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## LIMNIC AND BRACKISH WATER AMPHIPODA (CRUSTACEA) FROM IRAN

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### ABSTRACT

Records of 185 amphipod samples taken in Iran, both in the brackish Caspian Sea and in fresh waters belonging to the Caspian drainage system and the Central Basin. Twenty-nine species are represented (25 Gammaridae, 1 Pontoporeiidae, 1 Gammaracanthidae, 2 Corophiidae), of which 1 species of *Obesogammarus*, and 6 species of *Gammarus* (all from inland waters), 1 species of the new genus *Scytaelina*, and 1 species of *Derzhavinella* (both from the brackish Caspian Sea) are new to science, *Obesogammarus turcarum*, *Gammarus imberbus*, and *G. syriacus* are new to Iranian continental waters, whereas *Gammarus aequicauda* and *Pontogammarus borceae* are new to the Caspian Sea.

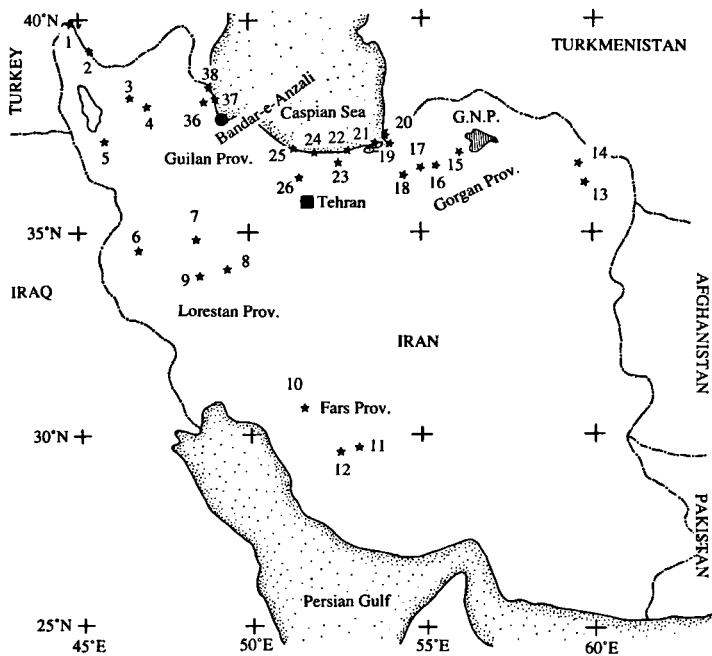
### INTRODUCTION

Under supervision of Dr. Bahram H. Kiabi, an Iranian team brought together a large collection of 185 samples of Amphipoda from Iran. Since our knowledge of Iranian freshwater amphipods was hitherto limited to papers by S. Karaman

(1934), Birstein (1945b), Ruffo (1979), and Pesce et al. (1982), it did not come as a surprise that the collection contained several novelties from inland waters (Map 1), but also from the brackish Caspian Sea itself (Map 2).

The following report is based on this collection. The major part of the material, including

†) Emeritus Professor Jan. H. Stock passed away on 17 February 1997. This manuscript on Iranian amphipods was then in the last phase of completion. It is the product of a long term cooperation with an Iranian team of biologists that had sent their material to Jan Stock's home where he worked on it from 1993 onward. (R.Vonk)



Map 1. Distribution of localities in Iran (scale 1: 11,000,000). 1. Boro-laan spring, 2. Aras dam, 3. Tabriz, 4. Ghoree Gol, 5. Mahabad, 6. Kermanshah, 7. Hamadan, 8. Shazand-e-Arak, 9. Sheikh Miree, 10. Yasooj, 11. Shiraz, 12. Pareshaan, 13. Mashad, 14. Kaarden, 15. Loveh falls, 16. Kalah Zard, 17. Gorgan, 18. Jahan Nama, 19. Bandar-e-Turkaman, 20. Gomeeshan, 21. Ashora deh, 22. Kazar abad, 23. Sari, 24. Babolsar, 25. Bandar-e-Nowshar, 26. Shares-tanak, G.N.P. = Golestan National Park

the type specimens, has been deposited in the Zoölogisch Museum of the University of Amsterdam, but a representative set will be preserved at the Fisheries Research Center of Guilan, Iran.

## SYSTEMATIC DESCRIPTIONS

### FAMILY GAMMARIDAE

#### A. SPECIES RESTRICTED TO CONTINENTAL (FRESH) WATERS OR OCCURRING BOTH IN THE BRACKISH WATERS OF THE CASPIAN SEA AND IN FRESH WATERS

#### Genus *Obesogammarus* Stock, 1974

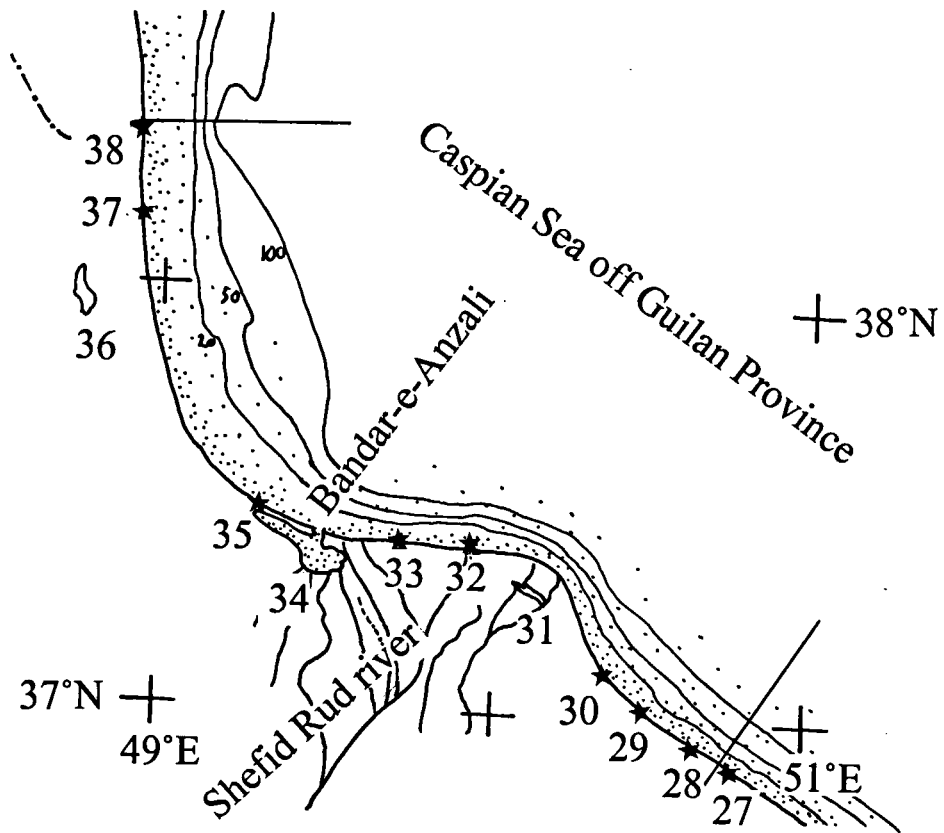
We have reunited *Turcogammarus*, which was split off by Karaman & Barnard (1979), with *Obesogammarus*. The only difference between the two is that the dorsal margin of urosomites 1 and 2 bears knob-like elevations in *Turcogammarus*, and is smooth or humped in *Obesogammarus* (see also Barnard & Barnard, 1983). This, however, is a poor character, since the development of the urosomal knobs in the related genus *Dikerogammarus* is both age-dependant and shows great variability

(see for instance Carausu, 1943: pl. XXI figs. 16-20, and pl. XXII figs. 36 and 38).

Three species of *Obesogammarus* are recorded from Iran.

#### KEY TO THE SPECIES OF *OBESOGAMMARUS* (♂) OF THE WORLD

- 1a. Metasome with dorsomedial keel ..... *O. spandli* (S. Karaman, 1931)
- 1b. Metasome not keeled ..... 2
- 2a. Exopodite of uropod 3 short (< 1.5 times as long as peduncle) ..... 3
- 2b. Exopodite of uropod 3 long (at least twice as long as peduncle) ..... 4
- 3a. Posterior margin of basis of pereopods 5 to 7 and flagellum of antenna 2 with short setae ..... *O. olivianus* (Sowinsky, 1904)
- 3b. Posterior margin of basis of pereopods 5 to 7 and flagellum of antenna 2 with long setae ..... *O. obesus* (Sars, 1894)
- 4a. Basis of pereopod 5 without posteroventral lobe, with excavate posterior margin. Flagellum of antenna 1 shorter than peduncle ..... *O. platycheir* (Sars, 1896)
- 4b. Basis of pereopod 5 with posterodistal lobe, posterior margin straight or convex. Flagellum of antenna 1 longer than peduncle ..... 5



Map 2. Sampling area on the coast of the Caspian Sea, Guilan province (scale 1: 2,200,000). 27 Ramsar, 28 Chaboksar, 29 Kelachy, 30, Roodsar, 31 Ameerkeleyeh wetland, 32 Sefid Rud estuary, 33 Leejarekee, 34 Anzali wetland, 35 Koporchal, 36 Neyr lake, 37 Lemeer, 38 Astara.

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>5a. Urosomites 1 and 2 with highly conical or pillar-shaped dorsal elevations ..... 6</p> <p>5b. Urosomites 1 and 2 with low elevations or flat ..... 7</p> <p>6a. Posterior margin of basis of pereopods 5 to 7 with very short setules. Posteroventral corner of epimeral plate 3 strongly pointed. Exopodite of uropod 3 six times longer than wide ..... <i>O. aralensis</i> (Uljanin, 1875)</p> <p>6b. Posterior margin of basis of pereopods 5 to 7 with long setae. Posteroventral corner of epimeral plate 3 weakly pointed. Exopodite of uropod 3 shorter than six times as long as wide ..... <i>O. turcarum</i> Stock, 1974</p> | <p>7a. Medial and lateral surface of basis of pereiopod 7 with vertical rows of (bunches of) setae. Ventral margin of coxal plate 4 setose ..... 8</p> <p>7b. Medial and lateral surface of basis of pereiopod 7 without vertical rows of setae. Ventral margin of coxal plate 4 almost naked ..... 9</p> <p>8a. Outer lobe of maxilla 1 with 7 spines. Posterior margin of basis of pereiopods 5 to 7 densely setose. Basis of pereiopod 6 slender (1 2/3 times as long as wide). Anterior margin of basis of pereiopod 3 with <i>c.</i> 10 setae. Ventral corner of epimeral plate 3 rectangular ..... 9</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

- ..... *O. setosus* (Schäferna, 1914)
- 8b. Outer lobe of maxilla 1 with 11 spines. Posterior margin of pereopods 5 to 7 less densely setose. Basis of pereopod 6 robust (< 1.5 times as long as wide). Anterior margin of basis of pereopod 3 with 2 setae. Ventral corner of epimeral plate 3 strongly pointed .....  
..... *O. acuminatus* n. sp.
- 9a. Posterior margin of basis of pereopods 6 and 7 almost regularly convex ..... *O. crassus* (Sars, 1894)
- 9b. Posterior margin of pereopod 6 strongly excavate, that of pereopod 7 straight .....  
..... *O. mediodanubialis* (Karaman, 1953)

**Obesogammarus crassus** (Sars, 1894)

*Gammarus crassus* Sars, 1894b: 362-365, pl. XIII.  
*Pontogammarus crassus*; Carausu et al., 1955: 154-158, figs. 118-122 (refs.).  
*Niphargoides (Pontogammarus) crassus*; Birstein & Romanova, 1968: 262, fig. 279 (refs.).  
*Obesogammarus crassus*; Stock, 1974: 83; Barnard & Barnard, 1983: 547.

**Material.**- 1 young specimen, probably this species. Caspian basin, W. of Chaboksar (36°59'00" N 50°34'27"E), 7 July 1993 (mixed with *Pontogammarus maoticus*). 5 Specimens. Khazar abad (36°48'N 53° 16'E), brackish, on gravel, 13 June 1994.

**Remarks.**- *Obesogammarus crassus* is widespread in the Black Sea, Sea of Azov and Caspian Sea, in marine, brackish and fresh waters.

**Obesogammarus turcarum** Stock, 1974

*Obesogammarus turcarum* Stock, 1974: 87-93, figs. 2-6.  
*Turcogammarus turcarum* ; Karaman & Barnard, 1979: 137; Barnard & Barnard, 1983: 545

**Material.**- 43 specimens. Boro Laan spring (Iranian-Turkish border, 39°43'N 44°34'E), 1995. 8 Specimens. Next to Aras Dam (prov. Azarbaijan), 1995.

Many specimens, same locality and date.

**Remarks.**- The tallness of the dorsal elevations on the urosome is, dependant on age and sex, variable, but the present material conforms quite well the type-material, which was collected nearby, viz. in the province of Agril on the

Turkish side of the border between Turkey and Iran.

**Obesogammarus acuminatus** n. sp.

Figs. 1-4

**Material.**- 1 ♂ holotype, 1 ♀ allotype, 83 para-types. Anzali wetlands (mainly fresh water, connected with the Caspian Sea) (c. 37°30'N 49° 25'E), in *Hydrocotyle* vegetation, 18 September 1993. September 1993; many specimens, same locality and various dates in 1993, in mixed vegetation. 36 Specimens, same locality, collected 1995. 18 Specimens Sefid Rud estuary (37°27'N 49°55'E), 1995. 14 Specimens Sefid Rud (c. 37°15'N 49°55'E), 1995.

Many specimens Ameerkeleyeh wetland, 28 March and 20 April 1994. 2 Specimens Ameer abad, 29 May 1994 (37°22'N 50°13'E). 6 Specimens Sari (36°38'N 53°10'E), 13 June 1994.

**Description.**- (unless otherwise stated based on the male): Body length 9-12 mm, females slightly smaller. Antenna 1 somewhat longer than antenna 2, slightly more than one-third of body length. Lateral head lobes rounded; eye elongate reniform, well-pigmented (Fig. 1a). Urosomites 1 and 2 with compressed dorsal elevations ("keeled"); each urosomite dorsally with 2 or 3 spines and 1 setule on either side (Fig. 1b).

Antenna 1 (Fig. 1d) with robust peduncle segments, 16-segmented flagellum, and long, 5-segmented accessory flagellum. Second to penultimate flagellum segments with short aesthetasc. Entire appendage poorly setose.

Antenna 2 (Fig. 1e) with strong, forward pointing gland cone. Peduncle segments 2 to 5 and flagellum with numerous setae, ventral ones long.

Upper lip (Fig. 2a) of usual shape. Pars incisiva of mandible (Fig. 2b) 4-dentate; right pars molaris with long, plumose seta, left with short plumose seta; right lacinia mobilis bifid, finely toothed; left lacinia (Fig. 1d) 4-dentate. Palp segment 3 with 3 A-setae, 2 B-setae, 1 C-seta, 8 D-setae, almost equal in length, and 9 E-setae (Fig. 1c). Lower lip (Fig. 2e) without well-defined inner lobes.

Maxilla 1 (Fig. 2f) with trapezoidal inner lobe, armed with 12 plumose setae; outer lobe with 11

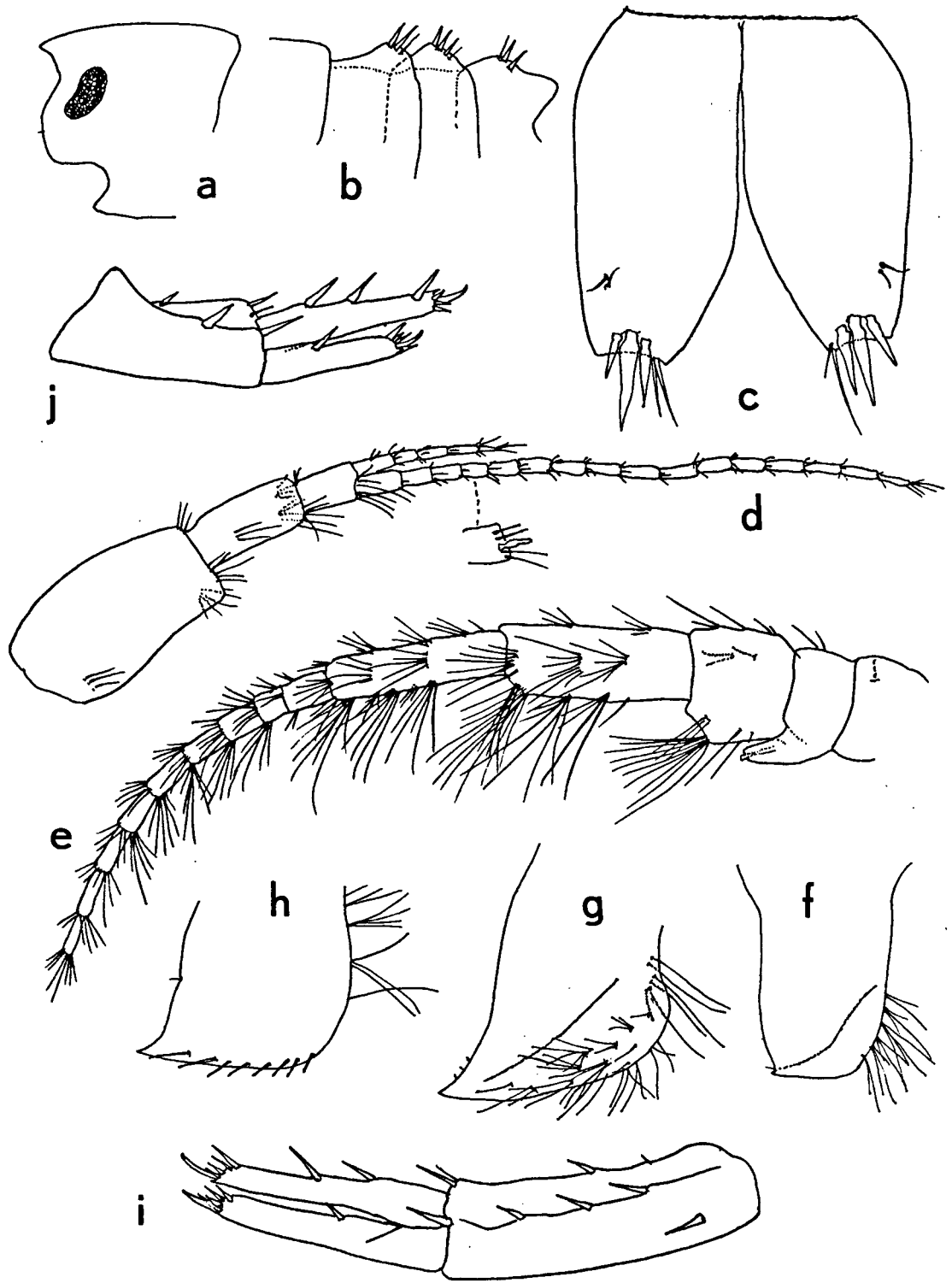


Fig. 1. *Obesogammarus acuminatus* n. sp., ♂. a. head, from the left; b. contour of urosome, from the left; c. telson; d. antenna 1; e. antenna 2 (same scale as d); f. epimeral plate 1; g. epimeral plate 2; h. epimeral plate 3 (f-h same scale); i. uropod 1; j. uropod 2 (same scale as i).

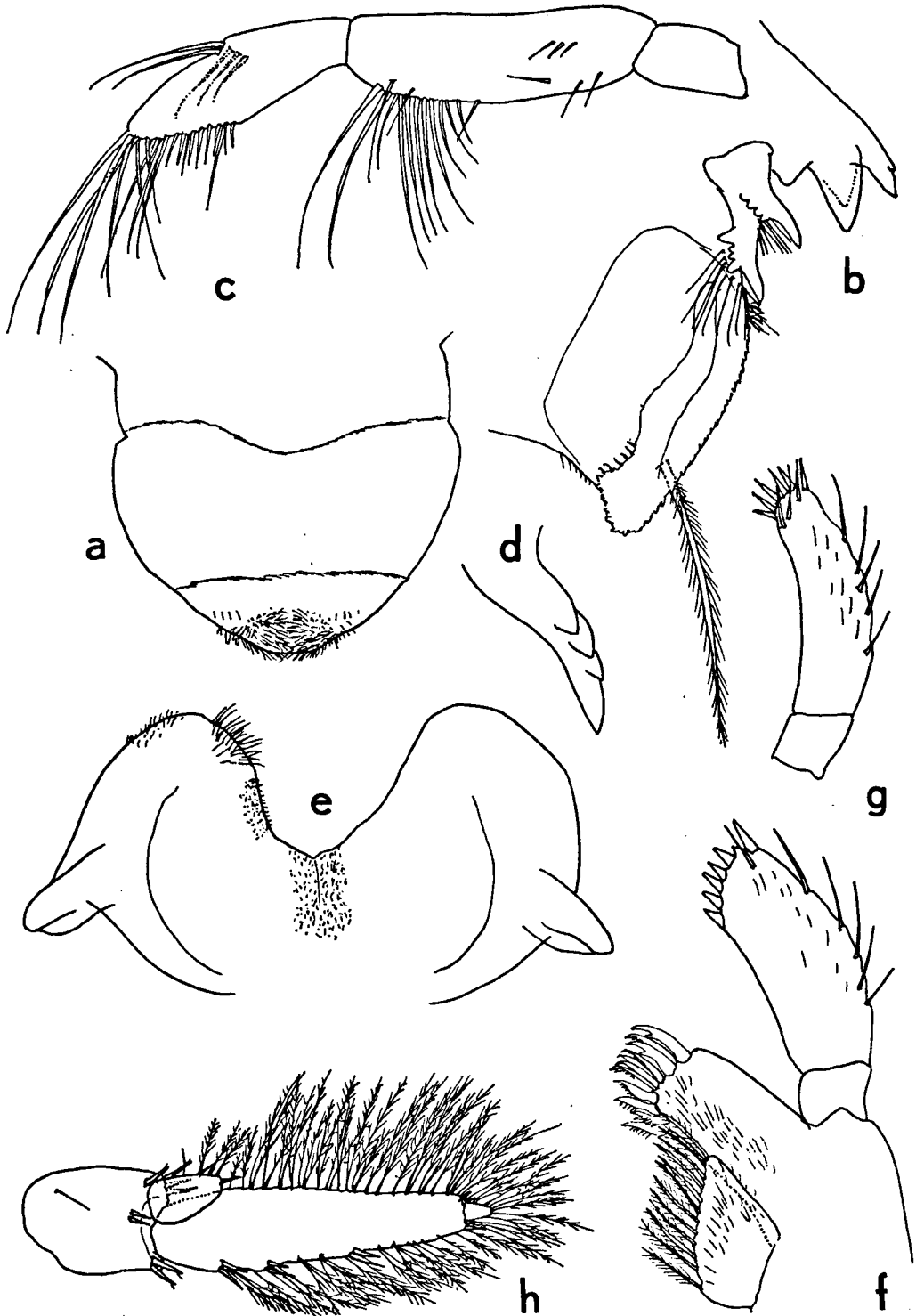


Fig. 2. *Obesogammarus acuminatus* n. sp., ♂. a. upper lip; b. right mandible; c. mandible palp; d. left lacinia mobilis; e. lower lip; f. right maxilla 1; g. palp of left maxilla 1; h. uropod 3 (b, d, e, f and g to same scale).

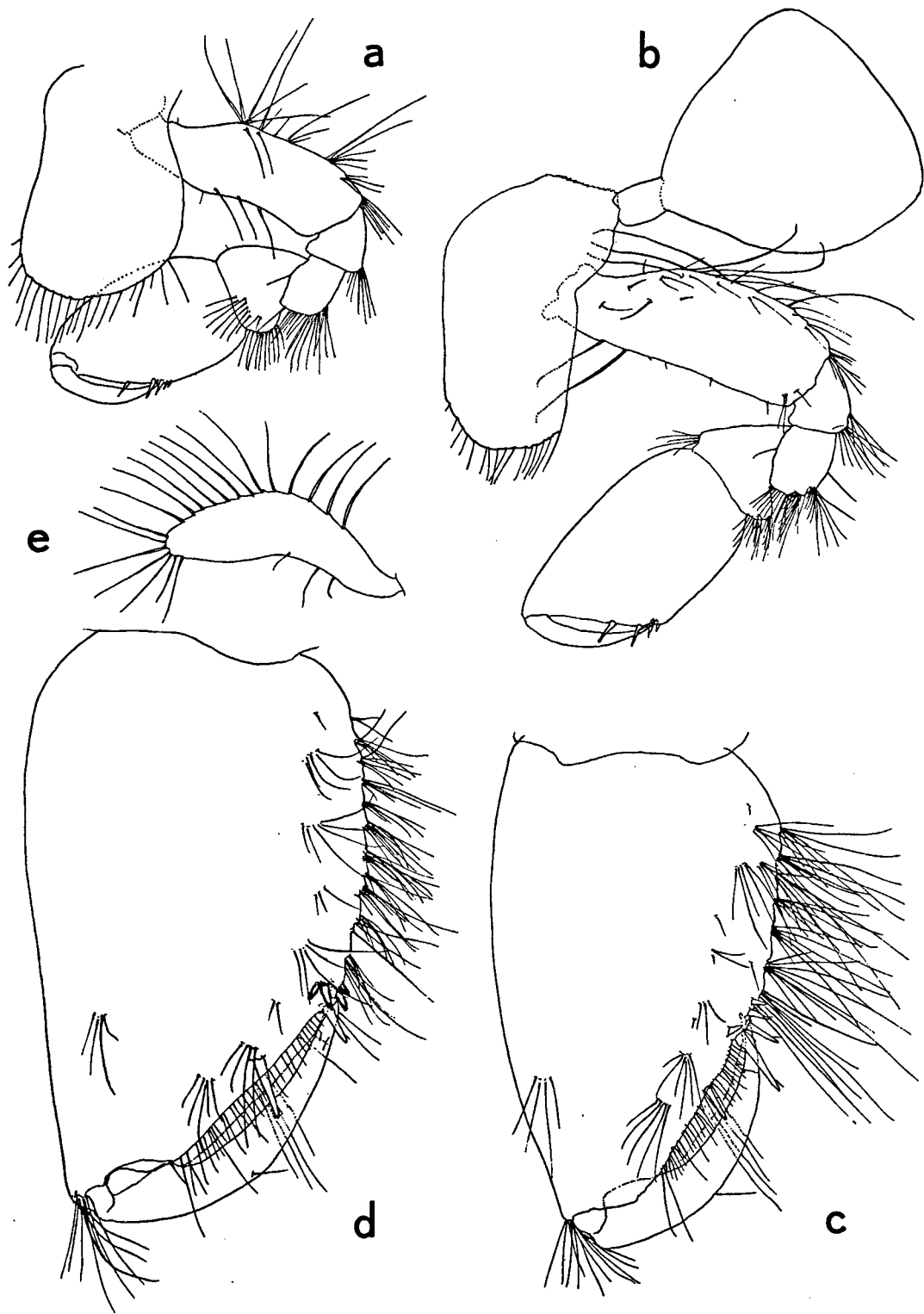


Fig. 3. *Obesogammarus acuminatus* n. sp., a-d: ♂; e: ♀; a. gnathopod 1; b. gnathopod 2 (same scale as a); c. propodus of gnathopod 1; d. propodus of gnathopod 2 (same scale as c); e. oostegite of gnathopod 2.

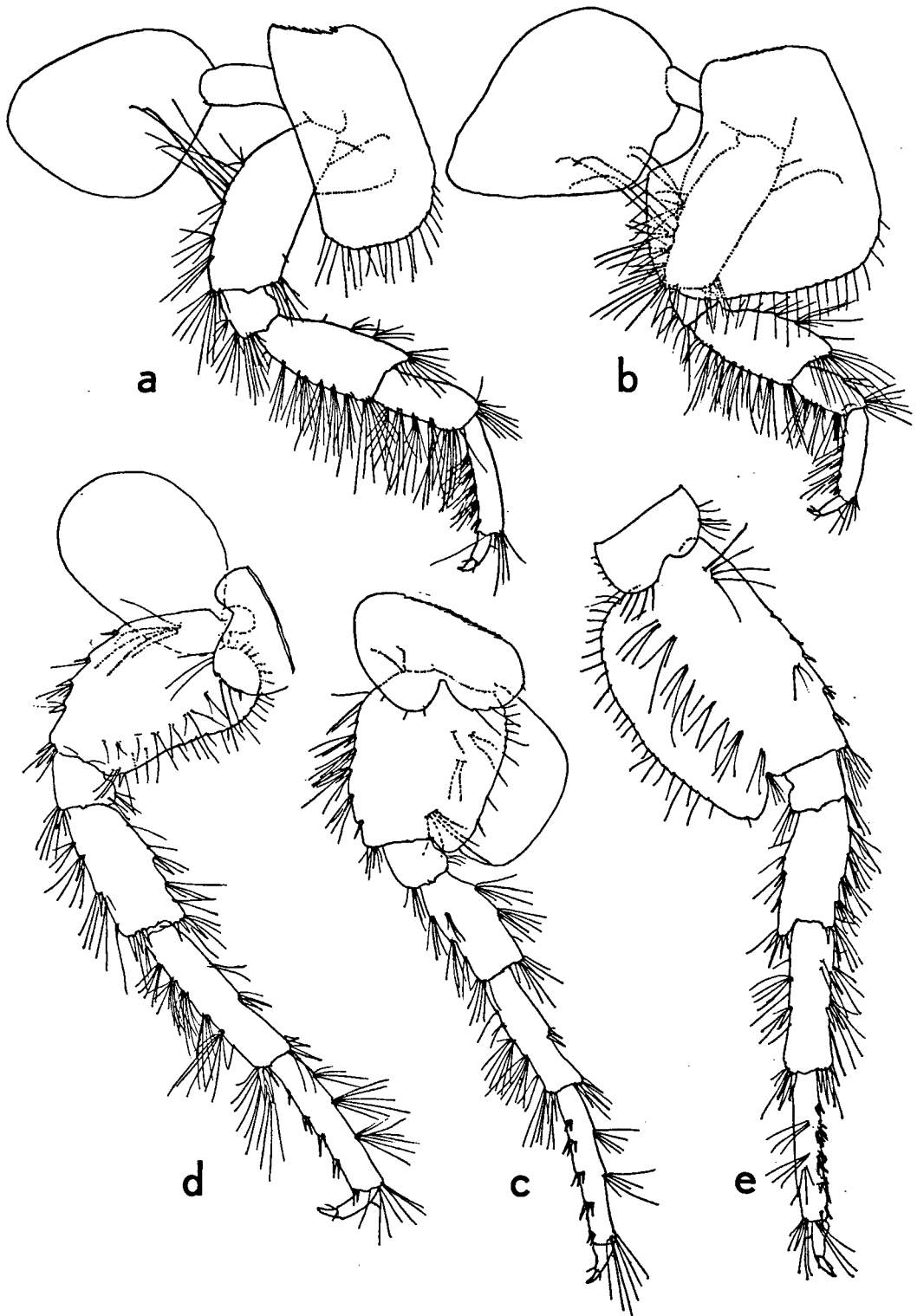


Fig. 4. *Obesogammarus acuminatus* n. sp., ♂. a. pereiopod 3; b. pereiopod 4; c. pereiopod 5; d. pereiopod 6; e. pereiopod 7 (all to same scale).



distal spines, ornamented (from lateral to medial) with 1, 3, 1, 4, 5, 5, 5, 3, 5, 4, and 6 teeth, respectively. Palp asymmetrical: right palp wide, with 6 strong, heavy distal spines and 1 seta; left palp (Fig. 2g) narrow, with 6 weaker, more slender, distal spines and 3 setae; both palps with 5 lateral setae.

Maxilla 2 and maxilliped similar to those of *Pontogammarus borceae* (see Carausu, 1943, pl. XXXIX).

