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Tanaidaceans (Crustacea: Malacostraca: Peracarida) from soft-sediment habitats off Israel, Eastern Mediterranean

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Table of contents

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Abstract

Tanaidacean material collected by the Israel Oceanographic and Limnological Research (IOLR) surveys between 2005 and 2007, in the Levant Sea off the coast of Israel, has been studied. A total of 21,731 individuals representing 15 species and 11 genera was identified from 351 samples. Of the eight species of Apseudomorpha, one, a species of *Leviapseudes*, is new to the Mediterranean, and probably to science, but the damaged immature material precludes description and diagnosis. The continued presence in this region of the Erythrean species *Cristapseudes omercooperi* was confirmed. Of the seven species of Tanaidomorpha, five are previously undescribed species, one each in the genera *Akanthophoreus*, *Leptochelia*, *Pseudotanais*, *Typhlotanais* and *Tanaissus*, the last being the commonest tanaidacean in the samples, yet the first record of the genus for the Mediterranean.

Key words: Tanaidacea, Mediterranean, Levant, Israel, *Akanthophoreus*, *Apseudes*, *Apseudopsis*, *Cristapseudes*, *Hexapleomera*, *Leptochelia*, *Leviapseudes*, *Pseudotanais*, *Tanaissus*, *Tanaopsis*, *Typhlotanais*

Introduction

The Levant Sea occupies the easternmost Mediterranean, east of the line connecting Rhodes and the coast of Cyrenaica. It is isolated from the Atlantic by the topographical and hydrological barriers posed by the shallow Gibraltar Straits and the Siculo-Tunisian sill. The Levantine surface water mass is distinguished by salinity and temperature values that are higher than in the rest of the Mediterranean (Hecht *et al*., 1988), and is notoriously ultra-oligotrophic (Berman *et al*., 1984).

The Israeli coast, at the southeastern corner of the Levant, describes a slightly curved line, with Haifa Bay the sole embayment in the mostly sandy coast (Figure 1). The Nilotic quartz sediments transported from the delta northwards by the prevailing inner shelf and wave-induced longshore currents produce a shallow shelf, narrowing considerably northwards (Emery and Neev, 1960; Inman and Jenkins, 1984). The most remarkable characteristic of the Levantine littoral biota is the intrusion of Erythrean species that have entered the Mediterranean through the Suez Canal—284 species have been recorded along the Israeli coast alone (Galil, 2007).

The tanaidacean fauna of the Israeli coast was studied by Băcescu (1961, 1977, 1980a, c) and Guţu (2002), and enthusiastically described as "…exceptionnellement riche et variée" (Băcescu, 1961: 167). Other Eastern Mediterranean tanaidacean species have been reported by Monod (1933: Egypt) and Larwood (1940: Alexandria, Egypt), while elsewhere in the Mediterranean the history of tanaidacean studies includes Sars (1886: central and western Mediterranean), Dolfuss (1898: Mediterranean coast of France), Smith (1906: Italy), Băcescu and Guţu (1971: France including Corsica, Monaco), Riggio (1973; 1975: Italy), Amar and

Cazaubon (1978: Mediterranean coast of France), Kudinova-Pasternak (1982: Tyrrhenian and Adriatic deep-waters), and Guțu (2006).

The specimens described in the present study were obtained from samples collected during a series of cruises conducted from 2005 to 2007 as part of pollution-monitoring surveys by the Israel Oceanographic and Limnological Research (IOLR). A total of 21,731 individuals representing 15 species and 11 genera was identified from 351 samples. Two species accounted for over half of the individuals. Of the eight species of Apseudomorpha, one, a species of *Leviapseudes*, is new to the Mediterranean, and probably to science, but the damaged immature material precludes description and diagnosis. The continued presence of the Erythrean species *Cristapseudes omercooperi* was confirmed. Of the seven species of Tanaidomorpha, five are previously undescribed species, perhaps reflecting the emphasis of studies in the region over the last century having concentrated on the apseudomorphs. One of these species was the commonest tanaidacean in the samples, yet the first record of the genus *Tanaissus* for the Mediterranean.

Material and methods

The samples were collected aboard the R/V *Shikmona* (720 HP; 27 m), using a 0.062 m² box-corer with an effective penetration of 40 cm (Ocean Instruments model 700 AL) in the deeper sites (> 30 m), and a 0.1 m² grab in the shallower sites. The samples were preserved in 10% buffered formalin aboard ship. In the laboratory, samples were washed and sieved through a 250 µm mesh, preserved in 70% alcohol, stained in Rose Bengal and sorted.

Sampling survey areas (see Figure 1) are abbreviated below with depth ranges and dates of sampling:

AGAN	Agan Israel, 7.4 to 12.5 m (May 2005, September 2005, May 2006, May 2007, October 2007)
ALFA	Alfa Israel, 1309 m (June 2005)
HMA DA	Hatpala Mekorot Ashdod Israel, 6 to 28 m (October 2007)
MI	Matash Israel, 4.4 to 10 m (September 2006, May 2007, October 2007)
NMI	National Monitoring Israel, 9.2 to 12.4 m (August 2005, August 2006, August 2007)
ORI	Orot Rabin Israel, 5.5 to 16.2 m (May 2005, July 2005)
RFI	Royal Fish Israel, 55 to 62 m (May 2006, September, 2006, May 2007, October 2007)

The marine stations of the National Monitoring Programme of Israel (NMI) range along the entire coastline of Israel, while those of the other surveys are concentrated in specific locations (Figure 1). Most of the sampling is in relatively shallow inshore waters, from 5 to 28 m; the RFI stations are somewhat deeper, while the single ALFA sample is from deep water.

Owing to the extensive and repeated sampling from the Agan and NMI stations, station data from these are presented in Appendix 1, although given in detail for all but the two most frequent species, along with data from the other sampling stations, within the main text.

Taxonomic work has been undertaken by specific authors in reflection of their authority for certain taxa, and thus they are so attributed as the relevant authority within the text. Type and voucher material has been lodged in the Natural History Museum, London (NHM), and the National Collections, Tel Aviv University, Israel (TAU).

Morphological terminology is as in Błażewicz-Paszkowycz and Bamber (2007), except that the plumose sensory setae commonly occurring on tanaidacean antennae and pereopod bases, *inter alia*, ("broom setae" *sens. auctt.*) are referred to as penicillate setae to be consistent with terminology in other crustacean groups (and since "brooms" have a multitude of different forms around the world); comb-rows of fine setules, occasionally present on maxillae and pereopod articles, *inter alia*, are referred to as microtrichia (see Bird, 2004). Use of the term "palm" for the main body of the propodus of the cheliped and "finger" for the propodal extension which forms

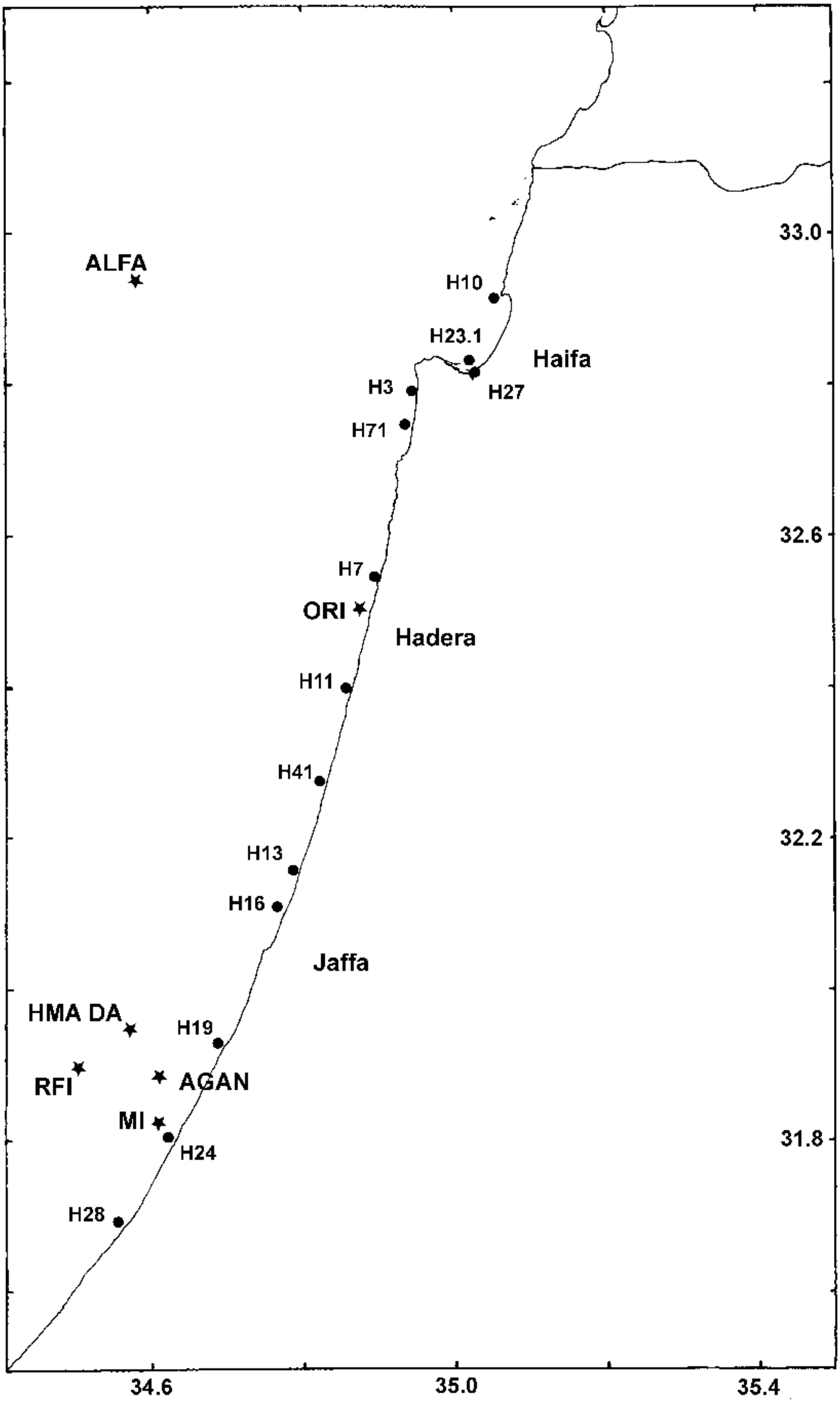

FIGURE 1. Map of the survey area showing sampling areas and marine National Monitoring stations (prefixed H: for other abbreviations, see Material and Methods).

part of the chela itself is in accord with the terminology used throughout the Crustacea (and Pycnogonida, *inter alia*). The antennule of the Apseudomorpha always has a four-articled peduncle, that of the Tanaidomorpha fundamentally has a three-articled peduncle, while flagellar segments range from one (most tanaidomorphs) to many (apseudomorphs), and are the segments bearing aesthetascs where these are present. There are, inevitably, exceptions owing to fusion of peduncle articles (e.g. *Tanaissus* males, see below), fusion of the distal peduncle article and the flagellum in the Pseudozeuxidae (e.g. Bamber & Bird, 1997; Fig. 8B), or loss of the flagellum (e.g. *Pseudotanais*, see below). Otherwise, terminology is as in Larsen (2003).

Measurements were made axially, dorsally on the body, laterally on the pereopods, etc. The higher taxonomy of the Tanaidomorpha is based on that of Guțu and Sieg (1999).

Systematics

Order Tanaidacea Dana, 1849

Suborder Apseudomorpha Sieg, 1980

Superfamily Apseudoidea Leach, 1814

Family Apseudidae Leach, 1814

Subfamily Apseudinae Leach 1814

Remarks. It has long been recognized that *Apseudes* Leach, 1814 *sensu lato* is polyphyletic (see Błażewicz-Paszkowycz & Bamber, 2007, for discussion). Guțu (2006) has recently undertaken a useful reanalysis of this "dustbin" genus, restricting *Apseudes* and resurrecting *Apseudopsis* Norman, 1899, *inter alia*., affording a valuable basis from which, in Guțu's own words, a more minute revision will be enabled in the future (for example by multivariate analysis).

Genus *Apseudes* Leach, 1814

Apseudes tenuimanus Sars, 1882

A. tenuimanus, Sars, 1886, 282–286, Pl.3.

Material examined: 1 juvenile (NHM.2008.3798), station RFI 2, 31°53.328'N 034°32.853'E, 58 m depth; fine mud, 25 May 2006.

Remarks. Recorded before off Israel (Haifa Bay) at 36 m depth by Băcescu (1961) and off Italy by Sars (1882; 1886). Not known outside the Mediterranean. This species is distinguishable from others in this region by its blunt, triangular rostrum, and reduced spination on pereopod 1 (only one ventral spine on the carpus); a small lateral spinose apophysis is present on the cephalothorax anterior to the branchial chamber.

Apseudes holthuisi Băcescu, 1961

A. holthuisi Băcescu, 1961, 146–147, figs 21–27.
Apseudes talpa of Sars, 1882; Sars, 1886, 267–282, Pl. 1–2, non *Cancer Gammarus talpa* Montagu, 1808

Material examined: 1 female with oostegites, 1 female with oostegites (dissected), 1 juvenile

(NHM.2008.3799–3800), station RFI 2, 31º53.328'N 034º32.853'E, 58 m depth; 1 juvenile (NHM.2008.3801), station RFI 1, 31º53.640'N 034º33.069'E, 57 m depth; 1 female, 1 juvenile (TAU AR 28404), station RFI 6, 31º51'N 034º31'E, 58 m depth; all fine mud, 25 May 2006. 14 specimens including 1 brooding female (NHM.2008.4971–4980), RFI 2; 2 juveniles (NHM.2008. 3802–3803), RFI 3, 31°53.842'N 034°33.300'E, 57.0 m depth; 5 juveniles (NHM.2008. 3804–3808), RFI 4, 31°54.193'N 034°33.241'E, 59.0 m depth; 2 specimens (NHM.2008.3809–3810), RFI 5, 31°53.633'N 034°33.251'E, 55.0 m depth; all fine mud, 03 May 2007. 1 female (TAU AR 28409), RFI 1; 2 juveniles (NHM.2008.3811–3812), RFI 2; 3 specimens (TAU AR 28410), RFI 3; 4 juveniles (NHM.2008.3813–3816), RFI 5; 6 females, 11 juveniles (TAU AR 28411), RFI 7, 31º48.809'N 034º28.892'E, 62 m depth; all fine mud, 20 October 2007.

Remarks. This exclusively Mediterranean species was distinguished from the north-east Atlantic species *Apseudes talpa* by Băcescu (1961), the type locality being "off Haifa". Interpretation of the literature by Sieg (1983) gives a depth range from 2 to 300 m, but this is likely to be an overestimate. The carpus of pereopod 1 has two ventral spines; there is no branchial apophysis, but small anterolateral spinose apophyses are present on pereonites 2 to 6, those on the anterior pereonites being hook-like.

Genus *Apseudopsis* Norman, 1899

Apseudopsis acutifrons (Sars, 1882)

Apseudes acutifrons Sars, 1886, 295–299, Pl. 6.

Material examined. 1 specimen (NHM.2008.4633), station RFI 7, 31º48.809'N 034º28.892'E, 62 m depth; fine mud, 14 September, 2006.

Remarks. A species variously recorded (with confused synonymy—*vide* Sieg, 1983) from the Mediterranean and Black Sea, out to the Atlantic coast of North Africa, at depths from 11 to 300 m. The rostrum has distinct rounded shoulders, and ends in an acute point; the pereonites bear both anterolateral and posterolateral spinose apophyses.

Apseudopsis apocryphus (Guţu, 2002)

A. apocryphus Guţu, 2002, 31–33, fig. 7.

Material examined. 2 specimens (TAU AR 28412), station RFI 1, 31º53.640'N 034º33.069'E, 57 m depth; 1 specimen (TAU AR 28413), station RFI 2, 31º53.328'N 034º32.853'E, 58 m depth; 1 specimen (NHM.2008.4634), station RFI 3, 31º53.842'N 034º33.300'E, 57 m depth; 1 specimen (NHM.2008.4635), station RFI 4, 31º54.193'N 034º33.241'E, 59 m depth;1 specimen (NHM.2008.4636), station RFI 7, 31º48.809'N 034º28.892'E, 62 m depth; all fine mud, 14 September, 2006.

Remarks. The type material of this species was collected from the "Coast of Israel, Haifa, 1973", but the depth is unknown (Guţu, 2002). The present material is the second time it has been recorded, and is all from deeper water (57 to 62 m) than the similar and more abundant *A. mediterraneus* (see below), from which it is distinguished principally in having one less spine on the ventral margin of the propodus of pereopod 1. Although a number of species were distinguished in the "*A. latreilli*-group" by Guţu (2002), including many purporting to be from Israeli waters, this is the only one of his which was found in the current surveys.

Apseudopsis mediterraneus **(Băcescu, 1961)**

Apseudes latreilli mediterraneus, Băcescu 1961, 160–162, figs 46, 58–64, Pl. I fig. 1.

Material examined. 362 specimens (NHM.2008.4642–4651), 463 specimens (TAU AR 28443), NMI stn H28.3, 31^0 41.497'N 34^0 33.030'E, 14.7 m, 15 August 2006; 89 specimens (TAU AR 28446), ORI 1, 32°27.904'N 034°52.190'E, 15.8 m depth, 26 May 2005; 60 specimens (NHM.2008.4666–4675), ORI 2, 32°28.472'N 034°52.316'E, 15.8 m depth, 26 May 2005; 83 specimens (TAU AR 28447), ORI 3, 32°27.362'N 034°52.028'E, 16.2 m depth, 26 May 2005; all clean sand. 1 specimen, MI 1, 31°51.199'N 034°39.496'E, 5.2 m depth, 19 September 2006; 2 specimens, MI 5, 31°51.237'N 034°39.301'E, 10 m depth, 17 September 2006. 37 specimens (NHM.2008.4656–4665), MI 5, 02 May 2007. 18 specimens (NHM.2008.4676–4685), Station AGAN 6, 31º51.342'N 034º39.050'E, 11.8 m depth; 8 specimens (NHM.2008.4686–4693), Station AGAN 7, 31º51.446'N 034º39.453'E, 7.4 m depth; 53 specimens (TAU AR 28448), Station AGAN 11, 31º51.014'N 034º38.992'E, 10.1 m depth; all 02 May 2007. 3 specimens, MI 5, 21 October 2007. 4 specimens, HMA DA3, 31°50.812'N 034°39.161'E, 6.4 m depth; 22 specimens (TAU AR 28444), HMA DA9, 31° 51.630'N 034° 38.558'E, 21 m depth; 7 specimens (TAU AR 28445), HMA DA18, 31° 52.059'N 034° 38.151'E, 28.1 m depth; 4 specimens (NHM.2008.4652–4655), HMA DA19, 31° 52.447'N 034° 38.468'E, 27.2 m depth; 5 specimens, HMA DA22, 31° 51.612'N 034° 39.187'E, 12 m depth; 1 specimen, HMA DA23, 31° 51.309'N 034° 39.303'E, 8.7 m depth; 5 specimens, HMA DA34, 31° 52.367'N 034° 38.573'E, 25.5 m depth; 20 specimens, HMA DA61, 31° 51.103'N 034° 38.826'E, 13 m depth; 79 specimens, HMA DA63, 31° 51.797'N 034° 39.068'E, 14 m depth; 1 specimen, HMA DA64, 31° 52.648'N 034° 38.509'E, 27.9 m depth; all 20 October 2007, coarse sand.
2548 specimens, NMI stations (see Appendix 2A). 1806 specimens, AGAN stations (see Appendix 2B).

