A new species of *Mysidopsis* (Crustacea, Mysida, Mysidae) from coastal waters of Catalonia (north–western Mediterranean)

C. San Vicente

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Abstract

A new species of Mysidopsis *(Crustacea, Mysida, Mysidae) from coastal waters of Catalonia (north–western Mediterranean).*— A new species of the genus *Mysidopsis* (Crustacea, Mysida, Mysidae, Leptomysinae) is described based on specimens sampled with a suprabenthic sled in the littoral located near the coastal city of Mataró (north–western Mediterranean). The new species lives in the soft–bottom suprabenthic habitat near a *Posidonia oceanica* meadow, at depths between 17 and 21 m. The main distinguishing features of *Mysidopsis iluroensis* n. sp. are the small body size, a prominent rostrum, the absence of carapace dorsal nodules, and the armature of the antennule, telson and uropod. The morphology of the new species is compared with other species of *Mysidopsis* in the Mediterranean Sea.

Key words: Mysida, Leptomysinae, New species, Mediterranean.

Resumen

Una nueva especie de Mysidopsis *(Crustacea, Mysida, Mysidae) de las aguas costeras de Cataluña (Mediterráneo noroccidental).*— Se describe una nueva especie del género *Mysidopsis* (Crustacea, Mysida, Mysidae, Leptomysinae) a partir de los ejemplares muestreados con un trineo suprabentónico en el litoral cercano a la ciudad de Mataró (Mediterráneo noroccidental). Esta nueva especie vive en el hábitat suprabentónico de los fondos blandos cercanos a una pradera de *Posidonia oceanica*, entre 17 y 21 m de profundidad. Las principales características que definen a *Mysidopsis iluroensis* sp. n. son su pequeña talla, un rostro prominente, la ausencia de nódulos dorsales en el caparazón y la armadura de la anténula, el telson y el urópodo. La morfología de la nueva especie se compara con las otras especies de *Mysidopsis* descritas en el mar Mediterráneo.

Palabras clave: Mysida, Leptomysinae, Nueva especie, Mediterráneo.

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Carlos San Vicente: c/ Nou 8, 43839 Creixell, Tarragona, Espanya (Spain).

E–mail: csanvicente@gencat.cat

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Introduction

The Mediterranean Sea is one of the most well studied geographical areas in the world, but many regions and habitats remain insufficiently studied and little is known about several taxonomic groups (Coll et al., 2010). Additionally, the Mediterranean Sea is a complex region where ecological and human interaction has a strong impact on marine biodiversity. It is therefore of high priority to improve descriptions of species and to expand our knowledge of their geographical distribution.

Mysids are an important component of the mobile fauna associated with seagrass meadows and algal communities (Ledoyer, 1962; Mazzella et al., 1989; Scipione et al., 1996; Sánchez–Jerez et al., 1999; Wittmann, 2001; Gan et al., 2010). Their diversity and abundance in the Mediterranean *Posidonia oceanica* meadows has been related to several environmental factors, including the influence of edge effects (Barberá–Cebrián et al., 2002). These edges could be considered a supplementary habitat for mobile fauna because they increase the spatial heterogeneity of seagrass ecosystems (Sánchez–Jerez et al., 1999).

During a monitoring program of the *Posidonia oceanica* meadow off the Mataró coast (Barcelona, NE Iberian peninsula), many suprabenthic Mysida were sampled in the neighbouring soft bottoms in 2001 and 2011. The following species were collected: the Erythropinae *Erythrops erythrophthalma* (Goës, 1864), the Gastrosaccinae *Anchialina agilis* (Sars, 1877), the Leptomysinae *Leptomysis gracilis* (Sars, 1864) and *Paraleptomysis banyulensis* (Bacescu, 1966), as well as some individuals ascribed to a new species within the genus *Mysidopsis* (Leptomysinae). This paper deals with the morphological description of this new taxon and provides an updated identification key to the known European *Mysidopsis*.

The genus *Mysidopsis* Sars, 1864 presently contains a heterogeneous group of 47 living species (Anderson, 2010; Mees & Meland, 2012), showing a wide variety of morphological characters (Bacescu, 1968; Brattegard, 1969; Tattersall, 1969; Bacescu & Gleye, 1979; Mauchline, 1980; Price et al., 1994; Bravo & Murano, 1996).

The first three species described in genus *Mysidopsis —M. didelphys* (Norman, 1863), *M. angusta* Sars, 1864 and *M. gibbosa* Sars, 1864— are known from the north–eastern Atlantic and the Mediterranean. Within their respective distributional areas, all of them have been reported in numerous studies such as Sars (1872), Colosi (1929), Bacescu (1941), Tattersall & Tattersall (1951), Mauchline (1970), Mauchline & Murano (1977), Lagardère & Nouvel (1980), Sorbe (1982), Müller (1993), Cunha et al. (1997), and San Vicente (2004). *Mysidopis cachuchoensis* San Vicente et al., 2012 is the latest species to be described from bathyal soft–bottoms specimens of the Bay of Biscay. These four known European species are morphologically well described and easy to identify (Sars, 1872; Tattersall & Tattersall, 1951; Tattersall, 1969; Mauchline, 1971; San Vicente et al., 2012).

