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## THREE NEW MEDITERRANEAN *MAERA* WITH REMARKS ON THE *QUADRIMANA* COMPLEX (CRUSTACEA AMPHIPODA, MELITIDAE)

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### ABSTRACT

Three new Mediterranean species of the *Maera quadrimana* complex are described and illustrated: *Maera revelata* from the western sector, *M. ariadne* from the eastern one and *M. aurora* from the entire Mediterranean. *Maera inaequipes* (A. Costa, 1857) is redescribed and its synonymy and geographical distribution are revised to stabilize the confused taxonomy of this species. These four species are compared by means of a table and an identification key. The *Maera quadrimana* complex is defined and 19 species are recognized in the world. This group is briefly reviewed from a biogeographical point of view.

### INTRODUCTION

Until recently the melitid amphipod *Maera inaequipes* (A. Costa, 1857) has been considered to be a species with a very wide, practically pantropical, distribution. Originally described from the Mediterranean Sea (loc. typ.: Gulf of Naples), the species was subsequently reported from many localities in the Atlantic and Indo-Pacific

Oceans and the Red Sea (G. Karaman, 1982). Several nominal species of *Maera* described afterwards have furthermore generally been considered junior synonyms of *M. inaequipes* (G. Karaman & Ruffo, 1972). These last authors nevertheless expressed the opinion that several valid taxa may have been confused under the name *Maera inaequipes*. They stressed the necessity of a thorough revision, using types or topo-

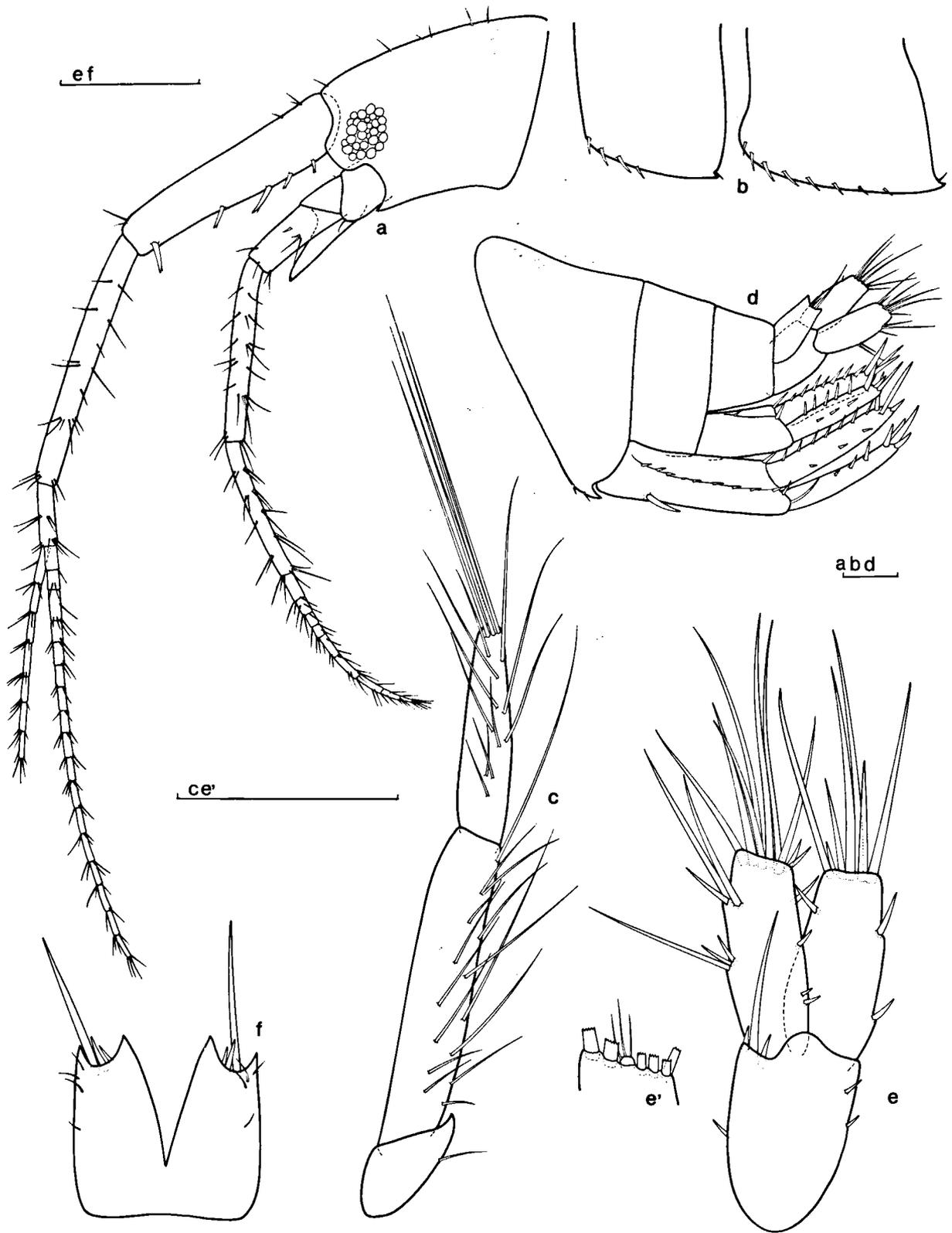


Fig. 1. *Maera revelata* n. sp. (female holotype), Alboraya near Valencia (Spain). a) head with antennae; b) epimeral plates 2,3; c) mandibular palp; d) urosome; e) uropod 3; e') tip of outer ramus of uropod 3; f) telson (scales represent 0.2mm).

typical material of the nominal species and careful checking of all distributional records, in order to elucidate the number of valid taxa in this complex and their distribution. The same opinion was expressed independently by J.L. Barnard (1972a) who discussed the existing doubts concerning the Indo-Pacific species, which were partially identified as *Maera inaequipes* in the *quadrimana* complex.

Recently one of us (A.M.) found specimens of *Maera* on the Mediterranean coast of Spain that keyed out as *Maera inaequipes* auct., but which differed from typical *Maera inaequipes* in some constant ways. The discovery of this material spurred us to check the rich Mediterranean collection of "*Maera inaequipes*" in the Museum of Verona. We could establish that not only was the new Spanish taxon also present in other parts of the Mediterranean, but the collection contained two further species that were clearly different from *Maera inaequipes* s.str., from the Spanish taxon, and from each other. One of these had already been recognized as distinct by G. Karaman & Ruffo (1972), but without giving a name as they only had at their disposition a few specimens from the coast of Israel.

In the present paper three new Mediterranean species of *Maera*, all very close to *Maera inaequipes* s.str., are described and the composition and distribution of the *Maera quadrimana* complex is discussed.

## MATERIAL AND METHODS

This study is based on the material of "*Maera inaequipes*" in the Verona Museum, and on the personal collections of T. Krapp and A. Martí. The type of the nominal species of *Maera integrimana* Heller, 1866 and other material were received on loan from the British Museum of Natural History, London, the Naturhistorisches Museum, Wien and the Zoologisches Museum der Universität, Innsbruck.

Our methods were the usual ones for taxonomic studies: direct observation under a dissecting microscope (Wild M5A), and drawings of preparations dissected and stored in glycerine and Faure's medium, under a phase contrast microscope (Leitz Laborlux S).

## SYSTEMATIC DESCRIPTIONS

### ***Maera revelata* n. sp.**

Figs. 1-3

#### MATERIAL EXAMINED

- Western Mediterranean: Alboraya near Valencia (Spain), 12 m depth, May 5, 1985, 3 females, 12 males or juveniles; Banyuls, 1 female (ovig).
- Alboran Sea: Congreso Island, Chafarinas archipelago (North Africa), 2 m depth, July 18, 1991, 10 juveniles.
- Tyrrhenian Sea, Napoli: Ischia, S. Anna, 8-10 m depth, July 27, 1969, 2 females, 1 juv.; Ischia, Pta S. Pancrazio, 35 m depth, June 30, 1969, 1 female; same locality, 40 m depth, September 10, 1969, 1 female (with oostegites); Secca d'Ischia, 35 m depth, October 23, 1956, 1 juv.; Secca di Forio, 40-45 m depth, August 1, 1970, 3 males, 2 females; Punta Pizzaco, Procida, 15-18 m depth, September 29, 1971, 6 females (ovig.), 2 males, 6 juveniles.
- Tyrrhenian sea, Sicily: Ganzirri, 3 m depth, September 9, 1971, 1 male, 3 juv.
- Eastern Mediterranean: Malta Isl., St. Paul's bay, 14 m depth, April 17, 1974, 11 males, 10 females (ovig.); same locality, 3 m depth, April 12, 1974, 2 males, 9 females; same locality, 18-22 m depth, April 26, 1974, 1 male, 1 female; near "Grotta Blu", 15 m depth, April 23, 1974, 3 males, 1 female (ovig.), 2 juv.; same locality, 15-20 m depth, April 24, 1974, 2 females; Gozo Isl. (Malta), 15-35 m depth, April 24, 1974, 2 males, 3 females (ovig).

The holotype (ovigerous female from Alboraya, 8 mm MVr Cr 362, partially mounted in glycerogelatine, on slides n. 3850-3853); 3 paratypes from Malta have been deposited in the Zoologisch Museum Amsterdam, reg. no. ZMA Crust. Amph. 202015; further paratypes have been deposited in the Museo Civico di Storia Naturale, Verona except 2 specimens in Museo Nacional de Ciencias Naturales, Madrid.