Remarks. This species was originally described by Băcescu (1961), as a subspecies of *A. latreilli* (Milne-Edwards, 1828), from material taken off Israel at depths ranging between 22 and 138 m (mainly 25 to 40 m), although this material may have included other taxa distinguished subsequently by Guțu (2002); the types of Băcescu no longer survive (Guțu, 2001). Guțu (2002) raised the taxon to full specific rank, and, in examining much Mediterranean material, distinguished further species in the "*A. latreilli*-group", including from Israeli waters. He had a further 15 specimens of *A. mediterraneus* from "the Coasts of Israel, Haifa, 1970". Despite this species being clearly very common in the fine sandy substrata off Israel, there are no other records in the literature.

The present collections comprise 3374 specimens from 99 samples, throughout the survey area between 32º54.054'N 034º04.330'E and 31º41.328'N 034º33.326'E, in shallower inshore waters ranging between 5 and 28 m depth.

Apseudopsis ostroumovi **Băcescu & Carausu, 1947**

Apseudes ostroumovi, Guțu, 2002, 24–26, fig. 3.

Material examined. 1 brooding female (TAU AR 28414), RFI 7, 31º48.809'N 034º28.892'E, 62 m depth; fine mud, 03 May 2007. 5 specimens including 1 male (NHM.2008.4637–4641), RFI 7, 20 October 2007.

Remarks. This species, showing some similarities to *A. mediterraneus*, was first described from the Black Sea. Subsequent records from the Adriatic and the Balearic Sea were considered by Guțu (2002) to be of other taxa, and he restricted the distribution of *A. ostroumovi* to the Black Sea. Nevertheless, the present material accords entirely with the original description, in particular in having the very elongate spiniform process on the ocular lobe, characteristic of this species. Ventral hyposphenia in the male are restricted to pereonites 2 and 3 (the penial tubercle is conspicuous on pereonite 6). Females have hooked posterolateral spiniform apophyses on the pereonites, while those of the male are straight and longer. There are 4 ventral spines on the propodus of pereopod 1.

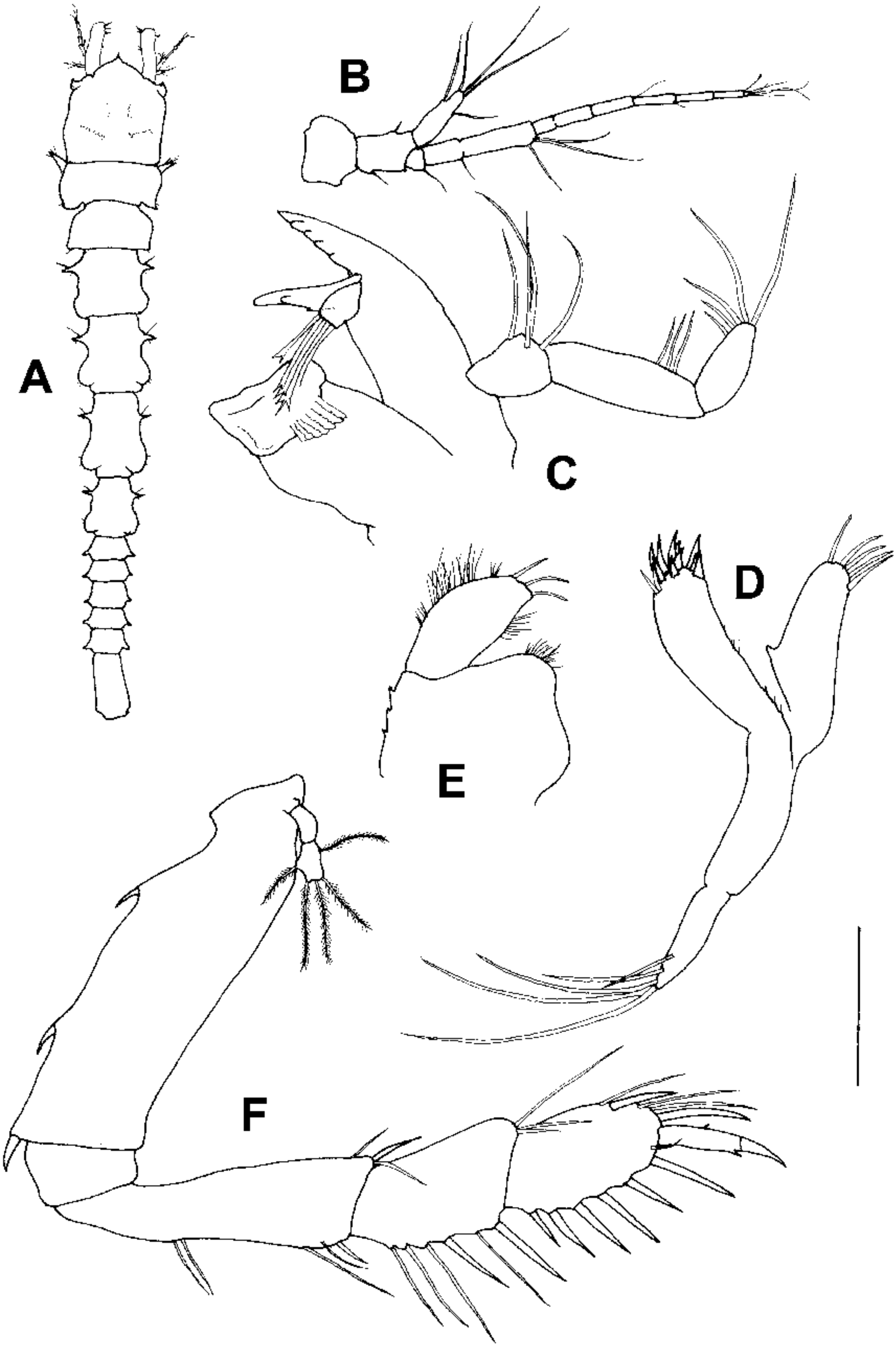

FIGURE 2. *Leviapseudes* sp. indet., subadult: A, habitus, dorsal; B, antenna; C, left mandible; D, maxillule; E. labium; F, first pereopod. Scale line = 1 mm for A; 0.2 mm for B, F; 0.1 mm for C to E.

Subfamily Leviapseudinae Sieg, 1983

Genus *Leviapseudes* Sieg, 1983

***Leviapseudes* sp. indet.**
Figure 2

Material examined. 5 subadult individuals (NHM.2008.4694–4698), ALFA station 2, 32° 55.950'N 034° 35.974'E,1309.0 m depth, 07 June 2005.

No species of *Leviapseudes* has been recorded previously from the Mediterranean. Indeed, the only member of the subfamily recorded from the Mediterranean is *Fageapseudes retusifrons* (Richardson, 1912) (moved to this subfamily recently by Bamber, 2007). The present species is undoubtedly new to science, but the material is too incomplete and too immature to allow a description or diagnosis. None of the specimens bore pleopods. The only complete appendages on the present material are pereopod 1, antennae and mouthparts. Ventral hyposphenia are present on all pereonites and pleonites, that on pereonite 1 being blade-like, curving posteriorly, the others slender. From the available morphology, this species is a member of Băcescu's (1984) *wolffi*-group.

Family Kalliapseudidae Lang, 1956

Subfamily Kalliapseudinae Guțu, 1972

Genus *Cristapseudes* Băcescu, 1980

***Cristapseudes omercooperi* (Larwood, 1954)**

Kalliapseudes omercooperi Băcescu, 1961, 162–167, figs 65–77. *C. omercooperi* Băcescu 1980b, 360–367, figs 1, 2.

Material examined. 2 females, station NMI H3, 32º43.360'N 034º56.852'E, 9.7 m depth, 18 August 2005; 989 specimens (NHM.2008.4699–4708) and 450 specimens (TAU AR 28438), including males, females and juveniles, station NMI H27, 31º41.634'N 034º32.763'E, 20 m depth, 17 August 2005; 1 female, station NMI H28, 31º41.328'N 034º33.326'E, 9.6 m depth, 24 August 2005; 1150 specimens (NHM.2008.4719–4728) and 1003 specimens (TAU AR 28440), including males, females and juveniles, station NMI H27, 20 August 2006. 1 female, NMI H13, 32^0 09.524'N 34^0 47.211'E, 10.2 m depth, 08 August 2007; 1 specimen, NMI H16, 32^0 06.394'N 34^0 45.976'E, 11.8 m depth, 08 August 2007; 2 specimens, NMI H24, 31^0 48.195'N 34^0 37.458'E, 11.0 m depth, 08 August 2007; 112 specimens (NHM.2008.4709–4718) and 165 specimens (TAU AR 28439), including males, brooding females and juveniles, NMI H27, 02 August 2007; all samples medium to fine sand. 2 females, station AGAN 2, 31º51.603'N 034º39.171'E, 12.3 m depth, 24 May 2006; 1 female, station AGAN 11, 31º51.014'N 034º38.992'E, 10.1 m depth, 24 May 2006; 3 specimens, AGAN 11, 11 October 2007; all coarse sand with shell grit.

714 specimens (NHM.2008.4729–4738), including juveniles, brooding females and males, HMA DA9, 31° 51.630'N 034° 38.558'E, 21 m depth; 509 specimens (NHM.2008.4739–4748), including juveniles, brooding females and males, HMA DA18, 31° 52.059'N 034° 38.151'E, 28.1 m depth; 847 specimens (TAU AR 28441), including juveniles, brooding females and males, HMA DA19, 31° 52.447'N 034° 38.468'E, 27.2 m depth; 427 specimens (NHM.2008.4749–4758), including juveniles, brooding females and males, HMA DA34, 31° 52.367'N 034° 38.573'E, 25.5 m depth; 1 male, HMA DA61, 31° 51.103'N 034° 38.826'E, 13 m depth; 1023 specimens (TAU AR 28442), including juveniles, brooding females and males, HMA DA64, 31° 52.648'N 034° 38.509'E, 27.9 m depth; all 20 October 2007.

Remarks. Previous records for this species are from the northern Indian Ocean, the Gulf of Aden, the Red

Sea, Suez (type locality), and "west of Gaza" (see Sieg, 1983). The present material represent the first records for this species since that publication. Apart from a few scattered specimens, the species was notably abundant at station NMI H27 to the north of the survey area in Haifa Bay (where *Apseudes mediterraneus* was the only other tanaidacean present), densities reaching >7,000 per m^2, and at five of the HMA DA stations to the south of the survey area, with densities reaching 3,400 per m^2. These southern stations are in the same region as the site of the only previous discovery of this species in the Mediterranean by Băcescu (1961) . Some recent sampling in early 2008 off Egypt (Bamber, unpubl.) found dense numbers of this species patchily localized off Alexandria.

Species of the Kalliapseudidae in the broader vicinity of the Mediterranean occur off the west African coast as far north as Mauritania, and in the Indian Ocean and Red Sea. It seems apparent that *C. omercooperi* has reached the Mediterranean though the Suez Canal.

The sex ratio of the large H27 sample in 2005 was close to 1:1 (with a similar third of the material being juveniles).

Suborder Tanaidomorpha Sieg, 1980

Superfamily Tanaiodea Dana, 1849

Family Tanaidae Dana, 1840

Subfamily Pancolinae Sieg, 1980

Tribe Pancolini Sieg, 1980

Genus *Hexapleomera* Dudich, 1931

***Hexapleomera robusta* (Moore, 1894)**

H. robusta, Sieg, 1980, 122–129; figs 33, 34, 39.

Material examined. 1 female (TAU AR 28449), MI 3, 31°51.472'N 034°39.553'E, 4.7 m depth; 2 females (NHM.2008.4911–4912), MI 4, 31°51.733'N 034°39.699'E, 4.4 m depth; both 02 May 2007.

Remarks. This is a distinctive species of the Tanaidae, with five distinct pleonites and truncate anterior pereonites. The present distribution of this species is world-wide, but this is suspected to be the result of synonymies of distinct taxa. The type-locality is off New Jersey, USA. Records from the eastern Mediterranean are from Suez (Omer-Cooper, 1929) and Alexandria (Larwood, 1940), and recent material has been collected from Lebanese waters (Bamber, unpubl.). Other distribution records are summarized by Sieg (1980).

Hexapleomera robusta is most commonly recorded as an ectoparasite on turtle tests and on manatees (e.g. Sieg, 1980; Morales-Vela *et al*., 2008), although Dudich (1931) found specimens among littoral algae. It is feasible that the present specimens had fallen from a turtle. This was the only member of the Tanaidae to be recorded in these soft-sediment surveys.

Superfamily Paratanaoidea Lang, 1949

Family Anarthruridae Lang, 1971

Subfamily Akanthophoreinae Sieg, 1986

Genus *Akanthophoreus* Sieg, 1986

Remarks. Guerrero-Kommritz (2004) suggested that the genus *Akanthophoreus* is a junior synonym of *Paraleptognathia* Kudinova-Pasternak 1981, but Bird (2007: p. 123) points out why this synonymy is untenable (and valuably discusses the general confusion in this genus). Equally, the subfamily Akanthophoreinae *sensu* Guţu & Sieg 1999 is almost certainly an artificial grouping (e.g., Larsen & Wilson, 2002), and is at present the subject of revisionary study by other tanaidacean workers, but has to be retained herein pending the results of that work.

***Akanthophoreus nanopsenos* Bamber & Bird, sp. nov.**
Figures 3–4

Material examined. Holotype: 1 female (NHM.2008.4759), station RFI 1, off the coast of Israel, 31°53.640'N 034°33.069'E, 57 m depth, fine mud; 14 September 2006. **Allotype**: 1 male, (slide-mount, NHM.2008.4760), station RFI 7, 31°48.809'N 034°28.892'E, 62 m depth; 03 May 2007. **Paratypes**: 4 females (NHM.2008.4761–4767), 3 females, 1 neuter, dissected, same sample as holotype; 1 female (NHM.2008.4768), station RFI 2, 31°53.328'N 034°32.853'E, 58 m depth; 2 females (NHM.2008.4769–4770), station RFI 3, 31°53.842'N 034°33.300'E, 57 m depth; 1 female (NHM.2008.4771), station RFI 4, 31°54.193'N 034°33.241'E, 59 m depth; 1 female (NHM.2008.4772), station RFI 5, 31°53.633'N 034°33.251'E, 55 m depth; 1 female (NHM.2008.4773), station RFI 7, 31°48.809'N 034°28.892'E, 62 m depth; all 14 September, 2006. 14 specimens (TAU AR 28415), RFI 2; 2 specimens (TAU AR. 28416), RFI 3; 5 females (TAU AR 28417), RFI 4; 11 females (TAU AR 28418), RFI 7; all 03 May 2007. 22 females (NHM.2008.4774–4783), RFI 1; 63 specimens (NHM.2008.4784–4793), RFI 2; 52 specimens (TAU AR 28419), RFI 3; 33 specimens (TAU AR 28420), RFI 5; 87 specimens (NHM.2008.4794–4803), RFI 7; all 20 October 2007. All fine mud.

Other material. 80 specimens, RFI 4; 20 October 2007. Fine mud.

Diagnosis: very small *Akanthophoreus*, female 8 times as long as wide, without long setae on basis and endite of maxilliped; articles of antenna peduncle and pereopods short, chela robust, truncate. Male with compact antennular flagellum segments, stout chela, dactylus and unguis of the anterior pereopods short, those of the posterior pereopods long; uropod endopod 3-segmented.

Description of female: body (Figure 3A) elongate, slender, 1.2 mm long, 8.2 times as long as wide. Cephalothorax subrectangular, tapering towards anterior, 1.2 times as long as wide, longer than any pereonite, with slight rounded rostrum, naked; eyes absent. Six free cylindrical pereonites; pereonites 1 and 5 subequal in length and 0.7 times as long as cephalothorax, pereonites 2 and 3 longer, pereonite 4 longest, pereonite 6 shortest (all pereonites respectively 1.3, 1.1, 1.1, 0.9, 1.1 and 1.4 times as wide as long). Pleon of five free subequal pleonites bearing pleopods, each pleonite with one midlateral seta on each side. Pleotelson (Figure 3I) pentagonal, short, 3 times as long as pleonite 5, 1.5 times as wide as long.

Antennule (Figure 3B) of four articles, proximal article 2.5 times as long as wide, with two outer setae; second article 1.3 times as long as wide, about half length of first, with one inner distal and two outer setae, one longer than article width; third article two-thirds length of second with simple distal inner seta and two outer penicillate setae; distal article slender, just longer than third article, with five distal setae and single aesthetasc.

Antenna (Figure 3C) of six articles, articles 1 to 3 subequal, compact, proximal article naked, second and third articles with single dorsodistal setae; fourth article longest, 1.4 times as long as articles 1 to 3 together, with ventrodistal seta; fifth article 0.4 times as long as fourth, with two distal setae; sixth article (flagellum) minute with three distal setae.

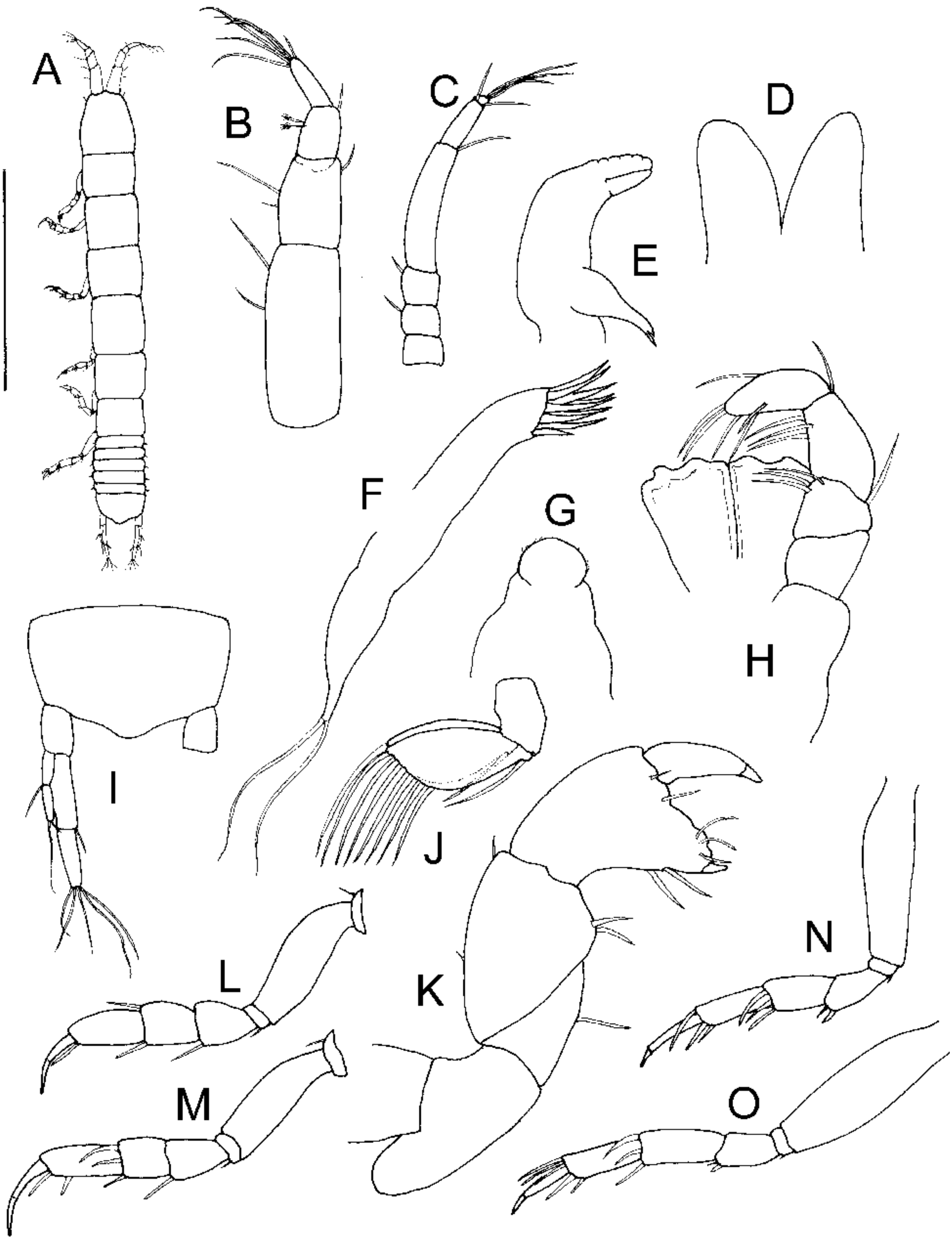

FIGURE 3. *Akanthophoreus nanopsenos* **sp. nov.**, female: A, holotype, dorsal; B, antennule; C, antenna; D, labium; E, left mandible; F, maxillule; G; labrum; H, maxilliped; I, pleotelson and left uropod; J, pleopod; K, cheliped; L, pereopod 1; M, pereopod 2; N, pereopod 4; O, pereopod 6. Scale line = 0.6 mm for A; 0.1 mm for B, C and I to O; 0.05 mm for D to H.