Material and methods

The specimens examined in the present study were recorded at Mataró II and Mataró III stations located at the edges of a *Posidonia oceanica* meadow at 20.6 and 17 m depth, respectively (fig. 1). This well conserved *Posidonia oceanica* meadow covers more than 730 hectares of substrate and the distribution of specimens has been studied in detail by Manzanera & Cardell (2002).

In 2001 and 2011, the mysid fauna was qualitatively sampled using a suprabenthic sled with a rectangular opening of 50 cm wide and 25 cm high, equipped with a 0.5 mm mesh size net, designed to skim over the surface of the sediment to collect the fauna swimming within the near bottom water layer. The sled was towed by a scuba diver who opened and closed the net at the beginning and end of the bottom sampling. On board, samples were fixed with a solution of 4% formalin in sea water. At the laboratory, the *Mysidopsis* specimens were sorted and conserved separately in 70% ethanol for later examination.

The total body length (TL) of individuals was measured from the apex of the rostrum to the posterior end of the telson, excluding setae. Specimens selected for the species description were dissected and temporarily mounted on slides. Dissected appendages were drawn with the aid of a camera lucida mounted on a Zeiss Axioscop 20 microscope. The terminology for cuticle projections (spines and setae) follows Watling (1989) and Garm (2004). Type material is deposited at the Institut de Ciències del Mar (CSIC) of Barcelona, Spain. The description below refers to both sexes, unless otherwise stated. Nomenclature of higher Mysida taxa follows Mees & Meland (2012).

Results

Taxonomy

Order Mysida Haworth, 1825
Family Mysidae Haworth, 1825
Subfamily Leptomysinae Hansen, 1910
Mysidopsis G. O. Sars, 1864
Mysidopsis iluroensis n. sp. (figs. 2–5)

Material examined

Holotype: (catalogue number: ICMM12120401), 1 mature male, 4.0 mm TL, 14 VI 2001, station Mataró II, 41º 31' 37.9029'' – N, 2º 28' 17.861'' E, 20.6 m depth, 0–25 cm near–bottom layer; dissected, one vial.

Paratypes: (ICMM12120402), 1 mature female, 4.9 mm TL, station Mataró II, data as for holotype, not dissected, one vial; (ICMM12120403), 1 mature male, 4.0 TL, 29 VI 2011, station Mataró III, 41º 30' – 2.574'' N, 2º 28' 56.901'' E, 17 m depth, 0–25 cm near–bottom layer, dissected, one vial.

Other material: (ICMM12120404), 5 juveniles (1.9, 2.0, 2.0 2.1, 2.1 mm TL), station Mataró II, not dissected, one vial; (ICMM12120405), 3 immature males (2.7, 3.6 and 3.7 mm TL), station Mataró III,

