

A NEW SUBTERRANEAN CRUSTACEAN FROM SOUTHERN ITALY,
METAHADZIA ADRIATICA N. SP., WITH NOTES ON *HADZIA MINUTA*
RUFFO (AMPHIPODA, GAMMARIDAE)¹⁾

by

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ABSTRACT

A new subterranean amphipod from southern Italy, *Metabadzia adriatica*, is described, and new localities for *Hadzia minuta* Ruffo, 1947, are reported. The morphology of the latter justifies its allocation in the genus *Metabadzia*.

RÉSUMÉ

Un nouvel Amphipode souterrain de l'Italie méridionale, *Metabadzia adriatica*, est décrit, et des nouvelles localités pour *Hadzia minuta* Ruffo, 1947, dans les eaux phréatiques de la région des Pouilles sont signalées. La morphologie de cette dernière espèce justifie l'attribution au genre *Metabadzia*.

During researches, still in progress, on the subterranean aquatic fauna of southern Italy, promoted by the Zoological Institute of the University of L'Aquila (Pesce, 1976; Pesca & Tete', 1978; Pesca et al., in press), a number of hadziid amphipods were collected from brackish wells along the Adriatic Sea and Ionian Sea coasts, and from the cave "L'Abisso" (Otranto, Lecce).

Among these materials some specimens of *Hadzia minuta* Ruffo from the type-locality (L'Abisso cave) and from new localities along the Ionian Sea coast (Porto Cesareo), as well as a new species of the genus *Metabadzia* Stock, 1977, from northern Apulia (Bari), were recognized.

The discovery of the new *Metabadzia* from Italy brings the total number of the species in this genus to four, the others being *M. tavaresi* (Mateus & Mateus, 1972) from subterranean waters of southern Portugal, *M. belladis* Pesca (in press) from phreatic waters of the island of Cephalonia (Greece) and *Hadzia minuta* Ruffo, 1947 which, after critical examination, revealed itself to be a *Metabadzia*.

In the present paper, the description of the new species and the new localities for *M. minuta*, together with remarks on its systematic status, are reported.

Metabadzia adriatica n. sp. Figs. 1-2

Material examined. — Southern Italy, Apulia, freshwater well along the main road Bari-Brindisi, among the houses of Mola, holotype (♀) and one paratype (♂) collected by Pesca, Maggi and Silverii, 9 October 1976.

Holotype and paratype completely dissected and mounted on coverslips in Faure solution are in the collections of the Zoologisch Museum, University of Amsterdam, cat. nr. Amph. 106.436.

Description. — A large (4.1-7.0 mm, excluding uropod 3 and antennae) phreatic species lacking eyes or body pigments. Antenna 1 longer than antenna 2 and about as long as body; peduncle segment 1 shorter than 2; peduncle segment 3 long, 2.5 times the length of first segment of primary flagellum and 0.5-0.6 times the length of second segment of peduncle; primary flagellum with up to 39 segments in female holotype and 43 to 44 segments in male paratype; segments 20 to 39 each with a long aesthetasc.

Accessory flagellum of 2 distinct segments, the distal reduced and about 0.14 the length of the basal one; in male the accessory flagellum is shorter than the first segment of the primary flagellum, in female it is slightly longer than this segment.

Antenna 2, segments 4 and 5 subequal in length; flagellum 11-segmented, armed with numerous setiform elements.

Upper lip regularly rounded.

Mandibles subequal, with well-developed incisor and lacinia mobilis; palp well-developed, first segment 0.85-0.90 the length of the second one; second segment armed with 1 subdistal seta; third segment long, 1.3-1.4 times the length of the second, with unarmed ventral margin and with 3 to 4 long setae apically.

¹⁾ Contributions to the knowledge of the underground water fauna in Central and Southern Italy, XI.

