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## Redescription of *Ischyromene lacazei* Racovitz, 1908 (Isopoda: Sphaeromatidae) from the Mediterranean Coast of southern France

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### Abstract

The sphaeromatid species *Ischyromene lacazei* Racovitz, 1908 is rediagnosed, and new data on its morphology and distribution are given, based on new material from the type locality, the intertidal zones at Banyuls-sur-mer, southern France. Groups of specimens were found in empty shells of *Balanus perforatus* and *Chthamalus stellatus* (Crustacea: Balanomorpha); the formation of harems was not observed. The full redescription, further data and a discussion are provided in an accompanying Organisms Diversity and Evolution Electronic Supplement.

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**Keywords:** Taxonomy; Mediterranean; Crustacea; Isopoda; Sphaeromatidae; *Ischyromene lacazei*

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### Results

#### Taxonomy

*Ischyromene lacazei* is the type species of the genus *Ischyromene* (Racovitz, 1908). In a revision of the latter, Harrison and Holdich (1982) transferred many species to *Ischyromene* from *Dynamenella* Hansen, 1905 and *Cymodocella* Pfeffer, 1887. However, a detailed description of *I. lacazei* was lacking, and therefore a redescription is of great interest.

The type material of *I. lacazei* has not been found despite intensive searching. On the other hand, the species is not involved in any complex zoological

problem, and its identity is indisputable. Therefore, a neotype is not designated here.

One of the key features of *Ischyromene* is the first pleopod. It covers pleopods 2–5 and shows a characteristically indurated internal half of the endopod (Harrison and Holdich 1982). *Ischyromene lacazei* is characterized by an oblong-oval body, and a light colour with black chromatophores. The body is dorsally convex, and the cephalon is not enlarged as, e.g., in *I. cordiforaminalis* (Chilton, 1883). The pleon is smooth, whereas the pleotelson shows conspicuous tuberculation. The pleotelson is almost triangular in shape, with the median region vaulted on both sides of the midline (Fig. 1, top right). The apical foramen opens dorsally, from above it is visible as an open slit. Both uropod rami are apically rounded. Neither tergites nor coxal plates show noticeable setulation.

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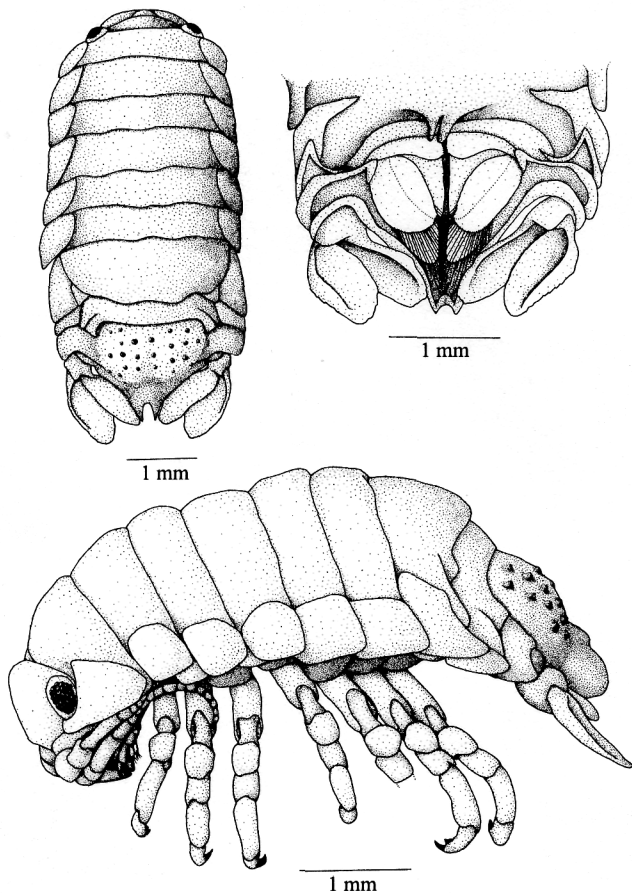


Fig. 1. *Ischyromene lacazei* Racovitza, 1908; male, 5.5 mm, Banyuls-sur-mer (42°29'N 3°8'E); dorsal, partial ventral, and lateral views.

The species is slightly sexually dimorphic. Males have the tuberculation of the pleotelson, which is somewhat more pronounced, and possess a dense fringe

of hair-like setae on merus, carpus and propodus of pereopods 1–7.

### Distribution

The species has been recorded from various Mediterranean shores, as well as from the Atlantic coast of the Iberian Peninsula (Harrison and Holdich 1982; Atta 1989; Castelló & Carballo 2001).

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### Abstract

The sphaeromatid species *Ischyromene lacazei* Racovitza, 1908 is redescribed, based on new material from the type locality, the intertidal zones at Banyuls-sur-mer, southern France. Groups of specimens were found in empty shells of *Balanus perforatus* and *Chthamalus stellatus* (Crustacea: Balanomorpha); the formation of harems was not observed.

**Keywords:** Taxonomy; Mediterranean; Crustacea; Isopoda; Sphaeromatidae; *Ischyromene lacazei*

### Introduction

According to Harrison (1981), the original diagnosis for *Ischyromene* Racovitza, 1908 was imprecise. Harrison and Holdich (1982), in revising the genus, characterized it by a short antennular peduncle article 1, stout pereopods, a bifid accessory unguis, posterior margin of pleon with two lateral sutures, lamellar uropods, an indurated internal half of the endopod of pleopod 1, exopod of pleopod 3 without an articulation, and by the posterior margin of the pleotelson with a dorsally directed foramen. Bruce (1995) placed the genus into the “*Ischyromene*-group”, together with eight further genera all of which share a relatively short first antennular peduncle article, bifid accessory unguis, and an indurated inner half of the endopod of pleopod 1. Many species have been transferred to *Ischyromene* by Harrison and Holdich (1982) from their originally places in *Dynamenella* Hansen, 1905 and *Cymodocella* Pfeffer, 1887.

For the type species of *Ischyromene*, *I. lacazei* Racovitza, 1908, the original publication gave a preliminary description only. A full description is provided here, based on new material from the type locality, the Mediterranean intertidal near Banyuls-sur-mer.