#### DIAGNOSIS

A *Maera* species of the *quadrimana* complex dis-

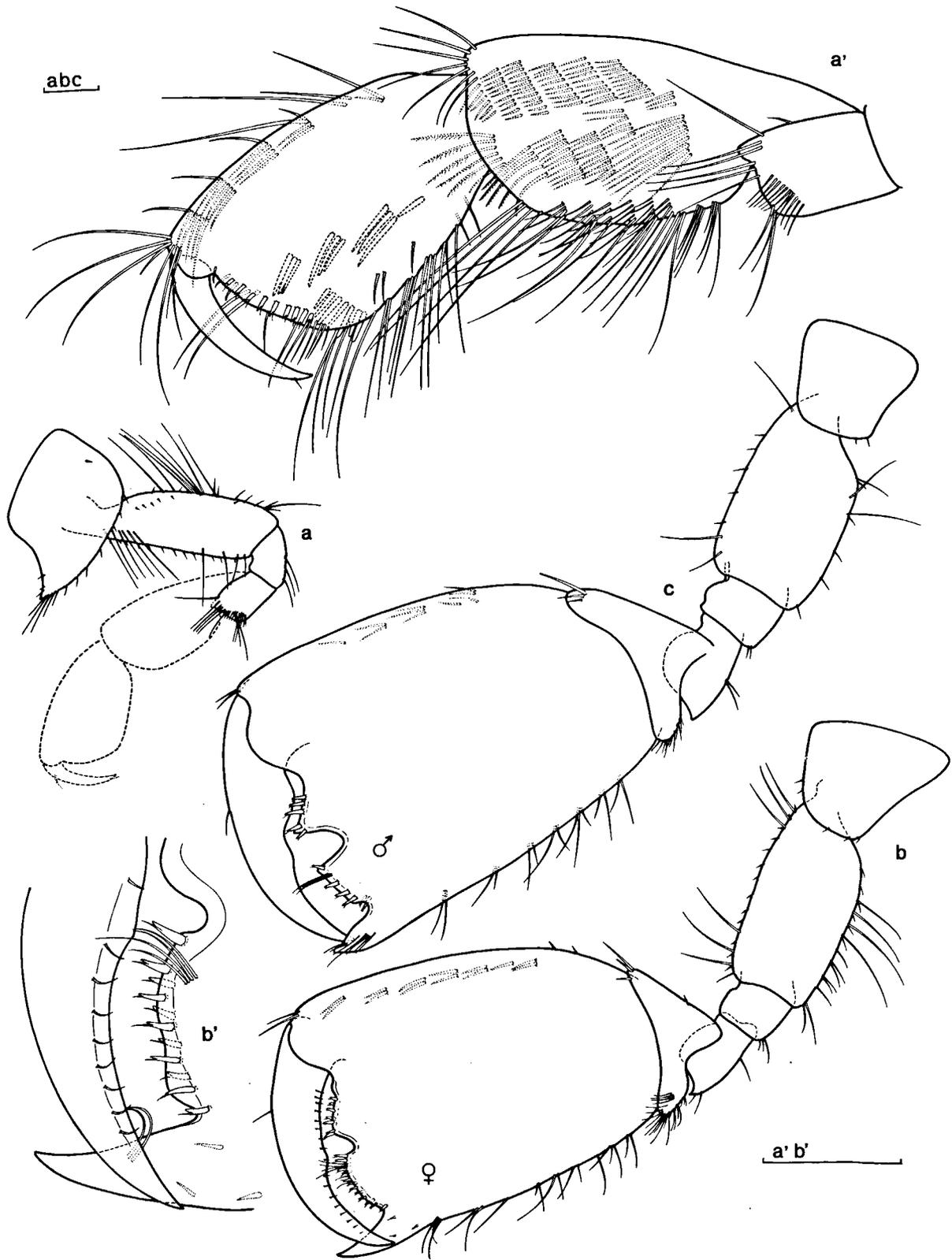


Fig. 2. *Maera revelata* n. sp. (female holotype), Alboraya near Valencia (Spain). a) gnathopod 1; a') distally enlarged; b) gnathopod 2; b') distally enlarged; *Maera revelata* n. sp. (male), Secca di Forio, Napoli. c) gnathopod 2 (scales represent 0.2mm).

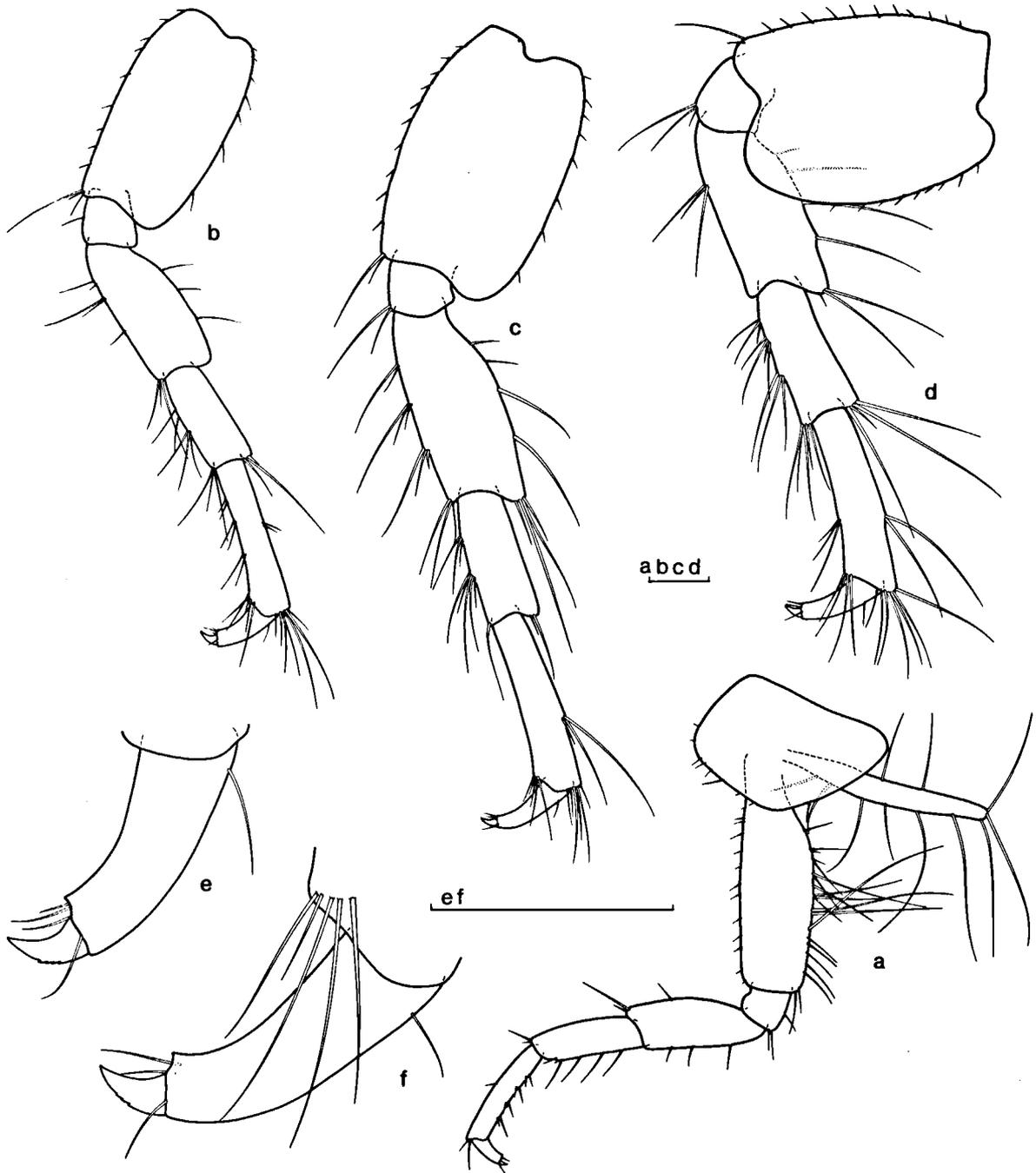


Fig. 3. *Maera revelata* n. sp. (female holotype), Alboraya near Valencia (Spain). a) pereopod 4 ; b) pereopod 5; c) pereopod 6; d) pereopod 7; e) dactylus and nail of pereopod 5; f) dactylus and nail of pereopod 6 (scales represent 0.2mm).

tinguished by: mandibular palp article 1 with acute distal tooth; coxa 1 acutely produced anterodistally; gnathopod 1 carpus anterior margin smooth, distally rounded, palm delimited by an inner row of spines; gnathopod 2 propodus palmar margin, in both sexes, with a relatively deep

median excavation and delimited by a strong sharp tooth without a spine, dactylus inner margin with two humps (male), or with one low hump (female); dactylus of pereopods 3-7 with nail not bifid, nail of pereopods 5-7 minutely denticulate on posterior margin; propodus of

peraeopods 6-7 with posteromedial tuft of long setae; uropod 3 short, rami broad and subequal, distally truncated and with distal spines as long as rami, outer ramus article 2 rudimentary. Telson lobes distally incised with 2-3 spines, the exterior one as long as telson.

Locus typicus: Alboraya, near Valencia (Spain)

## DESCRIPTION

Female with oostegites, 8 mm. Lateral cephalic lobes subquadrangular (fig. 1a). Antennal sinus deep, without cephalic notch, anteroventral cephalic corner produced in a sharp tooth. Eyes subrounded, diameter equal to the width of article 1 of peduncle antenna 1.

Epimeral plates 2-3 (fig. 1b) posterodistal corner produced into a small tooth and with a row of spines on distal margin.

Antenna 1 (fig. 1a) shorter than half the body; peduncle long, ratio of articles 1-3 = 1:1:0.25, flagellum slightly shorter than peduncle, with up to 17 articles, accessory flagellum nearly half as long as primary one, with 7-8 articles. Antenna 2 longer than peduncle of antenna 1, ratio of peduncle arts 4-5 = 1:0.8, gland cone reaching the tip of article 3, but never exceeding it, flagellum shorter than peduncle, with 7-9 articles.

Mandibular palp (fig. 1c) article 1 with distal tooth, article 3 shorter than 2.

Coxae 1-4 short, broader than long. Coxa 1 (fig. 2a) subquadrangular, acutely produced anterodistally, coxa 2 subrectangular, tapered distally, coxae 3-4 subquadrangular.

Gnathopod 1 (fig. 2a,a'): carpus elongate with several facial rows of setae on internal side and with about 10 groups of long setae on posterior margin, anterior margin not notched, distally rounded; propodus ovate, slightly shorter than carpus, palm oblique and convex, shorter than posterior margin, delimited by an inner row of 6-7 spines, dactylus with 1 anterior seta. Gnathopod 2 (fig. 2b,b') much larger than 1: basis with several long setae on anterior and posterior margin; merus distally acute; carpus very short, triangular; propodus broadly rectangular, longer than large, slightly expanded distally, palm transverse, regularly convex, crenulate, with median excavation, delimited by strong sharp tooth without any spine; dactylus robust, bearing 1 anterior

seta, with inner low hump fitting median excavation.

Peraeopods 3-4 (fig. 3a) small and slender, basis with numerous setae on posterior margin, some very long, dactylus short with nail not bifid.

Peraeopods 5-7 (fig. 3b,c,d) moderately slender, basis narrowly ovato-rectangular, posterior margin very weakly serrate, posterodistal rounded lobe present, merus and ischium with long marginal setae, propodus of peraeopods 6-7 with a median tuft of long setae on posterior margin, dactylus as long as the half of propodus, nail (fig. 3e,f) short, not bifid, posterior margin with 3-5 minute teeth.

Uropods 1-2 (fig. 1d) rami subequal, moderately long and spinose. Uropod 1 peduncle with 1 ventrofacial spine. Uropod 2 nearly reaching tip of uropod 1. Uropod 3 (fig. 1e) stout, slightly exceeding the tip of uropods 1, peduncle slightly shorter than rami, rami subequal flat, broad, truncated distally and spinose, outer ramus article 2 rudimentary, hardly visible (fig. 1e'), with distal spines partially as long as rami.

Telson (fig. 1f) exceeding peduncle of uropods 3, nearly as long as broad, cleft three fourths of its length; lobes distally incised with 2-3 distal spines of unequal length, the external one as long as telson, and with 3 distal and 1 marginal setulae.

Male, 7 mm (from Secca di Forio, Napoli). Differs from female in gnathopod 1 palm defined by 3 inner spines, palm of gnathopod 2 with deeper median excavation, dactylus inner margin with two low humps, bisinuate; uropod 3 peduncle shorter than rami.

## VARIABILITY

Some specimens of *Maera revelata* show variations in body length (6-8 mm), gland cone length, number of spines which delimit gnathopod 1 palm (3-7), different development of inner humps of gnathopod 2 dactylus, number of spines of telson and proportion between them, posterior margin of dactylus nail of peraeopods 5-7 sometimes entirely smooth.

## DERIVATIO NOMINIS

Species so far confused with *Maera inaequipis* and

now revealed (latin = *revelata*).

#### REMARKS

*Maera revelata* may, especially in the shape of the telson and gnathopod 2, correspond to *Maera truncatipes* Spence Bate, 1862, but type material of this species is lost. It appears therefore better to retain *Maera truncatipes* Spence Bate as "species dubia".

