S. Kar., Vjeternica pećina, ženka 22 mm: 1—2=gnatopod 1; 3—4=gnatopod 2; 5—6=gnatopodi 1—2, mužjak 28 mm; 7=koksa 3, ženka 21 mm iz Kifinog Sela.

*Niphargus vjeternicensis kusceri* S. Kar., izvor Bregave, ženka 20 mm: 8= metazomalni segmenti 1—3; 9—10=kokse 3—4.

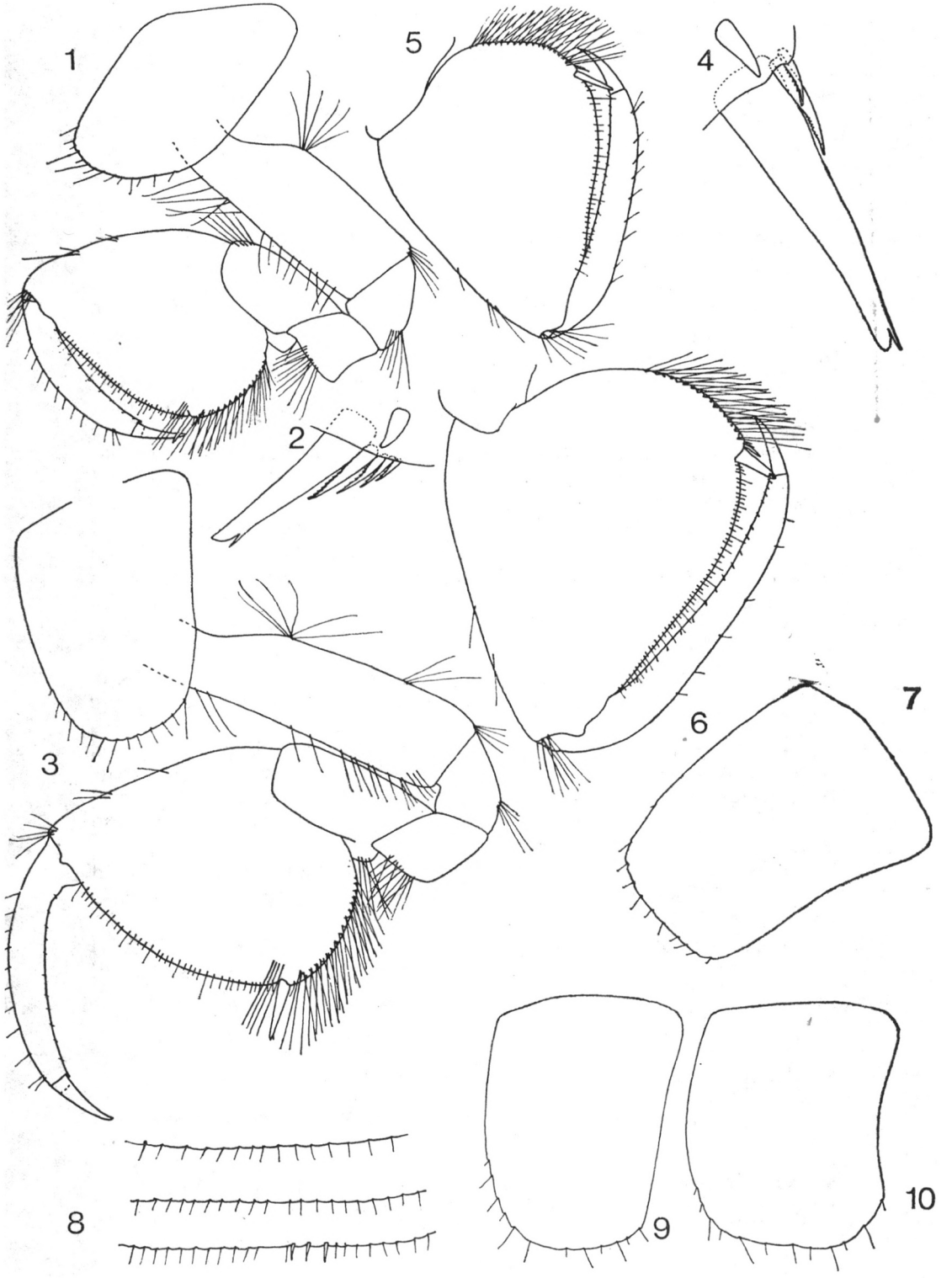


Fig. XXIX.