The type material of *I. lacazei* has not been found. Since it had been collected in southern France, the Mu-

séum National d’Histoire Naturelle in Paris and the Institut Océanographique in Monaco were consulted. In addition, we searched at the Speleological Institute “Emile Racovitza” (Cluj, Romania), the “Grigore Antipa” National Museum of Natural History (Bucarest, Romania), and at the Universitatea “Babes-Bolyai” (Cluj-Napoca, Romania). The species is not involved in any complex zoological problem, and its identity is indisputable. Therefore, a neotype is not designated here.

### Results

Order Isopoda – family Sphaeromatidae – subfamily Dynameninae – genus *Ischyromene* Racovitza, 1908.

#### *Ischyromene lacazei* Racovitza, 1908

Material examined. Southern France, Mediterranean coast; Banyuls-sur-mer, 42°29’N 03°8’E, August 2003: in empty shells of *Balanus perforatus* (0.3–0.5m) 35 males, 24 females, 11 juveniles; in empty shells of *Chthamalus stellatus* (0.2–0.3m) 5 males, 12 females, 8 juveniles; in crevices (0.3–0.5m) 2 females.

Habitat. Intertidal, shores of medium exposure to waves, dominated by *Halopteris scoparia*, *Lithophilum incrustans*, *Mytilus galloprovincialis*, *Chthamalus*

*stellatus* (0-0.3m), *Balanus perforatus* (0.25-0.5 m), *Patella caerulea* and *Monodonta turbinata*.

Distribution. Mediterranean shores of southern France (Monod 1931; Harrison and Holdich 1982), the Iberian Peninsula (Reboreda and Urgoni 1996; Castelló and Carballo 2001), the Moroccan Mediterranean coast (Menioni et al. 1990), and the eastern Mediterranean (Atta 1989).

### Redescription of male

(Figures 1-5)

Body (Fig. 1) about 2.5 times as long as wide, oblong-oval. Dorsal surface convex. Pereonites 1-6 subequal in size and form, about 5 times as wide as long. Vento-lateral margin of coxal plate 1 reaching under the eye. Pereonite 7 about twice as long as anterior pereonites. Coxal plates of pereonites 2-5 well developed. Shape almost square, with rounded edges. Coxal plates 1 and 7 bigger. Coxal plate 1 triangular in lateral view. Coxal plate 7 larger with caudally directed point. Caudal dorsal margins of pereonites 1-6 almost straight. Caudal margin of pereonite 7 convex, medially bearing a shallow concavity.

Pleonite 1 with epimeral plate narrow and lateral margin prolonged posteriorly, tergite completely covered by pereonite 7. Pleonites 2-5 with 2 short dorsolateral sutures. Pleotelson wider than long. Median region dorsally vaulted on both sides of midline. Dorsal surface conspicuously tuberculated. Apical foramen visible from above as a wide slit.

Dorsal surfaces of pereon and pleon smooth, bearing no setae. Colour light with black chromatophores covering nearly whole body. Anterior and lateral margins of pereonites and coxal plates without chromatophores. Margins of uropods likewise transparent and colourless.

Antenna 1 (Fig. 2c) with article 1 long and robust, with 3 short setae; second article shorter and stout; distally with 1 simple and 2 plumose setae; article 3 as long as first article, with 6 simple and 2 plumose setae distally. Flagellum with 12 articles, article 1 very short; articles 2-6 each apically with 2 aesthetascs and 5 simple setae; one seta less on articles 7-9; articles 10 and 11 with one aesthetasc and one seta; last article without aesthetascs but with 4 long simple setae; flagellum length about two thirds of peduncle.

Antenna 2 (Fig. 2d) about 1.5 times as long as antenna 1; article 1 short, outer side with numerous delicate setae; article 2 little longer, with 2 short simple setae; third article about as long as first one, with 2 plumose and one simple setae; article 4 of equal length as second article, with one plumose seta; fifth article the longest, apically with 5 plumose and 2 long simple setae. Peduncle articles and first flagellar article with various dispersed setae. Flagellum about three quarters of

length of peduncle. Flagellum of 12-14 articles (number may vary within one specimen), articles decreasing in size distally; all articles except the last with tufts of simple setae at the ventral distal margins; articles 1-3 with additional medial tufts; terminal article with an apical bundle of simple setae.

Mandibles (Fig. 2a, b) stout and robust. Pars molaris with toothed lower margin; surface wrinkled; dorsally and ventrally framed by tufts of delicate setae; 5 long simple setae ventrolaterally on pars molaris. Pars incisiva consisting of 3 blunt teeth. Right lacinia mobilis a long spine with 7 teeth. Spine row formed by 3 serrated spines, 5 serrated setae, and one plumose seta, increasing in length from apical to basal. Left lacinia mobilis with 5 teeth that are larger than on right lacinia. Spine row consisting of 3 serrated spines and 6 long setae, the third from the base plumose. Palp not surpassing length of corpus mandibulae; first article long with one simple seta; articles 2 and 3 shorter and robust; second article with a distal row of 10-12 setulated spines; third article with 17 setulated spines in a distal row, the last spine enlarged.

Maxilla 1 (Fig. 3b) with robust outer endite and slender; slightly shorter inner endite, distally with 4 long setulated setae and laterally one short simple seta; outer endite with one robust seta on its upper quarter; apically 5 cone-shaped smooth spines and 5 slender serrated spines; one small simple spine more medially.

Maxilla 2 (Fig. 3c) with outer and medial endite each with 4 long, narrowly serrated spines; inner endite distally with medial row of 11 short robust setae, alternating simple and ventrally setulated ones; lateroapically two setulated setae, two setae on inner margin only with dorsal setulation; one additional strong setulated seta at outer margin.

First article of maxillipedal palp (Fig. 3d) short, with one simple seta; article 2 the largest, sizes decreasing up to article 5; articles 2-4 with inner lobes, their apical margins as well as apex of last article with several simple setae; one simple seta at the outer margins of articles 3 and 4. Lateral margin of endite folded dorsally, medially one large retinaculum; a field of short simple setae on both sides of the endite; apically 4 plumose setae, 6 serrated short spines, 3 smooth cone-shaped spines as well as up to 15 strong simple setae (Fig. 8c).