Gnathopod 1 (Fig. 3a): Coxal plate distally slightly widened, rounded, with long ventral setae. Basis with 3 long anterior setae and many posterior setae. Carpus short, triangular. Propodus (Fig. 3c) ovate; 5 palmar angle spines, 1 mid-palmar spine; palmar margin sloping, about as long as free posterior propodal margin.

Gnathopod 2 (Fig. 3b): Coxal plate subrectangular, setose. Basis with 2 long anterior and many long posterior setae. Carpus triangular, slightly lobate. Propodus (Fig. 3d) elliptical; 1 mid-palmar and 5 palmar angle spines; palmar margin less sloping than in gnathopod 1 and shorter than free propodal margin. Propodus of gnathopods 1 and 2 of female smaller, lacking mid-palmar spine.

Pereiopod 3 (Fig. 4a) with rectangular, ventrally setose, coxal plate. Basis with 2 anterior and many posterior setae. Posterior margin of merus, carpus and propodus with 7, 5, and 4 groups of long setae, respectively.

Pereiopod 4 (Fig. 4b) with subquadrate, ventrally setose, coxal plate, posteroproximal emargination distinct. Posterior margin of merus, carpus and propodus with 10, 3, and 3 groups of long setae, respectively.

Pereiopod 5 (Fig. 4c): Coxal plate anterolobate. Basis with produced, slightly overhanging, posterodistal corner; anterior margin with long setae and some spines; posterior margin with short setae; some setae on flat surface. Merus with long setae on both margins. Carpus with long setae on anterior margin only.

Pereiopod 6 (Fig. 4d): Coxal plate posterolobate. Basis with convex posterior margin (degree of convexity variable), setose; posterodistal corner not produced. Armature of remaining segments more or less as in pereiopod 5.

Pereiopod 7 (Fig. 4e): Coxal plate weakly posterolobate. Basis with strongly produced and

overhanging posterodistal corner; posterior margin with numerous short setae; row of groups of long setae on flat surface.

Epimeral plate 1 (Fig. 1f) with setose anterior margin, obsolete pointed; plate 2 (Fig. 1g) with numerous setae in ventral part and on anterior margin, strongly pointed; plate 3 pointed, with long setae on anterior margin and 8 spiniform elements on ventral margin.

Uropod 1 (Fig. 1i): Peduncle with proximoventral spine; exopodite with 1, endopodite with 2 dorsal spines. Uropod 2 (Fig. 1j): Exopodite shorter than endopodite, exopodite with 1, endopodite with 2 dorsal spines. Uropod 3 (Fig. 2h) of parviramous type; exopodite 2-segmented, armed on both margins with groups of numerous plumose setae; distal segment minute.

Telson (Fig. 1c) almost entirely cleft; each lobe with 3 distal spines and 2 setae; 2 dorsal, subterminal, sensorial setules.

Coxal gills balloon-shaped, on gnathopod 2 (Fig. 3b) and pereiopods 3 through 6 (Fig. 4a-d). Oostegites (♀) narrow, though not quite linear (Fig. 3e).

**Etymology.** - The specific name *acuminatus* alludes to the pointed epimeral plates 2 and 3.

**Remarks.** - It is evident from the above key, that *O. acuminatus* resembles most closely *O. setosus* (Schäferna, 1914) from a spring in the Caucasus. For the distinction: see key.

Genus *Pandorites* Sars, 1895

### ***Pandorites podoceroideis* Sars, 1895**

*Pandorites podoceroideis* Sars, 1895: 287-291, pl. XIX; Birstein & Romanova, 1968: 271, fig. 294; Mordukhai-Boltovskoi et al., 1969: 471, pl. XV,4; Barnard & Barnard, 1983: 547-548.

**Material.** - 8 specimens Caspian Sea off Guilan province (37°20'N 50°20'E), depth 100 m, 1992; 16 specimens Caspian Sea off Guilan province (38°18'N 49°15'E), depth 75 m, 1992

**Remarks.** - This species was recorded before from the open waters of the Caspian and Black Seas, depths 3-75 m.

***Pontogammarus maeoticus*** (Sowinsky, 1894).  
Fig. 5.

*Gammarus maeoticus* Sowinsky, 1894:294-306, pls. I-II figs. 1-19.

*Pontogammarus maeoticus*; Carausu, 1943: 108-120, pls. XXXV-XXXVIII (refs.); Carausu et al., 1955: 131-136, figs. 95-100.

*Euxinia fagei* Tucolesco, 1933: 35-41, 19 figs.

*Euxinia maeoticus*; Barnard & Barnard, 1983: 550.

*Niphargoides (Pontogammarus) maeoticus*; Birstein & Romanova, 1968: 265, fig. 285 (refs.).

**Material.**- Very numerous specimens, from 20 different stations, located between 39 km W of Anzali and 10.5 km E. of Anzali (S.W. Caspian Sea, 37°30'N 49°25'E); July-August 1992, Nov. 1992, March-April 1993. Several specimens, Leejarekee (Amir Bekandeh) (37°27'N 49°40'E), 7 August 1993. Many specimens, E. of Roodesar (37°06'N 50°22'E), 10 August 1993. Many specimens, Astara (38°22'N 48°51'36"E), 11 September 1993. Many specimens, Lemeer (38°13'48"N 48°51'36"E), 11 September 1993. Several specimens, W. of Ramsar (36°54'N 50°37'E), 10 August 1993. Many specimens, W. of Babolsar (36°42'N 52°39'E), 7 July 1993. Many specimens, Koporchal (37°34'N 49°15'E), 1 August 1993. 14 Specimens, Kalet-e-Shadi, Kashmar (35°N 58°30'E), 27 July 1993 (in fresh water, in the Central Basin drainage system). 2 Specimens Caspian Sea off Guilan prov. (37°25'N 49°35'E), depth 10 m, 1992. Several specimens Ameer abad (on Caspian coast, 37°22'N 50°13'E), 29 May 1994. Several specimens Khazar abad (36°48'N 53°16'E), 13 June 1994.

**Remarks.**- This is a common species in the present collection. Its distribution covers the Caspian Sea, Black Sea and Sea of Azov. It penetrates far into the limnic reaches.

The shape of the eye is highly variable, ranging from reniform to very elongate (Fig. 5). The length of the inner ramus of uropod 3, the only character on which the genus *Euxinia* is based, varies also to a great extent, so we prefer not to recognize *Euxinia* as a genus distinct from *Pontogammarus*.

*Pontogammarus abbreviatus borceae* Carausu, 1943: 121-133, pls. XXXIV-XLII; Carausu et al., 1955: 143-148, figs. 107-112.

*Pontogammarus borceae*; Barnard & Barnard, 1983: 549.

**Material.**- 56 specimens 3 stations on the shore of the S.W. Caspian Sea, 23-36 km W. of Anzali (37°30'N 49°25'E), 3 and 25 August 1992, collected at the water edge, not really in the water body, in sand continuously moistened by the waves. Many specimens, W. of Chaboksar (36°59'N 50°34'E), 7 July 1993. Many specimens, E. of Chaboksar (36°57'N 50°37'E), 14 August 1993. Many specimens, E. of Kelachy (37°03'N 50°27'E), 10 August 1993. Many specimens, Astara (38°22'N 48°52'E), 11 September 1993. Many specimens, Lemeer (38°13'N 48°52'E), 11 September 1993. Many specimens, Koporchal (37°34'N 49°15'E), 1 August 1993.

**Remarks.**- *Pontogammarus borceae* was originally described by Carausu (1943) as a subspecies of *P. abbreviatus* (Sars, 1894), but was raised to full specific rank by Barnard & Barnard (1983: 549). There can be little doubt, however, that the two are closely related. Using Carausu's (1943: 130-133) table showing the differences, we have decided that our Caspian material comes closer to *P. borceae* than to *P. abbreviatus*. In particular, the shape of the 4th coxal plate (longer than wide), the dorsal armature of the urosome (spines on segment 3 only), the exopodite of uropod 2 (and usually also of uropod 1) devoid of dorsal armature, the almost vestigial 2nd exopodite segment of uropod 3, and the distal armature of the endopodite of uropod 3 (with 1 spine only) correspond closely with *P. borceae*. The distal armature of the telson lobes, used by Carausu as one of the discriminating features, is variable in our material: there may be 2, 3, or 4 distal spines, even in contralateral telson halves of the same individual. Likewise variable is the number of terminal spines on segment 1 of the exopodite of uropod 3.

The mandible palp of *P. borceae*, in particular the shape and armature of segment 3, is highly characteristic (see Carausu, 1943: pl. XXXIV fig. 6). However, the structure of this appendage

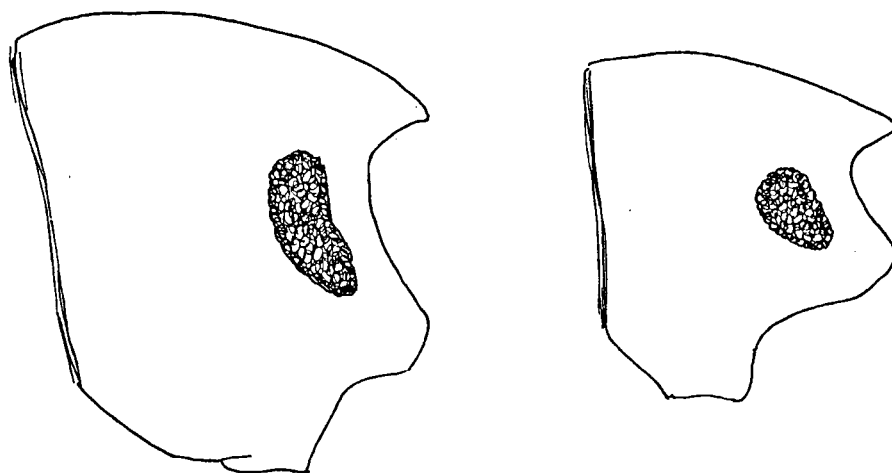


Fig. 5. *Pontogammarus maeoticus* (Sowinsky, 1894). Head of different specimens from the same station, to show the variation in eye size.

in *P. abbreviatus* is unfortunately unknown.

*P. borceae* has only been recorded from the Pontic area (Rumania, Bulgaria, and possibly from the Sea of Azov and the river Volga; see Carausu et al., 1955: 148). It is new to the Caspian basin. In the Pontic area, it is a rheophilous species, but in the Caspian Sea it occurs in the surf zone.

In one locality (W. of Chaboksar) the species was found together with *Obesogammarus maeoticus*, in another (W. of Chaboksar) with *Pontogammarus maeoticus* and *Obesogammarus crassus*.

#### Genus *Gammarus* Fabricius, 1775

This is a predominantly palaeartic genus, being represented with numerous species in the sea, as well as in brackish and fresh waters. Attempts to break up the genus have not found much support. A number of (artificial?) species-groups have been found in Iran, viz. the *G. locusta*-group (only representative in Iran: *G. aequicauda*), the *G. roeseli*-group (only representative in Iran: *G. anodon*), the *G. duebeni*-group (only representative in Iran: *G. lobifer*), and the *G. pulex*-group (with the 10 remaining species). Since these species-groups are weakly defined, they are not used in the following key, but they are indicated in the species descriptions.

#### KEY TO THE IRANIAN SPECIES OF THE GENUS *GAMMARUS* (MAINLY BASED ON ADULT ♂)

- 1a. Accessory flagellum of antenna 1 of 6 or more segments. Antenna 2 ♂ with calceoli. Lateral head lobes acute. Eyes large and elongate. Endopodite of uropod 3 90-99% of the length of first exopodite segment ..... *G. aequicauda* Martynov, 1931)
- 1b. Accessory flagellum of antenna 1 of 6 or less segments. Antenna 2 ♂ with or without calceoli. Lateral head lobes truncate. Eyes small or medium-sized, reniform or elongate-reniform. Endopodite of uropod 3 <90% (usually much less) of length of first exopodite segment ..... 2
- 2a. Peduncle and flagellum of antenna 2 densely setose; setae on proximal part of flagellum (much) longer than length of segments ..... 3
- 2b. Antenna 2 not very setose; setae on proximal part of flagellum about as long as segment length ..... 6
- 3a. Urosomites 1 and 2 with mid-dorsal, triangular, somewhat compressed elevations. Body length up to 23 mm ..... 4
- 3b. Urosomites 1 and 2 only slightly elevated. Body length usually <10 mm ..... *G. komareki* Schäferna, 1922
- 4a. Anterior margin of merus and carpus of pereopod 7 with spines and long setae ... *G. syriacus* Chevreux, 1895
- 4b. Anterior margin of merus and carpus of pereopod 7 with spines only ..... 5
- 5a. Setae on peduncle and flagellum of antenna 2 curved. Telson lobes at most twice as long as wide. Palm of

- gnathopod 2 ♂ short, transverse ..... *G. proiectus* n. sp.
- 5b. Setae on peduncle and flagellum of antenna 2 not curved. Telson lobes more than twice as long as wide. Palm of gnathopod 2 ♂ long, oblique .....  
..... *G. parthicus* n. sp.
- 6a. Dorsal surface of pleosome segments 1 to 3 with rounded carina and finely spinulose ..... *G. anodon* n. sp.
- 6b. Dorsal surface of pleosome segments 1 to 3 neither carinate nor spinulose ..... 7
- 7a. Posterior margin of pleosome segments 1 to 3 crenulate and with small setae implanted in each notch.....  
..... *G. paricrenatus* n. sp.
- 7b. Posterior margin of pleosome segments neither crenulate nor setiferous ..... 8
- 8a. Epimeral plates 2 (and 3) with sharply pointed posteroventral corner ..... 9
- 8b. Epimeral plate 2 with rectangular hind corner ..... 10
- 9a. Telson lobes with several long distal setae. Posteroventral corner of basis of pereopod 7 freely produced. Usually some setae on inner surface of basis of pereopod 7 ..... *G. osselai* Karaman & Pinkster, 1977
- 9b. Telson lobes with some short setae only. Posteroventral corner of basis of pereopod 7 not produced, inner surface of basis smooth ... *G. lacustris* Sars, 1863
- 10a. Endopodite of uropod 3 about half as long as first exopodite segment. Eye elongate reniform, rather large ..... *G. lobifer* n. sp.
- 10b. Endopodite of uropod 3 about 2/3 of length of first exopodite segment. Eye roundish-reniform, small ... 11
- 11a. Dorsal surface of urosome and telson with long setae .  
.....*G. crinicaudatus* n. sp.
- 11b Dorsal surface of urosome and telson with few setae  
..... *G. imberbus* Karaman & Pinkster, 1977

*Gammarus locusta* - group

***Gammarus aequicauda*** (Martynov, 1931)

*Carinogammarus aequicauda* Martynov, 1931: 593-602, figs 28-39.

*Gammarus aequicauda*; Stock, 1967: 45-54, figs. 21-26 (refs.).

*Gammarus aequicaudus*; Barnard & Barnard, 1983: 464 (syn.).

**Material.**- Many specimens collected in the S.E. Caspian Sea, from Gomeeshaan shore (37°05'N 54°00'E) to Bandar-e-Turkman (36°50'N 45°02'E), 20 November 1992, 27 and 29 April 1993, 1 October 1993. Part of the material came from an irrigation or drainage channel

about 1 km from the shore. Many specimens Bandar-e-Gaz (36°45'N 53°55'E), 1993. Many specimens Ashora deh (36°50'N 54°00'E), 1993

**Remarks.**- This is typically a species from mixohaline waters, often found in places with some vegetation. It is known from around the entire Mediterranean basin, the Black Sea and the Sea of Azov, but is was not recorded before from the Caspian area.

*Gammarus roeseli* - group

***Gammarus anodon*** n. sp.

Figs. 6-9.

**Material.**- 1 ♂ (holotype), 1 ♀ (allotype) and 16 paratypes, ZMA Amph. 201928. Hasheelan wetland (34°28'N 47°00'E), province Kermanshah, 1995.

**Description.**- Maximum length male 12.5 mm, ovigerous female 9.5 mm. Eye black, rather large; head lobes rounded-triangular (Fig. 6a). Dorsal surface of pereionites 6 and 7 and of pleonites 1 to 3 with many small spinules and a low, rounded mid-dorsal keel (most distinct on pleonite 3); this keel is not produced into a spiniform process on any body segment (Fig. 6b). Urosomites 1 and 2 with strong, compressed elevation, triangular in outline; setae on urosome about as long as spines.

**Male.**- Antenna 1 (Fig. 6c) slightly less than half the body length; peduncle segment 1 > 2 > 3, very poorly setose; flagellum with up to 30 segments, very poorly setose; accessory flagellum 4-segmented, longer than peduncle segment 3.

Antenna 2 (Fig. 6d) shorter than antenna 1; small groups of short setae on peduncle segments 4 and 5; gland cone tapering into narrow point, overreaching peduncle segment 3; flagellum 12-segmented, with short setae only; no calceoli.

Labrum and labium as illustrated (Fig. 6e and 6i). Mandible palp (Fig. 6f) with smooth first segment; segment 2 with 10-12 ventral setae; segment 3 with A-, B-, D- and E-setae; D-setae decreasing in size in distal direction. Palps of maxilla 1 asymmetric (Fig. 6g, h).

Ventral margin of coxal plates 1 to 4 curved,

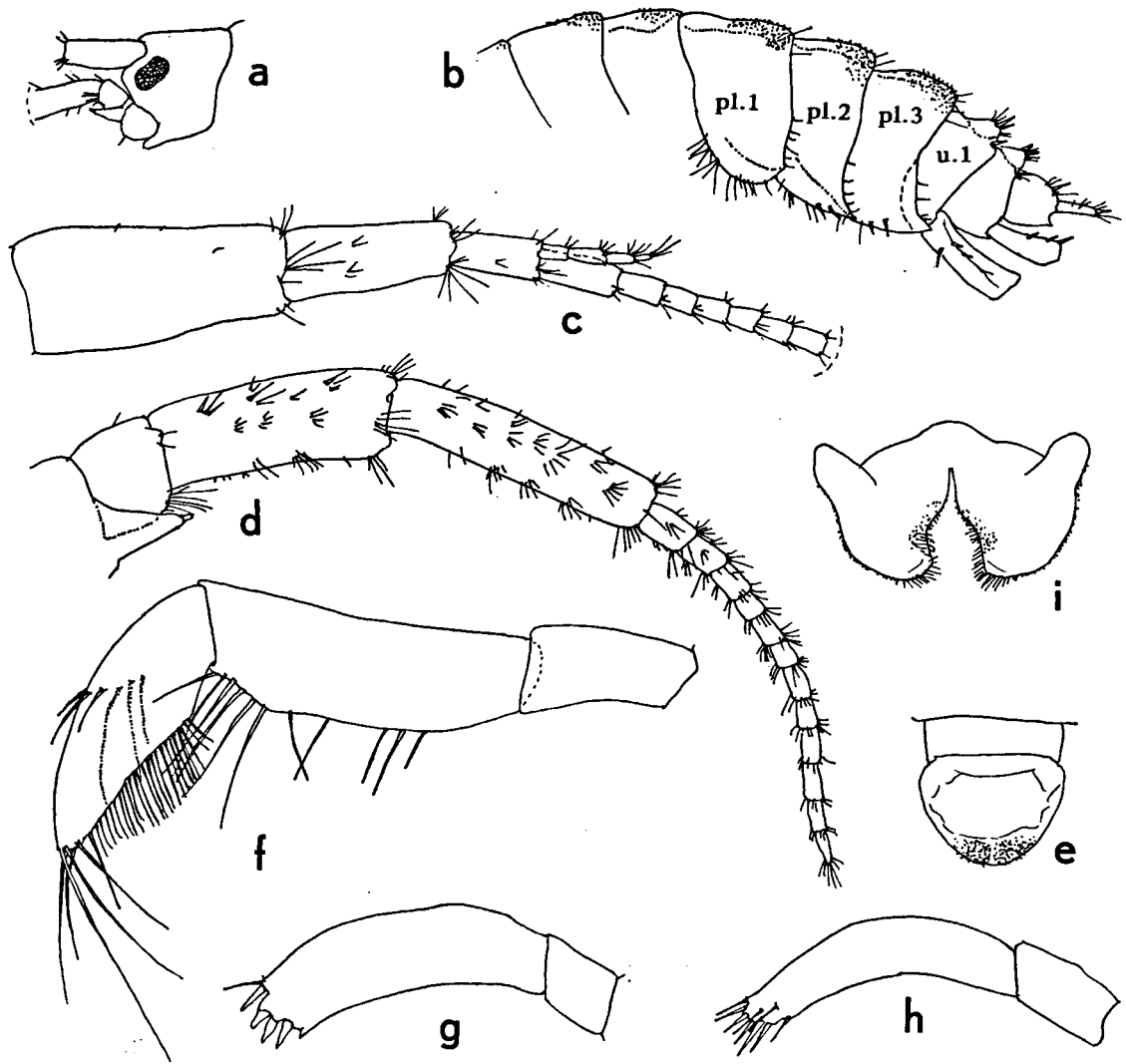


Fig. 6. *Gammarus anodon* n. sp., ♂ paratype. a. head; b. posterior part of body (to same scale as a); c. antenna 1; d. antenna 2; e. labrum; f. mandible palp; g. palp of right maxilla 1; h. palp of left maxilla 1; i. labium [pl. 1-3 = plesomites 1-3; u1 = urosomite 1]. (e, f and i to same scale; g and h to same scale.)

without conspicuous setae. Gnathopod 1 (Fig. 7a): basis with many long setae; propodus ovoid, with 6 pointed palmar angle spines and 1 truncate mid-palmar spine (Fig. 7b). Gnathopod 2 (Fig. 7c): propodus of same length as that of gnathopod 1, but more rectangular in shape, with 3 pointed palmar angle spines and 1 truncate mid-palmar spine (Fig. 7d).

Pereiopods 3 (Fig. 8a) and 4 (Fig. 8c) with setose basis; merus of P3 more setose than that of P4; coxal plate 4 wide, with well-developed pos-

terior emargination.

Pereiopods 5 (Fig. 9a), 6 (Fig. 7e), and 7 (Fig. 9b) with several setae on inner surface of basis. Basis of P5 with produced ventroposterior lobe; basis of P6 rounded rectangular; basis of P7 not projecting, rounded. Merus and carpus of P5-P7 mainly spinose, with few, short setae only. Coxal gills on all pereiopods, balloon-shaped, decreasing in size from anterior to posterior.

Epimeral plates (Fig. 6b) with setae (plate 1) and setae + spines (plates 2 and 3) on ventral

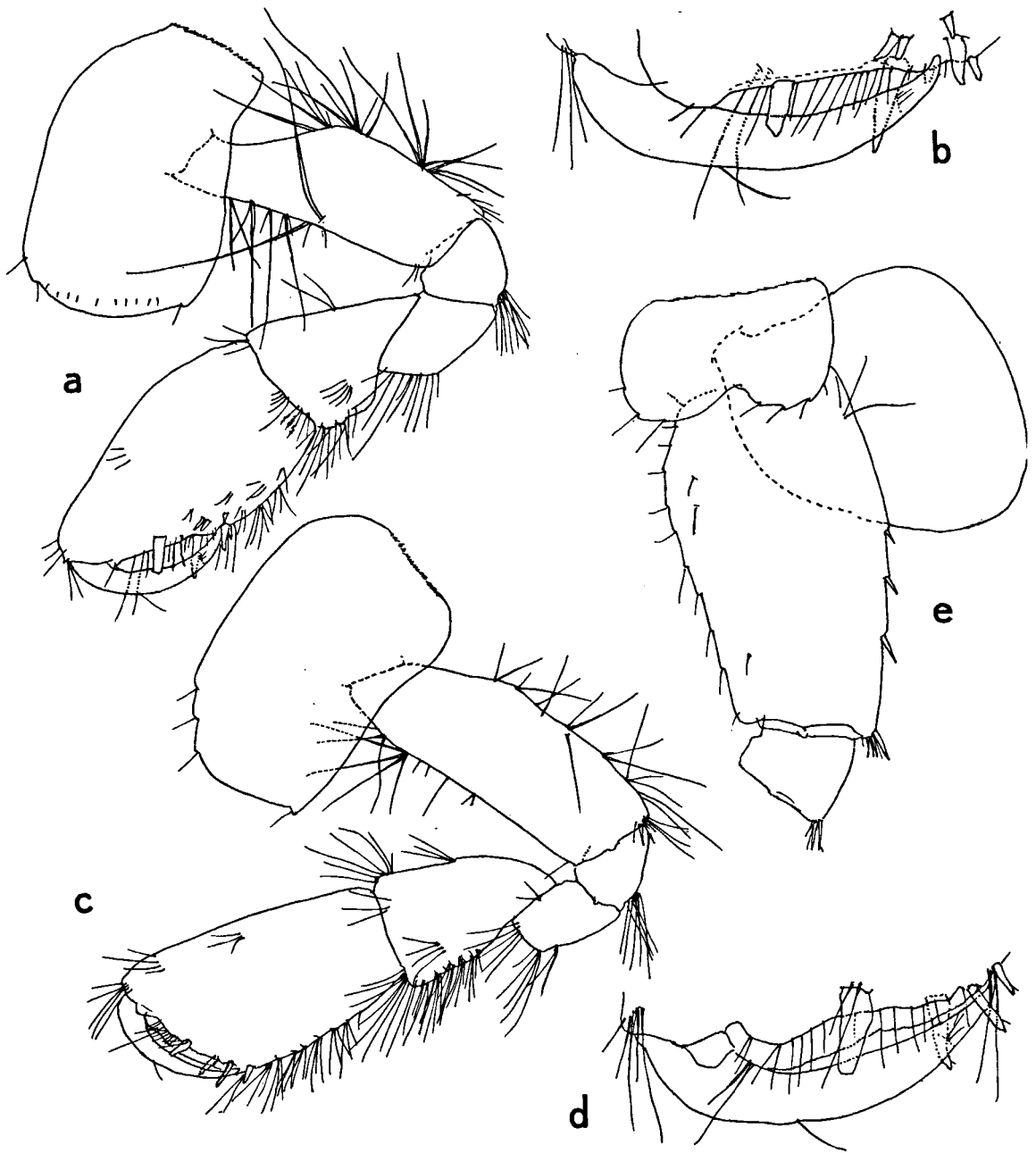


Fig. 7. *Gammarus anodon* n. sp., ♂ paratype. a. gnathopod 1; b. palma of gnathopod 1; c. gnathopod 2; d. palma of gnathopod 2; e. proximal part of pereopod 6 (b and d to same scale; a, c and e to same scale).

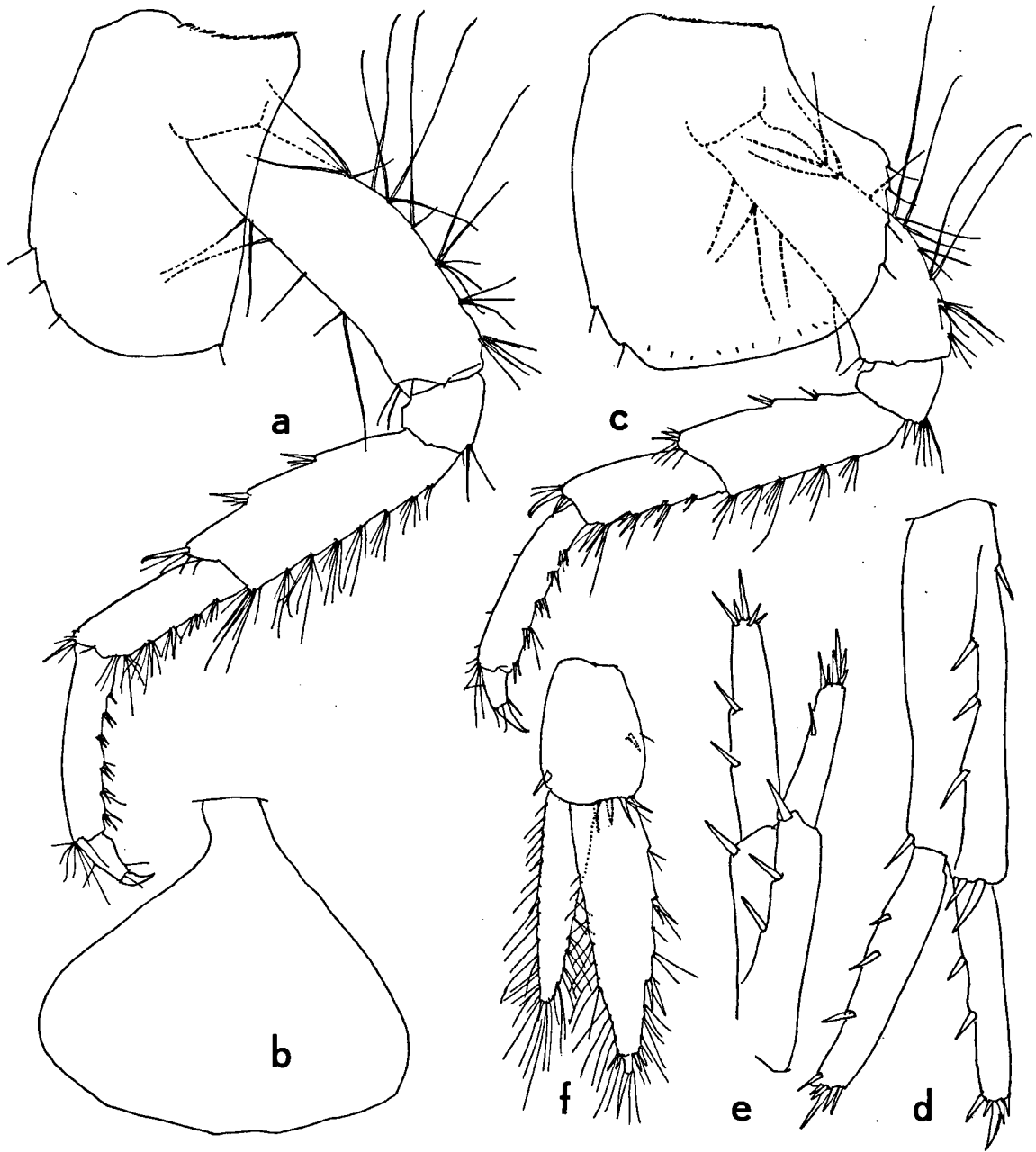


Fig. 8. *Gammarus anodon* n. sp., ♂ paratype. a. pereiopod 3; b. coxal gill of pereiopod 3; c. pereiopod 4; d. uropod 1; e. uropod 2; f. uropod 3 (all to same scale).