## NIPHARGUS VJETERNICENSIS KUSCERI

S. Karaman 1950 (new comb.)

fig. XXIX 8—10; XXX; XXXI

*Orniphargus orcinus kusceri* S. Karaman 1950a:127, fig. 29—31.
*Niphargus (Orniphargus) orcinus kusceri* G. Karaman 1967:11, fig. 10—11.
*Niphargus orcinus kusceri* G. Karaman 1972:5; G. Karaman 1974:21.

Description: (type-locality): Female up to 23 mm: Body stout, metasomsegments 1—3 prevalently setose, spines are more frequently on metasomsegment 3 (fig. XXX ,12; XXXI, 9). Urosomites 1—2 each with 3—5 spines on each side, urosomite 3 smooth (exceptionally with 1—2 spines) (fig. XXXI, 4). Head like that in ssp. *vjeternicensis.*

Maxilla 1: inner plate with 5—6 setae, outer plate with 7 spines (6 spines with 1 tooth, one spine with 2—3 teeth), palp with up to 12 setae. Maxilla 2, maxilliped and mandible like these in ssp. *vjeternicensis.*

Coxae 1—4 shorter than these in ssp. *vjeternicensis* (fig. XXIX, 9, 10; XXXI, 2, 3).

Gnathopods 1—2 large, but slightly smaller than these in ssp. *vjeternicensis* (fig. XXX, 1, 3), (regarding specimens of the same size).

Gnathopod 1: segment 6 remarkably inclinated, palm defined by one strong corner spine accompanied laterally by 4 slender toothed spines and one short subcorner spine (fig. XXX, 1, 2); dactyl reaching posterior margin of segment 6, with a row of setae on outer margin.

Gnathopod 2: palm defined by strong corner spine accompanied by 2—3 slender toothed spines attached partially behind corner spine (fig. XXX, 3, 4).

Pereopods 3—4 like these in ssp. *vjeternicensis* (fig. XXX, 5) Pereopods 5—7: segment 2 narrow, up to twice as long as broad,

Fig. XXX. *Niphargus vjeternicensis kusceri* (S. Kar.), Ljuta, female 22 mm: 1—2=gnathopod 1; 3—4=gnathopod 2; 5=dactyl of pereopod 3; 6—7=pereopod 5; 8—9=pereopod 6; 10—11=pereopod 7; 12=metasomsegments 1—3, female 18 mm.

Sl. XXX. *Niphargus vjeternicensis kusceri* (S. Kar.), Ljuta, ženka 22 mm: 1—2=gnatopod 1; 3—4=gnatopod 2; 5=daktil pereopoda 3; 6—7=pereopod 5; 8—9=pereopod 6; 10—11=pereopod 7; 12=metazomalni segmenti 1—3, ženka 18 mm.