Pereopods slightly increasing in size from 1 to 7 (Figs. 3e, 4a-e); all legs with different numbers of delicate, simple, hair-like setae; basis dorsally with one simple seta or up to 2 plumose setae; ventrally one simple seta; ischium dorsally with one proximal and one medial seta; merus dorsodistally with up to 2 plumose setae; ventrally up to 4 simple setae; carpus of pereopod 1 triangular in shape, short, with 2 simple setae ventrally; carpus of pereopod 7 bearing a distal



row of 5 plumose setae decreasing in size from dorsal to ventral margin; pereopods 2-6 carpus dorsodistally with 1-2 simple setae or one plumose seta; ventrally up to 6 simple setae; dorsal margin of propodus distally with one plumose and up to 3 simple setae; ventrally number of simple setae varying from 4-9; pereopod 1 with row of 4 plumose setae along palm of propodus; up to 7 simple setae at base of distal claw on dactylus; claws of all pereopods robust, inner claws short, with two accessory teeth, only pereopod 5 with 3 teeth (for further setation see Figs. 3e, 4e). Ventral margins of merus, carpus and propodus with dense fringe of delicate setae on each pereopod.

Pleopods in a respiratory chamber underneath pleon and pleotelson; pleopod 1 covering pleopods 2-5; endopod of pleopods 1-3 more or less triangular in shape, exopod smaller and oval; all rami bearing long swimming setae distally; endopod of pleopod 1 with small lobe at the base of the outer margin, medial half of endopod noticeably thickened, partly embedding medial margin of exopod; inner margins of sympods of pleopods 1-3 with 5 connecting hooks; endopod of pleopod 2 with appendix masculina placed in a groove near inner margin; appendix masculina about the same length as endopod, apically thickened with 3 spines; pleopods 4 and 5 both with inner margins of endopods bearing a row of short, delicate setae.

Penes (Fig. 1) short and stout, basally separated, arising from the distal margin of sternite 7.

Uropods oblong-oval and robust, somewhat surpassing the pleotelson distally; margins with various kinds and lengths of sensory setae that insert in small indentations (Fig. 5f). Longer sensory setae of adults mostly broken.

### Redescription of female

(Figures 6-10)

Females differ from males by the following characteristics: body (Fig. 6) slightly smaller, distal margin of pereonite 7 without medial indentation. Pereonite 7 only little longer than anterior pereonites. Tuberculation of pleotelson not as pronounced as in males.

First and second maxillae and maxilliped (Figs. 7e; 8a-d) similar to those of males. Right mandible spine row without plumose setae, 6 serrated setae instead; left lacinia mobilis reduced, spine row consisting of 6 serrated setae; second article of palp with 8 setulated spines, third article at left with 10, at right with 12 setulated spines (Fig. 7c-d).

Flagellum of antenna 1 with 10 articles, articles 3-9 bearing 1-2 aesthetascs distally and up to 4 simple setae (Fig. 7a).

Pereopods (Figs. 8e-10a) without the fringe of delicate setae on ventral margins of merus, carpus and propodus.

Adult female with 3 pairs of oostegites on pereopods 2-4, overlapping at midline (Fig. 6).

### Ecology

The new material was mainly collected from empty shells of *Balanus perforatus*. The vertical distribution is limited to the intertidal zone. The number of animals within each balanoid shell varied from 1 to 8. Among those shells inhabited by *I. lacazei*, abundances from 1 to 3 isopods per barnacle were most common. The collected groups differed in their composition by sex and age. There was no evidence for the formation of harems.

The collecting area was dominated by *Lithophyllum incrustans*, *Mytilus galloprovincialis*, *Patella caerulea*, and *Monodonta turbinata*.

### Discussion

*Ischyromene lacazei* is the only species of its genus found in the Mediterranean Sea. The genus has a primarily Southern Hemisphere distribution (see Harrison and Holdich 1982 for records up to that year; also Brattström 1990; Bruce 1995).

*Ischyromene lacazei* is characterized by a particular pattern of tuberculation on the pleotelson which is more pronounced in adult males than in females. Racovitza (1908) stated that a fringe of setulae on the ventral margin of male pereopods is a character of the genus. This is not referred to in the rediagnosis of the genus by Harrison and Holdich (1982), and might be a species character. However, a comprehensive revision of the species within *Ischyromene* and of the wider "*Ischyromene*-group" (Bruce 1995) is needed.

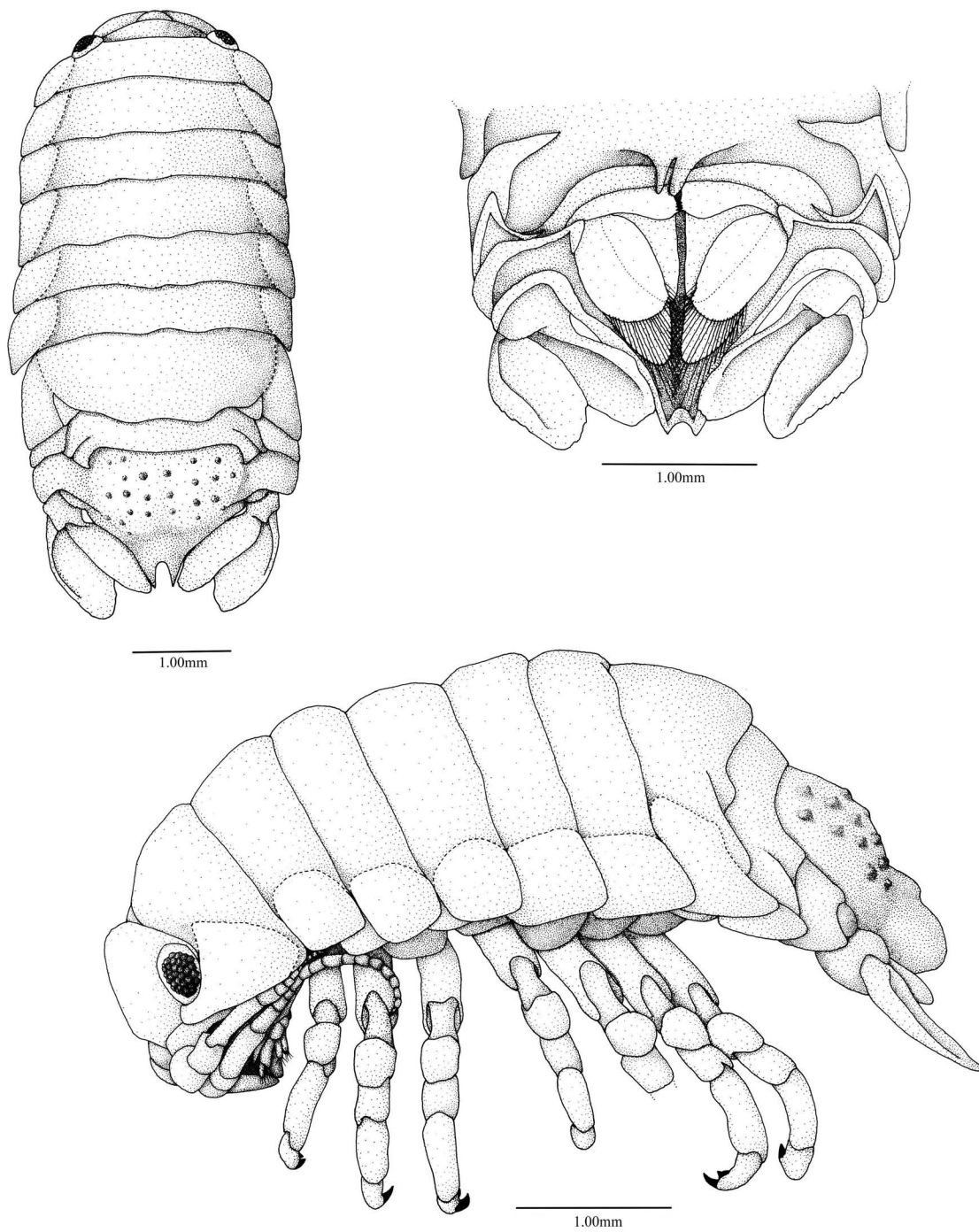
Specimens were found in groups inside empty shells of barnacles. A formation of true harems, as known for several sphaeromatid species inhabiting empty shells of barnacles or sponges (e.g. Holdich 1968; Shuster 1989), was not observed. The barnacles contained all developmental stages of *I. lacazei*, and often more than one male. It seems that barnacles were used for shelter, not as a special breeding habitat.