#### ECOLOGY

From 1 to 12 m. It is a sciaphilous species, inhabiting sublittoral enclaves (12 m depth) of the circalittoral coralligenous assemblage developed on the dead rhizome terraces of *Posidonia oceanica*, build by the action of calcareous algae *Pseudolithophyllum expansum*, *Lithophyllum mamillosum* and *Mesophyllum lichenoides*, covered by a sciaphilic flora (*Peyssonelia* sp., *Halimeda tuna*, *Udotea petiolata*, etc.) (Gulf of Valencia). Shallower (1-2 m depth) under stones and between rocky blocks (Chafarinas Islands). Accompanying species in sciaphilous environments are *Leucothoe spinicarpa*, *Pereionotus testudo* and *Pseudoprotella phasma*. Also identified in *Laminaria* (?). Sometimes together with *M. inaequipes* and *M. aurora* (Napoli, Malta).

#### BIOLOGY

Ovigerous females from April to September.

#### DISTRIBUTION

Western Mediterranean; in Eastern Mediterranean only at Malta.

#### **Maera ariadne n. sp.**

Figs. 4-6

#### MATERIAL EXAMINED

- Crete: East coast, 0.5-2 m depth, May 17, 1976, 30 males, 37 females, 15 juv.
  - Aegean Sea: Lesvos Isl., 0.5-2 m depth, August 22-27, 1991, 4 males, 3 females (with oostegites), 3 juv.
- The holotype (male from East coast of Crete),

dissected and mounted in Faure's medium, on slides n. 3798-3800; paratypes have been deposited in the Zoölogisch Museum Amsterdam, reg. no. ZMA Crust. Amph. 202016, and the Museo Civico di Storia Naturale, Verona, except the material from Lesvos which is in Krapp's collection, Bonn.

#### DIAGNOSIS

A *Maera* species of the *quadrimana* complex distinguished by: mandibular palp article 1 without distal tooth; coxa 1 anterodistally rounded, not produced; gnathopod 1 carpus with anterior margin smooth or slightly impressed, distally rounded, palm delimited by one inner spine; gnathopod 2 propodus of female with palmar margin serrate or with a very shallow median excavation and delimited by strong tooth with one spine; gnathopod 2 propodus of male similar to female but palmar margin with median excavation; dactylus inner margin with a single low hump or little tooth (male), or smooth (female); dactylus of peraeopods 3-7 with bifid nail; propodus of peraeopods 6-7 posteriorly without median tuft of long setae or with one small seta; uropod 3 rami slim and long, subequal in length, with few and short distal spines, outer ramus article 2 reduced; telson longer than broad, distal spines about half the length of telson.

Locus typicus: East coast of Crete (Greece)

#### DESCRIPTION

Male, 6 mm. Lateral cephalic lobes obtusely angular, without cephalic notch, anteroventral cephalic corner produced into a sharp tooth. Eyes suboval, diameter equal to breadth article 1 of peduncle of antenna 1.

Epimeral plates 2-3 (fig. 4a) posterodistal corner somewhat produced into a small tooth and with 2-3 short spines on distal margin.

Antenna 1 (fig. 4b) about 1/2 length of body; peduncle, ratio of articles 1-3 = 1:1.1:0.25, flagellum 4/5 of peduncle, with 19 articles, accessory flagellum about half length of primary one, with 8 articles. Antenna 2 (fig. 4c) longer than peduncle of antenna 1, ratio of peduncle arts 4-5 = 1:0.87, gland cone reaching tip of article 3, flagellum shorter than peduncle, with 9 articles.

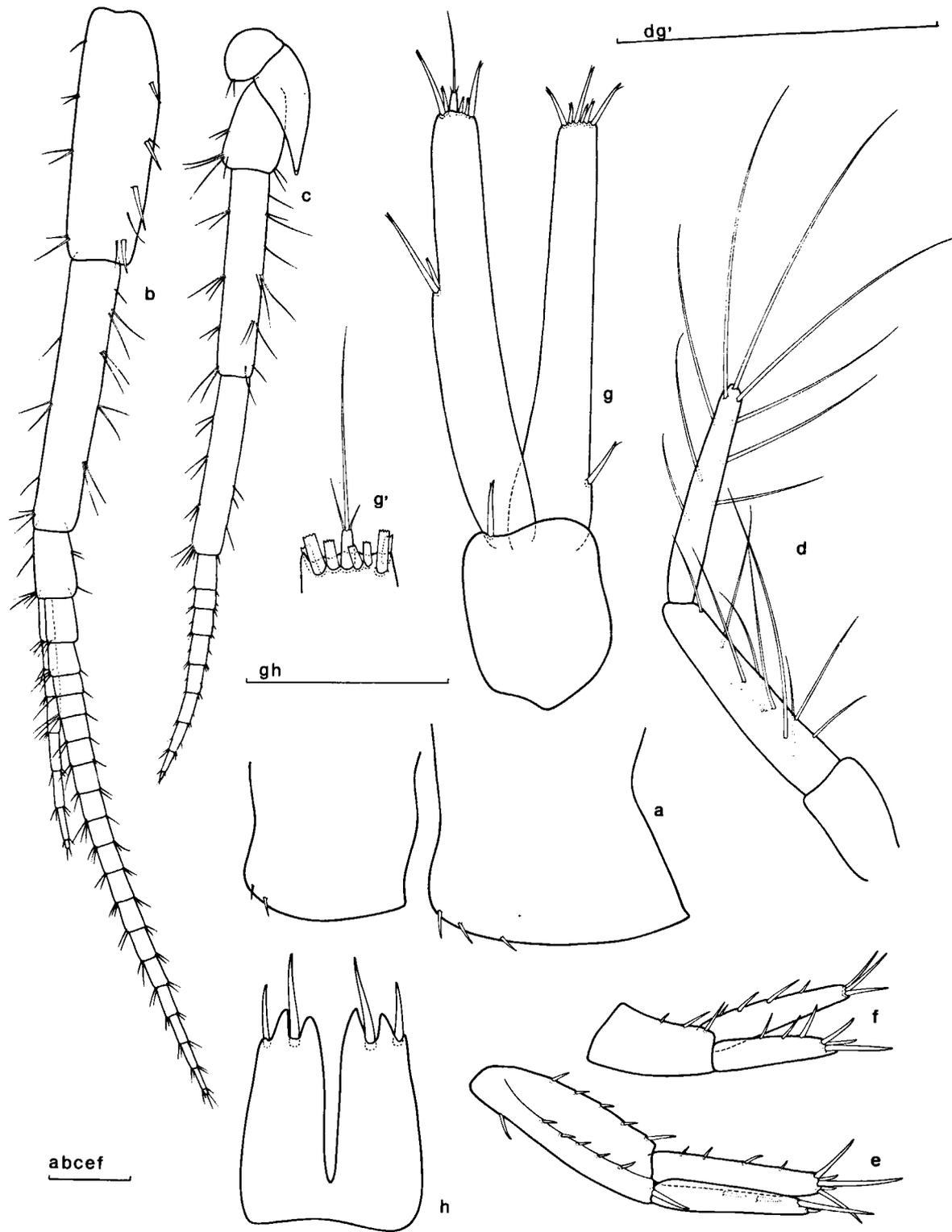


Fig. 4. *Maera ariadne* n. sp. (male holotype), East coast of Crete. a) epimeral plates 2,3; b) antenna 1; c) antenna 2; d) mandibular palp; e) uropod 1; f) uropod 2; g) uropod 3; g') distally enlarged; h) telson (scales represent 0.2mm).

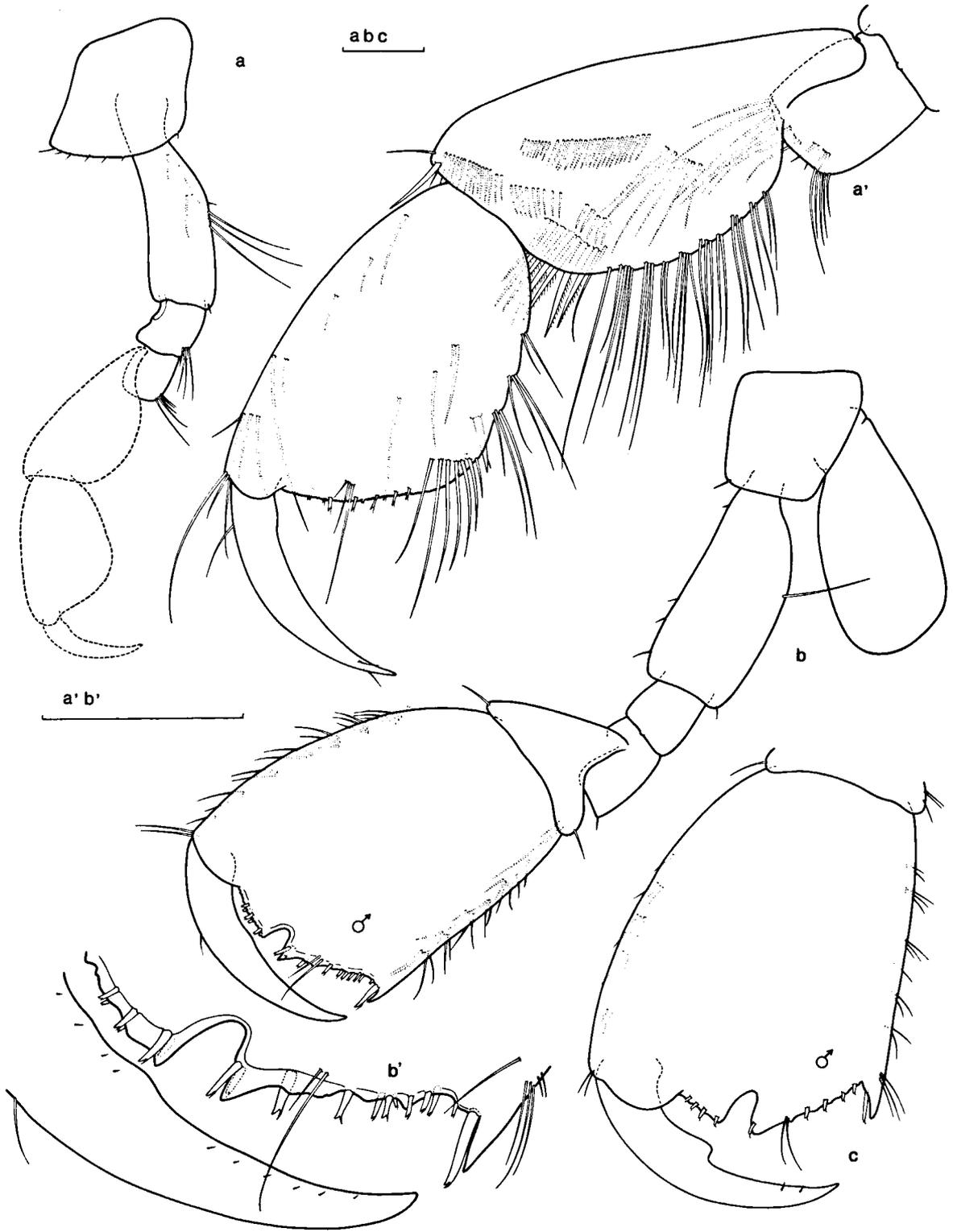


Fig. 5. *Maera ariadne* n. sp. (male holotype), East coast of Crete. a) gnathopod 1; a') distally enlarged; b) gnathopod 2; b') distally enlarged; c) propodus gnathopod 2 (paratype male) (scales represent 0.2mm).