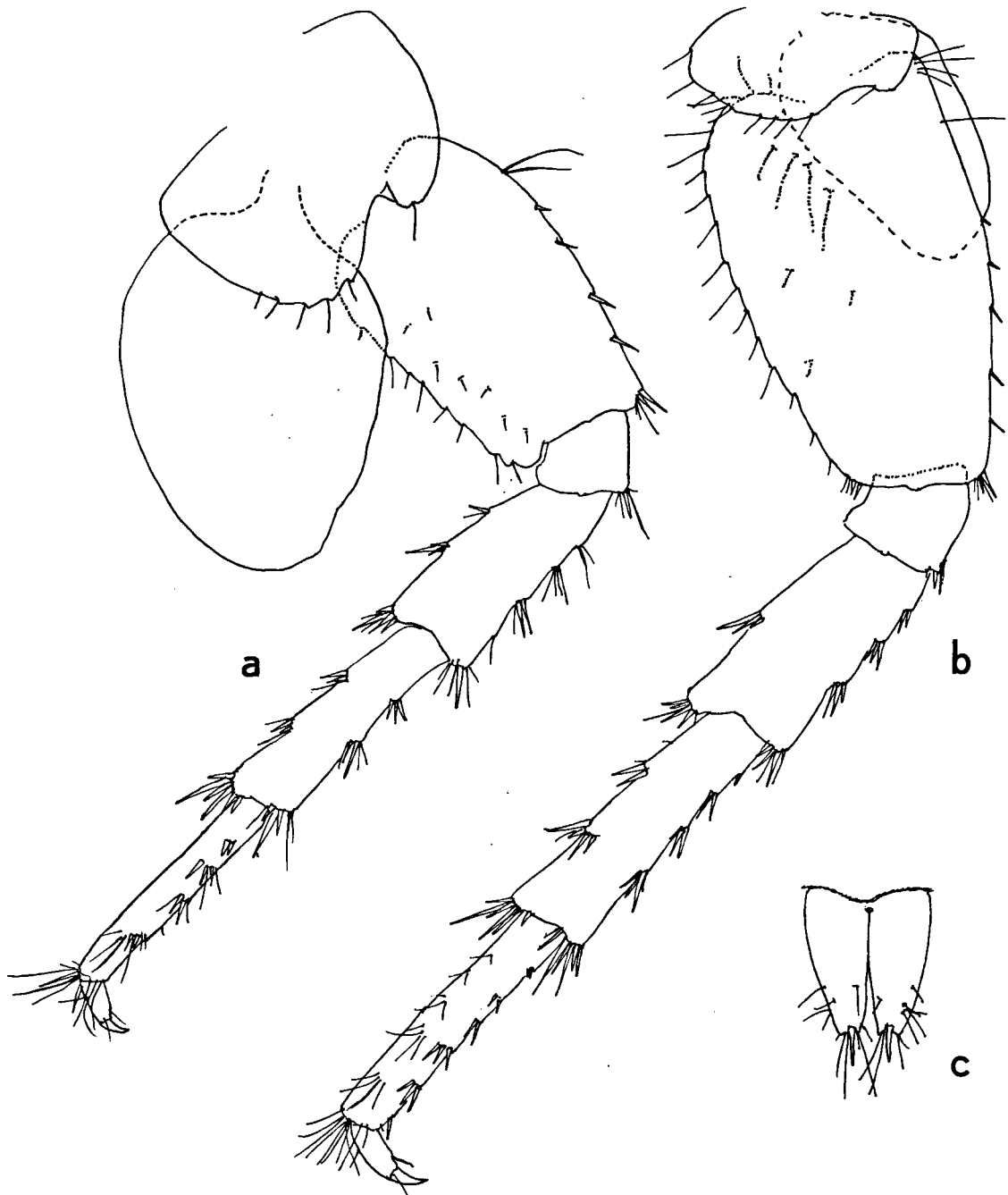


Fig. 9. *Gammarus anodon* n. sp., ♂ paratype. a. pereopod 5; b. pereopod 7; c. telson (all to same scale).



margin; posterior margin with several short setules; hind corner of plates 2 and 3 pointed.

Uropod 1 (Fig. 8d) with ventroproximal peduncular spine. Dorsal surface of rami of uropods 1 and 2 (Fig. 8e) with 1 to 3 spines. Uropod 3 (Fig. 8f): exopodite with small second segment; length endopodite about 80% of length of first exopodite segment; outer margin of exopodite with smooth setae, that of endopodite with mixture of smooth and plumose setae; inner margin of both rami with plumose setae.

Telson lobes narrow (Fig. 9c); armed with only 1 spine in terminal position; several terminal setae, longer than spine; several short lateral setae in distal part of telson lobes.

**Etymology.**- The proposed specific name *anodon* (Greek, meaning without teeth) alludes to the absence of mid-dorsal pointed, tooth-like projections on pereionites and pleonites.

**Remarks** - This is the only *Gammarus* species in the present collection that belongs to the *G. roeseli*-group, a presumably artificial grouping of species characterized by the presence of a more or less developed carina in the mid-dorsal line of the pleosomites (see Karaman & Pinkster, 1977a: 4). The group was fully revised and reviewed by Karaman & Pinkster, 1977b. According to the latter paper, *G. anodon* from Iran is morphologically closest to *G. argaeus* Vávra, 1905 from the Asiatic part of Turkey, with which it agrees in the spiniferous (not setiferous) merus and carpus of pereopod 7, a reduced setal armature of pereopod 4, the presence of long setae on the inner surface of the basis of pereopod 7, and the shape of epimeral plates 2 to 3 and of coxal plates 3 to 4.

The main differences between *G. argaeus* and *G. anodon* (apart from the complete absence of pleosomal teeth in *anodon*, which is a questionable taxonomic character, vide infra) reside in (1) the presence of many spinules on the dorsum of the pleonites in *anodon* (glabrous in *argaeus*); (2) the presence of spinules + setae on the ventral margin of epimeral plates 2 and 3 in *anodon* (spinules only in *argaeus*); (3) the strongly elevated, compressed mid-dorsal humps on urosomites 1 and 2 in *anodon* (slightly elevated, not compressed in *argaeus*); (4) the gland cone of antenna 2 over-

reaching the end of peduncular segment 3 in *anodon*, just beyond the middle of this segment in *argaeus*).

Armature of the dorsum of the pleosomites: The pleosome of all species of the *roeseli*-group is dorsally keeled. In many cases the posterior end of the keel is produced into a sharp tooth, but both the number of teeth and their shape can vary strongly (Schellenberg, 1943; S. & G. Karaman, 1959; Karaman & Pinkster, 1977b). A morph in which the pleosomal teeth are "very small...strongly reduced...the second smaller than the first or totally absent" (S. & G. Karaman, 1959: 191) was described by S. Karaman (1929) as *Carinogammarus vardarensis semiarmatus*, but is now (Karaman & Pinkster, 1977b: 170) synonymized with *G. roeseli*. In *G. argaeus*, the size of the teeth can vary also widely (compare fig. 7P in Karaman & Pinkster, 1977b with pl. III fig. 10 in Vávra, 1905). At any rate one or more pleosomal teeth, be it sometimes of small size, are always present in all species of the *roeseli*-group described so far, whereas in *G. anodon* n. sp. only a dorsal keel is present, but teeth are entirely lacking.

#### *Gammarus pulex* - group

#### ***Gammarus crinicaudatus* n. sp.**

Figs. 10-12.

**Material.**- 1 ♂ (holotype), 1 ♀ (allotype), 68 paratypes, ZMA Amph. 201937. Prov. Fars, Zagros region S.E. Shiraz (29°35' N 52°42' E), Oct. 1993. 70 Specimens Prov. Fars, Charon spring (Bamo National Park, 29°40'N 52°45'E), Oct. 1993. 27 Specimens Kaardeh Dam Basin, Hezar Masched, 42 km N.E. Mashad (36°37'N 59°44'E), 1995.

**Description.**- Largest male 15 mm long, largest female 13 mm. Head (Fig. 10a) with truncate lateral lobes; eyes small, but slightly variable, reniform. Urosome flat (Fig. 10b); armed with variable number of spines (common number: 1 lateral + 4 dorsal spines on either side of urosomite 1; 2 lateral + 2 dorsal spines on urosomite 2; 3 lateral and no dorsal spines on urosomite 3); setae longer than spines.

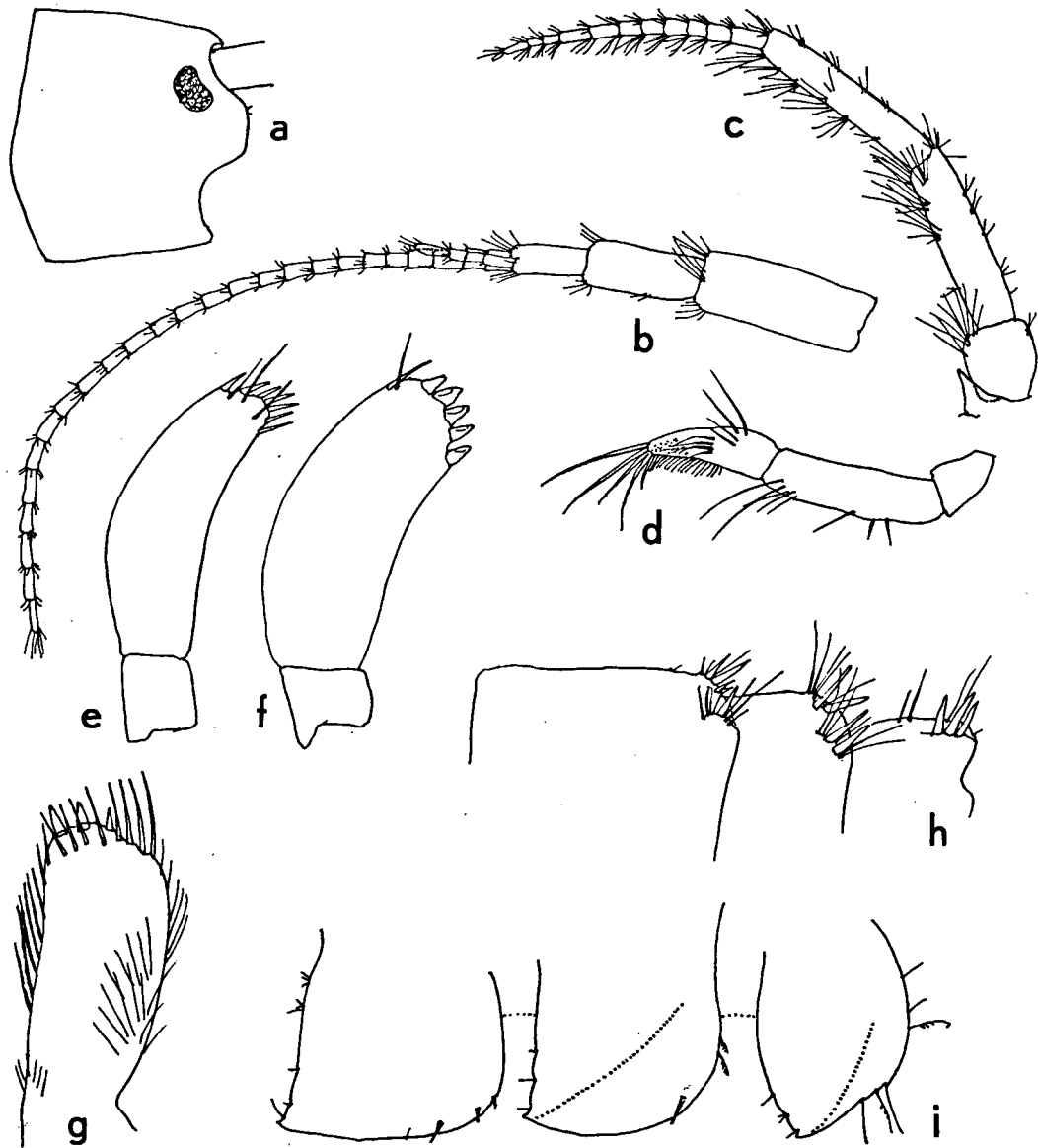


Fig. 10. *Gammarus crinicaudatus* n. sp., ♂. a. head from the right; b. antenna 1; c. antenna 2; d. mandible palp; e. palp of left maxilla 1; f. palp of right maxilla 1; g. inner lobe of maxilliped; h. dorsal contour of urosome, from the left; i. epimeral plates 1 to 3 (a-c, i to same scale, e-g to same scale).

Male: Antenna 1 (Fig. 10b) 7 to 8 mm long; peduncle practically without ventral armature; flagellum 24- to 26-segmented, armed with short setules only; aesthetascs shorter than setules; accessory flagellum 3-segmented.

Antenna 2 (Fig. 10c) much shorter than antenna 1; gland cone pointed, straight; pedun-

cle segments 4 and 5 with 3 and 5 groups of ventral setae, respectively, longest setae slightly longer than diameter of segment; flagellum 11- to 12-segmented, not very setose; no calceoli.

Mandible palp (Fig. 10d) ordinary. Maxilla 1: left palp narrow (Fig. 10e), armed with 7 thin spines + 3 setae; right palp broad (Fig. 10f),

armed with 5 triangular spines + 2 setae; lateral spines on outer lobe with 1-3 denticles, medial spines with 6-8 denticles; inner lobe with about 15 setae. Inner lobe of maxilliped narrow (Fig. 10g).

Coxal plates 1-4 with almost naked ventral margin. Gnathopod 1 (Fig. 11 a, b) with egg-shaped propodus; palmar angle with 2 larger and 3 smaller spines; mid-palmar spine present, accompanied by row of 4 smaller spines.

Gnathopod 2 (Fig. 11 c, d) with trapezoidal propodus; 2 palmar angle spines + row of 4 accessory spines; 1 pointed mid-palmar spine.

Pereiopods 3 and 4 with long setae on posterior margin of merus, carpus and propodus (Figs. 12 a, b). Coxal plate 4 with shallow posterior excavation. Pereiopod 5 (Fig. 12c) with subrectangular basis, posteroventral corner freely produced, unarmed, posterior margin with 8 to 10 setules; merus and carpus with spines and setae which are twice longer than spines. Pereiopod 6 (Fig. 12d) with slightly tapering basis, posteroventral corner about as in P5, posterior margin almost straight; remaining segments as in P7. Pereiopod 7 (Fig. 12e): posterior margin of basis slightly convex, posteroventral corner not produced, but usually with 2 subangular setae on inner surface.

Coxal gills stalked, on gnathopod 2 (large, balloon-shaped) and on pereiopods 3 through 7 (progressively smaller, shaped like a pointed egg).

Epimeral plates (Fig. 10i) with some setules on ventral margin (plate 1) or with 1 to 3 spinules (plates 2 and 3); posterior margin with some setules; posteroventral corner weakly pointed.

Uropod 1 with small ventroproximal peduncular spine; rami subequal (Fig. 11f). Uropod 2 (Fig. 11g): exopodite shorter than endopodite. Uropod 3 (Fig. 11h): second exopodite segment minute; endopodite about 75% of length of exopodite; inner and outer margins of both rami with numerous long setae, most of which plumose.

Telson lobes (Fig. 11i) nearly twice as long as wide; armature variable, even in left and right half of same specimen: lateral spines (0 or 1), mid-dorsal spines (1 or 2), terminal spines (usually 2), and considerable number of lateral, dorsal, and in particular distal setae, which are nearly as long as telson, several times longer than spines.

Female: Less setose (especially merus of P3 and P4) than male. Oostegites as illustrated (Fig. 12f). Propodus of gnathopods 1 and 2 (Fig. 12e) without mid-palmar spine, that of gnathopod 2 much smaller than in male. Posterior margin of basis of pereiopods 6 and 7 more convex than in male.

**Etymology.** - The specific name alludes to the numerous long setae on the telson.

**Remarks** - *Gammarus crinicaudatus* presents an embarrassing mix of characters commonly encountered in the genus. There is not a single set of features that characterizes this species. The differences from the taxa found in the Near East and the southern regions of the former U.S.S.R. are listed below. Note that each species may show up in several categories. Two look-alikes, *G. acalceolatus* from NW Africa, and *G. rambouseki* from Macedonia and Greece, are also listed. Judging from the short description, unaccompanied by illustrations, of *Gammarus pulex sovinskyi* by Pliginskij (1930) from a cave in the Crimea, this "morpha" does not belong to the *G. pulex*-group, but to the *G. balcanicus*-group. *G. kesslerianus* Martynov, 1931 (from the Crimea) might be a synonym of *G. komareki* Schäferna, 1922 according to G. Karaman (1969: 40).

Comparison of these species with *G. crinicaudatus* (*G.c.*):

- (1) Eye larger than in *G.c.*: *G. lobifer* n. sp., *G. ocellatus* Martynov, 1933, *G. bergi* Martynov, 1933, *G. nudus* Martynov, 1931.
- (2) Different shape of lateral head lobes: *G. lobifer* n. sp., *G. turanus* (Martynov, 1935), *G. angusticoxalis* (Martynov, 1935).
- (3) Antenna 1 half the body length: *G. bucharensis* (Martynov, 1935), *G. pseudosyriacus* Karaman & Pinkster, 1977.
- (4) Antenna 1 ♂ more "hairy": *G. bergi* Martynov, 1933
- (5) Peduncle segment 2 of antenna 1 subequal to segment 1: *G. acalceolatus* Pinkster, 1971.
- (6) Antenna 2, peduncle segments 4 and 5, not "hairy": *G. chostensis* Martynov, 1932, *G. pseudosyriacus* Karaman & Pinkster, 1977.
- (7) Antenna 2, flagellum, more "hairy": *G. komareki* Schäferna, 1922, *G. kesslerianus* Martynov, 1931

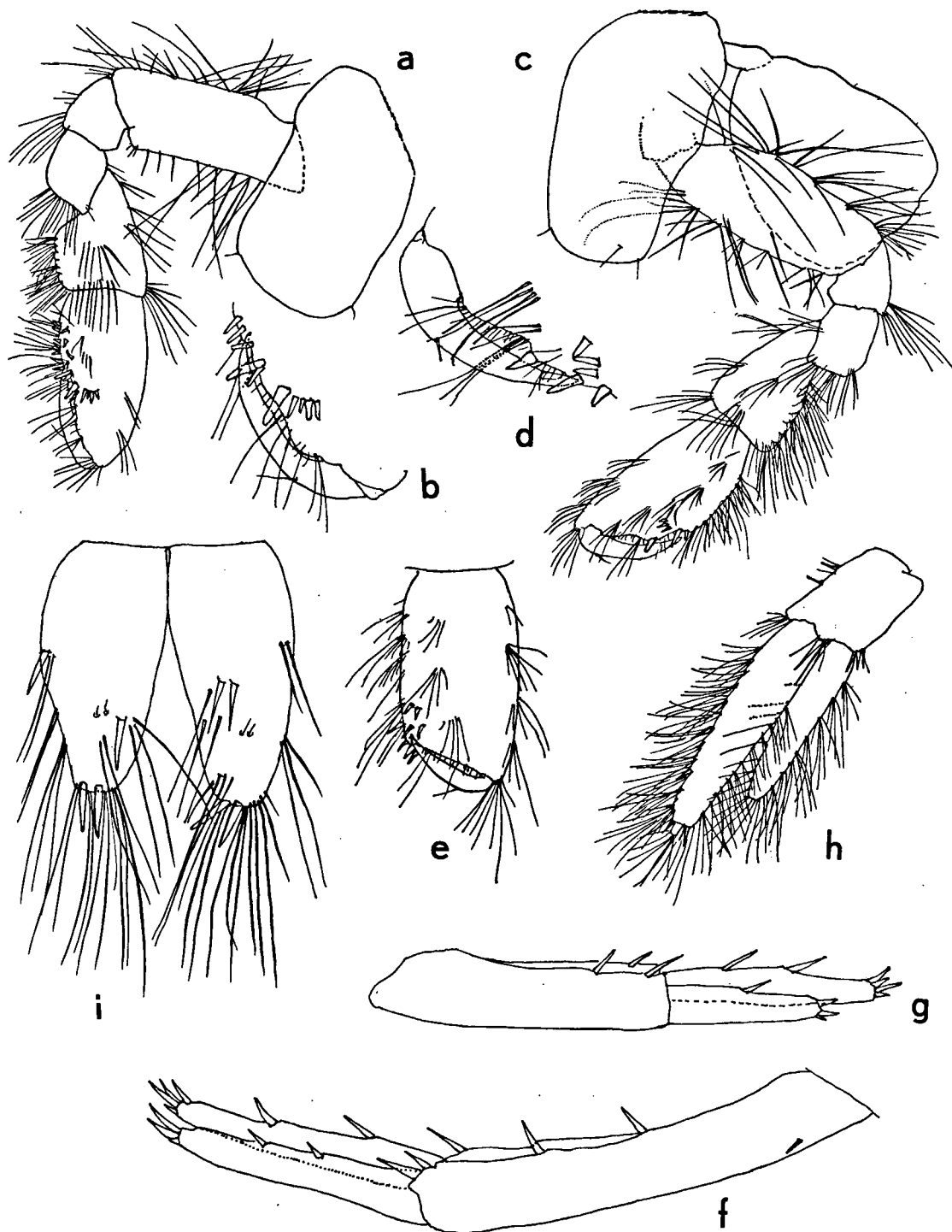


Fig. 11. *Gammarus crinicaudatus* n. sp. a. gnathopod 1 ♂ ; b. palma of gnathopod 1 ♂ ; c. gnathopod 2 ♂ ; d. palma of gnathopod 2 ♂ ; e. propodus of gnathopod 2 ♀ ; f. uropod 1 ♂ ; g. uropod 2 ♂ ; h. uropod 3 ♂ ; i. telson ♂ (a, c to same scale; b, d to same scale; f, g to same scale).

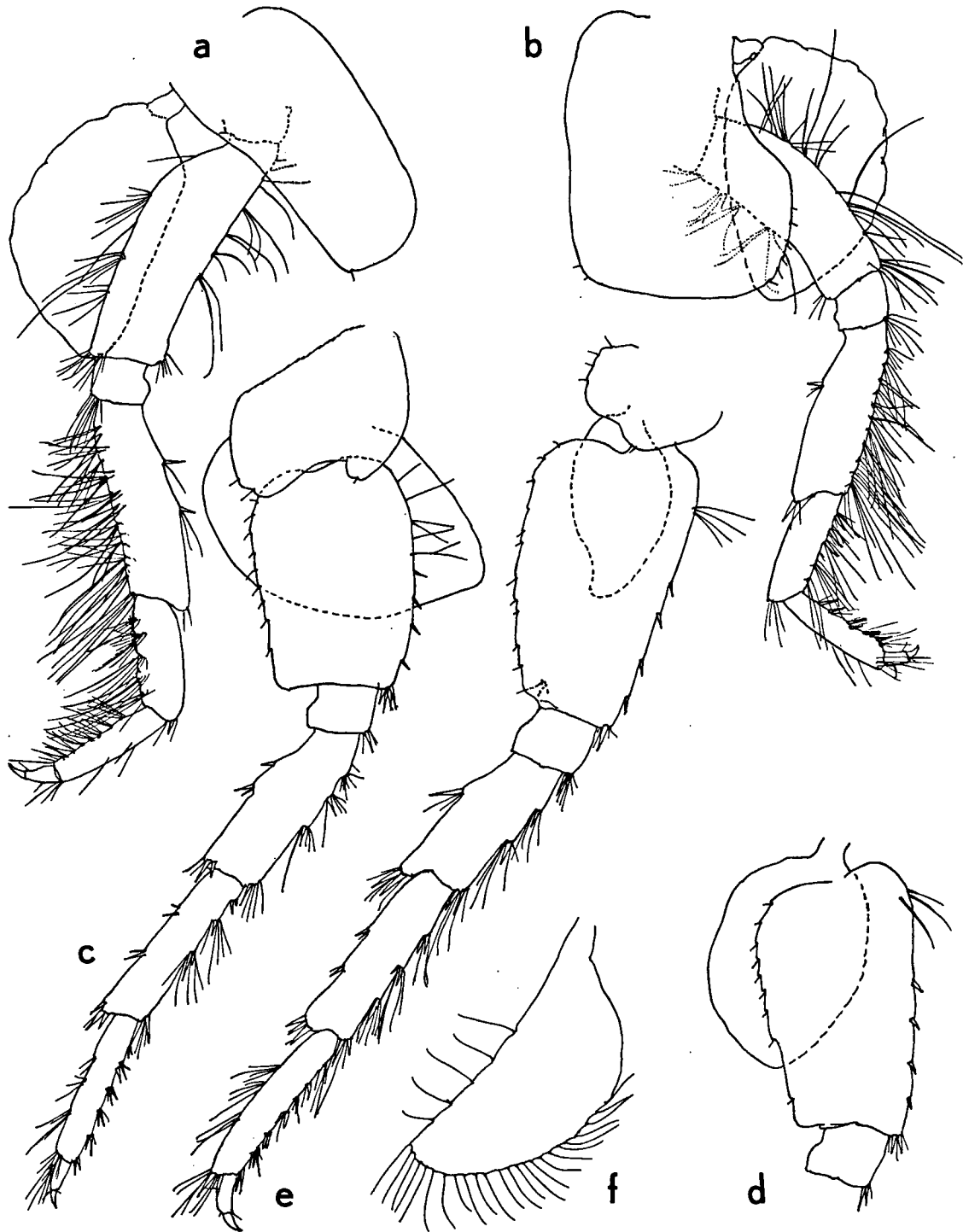


Fig. 12. *Gammarus crinicaudatus* n. sp. a. pereopod 3 ♂; b. pereopod 4 ♂; c. pereopod 5 ♂; d. basal part of pereopod 6 ♂; e. pereopod 7 ♂; f. oostegite of gnathopod 2 ♀ (a-e to same scale).

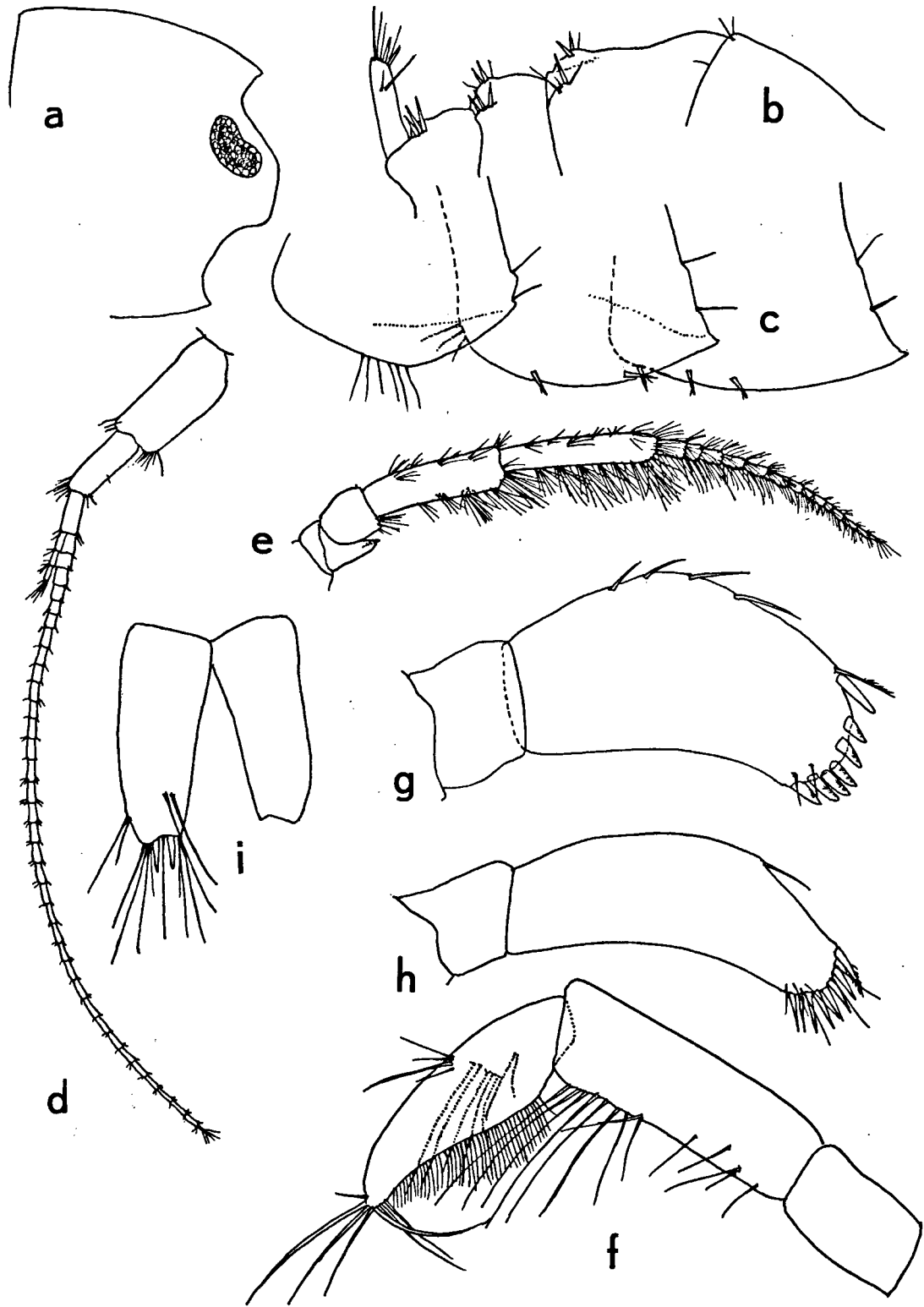


Fig. 13. *Gammarus parthicus* n. sp., ♂. a. head from the right; b. dorsal side of urosome, from the right; c. epimeral plates 1 to 3 (to same scale as b); d. antenna 1; e. antenna 2 (to same scale as d); f. mandible palp; g. palp of right maxilla 1; h. palp of left maxilla 1 (to same scale as g); i. telson.

- (8) Antenna 2 ♂, flagellum with calceoli: *G. caucasicus* Martynov, 1932, some specimens of *G. laborifer* Karaman & Pinkster, 1977, usually *G. syriacus* Chevreux, 1895 and *G. pseudosyriacus* Karaman & Pinkster, 1977, *G. spelaeus* Martynov, 1931.
- (9) Merus and carpus of pereopods 3 and 4 (much) less "hairy": *G. spinulatus* (Martynov, 1935), *G. parthicus* n. sp., *G. proiectus* n. sp., *G. tauricus* Martynov 1931, *G. nudus* Martynov, 1931, *G. spelaeus* Martynov, 1931.
- (10) Shape and/or armature of basis of pereopods 5 to 7 different: *G. subaequalis* (Martynov, 1935), *G. matienus* Derzhavin, 1938, *G. komareki* Schäferna, 1922, *G. syriacus* Chevreux, 1895, *G. pseudosyriacus* Karaman & Pinkster, 1977, *G. kesslerianus* Martynov, 1931, *G. nudus* Martynov, 1931, *G. spelaeus* Martynov, 1931.
- (11) Pereiopod 7 less or not at all "hairy": *G. tauricus* Martynov, 1931, *G. hirsutus* (Martynov, 1935), *G. nudus* Martynov, 1931, *G. brevicornis* (Martynov, 1935), *G. kesslerianus* Martynov, 1931, *G. ocellatus* Martynov, 1933, *G. bergi* Martynov, 1933, *G. crispus* Martynov, 1932, *G. komareki* Schäferna, 1922, *G. parthicus* n. sp., *G. lobifer* n. sp., *G. laborifer* Karaman & Pinkster, 1977, *G. pseudosyriacus* Karaman & Pinkster, 1977.
- (12) Pereiopod 7, posteroventral lobe of basis more strongly developed: *G. lobifer* n. sp., *G. nudus* Martynov, 1931, *G. spelaeus* Martynov, 1931, *G. proiectus* n. sp., *G. acalceolatus* Pinkster, 1971.
- (13) Epimeral plates 2 and 3 with setae on ventral margin: *G. rambouseki* (S. Karaman, 1931).
- (14) Urosomite 1 without spines: *G. crispus* Martynov, 1932, *G. rambouseki* (S.Karaman, 1931).
- (15) Relative length of endopodite of uropod 3 different: *G. turanus* (Martynov, 1935), *G. gracilis* (Martynov, 1935), *G. kesslerianus* Martynov, 1931, *G. hirsutus* (Martynov, 1935), *G. angusticoxalis* (Martynov, 1935), *G. spinulatus* (Martynov, 1935), *G. matienus* Derzhavin, 1938, *G. lobifer* n. sp., *G. tauricus* Martynov, 1931,
- (16) All setae on uropod 3 smooth: *G. rambouseki* (S. Karaman, 1931).
- (17) Fewer or shorter setae on telson and/or urosome: *G. acalceolatus* Pinkster, 1971, *G. spelaeus* Martynov, 1931, *G. syriacus* Chevreux, 1895, *G. pseudosyriacus* Karaman & Pinkster, 1977, *G. laborifer* Karaman & Pinkster, 1977, *G. gracilis* (Martynov, 1935), *G. bucharensis* (Martynov, 1935), *G. araxenus* Derzhavin, 1938, *G. komareki* Schäferna, 1922, *G. parthicus* n. sp., *G. proiectus* n. sp., *G. lobifer* n. sp., *G. nudus* Martynov, 1931, *G. tauricus* Martynov, 1931.