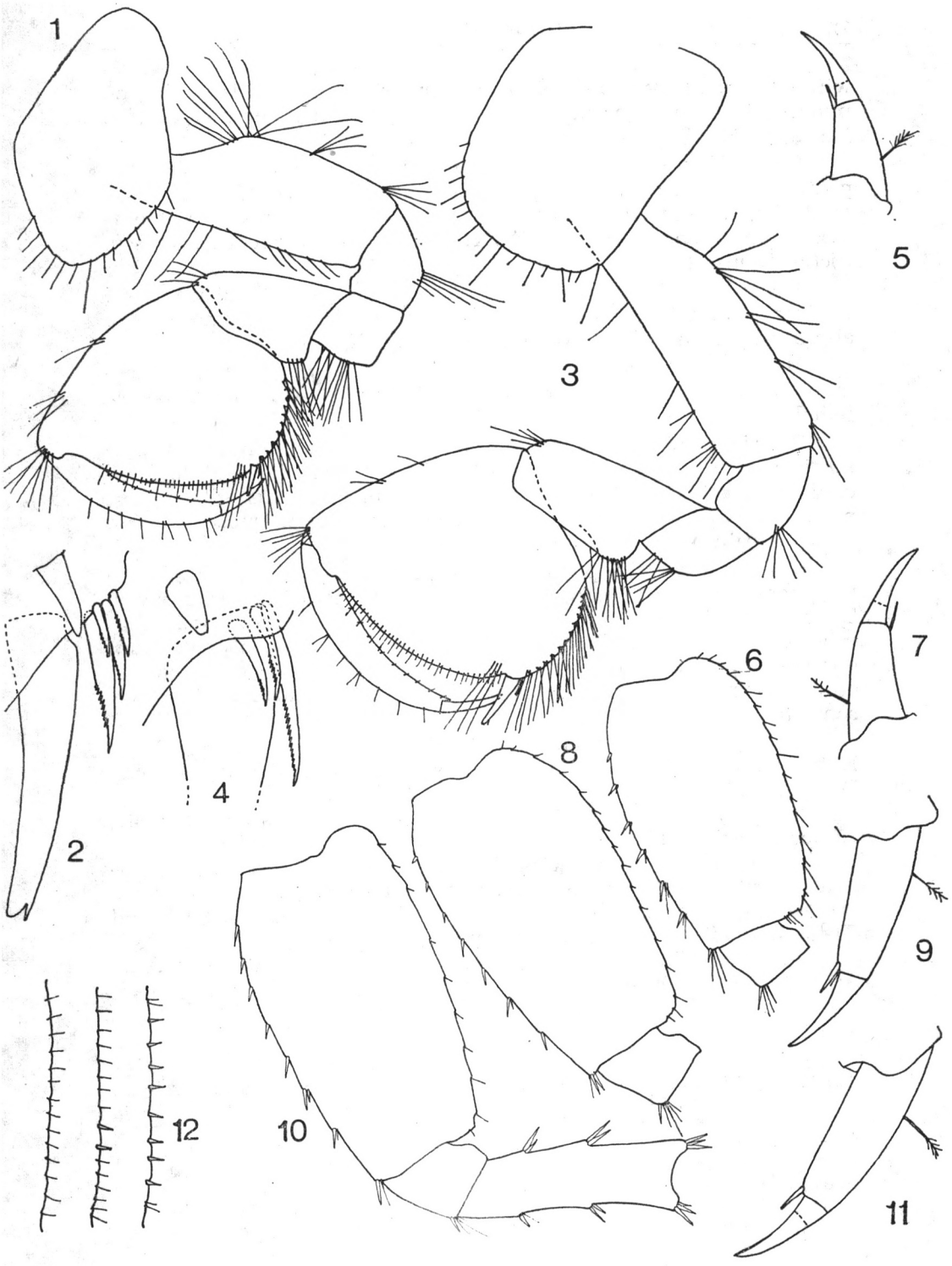


Fig. XXX.

without strong ventroposterior corner or lobe; dactyls with one plumose seta on outer margin and one spine on inner margin (fig. XXX, 6—11). Pleopods with 2 retinacula each.

Epimeral plates 1—3 angular to slightly pointed, usually less pointed than these in ssp. *vjeternicensis* (fig. XXXI, 1, 8). Uropods 1—2 like these in ssp. *vjeternicensis* but with lower number of plumose setae along rami (fig. XXXI, 4). Uropod 3 like that in ssp. *vjeternicensis* (fig. XXXI, 5).

Telson: each lobe with 4—6 distal spines and 1—2 groups of 1—2 spines on dorsal face of lobes; a pair of short plumose setae appears near the middle of each lobe (fig. XXXI, 7, 10).

Males are similar to females, but we have not in hand extremely large specimens over 24 mm. Uropods 1—3 like these in females.

Variability: The subspecies *kusceri* differs from ssp. *vjeternicensis* by shorter coxae 1—4, relatively smaller and less inclinated gnathopods 1—2, more obtuse epimere, less setose uropods 1—2 and by presence of prevalently one plumose seta on outer margin of dactyl in pereopods 5—7.

But there are the populations with partially transitive characters between *kusceri* and *vjeternicensis* (spring of Bregava river; Zeta river). On the other hand, variability of some taxonomic characters is remarkable often within the specimens of one population: obtuse to pointed epimeral plates, presence or absence of spines on metasomsegments, shape of gnathopods 1—2, armature of telson, etc.

