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***NIPHARGUS LOURENSIS* FIŠER, TRONTELJ & SKET, 2006  
(FAM. NIPHARGIDAE) IN GREECE (CONTRIBUTION TO  
THE KNOWLEDGE OF THE AMPHIPODA 313)**

*Abstract*

The species *Niphargus lourensis* Fišer, Trontelj & Sket, 2006 (Crustacea Amphipoda, Fam. Niphargidae) from the freshwater subterranean waters in Greece is studied. The nominal subspecies *N. lourensis lourensis* Fišer, Trontelj & Sket 2006, has been described and figured from spring of Louros River, Vouliasta, in Epirus, Greece, based on one dissected female only. The specimens of this taxon are now redescribed based on new discovered Greek localities: island Cephalonia and island Zakynthos (=Zante) in Ionian Sea, as well as from the subterranean waters along river Aranxtos [= Araxthos), on road Arta-Kommenon, Epirus.

The second subspecies, *N. lourensis skiroi* G. Karaman 2018c, is known from Skiros Island (Aegean Sea) only. Variability and taxonomical position of *N. lourensis* regarding other *Niphargus* species in Greece is discussed. The list of all known *Niphargus* species in Greece is presented and key to the known species of this genus in Greece is composed.

*Keywords:* Amphipoda, *Niphargus lourensis*, redescription, subterranean waters, Greece, key to the species

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## INTRODUCTION

The specific geomorphologic condition, geological history and mainly karstic type of terrains, favorable climate and diverse ecological diversification of present Greek regions with numerous islands, made it possible to develop the presence of very rich fauna of subterranean family Niphargidae existing in all kinds of clean subterranean waters, presenting in Greece by several genera [G. Karaman, 2016b] including genus *Niphargus* Schiödte, 1849.

Despite the fact that fauna of this genus is only partially known, in Greece there are discovered so far nearly 20 different species and subspecies, mainly endemic for Greece:

First discovered and described new species were *Niphargus graecus* and *Niphargus adei* described by Stanko Karaman (1934). Later S. Karaman described (1950c) another 2 new species, *N. versluysi* and *N. rhodi*. Further studies of the subterranean Greek fauna provided by various authors, conducted to discovery of numerous other new taxa of this genus, as well as some species already described and known from Northern Macedonia.

In that way, the present known number of *Niphargus* species and subspecies in Greece reached nearly 20, as follows:

- Niphargus adei* S. Karaman 1934 [loc. typ.: Island Samothrake, Aegean Sea, Greece];
- Niphargus aitolosi* Ntakis, A., Anastasiadou, C., Zakšek, V. & Fišer, C. 2015 [loc. typ.: Lake Lysimachia, Padanassa, Agrinio, Greece] [= ? *N. graecus* S. Kar. 1934];
- Niphargus cymbalus* G. Karaman 2017e [loc. typ.: Glikorizo — Arta, Epirus, Greece];
- Niphargus denarius* G. Karaman 2017b [loc. typ.: Cephalonia Island, loc. Efimia (Crini), Greece];
- Niphargus fautor* G. Karaman 2017f [loc. typ.: Epirus, Glikorizo Arta, Greece];
- Niphargus graecus* S. Karaman 1934: [loc. typ.: Acrocorinth, spring, Greece];
- Niphargus impexus* G. Karaman 2016a [loc. typ.: Crete Island, Iraklion, well one km after Panagio-Nigaditos, Greece];
- Niphargus jovanovici* S. Karaman 1931 [loc. typ.: Skoplje, N. Macedonia];
- Niphargus karkabounasi* Ntakis, A., Anastasiadou, C., Zakšek, V. & Fišer, C. 2015 [loc. typ.: Agioi Theodoroi, Korinthos, Peloponnese, Greece];
- Niphargus koukourasi* Ntakis, A., Anastasiadou, C., Zakšek, V. & Fišer, C. 2015 [loc. typ.: Springs of Louros River, Vouliasta, Ioannina, Greece];
- Niphargus lakusici* G. Karaman 2017a [loc. typ.: Crete Island: Pyrgos, Greece];
- Niphargus (Orniphargus) lindbergi*, S. Karaman 1956 [loc. typ.: Draconera Cave (Attique), Greece];

- N. lourensis lourensis* Fišer, Trontelj & Sket 2006 [loc. typ.: Spring of Louros River, Vouliasta, Ionannina, NW Greece];
- N. lourensis skirosi* G. Karaman 2018c [loc. typ.: Skiros Island, Molos];
- Niphargus pararhodi* G. Karaman 2018d [Spring-brook along river Goudouras (Gaidouras), Apollona region, Rhodos Island, Greece];
- Niphargus rhodi* S. Karaman, 1950c [loc. typ.: Spring Nimphe on Propheten (Eliasberg?) Mt., Rhodos Island, Greece];
- Niphargus skopljensis* S. Karaman 1929 [loc. typ.: Skoplje, N. Macedonia];
- Niphargus spasenijae* G. Karaman 2015 [loc. typ.: anchialine cave in Atspas near seashore, Skala Marion, Tasos Island, Aegean Sea, Greece];
- Niphargus versluysi* S. Karaman 1950c [loc. typ.: Spring Skophos, Zakynthos Island (=Zante Island), Greece];
- Niphargus zarosiensis* Zettler, M. & Zettler, A. 2017 [loc. typ.: spring at the shore of Lake Zaros (Limni Votomos), Crete Island, Greece].

Some of these species have been described based on very scarce number of specimens and localities requesting additional redescription based on new material. For this reason, we have redescribed some species (G. Karaman, 1917c; 2017d, 2017e, 2018a, 2018b, 2018c, 2018d, present paper).

Recently described *Niphargus sulfuricus* Spela et al., 2019 [loc. typ.: sulphidic Lake in Melissotrypa Cave, Greece] does not belong to this genus based on numerous specific morphological characters.

## MATERIAL AND METHODS

The specimens preserved in 70% ethanol, were dissected using a WILD M20 microscope and drawn using camera lucida attachment. Dissected body-parts were temporarily submersed in the mixture of glycerin and water for study and drawing. The body-length of examined specimens were measured by tracing individual's mid-trunk lengths (from tip of head to end of telson) using camera lucida. All appendages after the study were submersed in Liquid of Faure and covered by thin cover glass making permanent microscope slides.

The morphological terminology and seta's formula for the last mandibular palpus article follow G. KARAMAN's terminology (G. Karaman 1969): A= A-setae on outer face; B= B-setae on inner face; C= additional submarginal C-setae on outer face; D= lateral marginal D-setae; E= distal long E-setae. Terminology for propodus of gnathopods 1 and 2 follow G. KARAMAN terminology (G. Karaman, 2012): S= corner strong S-spine; L= lateral slender serrate L-spines; M= facial corner M-setae; R= subcorner R-spine on inner face.

Terms „setae“ and „spines“ are used based on its shape, not origin. Our studies were based on the external morphology, ecology and zoogeography of species.

**TAXONOMICAL PART****Family NIPHARGIDAE*****NIPHARGUS LOURENSIS LOURENSIS* Fišer, Trontelj & Sket, 2006**

(Figures 1–7)

*Niphargus lourensis* Fišer, Trontelj & Sket, 2006: 2288, figs. 7, 16–19.**MATERIAL EXAMINED: GREECE**

S-6368= G-175, Greece, Zante Island [=Zakynthos], Agalas, wells, hills in SW part of island, pH 7.0<sup>6</sup>, water temp. 15.2°C, 8.4.1979, one male 8 mm (leg. G. Pesce & D. Maggi);

G-11= Road Arta-Kommenon, along the river Araxtos [= Araxthos], Epirus, Ioannina reg.), 24.2.1976, 2 juv. 4 mm (leg. Argano, Pesce, Bianco);

G-59= Cephalonia Island, S. Efimia, Crini (Potamianota) (1), freshwater well, water temp 15°C, pH 7.3, 8.5.1977, 9 exp mixed with *Hyale* sp. juv. (leg. Pesce, Maggi & Miranda);

G-60= Cephalonia Island, S. Efimia, Crini (Potamianota) (2), freshwater well, water temp. 15°C, pH 7; NO<sub>2</sub> 0.1 mg/l, 8.5.1977, 2 exp. and 2 juv (leg. Pesce, Maggi & Miranda);

G-62= Cephalonia Island, Assos, along the seashore, freshwater well, water temp. 15.5°C, pH 7.2, 8.5.1977, 4 juv. exp. (leg. Pesce, Maggi and Miranda);

G-63= Cephalonia island, Assos, along the seashore, freshwater well, water temp. 15.5°C, pH 7.2, 3.4.1978, one ovig. female 9.1 mm (leg. Pesce, Maggi, Silverii).