This survey is mainly based on data published in the original and subsequent descriptions. In several cases, these descriptions are wanting sufficient detail, making comparisons difficult.

### **Gammarus parthicus** n. sp.

Figs. 13-16.

**Material.**- 1 ♂ holotype, 1 ♀ allotype, 22 paratypes, ZMA Amph. 201373. Shah zand-e-Arak (= Sarab-e-Abas abad) (33°55'N 49°30'E), 10 June 1991, spring pool in the central Basin drainage system of Iran.

**Description.**- Male: Body length up to 19 mm. Lateral head lobes truncate, with rounded corners; eyes rather small, reniform (Fig. 13a). Urosomites 1 and 2 with dorsally raised, triangular, slightly compressed elevations (Fig. 13b), armed with mid-dorsal group of 2 spines + some short setules, and lateral group of 1 to 3 spines + some setules. Urosomite 3 flat, without mid-dorsal armature, but with lateral group of 3 spines.

Antenna 1 (Fig. 13d) longer than antenna 2, about 60% of body length. Peduncle segments neither long nor slender, shorter than peduncle of antenna 2; segment 1 > 2 > 3; armature very scanty. Flagellum long, 30- to 36-segmented, armed with very short setules only, not compressed. Accessory flagellum 4-segmented.

Antenna 2 (Fig. 13e) with pointed, forward pointing gland cone. Peduncle segments 4 and 5 and 14-segmented flagellum with long, straight setae. No calceoli.

Mandible palp (Fig. 13f) with unarmed first segment. Distal segment falcate, without C-setae;

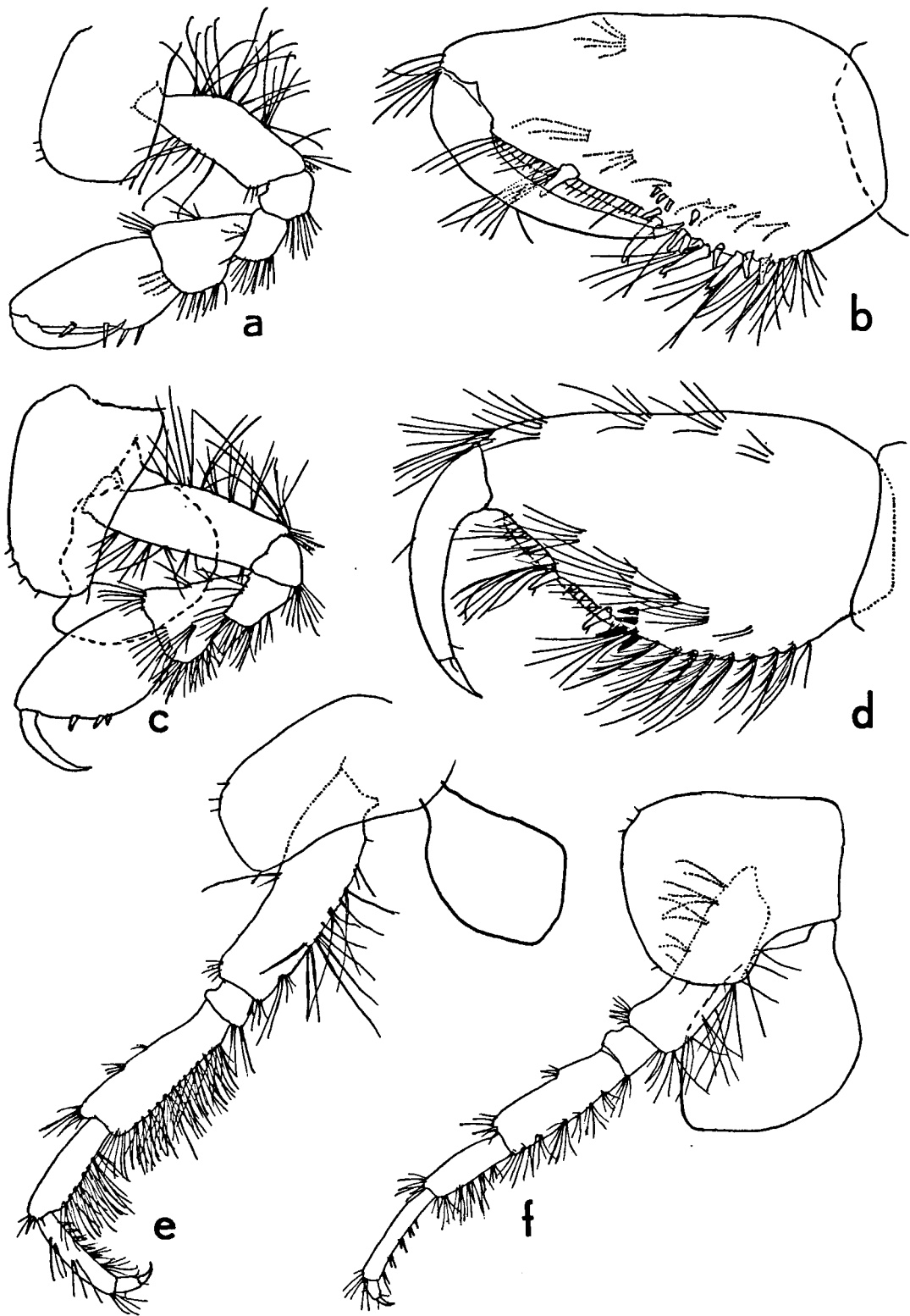


Fig. 14. *Gammarus parthicus* n. sp., ♂. a. gnathopod 1; b. propodus of gnathopod 1; c. gnathopod 2 (to same scale as a); d. propodus of gnathopod 2 (to same scale as b); e. pereopod 3; f. pereopod 4 (to same scale as e).



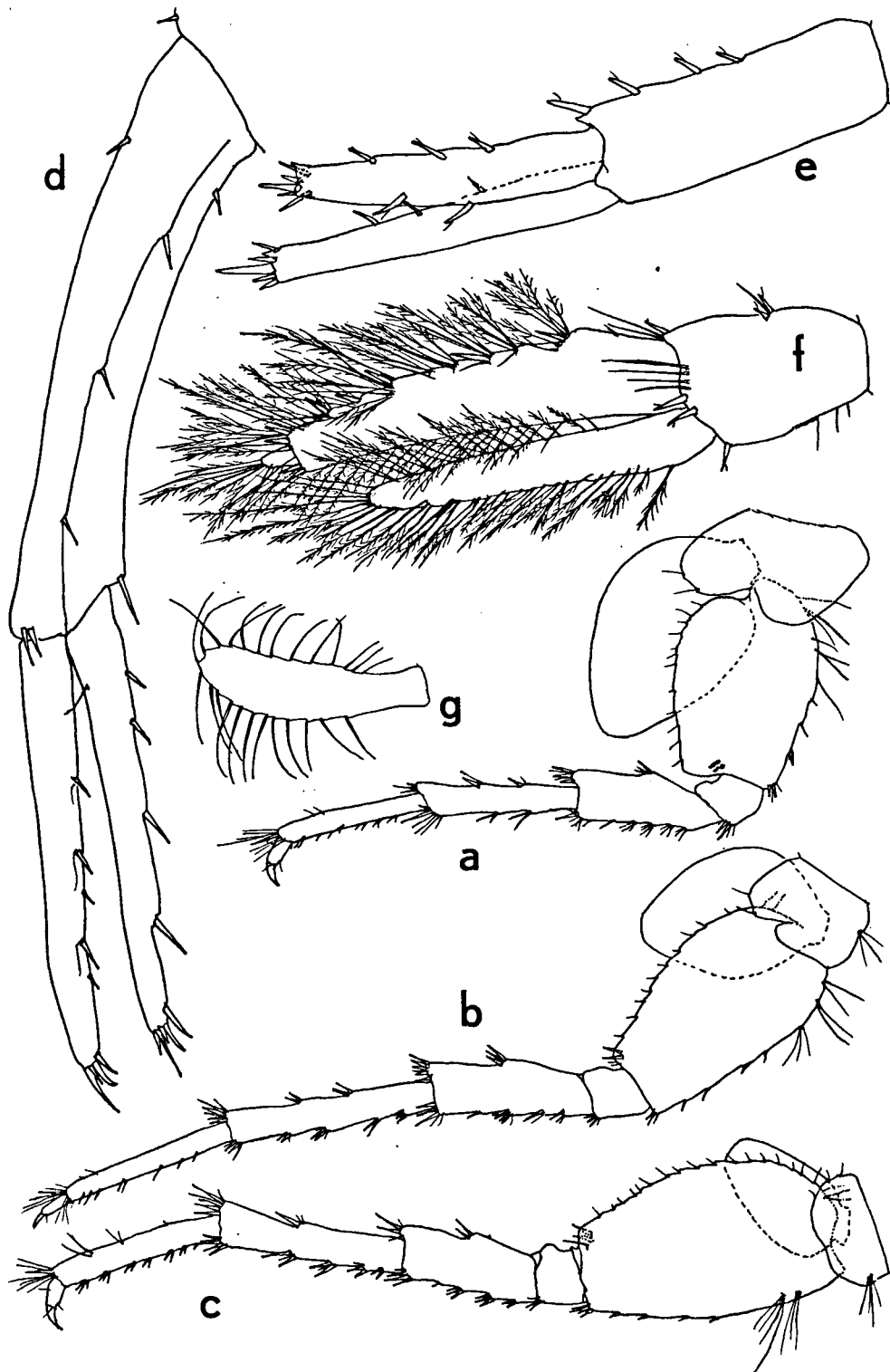


Fig. 15. *Gammarus parthicus* n. sp., a-f: ♂; g: ♀. a. pereopod 5; b. pereopod 6; c. pereopod 7 (a-c to same scale); d. uropod 1; e. uropod 2; f. uropod 3 (d-f to same scale); g. oostegite of pereopod 4.

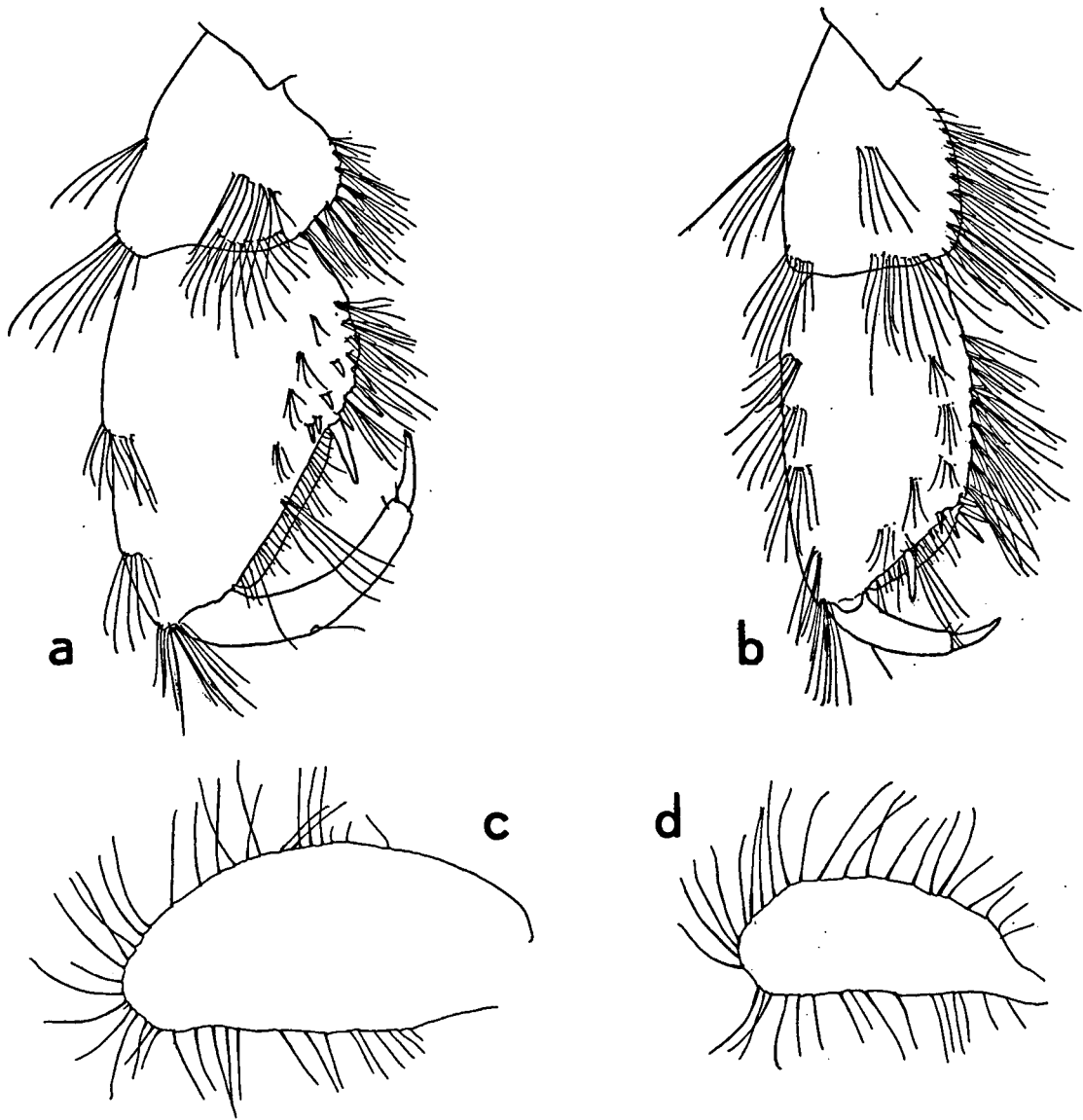


Fig. 16. *Gammarus parthicus* n. sp., ♀. a. distal segments of gnathopod 1; b. distal segments of gnathopod 2 (to same scale as a); c. oostegite of gnathopod 2; d. oostegite of pereiopod 3 (to same scale as c).

D-setae numerous, decreasing markedly in size toward distal end of segment.

Palps of maxilla 1 asymmetrical (Fig. 13g,h), segment 2 with setiferous outer margin. Spines on outer lobe unidentate (lateral spines) to pluridentate (medial spines). Inner lobe with 16 setae. Maxilla 2 and maxilliped without peculiarities.

Gnathopod 1 (Fig. 14a): Ventral margin of coxal plate unarmed. Palm of propodus (Fig.

14b) very oblique, palmar angle with 3 large and 10 accessory spines; mid-palmar spine present.

Gnathopod 2 (Fig. 14c) of same size as gnathopod 1. Palm (Fig. 14d) less oblique, about as long as free posterior propodal margin. Mid-palmar spine present, 5 palmar angle spines.

Pereiopod 3 (Fig. 14e) with numerous groups of setae on posterior margin of merus and carpus. Pereiopod 4 (Fig. 14f) with emarginate coxal

plate; merus with 5, carpus with 4 groups of setae on posterior margin.

Pereiopod 5 (Fig. 15a): Basis lobate, but not overhanging. Long segments with few, short elements.

Pereiopod 6 longer than pereiopod 5. Basis ovate, posterior margin with 10 short setules. Armature of long segments shown in Fig. 15b.

Pereiopod 7 (Fig. 15c) of almost same size of pereiopod 6. Posterior margin of basis with 18 to 20 short setules.

Epimeral plate 1 not produced, plates 2 and 3 with weak posteroventral point (Fig. 13c). Ventral margin of plate 1 with long setae, of plates 2 and 3 with 3 spines. Posterior margin with some medium-long setae.

Uropods 1 and 2 as illustrated (Fig. 15 d, e). Proximoventral peduncular spine on uropod 1 usually present (sometimes absent), but small.

Uropod 3 (Fig. 15f): Inner ramus about 85% of length of segment 1 of outer ramus. Lateral and medial margins of both rami with numerous plumose setae.

Telson lobes (Fig. 13i) very elongate, almost 2.5 times as long as wide; 4 long subdistal setae, 2 short distal spines and several very long distal setae.

Coxal gills with short, not clearly demarcated basal stalk; large and balloon-shaped on gnathopod 2 and pereiopods 3 to 4, gradually smaller and oval on pereiopods 5 through 7.

Female: Slightly smaller than male. Eggs numerous (25) and small (720 x 890  $\mu$ m). Broodplates densely setose, widest on gnathopod 2 (Fig. 16c), gradually narrower on posterior pereiopods (Figs. 16d, 15g).

Propodus of gnathopod 1 larger than that of gnathopod 2. Gnathopod 1 similar in shape to that of male, but lacking mid-palmar spine (Fig. 16a). Gnathopod 2 with less triangular, more quadrate carpus, and rectangular propodus; palmar margin almost transverse, short, with mid-palmar spine (Fig. 16b). Other appendages rather similar to those of male.

**Etymology.** - The specific name *parthicus* is derived from Parthus (Horatio), a big empire south-east of the Caspian Sea from 250 B.C. to 227 A.D.

**Remarks.** - *G. parthicus* belongs to the *Gammarus pulex*-group, as revised by Karaman & Pinkster (1977a). In their key to the European and Near-East species of the group, the new species keys out as *G. laborifer* Karaman & Pinkster, 1977, from Syria, Lebanon and Turkey. Not mentioned in their revision, but certainly looking close to *G. laborifer*, is *G. gracilis* (Martynov, 1935) from Turkestan. Barnard & Barnard (1983: 466) consider Martynov's name a homonym (of *Gammarus gracilis* Rathke, 1837), but Rathke's species is a junior synonym of *G. marinus* Leach, 1815, which is currently not placed in *Gammarus* any more, but in *Chaetogammarus* or *Echinogammarus*. Consequently, the specific name *gracilis* of Martynov is available for a species of *Gammarus*.

Based on Karaman & Pinkster's illustrations and on re-examination of part of their material (1 sample from Lebanon and 1 from Turkey, preserved in ZMA), the following differences have been noticed between males of *G. laborifer* (*G.l.*) and *G. parthicus* (*G.p.*): (1) peduncle segments 2 and 3 of antenna 1 with short ventroterminal setae only in *G.p.* (with several ventral groups in addition to the terminal group in *G.l.*); (2) distinctly more setae on the ventral margin of antenna 2 in *G.p.* than in *G.l.*; (3) the D-setae on mandible palp segment 3 decrease markedly in length in distal direction in *G.p.* (of subequal size in *G.l.*); (4) setation on posterior margin of pereiopod 3 longer and more abundant than on pereiopod 4 in *G.p.* (setae of both pereiopods alike in *G.l.*); (5) propodus of pereiopod 4 without setae on posterior margin in *G.p.* (with several long setae in *G.l.*); (6) four spine groups on anterior margin of merus of pereiopod 7 in *G.p.* (two groups in *G.l.*); (7) epimeral plates 1 to 3 with longer setae on posterior margin in *G.p.* than in *G.l.*; (8) endopodite of uropod 3 attaining 80-90% of length of first exopodite segment in *G.p.* (50-67% in *G.l.*).

It should be noted that according to Barnard & Barnard's key (1983: 461) and diagnosis (:472), the females of *G. parthicus* belong to the genus *Heterogammarus* Stebbing, 1899 (a genus endemic to Lake Baikal), characterized by the propodus of gnathopod 1 which is larger than that of gnathopod 2), whereas the males classify with *Gammarus* (a holarctic genus, in which gnathopod 1 is not

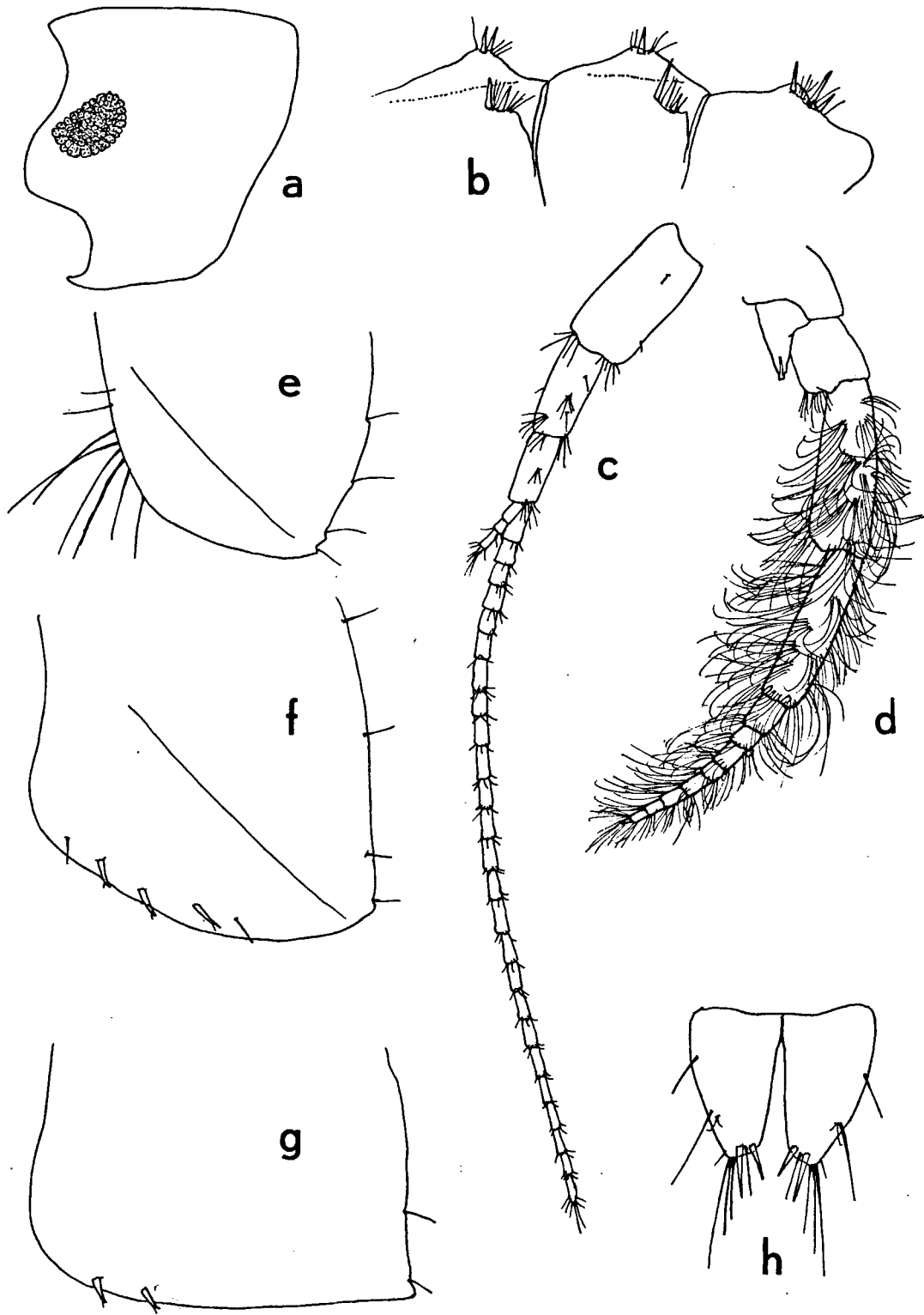


Fig. 17. *Gammarus proiectus* n. sp., ♂. a. head from the left; b. contour of urosome, from the left; c. antenna 1; d. antenna 2. medial view (c and d to same scale); e. epimeral plate 1; f. epimeral plate 2; g. epimeral plate 3; h. telson (b and e-h to same scale).

dominant). In the light of the close similarity of the new species to *G. laborifer*, we have little doubt that the classification with *Gammarus* is more correct. This implies that the diagnosis of *Heterogammarus* must be slightly rephrased, into "gnathopod 1 of the male weakly dominant".

*Gammarus parthicus* is certainly not identical to Iranian material recorded by Birstein (1945b: 154) as *Gammarus* ("Rivulogammarus") *lacustris*, which differs from *G. parthicus* in the poorly setose pereopod 3, antenna 2, and telson. *G. lacustris* was found during the present study in several Iranian localities (*vide infra*).

### ***Gammarus proiectus* n. sp.**

Figs. 17-20.

**Material.**- 1 ♂ holotype, 1 ♂ allotype, many paratypes, ZMA Amph. 201376. Shah zand-e-Arak (= Sarab-e-Abas abad) (33°55'N 49°30'E), spring pool, 10 June 1991. The locality is situated in the Central Basin drainage system.

**Description.**- Male: Body length of largest specimens 14.5-15 mm, often much smaller. Lateral head lobe rounded; eye reniform, pigmented (Fig. 17a). Urosomites 1 to 3 dorsally with raised, triangular, hardly compressed elevations (Fig. 17b); urosomites 1 and 2 with middorsal and lateral armature, consisting of 1 to 3 spines and several short setae; urosomite 3 with lateral armature only (2-4 spines, several short setae).

Antenna 1 shorter than half the length of body, with long, 25-segmented flagellum and rather short, 4-segmented accessory flagellum (Fig. 17c). Peduncle segments 1 to 3 decreasing in length, armed with some short setae. Flagellum with scarce, very short setae only; aesthetascs small (about two-thirds of length of setae), one on each of third to penultimate segments.

Antenna 2 (Fig. 17d) shorter than antenna 1; gland cone tapering, pointing forward. Peduncle segments 4 and 5 and all flagellum segments densely covered with long, curved or even curled setae, especially on ventral and medial surfaces. Flagellum shorter than peduncle segments 3+4, 9-segmented; no calceoli.

Mandible (Fig. 18a) with 5-dentate incisor; left lacinia mobilis 4-dentate, right lacinia bifid,

each branch finely toothed; molar seta present on both sides (left one shorter than right one). Palp segment 1 naked; segment 2 with >10 long ventral setae; segment 3 falciform, with 4 B-setae, 6 A-setae (in 2 groups), no C-setae, a row of 25-30 D-setae (central setae longest), and 7 E-setae.

Maxilla 1 with slightly asymmetrical palps (Fig. 18b, c); on the right, segment 2 is slightly broader than on the left; terminal armature of 4 heavy, short spines + 1 slender spine + 1 seta (right) or 6 slender spines + 4 setae (left). Lateral margin of palp segment 2 unarmed. Spines on outer lobe with 4 (lateral spines) to many (medial spines) teeth. Inner lobe with 17 setae.

Lips, maxilla 2 and maxilliped without peculiarities.

Gnathopod 1 (Fig. 19a) with quadrate, ventrally unarmed, coxal plate. Carpus trapezoidal. Propodus subrectangular; palmar margin not very oblique, sinuous, shorter than free posterior propodal margin; palmar angle with 7+2 spines (longest truncate at tip); truncate mid-palmar spine present.

Gnathopod 2 (Fig. 19b) with narrow coxal plate. Carpus slender, not much shorter than propodus. Propodus almost rectangular; palmar margin sinuous, transverse, short; 6 palmar angle spines and 1 truncate mid-palmar spine.

Pereopod 3 (Fig. 20a) with long, curled setae (up to 8 groups on merus, fewer on carpus). Pereopod 4 (Fig. 20b) with short, straight setae on merus and carpus.

Basis of pereopod 5 (Fig. 20c) with rounded, projecting distoposterior lobe. Lobe on basis of pereopod 6 (Fig. 20d) projecting and overhanging; at some distance from tip of lobe one spine on medial surface of basis. Lobe on basis of pereopod 7 (Fig. 20e) similar to that of pereopod 6; 2 spines on medial surface.

Epimeral plates 1 to 3 (Fig. 17e-g) with rectangular posteroventral corner; posterior margin with some rather long setae; anterior margin of plate 1 with several very long setae; ventral margin of plates 2 and 3 with 2 or 3 spines.

Uropod 1 (Fig. 18d) with small proximoventral peduncular spine; both rami with dorsal and terminal spines. Uropod 2 (Fig. 18e) likewise with dorsal spines on both rami. Uropod 3 (Fig. 18f) with tapering rami; exopodite with small but dis-

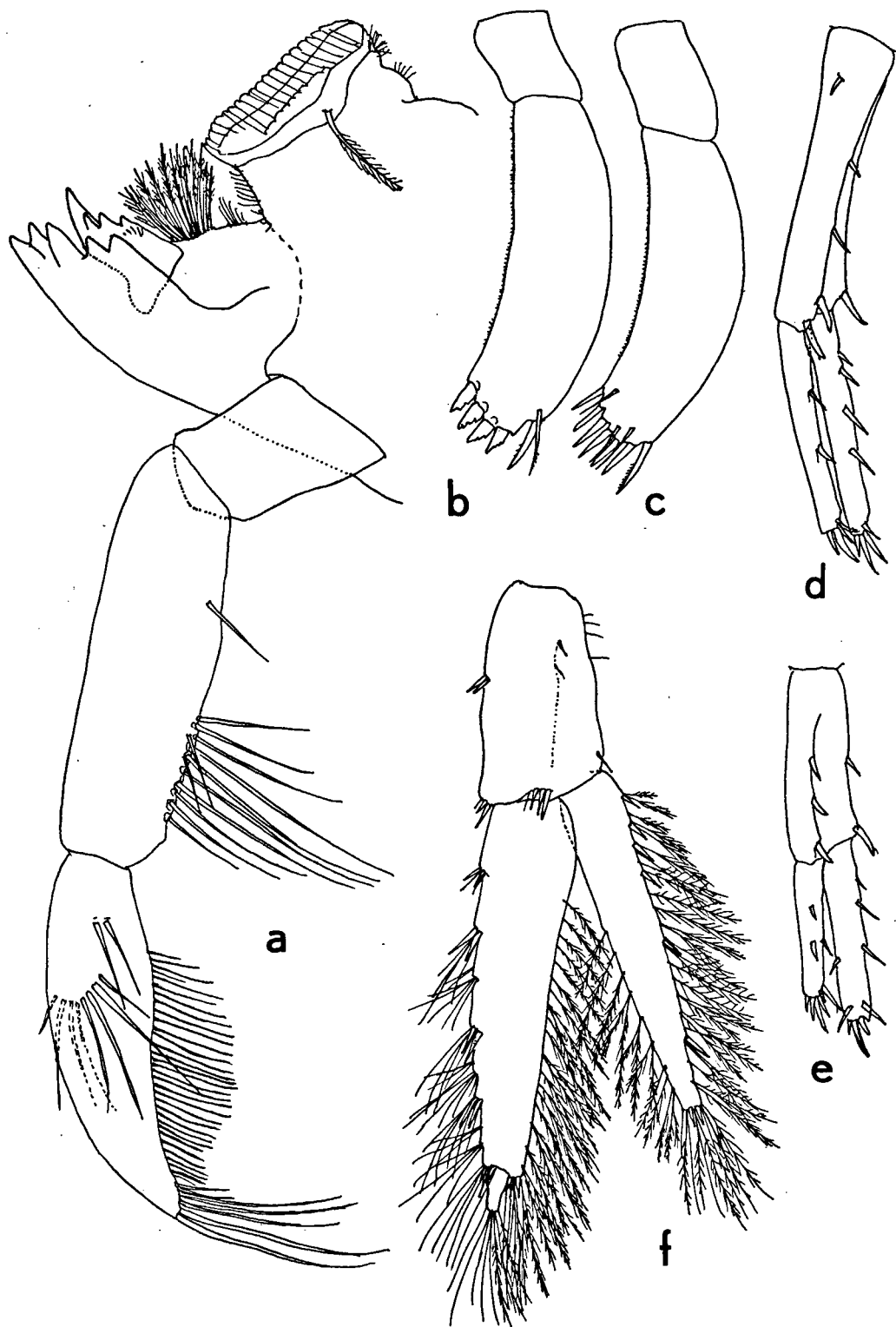


Fig. 18. *Gammarus proiectus* n. sp, ♂. a. left mandible; b. palp of right maxilla 1; c. palp of left maxilla 1 (a-c to same scale); d. uropod 1; e. uropod 2 (to same scale as d); f. uropod 3.