### Acknowledgements

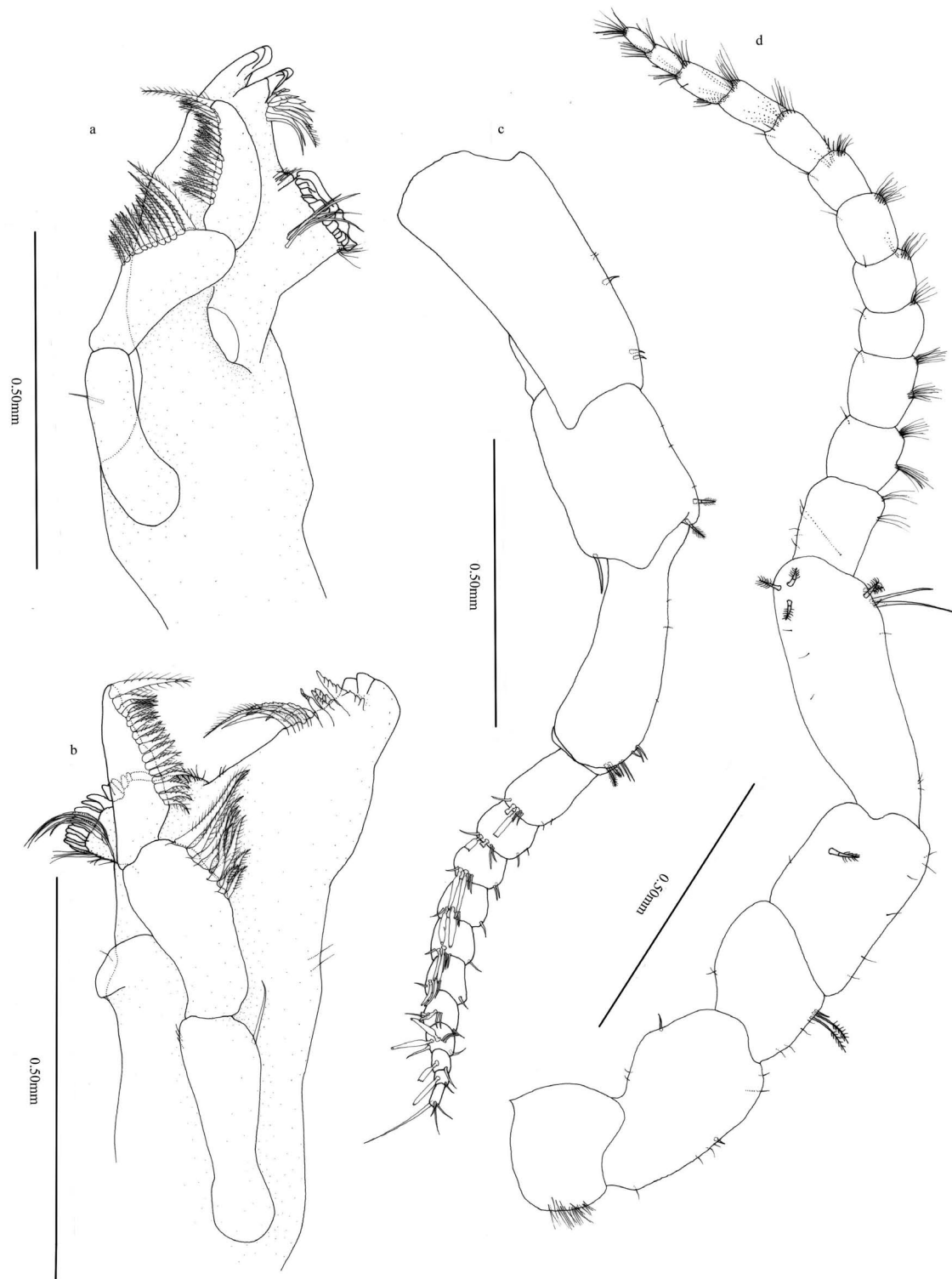
We would like to thank the Observatoire Océanologique Laboratoire Arago in Banyuls-sur-mer for providing laboratory space and a residence in August 2003.