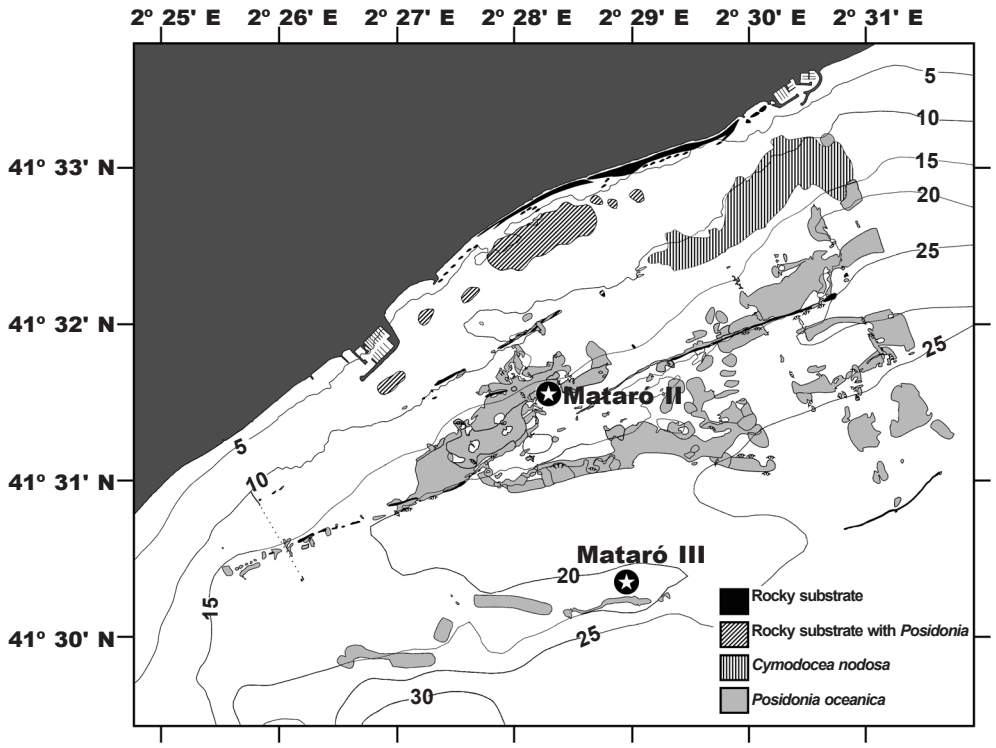

Fig. 1. Location of the two stations sampled with a suprabenthic sled in the *Posidonia oceanica* meadow edge off the Mataró coast (NE Iberian peninsula) in 2001 (Mataró II) and 2011 (Mataró III). *Posidonia* and *Cymodocea* meadow distribution and isobaths (in metres) modified following Manzanera & Cardell (2002).

Fig. 1. Localización de las dos estaciones muestreadas con un trineo suprabentónico en los márgenes de la pradera de Posidonia oceanica *de la costa de Mataró (NE de la península ibérica) en 2001 (Mataró II) y 2011 (Mataró III). Distribución y curvas batimétricas (en metros) de las praderas de* Posidonia *y* Cymodocea *modificado en base a Manzanera & Cardell (2002).*

not dissected, one vial; (ICMM12120406), 1 mature female (3.9, TL), station Mataró III, dissected, one vial; (ICMM12120407), 3 mature females (3.8, 4.1 and 4.1 mm TL) station Mataró III, not dissected, one vial; (ICMM12120408), 7 immature females (3.0, 3.1, 3.2, 3.3, 3.3, 3.4 and 3.5 mm TL), station Mataró III, not dissected, one vial; (ICMM12120409), 12 juveniles (1.1, 1.7, 1.7, 1.8, 1.9, 2.0, 2.1, 2.2, 2.2, 2.2, 2.4 and 2.4 mm TL), station Mataró III, not dissected, one vial.

Etymology

This species is dedicated to the archaeological remains of the ancient Roman city of Iluro preserved around the present village of Mataró.

Diagnosis

Small–size mysid characterized by a prominent triangular rostrum; carapace without dorsal nodules; eyestalk with a finger–like papilla on dorsal anterior margin; third article of antennular peduncle armed with one and three small cuspidate setae on the dorsal medium and posterior margins, respectively; linguiform telson with a rounded apex armed with two median cuspidate setae; endopod of uropod armed on its inner medium margin with 6–8 cuspidate setae.

Description

General form robust and compact. Carapace with anterior margin produced in the middle line into a large triangular rostrum which extends to the middle of the first segment of antennular peduncle; without dorsal nodules; posterior margin emarginated dorsally, leaving the last two, and part of the sixth thoracic somites uncovered; posterolateral lobe not covering anterior abdominal somite (fig. 2A). Abdomen moderately robust, as wide as the middle portion of the carapace and not tapering posteriorly; first five somites subequal in length; last somite two times as long as the fifth.

Eyes (fig. 2B) large, globular, broader than the eyestalk, laterally extending beyond carapace limits; eyestalk with dorsal finger–like papilla; ommatidial pigment orange (in preserved specimens).

Antennular peduncle (fig. 2C) shorter than antennal scale. First article longer than wide; second article short, half as long as broad, third article broader than long, armed with one and three small cuspidate setae on the dorsal medium and posterior margins, respectively; male lobe large and hirsute.

Antennal sympod (fig. 2D) with a pointed spine on the ventral outer posterior angle. Peduncle slightly shorter than the scale length; first article short as long as broad; second article three times as long as broad, inner posterior margin armed with two simple setae; third article half the length of the second article, posterior inner margin armed with three simple setae. Antennal scale lanceolate, four times as long as maximum width, extending beyond the antennular peduncle; outer margin straight, inner margin convex; a small suture present in posterior one–eleventh.

Labrum (fig. 2E) rounded, asymmetrical, without frontal spiniform process, posterior margin with two clusters of short, irregularly distributed thin simple setae.

Mandibles (fig. 2F–H) with a three–segmented palp, second article about twice as long as the third, with simple setae on both margins; third article armed on the posterior third of the inner margin with 10 ventral simple setae, five distally ventral serrate setae and one posterior large conspicuous pappose seta. Setal row and molar process reduced.

Maxillule (fig. 2I) apex of outer lobe armed with eight strong cuspidate setae; inner lobe with two apical and one median simple seta.

Maxilla (fig. 3A) with posterior article of endopod oval, longer than wide, inner posterior two–thirds margins armed with 18 pappose setae; exopod relatively narrow, extending to the third length of the posterior margin endopod article, with 10 pappose setae, the eight short simple setae on its anterior inner margin; inner margin of coxal and bilobulate basal endites armed with simple setae (fig. 2A).

First thoracopod (fig. 3B–C) short and robust, with unarmed epipodite; inconspicuous coxa and articulation between basis and preischium; endopod with preischium and ischium fused, carpopropodus subequal in length to fused preischium and ischium; dactylus with one strong posterior spine and nine simple setae.