Material examined: — spring Ljuta near Kotor in Boka Kotorska, June 20, 1935, many spec. (leg. D. Kuščer); — ibid., February 11, 1981, many spec. (leg. G. & M. Karaman);

— spring Škurda in Kotor, Boka Kotorska, March 18, 1967, 10 spec. (leg. G. Karaman);

— spring on left bank of Morača river near Zlatica in Titograd, April 20, 1968, many spec. (leg. G. Karaman);

— large spring along river Zeta between Danilovgrad and Glava Zete, December, 1967, 20 spec. (leg. G. Karaman);

— spring Vidrovan near Nikšić, August 6, 1970, 3 spec.; ibid., April 12, 1979, 10 spec. (leg. G. Karaman);

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Fig. XXXI. *Niphargus vjeternicensis kusceri* (S. Kar.), Ljuta, female 22 mm: 1=epimeral plates 1—3; 2—3=coxae 3—4; 4=urosome with uropods 1—2; 5=uropod 3; 6=antenna 1; 7=telson; 8=epimeral plates, female 20 mm; 9=metasomsegments 1—3, male 22 mm; 10=telson, male 22 mm.

Sl. XXXI. *Niphargus vjeternicensis kusceri* (S. Kar.), Ljuta, ženka 22 mm: 1=epimere 1—3; 2—3=kokse 3—4; 4=urozom sa uropodima 1—2; 5=uropod 3; 6=antena 1; 7=telzon; 8=epimere, ženka 20 mm; 9=metazomalni segmenti 1—3, mužjak 22 mm; 10=telzon, mužjak 22 mm.