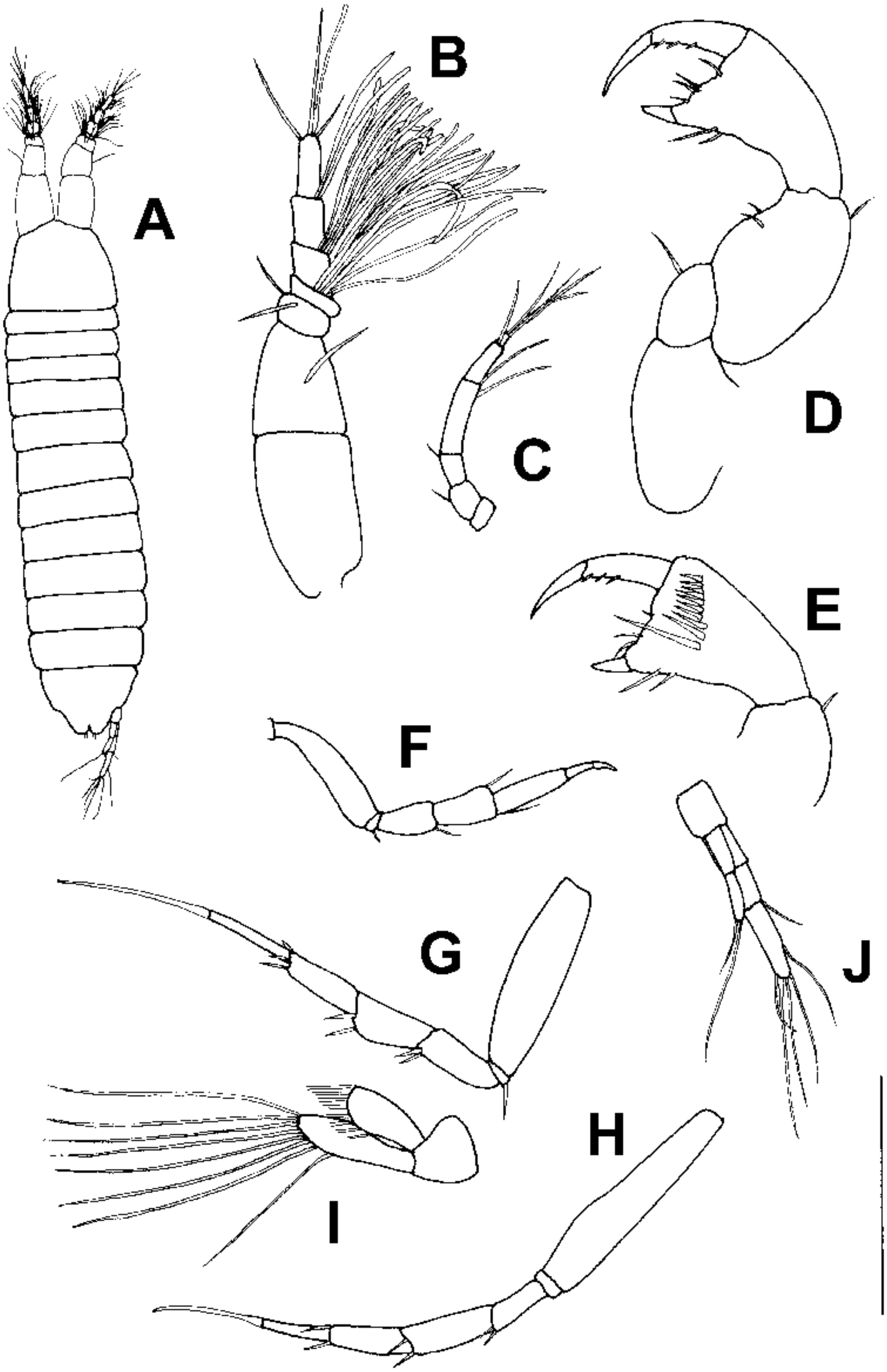

FIGURE 4. *Akanthophoreus nanopsenos* **sp. nov.**, male: A, allotype, dorsal; B, antennule; C, antenna; D, left cheliped; E, right chela, inner face; F, pereopod 1; G, pereopod 4; H, pereopod 6; I, pleopod; J, uropod. Scale line = 0.3 mm for A; 0.1 mm for B to J.

Labrum (Figure 3G) apically rounded, finely setose. Left mandible (Figure 3E) with slender, simple lacinia mobilis, pars incisiva crenulate; pars molaris slender, tapering, with few distal spinules; right mandible as left but without lacinia mobilis. Labium (Figure 3D) bilobate, simple. Maxillule (Figure 3F) with nine distal spines, palp short with two distal setae. Maxilla not seen. Maxilliped (Figure 3H) endites naked, with slightly crenulated distal margin; basis naked; palp first article naked, second and third articles with three inner and one outer distal setae; fourth article with two inner, two distal and one outer marginal setae, one inner submarginal seta.

Cheliped (Figure 3K) basis slender, 2.25 times as long as wide; carpus 1.2 times as long as wide with paired, short ventral setae and no shield; propodus longer than wide, fixed finger short with lamellate cutting edge, two ventral and three inner setae; dactylus with outer margin smooth, cutting edge naked.

Pereopod 1 (Figure 3L), coxa simple with seta; basis arcuate, three times as long as wide; ischium compact with single seta; merus as long as carpus, propodus 1.3 times as long as carpus; merus, carpus and propodus each with single ventrodistal spine, carpus with dorsodistal spine; dactylus with distinct, slender unguis, both together as long as propodus. Pereopod 2 (Figure 3M) similar to pereopod 1, but carpus with three distal spines, propodus with additional subdistal ventral spine. Pereopod 3 as pereopod 2.

Pereopod 4 (Figure 3N) basis slender, 3.5 times as long as wide; merus with ventrodistal seta and spine; propodus with outer-distal and one dorsodistal and two ventrodistal spines, all shorter than dactylus; dactylus with slight ventral groove, unguis short. Pereopod 5 as pereopod 4. Pereopod 6 (Figure 3O) as pereopod 4, but propodus with three dorsodistal spines.

Pleopods (Figure 3J) all alike, with naked basis, endopod and exopod both with proximal plumose seta on ventral margin well-separated from remaining seven distal plumose setae, all setae about as long as rami.

Uropod (Figure 3I) basis naked, rami slender; exopod of two segments, almost as long as proximal endopod segment, one distal seta of exopod much shorter than other; endopod of two subequal segments, setose as figured .

Description of male: body (Figure 4A) more compact and smaller than female, allotype 0.7 mm long, 4.7 times as long as wide. Cephalothorax proportionately shorter, 0.85 times as long as wide. All pereonites much wider than long, pereonites 1 to 3 subequal, very short, five times as wide as long; pereonites 4 and 5 subequal, 1.4 times as long as pereonite 3, pereonite 6 longest, 1.6 times as long as pereonite 3. Pleonites subequal, as long as, or slightly longer than, pereonite 6. Pleotelson elongate, about 1.5 times as long as last pleonites.

Antennule (Figure 4B) compact. Proximal peduncle article 1.7 times as long as wide; second article 0.6 times as long as first and with one outer seta; third article short, one-third as long as second article, with two ventrodistal setae. Flagellum of four segments, first segment very short, bearing about ten aesthetascs, second to fourth articles progressively longer, each longer than wide, bearing ten, two and one aesthetascs respectively, fourth article with three distal setae.

Antenna (Figure 4C) similar to that of female, but proximal peduncle article half length of second article, second and third articles twice as long as wide.

Mouthparts atrophied; only maxilliped palp seen.

Cheliped (Figure 4D, E) slightly stouter than that of female, chela more slender, dactylus proportionately much longer and overreaching terminal spine of fixed finger; inner face of propodus with comb of ten spines

Pereopod 1 (Figure 4F) similar to that of female, but merus, carpus and propodus more slender, unguis proportionately shorter. Pereopods 2 and 3 similar to pereopod 1. Pereopods 4 (Figure 4G), 5, and 6 (Figure 4H) again similar to but much more attenuate than those of female, but dactylus plus unguis much longer and more slender, three or more times as long as propodus.

Pleopods (Figure 4I) all similar, similar to but more slender than those of female, detached proximal seta much closer to seven distal setae, all setae plumose and more than twice as long as rami.

Uropod (Figure 4J) endopod three-segmented, first segment naked, second segment with one inner-distal seta, third segment with four distal and one sub-distal setae; exopod two-segmented, second segment with two unequal distal setae.

Etymology: from the Greek *nanos*— a dwarf, and *psenos*—bald (alluding to the lack of certain setae normally characteristic of the genus).

Remarks. The clarification of the various taxa once incorporated within the old “dustbin” genus *Leptognathia sensu lato*, in terms of both generic and familial affiliations, is proving complex and is far from resolution as yet. The present species resembles most closely species of *Akanthophoreus*, in terms of its mandibular, antennal, pereopodal, pleopodal and uropodal morphology, but departs from the most recent diagnosis of that genus (Bird, 2007) in the lack of setae on the basis and endite of the maxilliped; these setae are present in *A. longiremis* (Lilljeborg, 1864), the only other species of *Akanthophoreus* recorded previously from the Mediterranean. *A. nanopsenos* **sp. nov.** also differs from *A. longiremis* in its more truncate chela, in the proportions of the antennular and antennal articles, and in having less slender pereopods, as well as being a much smaller animal.

Males of this family are rare and infrequently recorded; indeed, the recorded sex-ratios in collections of species of *Akanthophoreus* (also *Araphura*, *et al.*) where males are found are of the order of hundreds to one (e.g. Holdich & Jones, 1983), and in most species males are unknown. That only one male of *A. nanopsenos* was found in the present material in a total of 385 individuals is therefore typical. With its small size and the similar morphology of antennae, pereopods, uropods (other than features of sexual dimorphism), there can be little doubt that the male is of the same species as the eleven females found in the same sample, and the only species of the genus or subfamily recorded in the area.

The present male shows many similarities to that of *A. gracilis* (Krøyer, 1842) (e.g. Sars, 1899, pl.12, as *A. longiremis*), including the morphology of the antenna and the three-segmented uropod endopod. However, the chela is stouter than that of *A. longiremis*, the antennular flagellum segments more compact, and the dactylus and unguis of the anterior pereopods proportionately shorter while those of the posterior pereopods are proportionately longer.

Akanthophoreus nanopsenos **sp. nov.** was only found in the finer mud sediments of the RFI stations, at between 55 and 62 m depth. It is one of the smallest species of the genus known: its discovery probably reflects the merit of using 0.25 mm mesh sieving for these diminutive peracarids.

Genus *Tanaopsis* Sars, 1896

Tanaopsis laticaudatus (Sars, 1882)

Leptognathia laticaudata Sars, 1886, 353–358, Pl. 15, figs 14–17.

Material examined. 5 females, 3 males (NHM.2008.4805–4812), station RFI 3, 31º53.842’N 034º33.300’E, 57 m depth; 1 female, (NHM.2008.4813), station RFI 7, 31º48.809’N 034º28.892’E, 62 m depth; both 14 September, 2006. 1 female, RFI 2 (TAU AR 28421), 31°53.328’N 034°32.853’E, 58.0 m depth; 1 female, RFI 3(TAU AR 28422); both 03 May 2007. 1 female, RFI 2 (NHM.2008.4814), 2 males, RFI 3 (NHM.2008.4815–4816), 1 female, RFI 4, 31°54.193’N 034°33.241’E, 59.0 m depth; 1 male, RFI 5 (TAU AR 28423), 31°53.633’N 034°33.251’E, 55.0 m depth; 3 females, 2 males (TAU AR 28424), RFI 7; all 20 October 2007. All fine mud.

Remarks. *Tanaopsis laticaudatus* has long been regarded as a junior synonym of *T. graciloides* (Lilljeborg, 1864), the only taxon in this genus recognized from the north-eastern Atlantic region. In practice, Sars’ material from Italy is the only record *in litt.* from the Mediterranean: from what has been found recently regarding allopatric and sympatric speciation within Tanaidacea (e.g. Larsen, 2001; Bamber, 2007; Larsen & Shimomura, 2008), it seems highly likely that his species is distinct from the north-east Atlantic *T. graciloides*. Unfortunately, no comprehensive description, or figure, was given by Lilljeborg, and indeed, the only figure for a Northeast Atlantic-Mediterranean *Tanaopsis* is that of *T. laticaudatus* by Sars (loc. cit.; also Sars, 1899, pl. 14).

The present material accords entirely with Sars’ detailed descriptions and figures of *T. laticaudatus*. Further, the present material, from depths between 55 and 62 m, is all collected from fine mud: recent analysis of extensive *T. graciloides* material from the Irish Sea (Bamber, in press) found this species to be characteristic only of coarser heterogeneous substrata such as muddy gravel. Until material from nearer Scandinavia is examined and described in detail (a project beyond the scope of the present study) the validity of any synonymy of these two forms cannot be established, so it is considered necessary to distinguish the Mediterranean *T. laticaudatus* at present.

Family Typhlotanaidae Sieg, 1984

Genus *Typhlotanais* Sars, 1882

***Typhlotanais angstromensis* Błażewicz-Paszkowycz & Bamber sp. nov.**
Figures 5–6

Material examined. Holotype: 1 female (NHM.2008.4817), station RFI 1, off the coast of Israel, 31º53.640'N 034º33.069'E, 57 m depth, fine mud, 14 September 2006. **Paratypes**: 2 females, dissected (NHM.2008.4818–4819), same sample as holotype; 1 female (NHM.2008.4820), station RFI 4, 31º54.193'N 034º33.241'E, 59 m depth; 1 female (NHM.2008.4821), station RFI 7, 31º48.809'N 034º28.892'E, 62 m depth; all fine mud, 14 September, 2006. 1 female (TAU AR 28425), RFI 3, 31°53.842'N 034°33.300'E, 57.0 m depth; 1 female (TAU AR 28426), RFI 7; both 03 May 2007. 3 females (TAU AR 28427), RFI 2; 6 specimens (TAU AR 28428), RFI 7; both fine mud, 20 October 2007.

***Other material*:** 1 female, dissected, station RFI 2, 31º53.328'N 034º32.853'E, 58 m depth; 14 September, 2006. 1 specimen, RFI 4; fine mud, 20 October 2007.

Diagnosis: (female) very small *Typhlotanais*, body 7.2 times as long as wide, pereonites with slightly rounded lateral margins, pleotelson with small distal setae. Antennule little shorter than carapace, article 3 less than twice as long as article 2; anterior pereopods without coxal apophysis, compact; pereopod 1 basis naked; pereopod 2 basis twice as long as wide; pereopods 4 to 6 carpus with prickly-tubercles of moderate size, not surrounded by spines; propodal distal seta as long as dactylus. Uropod rami 1-segmented, exopod about half as long as endopod.

Description of female: body (Figure 5A, B) compact, small (holotype 0.8 mm long, 7.2 times as long as wide). Cephalothorax margin slightly rounded, tapering anteriorly, 1.2 times as long as wide, as long as pereonites 1 and 2 together, naked, eyes absent. Six free pereonites with lateral margins slightly rounded; pereonite 6 shortest, pereonites 1 and 2 subequal, 1.25 times as long as pereonite 6, pereonites 3 to 5 subequal, 1.5 times as long as pereonite 6 (all pereonites respectively 2.1, 1.9, 1.6, 1.5, 1.5 and 2.3 times as wide as long). Pleon of five free subequal pleonites bearing pleopods; each pleonite 4.7 times as wide as long. Pleotelson subtriangular, as long as last two pleonites, distally pointed, with one posterolateral seta on each side and four distal setae (Figure 6G).

Antennule (Figure 5C) shorter than carapace, of three articles, proximal article 2.4 times as long as wide, longer than distal two articles together, with two simple and four penicillate setae in two groups along article; second article one-third as long as first article, with three distal setae; third article tapering, 1.7 times as long as second article, with five distal setae and one aesthetasc.

Antenna (Figure 5D) of six articles, proximal article compact, naked; second article twice as long as proximal article, longer than wide, with two short distal setae; third article as long as wide, with dorsodistal seta; fourth article longest, 2.6 times as long as second and four times as long as wide, with four distal setae; fifth article as long as second with one distal seta; sixth article minute with five distal setae.

Labrum (Figure 5E) flat, distal margin setose. Left mandible stout (Figure 5F) with well-developed, crenulate lacinia mobilis, pars molaris with sharp tooth-like protrusions and spinules, pars incisiva robust, crenulate; right mandible without lacinia mobilis. Labium (Figure 5H) bilobed, both lobes sparsely setose distally. Maxillule (Figure 5G) with nine distal spines, palp not seen; maxilla elongate, angular. Maxilliped (Figure 5I) bases each with single seta reaching only half length of endite; endites distally with setose outer margins and each with two distal oval tubercles; palp first article naked, second article wedge-shaped with one outer and three inner setae, one of these strongly serrated; third article with two simple and two serrated inner setae; fourth article with five distal and one dorsal simple setae.

