TALITRIDAE (CRUSTACEA, AMPHIPODA) FROM NON-MARINE HABITATS IN MADEIRA

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with 43 figures

SUMMARY. Four species of Talitridae are recorded from the banks of freshwater cascades and springs in Madeira. Three of these, have been recorded before from the island; the fourth, living in the mountains (600-650 m a.s.l.) represents a new species, which is described in this paper as *Orchestia monticola* n. sp.

SUMÁRIO. Foram encontradas quatro espécies de Talitridae em depósito de quedas de água e de águas de escorrência na Madeira. Três destas espécies já tinham sido encontradas anteriormente. A quarta, é uma nova espécie e foi encontrada em altitudes mais elevadas (600-650 m) e é aqui descrita como *Orchestia monticola* n. sp.

INTRODUCTION

The Talitridae (beach fleas, sandhoppers or landhoppers) from Madeira have been the subject of some previous studies (STEBBING, 1899; DAHL, 1950, 1967), but inland habitats in particular remained poorly studied. Since both the Canary Islands (DAHL, 1950; Stock, 1989b, 1990; STOCK & BOXSHALL, 1989; STOCK & MARTIN, 1988; RUFFO, 1990) and the Azores (DAHL, 1967; STOCK & BOXSHALL, 1989; MATEUS & AFONSO, 1974; MATEUS *et al.*, 1986; STOCK, 1989a) proved to have a diversified talitrid fauna, it was suspected that Madeira would yield some novelties as well. During 5 weeks of fieldwork in Madeira, special attention was paid to the search for talitrids, and although the collecting yielded a limited number of samples only, the results warrant the present publication.

The material on which this study is based has been deposited in the Zoölogisch Museum Amsterdam (ZMA) and the Museu Municipal do Funchal (MMF).

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TAXONOMIC PART

Genus *Orchestia* LEACH, 1814
Orchestia monticola n. sp.

Material. 1 male (holotype), 1 female (allotype), 1 male and 13 females (paratypes). Madeira, sample 91-557: Galeria de Levada do Boqueirão, near Espigão (= c. 2.5 km S. of Serra de Água); UTM coordinates CB ^{3}105 x ^{36}201; altitude c. 650 m; in very wet vegetation at the entrance of the galeria; water temperature 14.0° C, electric conductivity 0.2 mS/cm; 24 Oct. 1991. [ZMA Amph. 108.963, except for 3 paratypes deposited in MMF 25129.]

4 females. Madeira, sample 91-560: between Curral das Freiras and Casas Próximas; UTM coordinates CB ^{3}1625 x ^{36}2150; altitude c. 600 m; in very wet vegetation along a cascade; electric conductivity 0.1 mS/cm; 27 Oct. 1991. [ZMA Amph. 108.964.]

4 males, 18 females (1 ovig.), sample 92-44: same locality as 91-560; 29 Apr. 1992 [ZMA Amph.]

Description. Body length c. 10 mm (largest specimen, a female 12.7 mm). Body colour uniform dark greyish-green or greenish-brown. Eye black, circular, very large (fig. 1). No spines or processes on dorsum.

Antenna 1 (fig. 2) reaching slightly beyond distal end of segment 4 of antenna 2. Flagellum 6-segmented, armed with fairly long spinules.

Antenna 2 (fig. 3) not sexually dimorphic. Peduncle and flagellum with numerous, relatively long spinules. Flagellum 16-segmented.

Left mandible with 4-dentate lacinia mobilis (fig. 4) and 5 plumose setae + molar flake between lacinia and molar. Right mandible (fig. 4) with tricuspidate lacinia (2 cusps finely toothed, 1 cusp smooth) and 2 plumose setae + molar flake.

Labium (fig. 5) deeply cleft, without inner lobes.

Maxilla 1 of usual shape (fig. 6), with very small palp. Outer lobe with 9 curved distal spines; medial margin of these spines (from lateral to medial) with 1, 2, 1, 4, 4, 4, 4, 3, and 4 denticles, respectively. Inner lobe with 3 (sub)distal plumose setae.

Maxilla 2 (fig. 7) of usual morphology.

Maxilliped (fig. 8): Palp segment 2 with strong mediodistal lobe; segment 3 squarish, wide; segment 4 knob-like, small, but well-articulated with segment 3. Inner lobe with 3 distal triangular teeth and many plumose setae.

Gnathopod 1 male (fig. 9): Coxal plate with long, slender spines on ventral margin. Carpus with broad ventral lobe. Propodus (fig. 10) ventrodistally widened

into spinulous lobe. Claw not reaching end of propodal lobe. Gnathopod 1 female (fig. 11): Carpus longer than propodus, lobate. Propodus (fig. 12) rather elongate; palmar margin concave. Claw much longer than palma.