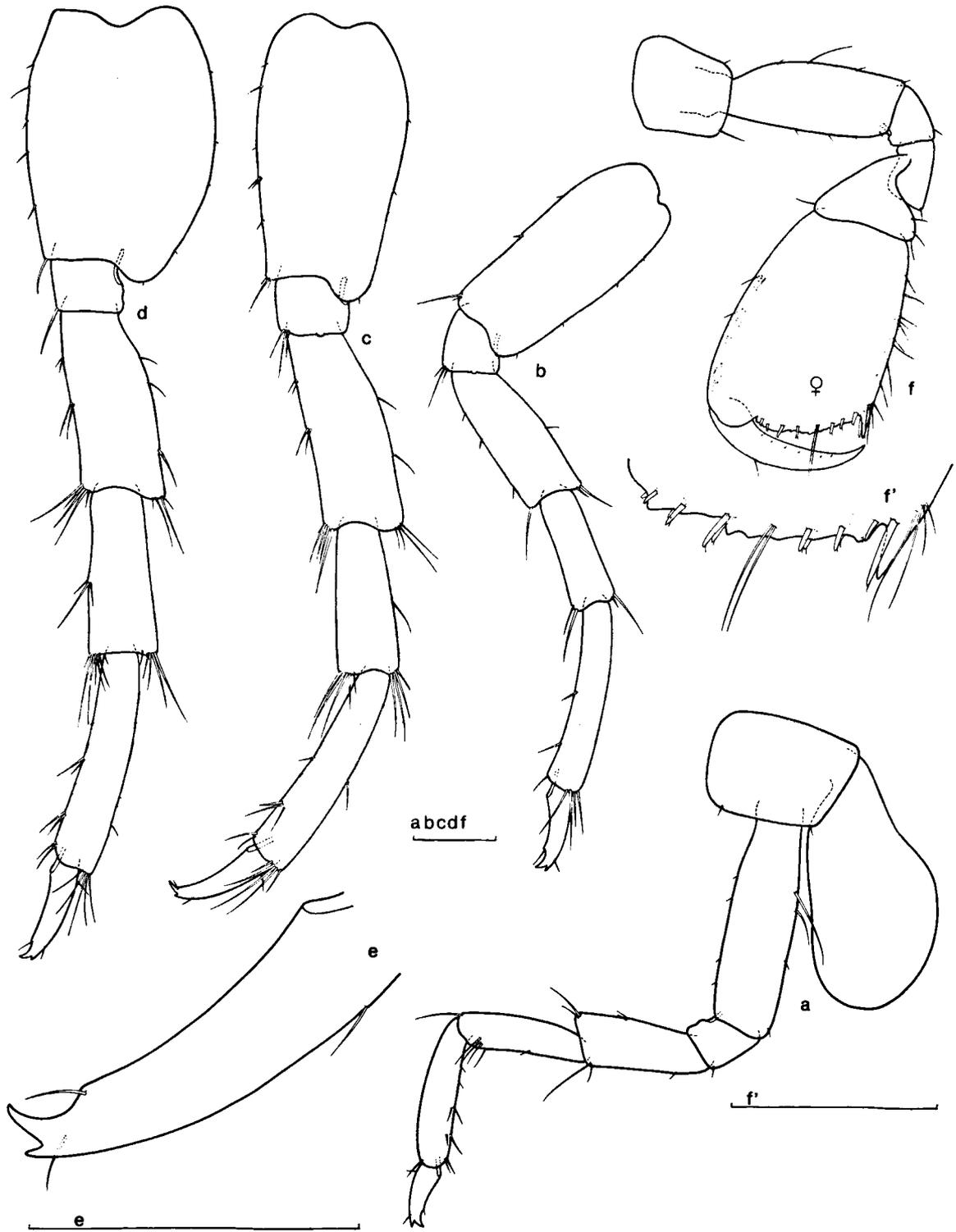


Fig. 6. *Maera ariadne* n. sp. (male holotype), East coast of Crete. a) peraeopod 4; b) peraeopod 5; c) peraeopod 6; d) peraeopod 7; e) dactylus of peraeopod 7 enlarged; (paratype female), same locality f) gnathopod 2; f') gnathopod 2 palm enlarged (scales represent 0.2mm).

Mandibular palp article 1 (fig. 4d) without distal tooth, article 3 slightly shorter than 2, bearing setae on inner and outer margin.

Coxae 1-4 subquadrangular. Coxa 1 (fig. 5a) anterodistally rounded, not produced.

Gnathopod 1 (fig. 5a,a'): carpus elongate with several facial rows of setae on internal side and with about 10 groups of long setae on posterior margin, anterior margin smooth, distally rounded; propodus ovate, shorter than carpus, palm oblique and convex, slightly shorter than posterior margin, delimited by one inner spine; dactylus with one anterior seta. Gnathopod 2 (fig. 5b,b',c) much larger than 1: merus distally rectangular; carpus very short, triangular; propodus broad, rectangular, longer than large, slightly expanded distally, palm transverse, crenulate, with median U-shaped excavation, delimited by strong sharp tooth with a spine; dactylus robust, bearing one anterior seta, with median low hump or little tooth (adult), fitting median palmar excavation.

Peraeopods 3-4 (fig. 6a) small and slender, basis with 2-3 long setae on posterior margin, dactylus with bifid nail.

Peraeopods 5-7 (fig. 6b-d) slender; basis of peraeopod 5 narrow, elongate with parallel margins, basis of peraeopod 6 ovato-rectangular, posterodistal lobe small, basis of peraeopod 7 broad, with small posterodistal lobe; propodus, carpus and merus with tufts of long distal setae on posterior and anterior margin, on ischium only anterior setae; propodus of peraeopods 6-7 without long setae on posterior margin, sometimes with one short seta; dactylus half length of propodus, nail short, bifid, posteriorly smooth.

Uropods 1-2 (fig. 4e,f) rami subequal, moderately long and spinose. Uropod 1 peduncle with 1 ventrofacial spine. Uropod 2 reaching or surpassing tip of uropod 1. Uropod 3 (fig. 4g) clearly exceeding tip of uropod 1, peduncle subquadrangular, short; rami subequal, 6 times as long as broad, more than twice as long as peduncle, with 5 distal spines of moderate length, and few marginal spines; outer ramus article 2 short, reduced (fig. 4g').

Telson (Fig. 4h) exceeding peduncle of uropods 3, slightly longer than broad, cleft 4/5 of its length; lobes distally incised, trifid, bearing 2 distal spines, the inner one about half the length of telson, without any setules.

Female, 6 mm. Differs from male in gnathopod 2 palm since it is serrate only (Fig. 6f, f'), and rarely with (very shallow) excavation.

#### VARIABILITY

Some specimens, particularly subadult, with longer spines in uropod 3.

#### DERIVATIO NOMINIS

The first material of this species we saw came from Crete. The name remembers princess Ariadne, daughter of king Minos of Crete and the heliade Pasiphae.

#### ECOLOGY

From 0.5 to 2 m depth: little water-movement, detritophilous. Sometimes together with *M. inaequipes* and/or *M. aurora* (Crete).

#### BIOLOGY

Ovigerous females in August.

#### DISTRIBUTION

Only Eastern Mediterranean.

#### **Maera aurora n. sp.**

Figs. 7-8

*Maera inaequipes* (partim) G. Karaman & Ruffo, 1972: 149, figs. XIX, 4-6, XX

*Maera inaequipes* (partim) G. Karaman, 1982: 314-317, fig. 213 (Caesarea)

#### MATERIAL EXAMINED

- Eastern Mediterranean, Israel: Caesarea, July 5, 1952, 2 males, 1 female (ovig.), 1 juv.; same locality, July 1, 1951, 1 male; same locality, May 12, 1952, 1 male, 1 female (with oostegites).
- Eastern Mediterranean, Crete: East coast, 0.5-1 m depth, May 16-18, 1976, 8 males, 7 females (ovig.), 3 juv.; Aghios Nicolaos, 0.5 m depth, April 24, 1976, 2 males, 3 females

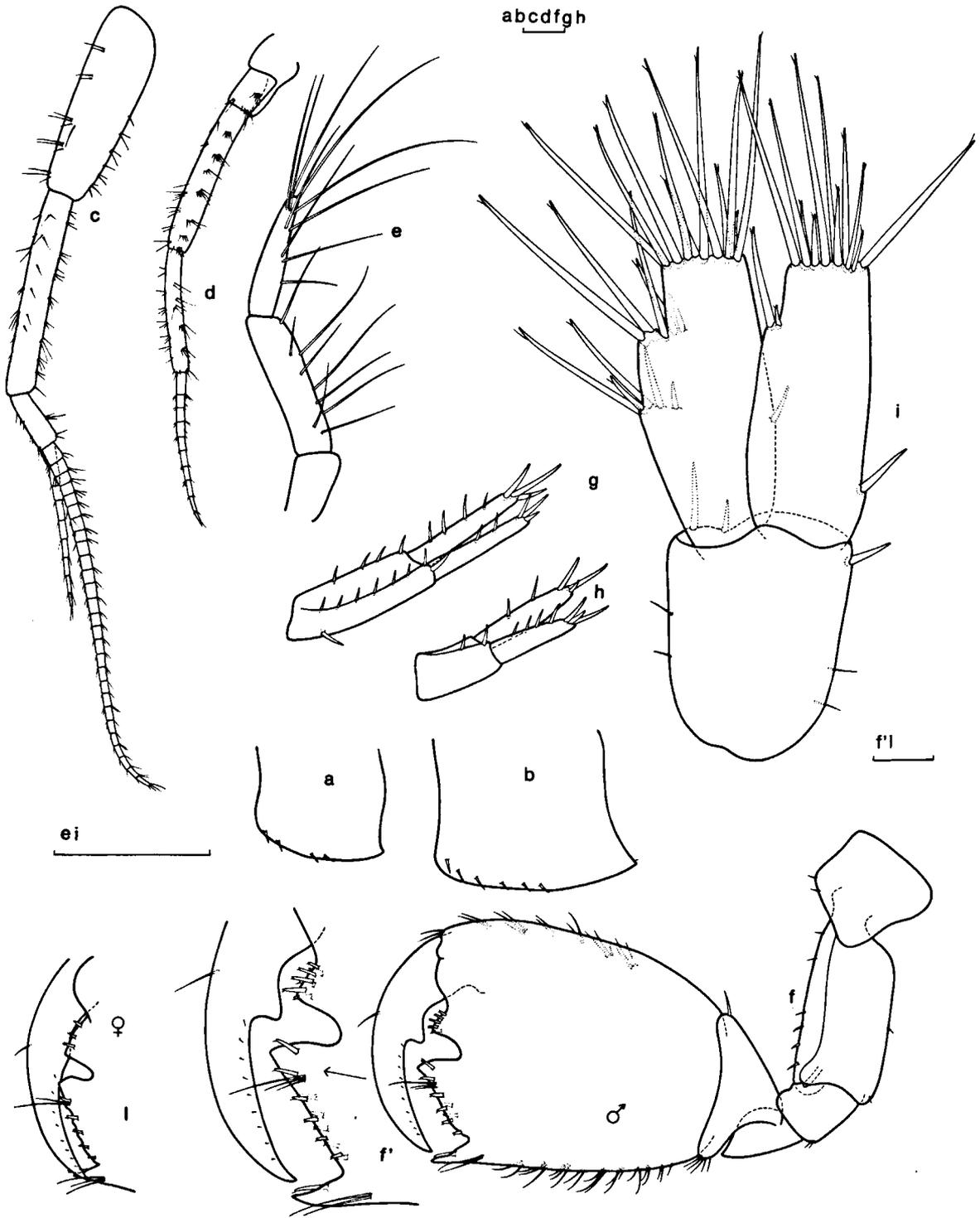


Fig. 7. *Maera aurora* n. sp. (male holotype), Caesarea (Israel). a) epimeral plate 2; b) epimeral plate 3; c) antenna 1; d) antenna 2; e) mandibular palp; f) gnathopod 2; f') distally enlarged; g) uropod 1; h) uropod 2; i) uropod 3; (paratype female) same locality. l) palmar margin and dactylus of gnathopod 2 (scales represent 0.2mm).