TYPE LOCALITY. Spring of Louros River, Vouliasta, Ionannina, [N of Arta], Epirus Greece.

**DIAGNOSIS**

Metasomal segments with dorsoposterior marginal setae. Urosomal segment 1 on each dorsolateral side with spines and 0–1 seta, urosomal segment 2 on each dorsolateral side with spines; urosomal segment 3 naked. Epimeral plate 3 angular to poorly pointed. Maxilla 1 outer plate with 7 spines partially or completely serrate; palpus short. Coxa 4 unlobed. Propodus of gnathopods 1–2 trapezoid, outer margin of its dactylus with several median setae; palm of gnathopod 1-propodus with 3 L-spines sitting laterally of corner S-spine; palm of gnathopod 2-propodus with L-spines sitting partially or completely behind S-spine. Dactylus of pereopods 3–7 with one spine at inner margin. Pleopods with 2 retinacula

each. Uropod 1 similar in male and female, with peduncle bearing dorsointernal and dorsoexternal row of spines, rami of equal length. Uropod 3 strong and short in males and females, spinose, with short distal article of outer ramus. Telson with 3–4 distal spines, lateral and facial spines absent.

#### DESCRIPTION:

**MALE 8.0 mm, Zakynthos island (S-6368):** Body moderately slender, metasomal segments 1–3 with 4 dorsoposterior marginal short setae each (fig. 1F, 3F). Urosomal segment 1 on each dorsolateral side with 2 strong spines; urosomal segment 2 on each dorsolateral side with 3 strong spines, urosomal segment 3 naked (fig. 3F). Urosomal segment 1 on each ventroposterior corner with one spine near basis of uropod 1 peduncle (fig. 3F).

Epimeral plates 1–2 sharply angular, with inclined posterior margin bearing several short setae; epimeral plate 3 poorly pointed, along posterior margin with several short setae; plate 2 with 2 subventral spines, plate 3 with 3 subventral spines (fig. 1F).

Head with short rostrum and short subrounded lateral cephalic lobes, eyes absent (fig. 1A).

Antenna 1 reaching nearly half of body; peduncular articles 1–3 progressively shorter (ratio: 48: 37: 23), scarcely setose (fig. 1B); main flagellum consisting of 21–22 articles (most of them with one short aesthetasc). Accessory flagellum is short, 2-articulated, not exceeding half of last peduncular article (fig. 1B).

Antenna 2 is moderately slender; peduncular article 3 short, with 2 long ventral setae; peduncular articles 4 and 5 of equal length; article 4 at dorsal margin with 3 short slender spines and single setae, at ventral margin with several setae (the longest setae slightly exceeding diameter of article itself (fig. 1C); flagellum relatively slender, slightly longer than last peduncular article; consisting of 9 articles; antennal gland cone short (fig. 1C).

Mouthparts well developed. Labrum broader than long (fig. 2A); labium with entire, outer lobes convex, inner lobes short (fig. 5A).

Mandible: molar large, triturative. Left mandible: incisor with 5 teeth, lacinia mobilis with 4 teeth and 7 rakers. Right mandible: incisor with 4 teeth, lacinia mobilis with 5 teeth and 7 rakers. Mandibular palpus 3-articulated: first article naked, second article with 10 setae; article 3 subfalciform, longer than second article (ratio: 79: 65), with nearly 20 D-setae, 6 distal E-setae; at outer face appear one bunch of 4 A-setae (fig. 1E), on inner face appear 3 bunches of B-setae (2–3–2) (fig. 1D).

Maxilla 1: inner plate with 3 distal setae (fig. 5B); outer plate with 7 spines [3 spines with 4–5 lateral teeth, 1–2 spines with 2 teeth, 2 spines with one lateral

tooth) (fig. 5C); palpus 2-articulated, not reaching distal tip of outer plate-spines and provided with 5 setae (fig. 5B).

Maxilla 2: inner plate slightly smaller than outer one, both plated with marginal setae only (fig. 4A).

Maxilliped: inner plate short, not exceeding outer tip of first palpus article (fig. 3A) and provided with 5 pointed distal spines mixed with several setae; outer plate not exceeding half of palpus article 2 and provided along mesial margin with a row of nearly 10 pointed spines and single setae; palpus article 2 along inner (mesial) margin with numerous simple setae, outer margin naked; palpus article 3 along outer margin with one median seta and one bunch of distal setae; palpus article 4 at outer margin with one median seta, at inner (mesial) margin with 2 setae near basis of the nail (fig. 3A).

Coxae 1–4 moderately long. Coxa 1 broader than long (ratio: 40: 36), with subrounded ventroanterior corner and provided with nearly 9 short marginal setae (fig. 2B). Coxa 2 longer than broad (ratio: 58: 43), with convex ventral margin bearing nearly 9 setae (fig. 2E). Coxa 3 remarkably longer than broad (ratio: 66: 45), at ventral margin with nearly 10 setae (fig. 3B). Coxa 4 only slightly longer than broad (ratio: 66: 54), with short angular ventroposterior dilatation and bearing nearly 10 short marginal setae (fig. 3D).

Coxa 5 distinctly shorter than coxa 4, bilobe, broader than long (ratio: 57: 41), with subrounded anterior lobe (fig. 4B) bearing scarce number of short setae. Coxa 6 like coxa 5 but smaller, broader than long (ratio: 52: 35) (fig. 4D). Coxa 7 much broader than long (ratio: 48: 24), entire (fig. 4F).

Gnathopods 1 and 2 moderately large, with propodus nearly as large as corresponding coxa (fig. 2B, E). Gnathopod 1 rather smaller than gnathopod 2, with article 2 bearing along anterior margin 3 proximal long setae and several short mediobasal setae, along posterior margin with 6 long proximal bunch of setae and 5–6 distal shorter setae; article 3 at posterior margin with one bunch of setae (fig. 2B). Article 5 rather shorter than propodus (ratio: 33: 41), at outer margin with distal bunch of setae. Propodus trapezoid, hardly longer than broad (ratio: 75: 72), along posterior margin with 6 transverse rows of setae (fig. 2C). Palm slightly convex, inclined nearly half of propodus-length, defined on outer face by one corner S-spine accompanied laterally by 3 serrate L-spines and 3 facial M-setae (fig. 2D), on inner face by one subcorner R-spine (fig. 2D). Dactylus reaching posterior margin of propodus, along outer margin appear row of 5 single median setae, along inner margin appear a row of several short setae (fig. 2C).

Gnathopod 2: article 2 along anterior margin with 2 proximal long setae and 4–5 mediobasal shorter setae, along posterior margin appear a group of 5–6 proximal long setae and 4–5 mediobasal shorter setae; article 3 at posterior margin with one median group of setae (fig. 2E). Article 5 shorter than propodus (ratio:

38: 51), along anterior margin with distal bunch of setae. Propodus trapezoid, nearly as long as broad, along posterior margin with 7 transverse rows of setae (fig. 2F). Palm convex, inclined slightly over half of propodus length, defined on outer face by one corner S-spine and 3 facial M-setae; one serrate L-spine is attached partially behind S-spine (fig. 2G) on inner face of propodus, as well as one subcorner R-spine (fig. 2G). Dactylus reaching posterior margin of propodus, along outer margin provided with 5 single median setae, along inner margin provided with row of short setae (fig. 2F).

Pereopods 3 and 4 rather slender and scarcely setose. Pereopod 3: article 2 along anterior margin with 3 long proximal and 3–4 mediobasal short setae, along posterior margin with several short setae (fig. 3B). Articles 4–6 of unequal length (ratio: 48: 35: 37); article 4 along both margins with single setae shorter than diameter of article; article 5 with 3 posterior marginal spines, along anterior margin with single setae; article 6 at posterior margin with 4 single spines and single short setae. Dactylus strong, much shorter than article 6 (ratio: 15: 37), at inner margin with one slender spine-like seta near basis of the nail, at outer margin with one median seta (fig. 3C); nail slightly shorter than pedestal (ratio: 21: 26).