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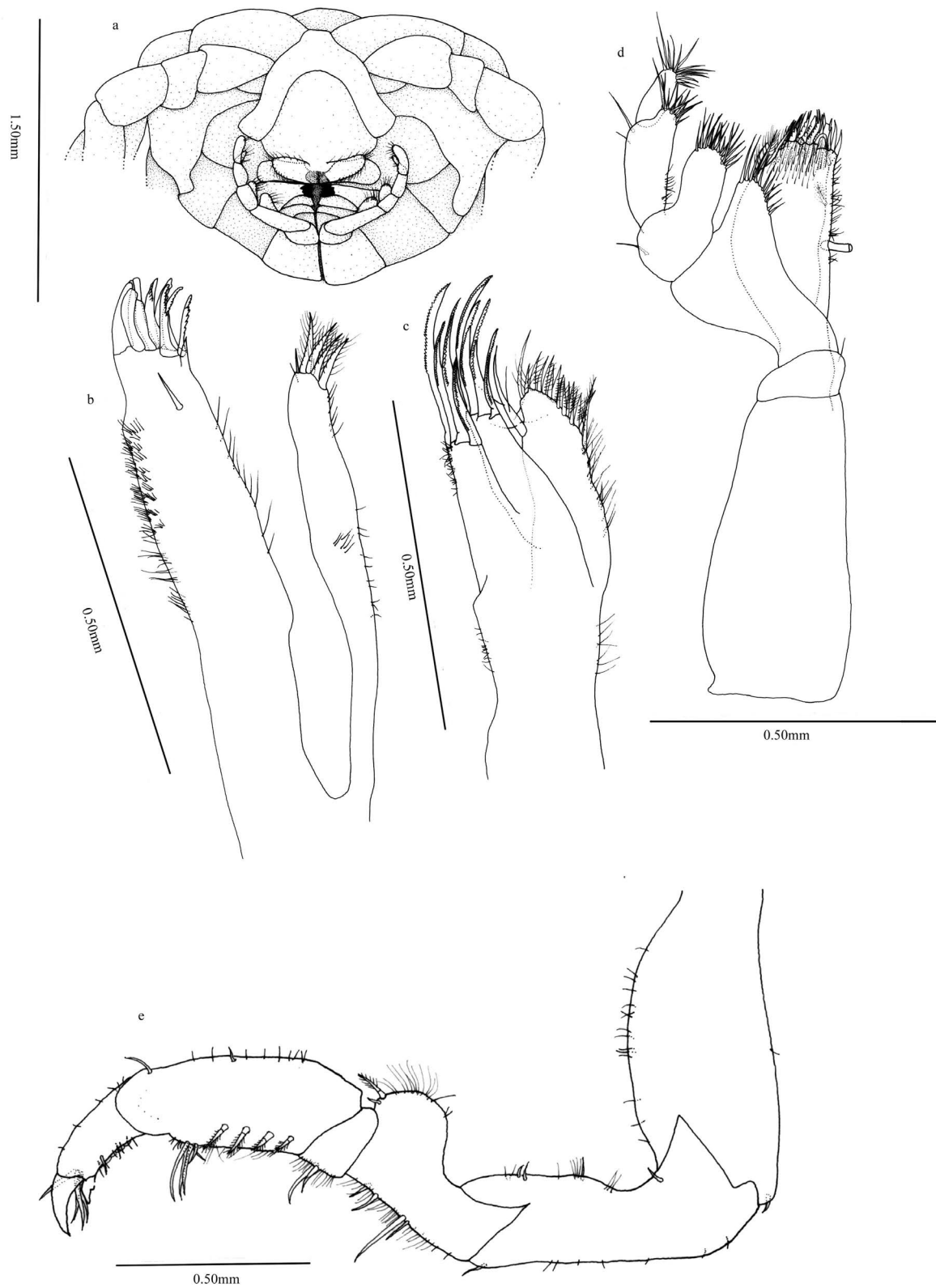


**Fig. 1:** *Ischyromene lacazei* Racovitza, 1908: male, 5.5 mm, Banyuls-sur-mer (42°29'N 3°8'E); dorsal, partial ventral, and lateral views.