(ovig).

- Aegean Sea: Lesvos Isl., 0.5-1 m depth, August 22, 1991, 1 male, 1 female (with oostegites).
- Eastern Mediterranean, Malta Isl.: Golden Sands, 0-4 m depth, April 20, 1974, 3 females (ovig.); Mellieha bay, 0-3 m depth, 1 female (ovig).
- Adriatic Sea: Rovinj, 0.7-2 m depth, 3 males.
- Tyrrhenian Sea, Sicily: Palermo, Pt. Addaura, 2 males.
- Tyrrhenian Sea, Napoli: Marechiaro, 2 m depth, 1 male; Ischia, 0.5-2 m depth, April 24, 1970, 1 female (ovig.); Ischia, Castello, 5-10 m depth, 1 female; same locality, 0-1 m depth, 2 males, 2 females.
- Tyrrhenian Sea, Civitavecchia, Torvaldaliga, June 20, 1972, 3 females (ovig.), 1 juv.
- Tyrrhenian Sea, Sardinia: Cala Dragonara, 2.5 m depth, 1 male, 1 female.
- Western Mediterranean: Banyuls s. Mer, 1 male.

The holotype (male from Caesarea MVr Cr 366, dissected and mounted in Faure's medium on slides 1226-1228); 5 paratypes from Crete have been deposited in the Zoologisch Museum Amsterdam, reg. no. ZMA Crust.Amph. 202014; further paratypes have been deposited in the Museo Civico di Storia Naturale, Verona.

#### DIAGNOSIS

A *Maera* species of the *quadrimana* complex distinguished by: mandibular palp article 1 without distal tooth; coxa 1 moderately produced anterodistally; gnathopod 1 carpus anterior margin smooth or weakly impressed, distally angular, weakly produced, palm delimited by one inner spine; gnathopod 2 in both sexes, palmar margin with median deep excavation (narrower in female) and delimited by strong tooth with a spine; inner margin of dactylus with tooth opposite to palmar excavation (male), or smooth (female); dactylus of pereopods 3-7 with bifid nail; propodus of pereopods 6-7 posteriorly with tuft of long setae; uropod 3 stout, truncated, distal spines shorter than rami, outer ramus uniaarticulate; telson about as broad as long, distal spines very short.

Locus typicus: Caesarea (Israel)

#### DESCRIPTION

Male, 6 mm. Lateral cephalic lobes broadly rounded, without cephalic notch, anteroventral cephalic corner produced into a sharp tooth. Eyes suboval, about as long as width of article 1 of peduncle of antenna 1.

Epimeral plates 2-3 (fig. 7a,b) posterodistal corner somewhat produced into a small tooth, with a row of spines on distal margin.

Antenna 1 (fig. 7c) about 1/3 of body: peduncle, ratio of articles 1-3 = 1:1:0.33, flagellum slightly shorter than peduncle, with 20-26 articles, accessory flagellum about 3/4 of main flagellum, with 8-10 articles. Antenna 2 (fig. 7d) reaching to the middle of the flagellum of antenna 1, peduncle articles 4-5 ratio = 1:0.8, gland cone reaching tip of article 3, flagellum as long as article 5 of peduncle, with 7 articles.

Mandibular palp (fig. 7e) article 1 without distal tooth, article 3 shorter than 2.

Coxae 1-4 short, about as broad as long. Coxa 1 (fig. 8a) subrectangular, slightly produced anterodistally, coxae 2-4 subquadrangular.

Gnathopod 1 (fig. 8a,a',a''): carpus elongate with several facial rows of setae on internal side and with about 8-9 groups of long setae on posterior margin, anterior margin smooth or slightly impressed, distally angular; propodus ovate, shorter than carpus, palm oblique, convex, slightly shorter than posterior margin, delimited by one inner spine; dactylus with one anterior seta. Gnathopod 2 (fig. 7f,f'') much larger than 1: merus distally acute, carpus triangular, shorter than broad; propodus broad rectangular, longer than large, scarcely expanded distally, palmar margin transverse, smooth or crenulate, with median U-shaped excavation, delimited by strong sharp tooth with a spine located on the inner edge; dactylus robust, bearing one anterior seta, with a median tooth on inner margin, fitting median palmar excavation.

Pereopods 3-4 (fig. 8b) small and slender, basis with short setae on posterior margin, dactylus with bifid nail.

Pereopods 5-7 (fig. 8c,d,e) robust, basis broadened, posterior margin smooth, posterodistal lobe present; propodus, carpus, merus but not ischium, with group of posterodistal setae, propodus of pereopods 6-7 with a median tuft of long

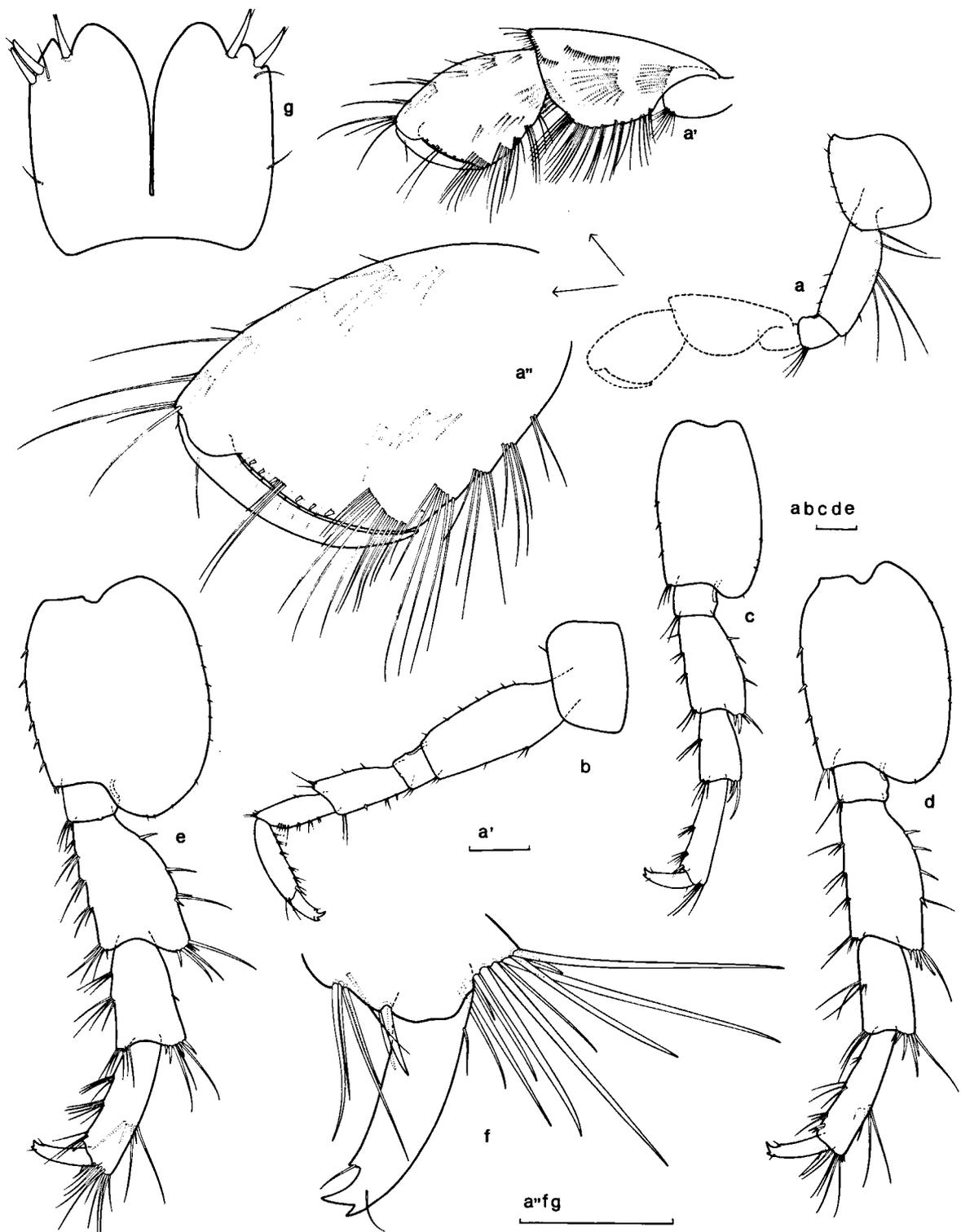


Fig. 8. *Maera aurora* n. sp. (male holotype), Caesarea (Israel). a) gnathopod 1; a') distally enlarged; a'') propodus enlarged; b) peraeopod 4; c) peraeopod 5; d) peraeopod 6; e) peraeopod 7; f) dactylus of peraeopod 7 enlarged; g) telson (scales represent 0.2mm).

setae on posterior margin, dactylus as long as half the propodus, nail short, bifid, posteriorly smooth.

Uropods 1-2 (fig. 7g,h) rami subequal, moderately long and spinose. Uropod 1 peduncle with 1 ventrofacial spine. Uropod 2 reaching tip of uropod 1. Uropod 3 (fig. 7i) stout, slightly exceeding tip of uropods 1-2, peduncle shorter than rami, rami subequal broad, flat, truncated distally, very spinose, outer ramus apparently one-articulate, with distal spines 2/3 length of rami.

Telson (fig. 8g) exceeding peduncle of uropods 3, slightly broader than long; lobes distally incised, with 2-3 distal spines of similar length, all very short, and with 2 marginal setulae.

Female with oostegites, 6 mm., similar to male, gnathopod 2 dactylus (fig. 7 l) with smooth inner margin.

#### VARIABILITY

Some specimens present telson with somewhat longer distal spines.

#### DERIVATIO NOMINIS

The first material of this new species we saw was coming from Caesarea (Israel, Eastern Mediterranean). The name therefore alludes to the dawn, the rising sun in the East. It is used as a noun in apposition.

#### REMARKS

*Maera aurora* seems to be similar to *Maera trisinuata* Mateus & Mateus, 1986, known only from two males found in the Gulf of Guinea, and very incompletely described and figured. But that species differs from *Maera aurora* in the shape of gnathopod 2 propodus, with shorter palmar excavation, dactylus without inner tooth and telson with three long spines.

#### ECOLOGY

From 0 to 10 m depth. Detritophobe, sometimes together to *M. inaequipes*, *M. ariadne* and *M. revelata* (Crete, Napoli, Malta, Civitavecchia, Banyuls s. Mer).

#### BIOLOGY

Ovigerous females from April to July.

#### DISTRIBUTION

Mediterranean, more frequently in Eastern basin.