Pereopod 4: article 2 along anterior margin with 4 proximal long setae and 3–4 mediobasal short setae, along posterior margin with row of proximal long setae and several mediobasal short setae. Articles 4–6 of unequal length (ratio: 45: 34: 35), article 2 along both margins with several setae shorter than diameter of article; article 4 at anterior margin with 3 single short spines, at posterior margin with several short setae. Article 5 at posterior margin with 3 single short spines and single short setae; article 6 with 4 single short spines at posterior margin (fig. 3D). Dactylus strong, much shorter than article 6 (ratio: 14: 35), at inner margin with one slender spine near basis of the nail, at outer margin with one median plumose seta (fig. 3E); nail shorter than pedestal (ratio: 20: 25).

Pereopods 5–7 moderately slender, progressively longer towards pereopod 7. Pereopod 5: article 2 ovoid, rather longer than broad (ratio: 77: 55), anterior convex margin provided with row of slender single spines, distoanterior corner not produced (fig. 4B), posterior convex margin with nearly 11 short setae, ventroposterior lobe not fully developed. Articles 4–6 of unequal length (ratio: 40: 54: 58), along both margins with short spines and single setae (spines and setae not exceeding diameter of articles themselves); article 2 longer than article 6 (ratio: 77: 58). Dactylus much shorter than article 6 (ratio: 18: 58), along inner margin with one slender spine near basis of the nail, at outer margin with one median plumose seta (fig. 4C); nail shorter than pedestal (ratio: 21: 33).

Pereopod 6 remarkably longer than pereopod 5; article 2 dilated, longer than broad (ratio: 86: 58), anterior slightly convex margin provided with row of 8

short spines, along posterior convex margin appear nearly 12 short setae, ventroposterior lobe not fully developed (fig. 4D). Articles 4–6 of unequal length (ratio: 51: 77: 86), along anterior and posterior margin with single or groups of short spines; article 2 nearly as long as article 6. Dactylus much shorter than article 6 (ratio: 88: 22), at inner margin with one slender spine near basis of the nail, at outer margin with one median plumose seta (fig. 4E); nail shorter than pedestal (ratio: 25: 40).

Pereopod 7: article 2 dilated, longer than broad (ratio: 83: 55), along anterior or slightly convex margin attached 6 single slender spines, along posterior convex margin appear nearly 10 short setae, ventroposterior lobe not fully developed (fig. 4F). Articles 4–6 of unequal length (ratio: 48: 69: 92), articles along both margins with single or bunches of short spines and setae not exceeding diameter of articles themselves. Article 2 slightly shorter than article 6 (ratio: 83: 92). Dactylus much shorter than article 6, at inner margin with one slender spine near basis of the nail, at outer margin with one median plumose seta (fig. 4G), nail broken.

Pleopods 1–3 with 2 retinacula. Peduncle of pleopod 1 along anterior margin with 3–4 mediobasal setae (fig. 5D); peduncle of pleopod 2 at anterior margin with one small distal seta (fig. 5E); peduncle of pleopod 3 along posterior margin with 3–4 setae (fig. 5F).

Uropod 1: peduncle with dorsoexternal row of strong spines and dorsointernal row of strong spines (fig. 3F); inner ramus as long as outer ramus but shorter than peduncle, and provided with 3–4 lateral spines and one simple seta, at tip attached 4 distal short strong spines.

Uropod 2: inner ramus distinctly longer than outer ramus and provided with 2 lateral and 4 distal short strong spines (fig. 3F), outer ramus provided with 3 lateral and 4 distal spines.

Uropod 3 relatively short: peduncle longer than broad (ratio: 40: 25), with several distal spines. Inner ramus scale-like, shorter than peduncle, uniaarticulate, with one distal spine and long plumose seta (fig. 5G). Outer ramus 2-articulate: first article provided along outer margin with 4 bunches of short spines, along inner (mesial) margin appear 5 bunches of spines mixed with single long plumose setae; second article much shorter than first article (ratio: 20: 125), with 3 lateral and one distal short simple seta.

Telson moderately long, longer than broad (ratio: 83: 65), incised almost 2/3 of telson-length; each lobe with 3 moderately long distal spines and one short plumose seta; a pair of short plumose setae appear near the middle of outer margin (fig. 1G).

Gills on legs 2–6 ovoid, moderately large, never reaching ventral tip of corresponding article 2 of the legs (figs. 2E, 3D, 4B, D).



**FEMALE 11.2 mm with oostegites (G-59)**= Cephalonia Island, S. Efimia, Crini (Potamianota);

Body rather similar to male. Metasomal segments 1–3 with 4 dorsoposterior or marginal setae each (fig. 6G). Urosomal segment 1 on each dorsolateral side with 2 spines, that of urosomal segment 2 with 3 spines; urosomal segment 3 naked. Urosomal segment 1 on each ventroposterior corner with one spine near basis of uropod 1-peduncle (fig. 7D).

Epimeral plates 1–3 distinctly acutely pointed. Epimeral plate 1 with slightly concave ventral margin, posterior margin slightly convex, with nearly 5 setae; epimeral plate 2 with sinusoid posterior margin bearing nearly 7 short setae and 4 ventral spines (fig. 6G); epimeral plate 3 with posterior inclined and slightly sinusoid margin bearing nearly 6 short setae, at ventral margin with 3–4 spines.

Mouthparts like these in male. Maxilla 1: inner plate with 4–5 setae, outer plate with 7 spines bearing various number of lateral teeth (5–5–3–4–1–2–2 or 5–4–4–4–2–2–2); palpus 2-articulated, nearly reaching basis of outer plate spines and provided with 8 distal setae (fig. 5J).

Coxae slightly longer than these in male. Coxa 1 nearly as long as broad, with convex subrounded ventroanterior corner, provided with nearly 13 short setae (fig. 6A). Coxa 2 longer than broad (ratio: 58: 43), along convex margin with nearly 12 short setae (fig. 6d). Coxa 3 remarkably longer than broad (ratio: 65: 47), with nearly 13 short marginal setae (fig. 5H); Coxa 4 longer than broad (ratio: 65: 47), posterior margin poorly excavated, concave, along ventral margin with nearly 16 short setae (fig. 5 I).

Coxa 5 distinctly shorter than coxa 4, broader than long (ratio: 60: 45), anterior lobe convex, not produced (fig. 7A). Coxa 6 broader than long (ratio: 43: 34) (fig. 7B). Coxa 7 shallow much broader than long (ratio: 50: 20), entire (fig. 7C).

Gnathopods 1–2 moderately large, with propodus nearly as large as corresponding coxa (fig. 6A, D). Gnathopod 1 remarkably smaller than gnathopod 2, article 2 with long setae along both margins; article 3 at posterior margin with distal bunch of setae (fig. 6A); article 5 shorter than propodus, along anterior margin with distal bunch of setae. Propodus trapezoid, poorly broader than long (ratio: 55: 60: 55), along posterior margin with 10 transverse rows of setae (fig. 6B). Palm slightly convex, inclined nearly half of propodus-length, defined on outer face by corner S-spine accompanied laterally by 3 L-spines and corner facial 5 M-setae, on inner face by subcorner R-spine (fig. 6C).

Gnathopod 2: article 2 along anterior and posterior margin with numerous long setae; article 3 at posterior margin with distal bunch of setae; article 5 shorter than propodus, along anterior margin with distal bunch of setae (fig. 6D). Propodus trapezoid, broader than long (ratio: 80: 74), along posterior margin with 10 transverse rows of setae (fig. 6E). Palm convex, inclined over 2/3

of propodus-length, defined on outer face by corner S-spine, and 4 corner M-setae, lateral 1–2 L-spine sitting partially behind S-spine, on inner face is one subcorner R-spine (fig. 6F).

Pereopod 3 rather longer than pereopod 4, pilosity similar that in male. Pereopod 3: articles 4–6 of unequal length (ratio: 50: 33: 40), dactylus much shorter than article 6 (ratio: 14: 40), at inner margin with one spine near basis of the nail (fig. 5H).

Pereopod 4: articles 4–6 of unequal length (ratio: 46: 35: 38), dactylus much shorter than article 6 (ratio: 14: 38), with one spine at inner margin near basis of the nail (fig. 5 I).