Cheliped (Figure 6A) with rounded, naked basis 1.9 times as long as wide; merus subtriangular with single ventral seta; carpus with rounded dorsoproximal extension, elongate, 2.5 times as long as wide, with two midventral setae, smaller ventrodistal seta and single dorsodistal and dorsoproximal setae; chela well-developed, palm of chela 1.9 times as long as wide, with outer and inner distal setae, fixed finger more than half as long as palm, with two ventral setae, three setae and three teeth distally on cutting edge; dactylus slender, curved, with two spines on cutting edge.

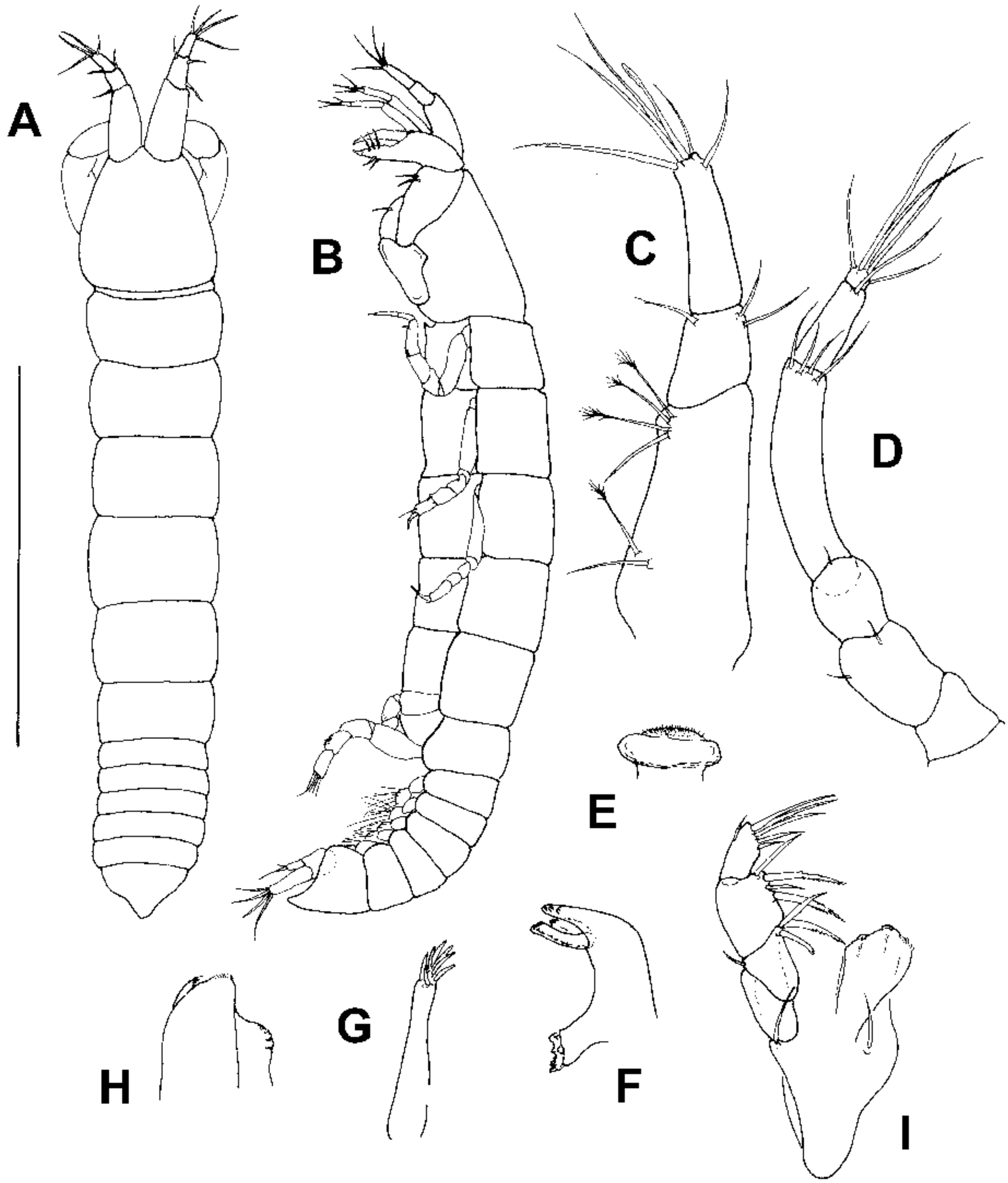

FIGURE 5. *Typhlotanais angstromensis* **sp. nov.**, female, A, holotype, dorsal; B, holotype, lateral; C, antennule; D, antenna; E, labrum; F, left mandible; G, maxillule; H, labium; I, maxilliped. Scale line = 0.4 mm for A, B; 0.1 mm for C to I.

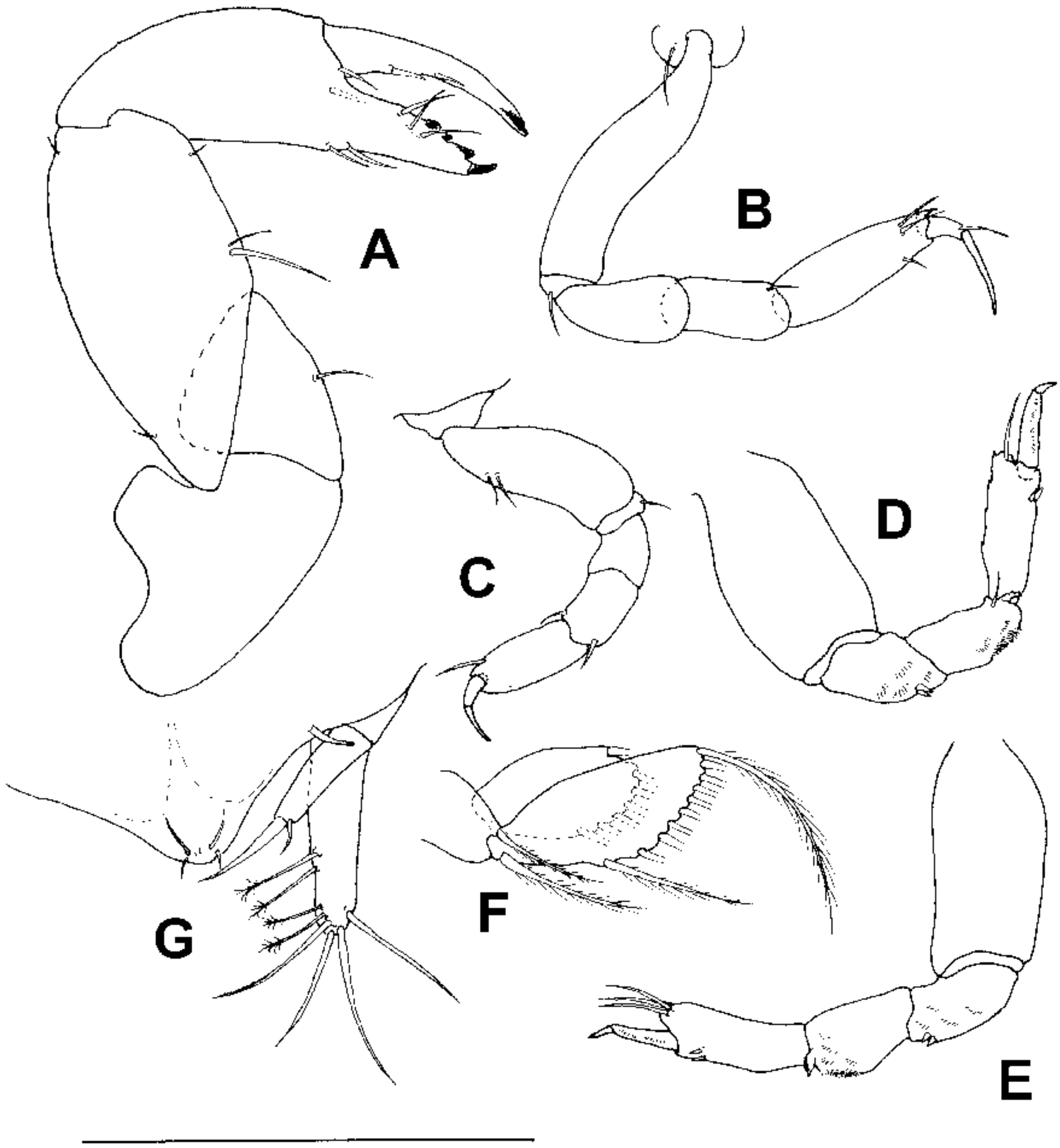

FIGURE 6. *Typhlotanais angstromensis* **sp. nov.**, A, cheliped; B, pereopod 1; C, pereopod 3; D, pereopod 4; E, pereopod 6; F, pleopod; G, uropod. Scale line = 0.1 mm.

Pereopod 1 (Figure 6B) of walking-type (*sensu* Błażewicz-Paszkowycz, 2007), longer than others, coxa without apophysis, with seta; basis slender, 5 times as long as wide, sinuous, naked; ischium compact with ventrodistal seta; merus 1.7 times as long as wide, just longer than carpus, naked; carpus with one distal seta; propodus 1.3 times as long as carpus, 2.7 times as long as wide, with two dorsodistal setae, one subdistal ventral seta, dorsodistal pointed apophysis; dactylus half length of distinct, slender unguis, with distal seta, both together 0.8 times as long as propodus. Pereopod 2 similar to pereopod 3. Pereopod 3 (Figure 6C) of walking-type, basis twice as long as wide with two proximodorsal setae; ischium compact with ventrodistal seta; merus subequal to carpus; carpus 1.7 times as long as wide, with two simple distal setae; propodus 1.8 times as long as wide and 1.25 times as long as carpus, with single dorsodistal and minute ventrodistal setae; short, stout, naked dactylus with slender unguis together two-thirds as long as propodus.

Pereopod 4 (Figure 6D) of clinging-type (*sensu* Błażewicz-Paszkowycz, 2007); basis stouter, 1.7 times as long as wide; merus and carpus of equal length, merus with two short ventrodistal spines and ventral fields of microtrichia; carpus with distal hooks and simple seta, prickly tubercles of moderate size, numerous microtrichia ventrally; propodus 1.5 times as long as carpus, dorsal margin serrate, with two short ventrodistal spines and distal seta almost as long as dactylus; dactylus ventrally serrate, distally bifurcated, together with unguis 0.6 times as long as propodus. Pereopod 5 as pereopod 4. Pereopod 6 (Figure 6E) as pereopod 4, but propodus with three dorsodistal setae.

Pleopods (Figure 6F) all alike, with naked basis, endopod and exopod each with ventrodistal plumose setae, and proximal seta separated from others by distinct gap.

Uropod (Figure 6G) biramous, both exopod and endopod of one segment; exopod about half as long as endopod with stout longer and fine shorter setae; endopod with four distal setae and group of subdistal penicillate setae.

Male unknown.

Etymology: named after the small unit of length, an Angstrom, owing to this species being probably the smallest *Typhlotanais* yet described.

Remarks. *Typhlotanais sensu lato* was another "dustbin" genus, which is currently being resolved. Recently, Błażewicz-Paszkowycz (2004; 2005), while redefining *Peraeospinosus* Sieg, 1986 (comprising species originally attributed to *Typhlotanais* as well as new taxa), pointed out the presence of a number of "morpho-groups" within *Typhlotanais sensu lato* which warranted distinction as separate genera, and she reported the principal phase of that work in Błażewicz-Paszkowycz (2007) giving us our current understanding of the Typhlotanaidae.

The present species does not accord with any of the new genera or morpho-groups defined by Błażewicz-Paszkowycz (2007: 25), remaining in *Typhlotanais sensu lato* at present. Only three species of the Typhlotanaidae have been recorded previously from the Mediterranean, viz. *Typhlotanais aequiremis* (Lilljeborg, 1864) (the type and currently only species of *Typhlotanais sensu stricto*), *T. messinensis* Sars, 1882 (of the "*greenwichensis*"-group of Błażewicz-Paszkowycz, 2007), and *T. spinipes* Kudinova-Pasternak, 1982 (of the "*eximius*"-group of Błażewicz-Paszkowycz, 2007). *T. angstromensis* **sp. nov.** does not have the long antennule of the "*eximius*"-group (twice as long as the carapace), nor the pronounced coxal apophysis of the "*greenwichensis*"-group, nor the setation of the basis and carpus of pereopod 1 characteristic of *Typhlotanais sensu stricto*, and is thus easily distinguished from the other Mediterranean species (as well as on its size).

The new species is most closely related to *T. grahami* Błażewicz-Paszkowycz, 2004 (included in *Typhlotanais sensu lato*), known only from its type locality in the West Antarctic. Both species are very small tanaidaceans no longer than 1 mm, and they share numerous characters, including the slightly rounded lateral margins of the pereonites, the relatively robust cheliped (with the carpus 2.5 times as long as wide, and the chela almost the size of the carpus), compact pereopods 1 to 3, the moderate size of the prickly tubercles on pereopods 4 to 6, and the distal seta on the propodus of these pereopods about the same length as the dactylus.

The new species however is much more slender than *T. grahami*, and has a one-segmented uropod exopod (two-segmented in *T. grahami*) and relatively short setae on the pereopod 1 propodus and the pereopod 2 carpus, these being long in *T. grahami*.

Typhlotanais angstromensis was only found in the finer mud sediments of the RFI stations, at between 55 and 62 m depth. It is the smallest species of the genus known: again, its discovery probably reflects the merit of using 0.25 mm mesh sieving.

Family Nototanaidae Sieg, 1973

Genus *Tanaissus* Norman & Scott, 1906

Species included: *Tanaissus lilljeborgi* (Stebbing, 1891) [type species], *T. danica* (Hansen, 1909), *T. psammophilus* (Wallace, 1919), ***T. microthymus* sp. nov.**

Tanaissus microthymus **Bird & Bamber sp. nov.**
Figures 7–11

Synonymy: ? *T. lilljeborgi* Makkaveeva, 1971, non-*Leptognathia lilljeborgi* Stebbing, 1891

Material examined. Holotype non-ovigerous female (NHM.2008.4969), 1.76 mm. Station ORI 2, off the northern coast of Israel, 32º 28.472 N 034º 52.316 E, 15.8 m depth, 26 May 2005. **Allotype**: terminal ('swimming') male (NHM.2008.4970), 2.83 mm; same sample as holotype. **Paratypes**: 249 specimens (TAU AR 28451), same sample data as holotype; 161 specimens including 3 males (NHM.2008.4913–4922), ORI 1, 32°27.904'N 034°52.190'E, 15.8 m depth, 26 May 2005; 65 specimens (TAU AR 28452), ORI 3, 32°27.362'N 034°52.028'E, 16.2 m depth, 26 May 2005. 57 specimens, including 4 males (NHM.2008.4923–4932), Station AGAN 6, 31º51.342'N 034º39.050'E, 11.8 m depth; 17 females, 1 male (NHM.2008.4933–4942), Station AGAN 7, 31º51.446'N 034º39.453'E, 7.4 m depth; 47 specimens, including 2 males (TAU AR 28453), Station AGAN 11, 31º51.014'N 034º38.992'E, 10.1 m depth; all 02 May 2007; 12 females, 2 males, 8 juveniles (TAU AR 28450), MI 5, 31°51.237'N 034°39.301'E, 10 m depth, 2 May 2007.

Other material: 1 specimen, ORI 13, 32°27.510'N 034°52.316'E, 5.5 m depth, 12 July 2005; all clean fine sand. 1 manca-II, two mancae-III, four juveniles, 68 neuters/non-ovigerous/post-ovigerous females (one dissected on microslide), 36 ovigerous females, eight males, same sample data as holotype. 1 specimen, MI 2, 31°50.955'N 034°39.347'E, 5.0 m depth, 19 September 2006; 23 specimens, MI 5, 31°51.237'N 034°39.301'E, 10 m depth, 17 September 2006. 35 specimens, MI 3, 31°51.472'N 034°39.553'E, 4.7 m depth; 24 specimens, MI 4, 31°51.733'N 034°39.699'E, 4.4 m depth; 126 specimens, MI 5; all 20 October 2007. all coarse sand with shell. 34 specimens, HMA DA331°50.812'N 034°39.161'E, 6.4 m depth; 2 specimens, HMA DA22, 31° 51.612'N 034° 39.187'E, 12 m depth; 8 specimens, HMA DA23, 31° 51.309'N 034° 39.303'E, 8.7 m depth; 40 specimens, HMA DA60, 31° 51.031'N 034° 39.247'E, 7.3 m depth; 61 specimens, HMA DA62, 31° 51.731'N 034° 39.568'E, 7.6 m depth; 8 specimens, HMA DA63, 31° 51.797'N 034° 39.068'E, 14 m depth; all 20 October 2007.

6182 specimens, NMI stations (see Appendix 2A). 1313 further specimens, AGAN stations (see Appendix 2B).

Diagnosis: typical *Tanaissus*, female with pleon about as long as pereonites 5 and 6 combined; mandible molar acuminate, single-pointed; cheliped propodus with bifid distal crest; fixed finger with one distal tooth on incisive margin. Male with very elongate cephalothorax, pereonites 2–5 about as long as broad, antennule seven-articled; cheliped carpus with finger-like ventral process and small distal shield.

Description of non-ovigerous female (neuter). Body (Figure 7A) slender, 8.7 times as long as wide, 1.76 mm long. (Other paratype neuters/non-ovigerous females, length 1.2–1.7 mm). Cephalothorax as long as pereonites 1–3 combined, rostral half much narrower than posterior, with rounded, crenulate rostral margin (Figure 7B) and two dorsal crenulate ridges. Pereonites all more or less rectilinear, pereonite-1 shortest, pereonites 1–6 0.4, 0.78, 0.92, 1.04, 0.86 and 0.71 times as long as broad respectively. Pleon just longer than pereonites 5–6 combined; pleonite-5 longest; shallow epimera with single seta. Pleotelson (Figure 7C) as long as two preceding pleonites, weakly tapering and with shallow convex posterior margin bearing four setae (two penicillate).

Antennule (Figure 7D) slender, 0.85 times as long as cephalothorax, three-articled, although articulation of fourth small terminal article (flagellum) is suggested; peduncle article-1 longer than articles 2 and 3 combined, with proximal and distal clusters of three penicillate setae and single simple seta; article-2 longer than broad with one penicillate and two simple distal setae; article-3 three times as long as broad, with about five simple terminal setae and one penicillate seta all distal of suggestion of articulation.

Antenna (Figure 7E) six-articled, 0.6 times as long as antennule; article-1 short and annular, article-2 longer than broad, with dorsal seta; article-3 short, with dorsal seta; article-4 longer than articles 2–3 combined with four penicillate and two simple distal setae; article-5 short with long seta; article-6 very small, with four setae.