Second thoracopod (fig. 3D) longer than the first; endopod with preischium and ischium not fused, merus shorter than carpopropodus; dactylus armed with one strong terminal curved setae; exopod subequal in length to the endopod, 10–segmented.

Third to eighth thoracopods (fig. 3E–I) much longer than first and second, with endopod longer than exopod; isquium, merus and carpoprodus subequal in length; carpopropodus three–segmented; dactylus with a posterior simple curved seta; exopods 8–9 segmented. Sixth to eighth female thoracopods with a pair of developed oostegites, first pair smaller than posterior pairs. Genital appendage of male short and cylindrical, armed distally with six simple setae (fig. 3J).

Pleopods of the female (fig. 4A–E) uniramous, unjointed, the first shorter than posterior pairs. Pleopods of the male (fig. 4F–J) well developed; first pleopod with plate–like endopod and 9–segmented exopod, second to fifth pleopods biramous with both rami subequal in length, 9–10 segmented; endopods with side pseudobranchial lobe rectangular, exopod of the fourth pair without modified setae.

Telson (fig. 4K–L) linguiform, one and half times as long as broad at base; lateral margins armed with 8–10 short cuspidate setae similar in size; apex rounded–truncate, armed with two median cuspidate setae.

Uropod (fig. 4K, M) short and robust; endopod extending beyond apex of telson for 1/5 of its length, armed on the medium inner ventral margin with 6–8 short cuspidate setae (seven in adult males, 6–8 in adult females and immature individuals); exopod longer than endopod, having entire margin setose, outer margin straight, inner margin convex.

Colour (in preserved specimens): almost opaque white tegument with brown pigmentation irregularly distributed on the abdomen and some appendages; two black spots on the dorsal anterior part of the telson (fig. 5).

Distribution and habitat

The known distributional area of the new *Mysidopsis* species is at present restricted to the sandy edges of the *Posidonia oceanica* meadow from the coast of Mataró (north–western Mediterranean).

Remarks

M. iluroensis n. sp. represents the fifth species of the genus currently known from NE–Atlantic and Mediterranean. Previously known species of the genus are *M. didelphys* (Norman, 1863), *M. angusta* Sars, 1864 and *M. gibbosa* Sars, 1864, reported from northern Europe and Iceland to the Mediterranean, between coastal waters (known depth range: 1–220 m) and the recently described *M. cachuchoensis* San Vicente et al., 2012, reported from the 'Le Danois' Bank (Bay of Biscay) at 828 m depth.

Although the genus *Mysidopsis* probably represents a polyphyletic melange of taxa (Price et al., 1994), the new species described in this paper undoubtedly shares the morphological diagnosis of the genus *sensu* Sars (1872), Tattersall & Tattersall (1951) and Tattersall (1969). The most distinctive characters whereby members of this genus may be recognized is the 4–articulate endopod of first thoracic appendages which was due to the fusion of the preischium and ischium, the fused carpopropodus divided into three subsegments in thoracopods 3–8, only setae along the inner margin of the uropodal endopod, not modified mandibular palps and the presence of an expodod in the maxilla. The pair of dark spots at the base of the telson is also a characteristic feature of the genus (Tattersall, 1969). All these characters are present in the new described species. In addition, the overall appearance of the individuals examined is very close to the type species of the genus: *Mysidopsis didelphys* (Norman, 1863).

The new species can be distinguished from *M. didelphys* and *M. angusta* by the telson shape and the uropod armature. The rounded apex of the telson