Pereopods 5–7 moderately spiniferous, articles 4–6 with short spines along both margins. Pereopod 5 remarkably shorter than pereopods 6 and 7, article 2 longer than broad (ratio: 73: 48), along anterior margin with nearly 8 single or paired short spine-like setae or spines, posterior poorly convex margin with nearly 16 short setae, ventroposterior lobe not fully developed (fig. 7A). Articles 4–6 of unequal length: 40: 52: 58); article 2 remarkably longer than article 6 (ratio: 73: 58). Dactylus much shorter than article 6 (ratio: 15: 58), at inner margin with one spine near basis of the nail.

Pereopod 6: article 2 longer than broad (ratio: 75: 53), along anterior margin with 7 groups of short spine-like setae or spines, along posterior margin with nearly 15 short setae, ventroposterior lobe not fully developed (fig. 7B). Articles 4–6 of unequal length (ratio: 43: 55: 65). Article 2 longer than article 6 (ratio: 75: 65). Dactylus much shorter than article 6 (ratio: 19: 65), at inner margin with one spine near basis of the nail.

Pereopod 7 slightly longer than pereopod 6; article 2 remarkably longer than broad (ratio: 79: 50), along anterior poorly convex margin with nearly 6 groups of spine-like setae, along posterior poorly convex margin with nearly 12 short setae (fig. 7C); ventroposterior lobe not fully developed. Articles 4–6 of unequal length (ratio: 49: 62: 85). Article 2 slightly shorter than article 6 (ratio: 79: 85). Dactylus much shorter than article 6 (ratio: 23: 85), at inner margin with one spine near basis of the nail.

Pleopods 1–3 with 2 retinacula. Pilosity of pleopod's peduncles scarce, like these in male.

Uropod 1: peduncle longer than rami, provided with dorsoexternal and dorsointernal row of spines (fig. 7D); rami of equal length, both provided with several lateral and 5 distal short spines; 2–3 short simple setae appears near some of spines.

Uropod 2: peduncle with single lateral and distal short spines; rami of equal length, outer ramus slightly curved, both rami with several lateral and 4–5 short distal spines (fig. 7E).

Uropod 3 short and relatively slender. Peduncle slightly longer than broad; inner ramus short, scale-like, with one spine and one plumose seta. Outer ramus 2-articulated, first article along outer ramus with 5 bunches of spines, along inner (mesial) margin with 6 groups of short spines mixed with single plumose setae (fig. 7F); second article very short, not exceeding diameter of first article, provided with 5–6 distal short simple setae.

Telson nearly as long as broad, incised nearly  $3/5$  of telson-length, each lobe with 4 distal spines shorter than half of telson-length (fig. 7G); a pair of short plumose setae attached nearly in the middle of outer margin of each lobe.

Coxal gills ovoid, present on pereopods 2–6 (figs. 5H, I; 6D; 7A, B). Oostegites ovoid, with marginal setae (fig. 6D).

#### VARIABILITY.

As *Niphargus lourensis lourensis* was described based on one adult female only, no variability of this taxon from type-locality is known. We studied several specimens from islands Cephalonia and Zakynthos with similar taxonomical characters like these in *N. lourensis* from type-locality.

Our male in hands of 8.0 mm from Zakynthos island is rather smaller than holotype (female), probably not of maximal length: article 2 of pereopods 5–7 are rather larger; lobes of telson rather broader, with 3 distal spines shorter than half of telson-length, Maxilla 1 inner plate with 3 setae, and palpus with 5 setae. Propodus of gnathopods 1–2 rather more narrow (probably because of smaller body-size of male regarding holotype-female), 1–2 lateral L-spines on palm of gnathopod 2-propodus sitting partially behind corner S-spine only; palm of gnathopod 1-propodus with 3 L-spines only.

The females from Cephalonia (up to 11.2 mm) are similar to the holotype; propodus of gnathopod 1 with 3–5 corner M-setae; propodus of gnathopod 2 with 2 L-spines sitting partially behind corner S-spine and 2–4 corner M-setae. Article 2 of pereopods 5–7 is rather more narrow than that in male of Zakynthos, and like that in holotype. Maxilla 1 inner plate with 3–5 setae, number of lateral teeth on spines of maxilla 1 outer plate is rather variable [7–5–3–4–4–3–3, etc. ], palpus with 8 distal setae; lobes of telson with 3–4 distal spines shorter than half of telson-length;

Based on the scarce material in hands from Zakynthos and Cephalonia Islands, as well as from type-locality, it was not possible to establish distinct differences among them, and we consider specimens from Zakynthos and Cephalonia as members of *N. lourensis lourensis*. Further study on new material from all three localities, including genetic= molecular analysis will help to understand taxonomical position of specimens from these three localities.

## REMARKS AND AFFINITIES

*Niphargus lourensis* belongs to *Orniphargus* group of species (subgenus *Orniphargus* S. Karaman, 1950a, b), presented in Greece by 2 species only: *N. lindbergi* and *N. lourensis*. It seems that *N. lourensis* was split in various populations morphologically more or less similar to these from type-locality (ssp. *skirosi*).

The eventual dissimilarity of genetic-molecular data of studied populations (based on use of very limited methods) is not automatically way to split this taxon in numerous genetically different species, but genetic-molecular varieties.

Recently described *Niphargus gammariformis* Spela et al. 2019 from sulphidic Melissotrypa Cave Lake in Greece, with elongated inner ramus of uropod 3 and other unique mouthparts doesn't belong to the genus *Niphargus* despite some molecular similarities with it.

## KEY TO THE TAXA OF GENUS *NIPHARGUS* IN GREECE

1. Dactylus of gnathopods 1 and 2 along outer margin with one, occasionally 2 setae . . . . . 2
  - -- Dactylus of gnathopods 1 and 2 along outer margin with several setae . . . . . 7
2. Lobes of telson with 3 very long distal plumose setae . . . JOVANOVICI
  - -- Lobes of telson with 2 short lateral plumose setae . . . . . 3
3. Pleopods 1–3 with 4–5 retinacula each . . . . . SPASENIJAE
  - -- Pleopods 1–3 with 2 retinacula each . . . . . 4
4. Maxilla 1 outer plate with all strongly pectinate spines . . SKOPLJENSIS
  - -- Maxilla 1 outer plate with spines bearing one to several lateral teeth each . . . . . 5
5. Outer ramus of uropod 3 with long distal article in males and females; Article 2 of pereopods 5–7 unlobed [uropod 1 equal in males and females] . . . . . KARKABOUNASI
  - --- Outer ramus of uropod 3 with short distal article in males. Article 2 of pereopods 5–7 lobed . . . . . 6
6. Telson with lateral spines; uropod 1 peduncle with dorsointernal row of setae (except distal spine) . . . . . LAKUSICI
  - -- Telson with distal spines only; uropod 1 peduncle with dorsointernal row of spines . . . . . FAUTOR
7. Rami of uropod 1 in male with lateral spines mixed with long plumose single setae . . . . . PARARHODI
  - -- Rami of uropod 1 in male with lateral spines mixed sometimes with single short simple setae . . . . . 8
8. Ventroposterior corner of urosomal segment 1 with 2 spines near basis of uropod 1 peduncle . . . . . LINDBERGI

- --- Ventroposterior corner of urosomal segment 1 with one spine near basis of uropod 1 peduncle . . . . . 9
- 9. Dactylus of some pereopods with additional spines at inner margin. . . . . 10
  - -- Dactylus of all pereopods with only one spine at inner margin. . . . . 11
- 10. Pereopods 3–7 with additional spines at inner margin of dactylus . . . . . DENARIUS
  - -- Some of pereopods 5 and 7 with additional spines at inner margin of dactylus . . . . . VERSLUYSI
- 11. Uropod 1 in males with equal rami. . . . . 12
  - --- Uropod 1 in males with inner ramus remarkably longer than outer one . . . . . 18
- 12. Telson with facial spines . . . . . KOUKOURASI
  - -- Telson without facial spines . . . . . 13
- 13. Uropod 3 distal article of outer ramus long in male . . . . . 14
  - -- Uropod 3 distal article of outer ramus short in male . . . . . 15
- 14. Uropod 1 peduncle with dorsointernal scarce number of setae (except distal spine); gnathopod 2 propodus inclined nearly half of propodus-length; telson and pereopod 7 article 2 broader . . . . . IMPEXUS
  - --- Uropod 1 peduncle with dorsointernal row of spines; gnathopod 2 propodus inclined over half of propodus-length; telson and pereopod 7 article 2 more narrowed . . . . . ZAROSIENSIS
- 15. Uropod 1 peduncle with dorsointernal row of spines. Telson always with distal spines only; maxilla 1 outer plate with several or all spines pluri-toothed; uropod 3 distal article of outer ramus very short (unknown in *cymbalus*) . . . . . 16
  - ---- Uropod 1 peduncle with dorsointernal row of setae (except distal spine). Telson usually with distal and lateral or mesial marginal spines); maxilla 1 outer plate with 6 unitoothed spines, one spine with one or more teeth; uropod 3 distal article of outer ramus slightly elongated spines (female and juv. male) . . . . . RHODI
- 16. Article 2 (basipodit) of pereopods 5–7 broadly rounded; maxilla 1 inner plate with 1–2 setae. . . . . CYMBALUS
  - --- Article 2 (basipodit) of pereopods 5–9 more narrow; maxilla 1 inner plate with 2–5 setae. . . . . 17
- 17. Gnathopod 2 propodus with L-spines sitting completely behind corner S-spine; maxilla 1 outer plate with spines provided with various number of lateral teeth each (telson with very long distal spines in holotype). . . . . LOURENSIS LOURENSIS