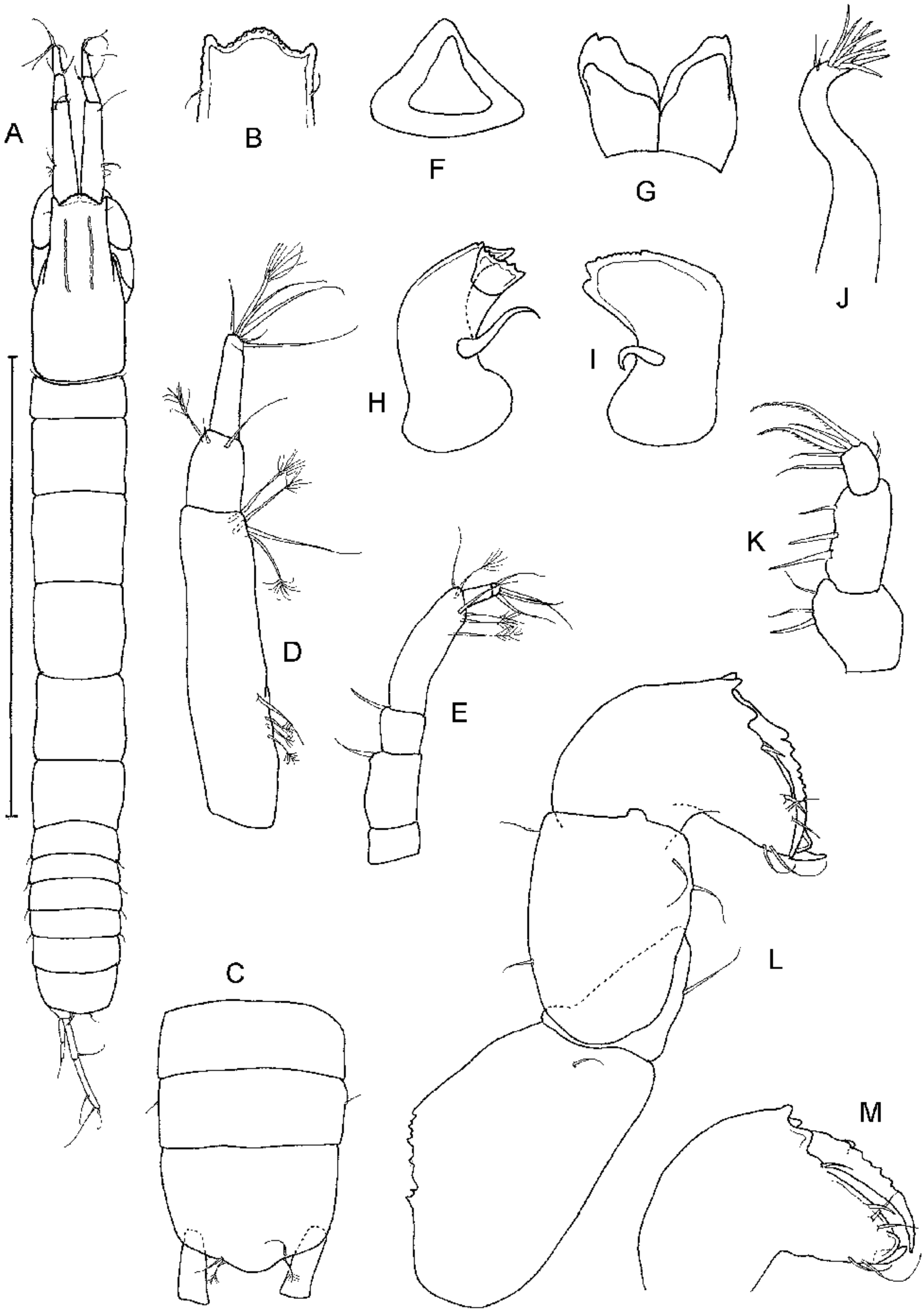

FIGURE 7. *Tanaissus microthymus* **sp. nov.**, holotype non-ovigerous female: A, habitus; B, rostrum; C, pleonites 5–6 and pleotelson; paratype post-ovigerous female: D, antennule; E, antenna; F, labrum; G, labium; H–I left and right mandibles respectively; J, maxillule endite; K, maxilliped palp articles 2–4; L, right cheliped; M, right chela from another paratype. Scale line = 1 mm A; 0.5mm B–C; 0.28 mm D–E, L–M; 0.18 mm F–K.

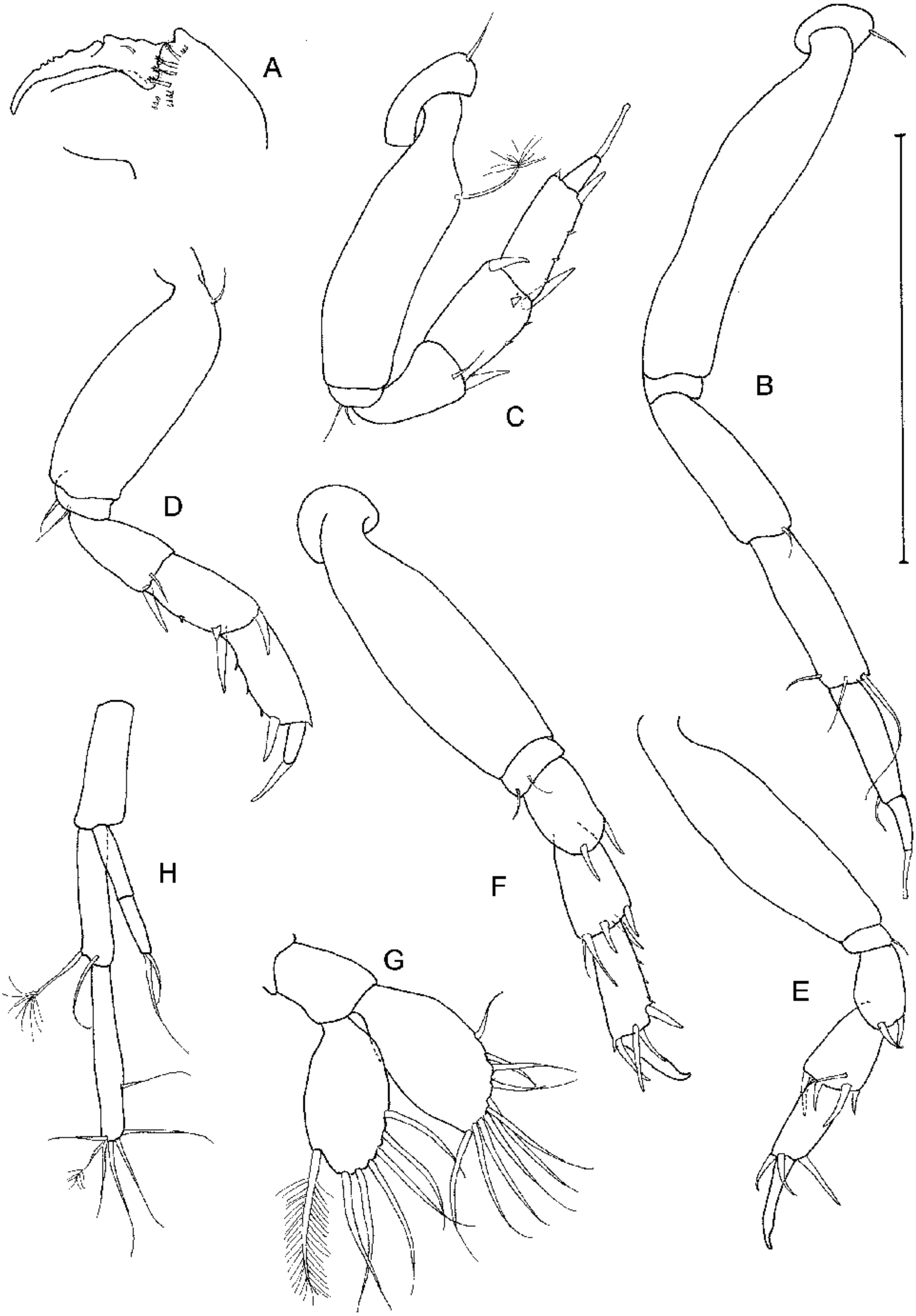

FIGURE 8. *Tanaissus microthymus* **sp. nov.**, paratype post-ovigerous female: A, right chela, inner face; B–F, pereopods 1–4 and 6 respectively; G, pleopod, only one plumose seta figured; H, uropod. Scale line = 0.25 mm A, H; 0.17 mm B–G.

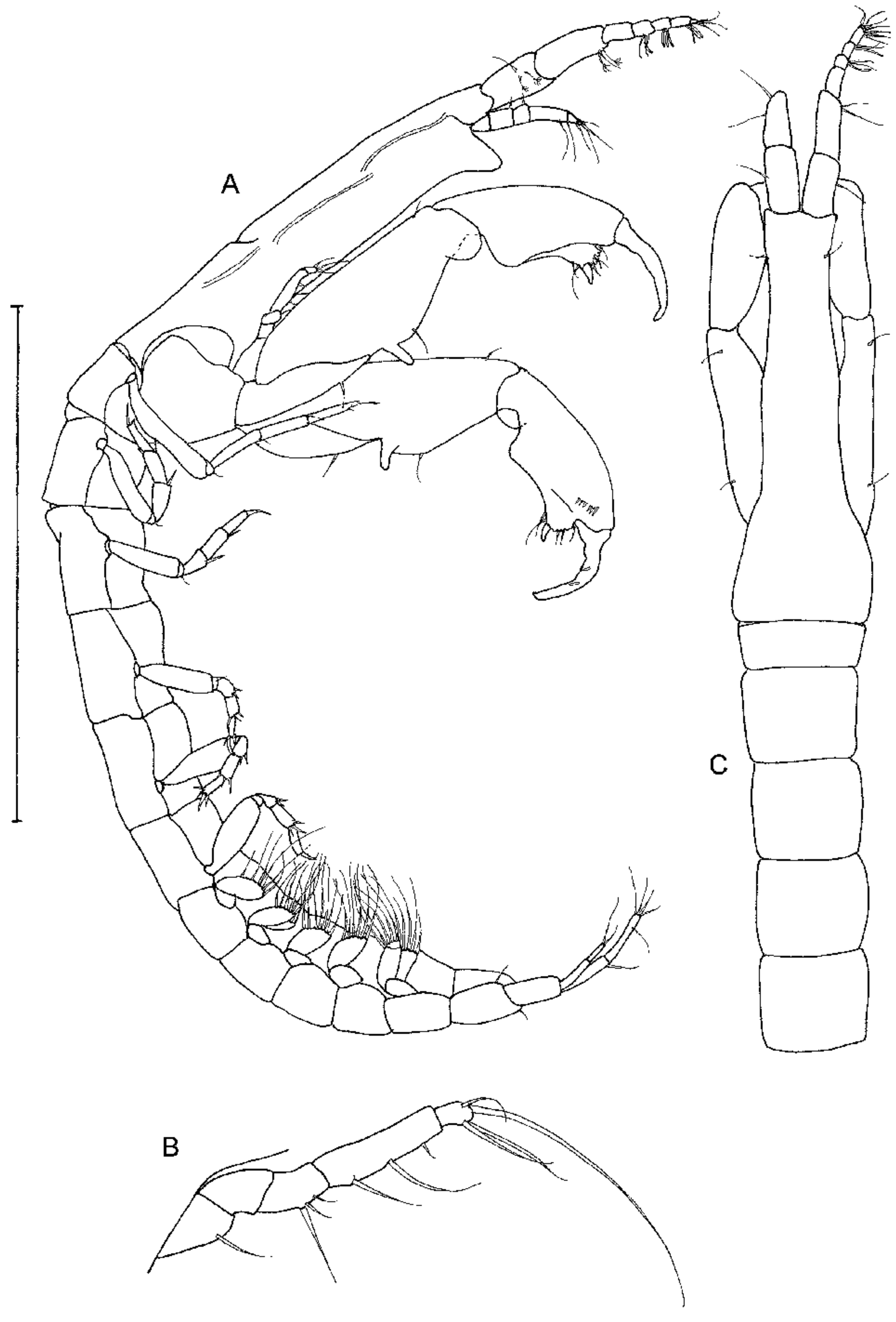

FIGURE 9. *Tanaissus microthymus* **sp. nov.**, allotype male: A, habitus, right side, only one set of pereopods drawn for clarity; B, maxilliped palp, lateral; paratype male, anterior fragment: C, habitus, dorsal, from cephalon to pereonite 5. Scale line = 1 mm A, C; 0.31 mm B.

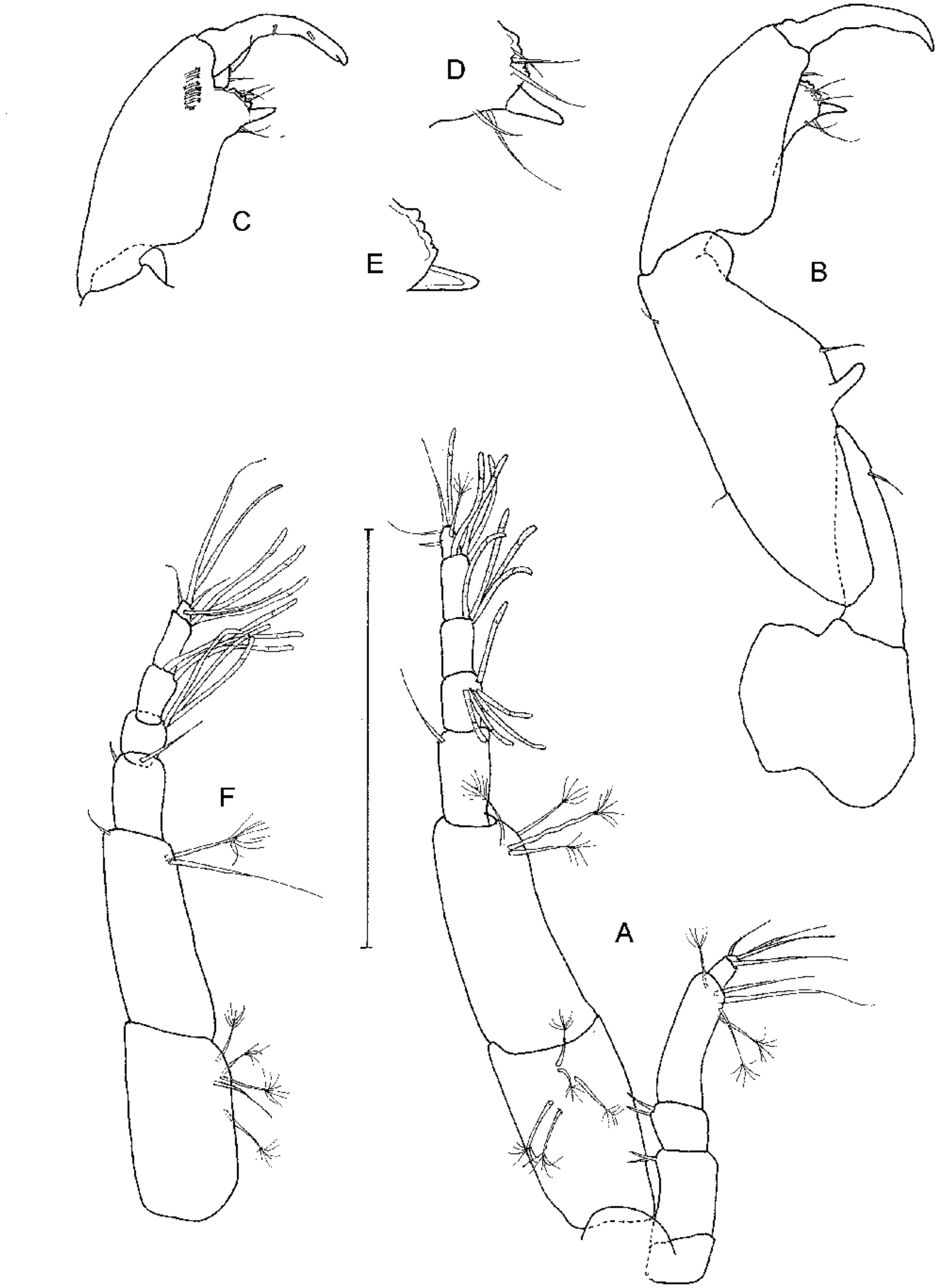

FIGURE 10. *Tanaissus microthymus* **sp. nov.**, allotype male: A, right antennule and antenna; B, right cheliped; C, left chela, inner face; D–E, detail of fixed finger, latter excluding setae for clarity; paratype male: F, antennule. Scale line = 0.5 mm B, C; 0.25 mm A, D–F.

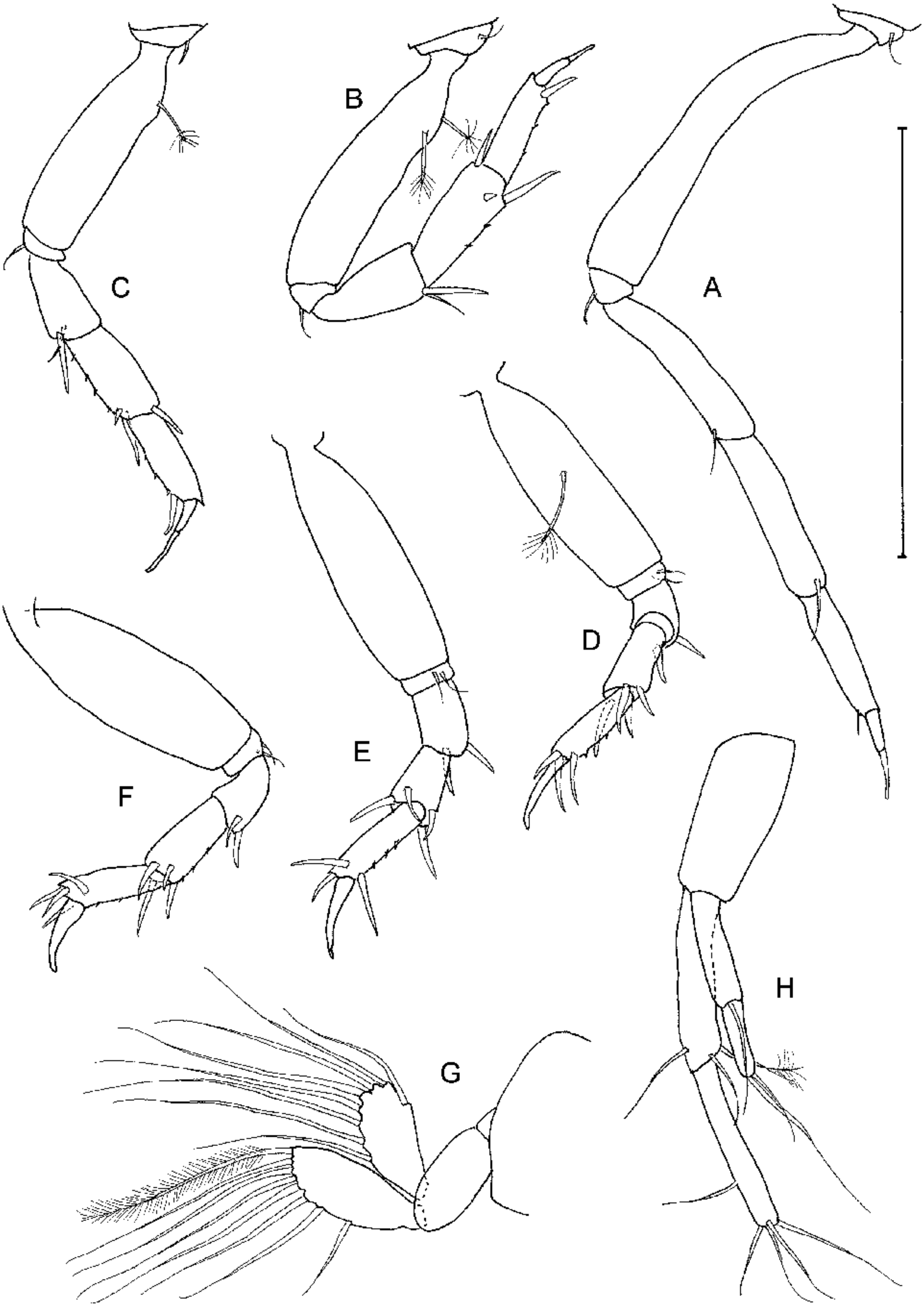

FIGURE 11. *Tanaissus microthymus* **sp. nov.**, allotype male: A–F, pereopods 1–6 respectively; G, pleopod, only one plumose seta figured; H, uropod. Scale line = 0.25 mm.