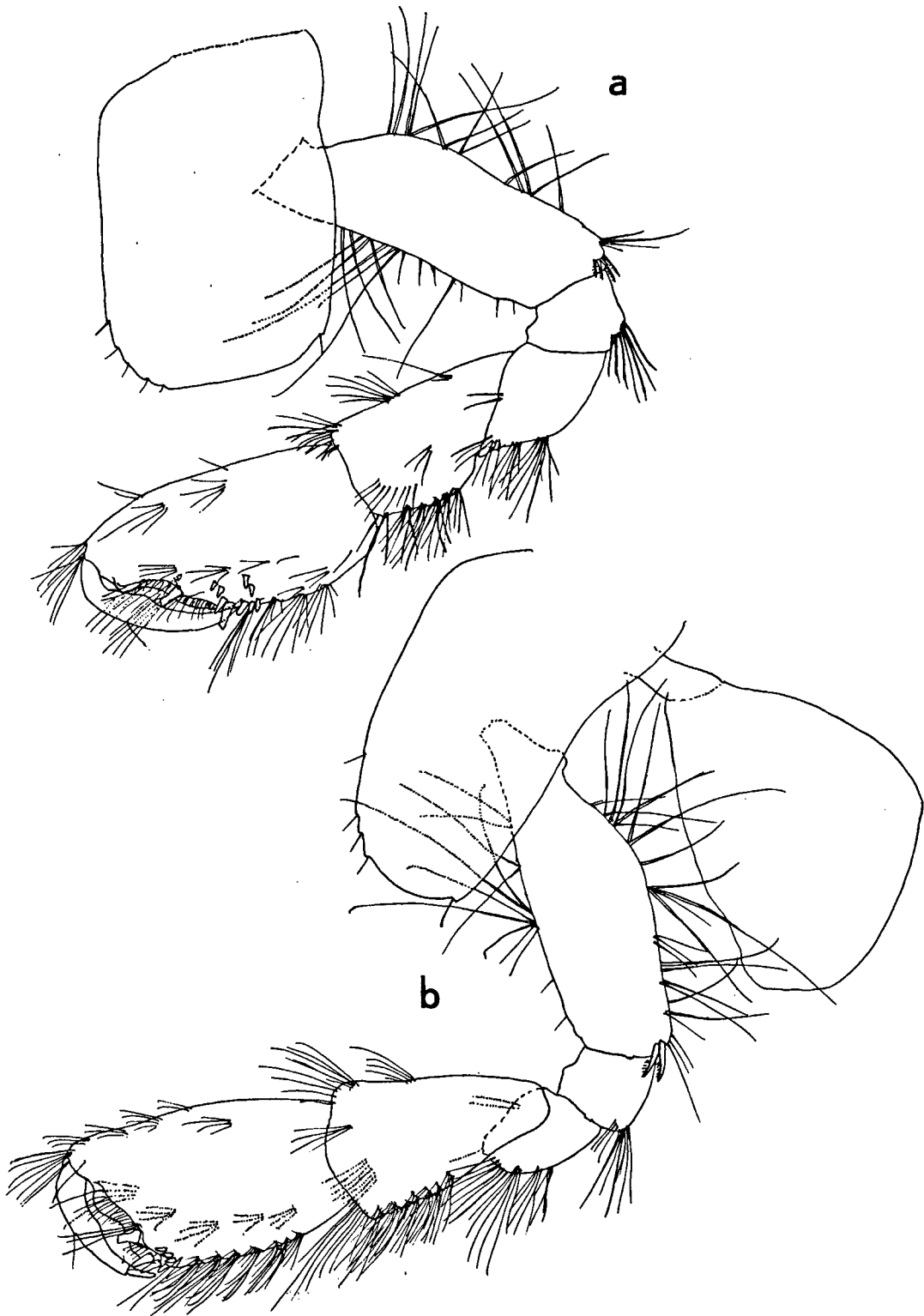


Fig. 19. *Gammarus proiectus* n. sp., ♂. a. gnathopod 1; b. gnathopod 2 (to same scale).

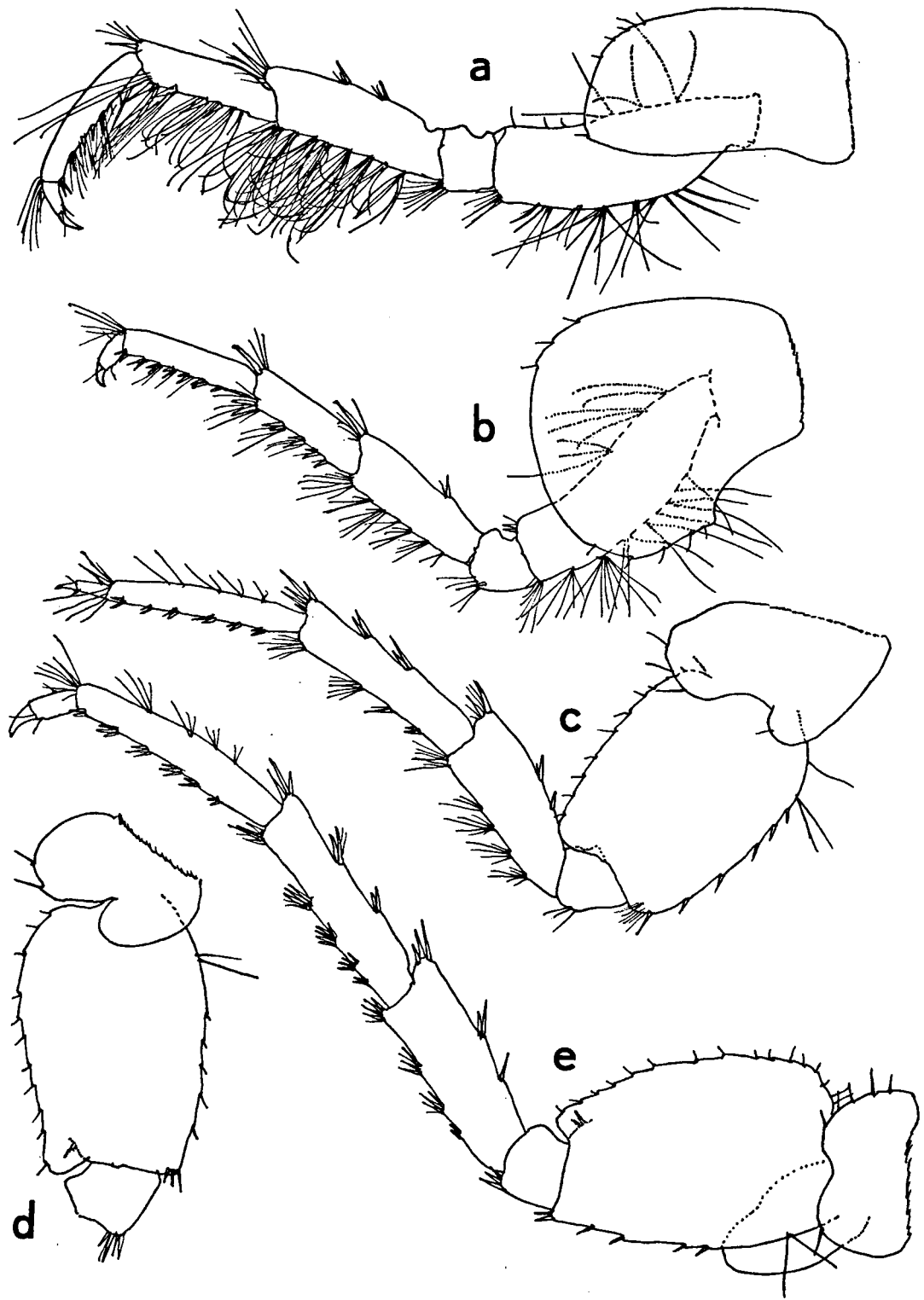


Fig. 20. *Gammarus proiectus* n. sp., ♂ . a. pereiopod 3; b. pereiopod 4; c. pereiopod 5; d. basal part of pereiopod 6; e. pereiopod 7 (all to same scale).



tinct second segment; endopodite only slightly shorter than segment 1 of exopodite; lateral setae of exopodite naked, medial setae of exopodite and all setae of endopodite plumose.

Telson lobes (Fig. 17h) less than twice as long as wide; each lobe with 2 long lateral setae, 2 sensory setules situated near base of second lateral seta, 2 terminal spines and several terminal setae, longer than spines.

Coxal gills on gnathopod 2 and pereopods 3 through 7, stalked, large and balloon-shaped on gnathopod 2, gradually smaller and egg-shaped on posterior legs.

Female: Much smaller than male. Gnathopod 1 without mid-palmar spine. Both gnathopods smaller than in male. Oostegites as in *G. parthicus*. Setae on antenna 2 and pereopod 3 shorter, less numerous and not curly. Eggs, like in *G. parthicus*, small and numerous.

**Etymology.**- The specific name, *proiectus* (Latin, meaning projecting) alludes to the projecting posteroventral corner of the basis of pereopods 5 to 7.

**Remarks** - Although this species co-occurs with the previous species, *G. parthicus*, males can easily be separated by the second antenna, which bears very numerous, curved setae, by the palmar margin of gnathopods 1 and 2, which is shorter and much less oblique, the less elongate telson lobes, the palp of maxilla 1 (less widened and with fewer spines), and the overhanging posteroventral lobe on the basis of pereopods 6 and 7. The last character is rare in the *Gammarus pulex*-group the situation found in *G. proiectus* is approached, but not quite reached, by *G. acalceolatus* Pinkster, 1971, *G. gauthieri* (S. Karaman, 1935), and *G. microps* Pinkster & Goedmakers, 1975, all three from N.W. Africa and sometimes Spain, and by *G. kesslerianus* Martynov, 1931 from the Crimea. These four species do not appear to be morphologically close to *G. proiectus*.

***Gammarus* aff. *imberbus* Karaman & Pinkster, 1977**

*Gammarus imberbus* Karaman & Pinkster, 1977a: 29-31, fig. 11.

**Material.**- Several specimens, all female or juvenile, but for one small male. Boro Laan Spring (Iranian-Turkish border, 39°43'N 44°34'E), 1995.

**Remarks.**- The material is not quite adult and contains only one male, which makes the identification provisional. The species was originally described from Kazakhstan, in the former U.S.S.R.

***Gammarus komareki* Schäferna, 1922**

*Gammarus komareki* Schäferna, 1922: 21-18, figs. 8-9, 10 m1-m4; G. Karaman, 1969: 35-42, figs. 1-20 (refs., syn.); Karaman & Pinkster, 1977a: 81-83, fig. 33 (older refs.).  
*G. pulex persicus* S. Karaman, 1934: 129-130, fig. 2.

**Material.**- Many specimens Mahabad (Zagros region, western Iran, 36°47'N 45°39'E), 4 September 1993. Many specimens Yasooj (Zagros region, 30°40'N 51°30'E), 22 September 1993. Many specimens Lake Pareshaan (29°30'N 51°30'E), 5 October 1993. Many specimens Golestan National Park (=G.N.P.) (37°17'N to 37°31'E and 55°43'N to 56°17'E for all G.N.P. specimens), 7-9 March 1994. Many specimens Raamyran, 13 April 1994. Many specimens Doogh river (G.N.P.), 3 May 1994. Many specimens Karkooly spring (G.N.P.), 4 May 1994. Many specimens Soolegurud spring (G.N.P.), 4 May 1994. Many specimens Almeah (G.N.P.), 4 May 1994. Some specimens Sharlegh (G.N.P.), 5 May 1994. Many specimens Mirza bay loo (G.N.P.), 5 May 1994. Many specimens Koom ali (G.N.P.), 5 May 1994. Many specimens Ghezghalaeh (G.N.P.), 5 May 1994. Many specimens Shafa rud (37°33'N 49°06'E), 8 June 1994.

90+ Specimens (incl. ovig. ♀). Vafae Spring (Sarab-e-Vafae, prov. Lorestan, 33°50'N 48°45'E), 1995. 63 specimens same data. 10 Specimens Sheikh Miree Spring (Prov. Lorestan, 33°47'N 48°45'E), 1995. 12 Specimens Sharesranala river, 1995. Many specimens Shahrestanak (36°08'N 51°20'E), 1995. 13 Specimens Dobarar spring (Prov. Mazandaran, 36°34'N 53°20'E), 1995. 24 Specimens Sheerabad spring (Prov. Mazandaran, 36°55'N 55°02'E), 1995. 43 Specimens Imamzadeh Gharn abad spring (Prov. Gorgan, 36°20'N 54°45'E), 1995. 26

Specimens Yeke so - Chelchay - Minodasht (Prov. Gorgan, 37°08'N 55°29'E), 1995. 4 Specimens Shamooshak Chesmeh spring (head water, Prov. Gorgan, 36°45'N 54°18'E), 1995. 4 Specimens Saied Kala - Ghoor Chai (Prov. Gorgan, 36°55'N 55°06'E), 1995 (probably this species, in poor condition). 9 Specimens Kordan Pol (Prov. Gorgan, 37°07'N 55°23'E), 1995. 3 Specimens Kalah Zard spring (prov. Gorgan, 36°50'N 54°45'E), 1995. 4 Specimens Baghoo river (prov. Gorgan, 36°56'N 55°24'E), 1995. 6 Specimens Chamani Pol (prov. Gorgan, 37°09'N 55°15'E), 1995. 5 Specimens Ghoor Chay (prov. Gorgan, 37°00'N 55°05'E), 1995. Many specimens Loveh Falls (37°15'N 55°28' E), 1995. 3 specimens Jahan Nama (36°40'N 54°15'E), 1995.

Remarks.- This species was recorded before from Iran by S. Karaman (1934) from Sultana-bad (under the name of *G. pulex persicus*), and by G. Karaman (1969) from Viladereb (Mount Savalan. near Ardébil, Azarbaijan). In the present collections, *G. komareki* is the most common freshwater gammarid.

Females of this species often have a shorter inner ramus of uropod 3 than males. Also the setation of the second antenna and of pereopod 7 is less strongly developed in females.

### **Gammarus lacustris** Sars, 1863

*Gammarus lacustris*; Karaman & Pinkster, 1977a: 32 (lit., syn.)

Material.- 15 specimens Borolaan spring (Iranian-Turkish border, 39°43'N 44°34'E), 1995. 4 ♀. Next to Aras Dam Reservoir (prov. Azarbaijan, 39°05'N 45°27'E), 1995. 49 Specimens Neur Lake (prov. Ardebeel, 38°00'N 48°35'E), 1995.

Remarks.- This species is widely distributed in Europe (from Norway to the Balkans and Russia), in palearctic Asia (Siberia, Turkey, Afghanistan, northern India), and Canada. Birstein (1945b) recorded it already from Iran, viz. from Lake Gurdgel, along the road Miane-Tabriz.

*G. lacustris* "usually inhabits mountain and

glacier lakes" (Karaman & Pinkster, 1977a: 34), but is found occasionally in other habitat types as well, provided summer temperatures stay below some 20 C.

### **Gammarus syriacus** Chevreux, 1895

*Gammarus syriacus*; Karaman & Pinkster, 1977a: 60 (lit., syn.).

Material.- 9 specimens Cheshmeh-e-Balfees (30°45'N 50°45'E), 1995.

Remarks.- This species is known from numerous localities ranging from northern Egypt in the west, through the Sinai, Israel, and Lebanon to Syria in the east, but it was not yet recorded from Iran. The specimens compare quite well with Karaman & Pinkster's material, although epimeral plates are slightly less pointed than in their fig. 25 I, K.

### **Gammarus paricrenatus** n.sp.

Figs. 21-23.

Material.- 1 ♀ (holotype), 7 ♀ (paratypes), ZMA Amph. 201952. Ghoree-Gol wetland (prov. E.Azarbaijan), 37°26'N 46°40'E), 1995.

Description.- Female: Body length of largest (ovigerous) female 12.5 mm. Eye elliptical, black, small; head lobes truncate (Fig. 21a). All pleosomites with crenulate dorsoposterior margin, armed with several setules (Fig. 21b). Urosomites 1 and 2 with dorsal and lateral group of spines, accompanied by some short setae (Fig. 21b). Epimeral plate 1 with setiferous ventral margin; epimeral plates 2 and 3 with 2 or 3 spines on ventral margin and some setules on posterior margin; hind corner weakly pointed (Fig. 21b).

Antenna 1 (Fig. 21c) poorly setose; flagellum 27-segmented; accessory flagellum short, 3-segmented. Antenna 2 much shorter than antenna 1; gland cone prominent, straight; peduncle and flagellum not very setose (Fig. 21d).

Coxal plates 1 to 4 much longer than wide, without armature on ventral margin. Propodus of gnathopod 1 (Fig. 21e, f) wider than that of gnathopod 2 (Fig. 22a, b), the latter of elongate-rectangular shape. Merus and carpus of pereio-

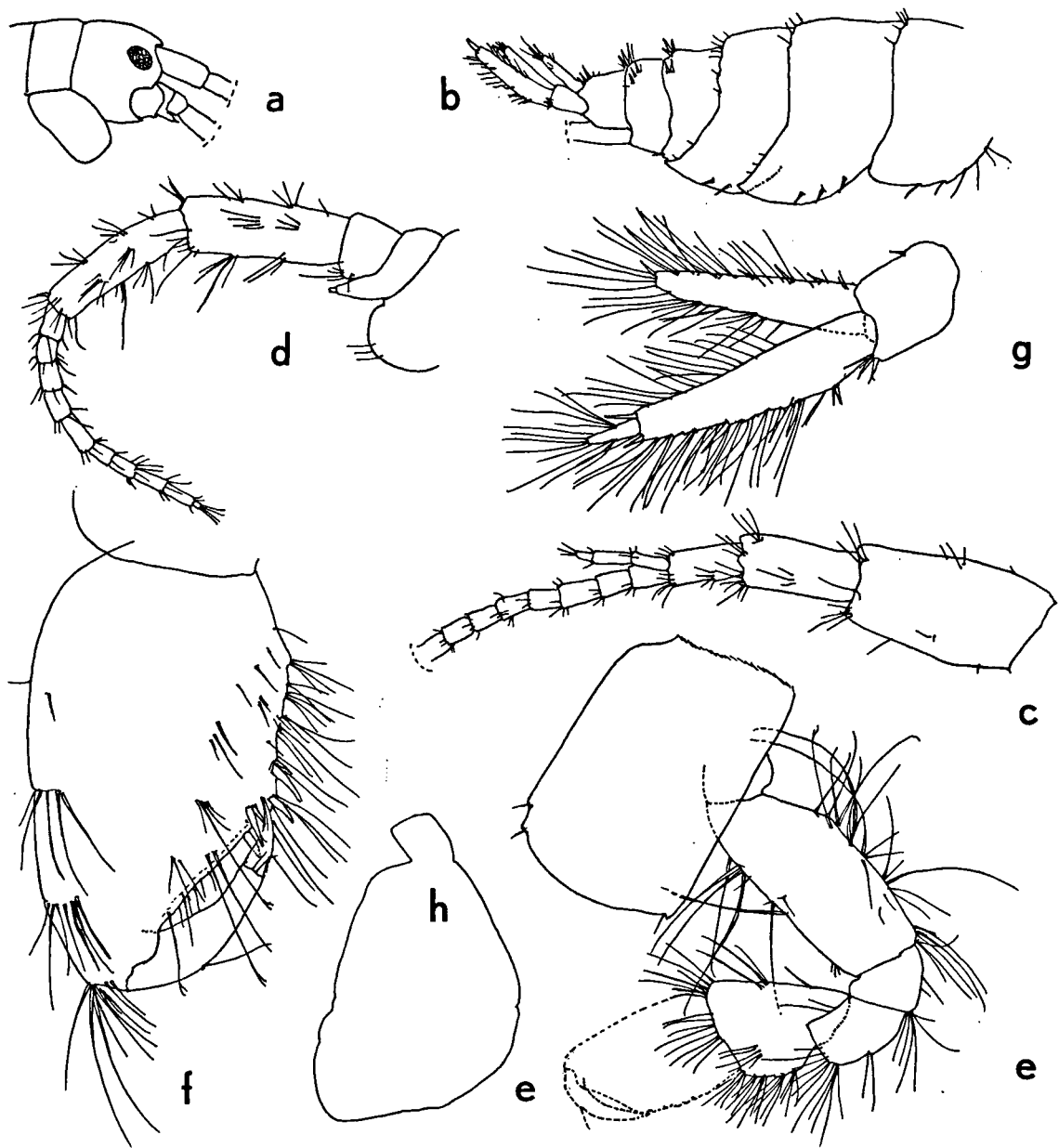


Fig. 21. *Gammarus paricrenatus* n. sp., ♀ paratype. a. head; b. posterior end of body; c. antenna 1; d. antenna 2; e. gnathopod 1; f. propodus of gnathopod 1; g. uropod 3; h. coxal gill of gnathopod 2 (a, b to same scale; c, d to same scale).

pod 3 (Fig. 22c) with numerous groups of long setae, those of pereopod 4 hardly less setose (Fig. 23a). Basis of pereopods 5 (Fig. 23b), 6 (Fig. 22d) and 7 (Fig. 23c) with slightly serrate posterior margin, bearing short setules; posterodistal projection small but distinct; on pereopod 7 this

“lobe” bears 2 submarginal setules on inner surface (Fig. 23c), but no setae on remainder of inner side of basis on these pereopods. Distal segments relatively long and slender, spinous, without long setae on anterior margin. Claw of all pereopods slender.

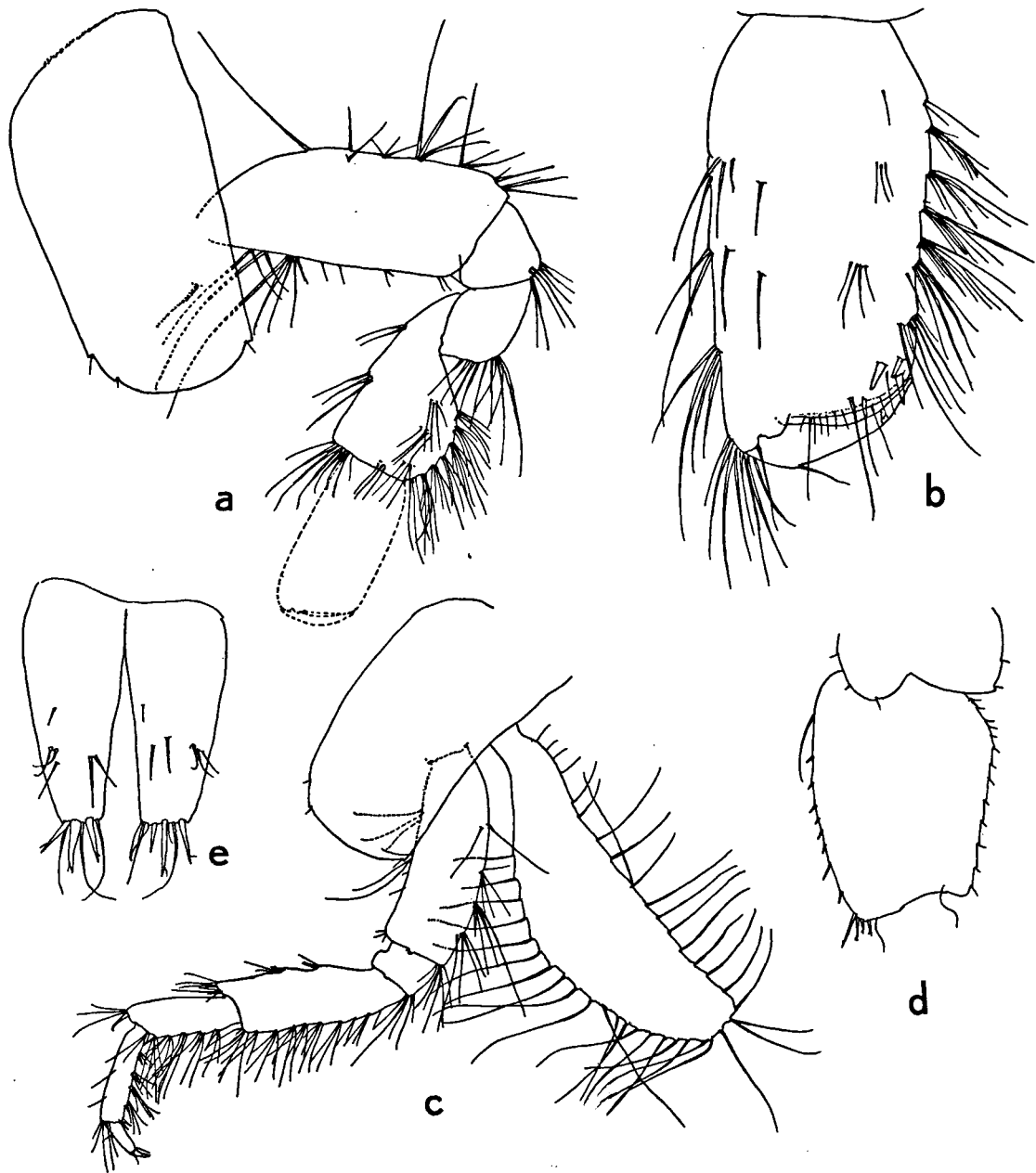


Fig. 22. *Gammarus paricrenatus* n. sp., ♀ paratype. a. gnathopod 2; b. propodus of gnathopod 2; c. pereopod 3; d. proximal segments of pereopod 6; e. telson (22a to same scale as 21e; 22b to same scale as 21f).

Coxal gills (Fig. 21h) broadly ovate, with short basal stalk.

Uropod 3 (Fig. 21g): endopodite about 75% of length of exopodite; exopodite with elongate second segment; all setae on endopodite and

most on exopodite plumose.

Telson lobes (Fig. 22e) elongate, more than twice as long as wide; dorsal surface with 1 pair of sensory setules and 4 to 5 "normal" setae; distal end with 3 or 4 spines and 2 or 3 setae that

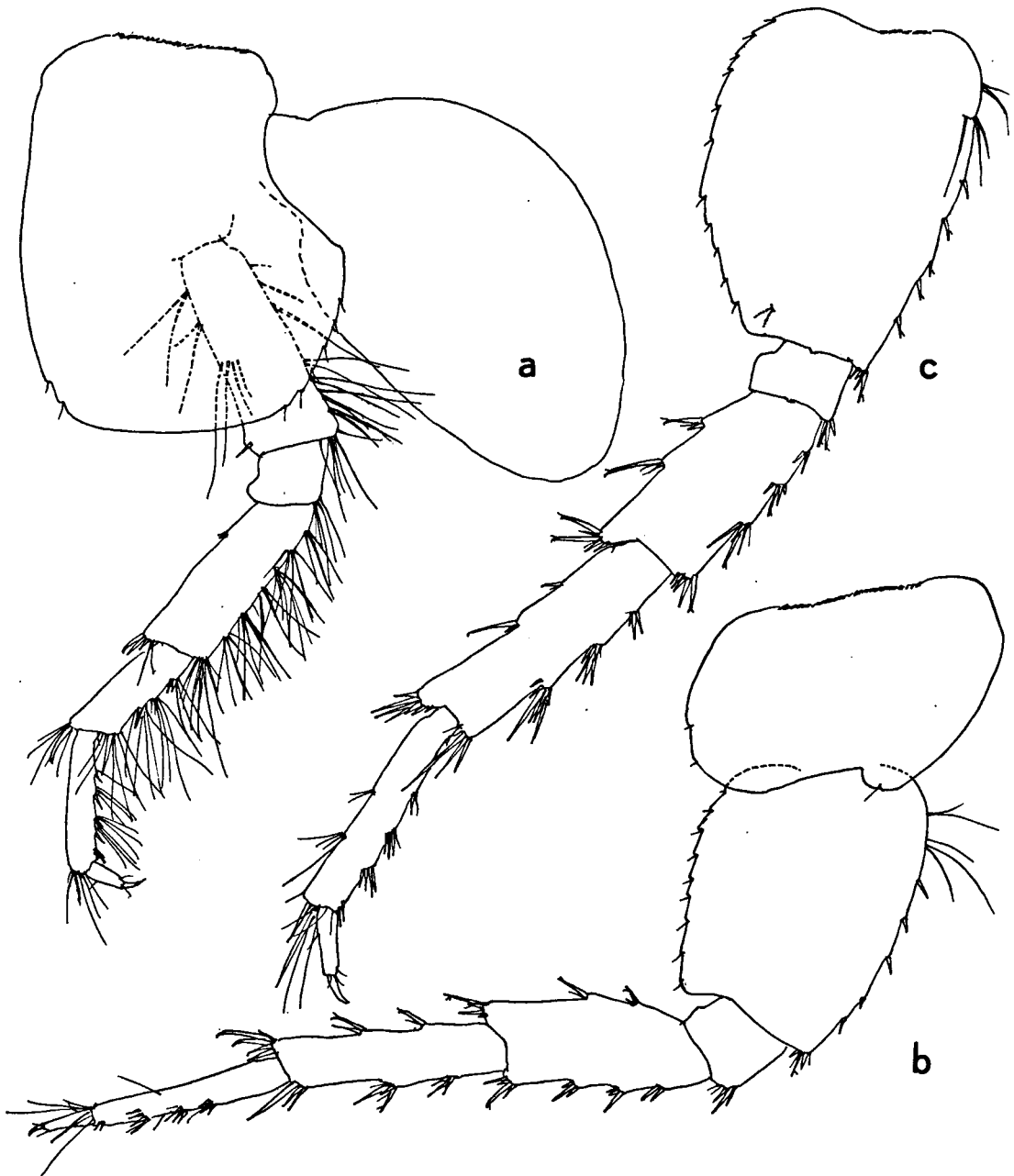


Fig. 23. *Gammarus paricrenatus* n. sp., ♀ paratype. a. pereopod 4; b. pereopod 5; c. pereopod 7 (a and b to larger scale than c).

overreach the spines.

Remaining characters, including morphology of mandible palp, as in *G. crenulatus* Karaman & Pinkster, 1977.

Male: Unknown.

Etymology.- The specific name *paricrenatus* is

derived from the Latin adjective *par* (= equal to) and the similarity to *G. crenulatus*.

Remarks.- Unfortunately only females are available, and it is not customary in this genus to base a new species on females. But within the

140 or so valid species of *Gammarus* distinguished so far, only *G. crenulatus* and *G. paricrenatus* share the presence of crenulate and setulose pleosomites. For this reason the Iranian taxon is easily recognizable. It differs from *G. crenulatus*, known from Thessalia (Greece) mainly by the elongate pereopods 5 to 7 and the absence of setae on the inner surface of the basis of these legs (in *G. crenulatus* such setae are present in both sexes).

*Gammarus duebeni*-group

***Gammarus lobifer* n. sp.**

Figs. 24-27.

**Material.**- 1 ♂ (holotype), 1 ♀ (allotype), 36 paratypes, ZMA Amph. 201936. Ya Sooj (Zagros region, 30°40'N 51°30'E), 22 September 1993. Many specimens Cheshmeh-e-Satangan (near Yasooj), 1995. Many specimens Cheshmeh e-Balfees (S. Chaeram, 30°45'N 50°45'E), 1995. 3 Specimens Jahan Nama (36°40' N 54°15' E), 1995.

**Description.**- Male: Body length of adults 8-11 mm. Dorsum of pereiosome unarmed (but for an isolated setule). Dorsal contour of urosomites (Fig. 24i) only slightly humped; armature variable, often only with 1 lateral + 1 dorsal spine on either side (urosomite 1), or 2 lateral + 2 to 3 dorsal spines (urosomite 2), or 1 to 2 lateral + 1 to 2 dorsal spines (urosomite 3); spines accompanied by few (1 or 2) setae of same length as spines.

Cephalic segment (Fig. 24a) with projecting, truncate lateral lobe; eyes well-pigmented, rather large, length greater than diameter of antenna 1.

Antenna 1 (Fig. 24c) half as long as body, or somewhat longer; peduncle segments 1 to 3 decreasing in length, ventral margin practically devoid of setae. Flagellum 22- to 24-segmented, armed with scarce short setae; one aesthetasc on second to antepenultimate segments, very short (shorter than setae). Accessory flagellum short, reaching to flagellum segment 3, 3-segmented.