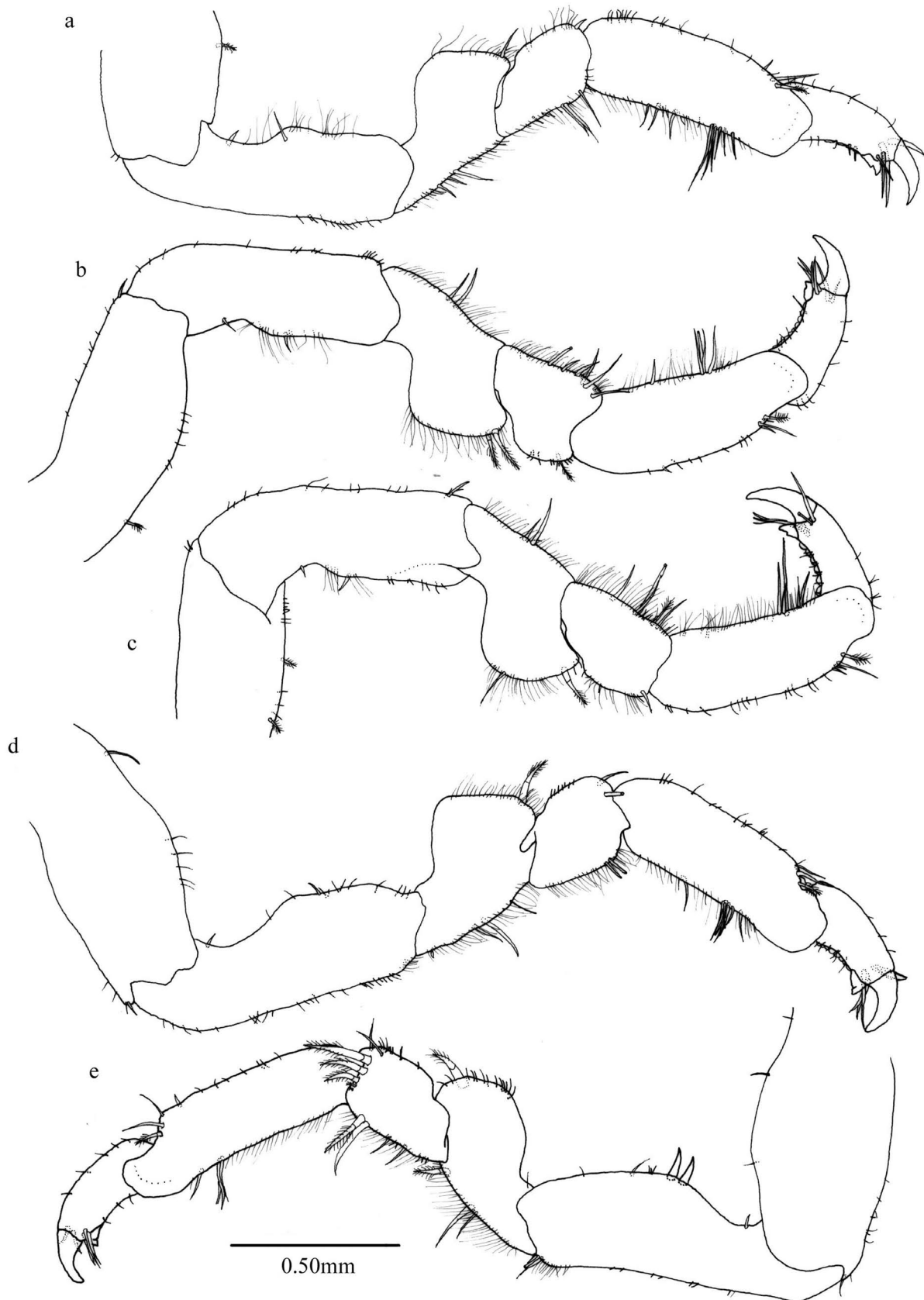


**Fig. 2:** *Ischyromene lacazei* Racovitza, 1908: male, 5.5 mm, Banyuls-sur-mer (42°29'N 3°8'E); (a) left mandible; (b) right mandible; (c) antenna 1; (d) antenna 2.