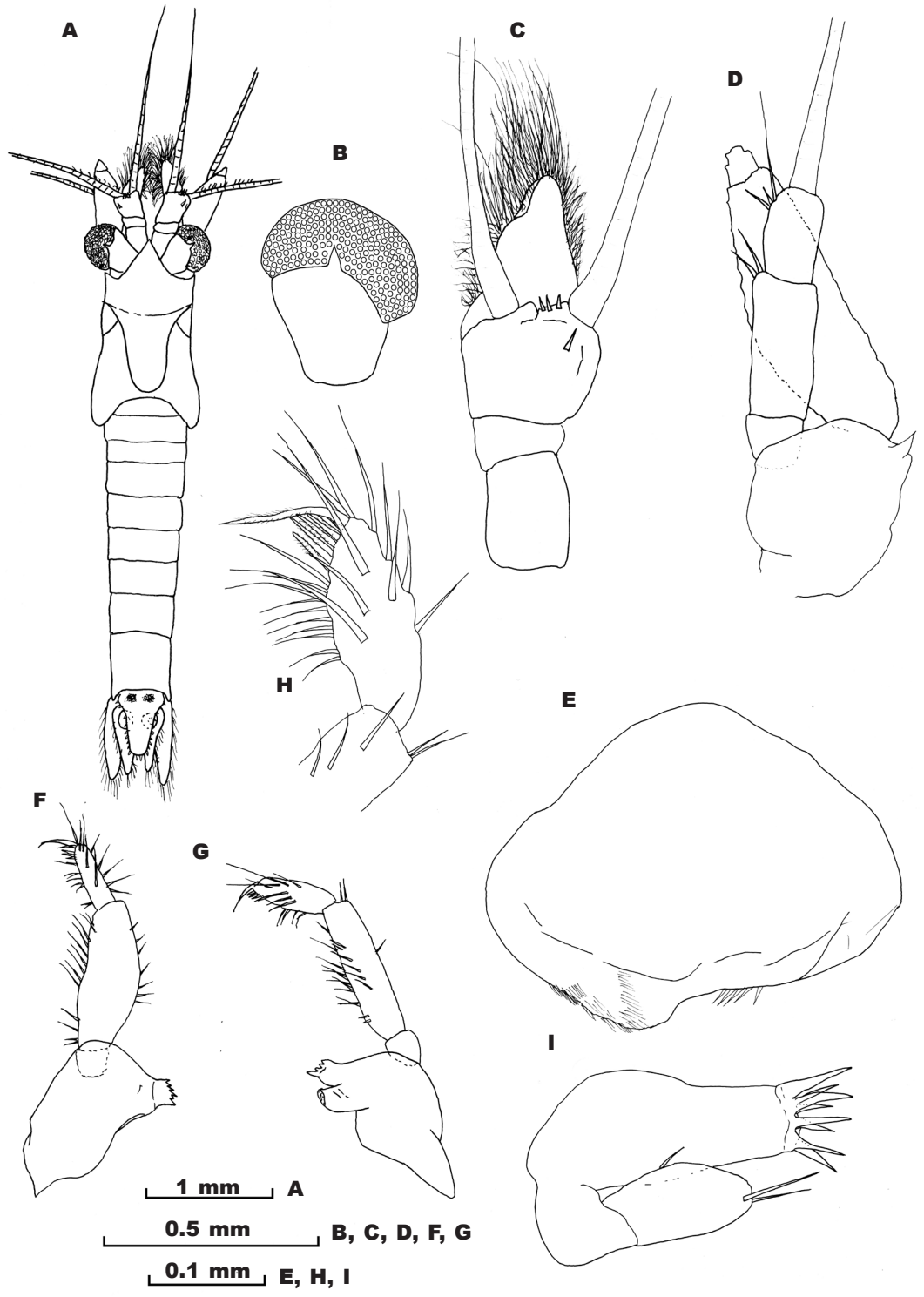

Fig. 2. *Mysidopsis iluroensis* n. sp., holotype, mature male (A–E, I) and paratype, mature male (F–H): A. Habitus in dorsal view; B. Right eye in dorsal view; C. Antennule in dorsal view; D. Antenna in ventral view; E. Labrum; F, G. Mandibles; H. Terminal segment of mandibular palp; I. Maxillule.

Fig. 2. Mysidopsis iluroensis *sp. n., holotipo macho adulto (A–E, I) y paratipo macho adulto (F–H): A. Vista dorsal; B. Vista dorsal del ojo derecho; C. Vista dorsal de la anténula; D. Vista ventral de la antena; E. Labro; F, G. Mandíbulas; H. Segmento terminal del palpo mandibular; I. Maxílula.*