Antenna 2 (Fig. 24d) shorter than antenna 1. Gland cone long, slender, straight, tapering. Peduncle segments 4 and 5 each with 3 ventral

and 1 distoventral groups of setae; setae not numerous, as long as diameter of segment or shorter. Flagellum 12- to 13-segmented, armed with some short setae that do not form a "brush"; no calceoli.

Labrum, labium, mandibles and second maxilla ordinary. Mandible palp (Fig. 24e) with unarmed first segment; segment 3 with regular row of some 16 D-setae, 3 or 4 A-setae, 4 B-setae, and 5 E-setae; no C-setae. Maxilla 1: left palp (Fig. 24f) slender and narrow, segment 2 with 4 slender distal spines; right palp (Fig. 24g) wider, with 3 short distal spines and 2 subdistal spines; outer lobe with 11 spines (outermost spines with 4 coarse teeth, innermost spines with 11 to 13 fine, slender teeth); inner lobe triangular, with 15 plumose setae. Maxilliped: outer lobe (Fig. 24h) oval, wide; inner lobe truncate, with 3 teeth.

Gnathopod 1 (fig. 25a): ventral margin of coxal plate smooth; propodus (Fig. 25b) egg-shaped, palmar margin sinuous, as long as free posterior margin; 2 palmar angle spines, 1 pointed mid-palmar spine, and several short accessory spines.

Gnathopod 2 (Fig. 25d, e): propodus of about same size as that of gnathopod 1, but shape subrectangular, palmar margin much shorter than free margin; mid-palmar spine pointed, 2 + 2 palmar angle spines.

Pereiopod 3 (Fig. 26b) with elongate coxal plate; merus, carpus, and propodus with long, straight setae. Pereiopod 4 with broad, emarginate coxal plate (Fig. 26c); distal segments with long setae as in P3.

Pereiopod 5 (Fig. 27a) with subrectangular basal segment; posterior margin with few (about 6) setae of medium length; posterodistal corner freely produced, unarmed; distal segments predominantly spinous, with few setae intermixed with spines; setae hardly longer than spines. Pereiopod 6: basis (Fig. 27b) more elongate than that of P5; distal segments as in P7. Pereiopod 7 (Fig. 27c): basis with straight margins, tapering; posterior margin with some 8 setae of medium length; posteroventral corner rounded, freely produced, unarmed, but with 1 subangular seta on inner surface; distal segments mainly spiniferous, with few setae between the spines. Inner surface of basis of P5 to P7 with some short setae.

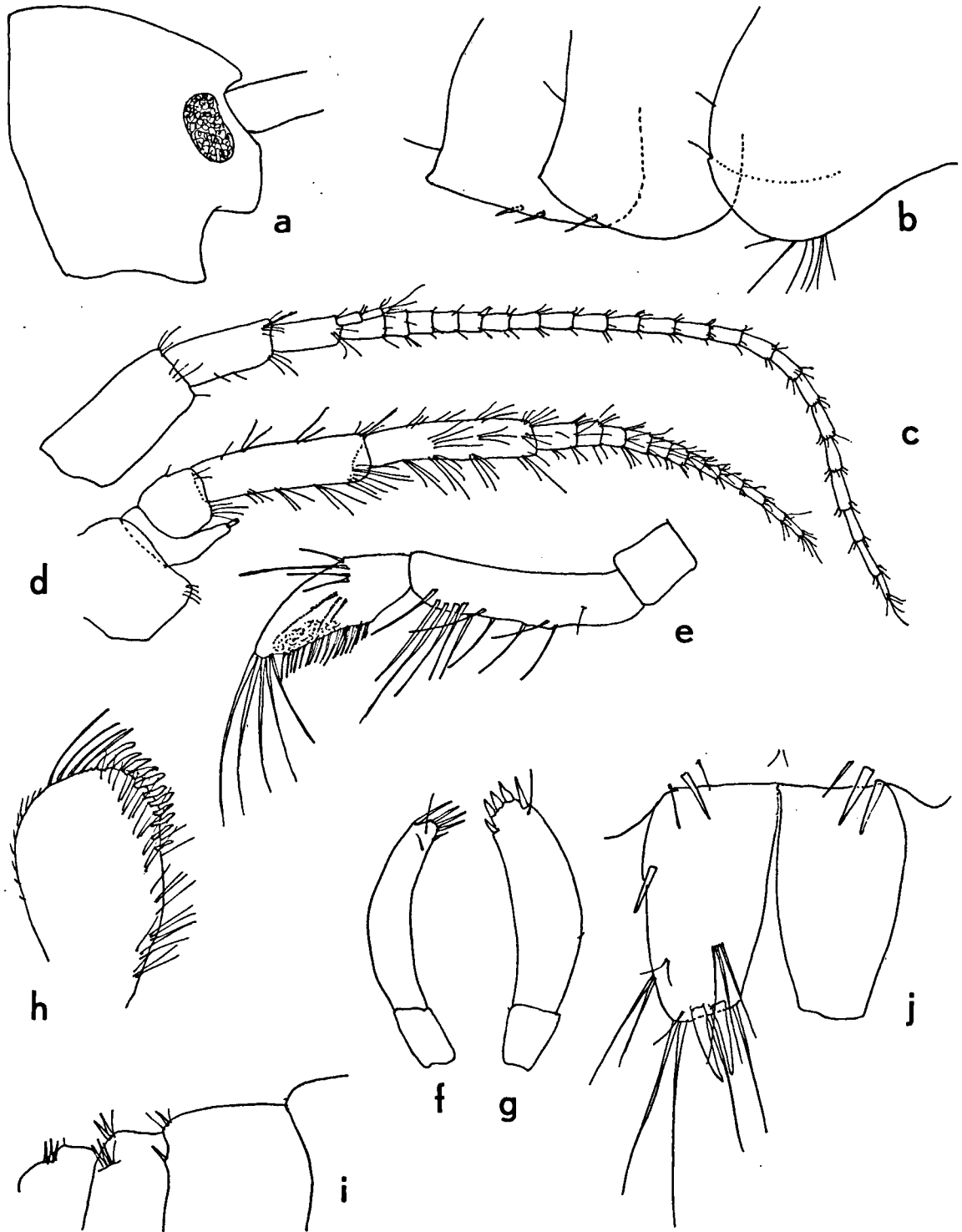


Fig. 24. *Gammarus lobifer* n. sp., ♂ paratype. a. head; b. epimeral plates 1 to 3; c. antenna 1; d. antenna 2; e. mandible palp; f. left palp of maxilla 1; g. right palp of maxilla 1; h. outer lobe of maxilliped; i. dorsal contour of urosome, from the left, telson (c, d to same scale; e-h to same scale).

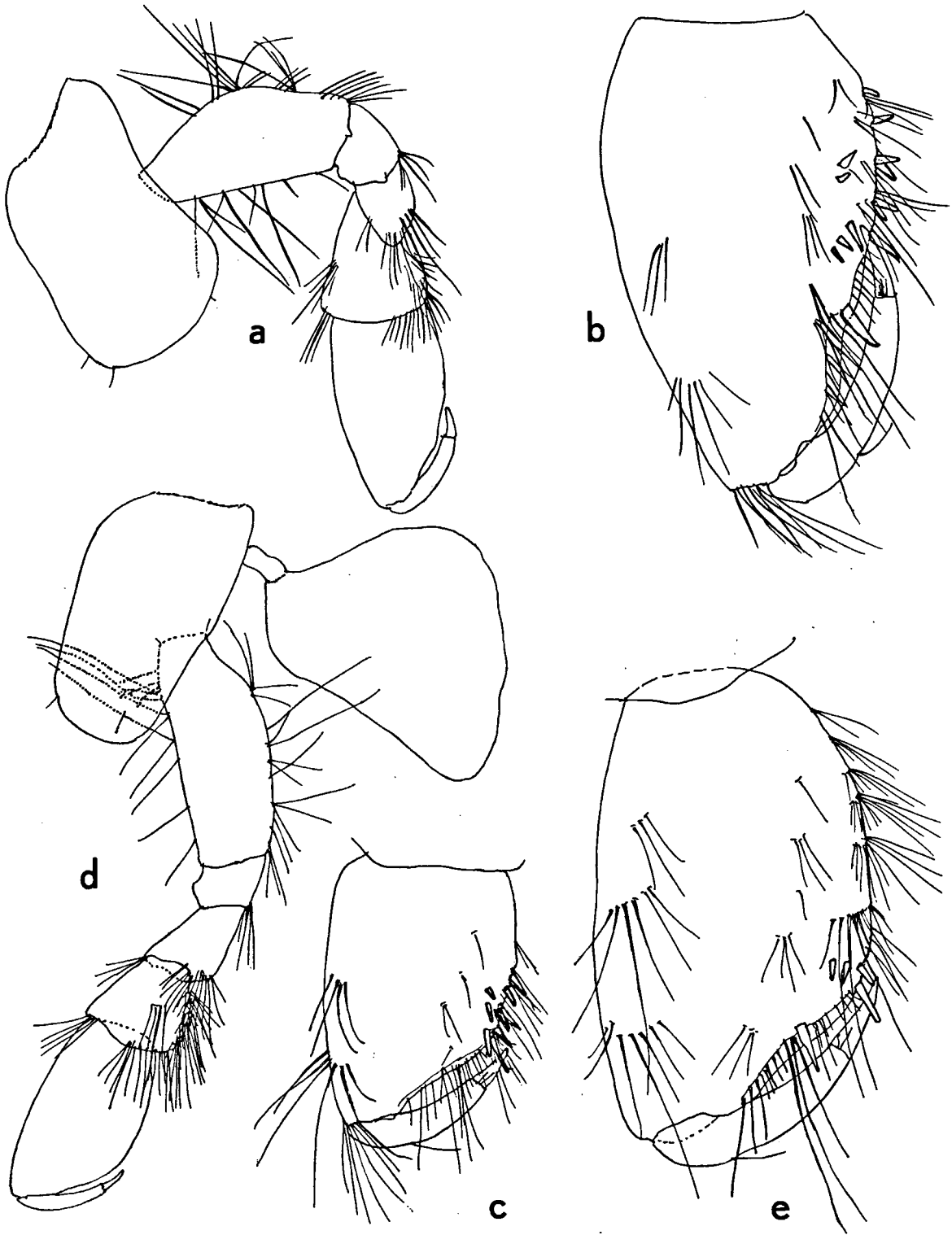


Fig. 25. *Gammarus lobifer* n. sp., paratypes. a. gnathopod 1, ♂; b. propodus of gnathopod 1, ♂; c. propodus of gnathopod 1, ♀; d. gnathopod 2, ♂; e. propodus of gnathopod 2, ♂ (a, d to same scale; b, c, e to same scale).



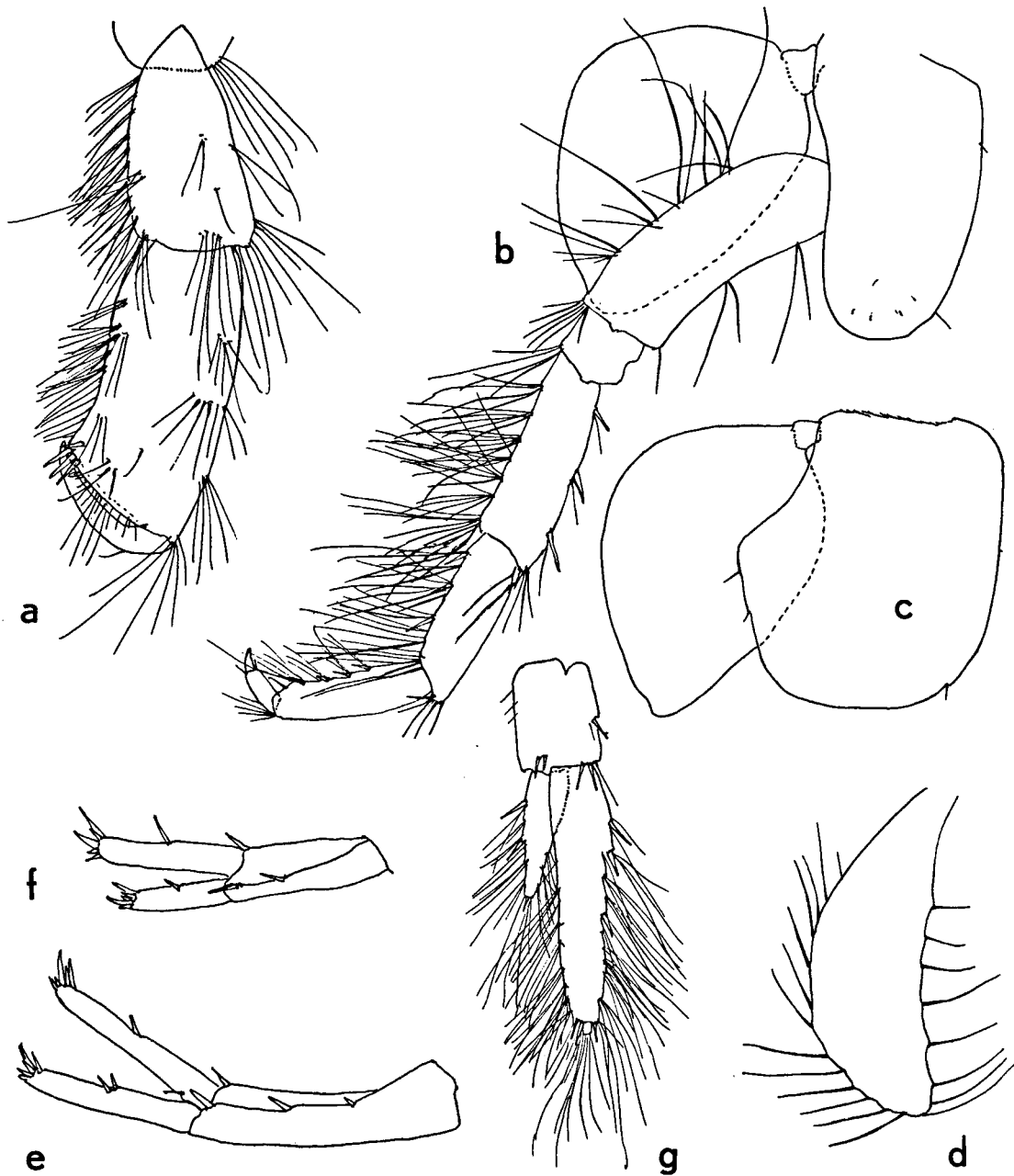


Fig. 26. *Gammarus lobifer* n. sp., paratypes. a. distal segments of gnathopod 2, ♀; b. pereopod 3, ♂; c. coxal plate and gill of pereopod 4, ♂; d. oostegite of gnathopod 2, ♀; e. uropod 1, ♂; f. uropod 2, ♂; g. uropod 3, ♂ (a to same scale as 25c; b-g to same scale).

Coxal gills present on gnathopod 2 and pereopods 3 through 7, broadly egg-shaped, largest on Gn2, P3 and P4, smallest on P7.

Epimeral plates 2 and 3 (Fig. 24b) with 1 or 2 spines on ventral margin and 1 setule on posteri-

or margin; posteroventral corner slightly produced into a minute point.

Uropod 1 (Fig. 26e): dorsal margin of pedunculus with few spines; exopodite with 0, 1, or 2 middorsal spines, endopodite with 1. Uropod 2

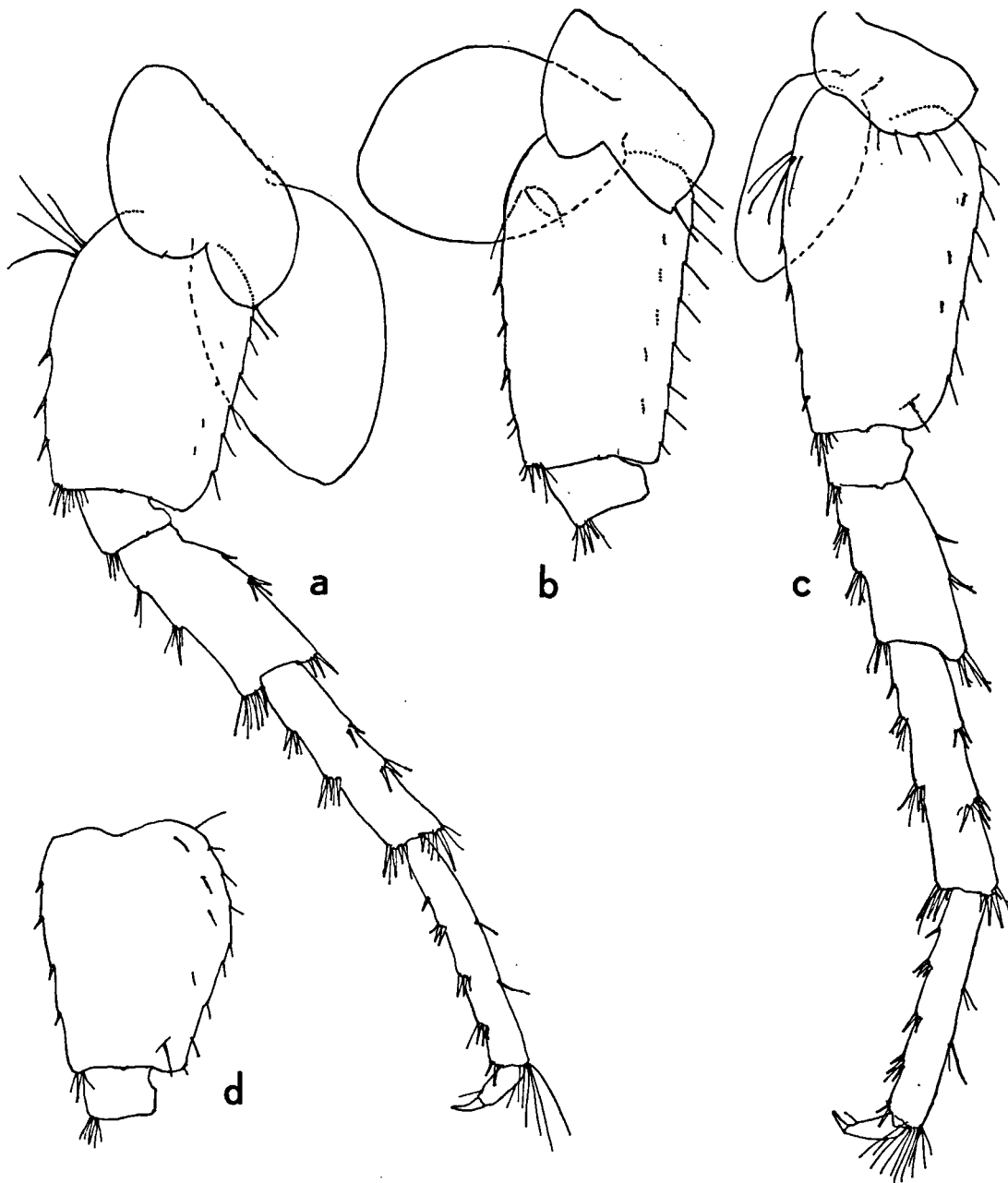


Fig. 27. *Gammarus lobifer* n. sp., paratypes. a. pereopod 5, ♂; b. basal segments of pereopod 6, ♂; c. pereopod 7, ♂; d. basis of pereopod 7, ♀ (all to same scale as 26b-g).

(Fig. 26f): exopodite shorter than endopodite, both rami with 1 middorsal spine. Uropod 3 not very long (Fig. 26g); exopodite slightly more than twice as long as endopodite, distal segment small (shorter than distal spines of proximal segment); endopodite narrow, tapering, with 1 distal spin-

ule. Setae on endopodite mostly plumose, some glabrous. Medial setae of exopodite mostly plumose, distal setae glabrous, lateral setae glabrous in proximal part of ramus, plumose in distal part.

Telson (Fig. 24j) cleft; each lobe truncate, with

1 lateral spine, 2 subdistal, lateral setae, 3 subdistal, medial setae; distal armature of 2 spines and 4 setae. Two sensorial setules, implanted on dorsal surface of telson lobe, near subdistal setae.

Female: Slightly smaller than male. Propodus of gnathopod 1 (Fig. 25c) smaller, shorter, more rectangular, without mid-palmar spine and with fewer auxiliary spines on posterior margin. Propodus of gnathopod 2 (Fig. 26a) narrow, elongate, without mid-palmar spine; carpus elongate as well. Basis of pereopods 6 and 7 (Fig. 27d) wider and more elongate than in male. Oostegites as illustrated (Fig. 26d).

**Etymology.** - The specific name *lobifer* is based on the Latin words *lobus* (= lobe) and *ferre* (= to bear), alluding to the freely produced posteroventral corner of the basis of pereopods 5 to 7.

**Variability.** - The material from Chesmeh-e-Balfes differs from the other material in having the basis of pereopod 7 more acuminate and without submarginal setae. Moreover, the epimeral plates 2 and 3 are more strongly pointed.

**Remarks.** - The new species shows a combination of characters shared only by a limited number of members of this large genus. These characters are: (1) a large, elongate eye (versus small; rounded to reniform in members of the *G. pulex*-group); (2) the presence of a protruding posteroventral lobe on the basis of pereopods 5 to 7; (3) endopodite of uropod 3 half or less than length exopodite. Two western European species, *G. duebeni* Liljeborg, 1852 and *G. finmarchicus* Dahl, 1938 show these characters. However, *G. duebeni* has longer and more numerous setae on pereopods 5 to 7, urosome, and posterior margin of the epimeral plates, moreover antenna 2 ♂ bears calceoli. *G. finmarchicus* lacks subangular armature on the posteroventral lobe of the basis of pereopod 7, has a shorter endopodite of uropod 3, a shorter gland cone on antenna 2, a longer accessory flagellum, and a richer setation on the peduncle of antenna 1.

No doubt close to the new species is *G. cantor* G. Karaman, 1978 from around Limin on the island of Thásos in the Aegean Sea (spelt Limen

and Tasos in Karaman's paper). *G. cantor* (the specific name means "singer" in Latin, but we have near heard the chant of a *Gammarus*) differs from the new species in the absence of lateral spines on urosomite 1, in shorter setae on the posterior margin of the basis of pereopods 5 to 7, the absence of subangular armature on the basis of pereopod 7, a longer endopodite of uropod 3, prevailing smooth (not plumose) setae on uropod 3, presence of calceoli on male antenna 2, and absence of long setae on the posterior margin of the propodus of pereopods 3 and 4.

The elongate carpus and propodus of the female gnathopod 2 might also be distinctive of the new species, just as the long gland cone of antenna 2, but these features are often insufficiently described by older authors.

## B. SPECIES RESTRICTED TO THE OPEN WATERS OF THE CASPIAN SEA

Genus *Chaetogammarus* Martynov, 1924

### **Chaetogammarus pauxillus** (Sars, 1896)

*Gammarus pauxillus* Sars, 1896: 467-469, pl. X figs. 1-17.

*Gammarus (Chaetogammarus) pauxillus*; Birstein & Romanova, 1968: 282, fig. 313

*Echinogammarus pauxillus*; Barnard & Barnard, 1983: 489.

**Material.** - 39 specimens Caspian Sea off Guilan Province, (37°33'N 49°30'E), depth 75 m, 1992.

**Remark.** - A Caspian endemic.

Genus *Amathillina* Sars, 1894

### **Amathillina cristata** Sars, 1894

*Amathillina cristata* Sars, 1894: 202-207, pl.5, pl.6 figs. 1-8;

Birstein & Romanova, 1968: 249, fig. 260; Mordukhai-Boltovskoi et al., 1969: 461, pl. VIII fig. 1.

**Material.** - 2 specimens Caspian Sea, off Guilan province, (37°18'N 50°15'E), depth 75 m, 1992.

**Remark.** - Distributed in the Black Sea but mainly in the Caspian basin.

Genus *Gmelinopsis* Sars, 1896

***Gmelinopsis aurita* Sars, 1896**

*Gmelinopsis aurita* Sars, 1896: 437-439, pl. 3 figs. 20-28;  
Birstein & Romanova, 1968: 273, fig. 299.

**Material.**- 13 specimens Caspian Sea, off Guilan province, (36°18'N 50°15'E), depth 75 m, 1992. 5 Specimens, Caspian Sea, 37°08'N 50°35'E, near Nowshahr shore, depth 100 m, 1992

**Remark.**- A Caspian endemic.

Genus *Axelboeckia* Stebbing, 1899

***Axelboeckia spinosa* (Sars, 1894)**

*Boeckia spinosa* Sars, 1894: 183-191, pls. I-II.  
*Axelboeckia spinosa*; Birstein & Romanova, 1968: 247, pl. II  
fig. 3.

**Material.**- 5 specimens Caspian Sea, off Guilan Province, (38°05'N 49°25'E), depth 75 m, 1992.

**Remark.**- Caspian Sea, Volga and Ural rivers (Barnard & Barnard, 1983: 532).

Genus ***Scytaelina* n. gen.**

**Definition.**- Small-sized Gammaridae of the *Gmelina*/*Cardiophilus* group. Head without antennal sinus. Eyes not visible (in preserved material). Mesosomal pleurae with acuminate posteroventral corner. Coxal plates with very few setae, 4th plate with posterior emargination. Mesosomites not keeled or knobbed. Pleosomite 3 and urosomite 1 knobbed. Telson fleshy, with shallow cleft.

Antenna 1 poorly setose; flagellum segments subequal in length to peduncle segments; aesthetascs long; accessory flagellum rudimentary, 1-segmented. Antenna 2 shorter than antenna 1; flagellum of 3 segments only.

Mandible palp 3-segmented; all segments lacking ventral armature; left lacinia mobilis 4-dentate. Maxilla 1 with strong palp, left and right palp strongly asymmetrical. Maxillipedal palp with strong claw.

Gnathopods 1 and 2 subsimilar in size and shape, both feeble. Pereiopods very poorly setose. Basis of pereiopods 5 to 7 without projecting ventrodistal lobe; basis of pereiopods 5 and 6 linear, of pereiopod 7 with convex posterior margin.

Pleopodal rami all 3-segmented, peduncle short; retinacula multidentate, elongate. Uropods: armature restricted to top of rami. Uropod 3 short, hardly overreaching uropod 2, parviramous.

**Type species.**- *Scytaelina simplex* n. sp.; Caspian.

**Etymology.**- The generic name *Scytaelina* (gender: feminine) is contrived, with clear allusions to the Scytae (a civilized people, probably of Iranian descent, living around the Caspian Sea around 600 BC) and the final part of the name of the related Ponto-Caspian amphipod genus *Gmelina*. The specific name, *simplex* (Latin, simple) refers to the very simple armature of most of the appendages.

**Relationship.**- Within the Ponto-Caspian swarm of genera and species, the new genus shows affinities with the *Gmelina*-group, by absence of a posteroventrally produced lobe on the basis of pereiopod 7 and by the reduction to 1, rarely 2 segments, of the accessory flagellum of antenna 1. Karaman & Barnard (1979) fragmented the old genus *Gmelina* Sars, 1894 into *Gmelina* s. str., *Yogmelina* and *Kuzmelina*. Contrary to the opinion of Barnard & Barnard (1983: 559), we consider *Cardiophilus* Sars, 1896 an apomorph of the *Gmelina*-group, with a number of derived character states (mainly the reduced size of the palp of maxilla 1 and of the maxillipedal claw), probably due to an associated way of life with bivalve molluscs.

From all genera in the *Gmelina*-group, the genus *Scytaelina* differs in (1) the absence of an antennal sinus; (2) acuminate posteroventral corners on the mesosomal pleurae; and (3) the naked ventral margin of all mandible palp segments (only the distal tip of palp segment 3 bears setae).

*Scytaelina* differs from *Gmelina* (with 2 species) and the monotypic *Kuzmelina* by (1) the absence

of mesosomal humps; (2) the short uropod 3; (3) the 1-segmented exopodite of uropod 3, in which the armature is reduced to a few terminal setae; (4) the shallow (not deep) telson cleft; (5) antenna 1 overreaching antenna 2 in length; and (6) the reduced number of segments in the flagelli of both antennae.

Four of the five species of *Yogmelina* have a long third uropod. Only *Y. brachyura* (Derzhavin & Pjatakova, 1962) has, like the new genus, a shortened third uropod. This species agrees also with *Scytaelina* in a strong reduction of the exopodal armature on uropod 3. The ventral margin of the coxal plates and the posterior margin of the basis of pereopods 6 and 7 are almost smooth in *Scytaelina*, setose in *Yogmelina*.

In general habit, *Scytaelina* looks very much like *Cardiophilus* (a genus with 2 species, both Ponto-Caspian), e.g. in the antennal morphology, the long claw of pereopods 3 to 7, the almost unarmed coxal plates 1 to 4, and the short uropod 3. The main differences reside in the mouthparts: (1) palp of maxilla 1 strongly developed in *Scytaelina*, reduced in *Cardiophilus*, and (2) claw of maxilliped strong in *Scytaelina*, reduced in *Cardiophilus*. Additional differences are furthermore: (3) carpus and propodus of gnathopods 1 and 2 of similar size and shape in *Scytaelina*, very dissimilar in *Cardiophilus*; (4) accessory flagellum of antenna 1 reduced to a 1-segmented vestige in *Scytaelina*, 2- to 4- segmented in *Cardiophilus*; (5) urosomite 1 humped in *Scytaelina*, smooth in *Cardiophilus*.

The strong, curved pereopodal claws and the simplified nature of both antennae, gnathopods, pereopods, pleopods, and urosomal appendages, may indicate that *Scytaelina*, instead of being free-living, is an associate of some invertebrate, perhaps a bivalve mollusc, just as *Cardiophilus baeri* Sars, 1896.

### ***Scytaelina simplex* n. sp.**

Figs. 28-31.

**Material.**- One holotype and one paratype, probably both females, ZMA Amph. 202041. Caspian Sea (38°10'N 49°15'E), depth 75 m, 1992.

**Description.**- Body (Fig. 28a): length 3.3 -

3.5 mm. Essential characters as in generic diagnosis. Shape of head characteristic: head lobes truncate in lateral view (Fig. 28a), wing-like in dorsal view (Fig. 28b). Dorsum with low humps (one left, one right) on pleonite 3; strong "saddle" on urosomite 1, accompanied by low hump on either side; urosomite 2 dorsally covered by urosomite 1; urosomites 2 and 3 unarmed (Fig. 28a).

Antenna 1 (Fig. 28c): peduncle segment 1 longest, segments 2 and 3 subequal; accessory flagellum small, squarish, 1-segmented, with 2 distal setae; flagellum 5-segmented, segments 3 and 4 each with 1 long distal aesthetasc.

Antenna 2 (Fig. 28d) poorly setose, slightly more than half as long as antenna 1; gland cone conical, robust; flagellum consisting of 2 long and 1 short segment; no calceoli.

Upper lip (Fig. 28e) more or less trapezoidal in outline. Mandible palp naked, but for 3 long and 2 short terminal setae on segment 3 (Fig. 28f); incisor 5-dentate (left) or 4-dentate (right); lacinia mobilis 4-dentate (left) or bifid, finely toothed (right); molar seta short (left) or long (right) (Fig. 28g). Lower lip without inner lobes (Fig. 28h). Maxilla 1 with well-developed, 2-segmented palp; left palp narrow, slender, distally armed with 5 slender spines (Fig. 28j); right palp broad, robust, distally armed with 4 short, broad spines and 1 seta (Fig. 28i); outer lobe with 6 spines, armed with denticles on medial margin; number of denticles, from lateral to medial, 2, 1, 2, 3, 2, 1 (left) or 2, 1, 2, 2, 2, 2 (right). Maxilla 2 (Fig. 28k): outer lobe with 2 distal rows of setae, 5 or 6 setae in each row; inner lobe with oblique row of 2 strong setae, and 2 distal rows of fine setae, 3 to 6 setae per row. Maxilliped (Fig. 29a): outer lobe wide, reaching to proximal third of palp segment 2, distally armed with 3 spines; inner lobe narrower than outer lobe, likewise with 3 distal spines; palp with few setae, claw long, thin, curved.