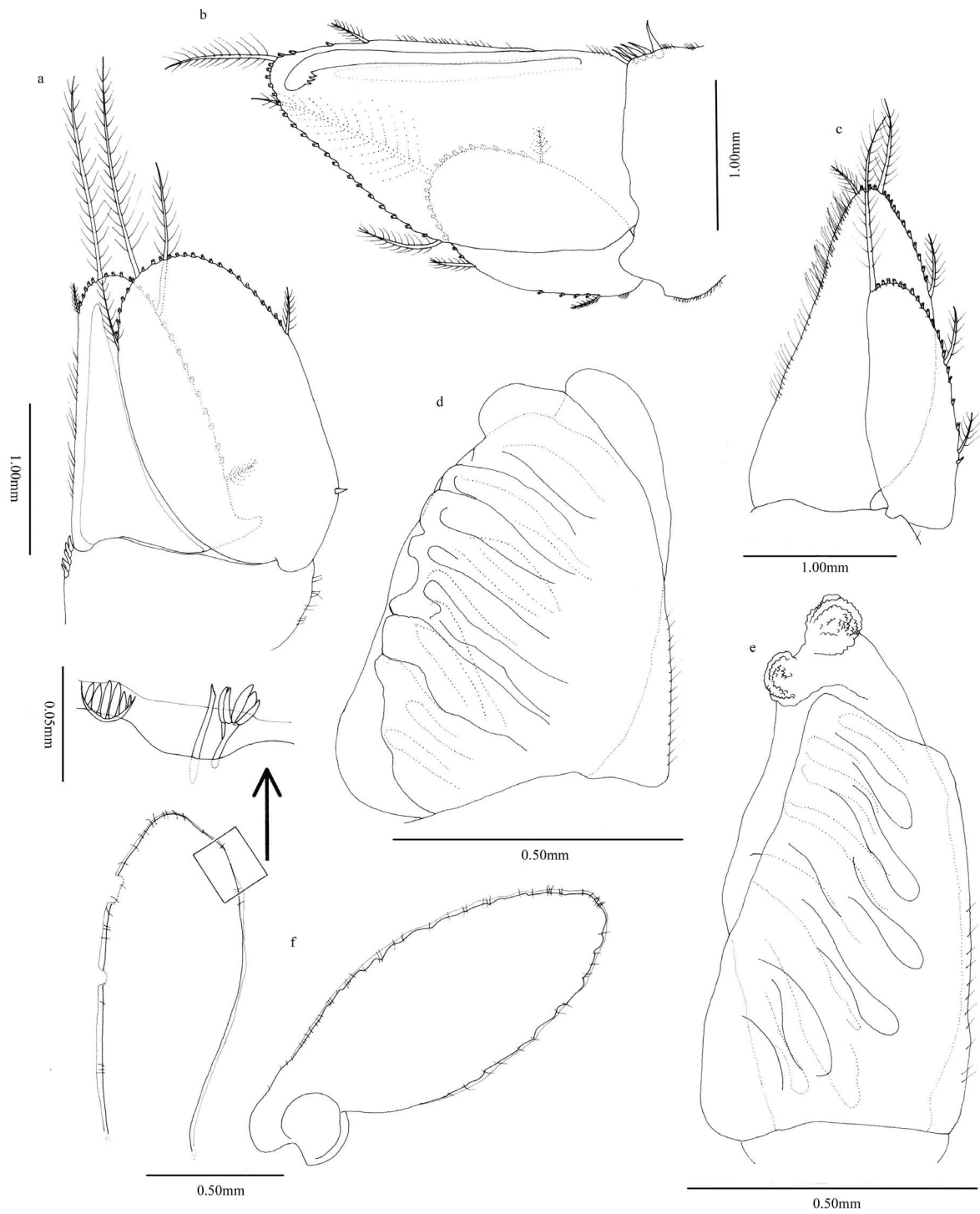




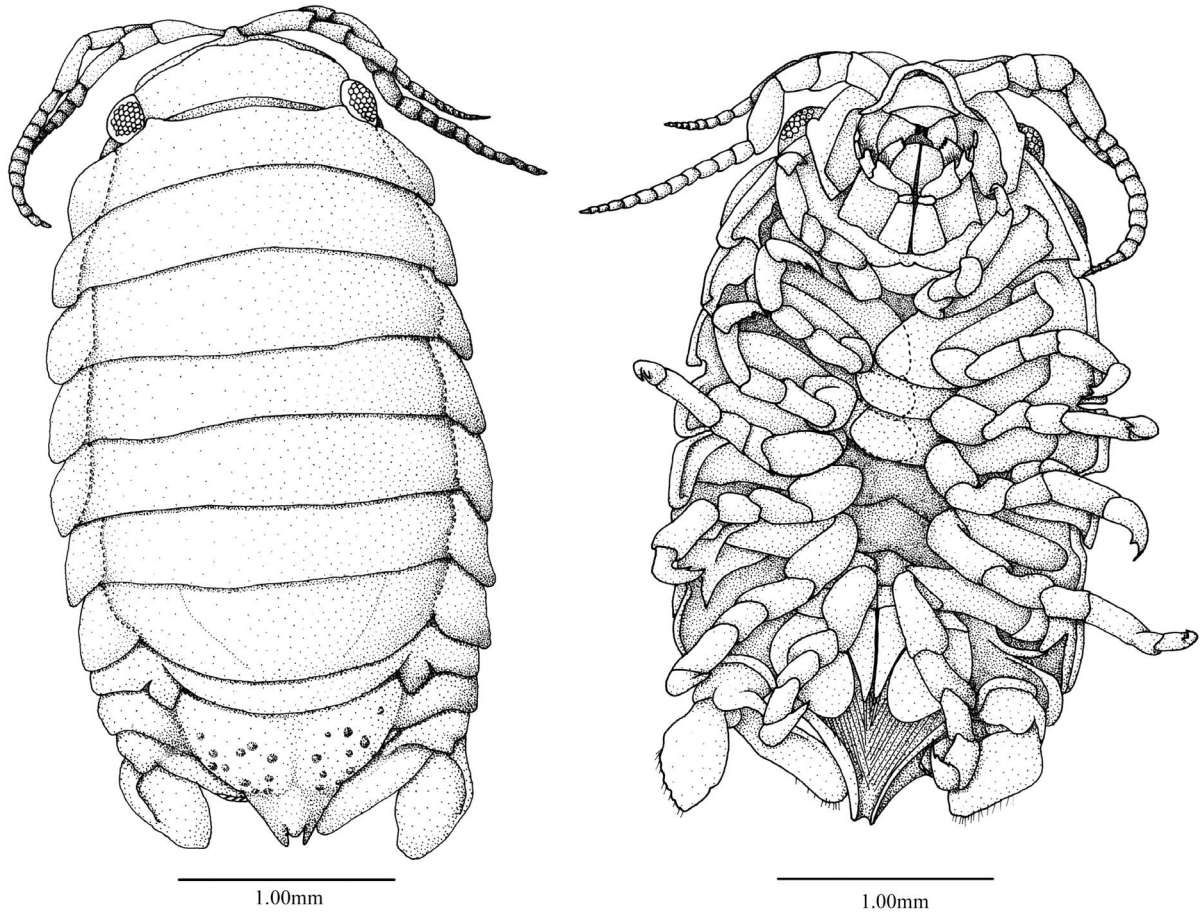
**Fig. 3:** *Ischyromene lacazei* Racovitza, 1908: male, 5.5 mm, Banyuls-sur-mer (42°29'N 3°8'E); (a) mouthparts, ventral view; (b) maxilla 1; (c) maxilla 2; (d) maxilliped; (e) pereopod 1.