- --- Gnathopod 2 propodus with L-spines sitting partially behind corner S-spine; six spines of maxilla 1 outer plate with one lateral tooth, one spine pluritoothed; telson with short distal spines . . . . LOURENSIS SKIROSI
18. Gnathopod 1 article 3 along posterior margin with 2 bunches of setae [telson without facial spines] . . . . . ADEI
- --- Gnathopod 1 article 3 along posterior margin with one bunch of setae only . . . . . 19
19. Epimeral plates subrounded or obtusely angular [pleopod 3 peduncle with additional lateral groups of setae] . . . . . VERSLUYSI
- --- Epimeral plate 3 distinctly pointed . . . . . GRAECUS [=AITOLOSI]

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***NIPHARGUS LOURENSIS* Fišer, Trontelj & Sket, 2006  
(FAM. NIPHARGIDAE) U GRČKOJ (313. Prilog poznavanju Amphipoda)**

*Sažetak*

Proučavana je podzemna vrsta *Niphargus lourensis* Fišer, Trontelj & Sket, 2006 (Crustacea Amphipoda, fam. Niphargidae) iz podzemnih voda Grčke. Nominalna podvrsta *N. lourensis lourensis* Fišer, Trontelj & Sket, 2006 bila je opisana i nacrtana iz izvora rijeke Louros, Vouliasta u Epiru, Grčka, na osnovu jedne secirane jedinke (ženke). Ovaj takson je ovdje ponovno detaljno opisan na osnovu jedinki iz drugih novih lokaliteta Grčke: podzemnih voda otoka Kefalonije i otoka Zakintos (Zante) u Jonskom moru kao i podzemnih voda duž rijeke Araxtos [= Araxthos), on road Arta-Kommenon, Epirus.

Druga podvrsta, *N. lourensis skirosi* G. Karaman 2018c, poznata je samo iz podzemnih voda grčkog otoka Skiros u Egejskom moru. Razmatran je varijabilitet i taksonomski položaj *N. lourensis* u okviru drugih *Niphargus* vrsta Grčke. Data je lista svih poznatih vrsta roda *Niphargus* u Grčkoj i sastavljen je ključ za determinaciju grčkih vrsta roda *Niphargus*.

*Ključne riječi:* Amphipoda, *Niphargus lourensis*, opis, podzemne vode, Grčka, ključ za determinaciju vrsta



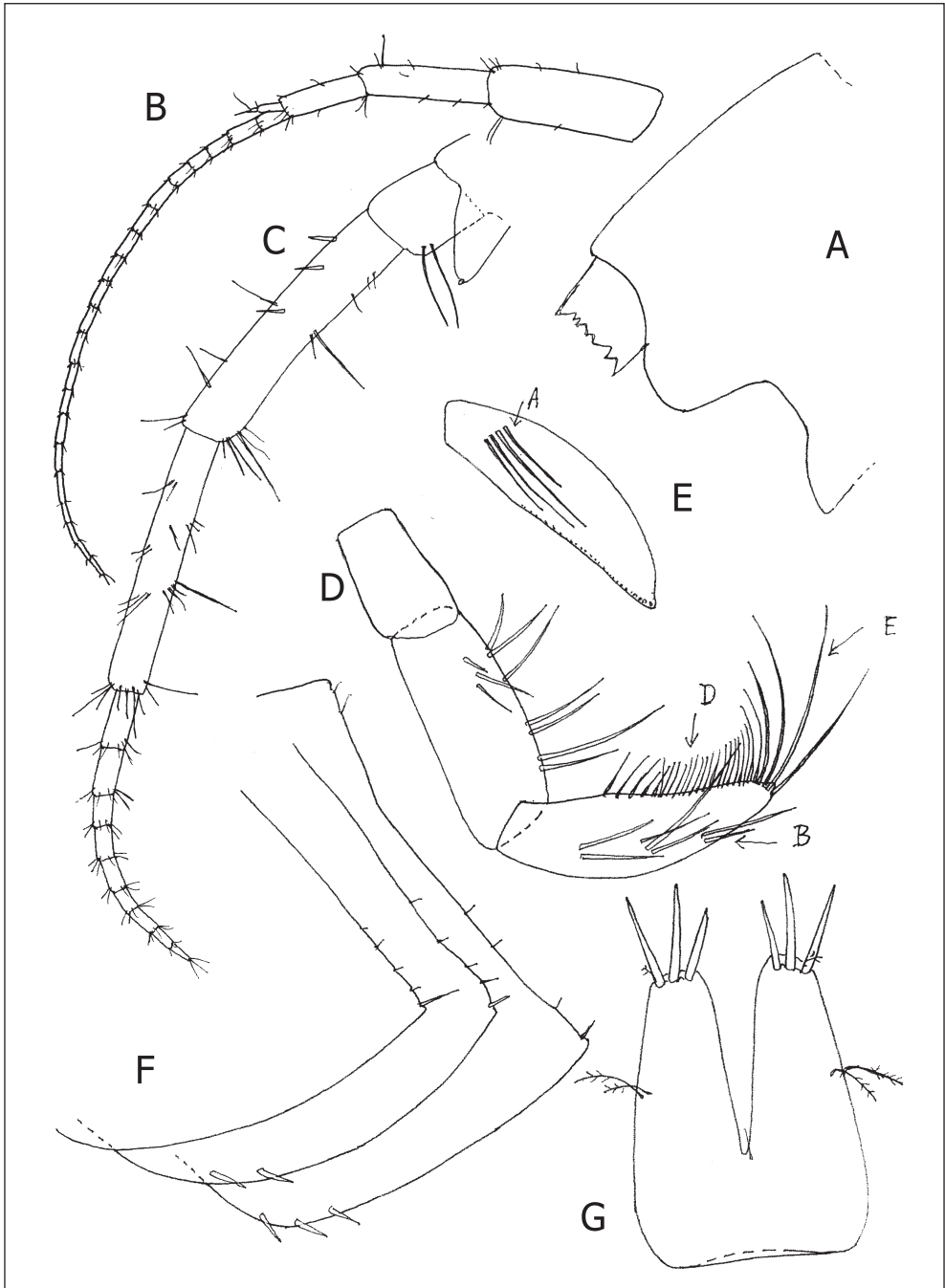


Fig. 1. *Niphargus lourensis lourensis* Ntakos et al., 2015, Agalas, Zakynthos island, Greece (G-175): male 8.0 mm: A= head; B= antenna 1; C= antenna 2; D= mandibular palpus, inner face (B= facial B-setae; D= marginal D-setae; E= distal E-setae); E= distal article of mandible palpus, outer face (A= facial A-setae); F= epimeral plates 1-3; G= telson.