#### *Maera inaequipes* (A. Costa, 1857)

Fig. 9

#### MATERIAL EXAMINED

- Gibraltar, May 16, 1882 (ex coll. A. Della Valle), 1 male.
- Western Mediterranean: Banyuls s. Mer, November, 1954, 1 female (ovig.); same locality, 14 males, 57 females (with oostegites), 7 juv. Spanish coast: Alboraya (Valencia), 10m depth, 2 males; Columbretes Islands (Gulf of Valencia) between 6 and 17 m depth, 11 females, 7 males, and 2 juv. Roquetas (Gulf of Almeria), 1 m depth, 3 females (ovig.).
- Alboran Sea: Chafarinas Islands, 20 m depth, 1 juv.
- Tyrrhenian Sea, Sardinia: Cala Dragonara, 0.5-2.5 m depth, 3 males, 6 females (ovig.), 2 juv.)
- Tyrrhenian Sea, Lipari Isl., Castello, July 10, 1889 (ex coll. A. Della Valle), 1 female (with oostegites).
- Tyrrhenian Sea, Sicily: Ganzirri, 10 m depth, 4 juv.
- Tyrrhenian Sea, Napoli: Ischia, S. Anna, 2-10 m depth, July 27, 1969, 12 females, 6 juv.; Ischia, Pta S. Pancrazio, September 10, 1969, 2 males, 3 females, 3 juv.; same locality, 40 m depth, July 12, 1969, 1 female (ovig.), 1 juv.; Ischia, Lacco Ameno, September, 1968, 6 males, 17 females (ovig.); Ischia, Castello, 5-10 m depth, 8 males, 20 females (ovig.), 6 juv.; same locality, 5-10 m depth, March 28, 1969, 1 male; Secca di Forio, 40-45 m depth, August 1, 1970, 2 females (ovig.); S. Lucia, October 18, 1956, 1 male; Procida, Pta Pizzaco, 20-30 m depth, October 29, 1970, 4 males, 3 females, 5 juv.; Pietra Salata, 6-12 m depth, February 28, 1974, 2 males, 7 females, 3 juv.; Baia, 4-10 m

- depth, March 26, 1974, 1 female; Trentaremi, 0.3 m depth, October 19, 1956, 1 female (ovig.), 3 juv.; Sorrento, 4 females.
- Tyrrhenian Sea, Civitavecchia, Torvaldaliga, March 20, 1972, 2 males, 1 juv.; same locality, 1 m depth, June 20, 1972, 1 male.
  - Adriatic Sea: Castromarina (Puglia), 1 m depth, 8 males, 12 females (ovig.), many juv.; Rovinj, 3 males, 3 females (ovig.); Rovinj, Pt. Skaraba, 0.7-2 m depth, August 8, 1992, 4 males, 2 females, 3 juv.; Rovinj, Banjole, 2.5-6 m depth, 2 males, 2 females, 1 juv.; Muggia-Lazzaretto, 1 m depth, 3 males, 5 females, 5 juv.; Lastovo Isl, 3 females (ovig.) (syntypi of *Maera integrimana* Heller, 1866, Inv. n. 11858/692, coll. C. Heller, Naturhist. Museum Wien); Hvar Isl., 2 males (sub *Maera scissimana* A. Costa, 1851, coll. C. Heller, Zool. Mus. Univ. Innsbruck)
  - Eastern Mediterranean: Pantelleria Isl. October, 1970, 2 males, 2 females (ovig.), 3 juv..
  - Eastern Mediterranean, Malta Isl.: St. Paul's bay, 0.4-22 m depth, April 12-26, 1974, 16 males, 20 females (ovig.), 4 juv.; near "Grotta Blu", 15-20 m depth, April, 23, 1974, 1 male, 9 females (ovig.), 4 juv.; Mellieha bay, 0-10 m depth, April 17-18, 1974, 8 males, 14 females (ovig.), many juv.; Golden Sands, 0.4-10 m depth, April 19-21, 1974, 16 males, 14 females (ovig.), many juv.. Gozo Isl. (Malta), 15-35 m depth, April 24, 1974, 8 females (ovig.)
  - Eastern Mediterranean, Crete: Aghios Nicolaos, 0.5 m depth, April 24, 1976, 8 males, 24 females (ovig.), many juv.; East Coast, 0.5-1 m depth, May 17, 1976, 6 males, 8 females (ovig.)
  - Aegean Sea: Lesvos Isl., 0.5-1.5 m depth, August, 1991, 25 males, 36 females (ovig.), 16 juv.
  - Atlantic Ocean, Canary Isl.: Gran Canaria, Aquamarina, 6 females (ovig.).

This species was extensively redescribed from topotypical material from Ischia - Castello (Gulf of Naples) by G. Karaman & Ruffo (1971; see details here), who also established a neotypus, because the type material is lost. In this paper we restrict ourselves in giving a diagnosis and stressing the differential characters from the three new species described here.

#### DIAGNOSIS

A *Maera* species of the *quadrimana* complex dis-

tinguished by: mandibular palp (fig. 9a) article 1 without distal tooth; coxa 1 (fig. 9b) acutely produced anterodistally; gnathopod 1 (fig. 9b') carpus anterior margin deeply notched, distally acutely produced; gnathopod 2 propodus in male (fig. 9c) palmar margin with median deep semicircular excavation, and delimited by a strong tooth with a spine, dactylus inner margin (fig. 9c') with two strong teeth defining the excavation; gnathopod 2 propodus of female (fig. 9g) similar to male but palmar margin only serrate, without excavation, on inner margin dactylus smooth; dactylus of peraeopods 3-7 with bifid nail (fig. 9d), on posterior margin smooth; propodus of peraeopods 6-7 posteriorly without any tuft of long setae; uropod 3 (fig. 9e) stout, rami distally truncated, inner ramus distinctly shorter than outer, distal spines as long as 2/3 of rami length, outer ramus article 2 reduced, but well visible; telson lobes (fig. 9f) distally incised bearing two spines, the interior one as long as 2/3 of lobes.

Locus typicus: Ischia, Castello (Napoli)

#### REMARKS ON SYNONYMY

Bearing in mind the restricted diagnosis of *Maera inaequipipes* (A. Costa, 1857) and the existence of the three closely related species described here, it was deemed necessary to review the synonymy and distribution of *Maera inaequipipes* sensu auctorum (Stebbing, 1906; G. Karaman & Ruffo, 1972).

We consider that three nominal taxa, described from the Mediterranean and later synonymized with *Maera inaequipipes*, should be labelled "species dubiae"; they are undoubtedly very similar to *Maera inaequipipes* or (in the case of *Maera truncatipes* Spence Bate) *Maera revelata*, but the type material is no longer extant and the descriptions insufficient for a certain identification with any of the four Mediterranean species now known. These species are:

*Gammarus scissimanus* A. Costa, 1857: 221, pl. III, fig. 7 (locus typicus: Gulf of Taranto);

*Maera truncatipes* Spence Bate, 1862: 189, pl. XXXIV, fig. 4 (locus typicus: Italy, sic!)

*Maera blanchardi* Spence Bate, 1862: 190, pl. XXXIV, fig. 5 (locus typicus: Cape of Santo Viti, Sicily, probably Capo San Vito near S. Vito Lo

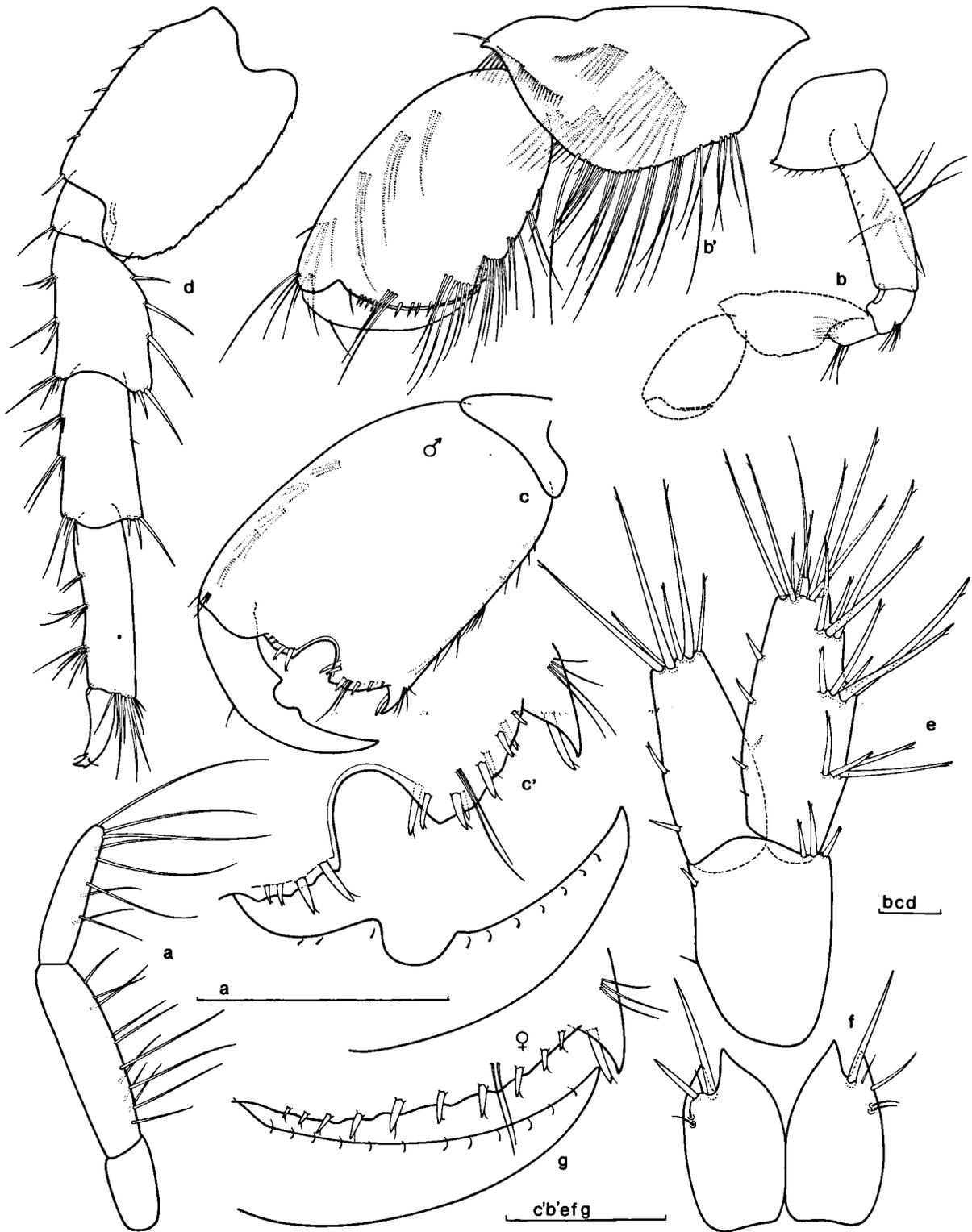


Fig. 9. *Maera inaequipes* (A. Costa, 1857), (male neotype), Ischia Castello, Napoli. a) mandibular palp; b) gnathopod 1; b') distally enlarged; c) gnathopod 2; c') distally enlarged; d) peraeopod 7; e) uropod 3; f) telson; (female) same locality. g) palmar margin and dactylus of gnathopod 2 (scales represent 0.2mm).

Capo).

We could examine the syntypes of *Maera integrimana* Heller, 1866: 40-41, pl. III, fig. 25 (locus typicus: Lastovo Island, Adriatic) preserved at the Naturhistorisches Museum, Wien. This nominal species is a junior synonym of *Maera inaequipes* (A. Costa, 1857) and contains only females. Syntype material from the same museum from Hvar Island and Vis Island (Adriatic) cited by Heller (1866) as *Maera scissimana* as well as others from the Zoologisches Museum der Universität Innsbruck show unmistakably males of *Maera inaequipes* (cf. also G. Krapp-Schickel, 1974).