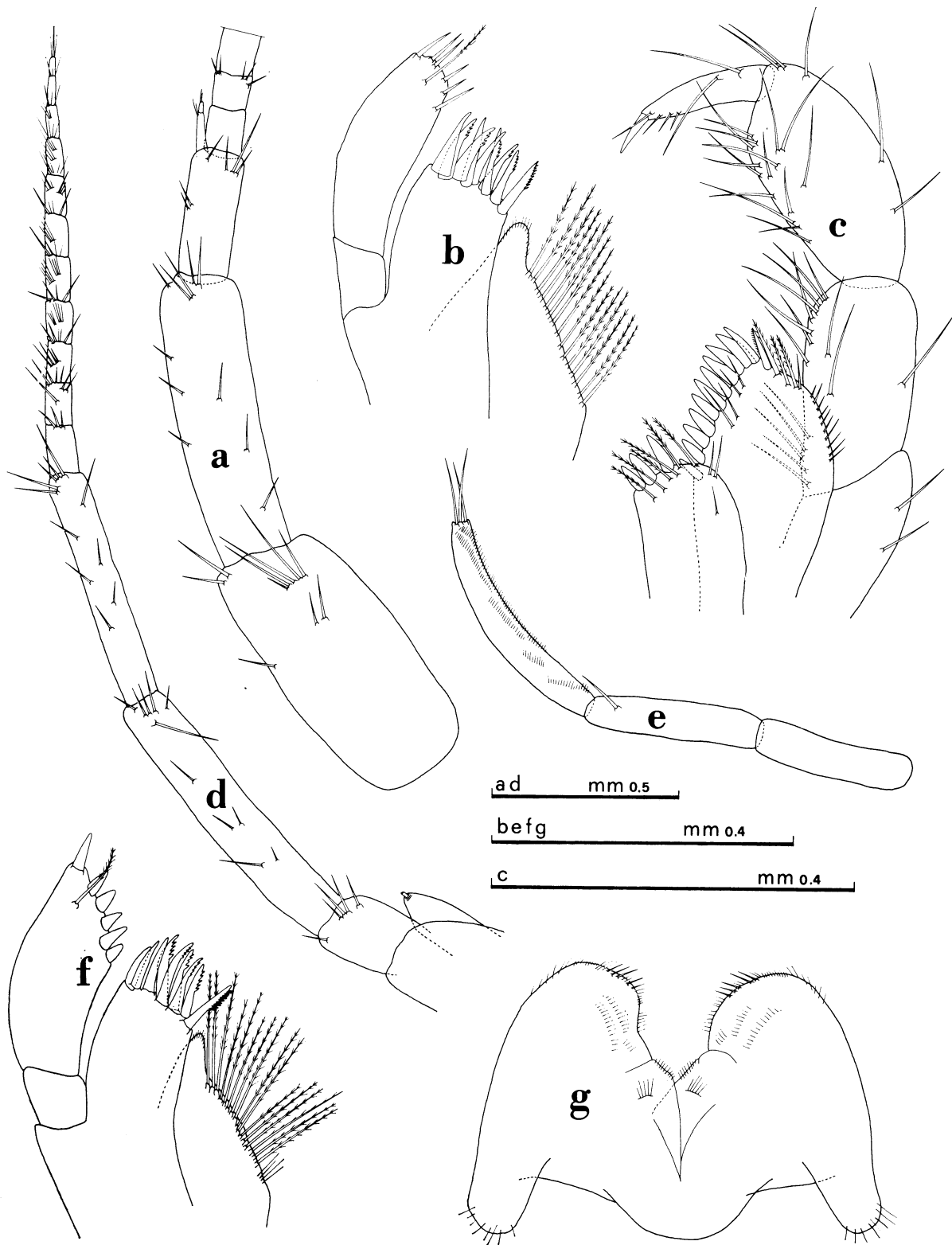


Fig. 1. *Metabadzia adriatica* n. sp. a, first antenna; b, left first maxilla; c, maxilliped; d, antenna 2; e, mandible palp; f, right first maxilla; g, lower lip.