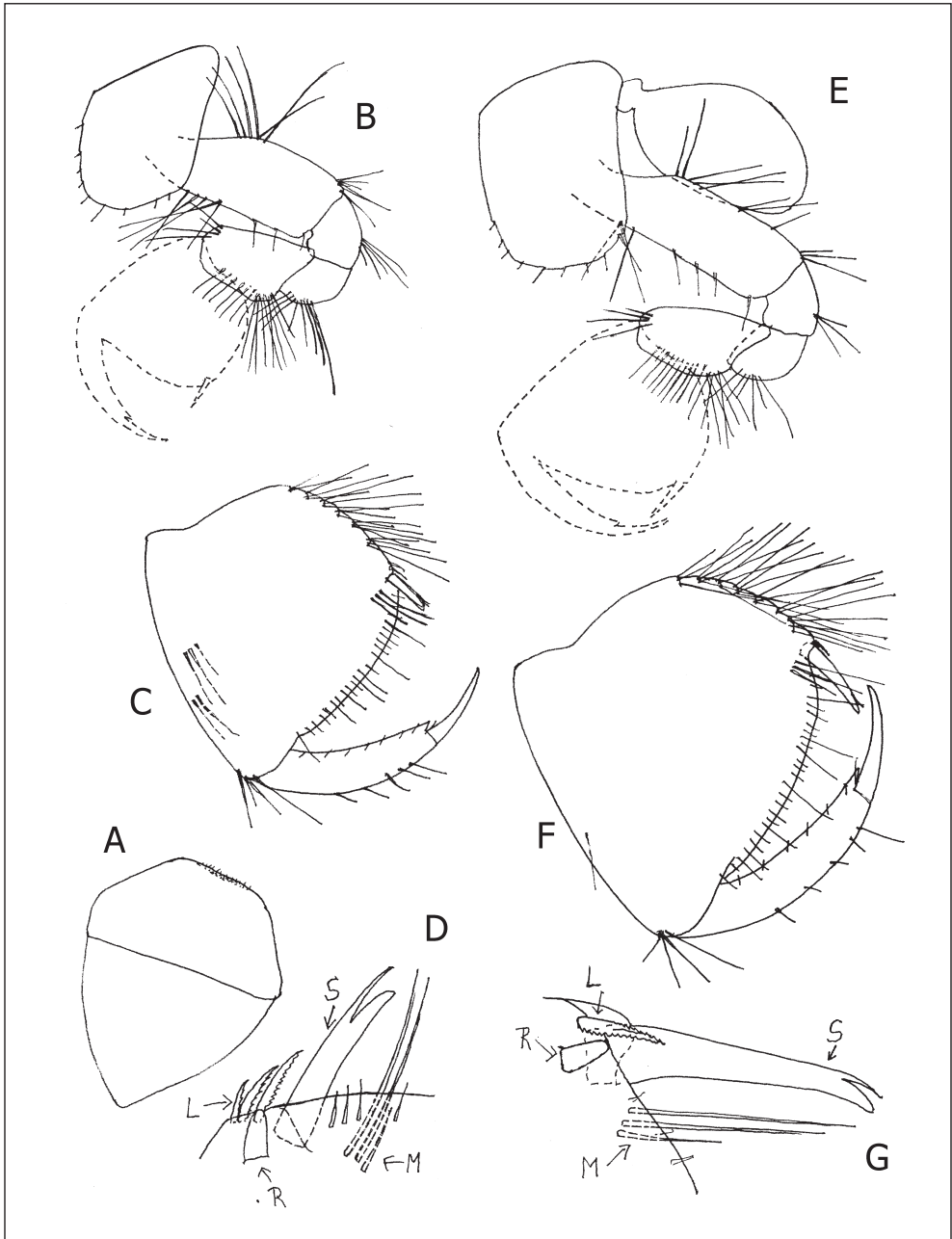


Fig. 2. *Niphargus lourensis lourensis* Ntakís et al., 2015, Agalas, Zakynthos island, Greece (G-175): male 8.0 mm: A= labrum; B-C= gnathopod 1, outer face; D= distal corner of gnathopod 1-propodus, inner face (S= corner S-spine; L= lateral L-spines; R= subcorner R-spine; M= corner facial M-setae); E-F= gnathopod 2, outer face; G= distal corner of gnathopod 2-propodus, inner face (S= corner S-spine; L= lateral L-spines; R= subcorner R-spine; M= corner facial M-setae).

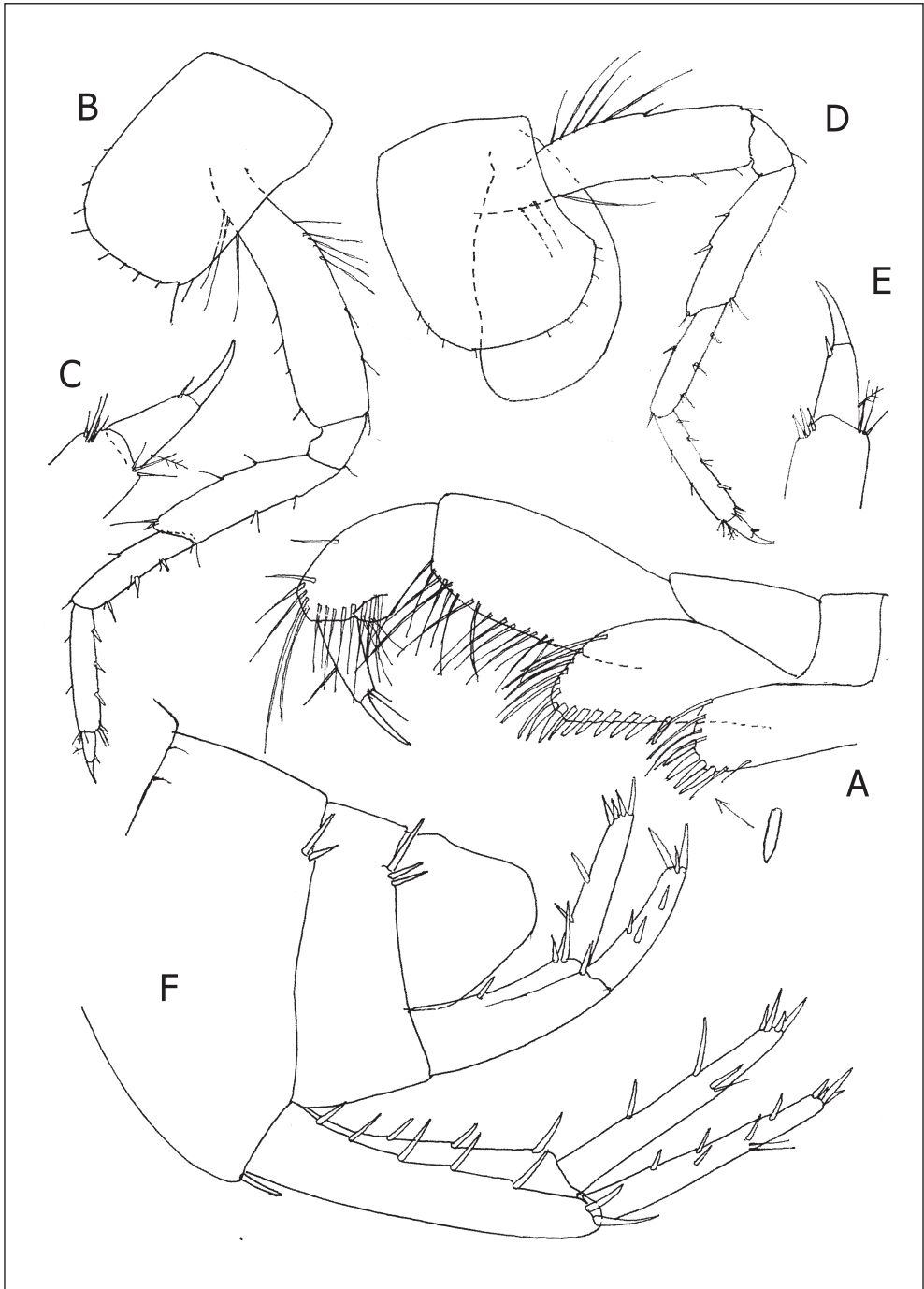


Fig. 3. *Niphargus lourensis lourensis* Ntakís et al., 2015, Agalas, Zakynthos island, Greece (G-175): male 8.0 mm: A= maxilliped; B-C= pereopod 3; D-E= pereopod 4; F= urosome with uropods 1-2.