Two nominal species of *Maera* from the Indo-Pacific have generally been considered to be junior synonyms of *Maera inaequipes*. They are *Maera massauensis* Kossmann and *Maera diversimanus* Miers.

*Maera massauensis* Kossmann, 1880: 133-134, pl. XIV, figs. 9-11 (locus typicus: Mitsiwa (= Massaua), Red Sea).

We do not know if and eventually where the type-material has been preserved, but we have studied topotypical material from the collection of the Verona Museum and are of the opinion that this taxon represents a valid species, close to, but clearly distinct from *Maera inaequipes*.

*Maera diversimanus* Miers, 1884: 567, pl. 52, fig. D.

K.H. Barnard (1937) also synonymized this species with *Maera inaequipes*; the original description of Miers was unfortunately not accessible to us.

Generally we are of the opinion that all citations of *Maera inaequipes* from the Indo-Pacific are probably erroneous and need to be revised: Walker, 1904 (Sri Lanka, sub *Maera scissimana*); Walker, 1909 (Chagos Archipelago, Seychelles, Coast of Tanzania, Suez Canal); Stebbing, 1910 (Western and Eastern Australia); K.H. Barnard, 1916 (South Africa); Schellenberg, 1928 (Suez Canal); K.H. Barnard, 1937 (Red Sea, South Arabian Coast); Schellenberg, 1938 (Gilbert Islands); Sivaprakasam, 1968; 1970 (East Coast of India); Griffiths, 1973 (Southern Moçambique); Griffiths, 1974a (South West Africa); Griffiths 1974b (Natal); Griffiths, 1974c (Cape Province East of Cape Agulhas); Griffiths, 1975 (Cape Province West of Cape Agulhas); Ledoyer, 1982 (Madagascar).

*Maera inaequipes* has also been cited from the Atlantic Ocean. Barrois (1888) reported it as *Maera scissimana* from the Azores; judging from his figures, he may well have had the real *Maera inaequipes*.

We have, however, still strong doubts about the records by Kunkel (1910) from Bermuda. After the description and figures this *Maera* seems to be different from *Maera inaequipes*. The propodus of gnathopods 2 in both sexes has a palmar incision, and the telson is elongated, with only a single short spine in the distal incision of the lobes.

Also the citations by Chevreux (1927) from the Cape Verde Islands and by Pirlet, 1939 (Rio de Oro) are uncertain, as the diagnostic parts have not been illustrated or described. The citation from the Canary Islands by Chevreux (1925) has, on the other hand, been confirmed by Krapp & Ruffo (1990).

Truchot (1963) reported *Maera inaequipes* from the French Channel; because of its specialized habitat (living inside the holdfasts of *Saccorhiza*) also this material needs checking.

The revised synonymy of *Maera inaequipes* sensu stricto is therefore as follows:

*Maera inaequipes* (A. Costa, 1857)

1857 *Amphithoe inaequipes* A. Costa: 205, pl. II, fig. 10

1866 *Maera scissimana* Heller: 40, pl. III, fig. 24; nec *Gammarus scissimanus* A. Costa, 1857, species dubia

1866 *Maera integrimana* Heller; 40-41, pl. III, fig. 25

1888 *Maera scissimana* Barrois: 35, fig. 1, pl. III, figs. 1-6; nec *Gammarus scissimanus* A. Costa, 1857, species dubia

1893 *Maera truncatipes* (partim) Della Valle: 725-726, pl. I, fig. 2, pl. XXII, figs. 26-40; nec *Maera truncatipes* Spence Bate, 1862, species dubia

1906 *Maera inaequipes* (partim) Stebbing: 435-436

1925 *Maera inaequipes* Chevreux & Fage: 240-241, fig. 251

1925 *Maera inaequipes* Chevreux: 307

1934 *Maera inaequipes* Cecchini & Parenzan: 198-200, fig. 33

1971 *Maera inaequipes* (partim) G. Karaman &

- Ruffo: 143-151, figs. XVII-XIX, 1-3  
 1982 *Maera inaequipes* (partim) G Karaman: 314-317, fig. 213  
 1990 *Maera inaequipes* Krapp & Ruffo: 54  
 1910 nec *Maera inaequipes* Kunkel: 44-46, fig. 16 (n. sp.?)  
 1916 nec *Maera inaequipes* Chilton: 365-367, figs. 5-6  
 1954 nec *Maera inaequipes* J.L. Barnard: 16-18, pl. 16.17 ; = *M. simile* Stout  
 1982 nec *Maera inaequipes* Ledoyer: 527-529, fig. 195

#### ECOLOGY

Normally from 0 to 20 m depth, exceptionally to 45 m. Detritophobe, on vegetal biotopes: photophilic algae (*Cystoseira*, *Halopteris*, *Jania*, *Dictyota*, *Acetabularia*, *Padina*), hemiphotophilic algae (*Cystoseira spinosa*), sciaphilic algae (*Halimeda*, *Udotea*) and rhizomes of *Posidonia oceanica*. Sometimes together with *M. revelata*, *M. aurora* and *M. ariadne* (Crete, Napoli, Malta, Civitavecchia, Banyuls s. Mer).

#### BIOLOGY

Ovigerous females from April to November.

#### DISTRIBUTION

At the moment *Maera inaequipes* is known with certainty from the Mediterranean (Western and Eastern basins) and the Canary and Azores Islands only. In the East Atlantic Ocean it has also been cited from the coasts of Morocco (Bittar, 1987; Menioui, 1988), Portugal (Marques & Santini, 1985) and from the French coasts of the Channel (Truchot, 1963), but these references should be checked.

#### COMPARISON BETWEEN THE MEDITERRANEAN SPECIES OF THE *MAERA QUADRIMANA* COMPLEX

The differences between the four species here treated are shown in Table 1. For their identification we propose the following key:

1. Peraeopods 3-7 dactylus nail bifid; gnathopod 2 defining tooth of palm with a spine ..... 2
- Peraeopods 3-7 dactylus nail simple; gnathopod 2 defining tooth of palm without spine. Peraeopods 6-7 posterior margin of propodus with a tuft of long setae. Gnathopod 1 carpus anterior margin smooth, distally rounded; gnathopod 2 palm, in both sexes with deep excavation (shallower in female), inner margin of dactylus with two low humps, bisinuate (male), or smooth (female). Telson lobes distally deeply incised, with acute inner corners, one of distal spines about as long as telson ..... *Maera revelata*
2. Uropod 3 rami broad, < double length of peduncle, with many long spines..... 3
- Uropod 3 rami slim, subequal, > double length of peduncle, with few short spines. Gnathopod 1 carpus anterior margin smooth, distally rounded; gnathopod 2 palm with deep and narrow excavation (male), serrate only or with very shallow excavation (female); inner margin of dactylus with a single low hump or little tooth (male), or smooth (female). Peraeopods 6-7 posterior margin of propodus without long setae. Telson longer than broad, with distal spines about half length of telson ..... *Maera ariadne*
3. Telson lobes distally feebly incised, with rounded inner corners, distal spines very short; peraeopods 6-7 posterior margin of propodus with median tuft of long setae. Gnathopod 1 carpus anterior margin smooth or feebly impressed, distally angular; gnathopod 2 palm, in both sexes, with deep excavation (narrower in female), inner margin of dactylus with one tooth (male) or smooth (female) ..... *Maera aurora*
- Telson lobes distally deeply incised, with acute inner corners, one of distal spines > 1/2 length of telson; peraeopods 6-7 posterior margin of propodus without long setae, or with a single short seta. Gnathopod 1 carpus anterior margin deeply notched, distally acutely produced; gnathopod 2 palm with semicircular excava-

Table 1. Distribution of characters within the 4 Mediterranean species of *Maera*.

	<i>Maera inaequipes</i>	<i>Maera ariadne</i>	<i>Maera aurora</i>	<i>Maera revelata</i>
Size (mm)	6-8	4	6	6-8
Mdb palp art 1 distal tooth	-	-	-	+
A1 ♂ in relation to body length	> 1/2 body	about 1/2 body	≤1/3 body	< 1/2 body
Coxa 1 anteriorly	pointed	rounded	pointed	pointed
Gn1 carpus anterior margin	evident notch	smooth or slightly notched,	smooth or slightly notched, distally pointed	smooth
Gn1 propodus palm defined on inner face by	1 spine ♂, ♀	1 spine ♂, ♀	1 spine ♂, ♀	6-7 spines ♂ 3 spines ♀
Gn 2 ♂ palm	semicircular excavation	U-shaped excavation	U-shaped excavation	smooth or very weak excavation
Gn2 ♂ palm-defining tooth with inner spine	+	+	+	-
Gn 2 ♂ dactylus inner margin	2 teeth defining excavation	smooth or little hump (tooth)	1 tooth	2 low humps
Gn 2 ♀ palm excavation	-	-	+	+
P3-7 dactyl- "nail" bifid	+	+	+	-
P3-7 "nail" posteriorly denticulate	-	-	-	+
P5 basis narrow with parallel margins	-	+	-	+
P6,7 propodus medioposterior tuft of setae	-	-	+	+
U3 rami	broad, oval, with long spines	slim and long, few and short spines	stout, truncated, spines shorter than rami	stout, truncated, spines very long
Telson l:b	<	>	≤	=
Telson distal spines	max. 3/4 telson (inner ones)	1/2 telson	very short	max.= telson (outer ones)

tion (male), or only serrate (female); inner margin of dactylus with two strong teeth, defining excavation (male), or smooth (female) ..... *Maera inaequipes*

#### REMARKS ON INTERMEDIATE CHARACTERS

As mentioned earlier, these four *Maera* species coexist in some localities, e.g. on Crete (*M. ariadne*, *M. aurora* and *M. inaequipes*), in Ischia-Napoli (*M. inaequipes*, *M. revelata*, *M. aurora*), on Malta (*M. inaequipes*, *M. revelata* and *M. aurora*), in Gozo (*M. revelata*, and *M. inaequipes*), in Rovinj (*M. inaequipes*, *M. aurora*), in Civitavecchia (*M. inaequipes*, *M. aurora*), and in Banyuls s. Mer (*M. inaequipes*, *M. aurora*).

In some of these localities specimens have shown somewhat intermediate characters. For example a male in a mixed population of *M. inaequipes* and *M. revelata* from Malta, St. Paul's bay has the propodus of peraeopods 6-7 with tuft of long setae on outer margin, dactylus nail of peraeopods not bifid, minutely denticulate on posterior margin (all characters of *M. revelata*), but gnathopod 2 palmar margin delimited by tooth with one spine, and its dactylus on the inner margin with two teeth defining excavation (as in *M. inaequipes*). At Gozo (Malta), an ovigerous female in a mixed population of *M. inaequipes* and *M. revelata* showed the propodus of peraeopods 6-7 with a tuft of long setae on the outer margin, the dactyl nail not bifid, minutely denticulate on outer margin (characters of *M. revelata*), but gnathopod 2 propodus with the palmar margin only serrate, without a median excavation, and the palmar tooth defined with a single spine (as in *M. inaequipes*). In a mixed population of *M. inaequipes*, *M. aurora* and *M. ariadne* at Crete, there were a few specimens that showed the propodus of peraeopods 6-7 with a tuft of 3 long setae on the outer margin and the dactylus nail bifid (as in *M. aurora*); uropod 3 rami were elongate, the outer ramus with a distinct article 2 (characters of *M. ariadne*), and the rami with few spines (as in *M. ariadne*), but elongate (as in *M. aurora*).