Labrum (Figure 7F) subtriangular, as long as labium. Labium (Figure 7G) two-lobed with slightly notched distal processes. Mandibles stout; right mandible (Figure 7I) with finely crenulate distal margin and bifid incisor; molar weak and acutely pointed; left mandible (Figure 7H) with crenulate incisor and broader *lacinia mobilis*, molar as in right mandible. Maxillule (Figure 7J) endite sigmoid, with two distal setae and eight terminal spines. Maxilliped (Figure 7K) basis with seta near articulation with palp; palp article-2 with three unequal weak setae, article-3 with three unequal setae and article-4 with four unequal simple setae and two stronger pinnate setae.

Cheliped (Figs 7L, M) basis large, with rounded posterior free margin, attached to carapace only by a small dorso-posterior section, with small distolateral seta; merus subtriangular, with ventral seta; carpus 1.4 times as long as broad, with two dorsal and two ventral setae; chela 1.3 times as long as carpus, propodus with bifid dorsodistal crest and anterior comb of four dendritic setae (Figure 8A) and associated small spines, fixed finger with weakly convex incisive margin and single distal subtriangular tooth, two unequal ventral setae, one seta near articulation with dactylus, and three unequal setae near incisive margin; dactylus narrow and acute, with several dorsal nodules and one small anterior seta.

Pereopod 1 (Figure 8B) longer and more slender than pereopods 2–3; coxa with seta; basis five times as long as broad; ischium with small seta; merus nearly three times as long as broad, with small dorsal seta; carpus subrectangular, as long as merus, with three unequal setae, one as long as propodus; propodus 0.7 times as long as carpus, with small distal seta; dactylus and unguis 0.6 times as long as propodus, unguis spatulate at tip.

Pereopod 2 (Figure 8C) relatively stout, coxa with seta; basis as long as merus, carpus and propodus combined, with dorsal penicillate seta; ischium with two small setae; merus distally expanded, 1.8 times as long as greatest width, with one seta and one spine; carpus about as long as merus, rectangular, 1.3 times as long as broad, with one dorsodistal spine, one larger ventrodistal spine and one very short spine, ventral margin with two spinules; propodus as long as carpus, but narrower, with distoventral spine and several ventral spinules; dactylus and unguis together as long as propodus, unguis spatulate at tip. Pereopod 3 (Figure 8D) very similar to Pereopod 2 but basis slightly stouter, with dorsal simple seta.

Pereopod 4 (Figure 8E) coxa indistinct; basis as in Pereopod 2 but without setae; ischium with two setae; merus 1.7 times as long as broad, expanded distally, with two ventral spines; carpus just shorter than merus, with four unequal spines and simple seta; propodus about as long as carpus, but narrower, with three distal spines and a few ventral spinules; dactylus and unguis fused, together longer than propodus. Pereopod 5 (not figured) similar to Pereopod 4. Pereopod 6 (Figure 8F) similar to pereopods 4–5 but propodus with four distal spines and dactylus/unguis shorter than propodus.

Pleopods all similar (Figure 8G), with basal article about as long as broad, naked; endopod and exopod rami similar, but exopod somewhat broader, with ten terminal setae, endopod with one distal and seven terminal setae; all setae plumose and longest barely as long as rami.

Uropod (Figure 8H) slender, about twice as long as pleotelson; basal article three times as long as broad, as long as exopod; exopod two-segmented, as long as proximal article of two-segmented endopod; setation as figured.

Ovigerous female, generally similar to non-ovigerous female, but pereon dorso-ventrally compressed and with pairs of oostegites on pereopods 1 to 4; length 1.41–1.76 mm (*cf.* 2.18 mm *T. lilljeborgi*, 2.62–3.20 mm *T. danica*).

Post-ovigerous females, generally similar to ovigerous female, but oostegites shed; length 1.38–1.79 mm.

Manca-II, generally similar to non-ovigerous female but pereonite-6 and pleonites shorter, lacking pereopod 6 and pleopods; length 0.68 mm. (*cf.* 0.99 mm *T. lilljeborgi*, 1.05 mm *T. danica*)

Manca-III, similar to manca-II but with rudimentary pereopod 6; length 1.00–1.04 mm (*cf.* 1.3–1.4 mm *T. lilljeborgi*, 1.28 mm *T. danica*)

Juvenile, similar to manca-III but also with rudimentary (setae-less) pleopods; length 0.96–1.00 mm.

Terminal male, body (Figure 9A) slender, length 2.83 mm (paratypes 1.87–2.3 mm). Cephalothorax

(Figure 9C) extremely attenuated, particularly rostral two-thirds that is almost conical, about three times as long as greatest width, as long as pereonites 1–4 and half of pereonite 5 combined; with dorsal ridges as in female and prominent conical process ventral to antennae; maxillipeds attached beneath caudal third of cephalothorax. Pereonites more or less rectangular, or with slightly convex lateral margins, pereonite-1 shortest, others about as long as broad, none elongate. Pleon about 1.5 times length of pereonites 5 and 6. Pleotelson short, only as long as preceding pleonite and basal article of uropods.

Antennule (Figure 10A, F) seven-articled, half as long as cephalothorax; peduncle article 1 stout. 1.8 times as long as broad, with or without one simple lateral seta and at least four penicillate setae; peduncle article 2 longer than article 1, with one small medial seta, one long lateral seta and one to four penicillate setae; peduncle article 3 longer than any flagellar segments, with only two unequal setae; flagellum of four segments, proximal segment as long as broad, with group of five (or three in smaller paratype) aesthetascs; second segment slightly longer, with similar group of aesthetascs; third segment longer and more slender than second, with group of aesthetascs; distal segment small with at least four unequal simple and penicillate setae and one aesthetasc.

Antenna (Figure 10A) just longer than first article of antennule peduncle, generally similar to that of female, but articles 2 and 3 with two dorsal setae.

Mouthparts absent apart from large maxillipeds. Maxilliped (Figure 9B) basis with seta near articulation with palp; palp articles 1 and 2 similar in length, article 2 with two small and one long seta; article 3 longer than articles 1 and 2 combined, with two long setae and one small distal seta, article 4 small, with short and long terminal setae, as figured.

Cheliped (Figure 10B) large and about as long as cephalothorax and antennules combined; attached at extreme caudal part of cephalothorax and posterior of basis overlaps sternal part of pereonite 1; basis with large free posterior margin but narrow articulation with merus; merus elongate, 'conical', with ventral seta; carpus slender, 2.5 times as long as greatest width, with finger-like ventral spur, one ventral and two dorsal setae, and small rounded distal shield on outer margin; chela almost as long as carpus; propodus (Figure 10C, D, E) with prominent ventral process, one seta near articulation with dactylus and anterior comb of about seven strong spiniform setae; fixed finger twisted medially, short, with strongly convex incisive margin bearing five 'teeth', with three outer and two ventral setae, distal spine straight and conical; dactylus strongly curved, wide at base, with two inner peg-like spines.

Pereopod 1 (Figure 11A) elongate, about 1.5 times as long as pereopods 2 and 3; coxa with seta; basis wider distally; ischium with seta; merus four times as long as broad, with ventral seta; carpus rectangular, as long and wide as merus, with stronger distal seta; propodus 0.75 times as long as carpus, with small distal seta; dactylus and unguis shorter than propodus.

Pereopod 2 (Figure 11B) more slender than in female, basis, merus, carpus and propodus proportionately longer, setation similar but spines longer and basis with two penicillate setae. Pereopod 3 (Figure 11C) similar to pereopod 2 but basis with single penicillate seta.

Pereopod 4 (Figure 11D) generally similar to that of female but basis with penicillate seta, longer spines on merus, no simple seta on carpus and propodus proportionately longer. Pereopod 5 (Figure 11E) similar to pereopod 4, but without basal penicillate seta. Pereopod 6 (Figure 11F) similar to pereopods 4 and 5 but with four propodal spines.

Pleopods all similar (Figure 11G), proportionately larger than in female and rami more elongate; endopod with one distal and seven terminal plumose setae, exopod with eight plumose setae, longest twice as long as rami.

Uropod (Figure 11H) similar to that of female but basal article stouter.

Etymology: from Greek *mikrothymos,* 'narrow-minded', a pun on the male's narrow cephalothorax and focus on detecting females for mating.

Distribution: throughout the survey area between 32°54.054'N 034°04.33'E and 31°41.328'N 034°33.326'E, in the shallow inshore waters ranging between 4.4 and 16.2 m depth.

Remarks. This small genus of slender nototanaids was partly revised by Bird (2002), who established that two distinct species were present in British and West European waters, and which are common in sandy substrata at intertidal and shallow-shelf depths (Bird *op.cit*., Holdich & Jones 1983). Differences in female cheliped and mandible molar structure, as well as male morphology (particularly pereon length, antennule and cheliped shapes), help distinguish the two previously described European species *T. lilljeborgi* and *T. danica*. Male antennule structure in *T. lilljeborgi* is of two long peduncular articles (owing to presumed fusion of the proximal two articles) and a four-segmented flagellum (terminal article small and indistinctly demarcated) all of which bear aesthetascs, whereas *T. danica* (males formerly known as *T. elongatus* Jones & Holdich, 1983) has a three-articled peduncle and four-articled flagellum with distinct small terminal article. The new species described above shares its antennule morphology with *T. danica* but has a pereon shape more similar to that of *T. lilljeborgi*. Elongation of the male cephalothorax, with associated reduction of mouthparts, is typical of several nototanaid genera such as *Nototanais* Richardson, 1906 and *Nototanoides* Sieg & Heard, 1985, but the extreme example shown by *Tanaissus microthymus* **sp. nov.** is comparable only with *Paranesotanais longicephalus* Larsen & Shimomura, 2008.

At first glance, with their highly elongate cephalothorax and distinctive cheliped carpus structure, only the males of *T. microthymus* differ significantly from those of *Tanaissus lilljeborgi*, but the females are also separable, primarily on morphometrics, including the relative size of the pleon. In neuters and females the pleon is shorter than, or slightly longer than pereonites 5 and 6 combined (0.81–1.14 times as long), with a weak trend to lengthening with size, compared to ratios of 0.93–1.9 in *T. lilljeborgi* (with allometric increase) and 0.76–1.08 in *T. danica* (no allometric increase). The female cephalothorax is also slightly more elongate in *T. microthymus* than in *T. lilljeborgi* and the new species is also smaller than *T. lilljeborgi* and *T. danica* at equivalent life-cycle stages (see description above). The females of *T. microthymus* and *T. lilljeborgi* share cheliped morphology, with a bicuspid crest on the propodus, and this, together with more similar male morphology implies a closer phylogenetic relationship than with *T. danica*. Minor differences are, however, evident in pleopod shape, maxilliped palp, pereopod and pleopod setation; in addition, the anterior comb on the cheliped propodus is of dendritric setae in *T. microthymus* and the cheliped fixed finger of this species has only a single distal tooth.

It might be considered that the new species merely represents an East Mediterranean regional variant of the type species, but the differences, especially in male morphology, appear too large to accommodate this hypothesis. Remarkably, considering the huge number of specimens recorded off Israel in the present study (8633 specimens from 99 samples, densities up to 2,800 per m^2), there are no previous records of the genus *Tanaissus* from the Mediterranean. This may well be a result of previous sample-analyses using too-coarse a mesh size. There is a typically enigmatic record by Makkaveeva (1971) of "*Tanaissus lilljeborgi*" from the Red Sea, which may in fact be the present species. Ideally, *Tanaissus* populations from regions westwards around the Mediterranean, through to the Iberian Atlantic seaboard should be studied, along with DNA molecular analyses, to establish true phylogenetic affinities and relationships.

Key to European and Mediterranean *Tanaissus* species

1 Antennule three-articled .... (females) 2
Antennule six or seven-articled (two or three-articled peduncle and four segmented flagellum bearing aesthetascs) . ... (males) 4
2 Cheliped propodus with bifid dorsodistal crest and spur near dactylus insertion; mandible molar process acuminate and single-pointed 3
Cheliped propodus without bifid crest; mandible molar acuminate but with minute terminal spines .... *T. danica*.
3 Pleon as long as pereonites 5–6 and half of pereonite 4 combined; cheliped fixed finger with three teeth.................. .... *T. lilljeborgi*.
Pleon about as long as pereonites 5–6 only; cheliped with single distal tooth........................ *T. microthymus* **sp. nov.**
4 Pereonites 2–4 about as long as broad, pleon longer than pereonites 4–5; cheliped carpus with finger-like ventral process or spur .... 5.
Pereonites 2–4 at least twice as long as broad, pleon as long as pereonites 4–5; cheliped carpus without peg-like pro-

cess or spur .... *T. danica*.

5 Cephalothorax twice as long as greatest width; antennule with two-articled peduncle and four-segmented flagellum, cheliped carpus without disto-lateral shield .... *T. lilljeborgi*.

Cephalothorax nearly three times as long as greatest width, distal two-thirds very narrow; antennule with three-articled peduncle and four-segmented flagellum; cheliped carpus with disto-lateral shield .... *T. microthymus* **sp. nov.**

Family Leptocheliidae Lang, 1973

Genus *Leptochelia* Dana, 1849

***Leptochelia tanykeraia* Bamber sp. nov**.
Figs 12–14

Synonymy: ? *L. dubia* Monod, 1933 non-*Tanais dubius* Krøyer, 1842 (partim)

Material examined. Holotype: female holotype (NHM.2008.4822), station RFI 7, off the coast of Israel, 31º48.809'N 034º28.892'E, 62 m depth, fine mud, 14 September 2006. **Allotype**: 1 male (NHM.2008.4823), station RFI 4, 31º54.193'N 034º33.241'E, 59 m depth, fine mud, 14 September 2006. **Paratypes**: 2 females (NHM.2008.4824–4826), 1 female, dissected, station RFI 7, same sample as holotype; 3 females (TAU AR 28429), station RFI 1, 31º53.640'N 034º33.069'E, 57 m depth; 1 female (TAU AR 28430), station RFI 5, 31º53.633'N 034º33.251'E, 55 m depth; all 14 September, 2006. 3 females (TAU AR 28431), RFI 3, 31°53.842'N 034°33.300'E, 57.0 m depth; 3 females (TAU AR 28432), RFI 5; 159 specimens (NHM.2008.4827–4836), including brooding females and 2 males, RFI 7; all 20 October 2007. All fine mud. 1 female, 2 neuters (NHM.2008.4837–4839), station NM H71, 32º45.057'N 034º56.565'E, 10.3 m depth,17 August 2006.

Other material: 1 female, AGAN 6, 31°51.342'N 034°39.050'E, 11.8 m depth; 02 May 2007. 2 females, AGAN 8, 31°51.707'N 034°38.855'E, 11.3 m depth; 02 May 2007. 1 female, RFI 4; 92 specimens, including brooding females, RFI 7; both 20 October 2007. 1 female, NMI H7, $32^0$32.696'N $34^0$53.717'E, 12.5 m depth, 07 August 2007. 1 female, HMA DA19, 31° 52.447'N 034° 38.468'E, 27.2 m depth, 20 October 2007.

Diagnosis: *Leptochelia* with three distal setae on maxilliped basis and third article of female antennule 1.4 times as long as the second. Pereopod 1 basis slender, 4.4 times as long as wide; dactylus and unguis together some 1.4 times as long as propodus. Pereopods 2 and 3, merus as long as carpus. Uropod exopod of one segment, two-thirds as long as proximal endopod segment, endopod of five slender segments. Male of the "*dubia*"-type, antennule half as long as body.

Description of female: body (Figure 12A) slender, holotype 2.1 mm long, 7.4 times as long as wide. Cephalothorax subrectangular, 1.25 times as long as wide, twice as long as pereonite 1, with slight rostrum, eyelobes conspicuous, eyes present and black. Six free pereonites; pereonite 1 shortest, pereonites 2 to 5 progressively longer (pereonite 5 one-and-a-half times as long as pereonite 1), pereonite 6 as long as pereonite 1 (all pereonites respectively 1.6, 1.4, 1.2, 1.1, 1.1 and 1.5 times as wide as long). Pleon of five free subequal pleonites bearing pleopods; each pleonite about 5 times as wide as long, with paired lateral setae. Pleotelson (Figure 13F) semicircular, just shorter than last two pleonites together, twice as wide as long, with single lateral setae on each side and two distal setae lateral to, and two distal setae on, caudal protrusion.

Antennule (Figure 12B) of three tapering articles and one minute distal article, proximal article 3.9 times as long as wide, longer than distal three articles together, with two long outer and two shorter inner setae; second article over twice as long as wide, one third as long as proximal article, distal outer seta 0.6 times as long as article; third article 1.4 times as long as second, with two distal setae; fourth article minute, eccentric, with five distal setae and one aesthetasc.

Antenna (Figure 12C) of six articles, proximal article compact with small ventral seta; second article longer than wide, with single inner distal and dorsodistal slender spines; third article as long as wide, with dorsodistal slender spine; fourth article longest, four times as long as wide, with paired distal setae; fifth article half as long as fourth, with one distal seta; sixth article minute, with four distal setae.