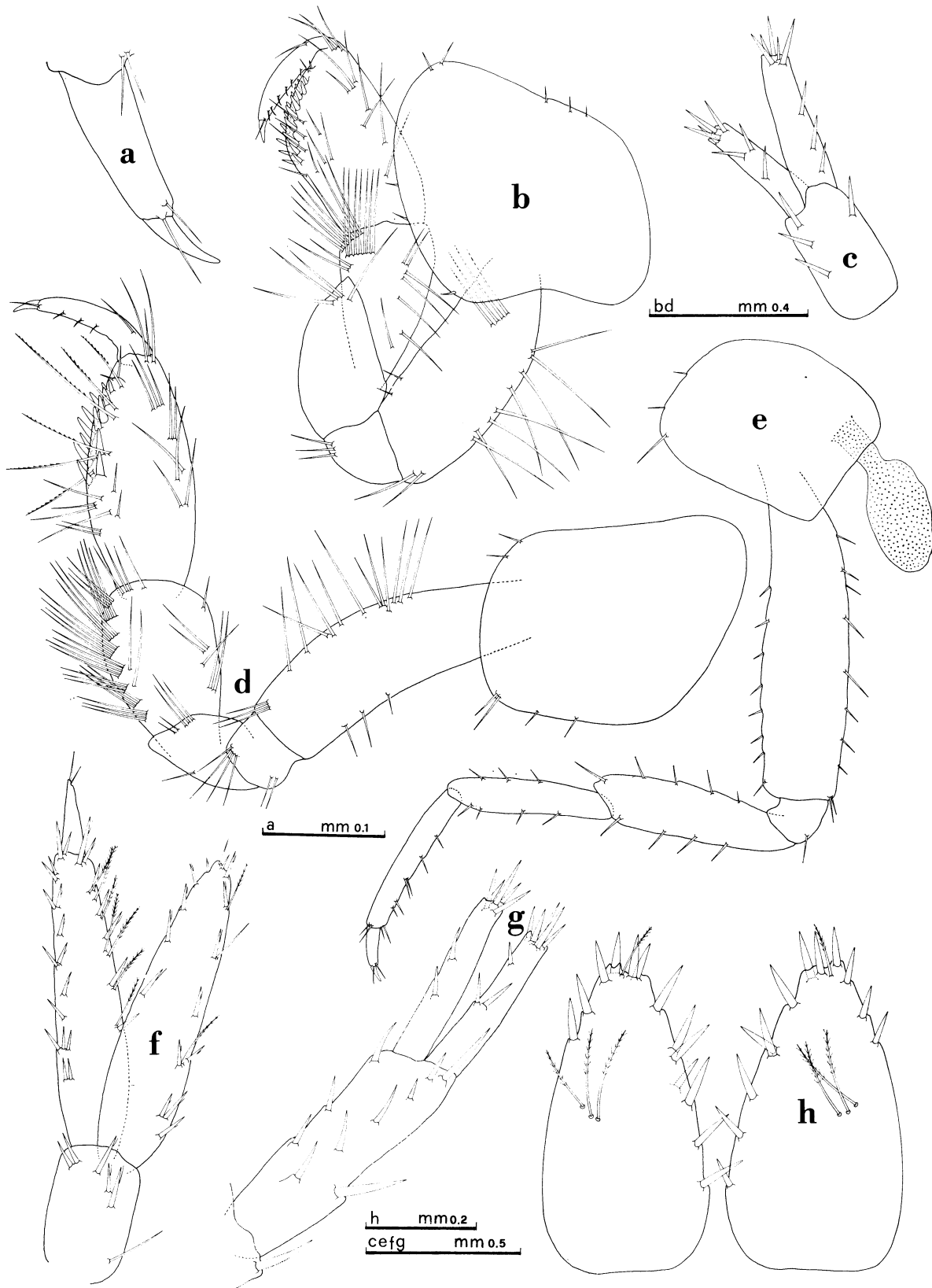


Fig. 2. *Metabazia adriatica* n. sp. a, pereopod 4, dactylus; b, gnathopod 1; c, uropod 2; d, gnathopod 2 ♀; e, pereopod 4; f, uropod 3; g, uropod 1; h, telson.