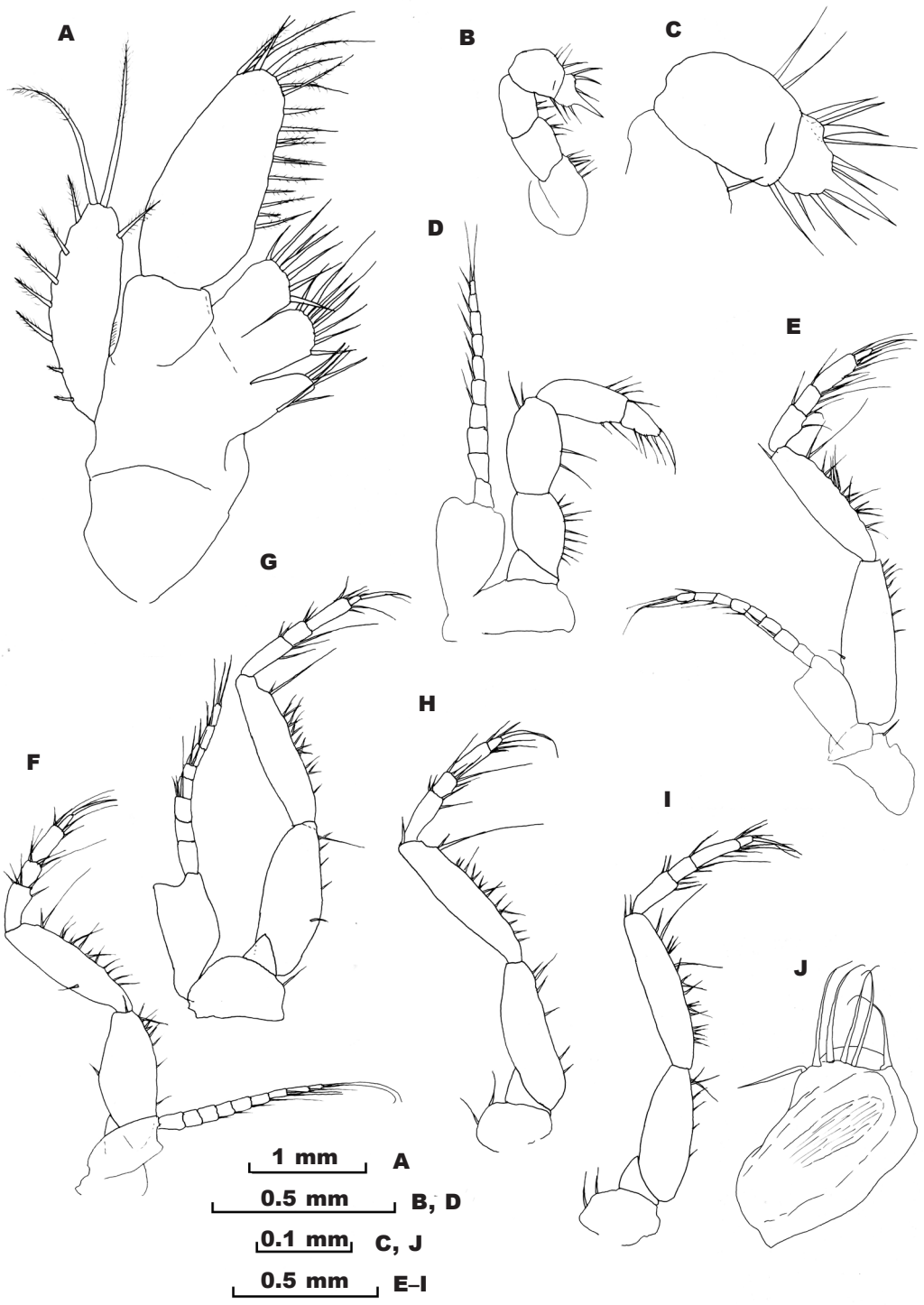

Fig. 3. *Mysidopsis iluroensis* n. sp., holotype, mature male (A–D, G–J) and other material, mature female, TL 4.1 mm (E–F): A. Maxilla; B. First thoracopod; C. Posterior articles of endopod of first maxilliped; D. Second thoracopod; E. Third thoracopod; F. Fifth thoracopod; G. Sixth thoracopod; H. Endopod of 7th thoracopod; I. Endopod of 8th thoracopod; J. Male genital organ.

Fig. 3. Mysidopsis iluroensis *sp. n., holotipo macho adulto (A–D, G–J) y otro material, hembra adulta, longitud total 4,1 mm (E–F): A. Maxila; B. Primer toracópodo; C. Artejos posteriores del endópodo del primer maxilípedo; D. Segundo toracópodo; E. Tercer toracópodo; F. Quinto toracópodo; G. Sexto toracópodo; H. Endópodo del 7º toracópodo; I. Endópodo del 8º toracópodo; J. Órgano genital masculino.*