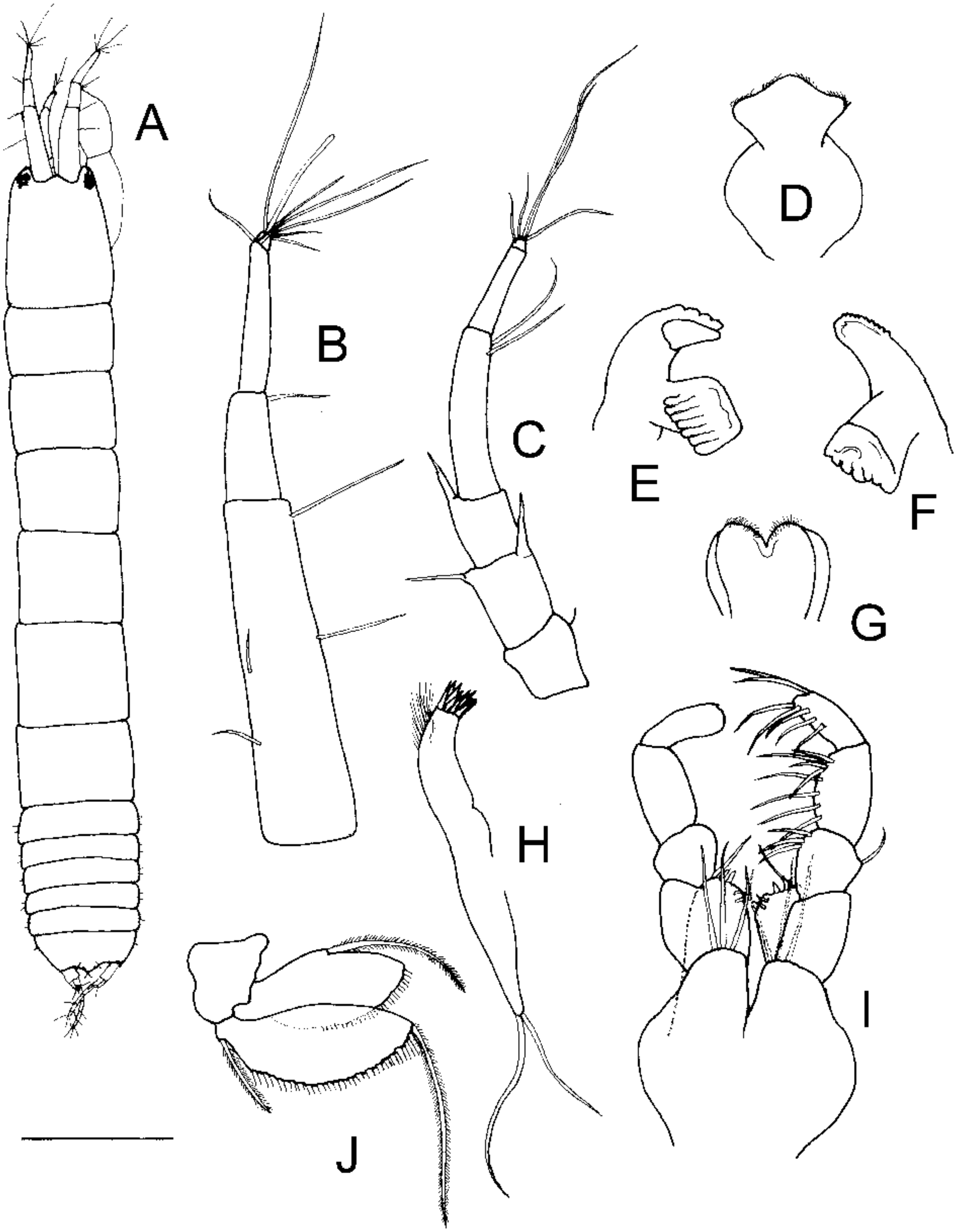

FIGURE 12. *Leptochelia tanykeraia* **sp. nov.**, female, A, holotype, dorsal; B, antennule; C, antenna; D, labrum; E, left mandible; F, right mandible; G, labium; H, maxillule; I, maxilliped; J, pleopod. Scale line = 0.4 mm for A; 0.1 mm for B to J.

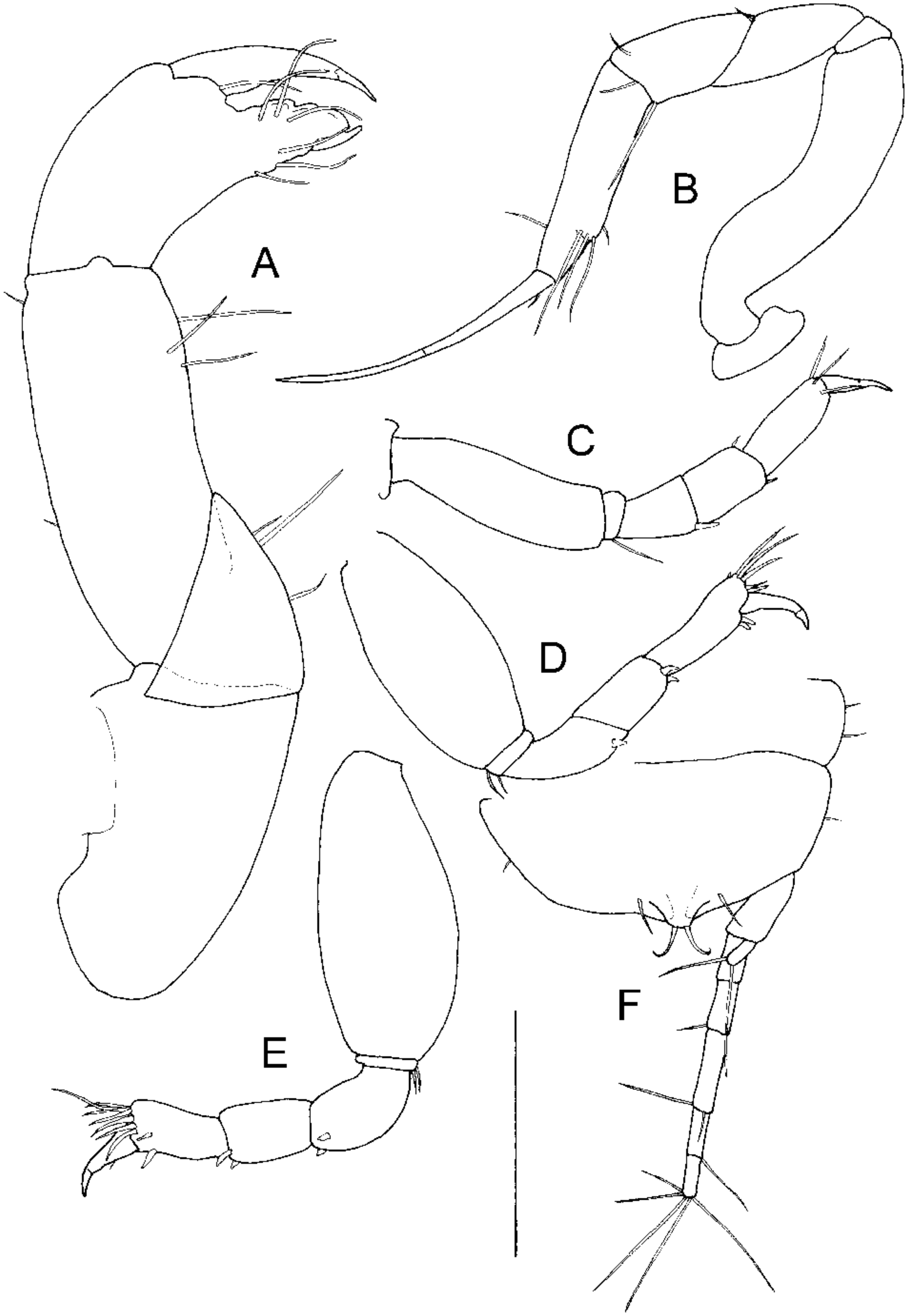

FIGURE 13. *Leptochelia tanykeraia* **sp. nov.**, female, A, cheliped; B, pereopod 1; C, pereopod 2; D, pereopod 4; E, pereopod 6; F, pleotelson and right uropod. Scale line = 0.2 mm.

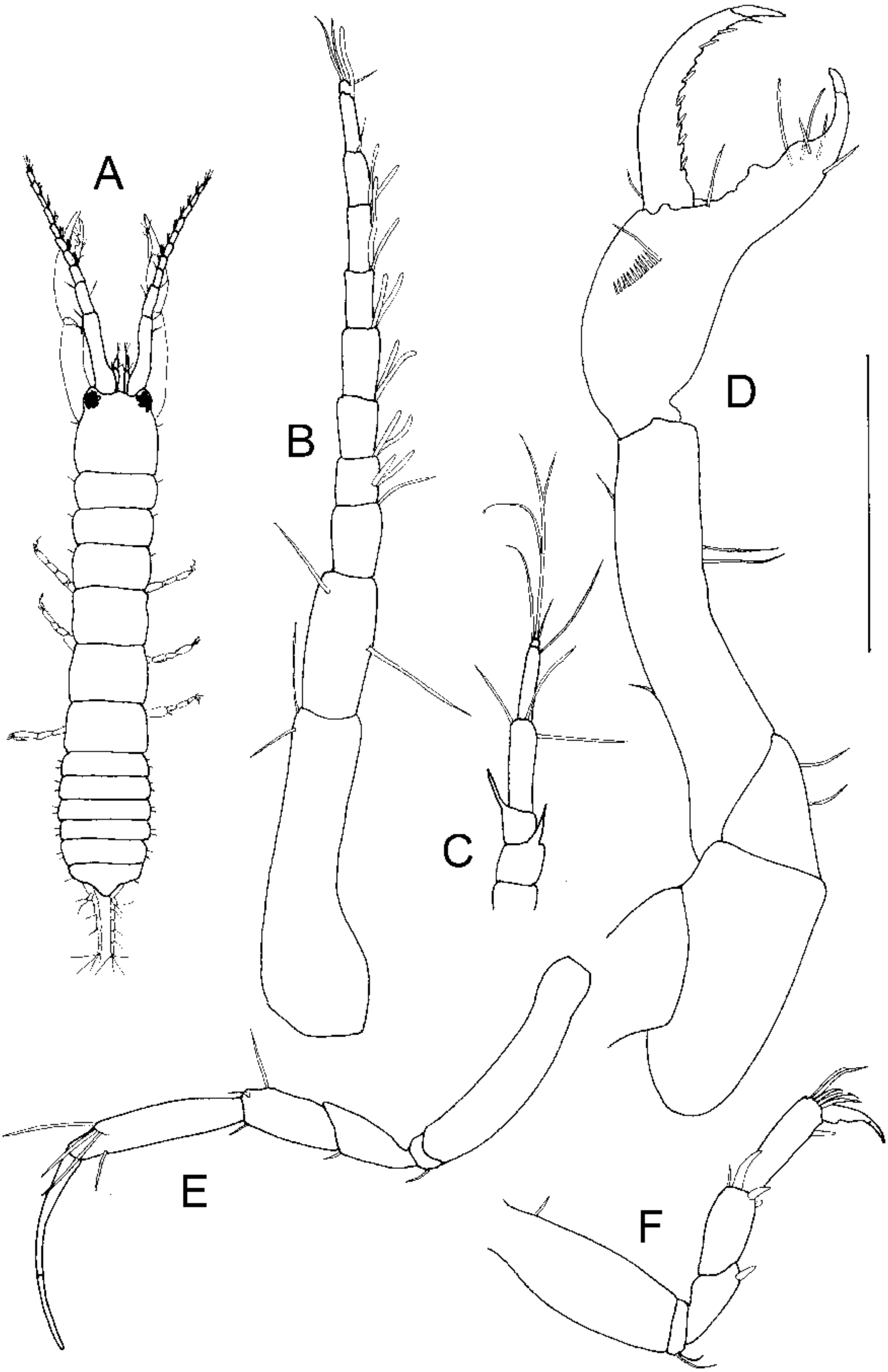

FIGURE 14. *Leptochelia tanykeraia* **sp. nov.**, male allotype, A, entire, dorsal; B, antennule; C, antenna; D, cheliped, E, pereopod 1; F, pereopod 6. Scale line = 1 mm for A; 0.25 mm for to F.

Labrum (Figure 12D) trapezoid, setose. Left mandible (Figure 12E) with smooth lacinia mobilis, four crenulations on pars incisiva, pars molaris robust with strong rugosity; right mandible (Figure 12F) similar but without lacinia mobilis, pars incisiva with finer crenulations. Labium (Figure 12G) relatively narrow, distally finely setose, without palp. Maxillule (Figure 12H) with ten distal spines and setose outer margin; palp distinct, with two distal setae. Maxilliped (Figure 12I) palp first article naked, second article with one outer and three inner distal setae, distal-most inner seta reaching only half length of third palp article; third and fourth articles with filtering rows of five setae, third article with three further inner distal setae, fourth article with two outer setae; basis with three long distal setae not extending to distal margin of second palp article; endites distally with single seta and two robust spatulate spines, inner distal edge with two fine spines. Maxilla (not figured) oval, naked; epignath not seen.

Cheliped (Figure 13A) with rounded, elongate basis twice as long as wide; merus triangular with three ventral setae; carpus 2.5 times as long as wide, with three midventral setae and two dorsal marginal setae; propodus slender, palm just longer than maximum width, fixed finger about half length of palm, with three ventral and three inner setae, cutting edge crenulate; dactylus naked.

Pereopod 1 (Figure 13B) longer than other pereopods; coxa naked; basis slender, 4.4 times as long as wide; ischium compact; merus as long as carpus, with single ventrodistal seta; carpus with three distal setae, longest of which (dorsodistal seta) half length of propodus; propodus as long as carpus and merus together, with four subdistal setae on dorsal swelling, one ventral subdistal seta; dactylus slender, extending into slender unguis of equal length, the two together some 1.4 times as long as propodus; single proximal seta on dactylus. Pereopod 2 (Figure 13C) more compact than pereopod 1; ischium with one seta; merus as long as carpus, merus with ventrodistal spine, carpus with dorsodistal and ventrodistal setae; dactylus and short unguis together 0.6 times as long as propodus. Pereopod 3 similar to pereopod 2.

Pereopod 4 (Figure 13D) basis stout, twice as long as wide; ischium with two setae; merus 1.2 times as long as carpus, with two short, ventrodistal spines (only one visible in Figure 13D); carpus with one outer, one ventral and one inner distal short spines (the last not visible in Figure 13D); propodus 1.5 times as long as carpus, with two ventrodistal slender simple spines, three longer and two shorter dorsodistal setae, the longest almost as long as dactylus plus unguis; dactylus and unguis just longer than half propodus, curved. Pereopod 5 as pereopod 4, but with only three dorsodistal setae on propodus. Pereopod 6 (Figure 13E) similar to pereopod 4, but propodus as long as carpus and with crown of seven distal setae.

Pleopods (Figure 12J) all alike, typical for the genus, basis naked.

Uropod (Figure 13F) biramous, basis naked; exopod of one segment, two-thirds as long as proximal endopod segment, outer distal seta longer than inner distal seta; endopod of five slender segments, setose as figured.

Description of male: smaller than female (allotype length 1.7 mm), body (Figure 14A) more compact, 6 times as long as wide; cephalon as long as wide, just longer than pereonites 1 and 2 together, with large eyelobes bearing large black eyes; pereonite 1 shortest, pereonites 2, 3 and 6 progressively slightly longer, pereonites 4 and 5 subequal, longest, 1.7 times as long as pereonite 1. Sexual dimorphism as follows.

Antennule (Figure 14B) elongate, half as long as body, first peduncle article 4.6 times as long as wide with conspicuous rounded inner proximal apophysis; second article 0.45 times as long as first; third article half as long as second; flagellum of 8 segments, most bearing distal pair of aesthetascs, proximal segment with additional proximal pair of aesthetascs. Mouthparts atrophied.

Cheliped (Figure 14D) more slender than that of female; carpus curved, 4.7 times as long as wide; propodus fixed finger as long as palm, with two low inner tooth-like apophyses on cutting edge; dactylus with setose crenulations along cutting edge. Setation of pereopods (e.g. Figs 14E, F) similar to that of female; dactylus and unguis of first pereopod 1.1 times as long as propodus; carpal spines on pereopods 4 to 6 longer than in female; propodus of pereopod 6 one-and-a-half times as long as carpus.

Etymology: from the Greek *tany*—long, and *keraia*—antenna.

Remarks. The second and third articles of the antennule in *Leptochelia* species are normally subequal in length: the present species is quite distinct (and thus recognizable without dissection) in having the third article 1.4 times as long as the second. Monod (1933) figures something similar in some of his "*Leptochelia dubia*" material from the Gulf of Suez, which was thus probably the same species, but as little other information was presented, it is not possible to be sure. There are four described species of *Leptochelia* which have three distal setae on the maxilliped basis, *L. itoi* Ishimaru, 1985 from Japan, *L. lusei* Bamber & Bird 1997 from Hong Kong, *L. nobbi* Bamber, 2005 from Western Australia, and *L. karragarra* Bamber, 2008 from Queensland, Australia; a further as-yet-unpublished species has been recognized from the Azores (Bamber, in prep.). Of these five, only *L. itoi* also has a pereopod 1 basis significantly more than four times as long as wide (4.2 times) and the dactylus and unguis of the first pereopod as much as 1.3 times as long as the propodus, but the proximal antennule article of that species is only 2.5 times as long as wide (3.9 times in *L. tanykeraia* **sp. nov.**), and none of these other species has such a slender cheliped carpus (2.5 times as long as wide in *L. tanykeraia*, 2.1 times or less in all the others).

In addition to the unique antennule-article proportions, the ornamentation of the maxilliped endite of *L. tanykeraia* is unique in having only two robust spatulate spines distally but with two fine spines on the inner distal edge, all other described species of *Leptochelia* having three robust spatulate spines distally, and no fine spines on the inner distal edge. The male of the present species is less remarkable, being broadly similar to that of *L. "dubia" sensu* Sars, 1886 from the Mediterranean coast of Italy.

Leptochelia is a shallow-water genus, normally found from the littoral zone down to about 15 m depth; the present species, largely taken from between 55 and 62 m depth (although as shallow as 10 m towards the north of the survey area), is the deepest so far recorded.

Family Pseudotanaidae Sieg, 1976

Subfamily Pseudotanainae Sieg, 1977

Genus *Pseudotanais* Sieg, 1977

***Pseudotanais (Pseudotanais) stiletto* Bamber sp. nov.**
Figures 15–17

Material examined. Holotype: 1 female (NHM.2008.4840), station RFI 2, off the coast of Israel, 31º53.328'N 034º32.853'E, 58 m depth, fine mud, 14 September, 2006. **Allotype**: 1 male (NHM.2008.4841), station RFI 4, 31º54.193'N 034º33.241'E, 59 m depth, 20 October 2007. **Paratypes**: 5 females (NHM.2008.4842–4846), same sample as holotype; 9 specimens (NHM.2008.4847–4856), 1 female with oostegites, dissected, station RFI 1, 31º53.640'N 034º33.069'E, 57 m depth; 3 specimens (NHM.2008.4857–4859), station RFI 3, 31º53.842'N 034º33.300'E, 57 m depth; 6 specimens (NHM.2008.4860–4865), station RFI 4, 31º54.193'N 034º33.241'E, 59 m depth; 4 specimens (NHM.2008.4866–4869), station RFI 5, 31º53.633'N 034º33.251'E, 55 m depth; 7 specimens (TAU AR 28433), 1 female dissected, station RFI 7, 31º48.809'N 034º28.892'E, 62 m depth; all 14 September, 2006; all fine mud. 5 specimens (TAU AR 28434), RFI 2; 4 specimens (TAU AR 28435), RFI 4; 1 specimen (TAU AR 38436), RFI 5;14 specimens (TAU AR 38437), RFI 7; all 03 May 2007. 2 females (NHM.2008.4870–4871), RFI 1; 6 females (4 brooding) (NHM.2008.4872–4877), RFI 2; 7 females (NHM.2008.4878–4884), RFI 3; 11 females (NHM.2008.4885–4894), RFI 4; 6 females (NHM.2008.4895–4900), 1 male (dissected), RFI 5; 101 specimens (NHM.2008.4901–4910), RFI 7; all 20 October 2007.

Other material: 11 specimens, HMI 18, 31° 52.059'N 034° 38.151'E, 28.1 m depth; 6 specimens, HMI 19, 31° 52.447'N 034° 38.468'E, 27.2 m depth; 2 specimens, HMI 34, 31° 52.367'N 034° 38.573'E, 25.5 m depth; 10 specimens, HMI 64, 31° 52.648'N 034° 38.509'E, 27.9 m depth; all 20 October 2007.