Gnathopod 2 male (fig. 16): Ventral margin of coxal plate with numerous small spinules. Basis swollen, anterior margin sinuous. Propodus ovate; indistinct notch near palmar corner; another notch near implantation of dactylus. Palmar margin longer than free posterior margin of propodus. Claw strongly curved; inner margin with minute spinules, but without tooth, distally attenuated into narrow, obtuse tip. Coxal gill sinuous, longer than basis. Gnathopod 2 female (fig. 14): Basis as in male. Ischium and merus more elongate than in male. Between merus and carpus, the appendage is bent at right angle, making it very difficult to make a satisfactory slide of the appendage without distorting it. Carpus with ventral "blister". Propodus (figs. 13, 15) longer than carpus, mitten-shaped.

Pereiopods 3 through 7 cuspidactylate.

Pereiopods 3 (fig. 18) and 4 (fig. 19) dissimilar: P4 < P3, in particular at the level of merus and carpus; dactylus of P3 "normal", that of P4 pinched. Coxal gills smaller than those of gnathopod 2, shorter than basis.

Pereiopod 5 (fig. 20) slightly longer than P4. Coxal plate anterolobate. Basis wide, with distinct posterodistal lobe. Claw thin and slender. Coxal gill sausage-shaped, rather short.

Pereiopod 6 (figs. 21, 22) almost as long P7. Coxal plate strongly posterolobate. Basis with convex anterior and posterior margins, with distinct posterodistal lobe. Propodus elongate and slender, with 6 groups of spines on anterior margin. Claw thin and slender. Coxal gill large, ribbon-shaped, roughly Z-shaped.

Pereiopod 7 (fig. 23) without coxal gill. Coxal plate non-lobate. Remaining segments more or less similar to those of P6. Merus and carpus of male not widened.

Oostegites (fig. 17) narrow at base, slightly widening distally; marginal setae not curved or curled at tip.

Epimeral plates (fig. 28): Ventral margin unarmed; posterior margin with some fine saw-teeth, each with a setule. Posteroventral corner ending in obtuse point.

Pleopods of male (figs. 24-26): Peduncle more than twice as long as rami, armed with minute setules. Two retinacula, smooth, strongly hooked (fig. 24). Number of segments in rami reduced, through fusion of segments; endopodite and exopodite 3- or 4-segmented (vestiges of the higher number of original segments indicated by the presence of partly smooth, partly feathered, setae). Pleopods 1 and 2 of subequal size, pleopod 3 much shorter. Pleopod of female: Rami with fewer segments, exo- and endopodite 2-segmented in pleopod 1 (fig. 27), 3-segmented in pleopods 2 and 3.

Uropod 1 (fig. 29): Peduncle longer than rami. Tip of rami projecting beyond

tip of uropod 2. Both rami with dorsal and long distal spines.

Uropod 2 (fig. 30): Peduncle subequal to rami.

Uropod 3 (fig. 31): Peduncle longer than single ramus; latter narrow, slender, armed with distal and lateral spines.

Telson (fig. 32) lozenge-shaped, with shallow distal notch; 3 long and 3 short spines is distal part of each telson lobe. Pair of minute sensory setules, proximad of most basal spine on lateral margin.