Maxilla 1: inner plate not rounded in shape but distally produced into a lobe, and armed with 15 to 16 plumose setae on the inner margin; outer plate with 8 to 9 apical, irregularly denticulate, spines; left palp segment 2 large, with 7 distal setae; right palp segment 2 large, with 6 stout spines and 1 distally implanted seta.

Maxilla 2: inner plate with an oblique row of 18 setae on inner margin and numerous plumose setae apically; outer plate with numerous apically naked setae.

Maxilliped: inner plate subapically armed with 3 to 4 blade-like stout spines and a number of setae; outer plate with 12 blade-like spines on inner margin, the outer one dentate, and some setae, three of which plumose; palp segment 3 enlarged and very setulose, segment 4 unguiform, with 2 dorsal and 4 ventral setae, apical nail well-developed.

Lower lip: outer lobes large, lateral processes with some cilia; inner lobes small, distinct.

Gnathopod 1: propod large and long, about 1.15 times the length of segment 5; palm of propod long and inclined (palm index²) = 0.45-0.46), armed with 9 spine-teeth on inside and 9 spine-teeth and 4 setae on outside; posterior margin longer than palm, with numerous setae, 4 distally implanted; nail of dactylus short and with one slender basal seta. Coxal plate 1 broad, margin with 7 to 8 short spines and 2 setae.

Gnathopods 2 sexually dimorph. Gnathopod 2 (♀): propod elongated, 2.21 times longer than large; palm oblique, inclined (palm index = 0.34), armed with 7 spine-teeth on inside, 6 spine-teeth and 8 long setae on outside; posterior margin long, with numerous setae; dactylus with a dorsal seta, a small slender seta at the base of the nail and 3 setules on the inner margin; carpus without marked posterior lamellar expansion and armed on ventral margin with 8 sets of 3 to 5 long setae. Gnathopod 2 (♂) differing from that of the female by the palm of the propod, armed with more inside as well outside spines (22 at all) and by the longer dactylus, which is more than half the palm; coxal plate 2 similar in shape to plate 1, margin with 6 short setae only.

Pereopods 3 and 4 subequal in length; coxal plate 4 subrectangular, without marked posterior emargination. Dactylus of all the pereopods about 1/3 the length of the propod. Bases of pereopods 5 to 7 enlarged (L/1 about 1.35), posterior margins convex, anterior and posterior margins bearing a row of spines and slender short setae, respectively.

Coxal gills small, subovate, with marked stalks. Brood plates of the female holotype small and narrow.

Epimeral plates: posterior margin of 1 and 2 nearly rectilinear, that of 3 convex; posterior corners with 1 or 2 small setae; ventral margin of plates 2 and 3 each with 2 or 3 spines.

Pleopods each with 2 coupling hooks and one small seta on inner margin of the peduncle. Pleopod 3 not sexually dimorph.

Uropod 1 with a well-developed subbasal spine; inner and outer rami subequal in length and shorter than peduncle; peduncle armed with 10 spines, inner and outer ramus each with 8 spines (♀), 10 spines on the outer ramus of ♂. Uropod 2 not sexually dimorph; inner ramus longer than outer ramus and 1.15 times the length of peduncle; peduncle with a spine on inner margin and a row of 3 spines on outer margin; inner and outer ramus each armed with 7 to 8 spines. Uropod 3 short; rami elongated, not much enlarged (L/1 = 4.3-4.8); inner ramus about 0.9 the length of outer one, lateral margin bearing spines and plumose setae; outer ramus 2-segmented, the second segment about 1/4 the length of first, with 2 tiny apical setae; inner margin of segment 1 with spines and plumose setae; outer margin only with sets of 2 to 3 spines; peduncle with 5 spines distally and subdistally implanted, and one slender seta at the base.