Gnathopod 1 (Fig. 29b): coxal plate elongate, rounded, with 2 setae; basis long, narrow; carpus widely triangular; propodus narrower than carpus, almost rectangular; palma transverse, short, armed with fine spinules; 3 palmar angle spines. Gnathopod 2 (Fig. 29c) almost as gnathopod 1, but carpus elongate-triangular; propodus with 1 palmar angle spine.

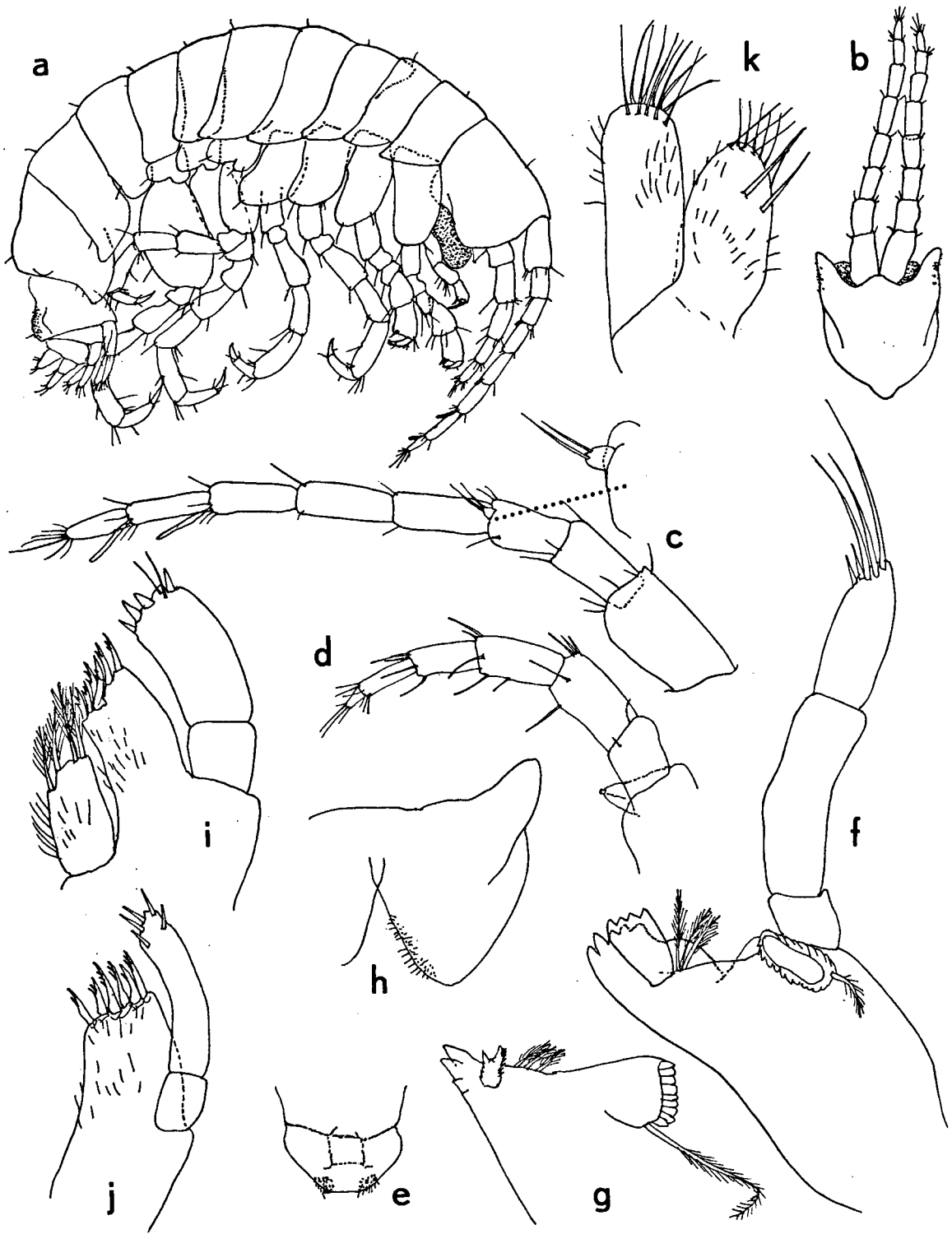


Fig. 28. *Scytaelina simplex* n. gen., n. sp. (holotype). a. entire animal, from the right (actual length c. 3.2 mm); b. head and antenna 1, dorsal; c. antenna 1; d. antenna 2; e. upper lip; f. left mandible; g. right mandible (palp omitted); h. lower lip; i. right maxilla 1; j. left maxilla 1. inner lobe omitted; k. maxilla 2 (a-b to same scale; f-k to same scale).

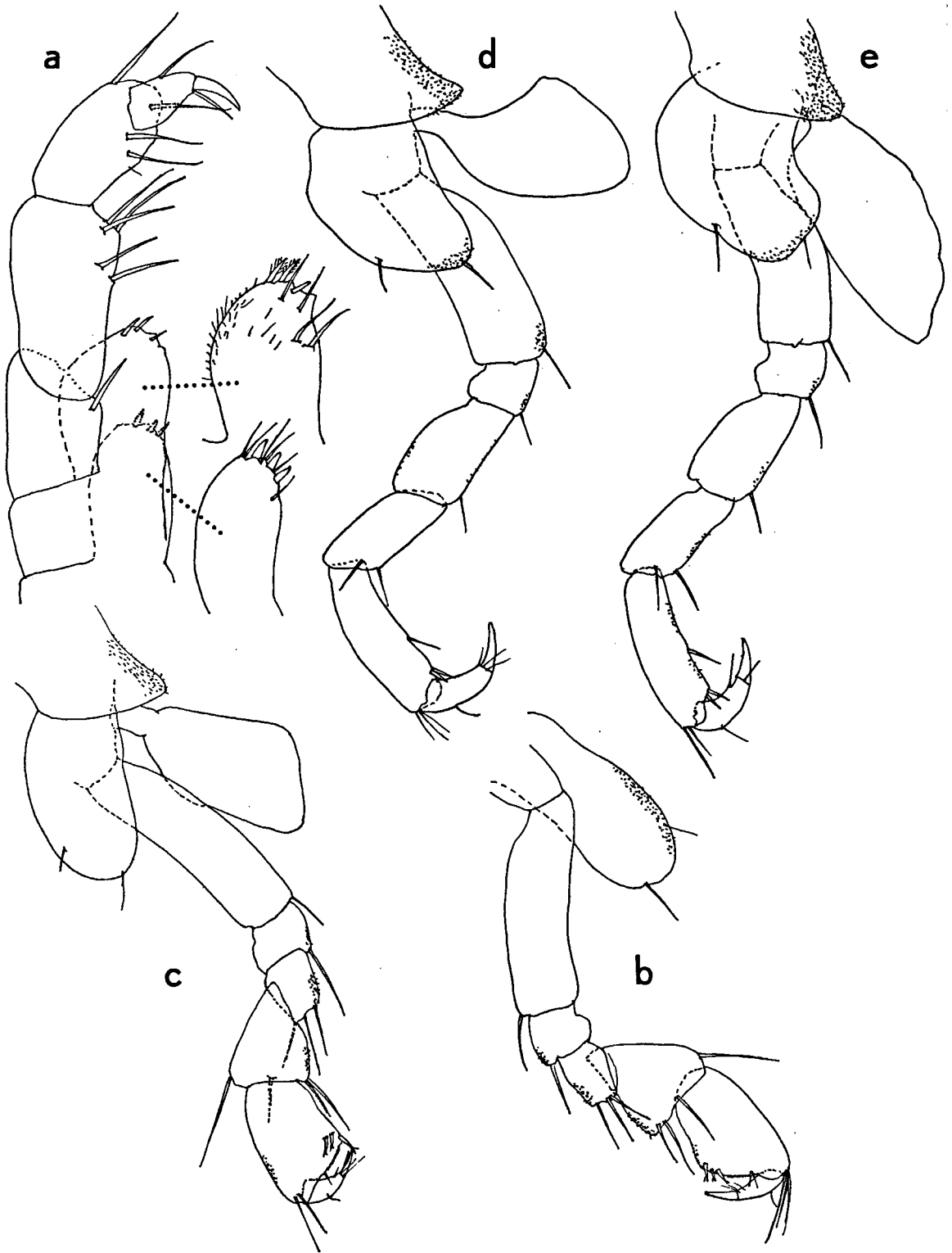


Fig. 29. *Scytaelina simplex* n. gen., n. sp. (holotype). a. maxilliped; b. pleura + gnathopod 1; c. pleura + gnathopod 2; d. pleura + pereopod 3; e. pleura + pereopod 4 (b-e to same scale; a to same scale as remaining mouthparts).

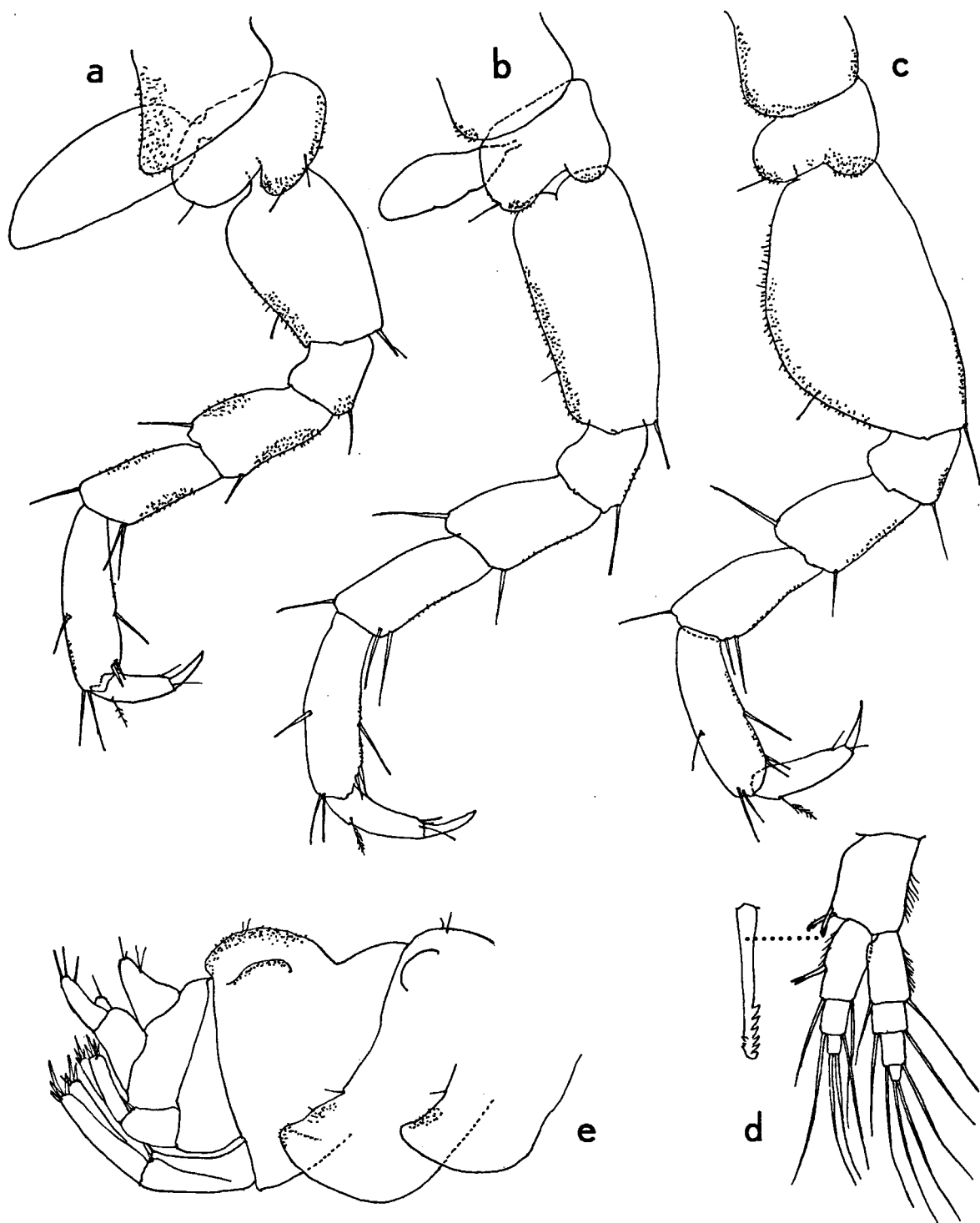


Fig. 30. *Scytaelina simplex* n. gen., n. sp. (holotype). a. pleura + pereiopod 5; b. pleura + pereiopod 6; c. pleura + pereiopod 7; d. pleopod 1, plumosity of all setae omitted; e. posterior end of body, from the right (a-c, to same scale; d-e to same scale).



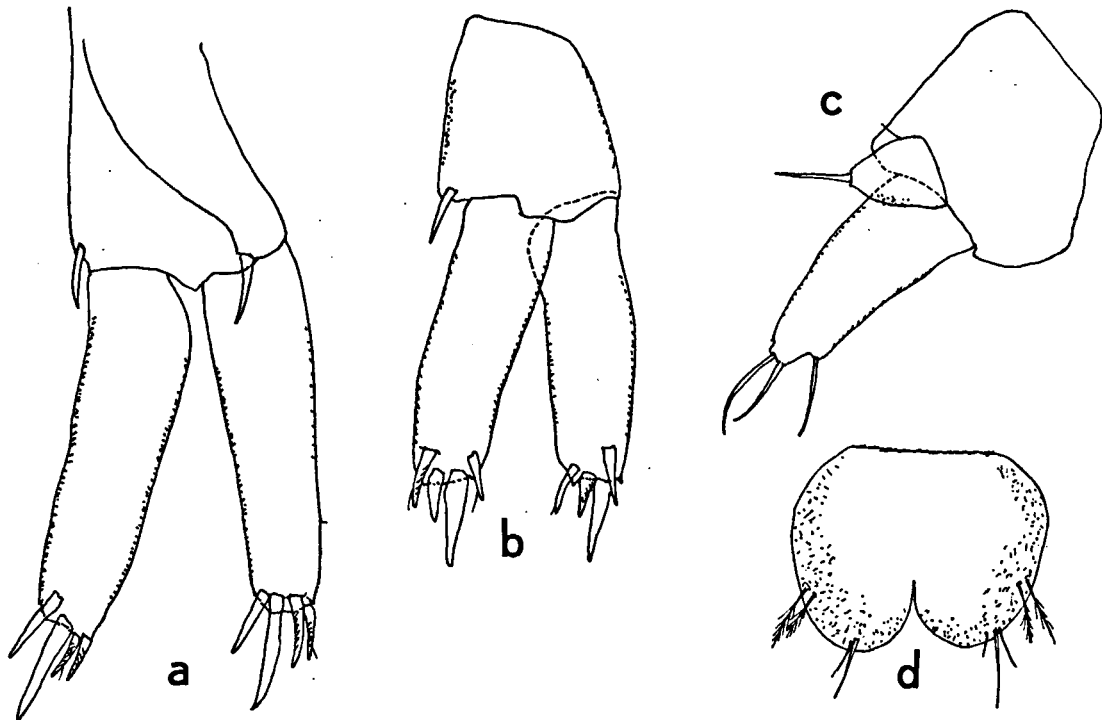


Fig. 31. *Scytaelina simplex* n. gen., n. sp. (holotype). a. uropod 1; b. uropod 2; c. uropod 3; d. telson (all to same scale).

Pereiopods 3 (Fig. 29d) and 4 (Fig. 29d) similar, but for coxal plate (narrow with rounded ventral margin in P3; wider, with straight ventral margin and marked posterior emargination in P4).

Pereiopod 5 (Fig. 30a) shorter than 6; basis with straight posterior margin, more or less rectangular, slightly tapering; claw about 60% of length of propodus, slender, curved. Pereiopod 6 (Fig. 30b) resembling P5, but basis much more elongate, and claw slightly longer. Pereiopod 7 (Fig. 30c) about as long as P6; basis wider, with convex posterior margin. Basis of P5 to P7 mainly armed with very short setules. Coxal gills on gnathopod 2 and pereiopods 3 through 6 (that of P6 small). Oostegites not found.

Epimeral plates (Fig. 30e) rounded. Mesosomites, pleosomites, and urosomite 1 each with 1 pair of dorsal setules, but without spines. Pleopods (Fig. 30d) resembling that of a bogidiellid; rami short, 3-segmented; each segment with 2 plumose setae; first endopodite segment more-

over with 1 clothespeg spine on medial margin; peduncle only 2/3 as long as rami, with 2 very long and thin retinacula. All pleopods similar.

Uropod 1 (Fig. 31a) without proximoventral peduncular spine; exopodite slightly shorter than endopodite; each ramus with 4 terminal spines; 2 spines on each ramus striate. Uropod 2 (Fig. 31b) with short peduncle; each ramus with 4 terminal spines, 1 spine on each ramus striate. Uropod 3 (Fig. 31c) short; peduncle unarmed; exopodite 1-segmented, tapering, with 1 subterminal and 2 terminal setae; endopodite triangular, longer than wide, with 1 terminal seta.

Telson (Fig. 31d) fleshy, wider than long, rounded; mid-terminal cleft not reaching middle of telson; each lobe with 2 or 3 short setae; 2 plumose sensory setules near lateral margin.

Remarks. - The low number of segments in the flagellum of antennae 1 and 2 and in the pleopodal rami, as well as the small body size, might indicate that the type-specimens are not

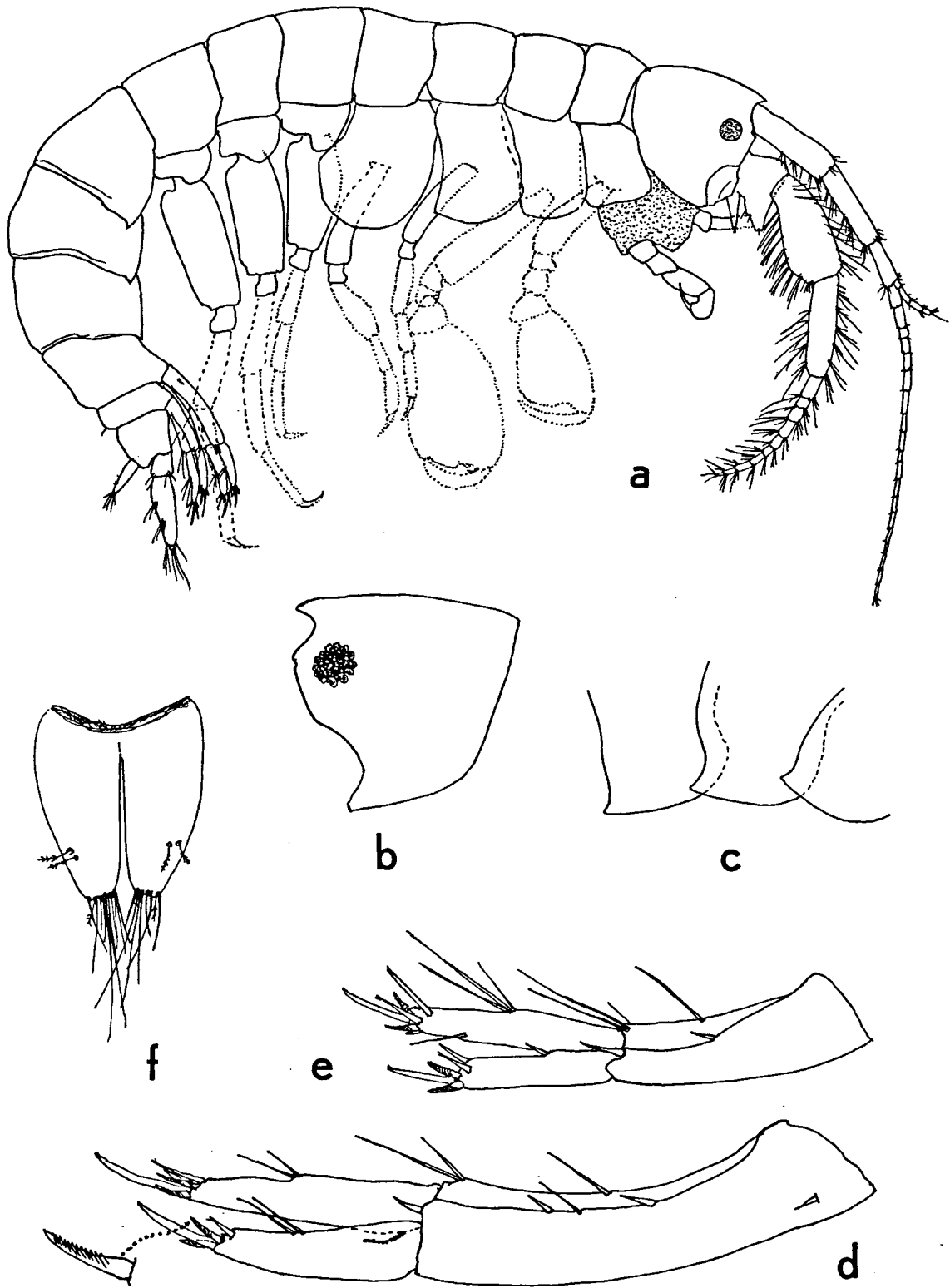


Fig. 32. *Derzhavinella cava* n. sp., ♀. a. entire animal (actual length 8.5 mm), from the left; b. head, from the right; c. epimeral plates 1 to 3 (same scale as b); d. uropod 1; e. uropod 2; f. telson (d-f to same scale).

full-grown. However, both specimens are heavily sclerotized, and not at all of the thin-cuticled nature of juveniles.

Genus *Derzhavinella* Birstein, 1938

A highly characteristic genus, by its antenna 2 (ventrally produced peduncle segment 3, ventrally keeled peduncle segment 4), and large hands of gnathopods 1 and 2. The genus is endemic to the Caspian Sea. So far only one species was known, *D. macrochelata* Birstein, 1938, but during the present survey a second species was discovered, described below.

***Derzhavinella cava* n. sp.**

Figs. 32-36, 37a-d.

**Material.**- 1 ♀ (holotype), ZMA Amph. 202366. S.W. Caspian Sea, Anzali (37°25'N 49°35'E), depth 45 m, 19 September 1993. 64 Specimens of both sexes, S.W. Caspian Sea, off Guilan province coast, depth 50 m, 1993. 7 Specimens, same locality, depth 75 m, 1992. 1 ♂, Same locality, depth 100 m, 1992

**Description.**- Female: Head and pereion (Fig. 32a) smooth. Dorsum of urosomites with variable ornamentation: entirely unarmed, or with 1 or 2 setules on urosomite 2, more rarely also with 1 or 2 setules on urosomites 1 and 3. Total body length (without antennae and uropods) 8.5 mm. Head (Fig. 32b) with distinct, shallow antennal sinus; eye round, well-pigmented.

Antenna 1 (Fig. 33a) slightly over half as long as body. Peduncle segments 1 and 2 of equal length, with 4 to 5 groups of long setae on ventral margin; segment 3 less than half as long as segment 2. Accessory flagellum well-developed, 4-segmented. Flagellum 17-segmented, armed with few, short setules; one aesthetasc on each of segments 4 to 16, mostly about half as long as corresponding flagellum segment, but longer on segments 15 and 16.

Antenna 2 (Fig. 33b) distinctly shorter than antenna 1; gland cone thin, pointed; peduncle segment 3 with strong ventral keel, projecting into bifid tip; peduncle segment 4 slightly keeled ventrally, ventral margin with 9 groups of long

setae (as long as ventral setae on segment 5); dorsal surface of segment 4 likewise with long setae; segment 5 ventrally with 5 bunches of long setae, dorsal surface likewise with long setae. Flagellum 11-segmented, with long ventral and dorsal setae.

Upper lip (Fig. 33c) of usual shape. Mandible (Fig. 33d) with 5-dentate incisor; left lacinia mobilis (Fig. 33e) 4-dentate, right lacinia tricuspidate, finely toothed; molar seta present on both sides, right one longer than left one. Mandible palp (Fig. 33f): segment 1 with several setae; segment 2 with numerous long setae; segment 3 hardly shorter than segment 2, with several A-, B-, C-, and E-setae, and row of 12 D-setae of regular length. Lower lip (Fig. 33g) with vestigial inner lobes.

Maxilla 1 (Fig. 34a) with elongate-triangular inner lobe, armed with 9 plumose setae; outer lobe with 11 distal spines, whose medial margins are denticulate (from medial to lateral, spines bear 3, 5, 9, 4, 7, 11, 3, 9, 3, 6, and 4 denticles on left lobe; 9, 3, 4, 6, 8, 5, 9, 6, 9, 3, and 3 denticles on right lobe).

Right palp (Fig. 34b) less slender than left palp; (sub)distal armature of 6 spines + 6 setae (right) or 1 spine + 12 setae (left). Maxilla 2 (Fig. 34c): inner lobe with oblique row of 6 plumose setae; both lobes with usual distal setae.

Maxilliped (Fig. 34d): inner lobe, reaching to end of palp segment 1, with 3 spines on distal margin; outer lobe reaching to halfway palp segment 2; claw of palp long and thin.

Gnathopod 1 (Fig. 35a) with quadrate coxal plate, ventral margin of which naked. Propodus (Fig. 35b) slightly widening distally; palmar margin slightly S-shaped, armed with setae only; no mid-palmar spine; 3 short palmar angle spines, claw longer than palmar margin, outer surface with several setae.

Gnathopod 2 (Fig. 35c): coxal plate much longer than wide, ventral margin with 3 setules; coxal gill with long stalk, blade ovoid, about as long as stalk. Propodus (Fig. 35d) much larger than that of gnathopod 1, broadly oval, with long setae on ventral and dorsal surface; palmar margin with 2 excavations, a wide and shallow one near the 2 conical palmar angle spines, and a narrower one near the conical mid-palmar spine; claw shorter than palmar margin, outer

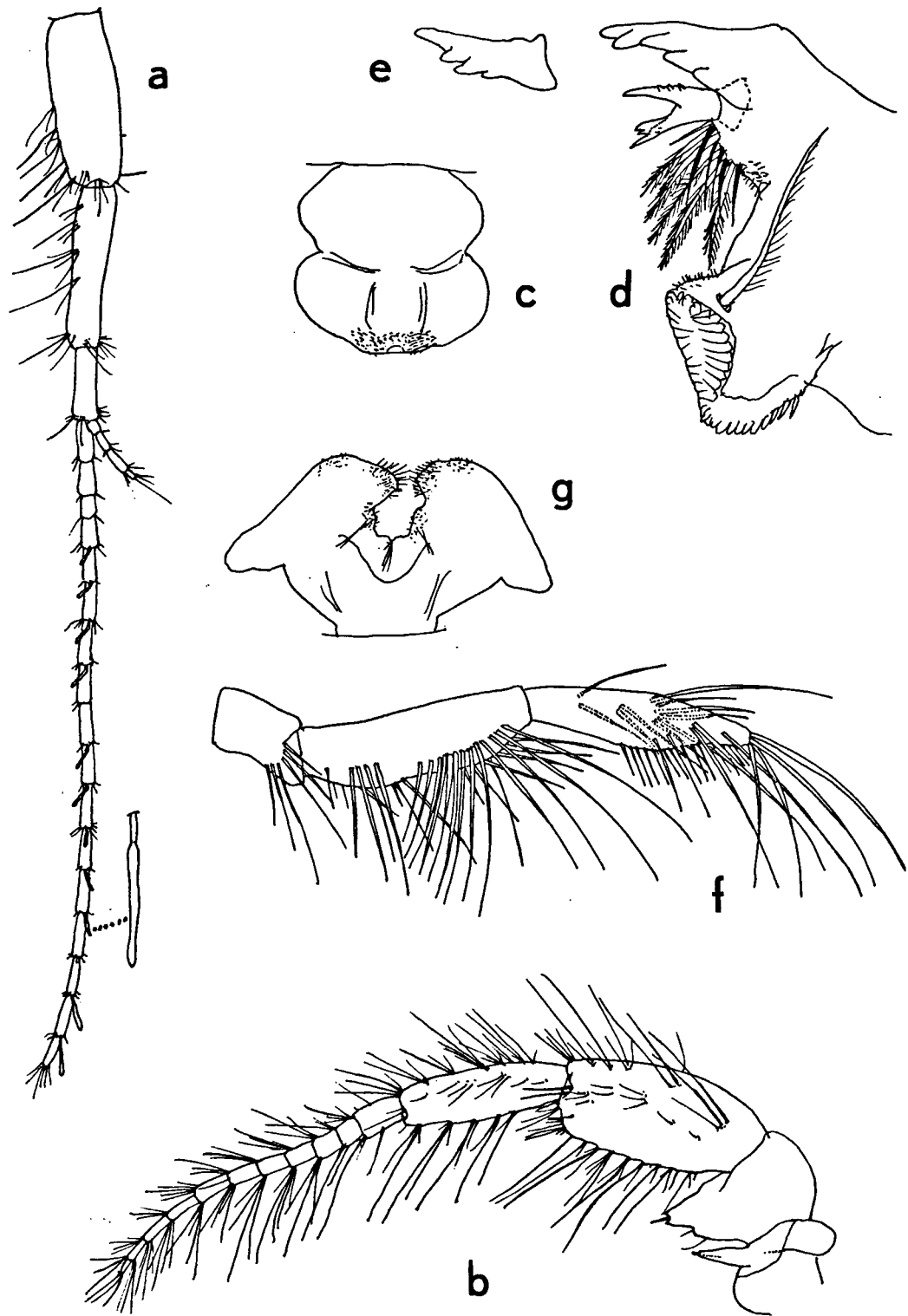


Fig. 33. *Derzhavinella cava* n. sp., ♀. a. antenna 1; b. antenna 2 (same scale as a); c. upper lip, d. right mandible; e. left lacinia mobilis (same scale as d); f. mandible palp; g. lower lip (c, f, and g to same scale).