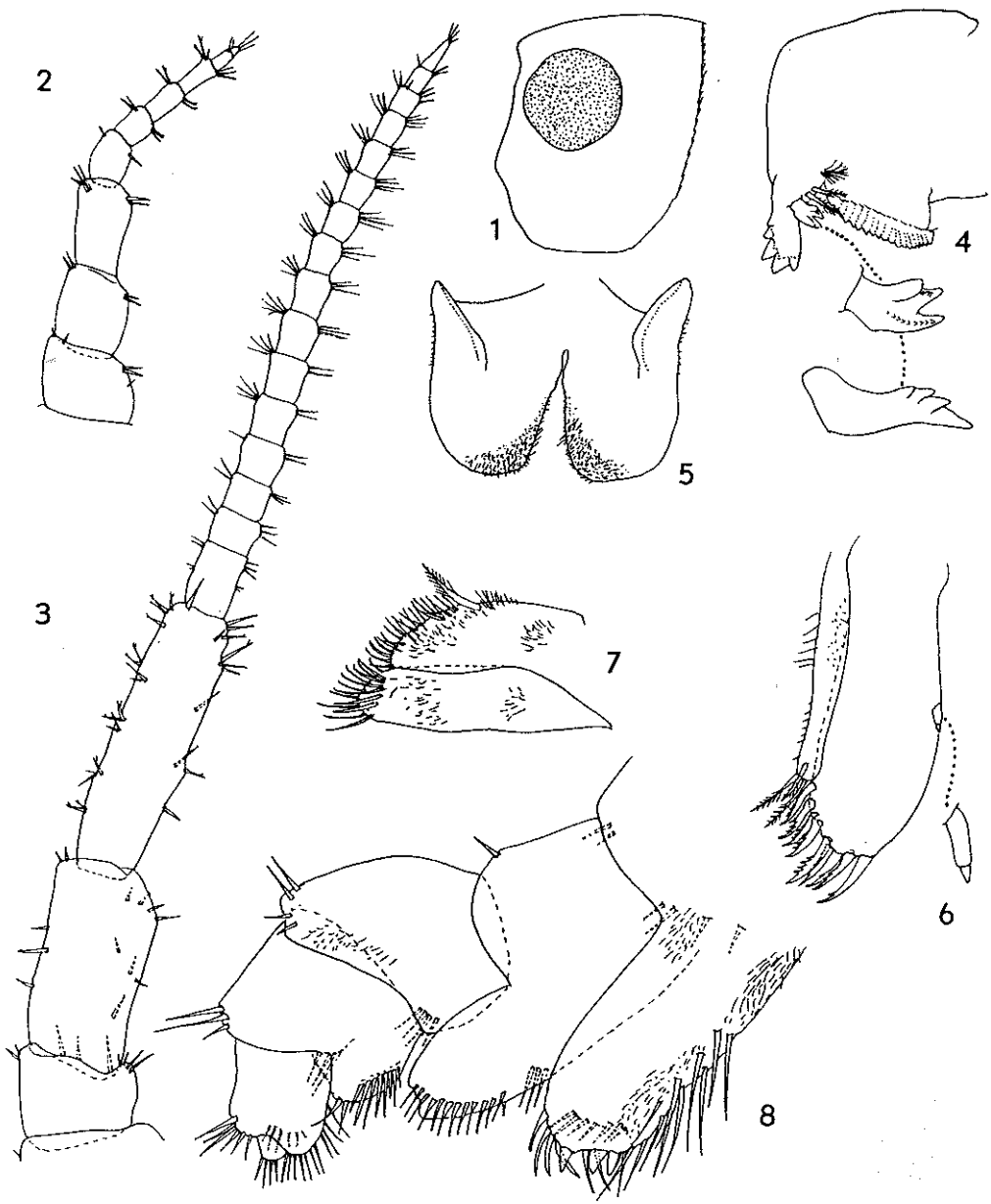
Remarks. This species is closely related to *O. remyi* SCHELLENBERG, 1950 (from a freshwater well in a near-shore cave in Corsica) and *O. roffensis* WILDISH, 1969 (Thames and Kent, U.K., estuarine). The phenetic resemblance bears on the morphology of most appendages, but especially on the reduced pleopod rami and the spinose antennae.

From *O. remyi* the new species differs in the much larger eyes, a much wider basis of pereiopods 5 to 7, a less wide coxal plate 4, the presence of lateral spines of the ramus of uropod 3, and a longer palmar margin of the propodus of gnathopod 2 male. Some new drawings of *O. remyi*, from Corsica are incorporated into the present paper (figs. 33-41). Further illustrations of *O. remyi*, supplementing SCHELLENBERG's scarce figures, can be found in RUFFO (in press).