Telson cleft to base, with large suboval lobes (L/1 = 1.7-1.8); outer margin of each lobe armed with 3 spines; inner margin armed with 6 to 7 spines; each apex with 3 spines and 1 slender plumose seta; on the middle dorsal margin of each lobe there is a set of 3 plumose setae.

Distribution and ecology. — To date, *Metabaddzia adriatica* n. sp. is known only from its type-locality, i.e. a well near Mola, Bari (southern Italy).

²) Evaluation of palm index according to Ruffo, 1973.

The new species lives in underground phreatic brackish waters, along the Adriatic Sea coast, about 0.5 km from the sea (water level in the well at 6 m; water depth 0.5 m; water temperature 18.5°C; pH 6.9; bottom sediment composed of thin organogenic sandstone, with small fossil remains of Foraminifera, Mollusca and Echinoidea).

In the above well *Metahadzia adriatica* n. sp. lives in association with the following other taxa: Mysidacea (*Spelaeomysis bottazzii*, *Stygiomysis hydruntina*); Isopoda Asellota (*Proasellus coxalis*); ostracods; water mites; turbellarians; gastropods; oligochaetes and some mosquito larvae.

Affinities. — *Metahadzia adriatica* n. sp. quite fits in the genus *Metahadzia* as defined by Stock (1977) and successively emended by Pesce (in press). The new species is close to the other species of the genus, *M. tavaresi* (Mateus & Mateus, 1972) and *M. belladis* Pesce (in press) in the following features: peduncle of antenna 1; armature of the third segment of the mandibular palp; uropod 3 of magniramus-type; lack of swollen lobe of carpus of gnathopod 2; stalked coxal gills.

M. adriatica n. sp. is specifically distinguished from *M. tavaresi* by the ratio between the segments 1 and 2 of the mandibular palp, the morphology of gnathopod 1, the absence of sexual dimorphism in the uropods and, above all, by the shape and armature of the telson. It is further distinguished from *M. belladis* by the flagellum of antenna 2, the shape and the armature of gnathopods, the morphology and armature of the uropods and, finally, by the shape and armature of the telson.

Metahadzia minuta (Ruffo, 1947) comb. nov.
Fig. 3

Hadzia minuta Ruffo, 1947: 178-188; Ruffo, 1957: 51-53.
Metahadzia(?) *minuta* Stock, 1977: 1-130.

Material examined. — Holotype (ovigerous female, 3.5 mm), cave "L'Abisso", Otranto (Lecce), September 1937, coll. Lazzari; topotypes (2 ♀♀, 2 ♂♂ and 2 juveniles), 20 May 1977, coll. Pesce and Maggi; 2 ♀♀, 3 ♂♂ and 3 juveniles, from brackish wells (P. 111-112³) at S. Maria al Bagno, Porto Cesareo (Lecce), 11 June 1976, 20 May 1978, coll. Pesce, Maggi and Silverii.

³) The list of the collecting localities of phreatic fauna in southern Italy (Salentine Peninsula) can be found in Pesce et al., (in press).

Remarks. — The species was described and partially illustrated after a single ovigerous female specimen; later on also males were recorded, which according to Ruffo (1957) did not differ appreciably from the female; in the above description no sexual dimorphism in the pleopods or in the uropods was reported.

Lately, Stock (1977) pointed out that the description as well as the illustrations by Ruffo lacked certain details such as the mouthparts, which were dismissed as "corresponding to the description of Karaman for the other two species of the genus (*H. fragilis* and *H. gjorgjevici*)", and the morphology of the coxal gills. Moreover, the same author suggested that *H. minuta* presumably could belong to the genus *Metahadzia* on account of the morphology of the peduncle of antenna 1, the armature of the third segment of the mandibular palp and the absence of a swollen lobe on the carpus of gnathopod 2.