It seems possible that these specimens actually may be hybrids (*inaequipes* x *revelata* at Malta and Gozo, and *aurora* x *ariadne* at Creta). These

few specimens are clearly insufficient to decide this question; it is nevertheless worth noting here, to draw it to the attention of future ecological workers.

Previous references on species of the *M. quadrimana* complex showing morphological variability were interpreted by Barnard (1970) mainly as developmental steps during maturation of the species, and also as the result of regeneration of appendages accidentally lost. Intraspecific variability was already remarked by Barnard for some characters on gnathopod 2, giving an ambiguous description for these characters: "dactyl ... acclivity weak to strong, usually absent in females and juveniles", and "palm deep incision ... occasionally in females" for *M. reishi* (Barnard, 1979: 83); "dactyl ... occasionally with inner acclivity" for *M. pacifica* (Barnard, 1970: 150). Another variable character is the relative length of the rami of uropod 3, which is related to the size of the specimens in *M. reishi*, *M. quadrimana*, *M. serrata* and *M. kaiulani* (Barnard, 1970, 1979). Variability of this character may be so strong that early stages of *M. kaiulani* "resembles the genus *Melita*" (Barnard, 1970: 150).

In this study, a juvenile of *M. revelata* from the Gulf of Valencia shows the palm lacking median incision in gnathopod 2, and defining palmar tooth bearing a spine; uropod 3 rami elongate, inner ramus shorter than outer. These differences between juveniles and adults of *M. revelata* are in agreement with Barnard's observations on morphological variability in species of *M. quadrimana* complex.

Finally, morphological variability can exceptionally be observed in the same specimen, showing differences between left and right appendages. One male of *M. inaequipes* from the Gulf of Valencia showed median palmar excavation only on left gnathopod 2.

Because their morphological variability, characters related with gnathopod 2 and rami of uropod 3 should be used with caution. Instead of these characters, there are more stable characters, such as dactylus nail bifid or entire, and presence of a tuft of long setae on the posterior margin of peraeopods 6-7, which may be more useful to discriminate between species of *M. quadrimana* complex.

A shortened key could therefore be:

1. Peraeopods 3-7 dactylus nail bifid; mandibular palp article 1 without distal tooth ..... 2
- Peraeopods 3-7 dactylus nail simple; mandibular palp article 1 with acute distal tooth.....*Maera revelata*
2. Peraeopods 6-7 posterior margin of propodus with median tuft of long setae.....  
.....*Maera aurora*
- Peraeopods 6-7 posterior margin of propodus without median tuft of long setae..... 3
3. Uropod 3 rami slim, subequal, > double length of peduncle, with few short spines. Telson longer than broad, with distal spines about = 1/2 length of telson.....  
..... *Maera ariadne*
- Uropod 3 rami broad < double length of peduncle, with many long spines. Telson broader than long, one of distal spines > 1/2 length of telson ..... *Maera inaequipes*

#### REMARKS ON THE *MAERA QUADRIMANA* COMPLEX

J.L. Barnard (1972a) was the first to find out that there is a group of species within the huge genus *Maera* distinguished by the following combination of characters: gnathopods 2 with propodus strongly subquadrangular, with transverse palm defined by a sharp tooth and with only one short seta on exterior margin of dactylus (see *Maera grossimana* complex, with many long setae); dactylus of peraeopods 3-7 generally with bifid nail (four exceptions).

We confirm the possibility of distinguishing this group and name it *Maera quadrimana* complex (after the earliest species described); it is made up by the following 19 species (the species marked with \* have no bifid nail of peraeopods 3-7):

1. *Maera quadrimana* (Dana, 1853) (see J.L. Barnard, 1970; Berents, 1983) - Indopacific, Red Sea, Cuba
2. *Maera inaequipes* (A. Costa, 1857) - Mediterranean, East Atlantic
3. *Maera viridis* Haswell, 1880 (see J.L. Barnard, 1972b) - South Australia, Vanuatu Isl.

4. *Maera massauensis* Kossmann, 1880 - Red Sea
5. *Maera incerta* Chilton, 1883 (see J.L. Barnard, 1972a) - New Zealand
6. *Maera rathbunae* Pearse, 1908 (see Kunkel, 1910) - Florida, Bermuda Isl.
7. *Maera pacifica* Schellenberg, 1938 (see J.L. Barnard, 1970) - Indopacific, Red Sea
8. *Maera serrata* Schellenberg, 1938 (see J.L. Barnard, 1970; Berents, 1983) - Indopacific, Red Sea, Cuba
9. *Maera schellenbergi* Ruffo, 1938 - Red Sea
- \*10. *Maera serratipalma* Nagata, 1965 - Japan, Madagascar
- \*11. *Maera vigota* J.L. Barnard, 1969 - California
12. *Maera kaiulani* J.L. Barnard, 1970 - Hawaiian Islands
13. *Maera chinarra* J.L. Barnard, 1979 - California, Galapagos Islands, Cocos Isl.
14. *Maera reishi* J.L. Barnard, 1979 - California, Galapagos Islands, Lizard Island (Australia)
15. *Maera trisinuata* Mateus & Mateus 1986 - Principe Island (Gulf of Guinea)
- \*16. *Maera mooreana* Myers, 1989 - Society Islands (Southern Pacific)
- \*17. *Maera revelata* n. sp. - Western Mediterranean
18. *Maera ariadne* n. sp. - Eastern Mediterranean
19. *Maera aurora* n. sp. - Mediterranean

It is possible that *Maera excavata* Mateus & Mateus, 1986 from the Gulf of Guinea also belongs to this complex of species, but the description is too incomplete to take decisions.

The majority of species of this complex is known from the Indopacific and the Red Sea (14 out of 19, cf. Fig. 10) and we expect more species there, especially once the many references to *Maera inaequipes* from the Indian and Pacific Ocean can be checked.

Four species of this complex are found in the Mediterranean, a fact which is particularly interesting from a biogeographical point of view, because it confirms the already noticed relationship between the Mediterranean and Indopacific Amphipod faunas.

Except for *Maera trisinuata* from the Gulf of Guinea we only find *Maera inaequipes* quoted for the Eastern Atlantic; its alleged distribution

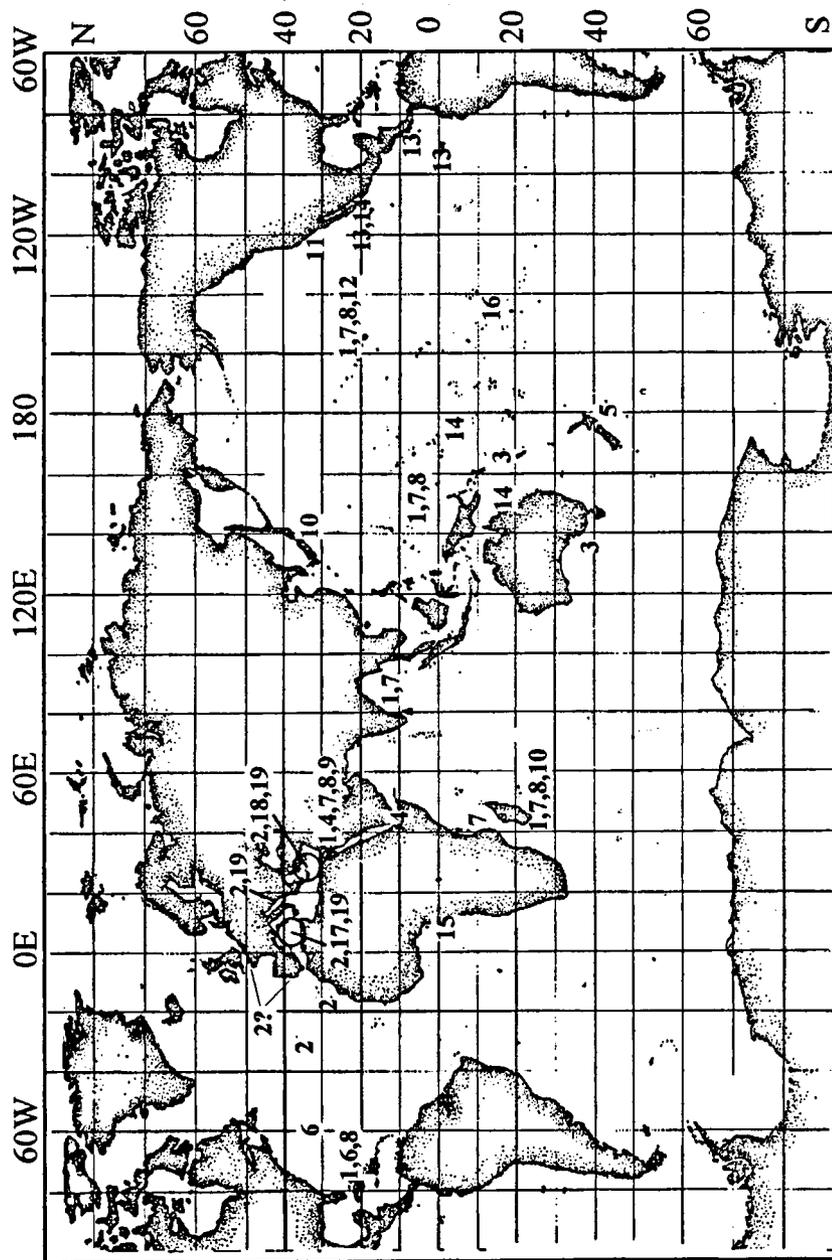


Fig.10. Geographical distribution of the *Maera quadrimana* - complex: The species marked with \* have no bifid nail of pereopods 3-7. 1. *Maera quadrimana* (Dana, 1853); 2. *Maera inaequipes* (A. Costa, 1857); 3. *Maera viridis* Haswell, 1880; 4. *Maera massauensis* Kossmann, 1880; 5. *Maera incerta* Chilton, 1883; 6. *Maera vaitubunae* Pearse, 1908; 7. *Maera pacifica* Schellenberg, 1938; 8. *Maera serrata* Schellenberg, 1938; 9. *Maera schellenbergi* Ruffo, 1938; \*10. *Maera serratipalma* Nagata, 1965; \*11. *Maera vigota* J.L. Barnard, 1969; 12. *Maera kaiulani* J.L. Barnard, 1970; 13. *Maera chinarra* J.L. Barnard, 1979; 14. *Maera retschi* J.L. Barnard, 1979; 15. *Maera trisinuata* A. and E. Mateus 1986; \*16. *Maera mooreana* Myers, 1989; \*17. *Maera revelata* n. sp.; 18. *Maera ariadne* n. sp.; 19. *Maera aurora* n. sp.

along the African and European coasts is not confirmed; however, it reaches no further North than the French coast of the Channel.

The *Maera quadrimana* complex is even less known in the Western Atlantic. Besides *Maera rathbunae* Pearse, 1908, from Florida and Bermuda Islands, Kunkel (1910) described a species from the Bermuda Islands under the name *Maera inaequipes* which is most probably different, perhaps even a new species. From Cuba two Indo-pacific species have been recorded: *Maera quadrimana* and *Maera serrata* (Ortiz, 1978 in Berents, 1983) and this does not seem all too improbable since the Caribbean fauna is known for its relationship with the Indopacific. The material, however, ought to be checked.

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