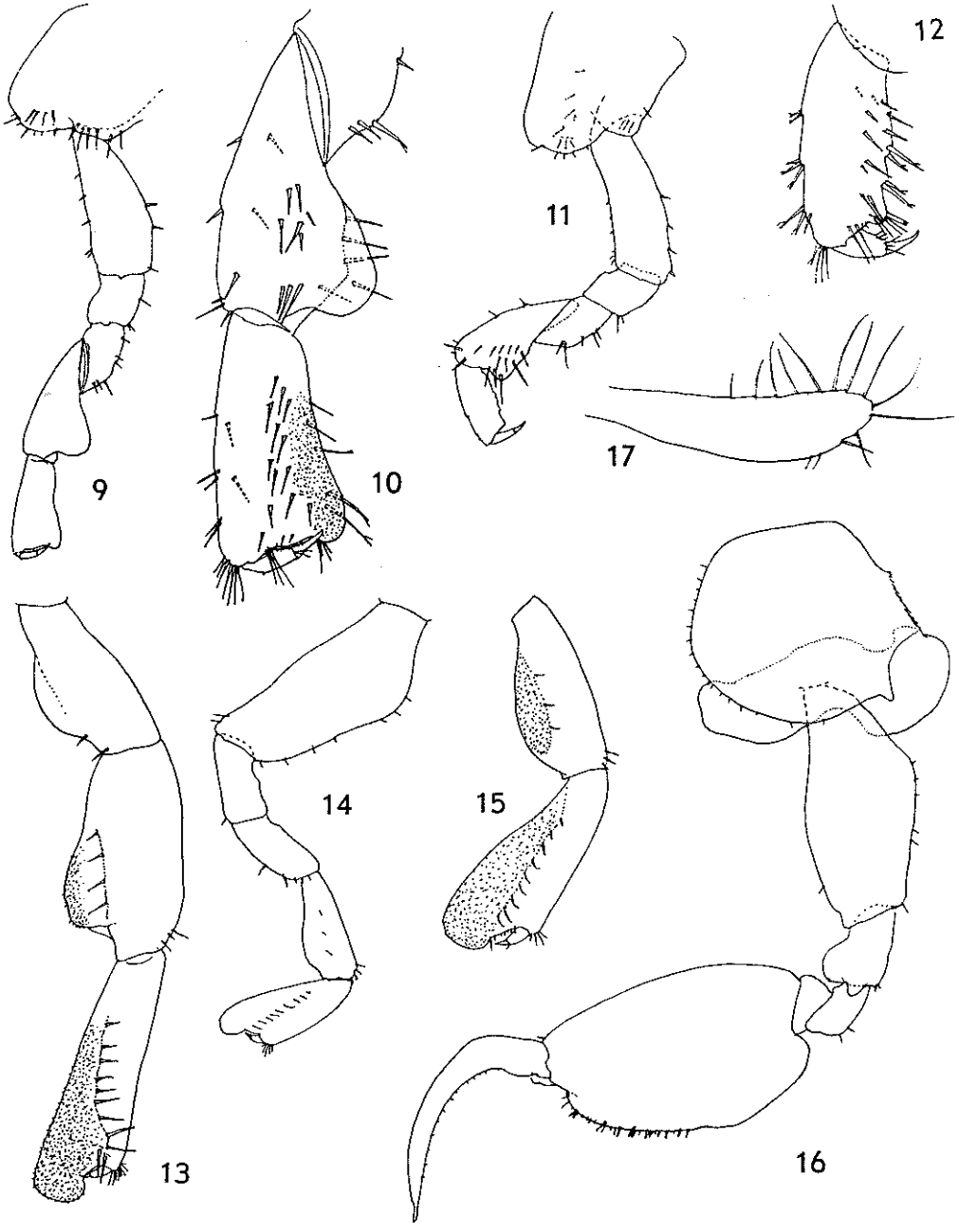
From *O. roffensis* (see WILDISH, 1969, 1987, and LINCOLN, 1979), the new species differs in segmented (versus unsegmented) pleopod rami, armed with several (versus 1 or 2) setae, in a longer palmar margin of gnathopod 2 male, a larger eye, and a wider basis of gnathopod 2.

The new species differs also from *O. remyi* and *O. roffensis* in its habitat: near freshwater springs or cascades, at considerable altitude in the mountains (the two other species have been found in estuarine or other near-coast localities).

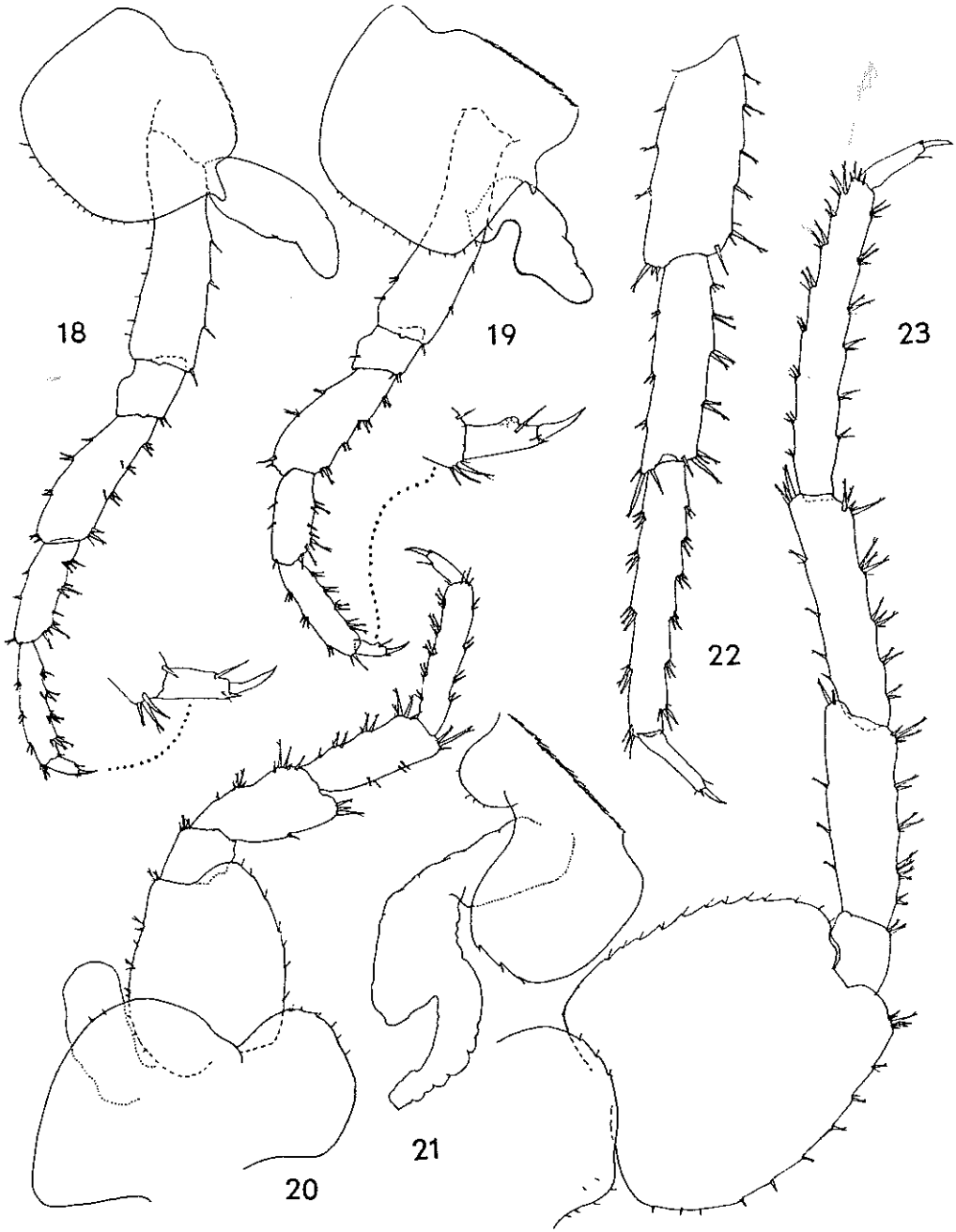
Etymology. The name *monticola* for the new species (Latin = living in the mountains) alludes to the habitat, at 600-650 m a.s.l.