Since the original description and illustrations are little detailed, a few additional notes on the morphology of the species are necessary.

Antenna 1. Third peduncle segment very long, longer than half the length of the peduncle segment 2; accessory flagellum reaching half the length of the first segment of the main flagellum in females, overreaching the same segment in males. Main flagellum of 20 to 24 segments.

Antenna 2 quite corresponding to the original description.

Mandible palp 3-segmented, the third segment longer than the others; segment 2 slightly longer than 1, unarmed; segment 3 without ventral setation (lacking D-setae, according to Stock, 1977) and armed with 3 to 4 apical setae only (E-setae, according to Stock, 1977).

Maxilla 1: inner plate with 8 to 10 subapical plumose setae; outer plate with 7 to 8 serrate pectinated apical spines; second segment of right palp with 4 to 5 heavy spines and 1 coarse seta distally, second segment of left palp with 4 slender spines and 1 distal seta.

Maxilla 2 without particulars as compared to that of *Hadzia fragilis* and *H. gjorgjevici*.

Maxilliped, palp segment 4 unguiform, apical nail present and well-developed.

Other mouthparts and gnathopod 1 well cor-

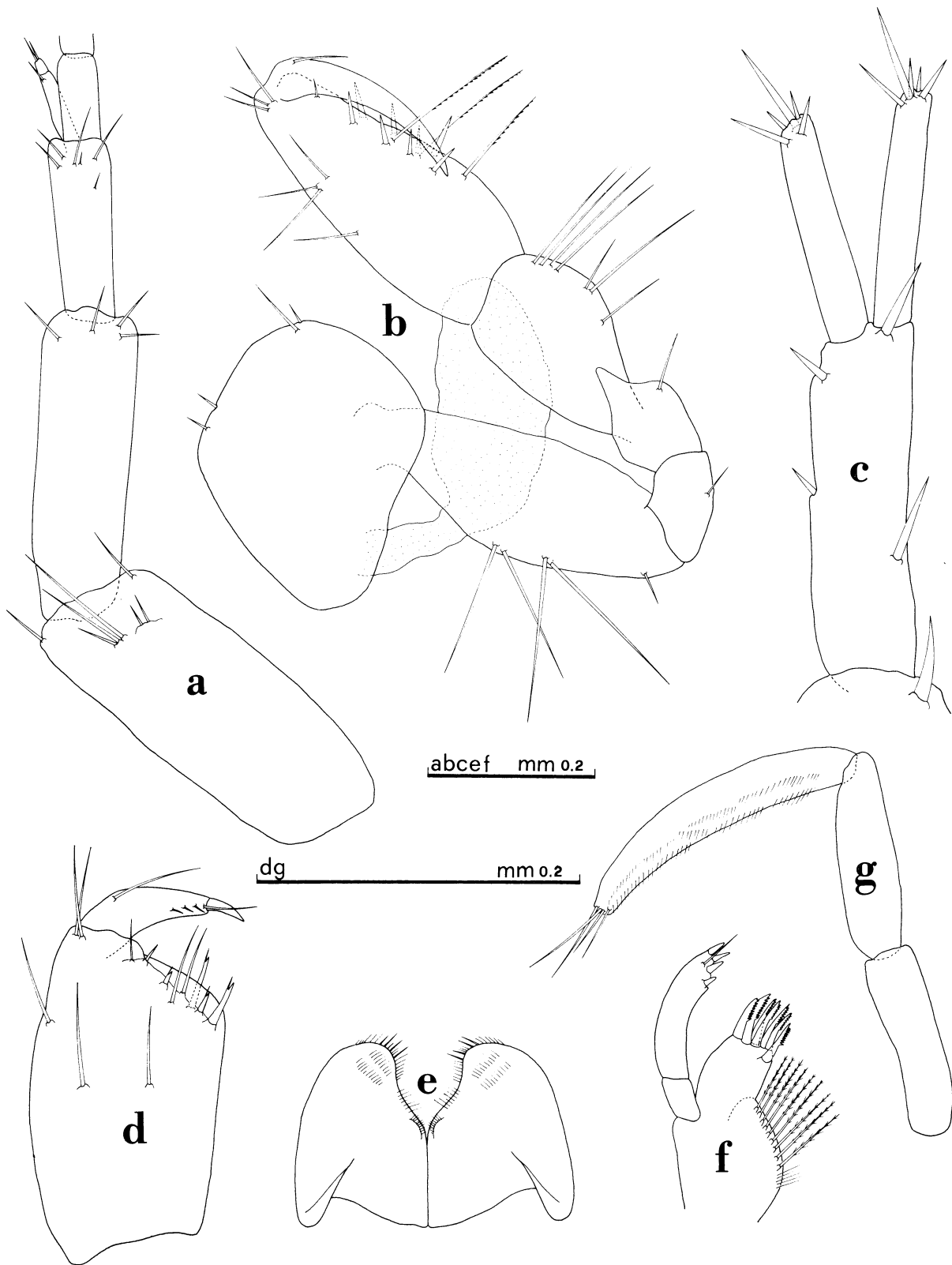


Fig. 3. *Metabadzia minuta* (Ruffo) comb. nov. a, antenna 1, peduncle and accessory flagellum; b, gnathopod 2 ♂; c, uropod 1; d, gnathopod 1, propodus; e, lower lip; f, right first maxilla; g, mandible palp.

responding to the description and illustration by Ruffo.

Gnathopod 2 sexually dimorph. Gnathopod 2 (♀), propod elongated, about 2-2.2 times longer than large; palm oblique, armed with 4 to 5 spine-teeth and some long setae; dactylus with a dorsal seta and a small seta at the base of the nail; carpus without marked swollen lobe, setation marginal. Gnathopod 2 (♂) differing from that of the female by the palm of the propod, armed with more spine-teeth (4 inside and 4 outside) and by the longer dactylus, longer than half the palm.