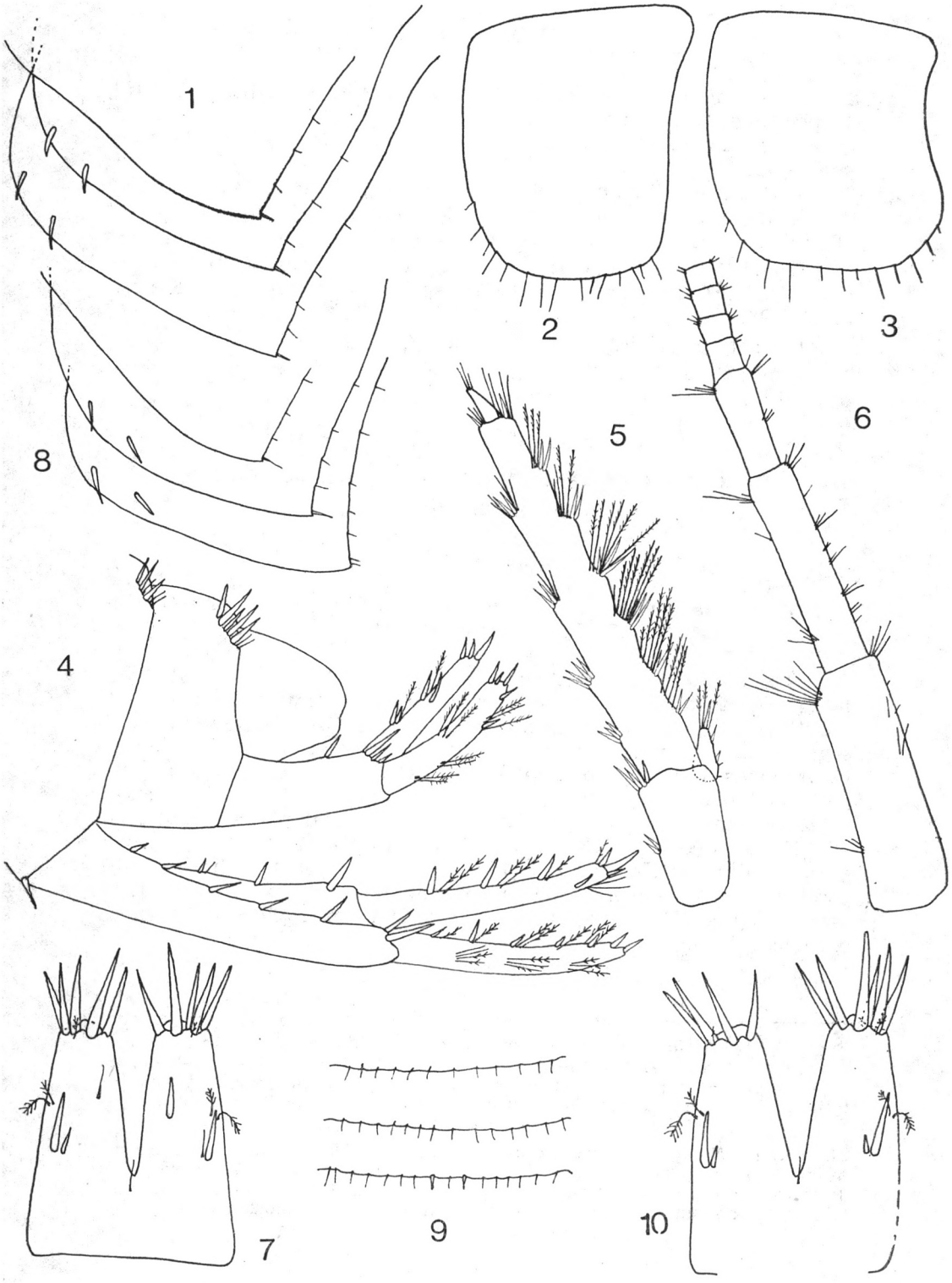


Fig. XXXI.

— spring in Mratinje, affluent of Piva river, April 12, 1979, 1 spec. (leg. G. Karaman);

— spring of Bregava river near Stolac, Sept. 12, 1973, many spec. (leg. G. Karaman);

— ? Parež, Trebinje, 1957, 2 spec. (leg. T. Petkovski);

— ? spring (vrelo) Pećina, Gornji Studenci (Čapljina), August 10, 1970, 1 spec. juv. (leg. C. Deeleman).

Localities cited: spring Ljuta near Kotor (S. Karaman 1950, G. Karaman 1967), spring of Škurda (G. Karaman 1967).

Loc. typ.: spring Ljuta in Boka Kotorska.

Holotype: female 24 mm. Holotype and paratypes are deposited in Karaman's collection in Titograd.

## NIPHARGUS VJETERNICENSIS KUSCERI f. BILECANUS

S. Karaman 1953 (new comb.)

fig. XXXII

*Niphargus bilecanus.* S. Karaman 1953:149, fig. 18—27; G. Karaman 1972:5; G. Karaman 1974:15.

Description: Female ovig. up to 23.3 mm. Generally very similar to ssp. *kusceri* by numerous characters: antennae 1—2, mouthparts, short coxae (fig. XXXII, 4—7, 12); third peduncular segment of antenna 1 shorter than that in ssp. *vjeternicensis.* Gnathopods 1—2 and pereopod 3—7 similar to these of ssp. *kusceri,* but dactyl of pereopods 5—7 prevalently with 2 plumose setae on outer margin (fig. XXXII, 8). Epimeral plates angular to slightly pointed (fig. XXXII, 3). Metasomsegments 1—3 and telson very spiniferous (fig. XXXII, 10, 11, 13). Uropod 3 with short second segment, bearing bunches of spines along margins of first segment (fig. XXXII, 9). Oostegyts broad, coxal gills on thoracal segments 2—6.

Fig. XXXII. *Niphargus vjeternicensis kusceri f. bilecanus* (S. Kar.), Bileća, female 23,5 mm: 1—2=gnathopods 1—2; 3=epimeral plates 1—3; 4—7=coxae 1—4; 8=dactyl of pereopod 7; 9=uropod 3; 10=metasomsegments 1—3; 11=telson; 12=antenna 1; 13=metasomsegments 1—3, female 27 mm from Ljelješnica cave.

Sl. XXXII. *Niphargus vjeternicensis kusceri f. bilecanus* (S. Kar.), Bileća, ženka 23,5 mm: 1—2=gnatopodi 1—2; 3=epimere 1—3; 4—7=kokse 1—4; 8=daktil pereopoda 7; 9=uropod 3; 10=metazomalni segmenti 1—3; 11=telzon; 12=antena 1; 13=metazomalni segmenti 1—3, ženka 27 mm iz pećine Ljelješnica.