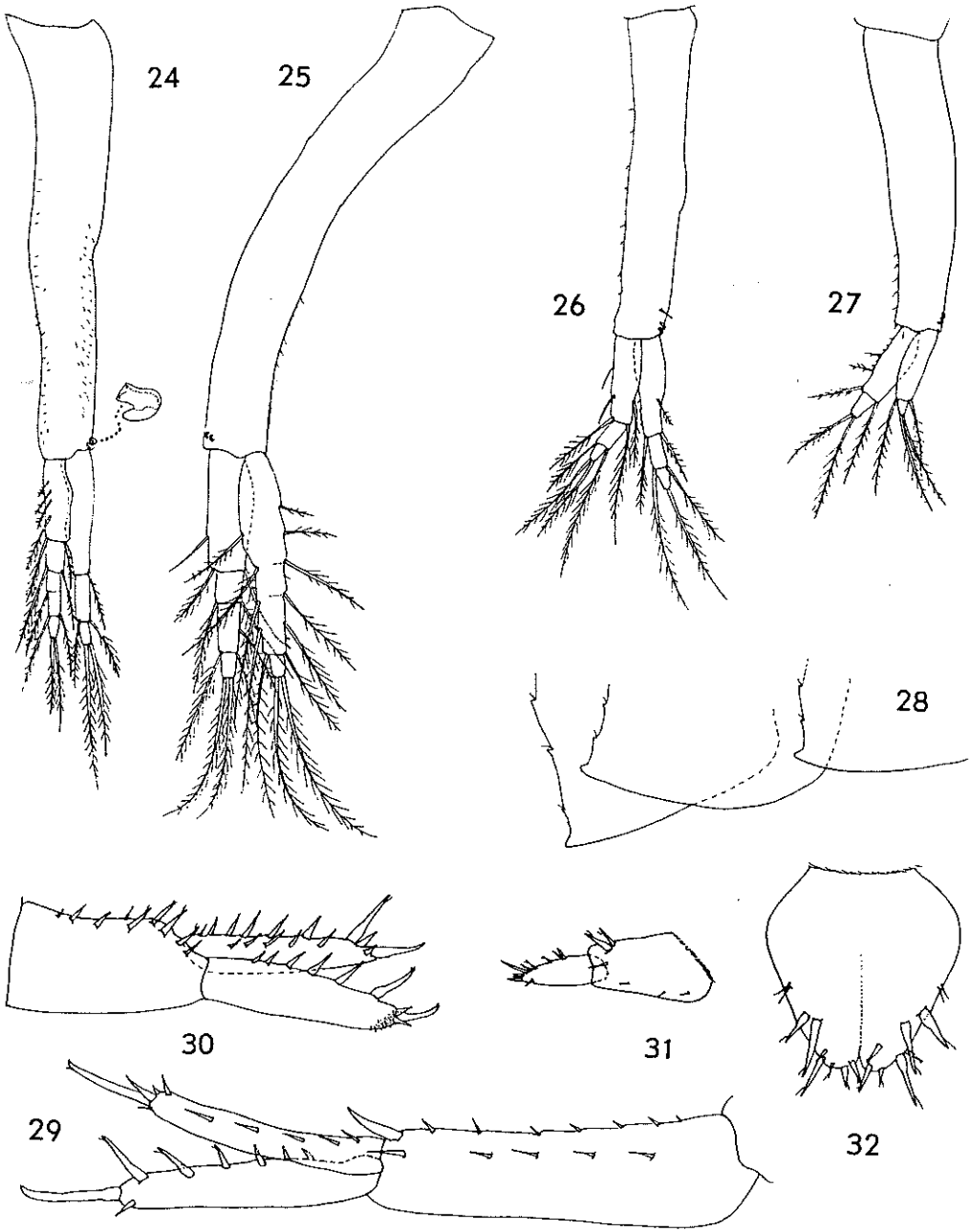
Figs. 1-8. *Orchestia monticola* n. sp., paratypes male and female (body length 10 mm). 1, head, female, from the left (scale a); 2, antenna 1, male (b); 3, antenna 2, male (b); 4, right mandible, male (c) and right and left lacinia mobilis, male (d); 5, labium, male (c); 6, maxilla 1, male (e); 7, maxilla 2, male (e); 8, maxilliped, male (c). Scales right of fig. 42.