Coxal gills well-developed, with a marked, long stalk.

Pleopods and uropods not sexually dimorph. Pereopods and telson without particulars as compared to the description and illustration of Ruffo.

Remarks. — The new morphological data provided above necessitate a rearrangement of *H. minuta* at generic level.

As far as I can see, and in agreement with Stock's (1977) concept of *Metahadzia*, the best "fit" of *Hadzia minuta* is in *Metahadzia*, the species differing markedly from *Hadzia* s. str. in the following features: 3rd peduncle segment of antenna 1 long; distal segment of the mandibular palp with distal armature only (versus armature ventrally and distally); lack of naked lobe on carpus of gnathopod 2 and setation marginal (versus light pubescence on the posterior lobe of gnathopod 2 and armature at the insertion of the lobe); stalked coxal gills well-developed (versus gills without well-defined stalks).

On the other hand, *H. minuta* differs from the other known species of *Metahadzia* in many morphological characteristics; particularly it is distinguished from *Metahadzia tavaresi* by the antenna 2, the denticulation of the spines of the maxilla 1, the shape and armature of gnathopods, the uropods 2 being not dimorphous and, at last, by the armature of the telson. From *M. helladis* it differs mainly by the morphology and the armature of the telson. From *M. adriatica* n. sp. it

differs by numerous features, such as the antenna 2, the armature of maxilla 1, the gnathopods, the shape and the armature of the telson, etc.

Obviously the hadziid complex needs much further study and may, pending the discovery of other new forms, require some rearrangements at the generic level, but for the present time I suppose that *Metahadzia* is the best place for *Hadzia minuta*, and in this regard I agree with Stock (1977) attaching great value to the armature of the mandibular palp as well as to the construction of antenna 1 and the gnathopods.

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