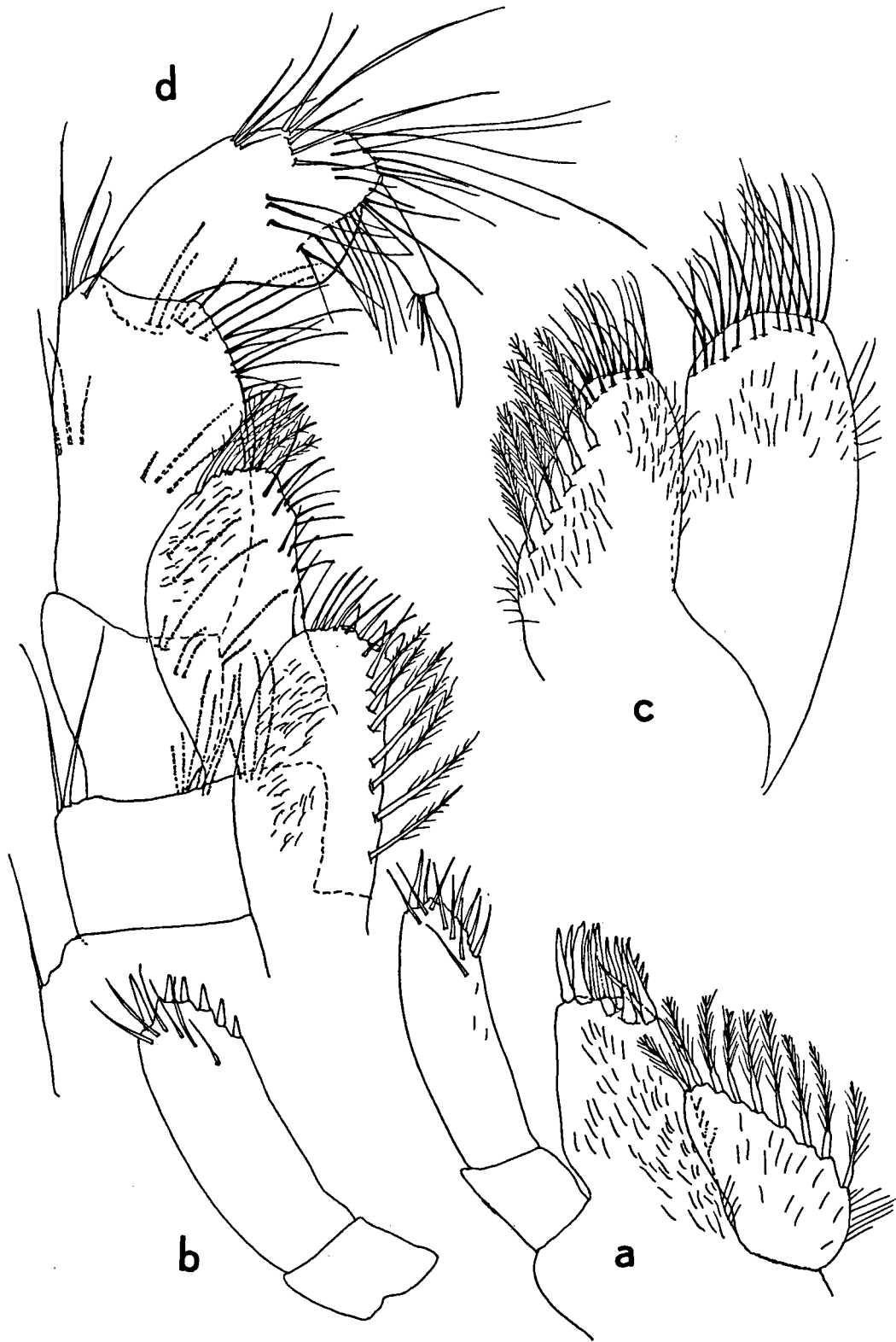


Fig. 34. *Derzhavinella cava* n.sp., ♀. a. left maxilla 1; b. palp of right maxilla 1; c. maxilla 2; d. maxilliped (all to same scale).

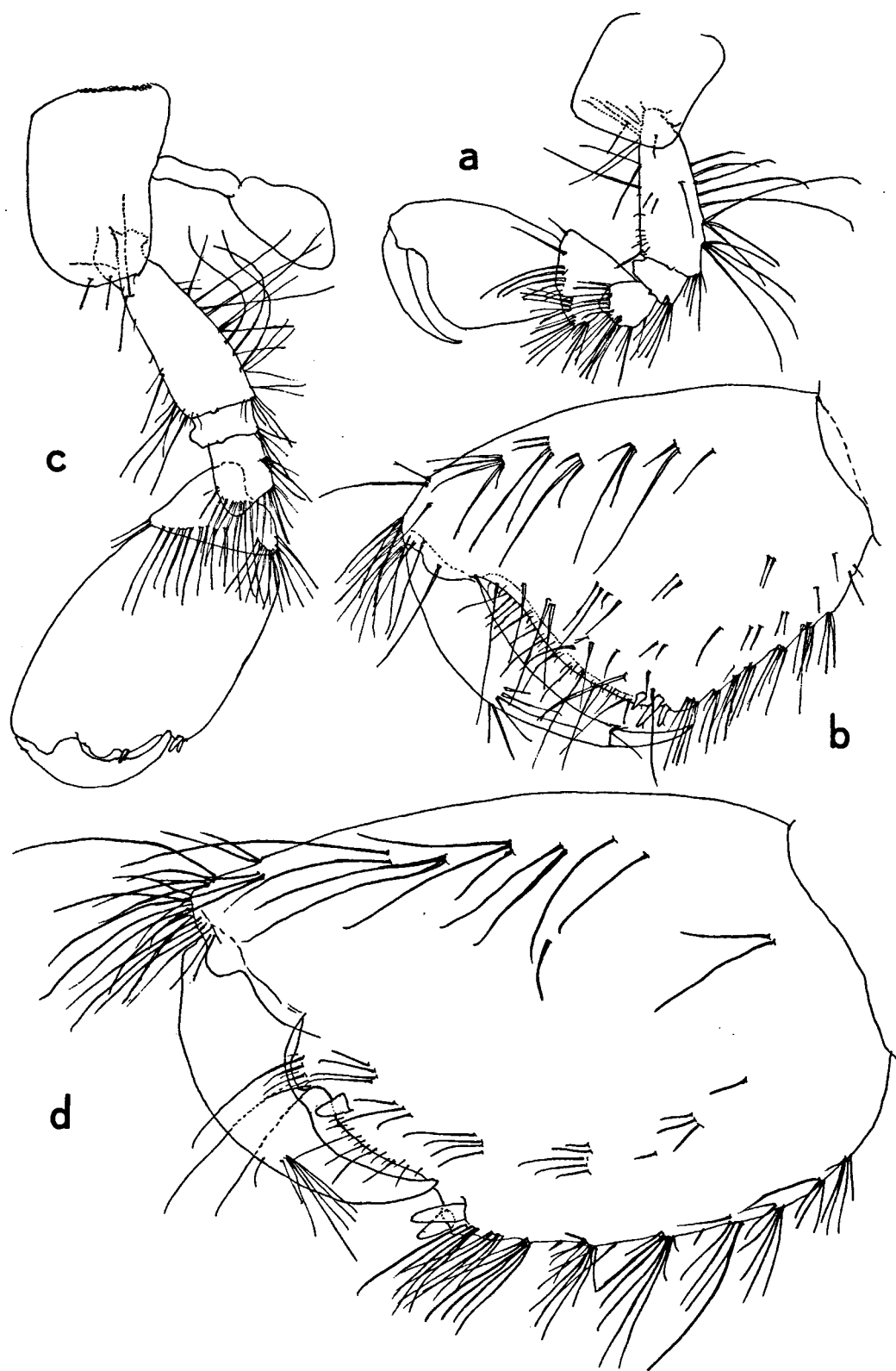


Fig. 35. *Derzhavinella cava* n. sp., ♀. a. gnathopod 1; b. propodus of gnathopod 1; c. gnathopod 2 (same scale as a); d. propodus of gnathopod 2 (same scale as b).

surface with several setae.

Pereiopod 3 (Fig. 36a) with subrectangular coxal plate, bearing several setules on and near ventral margin. Coxal gill with long stalk. Anterior and posterior margins of basis and merus with long setae, posterior margin of carpus with some long setae, of propodus with 3 spines.

Pereiopod 4 (Fig. 36b) shorter than pereiopod 3. Coxal plate rounded, ventral margin almost unarmed; posterior emargination shallow. Coxal gill with shorter stalk and larger blade than on pereiopod 3. Fewer setae on basis and merus.

Pereiopod 5 (Fig. 36c) shorter than subequal pereiopods 6 and 7. Coxal plate anterolobate. Coxal gill with short stalk. Basis with 3 spines on anterior margin and 4 setules on posterior margin; posteroventral corner weakly produced, not overhanging. with 2 setules. Entire appendage with few short setae. Claw thin, slender.

Pereiopod 6 (Fig. 36d) with small coxal gill, stalk short. Basis with 3 spines on anterior margin and 6 setules on posterior margin; posteroventral corner weakly produced. Rest of appendage as in pereiopod 7.

Pereiopod 7 (Fig. 36e) without coxal gill. Basis elongate, anterior margin with 4 spines, posterior margin with 9 setules. Merus and carpus with short setae only.

Epimeral plates (Fig. 32c) with pointed posteroventral corner; margins unarmed.

Uropod 1 (Fig. 32d) with small proximoventral peduncular spine; rami hardly more than half as long as peduncle. Exopodite slightly shorter than endopodite; exopodite with 0-2 short mid-dorsal setae, endopodite with 1-2 such setae, not reaching to top of ramus, 1 long distal spine, and 4 or 5 small distal spines, two of which being finely denticulate.

Uropod 2 (Fig. 32e): distal peduncular setae reaching to middle of endopodite; 1 to 3 mid-dorsal setae on endopodite reaching to top of ramus; exopodite with 0 or 1 mid-dorsal spine; two of terminal spines on each ramus finely denticulate.

Uropod 3 (Fig. 36f) with 2-segmented, rather broad, exopodite; distal segment minute. Endopodite tapering, not quite 40% of length of exopodite. Exopodite segment 1 with 2 groups of setae on lateral and medial margins, and long

setae on distal margin, as well as on segment 2. Endopodite with 2 short medial setae and several long terminal setae. None of these setae plumose; no spines on rami or peduncle.

Telson (Fig. 32f) almost completely cleft. Central cleft narrow, slit-like. Lateral margin of each telson lobe with 2 plumose, sensory setules; distal margin with about 4 to 9 longish, naked setae and 1 short plumose setule. Under cover glass pressure, telson cleft may open up in a V-shape (as illustrated for *D. macrochelata*).

Oostegites (Fig. 36a) spatulate, elongate, with long marginal setae; present on gnathopod 2 and pereiopods 3 through 5. Eggs few (up to 6), large.

Male: Very similar to female and of same size. No calceoli on antenna 2. Propodus of gnathopod 1 slightly more triangular in outline and with 4 palmar angle spines (Fig. 37a). Propodus of gnathopod 2 of same shape as in female, but larger. Pereiopod 7 (Fig. 37b) with longer and more numerous setae on merus and carpus. Setae on uropods 1 and 2, in particular at distal end of peduncle, longer than in female (Fig. 37c, d).

**Etymology.** - The specific name *cava* (Latin for hollow) alludes to the excavations in the palmar margin of gnathopod 2.

**Remarks.** - The new species is obviously closely related to the type-species, and only species known, *Derzhavinella macrochelata* Birstein, 1938 (see also Birstein, 1945a : 517 and especially Birstein & Romanova, 1968: 278-279, fig. 308). Birstein's (1938) description is quite detailed, but the illustrations in Birstein & Romanova (1968) are reproduced better.

The following differences exist between *D. macrochelata* and *D. cava*. It should be borne in mind, however, that of the former species only the male sex is described, and that we have not seen actual material of it.

The most obvious differences are: (1) peduncle segments 1 and 2 of antenna 1 with long setae in *D. cava* (versus naked); (2) ventral setae on peduncle segment 4 of antenna 2 as long as those on segment 5 in *D. cava* (vs. much shorter); (3) ventral setae on peduncle segment 4 of antenna 2 arranged in 9 groups in *D. cava* (vs. 5) (however, young specimens of *D. cava* have fewer

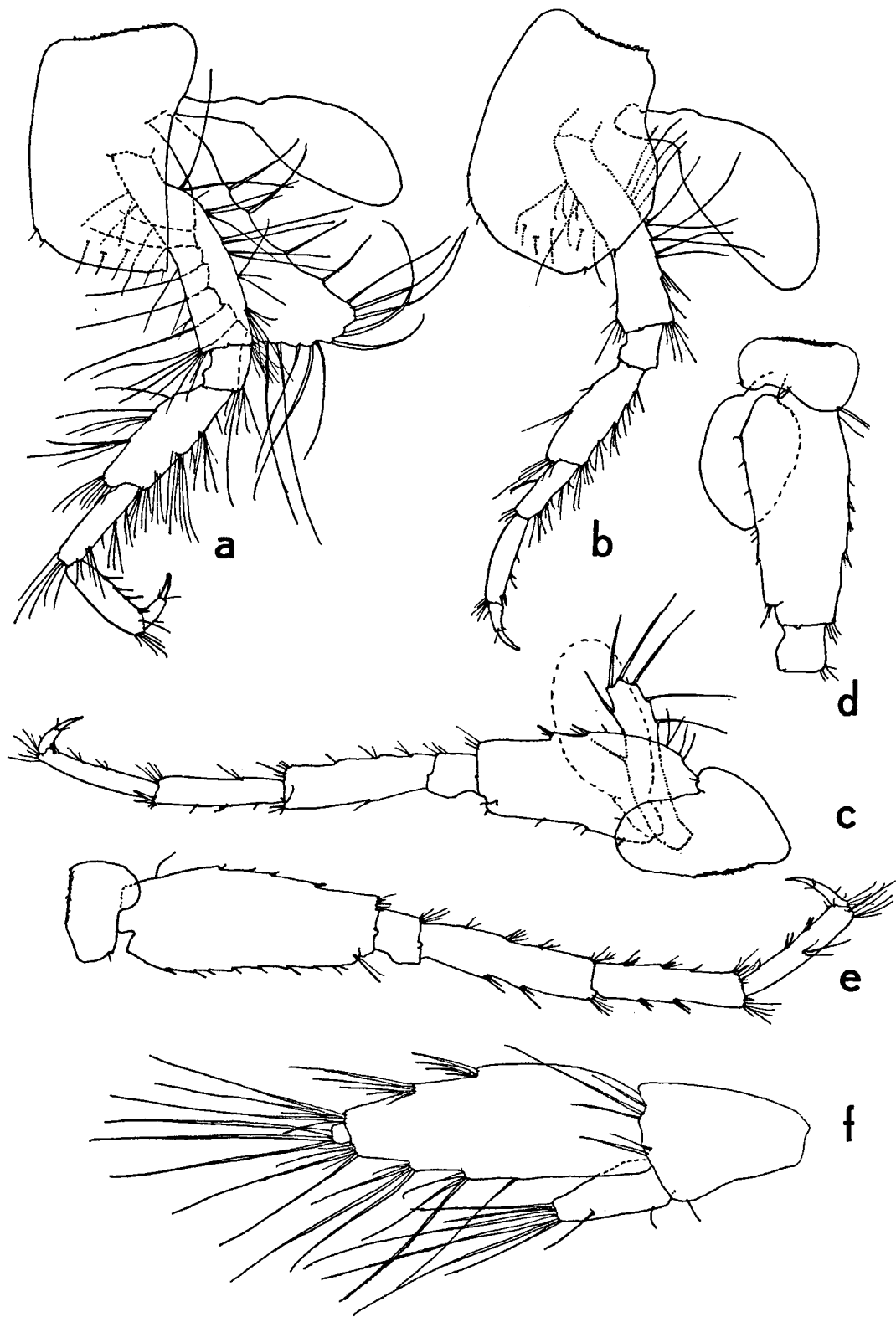


Fig. 36. *Derzhavinella cava* n. sp., ♀. a. pereiopod 3; b. pereiopod 4; c. pereiopod 5; d. basal segments of pereiopod 6; e. pereiopod 7; f. uropod 3 (a-e to same scale).



groups than adults); (4) segment 3 of mandible palp hardly shorter than segment 2 in *D. cava* (vs. much shorter); (5) E-setae of mandible palp long in *D. cava* (vs. short); (6) palma of propodus of gnathopod 1 (♂, ♀) convex in *D. cava* (vs. concave); (7) gnathopod 2 with 2 palmar angle spines in *D. cava* (vs. 1); (8) propodus of gnathopod 2 with long setae on medial surface in *D. cava* (vs. short); (9) palmar angle sinus of gnathopod 2 wide and shallow in *D. cava* (vs. narrow and deep); (10) anterior margin of merus of pereopod 3 with long setae in adults of *D. cava* (vs. short); (11) mid-dorsal setae on endopodite of uropods 1 and 2 not reaching beyond tip of ramus in *D. cava* (vs. overreaching tip of ramus); (12) proximoventral peduncular spine on uropod 1 present in *D. cava* (vs. absent).

The new species is described here in great detail, since representatives of this endemic Caspian genus are only rarely recorded.

Genus *Niphargoides* Sars, 1894

***Niphargoides grimmi* Sars, 1896.**

Fig. 37 e-f.

*Niphargoides grimmi* Sars, 1896: 471-474, pl. 11 figs. 1-12;  
Birstein & Romanova, 1968: 259, fig. 270.

*Paraniphargoides grimmi*, Stock, 1974: 87.

*Paraniphargoides(?) grimmi*, Barnard & Barnard, 1983: 557.

**Material.**- 1 specimen. Caspian Sea off Guilan province (38°28'N 48°55'E), depth 10 m, 1992

Many specimens Caspian Sea off Guilan province (37°35'N 49°10'E), depth 75 m, 1992.

Many specimens Caspian Sea off Guilan coast (37°30'N 49°30'E), depth 50 m, 1992

**Remark.**- A Caspian endemic, recorded from 10 to 300 m. This species was removed from *Niphargoides* to *Paraniphargoides* by Stock (1974), mainly because Sars (1896, pl. 11) did not show the presence of setal fans on the third epimeral plate. Examination of the present material shows that these fans are well-developed (Fig. 37f).

The mandible palp was neither described nor illustrated before. It proves to correspond with the *Niphargoides* type (Fig. 37e) and not with that of *Paraniphargoides* (cf. Stock, 1974: 81, 86, 87).

Moreover, as pointed out by Barnard & Barnard (1983: 557), segment 1 of antenna 1 of *N. grimmi* is poorly setose and departs significantly from that of *Paraniphargoides*.

In conclusion, this species has to be moved back to *Niphargoides*.

Genus *Paraniphargoides* Stock, 1974

***Paraniphargoides motasi* (Carausu, 1943)**

*Niphargoides motasi* Carausu, 1943: 168-172, pls. LVI-LX;  
Carausu et al., 1955: 211-214, figs. 182-186; Birstein & Romanova, 1968: 260, fig. 275; Mordukhai-Boltovskoi et al., 1969: 463.

*Paraniphargoides motasi*, Stock, 1974: 87; Barnard & Barnard, 1983: 556-557.

**Material.**- 1 spm. Caspian Sea off Guilan coast (37°55'N 49°20'E), depth 75 m, 1992. 10 Specimens (38°05'N 49°15'E), depth 50 m, 1992. 24 Specimens (38°10'N 49°35'E), depth 150 m, 1992. 51 Specimens (38°17'N 49°30'E), depth 100 m, 1992.

**Remark.**- Endemic of Black and Caspian Seas (Mordukhai-Boltovskoi et al., 1969).

Family Pontoporeiidae

Genus *Monoporeia* Bousfield, 1989

***Monoporeia microphthalma* (Sars, 1896)**

*Pontoporeia microphthalma* Sars, 1896: 428-430, pl. 2 figs. 1-7.  
*Pontoporeia affinis microphthalma*, Birstein et al., 1968: 285, fig. 316.

*Pontoporeia affinis* Lindström, 1855; Barnard & Barnard, 1983: 564.

*Monoporeia affinis*, Bousfield, 1989: 1715.

**Material.**- 20 specimens Caspian Sea, off Guilan coast (37°22'N 50°15'E), depth 100 m, 1992. Many specimens Caspian Sea, off Guilan coast (37°30'N 56°00'E), depth 100 m, 1992. 2 Specimens Caspian Sea, off Guilan coast (37°20'N 50°17'E), depth 75 m, 1992. 5 Specimens Caspian Sea (38°20'N 49°15'E), depth 75 m, 1992. 4 Specimens Caspian Sea, (37°32'N 49°00'E), depth 150 m, 1992. 2 Specimens Caspian Sea (37°10'N 50°35'E),

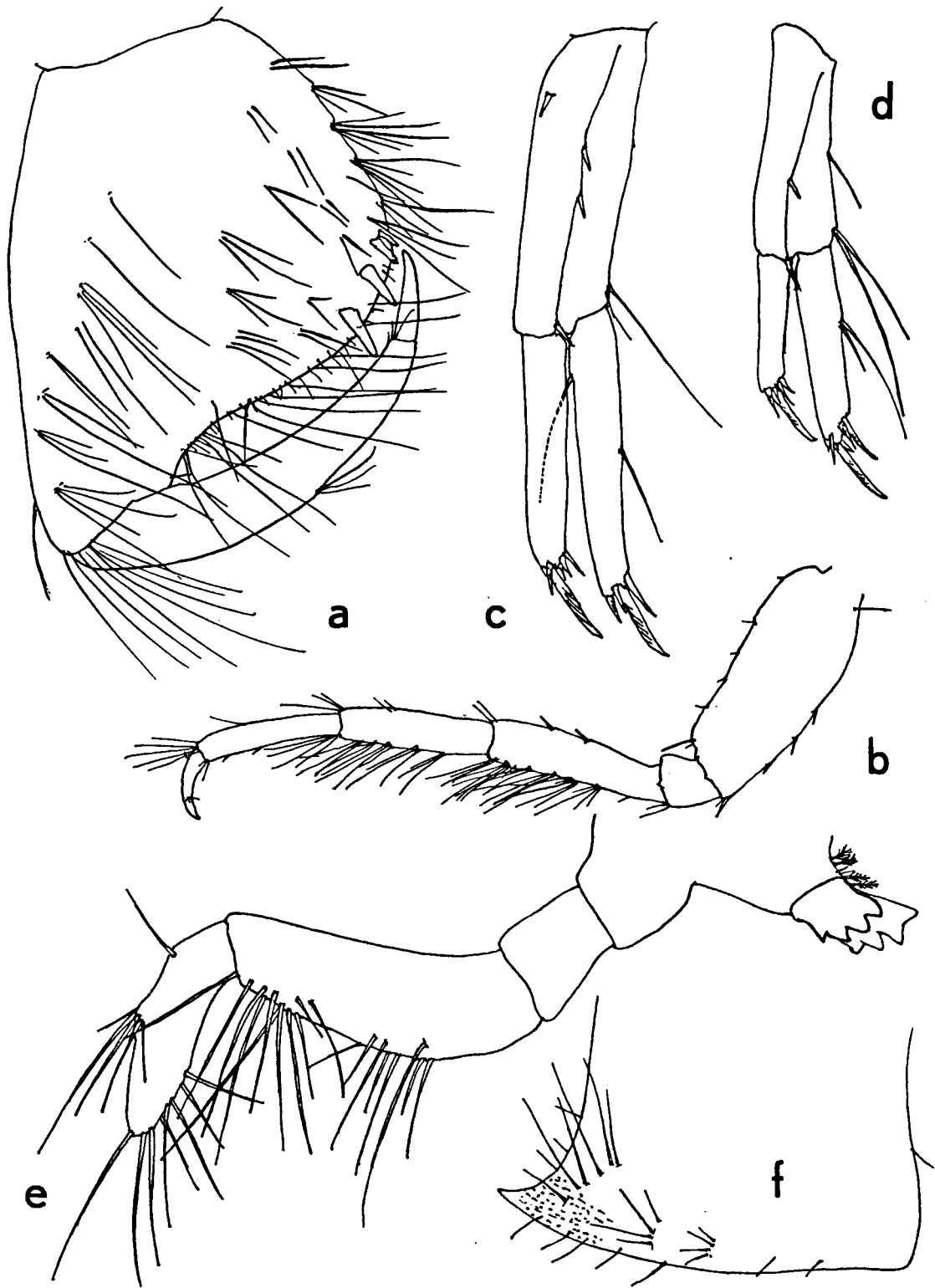


Fig. 37 a-d. *Derzhavinella cava* n. sp., ♂ . a. propodus of gnathopod 1; b. pereiopod 7; c. uropod 1; d. uropod 2 (c and d to same scale).

e-f. *Niphargoides grimmi* Sars, 1896, ♂ . e. left mandible; f. epimeral plate 3.

depth 75 m (near Nowshahr shore), 1992.

Remark.- A Caspian endemic.

Family Gammaracanthidae

Genus *Gammaracanthus* Bate, 1862

***Gammaracanthus caspius* Sars, 1896**

*Gammaracanthus caspius* Sars, 1896: 439-441, pl. 4 figs. 1-6; Barnard & Barnard, 1983: 525.

*Gammaracanthus loricatus caspius*; Birstein & Romanova, 1968: 248, fig. 259.

*Gammaracanthus (Pseudacanthus) caspius*; Bousfield, 1989: 1720.

Material.- 2 specimens Caspian Sea, off Guilan province (37°35'N 49°20'E), depth 75 m, 1992.

Remark.- A Caspian endemic, known from depths of 50-200 m.

Family Corophiidae

Genus *Corophium* Latreille, 1806

This genus counts several endemics in the Ponto-Caspian region. Three of these are represented in the present collection.

***Corophium nobile* Sars, 1895**

*Corophium nobile*; Carausu et al., 1955: 369-372, figs. 338-341 (earlier refs.); Birstein & Romanova, 1968: 289, fig. 319e; Ingle, 1969: 62-64, pls. 5a, 16b, 26a, 29 h (earlier refs.); Osadchikh, 1973: 105-106, 118, figs. 1, 6.

Material.- 3 specimens S.W. Caspian Sea, Anzali (37°35'N 49°35'E), depth 45 m, 19 September 1993. Many specimens Caspian Sea (37°30'N 49°55'E), depth 50 m, 1993. Many specimens Caspian Sea (3), depth 75 m, 1992. 2 Specimens Caspian Sea (sample IV-32), off Guilan province (38°18'N 48°55'E), depth 50 m, 1993. 1 Specimen. Caspian Sea (sample IV-40), off Guilan province (38°55'N 49°20'E), depth 50 m, 1992.

Distribution.- Caspian Sea, Volga delta, lower reaches of rivers Dniepr and Bug (Black Sea), from 3 to 75 m.

***Corophium spinulosum* Sars, 1896.**

Fig. 38.

*Corophium spinulosum* Sars, 1896: 481-484, pl. 12 figs. 18-25; Stebbing, 1906: 688; Crawford, 1937: 601; Birstein & Romanova, 1968: 288, fig. 319c; Ingle, 1969: 49-50, pls. 4c, 14a; Osadchikh, 1973: 105, 106.

Material. - 24 specimens Caspian Sea (37°33'N 49°33'E), depth 30 m, 24 and 26 August 1993, 19 September 1993. 15 Specimens Caspian Sea (37°32'N 49°29'E), depth 30 m, 19 September 1993. Many specimens Caspian Sea (38°15'N 49°35'E), depth 45 m, 19 September 1993. Many specimens Anzali wetland, sample IV-3 (37°30'N 49°25'E), depth 50 m?, 1992. 8 Specimens Caspian Sea, (37°25'N 49°55'E), depth 20 m, 1992. Many specimens, Caspian Sea (sample IV-4) (38°18'N 48°55'E), depth 50 m, no date. Many specimens Caspian Sea (sample IV-5) (36°50'N? 50°55'E), depth 50 m, no date. Many specimens Caspian Sea, (37°20'N 50°15'E), depth 75 m, 1992. Many specimens Caspian Sea, off Guilan province (sample IV-32), depth 50 m, 1992.

Remarks.- The specimens at hand agree with Sars's description and plate, except for the telson (Fig. 38d), which has a straight distal margin, flanked by a triangular process on either side. The body length of the male has never been recorded in the literature; that of the terminal male is 9.5 mm, that of mature, but non-terminal males 8 mm.

The terminal male has a very strong distoventral process on peduncle segment 4 of antenna 2 (Fig. 38a). However, many males in the collection, though apparently sexually mature, are not in the terminal (so-called "senile") stage. In such males, the process of segment 4 is distinctly shorter (Fig. 38c), approaching the female condition (Fig. 38b). Non-terminal males and females can be told apart by (1) the presence of a second, smaller, tooth on the distal process of segment 4 in the male, absent in the female; (2) the greater length of the distoventral tooth on segment 5 of antenna 2 of the male.

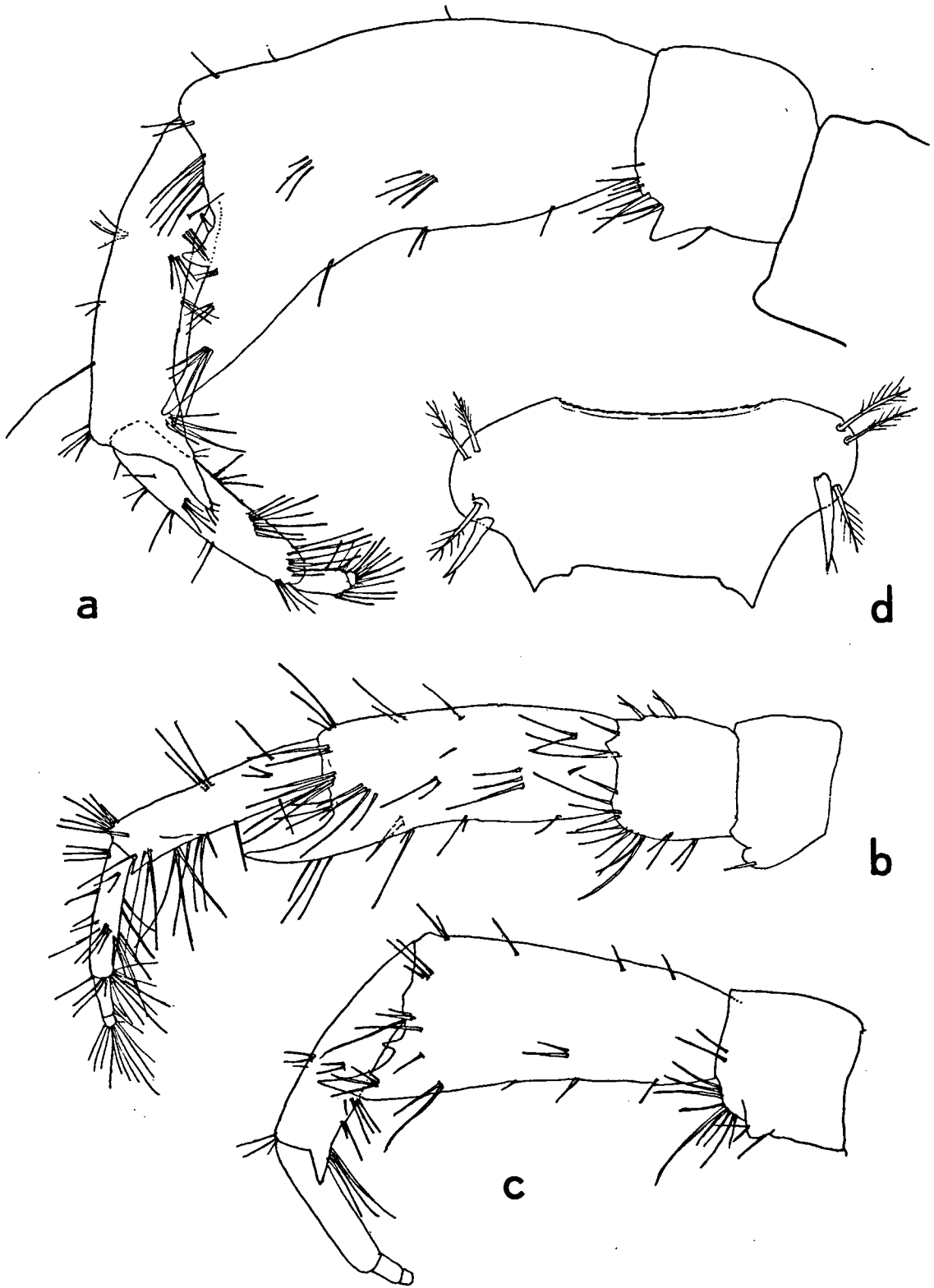


Fig. 38. *Corophium spinulosum* Sars, 1896. a. antenna 2, ♂, 9.5 mm; b. antenna 2, ♀, 8.7 mm; c. antenna 2, ♂, 8 mm; d. telson, ♀ (a-c to same scale).

**Distribution.**- The species is a rarely recorded endemic of the Caspian Sea, up to now known only from the northern part of the basin. Bathymetrical range 25-100 m.

### **Corophium chelicorne** Sars 1895

*Corophium chelicorne* Sars 1895: 299-302, pl XXII; Carausu et al., 1955: 372-375, figs. 342-345; Birstein & Romanova, 1968: 288, fig. 319 d.

**Material.**- 5 specimens Caspian sea off Guilan province (c 37°35'N 49°23'E), 50 m, 1992. Many specimens Caspian Sea off Guilan province (c 38°00'N 49°23'E) 100 m, 1992.

**Distribution.**- Caspian Sea, basin of the Black and Azov Seas. Mostly from 25 to 75 m in northern Caspian sea.

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