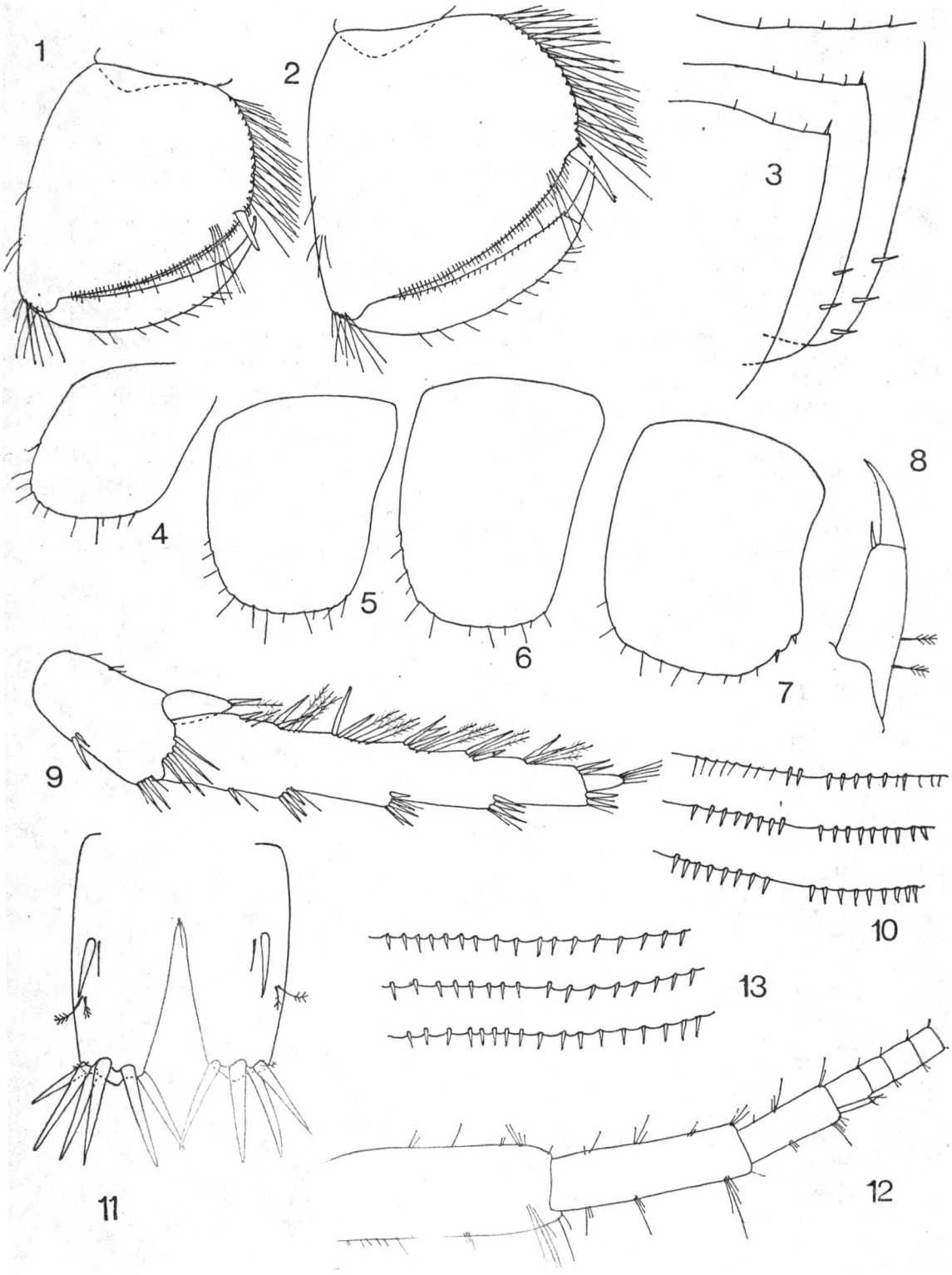


Fig. XXXII.

Males like females, including uropods 1—3.

Variability: Forma *bilecanus* differs from ssp. *kusceri* by more spiniferous metasomsegments and by presence of 2 plumose setae on outer margin of dactyl in pereopods 5—7.

Subspecies *vjeternicensis* differs from forma *bilecanus* by more elongated third peduncular segment of antenna 1, longer coxae 1—4, relatively larger gnathopods 1—2, more setose uropods 1—2 (rami), more pointed epimeral plates.

The slender corner spines on gnathopods 1—2 attached laterally of strong corner spine, or, on gnathopod 2 slender toothed spines can be partially behind corner spine. Dactyl of pereopods 5—7 sometiimes with only one plumose seta on outer margin in some specimens of the same population.