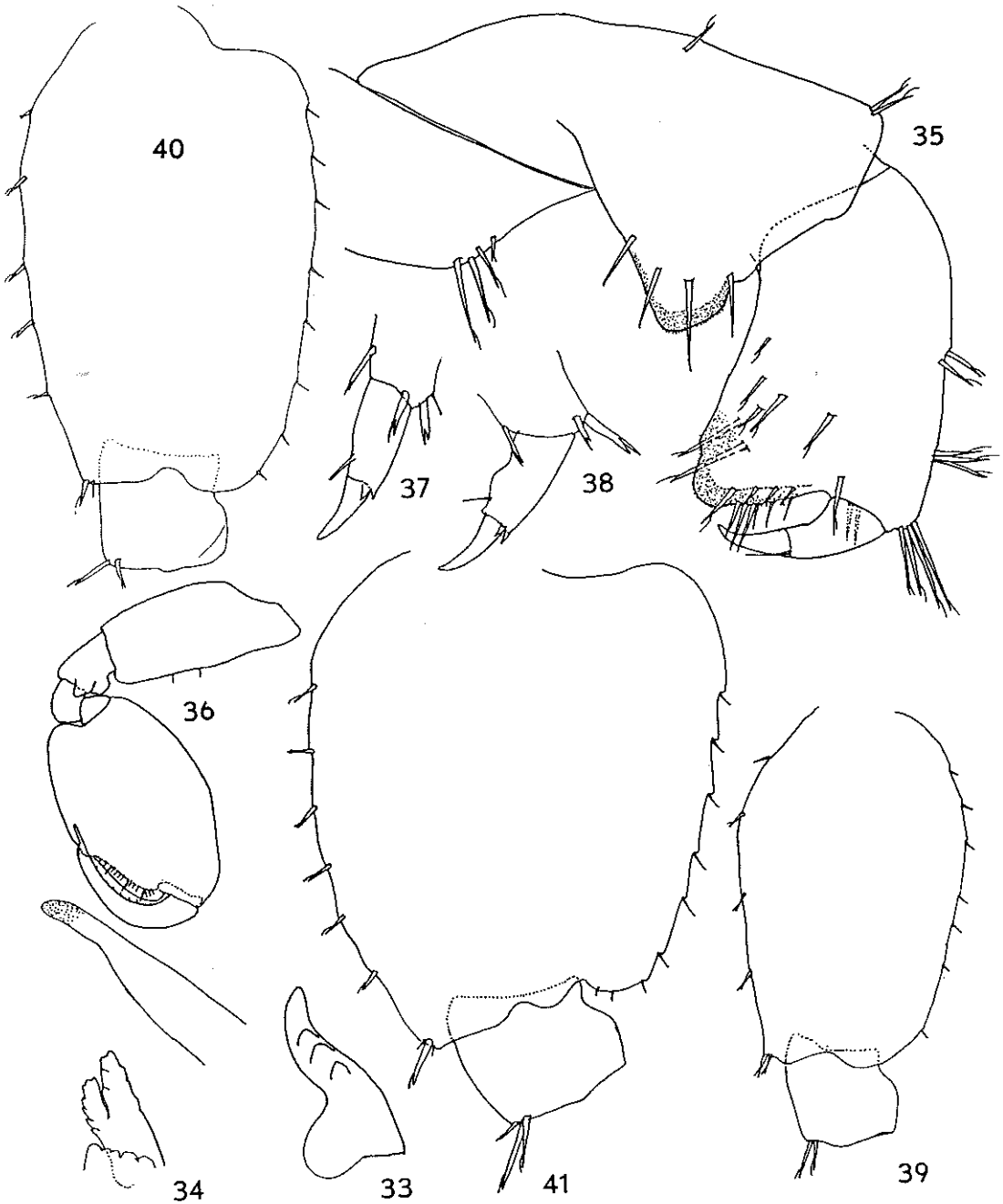
Figs. 9-17. *Orchestia monticola* n. sp., paratypes male and female (body lenght 10 mm, except for figs. 13 and 17, which are from a female paratype of 12.7 mm). 9, gnathopod 1, male (scale a); 10, distal segments of gnathopod 1, male (c); 11, gnathopod1, female (a); 12, propodus of gnathopod 1, female (c); 13, distal segment of gnathopod 2, female (b); 14, gnathopod 2, female (a); 15 distal segments of gnathopod 2, female (b); 16, gnathopod 2, male (a); 17, oostegite of pereipod 3, female (a). Scale right of fig. 42.