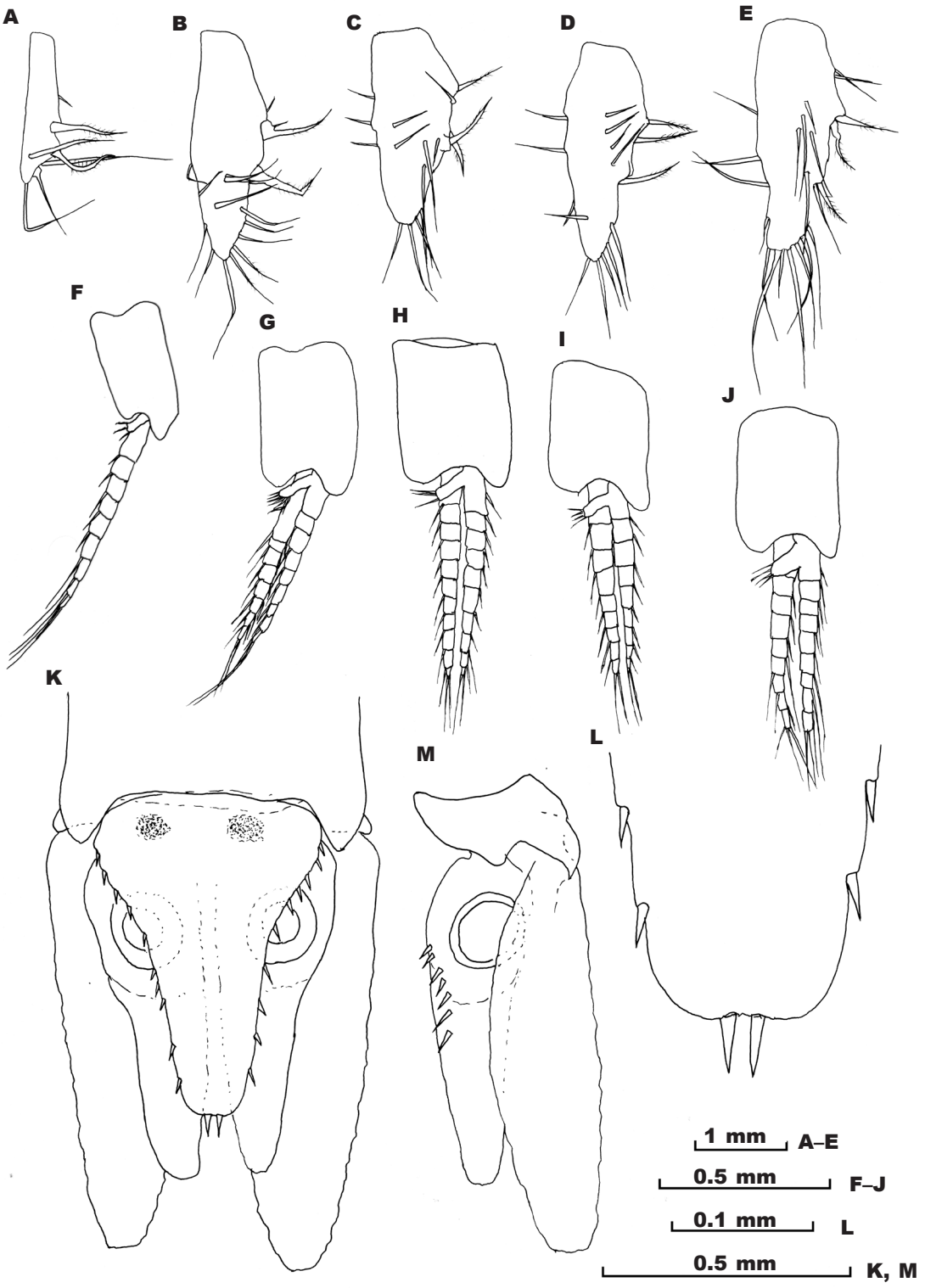

Fig. 4. *Mysidopsis iluroensis* n. sp., other material, mature female, TL 4.1 mm (A–E) and holotype, mature male (F–M): A–E. First to 5th female pleopods; F–J. First to 5th male pleopods; K. Telson and uropods in dorsal view; L. Posterior end of telson; M. Uropod in ventral view.

Fig. 4. Mysidopsis iluroensis *sp. n., otro material, hembra adulta longitud total 4,1 mm (A–E) y holotipo macho adulto (F–M): A–E. Del 1º al 5º pleópodos femeninos; F–J. Del 1º al 5º pleópodos masculinos; K. Vista dorsal del telson y los urópodos; L. Extremo posterior del telson; M. Vista ventral del urópodo.*

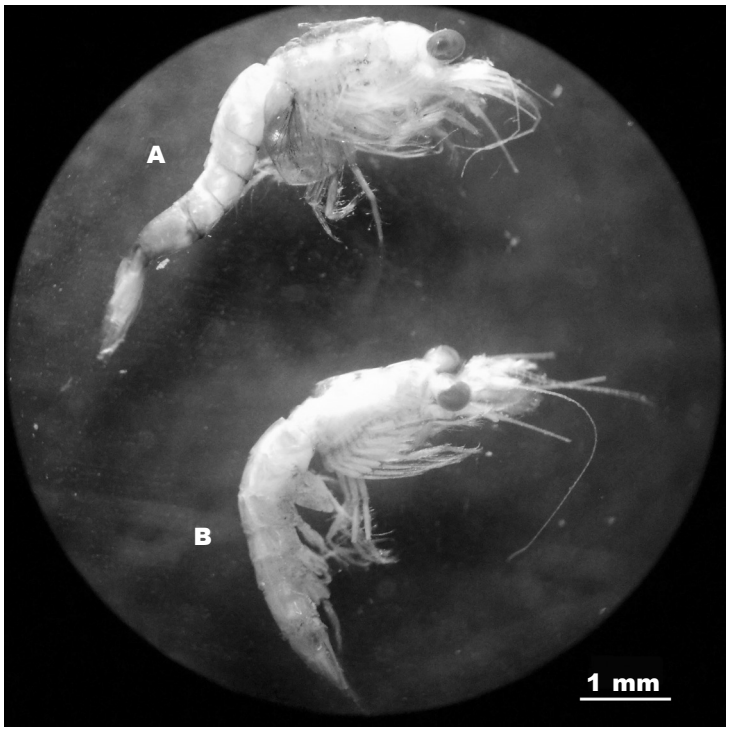

Fig. 5. *Mysidopsis iluroensis* n. sp., photograph of ethanol preserved specimens: A. Paratype, mature female in lateral view; B. Holotype, mature male in lateral view.