Some transitive populations between forma *bilecanus* and *vjeternicensis* were observed (Dabarsko polje) and between *kusceri* and *bilecanus*.

Material examined: — spring in Bileća, Herzegovina, August, 1951, 8 spec. (leg. S. Karaman);

— spring of Trebinjćica river near Bileća, Sept. 1, 1951, 7 spec. (leg. A. Buturović);

— Ljelješnica cave (Divin, Dabarsko polje in Herzegovina), July 21, 1956, 5 spec. (leg. T. Petkovski); ibild. August 8, 1970, spec. (leg. C. Deeleman).

Localities cited: spring of Trebinjčica river near Bileća (S. Karaman 1953), Ljelješnica cave (G. Karaman 1974).

Loc. typ.: spring of Trebinjćica river near Bileća.

Holotype: male 25 mm. Holotype and paratypes are deposited in Karaman's collection in Titograd.

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## REVIZIJA NIPHARGUS ORCINUS — GRUPE (FAM. NIPHARGIDAE), I. DIO. (130. PRILOG POZNAVANJU AMPHIPODA)

*Gordan S. KARAMAN*

Rezime

Vrste podzemnih rakova iz roda *Niphargus (Amphipoda, Niphargidae)* naseljavaju raznovrsne podzemne slatke vode (bunare, pećine, izvore i sl.). Među preko 100 taksona ovog roda, poznatih iz Jugoslavije, svakako je najinteresantnija *Niphargus orcinus* — grupa vrsta, nazvana i kao subgenus *Orniphargus*. Predstavnici ove grupe spadaju među najveće vrste roda *Niphargus* dostižući veličinu i preko 25 mm.

*Niphargus orcinus* — grupa vrsta (podrod *Orniphargus* S. Kar. 1950) je sastavljena od vrsta koje su svi endemi, rasprostranjeni na relativno malom prostoru svaki. Dijagnoza taksonomskih odlika taksona ove grupe je slijedeća: Tijelo relativno veliko, često trnovito na metazomalnim i urozomalnim segmentima; gnatopodi veliki, sa daktilusom koji nosi red dlaka

na vanjskom rubu. Segmenti glavnog biča prve antene često sa uvećanim brojem osjetnih organa (štapića). Usni aparat normalan. Kokse normalne, srednje veličine. Pereopodi sa slabim lobusom na stražnjem donjem dijelu drugog segmenta. Uropodi 1—2 sa ili bez perastih dlaka, uropodi nisu diferencirani kod mužjaka. Treći uropod kratak kod mužjaka. Telzon normalan. Pleopodi sa 2 ili više retinakula. Škrge dolaze na torakalnim segmentima 2—6. Oostegiti široki, dolaze na torakalnih segmentima 2—5. Mužjaci su skoro sasvim slični ženkama.

Tip grupe: *Niphargus orcinus* Joseph 1869.

Taksoni ove grupe u Jugoslaviji: *arbiter*, n. sp., *bilecanus* S. Kar. 1953, *croaticus* Jur. 1887, *hercegovinensis* S. Kar. 1950, *kolombatovici* S. Kar. 1950, *kusceri* S. Kar. 1950, *longiflagellum* S. Kar. 1950, *macedonicus* S. Kar. 1929, *orcinus* Joseph 1869, *pachytelson* Sket 1960, *pellagonicus* S. Kar. 1943, *podgoricensis* S. Kar. 1934, *redenseki* Sket 1959, *rejici* Sket 1958, *salonitanus* S. Kar. 1950, *stenopus* Sket 1960, *steueri* Schell. 1935, *subtypicus* Sket 1960, *trullipes* Sket 1958, *vjeternicensis* S. Kar. 1932.

U prvom dijelu revizije grupe *N. orcinus*, obrađeni su i nacrtani slijedeći taksoni: *Niphargus orcinus* Jos. 1869, *N. longiflagellum* S. Kar. 1950, *N. salonitanus* S. Kar. 1950, *N. arbiter*, n. sp., *N. croaticus* (Jur. 1887), *N. steueri steueri* Schell. 1935, *N. steueri kolombatovici* S. Kar. 1950, *N. podgoricensis* S. Kar. 1934, *N. hercegovinensis* S. Kar. 1950, *N. trullipes* Sket 1958, *N. vjeternicensis vjeternicensis* S. Kar. 1950, *N. vjeternicensis kusceri* S. Kar. 1950 i *N. vjeternicensis kusceri* f. *bilecanus* S. Kar. 1953.