Figs. 18-23. *Orchestia monticola* n. sp., paratypes male and female (body length 10 mm). 18, pereiopod 3, male (scale a); 19, pereiopod 4, male (a); 20, pereiopod 5, male (a); 21, coxal plate and gill of pereiopod 6, male (a); 22, distal segments of pereiopod 6, female (a); 23, pereiopod 7, male (a). Scales right of fig. 42.



Figs. 24-32 - *Orchestia monticola* n. sp., paratypes male and female (body length 10 mm). 24) pleopod 1, male (scale c); 25) pleopod 2, male (c); 26) pleopod 3, male (c); 27) pleopod 1, female (c); 28) epimeral plates 1 to 3, female, from the right (a); 29) uropod 1, male (b); 30) uropod 2, male (b); 31) uropod 3, male (b); 32) telson, male (c). Scales right of fig. 42.



Figs. 33-41. *Orchestia remyi* Schellenberg, 1950, from Corsica. 33, left lacinia mobilis, female (scale f); 34, right lacinia mobilis, female (f); 35, gnathopod 1, male (d); 36, gnathopod 2, male (a); 37, claw of pereiopod 3, male (d); 38, claw of pereiopod 4, male (d); 39, basis of pereiopod 5, male (c); 40, basis of pereiopod 6, male (c); 41, basis of pereiopod 7, male (c). Scales right of fig. 42.

Orchestia gammarellus (PALLAS, 1766)

Material.- 7 males, 18 females. Madeira, sample 91-506: natural freshwater spring at foot of cliff, Lugar de Baixo. Close to the sea, under stones and in mud. 9 Oct. 1991. [ZMA & MMF 25130.]

2 males, 3 females. Madeira, sample 91-508: Fajã da Pedra, cascade of Ladeira da Vinha. In humus along brook, near the sea. 9 Oct. 1991. Together with *Platorchestia platensis*. [ZMA.]

Remarks. DAHL (1967) recorded this species from one Madeiran locality: W. part of Funchal, under stones below the cliff near the shore. The present two records are also close to the sea, but both in purely fresh water.

Genus *Platorchestia* BOUSFIELD, 1982

Platorchestia platensis (KRØYER, 1845)

Material. 6 males, 8 females. Madeira, sample 91-558: Fonte do Geraldo, Ponta de São Lourenço; slightly brackish spring (electric conductivity 1.6 mS/cm) in steep cliff on the south side of the peninsula, near Casa do Sardinha; slowly running; in filamentous algae, less than 100 m from the sea; altitude c. 60 m; 25 Oct. 1991. [ZMA.]

4 females. Madeira, sample 91-508: Fajã da Pedra, cascade of Ladeira da Vinha; in humus along brook, close to the sea; 9 Oct. 1991. Together with *Orchestia gammarellus*. [ZMA & MMF 25128.]

Remarks. This species has been recorded before from Madeira by DAHL (1967), from the mouth of the Ribeira do Faial.

Orchestia monodi MATEUS *et al.*, 1986, from a littoral habitat in S. Miguel (Azores) certainly belongs to the genus *Platorchestia*, as is clear from the incrassate male second antenna, the unarmed dorsal margin of the exopodite of uropod 1, and the number of teeth on the left lacinia mobilis. The illustrations of *P. monodi* look very similar to those of LINCOLN (1979, fig. 101) made from British material of *P. platensis* and of JO (1988, fig. 8) of Danish material, in particular in the shape of gnathopod 2 male, having *one* shallow incurvation in the palmar margin.

Our material from Madeira has *two* shallow incurvations in the palmar margin (see figs. 42-43 in the present paper), like the Mediterranean material illustrated by CHEVREUX & FAGE (1925, fig. 287), West Indian material illustrated by CIAVATTI (1990, figs. 6-8) or New England material illustrated by BOUSFIELD (1973, pl. XLVI fig. 2). However, the merus and carpus of the seventh pereiopod of the male are not

so strongly widened in the Madeiran specimens, compared with the figures in JO, CHEVREUX & FAGE and BOUSFIELD, but this may be due to age differences and have no taxonomic significance.