Fig. 5. Mysidopsis iluroensis *sp. n., fotografía de los ejemplares conservados en etanol: A. Paratipo, vista lateral de la hembra adulta; B. Holotipo, vista lateral del macho adulto.*

of *M. iluroensis* n. sp. is armed with two median cuspidate setae whereas in *M. didelphys* the apex of the telson is truncate and armed at the outer corners with two cuspidate setae, and in *M. angusta* the apex of the telson has a median cleft. *M. iluroensis* sp. nov. differs from both latter species in the inner endopod armature of the uropod (with 6–8 cuspidate setae in *M. iluroensis* n. sp. versus only one in *M. didelphys* and *M. angusta*).

M. iluroensis n. sp. can be easily distinguished from *M. cachuchoensis* by the ornamentation of its eyestalk (with dorsal finger–like papilla in the new species, absent in *M. cachuchoensis*), the structure of its antennal scale (without posterior article in *M. cachuchoensis*), the armature of the inner margin of its uropodal endopods (more than 30 graduated cuspidate setae from statocyst to sub–apex in *M. cachuchoensis*) and the armature of the lateral margins of its telson (anterior half naked in *M. cachuchoensis*).

M. iluroensis sp. nov. shows the closest morphological similarity to *M. gibbosa*. The new species can be distinguished from *M. gibbosa* by its largest rostrum and the armature of the antennules and the uropod endopod. The dorsal surface of the carapace (without dorsal nodules in the new species versus two quite conspicuous and large nodules in *M. gibbosa*) is another morphological difference. However, as mentioned by Bacescu (1941) and Ariani (1967), these nodules are sometimes poorly visible or even absent in some Mediterranean specimens. The armature of the dorsal surface of the third article of the antennular peduncle, with one and three small setae on the dorsal medium and posterior margin, respectively in *M. iluroensis n.* sp. distinguished also the new species from *M. gibbosa* (without any setae on the dorsal surface of the antennule). *M. iluroensis* sp. nov. differs from *M. gibbosa* in the inner endopod armature of the uropod (with 6–8 cuspidate setae in *M. iluroensis* versus only three–five small setae in *M. gibbosa*).

After Tattersall (1909), Mauchline (1971) and Lagardère & Nouvel (1980) two forms of *M. gibbosa* may be found; one living in shallow bays, usually near the outflow of a freshwater stream, the other living at depths of 40–70 m. The general body shape of the shallow water form is as described by Tattersall & Tattersall (1951) for this species. The deep water form usually resembles young *M. didelphys*, the abdomen not being sigmoid to any great degree in lateral view but examination of the telson immediately distinguishes it from young *M. didelphys*. Neither of these two forms is morphologically close to *M. iluroensis* sp. nov.

Key to species of *Mysidopsis* G. O. Sars, 1864 recorded in European waters.

Clave de las especies de Mysidopsis *G. O. Sars, 1864 registrados en aguas europeas.*

1	Apex of telson with small median V–shaped cleft	*M. angusta* G. O. Sars, 1864
	Apex of telson entire	2
2	Eyes with a finger–like papilla on the inner dorsal side of the eyestalk. Antennal scale with posterior article. Inner margin of uropodal endopod with no more than 8 cuspidate setae near statocyst. Anterior lateral margin of telson with cuspidate setae	3
	Eyestalk without dorsal finger–like papilla. Antenna scale without posterior article. Uropodal endopod with a row of more than 30 cuspidate setae along inner margin. Anterior lateral margin of telson unarmed	*M. cachuchoensis* San Vicente et al., 2012
3	Telson linguiform, apex with outer corners rounded and naked, only armed with a pair of median cuspidate setae. Inner margin of the uropod endopod armed with 4–8 short cuspidate setae	4
	Telson triangular with narrow truncate apex, armed with a pair of large cuspidate setae at the outer corners. Inner margin of the uropod endopod with a single long cuspidate seta near the statocyst	*M. didelphys* (Norman, 1863)
4	Rostrum small, obtusely triangular. Inner margin of the uropod endopod armed with 3–5 cuspidate setae	*M. gibbosa* G. O. Sars, 1864
	Rostrum well produced, broadly triangular and acutely pointed. Inner margin of the uropod endopod armed with 6–8 cuspidate setae	*M. iluroensis* n. sp.

None of the morphological peculiarities described for the new species have previously been described in *M. gibbosa* even in the Mediterranean specimens (Sars, 1877; Carus, 1885; Lo Bianco, 1903; Tattersall, 1909; Colosi, 1929; Bacescu, 1941; Ariani, 1967; Barberá Cebrián et al., 2001). Moreover, re–examination of specimens of *M. gibbosa* sampled on sandy bottoms near the coast of Mataró (Masnou beach between 5–10 m depth) by San Vicente & Munilla (2000) confirms the differences between the two species, especially in the armature of the antennule (without any setae on the dorsal surface) and the uropod endopod (with four setae on all *M. gibbosa* specimens analyzed).

Adapted from Tattersall & Tattersall (1951), Tattersall (1969) and San Vicente et al. (2012), an identification key is proposed to include the new Mediterranean species herein described.

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