Opisana je nova vrsta za nauku, *Niphargus arbiter*, n. sp., iz podzemnih voda u Lici (pećine kod Pećina sela kod Otočca, Crna pećina kod Rakovice, podzemne vode u Klancu, Sopot pećina kod Severina na Kupi, Zelena pećina kod sela Bunić na Krbavskom polju, Čurković pećina kod Otišića, podzemne vode kod Slunja, izvori rijeke Mrežnice). Dijagnoza ove vrste je slijedeća (sl. X—XII):

Dužina ženke do 22 mm. Metazomalni segmenti sa nizom trnova i dlaka po stražnjem rubu. Urozomiti 1 i 2 sa 3—5 trnova na svakoj strani. Urozomit 3 bez trnova. Prva antena jedva prelazi polovinu dužine tijela, segmenti drške relativno dugi, osobito treći segmenat koji prelazi polovinu dužine drugog segmenta; glavni bič j sastavljen od 46 segmenata koji nose 1—2 hijalina štapića svaki.

Druga antena je tanka i duga, njen bič je sastavljen od 14 segmenata i približno dostiže dužinu petog segmenta drške. Usni dijelovi su normalni. Prva maksila: unutrašnji lobus sa 4 dlake, vanjski lobus nosi 7 trnova sa 1—2 zubca svaki. Koksalne ploče su srednje veličine, prva koksa sa polušiljastim donjim prednjim uglom. Gnatopodi 1 i 2 su veliki, ali je drugi gnatopod mnogo veći od prvog. Šesti segment prvog gnatopoda jedva širi nego što je dug, sa nagnutom palmom koja nosi jedan jak ugaoni trn pokraj koga se nalazi još 5—6, rijetko 7 tankih nazubljenih trnova i jedan kratak submarginalni trn; daktilus gnatopoda sa nizom kratkih pojedinačnih dlaka po vanjskom rubu.

Šesti segment drugog gnatopoda je širi nego dug, palma nosi jedan jak ugaoni trn iza koga se nalaze 3 nazubljena trna; daktilus ne dopire do stražnjeg ruba šestog segmenta. Drugi segment pereopoda 5—7 širok, daktilusi sa jednom perastom dlakom na vanjskom rubu i jednim trnom na unutrašnjem rubu. Pleopodi sa po 2 retinakule svaki. Epimere 1—3 zašiljene. Grane prvog uropoda su podjednake dužine, bez perastih dlaka. Unutrašnja grana drugog uropoda je znatno duža nego vanjska grana, obje grane bez perastih dlaka. Telzon duboko usječen, svaki lobus nosi 5—8 distalnih trnova i O—1 leđni trn; par dugih perastih dlaka se nalazi na polovini visine svakog lobusa.

Mužjaci slični ženkama, uključujući i oblik uropoda 1—3.

*N. arbiter* je dosta sličan vrsti *N. salonitanus* (oblik gnatopoda, antena, pereopoda, uropoda), ali se *N. salonitanus* razlikuje od *N. arbiter* slabije

trnovitim telzonom, drugačijom armaturom daktilusa pereopoda 5—7, slabije trnovitim metazomalnim segmentima, manjom dužinom tijela itd.

*Niphargus croaticus*, opisan još 1887. godine iz izvora rijeke Mrežnice, sada je prvi put opisan ponovo, iz istog lokaliteta detaljno i napravljena je analiza njegovih taksonomskih oblika.

Dosadašnje podvrste *hercegovinensis* S. Kar. 1950, *longiflagellum*, S. Kar. 1950. i *vjeternicensis* S. Kar. 1932. su analizirane i postavljene u rang posebnih vrsta. *N. bilecanus* je prebačena u vrstu *vjeternicensis* kao posebna forma podvrste *kusceri*. *Niphargus orcinus kusceri* je prebačen u vrstu *vjeternicensis* kao posebna podvrsta veoma slična podvrsti *vjeternicensis*. Neophodna je detaljna biometrijska analiza svih taksonomskih karaktera, ova tri taksona *(vjeternicensis, kusceri* i *bilecanus)* iz većeg broja lokaliteta kako bi se utvrdio pravi taksonomski status tih taksona.