The conclusion for the moment is that *O. platensis* may be a varyable species, as was already stated by CHEVREUX (1907), but that further study of its variability in necessary.

Genus *Talitroides* BURT, 1934

Talitroides topitotum BURT, 1934

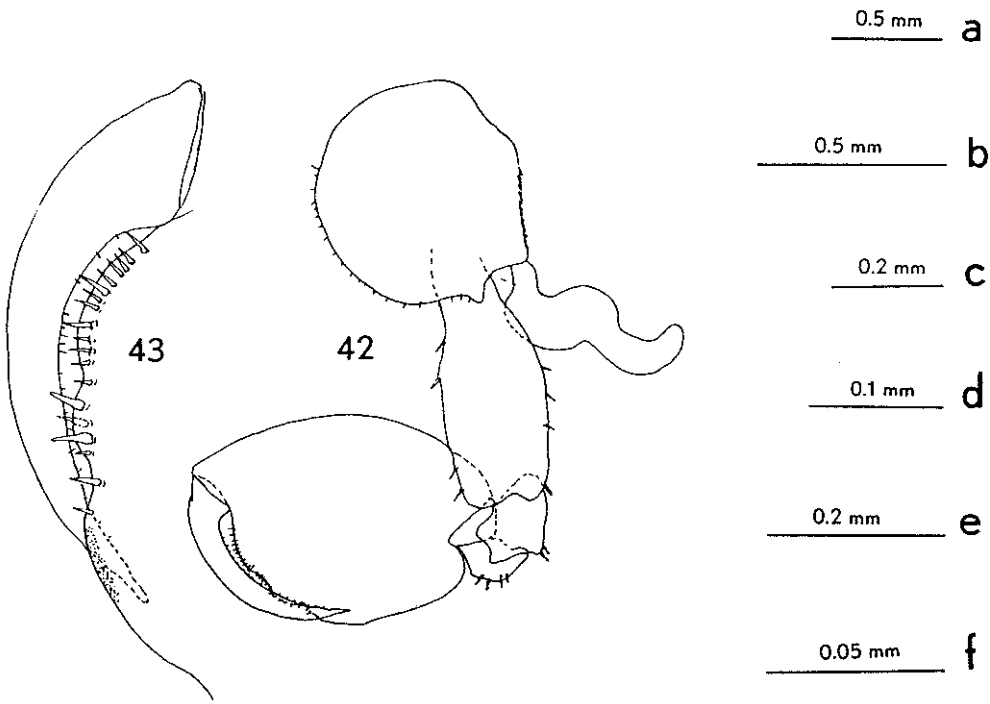
T. topitotum; Bousfield, 1982 [refs.]: 55; Friend & Lam, 1985: 27-33, figs. 1-2 [distribution, synonymy].

Material. 26 specimens. Madeira, sample 92-42: Levada da Central da Ribeira da Janela (= S. of Porto Moniz), UTM coordinates BB ^{2}9725 x ^{36}3605, altitude *c.* 450 m, in wet vegetation near small spring; 28 Apr. 1992 [ZMA].

7 spms., same locality, but 17 Jan. 1992 [MMF].

74 spms., sample 92-21: Fonte do Seixo (= S.E. of Agua de Pena), in wet vegetation along levada, UTM coordinates CB ^{3}3430 x ^{36}1955, altitude *c.* 50 m, 25 Apr. 1992 [ZMA].

Remarks. This species has been already recorded from Madeira by DAHL (1967) under the name of *Talitrus pacificus* HURLEY, 1955, a junior synonym. It is presumably introduced into Madeira, the Azores, and the Canary Islands in soil surrounding exotic plants imported into the Macaronesian islands.



Figs. 42-43. *Platorchestia platensis* (Krøyer, 1845), from Madeira. 42, gnathopod 2, male (scale a); 43, palma and finger of gnathopod 2, male (c).

ACKNOWLEDGEMENTS

The fieldwork for this study was carried out with the aid of a NATO (Brussels) Collaborative Research Grant, contract 880022, to the senior author. Dr. M.J. BISCOITO, Director, and Mr. G. E. MAUL, former Director, of the Museu Municipal do Funchal (Madeira, Portugal) are thanked for their hospitality and efficient assistance during the preparations of the fieldwork. We express our gratitude to Eng°. HENRIQUE COSTA NEVES, Parque Natural da Madeira, for guiding us to the Fonte do Geraldo. The Câmara Municipal da Ribeira Brava is thanked for the permission to visit the Galeria de Levada de Boqueirão. For the loan of some specimens of *Orchestia remyi* we are indebted to Professor SANDRO RUFFO (Verona, Italy). Finally, Mr. J. J. VERMEULEN, University of Amsterdam, is thanked for his assistance in the 1992 fieldwork.

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Received 27.01.1992