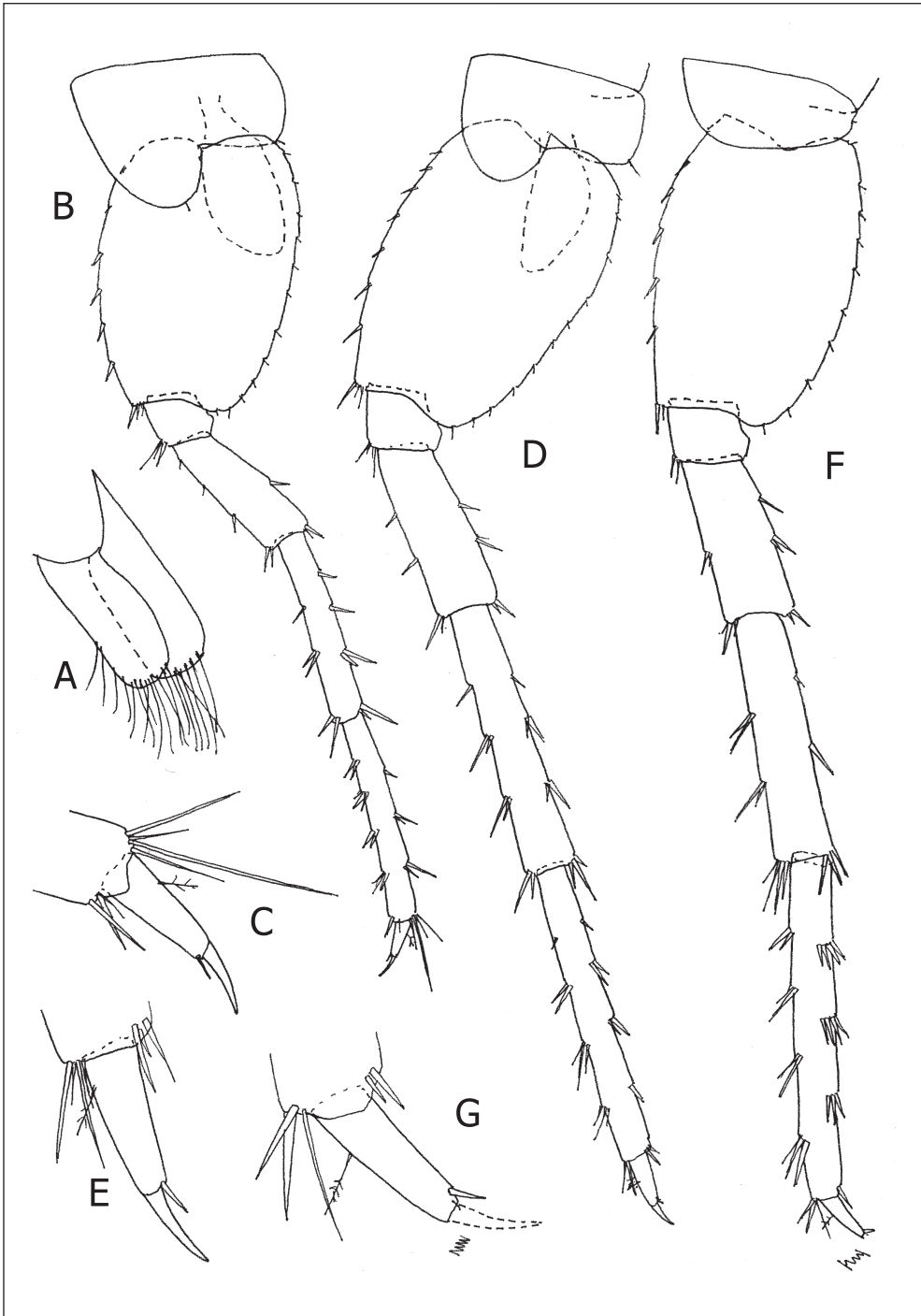


Fig. 4. *Niphargus lourensis lourensis* Ntakís et al., 2015, Agalas, Zakynthos island, Greece (G-175): male 8.0 mm: A= maxilla 2; B-C= pereopod 5; D-E= pereopod 6; F-G= pereopod 7.

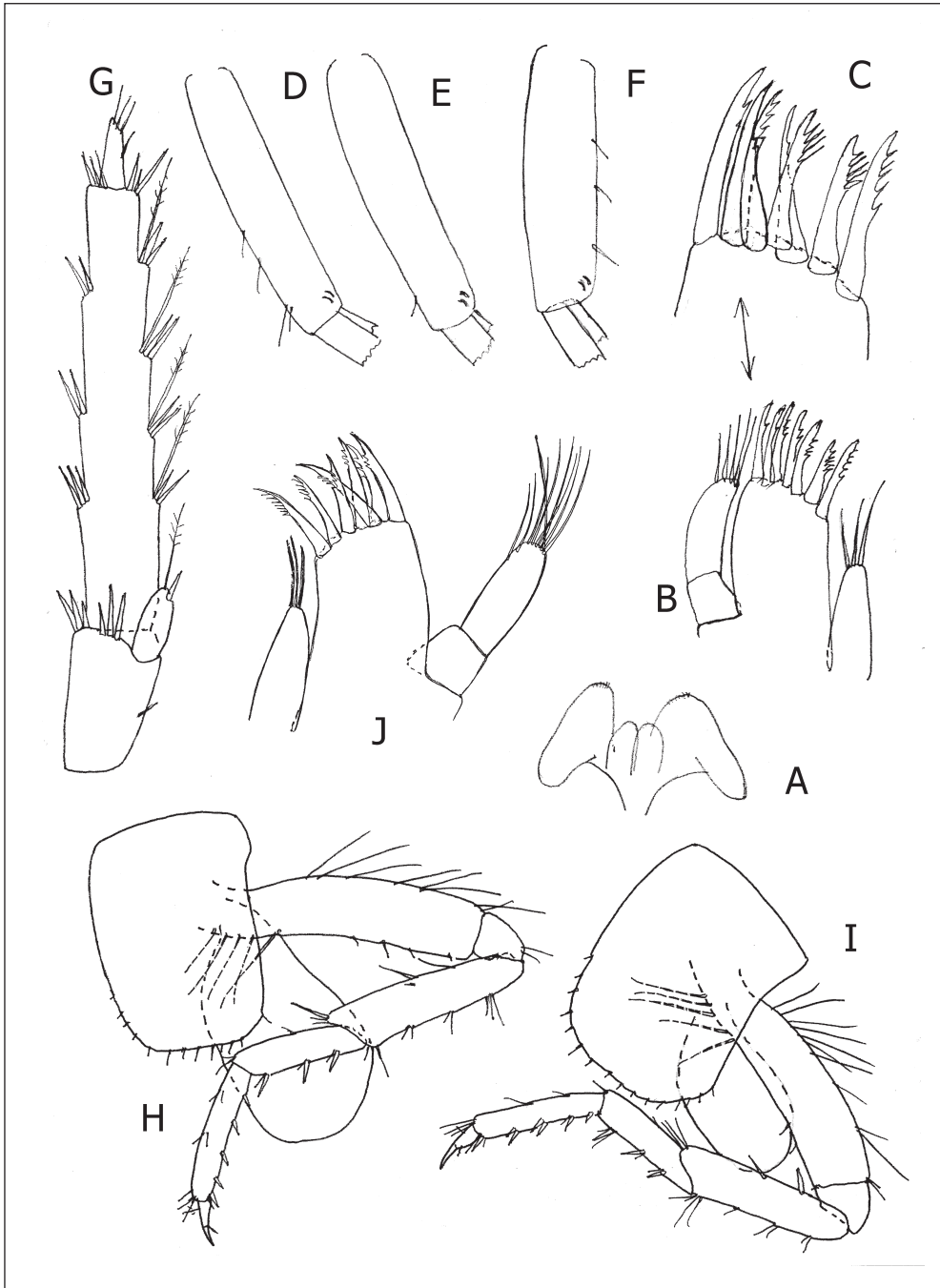


Fig. 5. *Niphargus lourensis lourensis* Ntakis et al., 2015, Agalas, Zakynthos island, Greece (G-175): male 8.0 mm: A= labium; B-C= maxilla 1; D= pleopod 1-peduncle; E= pleopod 2-peduncle; F= pleopod 3-peduncle; G= uropod 3. S. Efimia, Crini (Potamianota), Cephalonia Island, Greece (G-59), **female 11.2 mm**: H= pereopod 3; I= pereopod 4; J= maxilla 1.