**Fig. 4:** *Ischyromene lacazei* Racovitza, 1908: male, 5.5 mm, Banyuls-sur-mer (42°29'N 3°8'E); (a)-(e) pereopods 2-7.

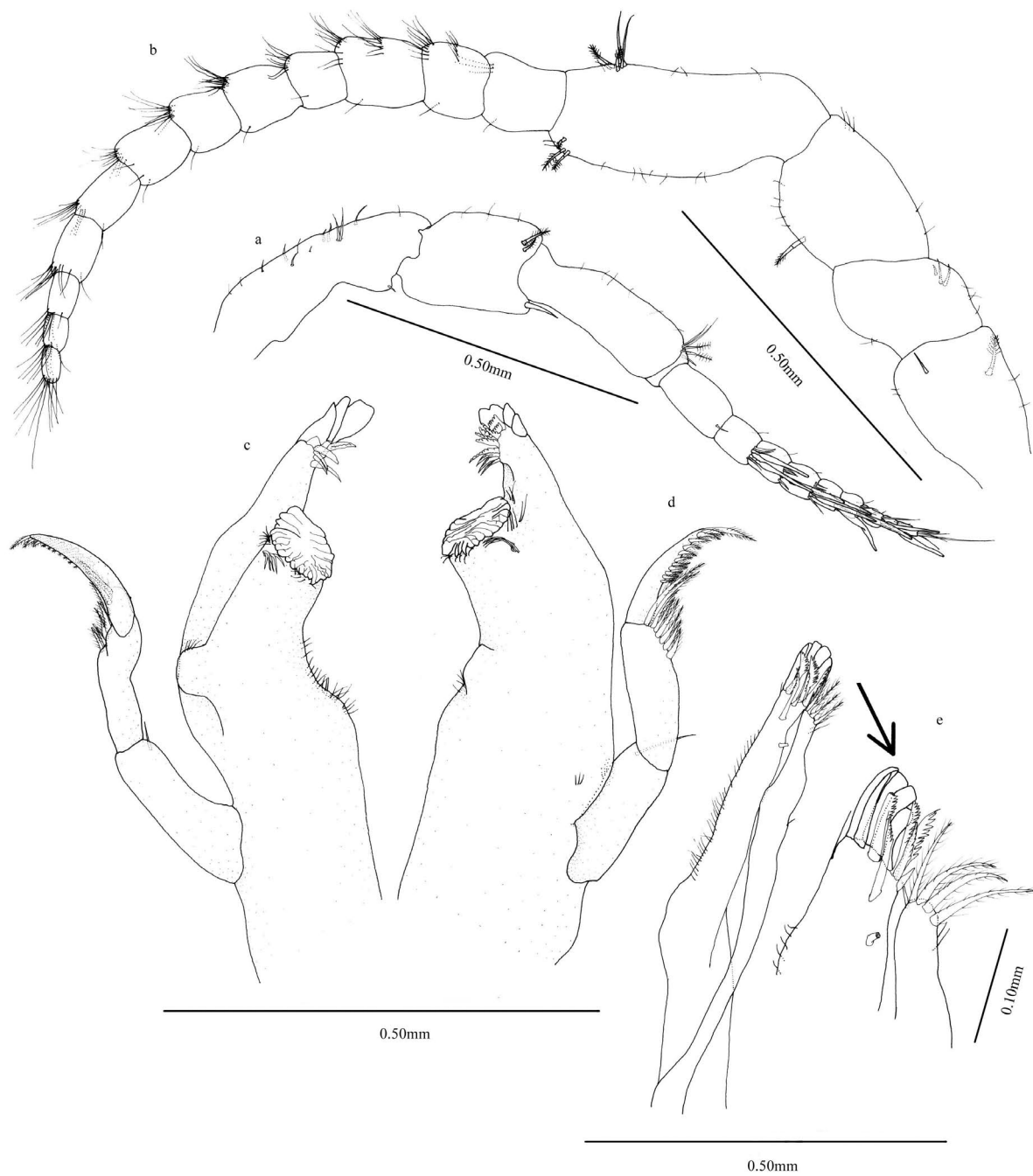


**Fig. 5:** *Ischyromene lacazei* Racovitza, 1908: male, 5.5 mm, Banyuls-sur-mer (42°29'N 3°8'E); (a)-(e) pleopods 1-5; (f) uropods: endopodite, exopodite.



**Fig. 6:** *Ischyromene lacazei* Racovitza, 1908: female, 3.6 mm, Banyuls-sur-mer (42°29'N 3°8'E); dorsal and ventral views.





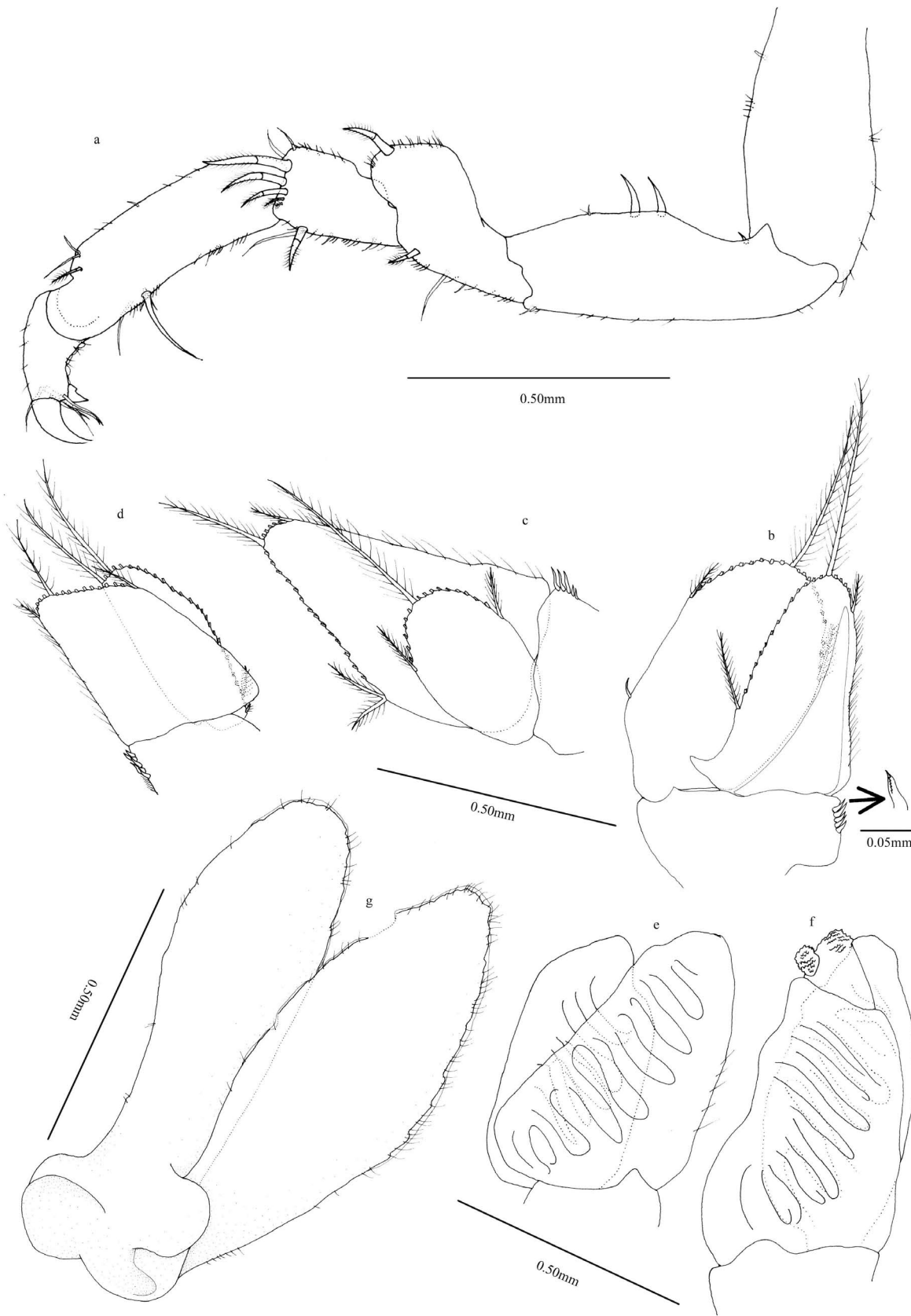
**Fig. 7:** *Ischyromene lacazei* Racovitza, 1908: female, 3.6 mm, Banyuls-sur-mer (42°29'N 3°8'E); (a) antenna 1; (b) antenna 2; (c) left mandible; (d) right mandible; (e) maxilla 1.



**Fig. 8:** *Ischyromene lacazei* Racovitza, 1908: female, 3.6 mm, Banyuls-sur-mer (42°29'N 3°8'E); (a) maxilla 2; (b) maxilliped; (c) maxillipedal endite; (d) retinaculum; (e)-(f) propods 1-2.



**Fig. 9:** *Ischyromene lacazei* Racovitza, 1908: female, 3.6 mm, Banyuls-sur-mer (42°29'N 3°8'E); (a)-(d) pereopods 3-6.



**Fig. 10:** *Ischyromene lacazei* Racovitza, 1908: female, 3.6 mm, Banyuls-sur-mer (42°29'N 3°8'E); (a) pereopod 7; (b)-(f) pleopods 1-5; (g) uropods.