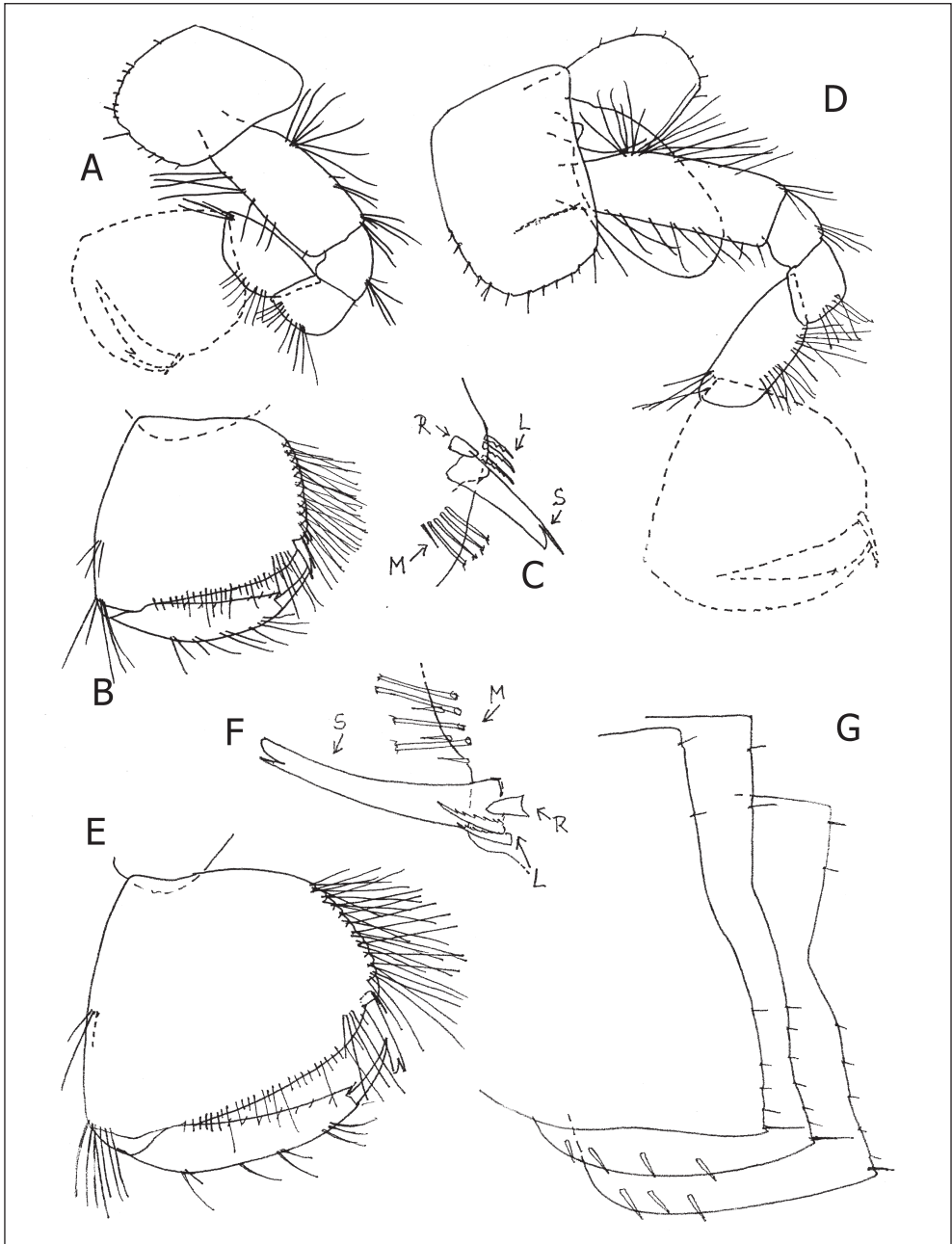


Fig. 6. *Niphargus lourensis lourensis* Ntakís et al., 2015, S. Efímia, Crini (Potamianota), Cephalonia Island, Greece (G-59), female 11.2 mm: A-B= gnathopod 1, outer face; C= distal corner of gnathopod 1-propodus, inner face (S= corner S-spine; L= lateral L-spines; R= subcorner R-spine; M= corner facial M-setae); D-E= gnathopod 2, outer face; F= distal corner of gnathopod 2-propodus, inner face (S= corner S-spine; L= lateral L-spines; R= subcorner R-spine; M= corner facial M-setae); G= epimeral plates 1-3.

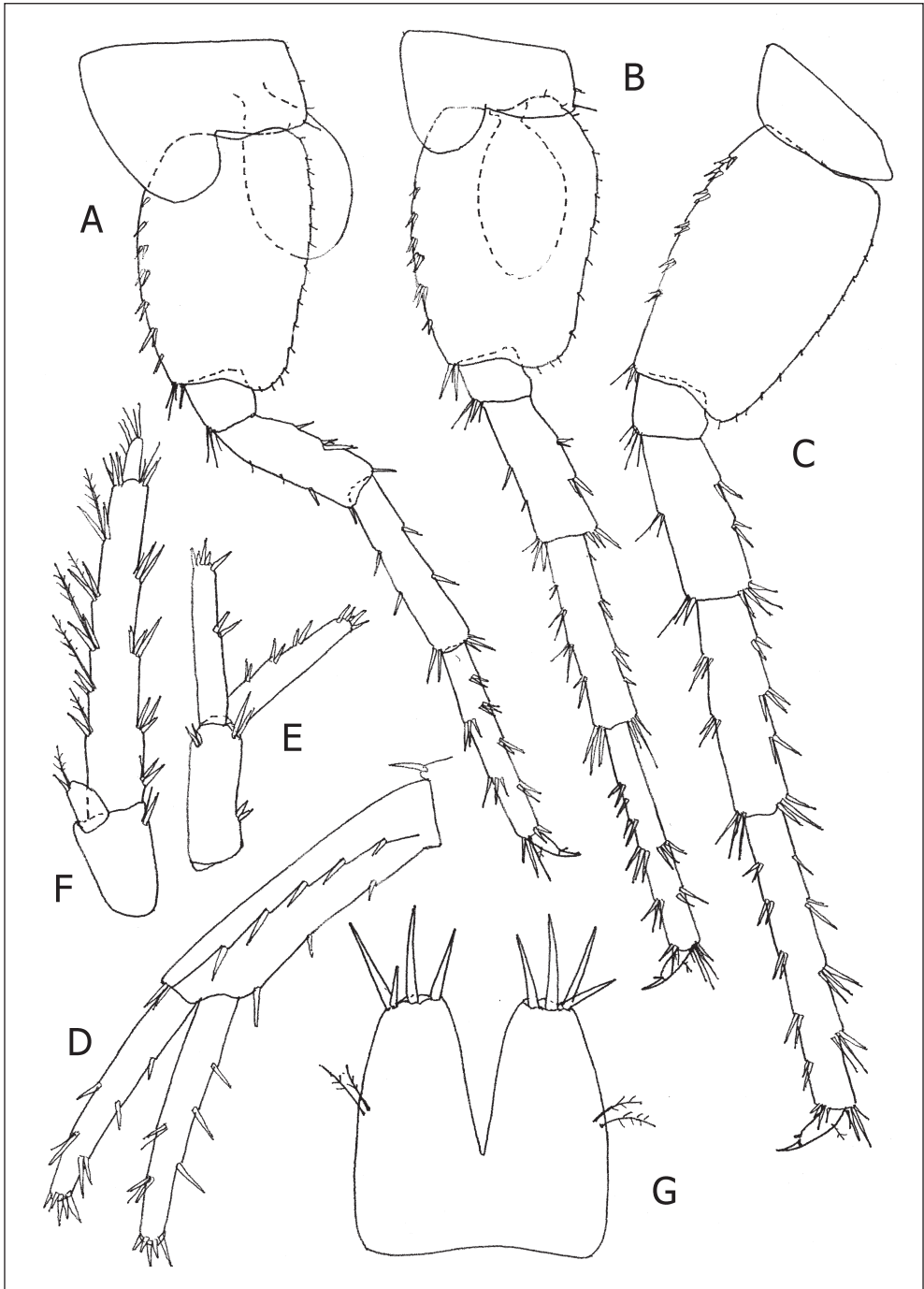


Fig. 7. *Niphargus lourensis lourensis* Ntakís et al., 2015, S. Efímia, Crini (Potamianota), Cephalonia Island, Greece (G-59), female 11.2 mm: A= pereopod 5; B= pereopod 6; C= pereopod 7; D= uropod 1; E= uropod 2; F= uropod 3; G= telson.