Diagnosis: member of the '*forcipatus*-group' of *Pseudotanais (P.) sensu* Bird & Holdich (1989), but with distinct black eyes and a single-segmented uropod endopod. Male with posterior pereopods much longer than anterior pereopods, and bearing elongate, corrugated dactylus.

Description of female: small *Pseudotanais*, holotype length 1.07 mm, body (Figure 15A) 4.5 times as long as wide, colour translucent white, eyes black. Cephalothorax subtriangular, 1.2 times as wide as long, longer than any pereonite, naked; eyes present, pigmented. Six free cylindrical pereonites, pleonites 3 to 6 with small anterolateral seta on each side; pereonites 1 and 2 equal in length, shortest, pereonite 3 almost twice as long as pereonite 2, pereonites 4 and 5 subequal, 2.5 times as long as pereonite 3, pereonite 6 shorter,

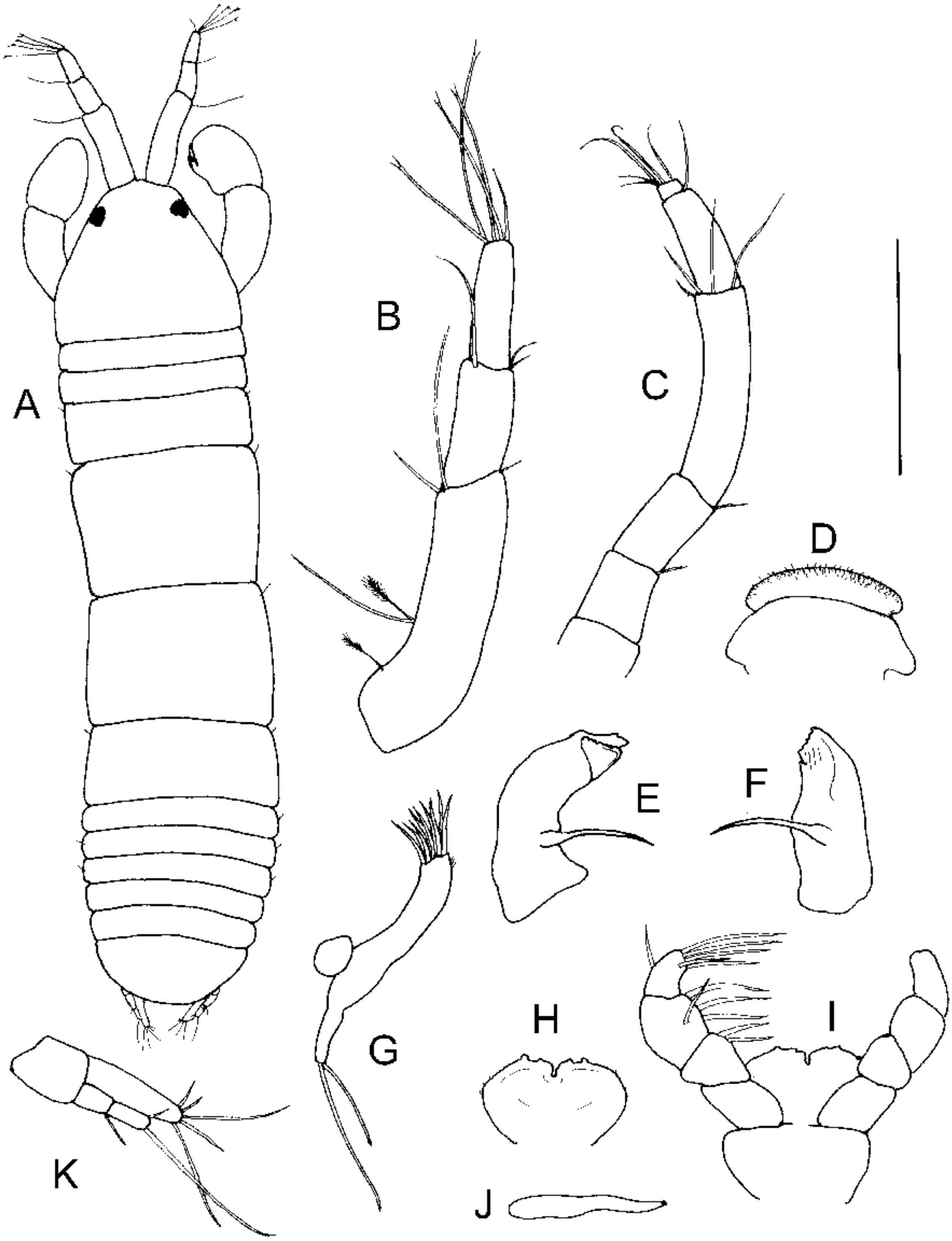

FIGURE 15. *Pseudotanais (P.) stiletto* **sp. nov.**, A, holotype female, dorsal; B, antennule; C, antenna; D, labrum; E, left mandible; F, right mandible; G, maxillule and maxilla; H, maxilliped endite; I, maxilliped; J, epignath; K, uropod. Scale line = 0.3 mm for A; 0.1 mm for B to K.

only three times as long as pereonite 2 (all pereonites respectively 6.4, 6.4, 3.6, 1.4, 1.4 and 2.2 times as wide as long). Pleon of five free subequal pleonites bearing pleopods plus pleotelson; pleonites 7.5 times as wide as long; at least pleonites 1 to 3 with simple lateral seta on each side. Pleotelson semicircular, short, 3 times as long as pleonite 5, half as long as wide, naked.

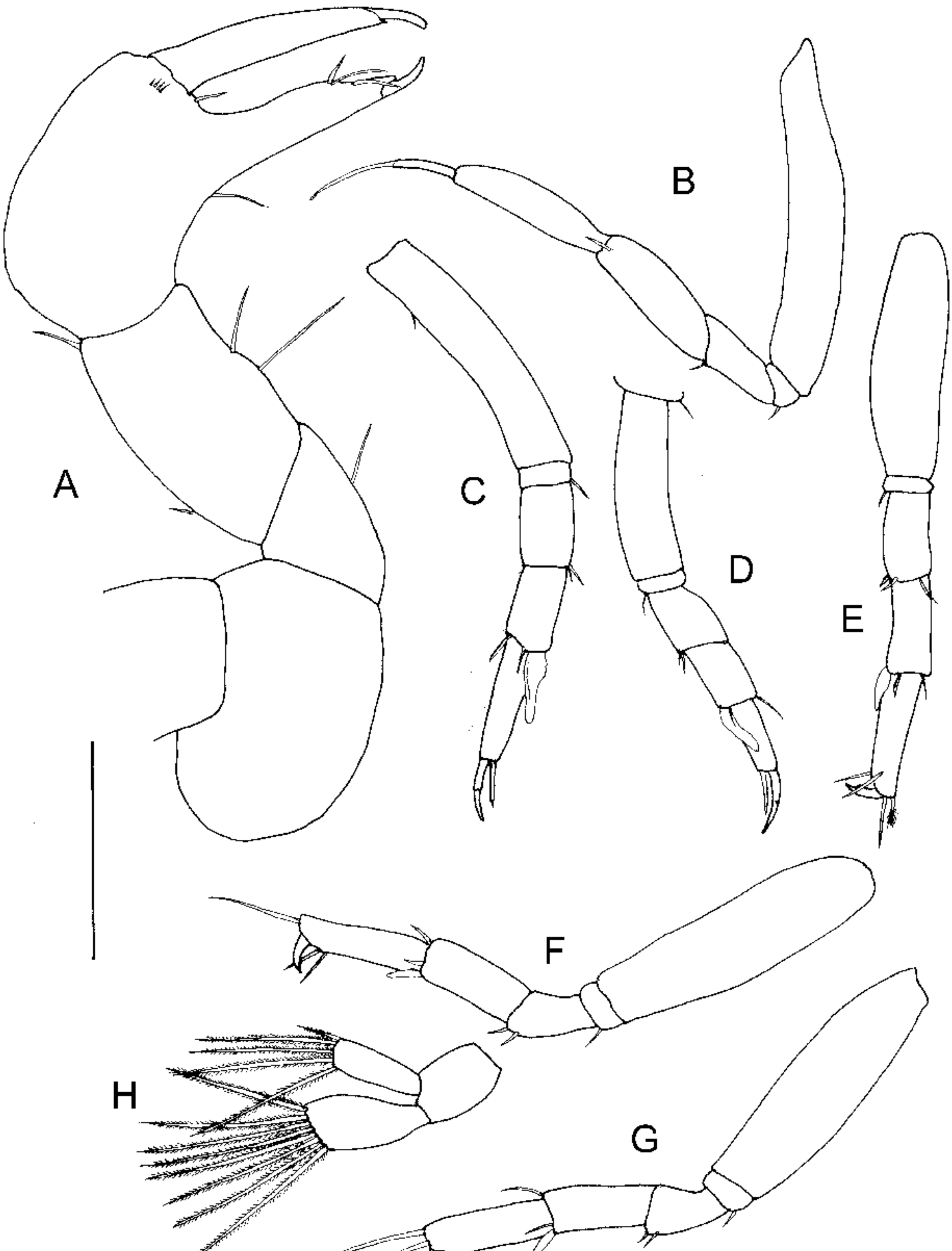

FIGURE 16. *Pseudotanais (P.) stiletto* **sp. nov.**, A, cheliped, B to G, pereopods 1 to 6 respectively; H, pleopod. Scale line = 0.1 mm.

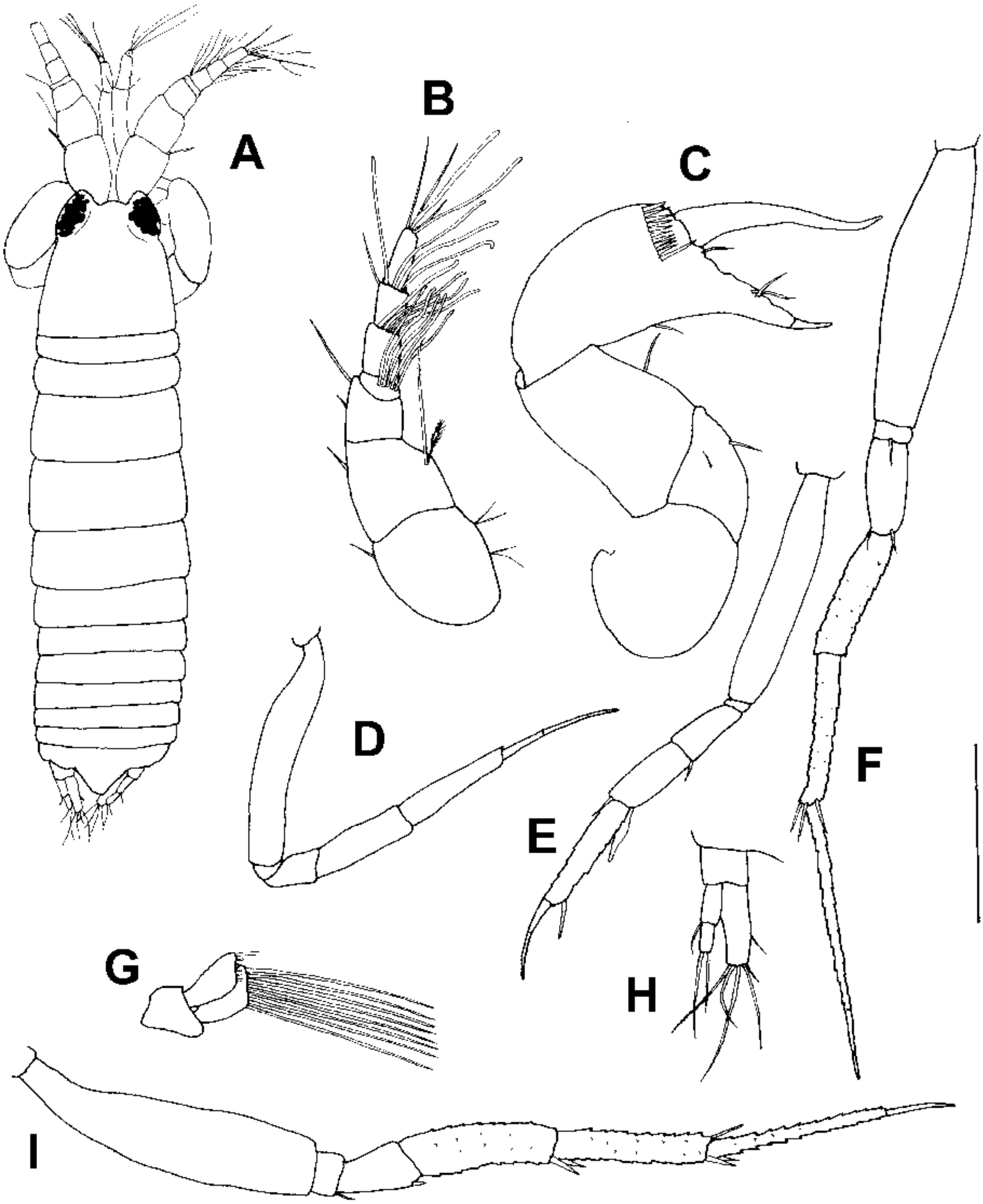

FIGURE 17. *Pseudotanais (P.) stiletto* **sp. nov.**, male, A, allotype, dorsal; B, antennule; C, left cheliped; D, pereopod 1; E, pereopod 2; F, pereopod 4; G, pleopod; H, uropod; I, pereopod 6. Scale line = 0.2 mm for A; 0.1 mm for B to I.

Antennule (Figure 15B) of three articles, proximal article 3.8 times as long as wide, with outer medial and distal setae longer than article width, and two proximal penicillate setae; second article half as long as first, with outer distal seta as long as article and paired smaller inner distal setae; third article just longer than second, with four distally bifurcate and one simple distal setae.

Antenna (Figure 15C) of six articles, proximal article compact, naked; second article with fine dorsodistal seta; third article 1.3 times as long as second with fine dorsodistal seta; fourth article curved, twice as long as third, with four distal simple setae; fifth article just longer than third with distal seta; sixth article minute with five distal setae.

Labrum (Figure 15D) rounded, setose. Left mandible (Figure 15E) with triangular, crenulate lacinia mobilis, pars molaris a very slender spike with simple point; right mandible (Figure 15F) with lacinia mobilis fused to a small process. Labium, and maxillule and maxilla (Figure 15G) typical of the genus, maxillule palp with two unequal distal setae. Maxilliped (Figure 15H, I) endites almost entirely fused, with slight distal tubercles but no setae; palp first article naked, second article with two simple inner setae, third with three inner and one submarginal setae, fourth article with four distal, one subdistal and one outer simple setae; distal margin of endites naked. Epignath (Figure 15J) simple, linguiform.

Cheliped (Figure 16A) forcipate, basis 1.5 times as long as wide, naked; merus subtriangular, with single midventral seta; carpus 2.3 times as long as wide, with two midventral setae, and dorsodistal and dorso-sub-proximal single setae; propodus palm longer than fixed finger, with ventral seta proximal to fixed finger and four anterior spines; fixed finger slender, cutting edge with three distal setae; unguis slender; dactylus naked.

Pereopod 1 (Figure 16B) slender; coxa simple, naked; basis 5.8 times as long as wide, naked; ischium with single small seta; merus half as long as carpus, with ventrodistal seta; carpus with single inner distal seta; propodus 1.2 times as long as carpus; dactylus with distinct, slender, longer unguis, both together 0.9 times as long as propodus.

Pereopod 2 (Figure 16C) relatively compact, basis 5.3 times as long as wide with single dorsoproximal seta; ischium with single small seta; merus and carpus equal in length, merus with paired ventrodistal setae, carpus with single dorsodistal seta, inner-distal seta and large, spatulate ventrodistal spine; propodus 1.5 times as long as carpus, with distal spine longer than dactylus, dactylus plus unguis half length of propodus. Pereopod 3 (Figure 16D) similar to but smaller than pereopod 2 (total length 73% of that of pereopod 2), propodus only just longer than carpus.

Pereopod 4 (Figure 16E) articulation of coxa with sternite obscure; basis 3.6 times as long as wide, naked; ischium with single small seta; merus and carpus of equal length, merus with two fine ventrodistal simple spines and dorsodistal seta, carpus with single dorsodistal seta, inner-distal seta and spatulate ventrodistal spine; propodus 1.4 times as long as carpus with one distal and paired ventrodistal setae, and distal penicillate seta; dactylus and unguis fused into claw, curved, together one-third as long as propodus. Pereopod 5 (Figure 16F) as pereopod 4 but without propodal penicillate seta. Pereopod 6 (Figure 16G) as pereopod 4, but propodus with two simple distal setae.

Pleopods (Figure 16H) all alike, with naked basis, endopod larger than exopod, with eight distal plumose setae; exopod with four longer and one shorter distal plumose setae.

Uropod (Figure 15K) basis naked, endopod of one segment with five distal setae, exopod of two segments, together 0.7 times as long as endopod, proximal segment with single outer seta, distal segment with paired unequal setae.

Description of male: body (Figure 17A) smaller and more compact than female, allotype 0.66 mm long, 4 times as long as wide. Cephalon tapering less than that of female, proportionately longer, as long as wide. Eyes large, black. Pereonite 1 shortest, pereonite 2 slightly longer, pereonites 3 to 5 subequal (pereonite 4 longest, twice as long as pereonite 2), pereonite 6 as long as pereonite 2 (all pereonites respectively 6, 4.3, 2.4, 2.3, 2.5 and 4.3 times as wide as long). Pleotelson short, distally produced, three times as wide as long.

Antennule (Figure 17B) peduncle more compact than that of female; first article 1.22 times as long as wide with four paired fine ventral setae and single dorsodistal seta; second article almost as long as first and with single dorsodistal seta, long midventral seta and adjacent penicillate seta; third article just longer than wide and less than half length of second, with two dorsal setae; flagellum of four segments, first segment very short, much wider than long, with five or six ventral aesthetascs, second segment much longer than wide and longer than third peduncle article with four ventrodistal aesthetascs, third segment 0.8 times as long as second, with four aesthetascs, fourth article as long as second, with two distal aesthetascs and four setae. Antenna similar to that of female.

Mouthparts not studied.

Cheliped (Figure 17C) with basis and carpus more compact than those of female, merus with two ventral setae, carpus with single ventral seta, propodus with distal comb-row of eleven spines, fixed finger with two distal setae on cutting edge; dactylus slender and sinuous, unguis not obviously distinct; forcipate nature of chela less obvious.

Pereopod 1 (Figure 17D) similar to that of female, but apparently without setae. Pereopod 2 (Figure 17E) more slender than that of female, basis six times as long as wide, merus shorter than carpus, spatulate carpal spine narrower; propodus with corrugated dorsal and ventral margins, dactylus plus unguis two-thirds as long as propodus. Pereopod 3 as pereopod 2.

Posterior pereopods much longer than anterior pereopods. Pereopod 4 (Figure 17F) 1.7 times as long as pereopod 2, basis four times as long as wide, ischium with single distal seta, merus with paired distal setae, carpus 1.5 times as long as merus and naked, propodus 1.1 times as long as carpus with three distal setae; dactylus long and slender, 2.7 times as long as unguis, both together 1.8 times as long as propodus. Carpus, propodus and dactylus with corrugated dorsal and ventral margins. Pereopods 5 and 6 (Figure 17I) as pereopod 4, but merus with short ventrodistal spine, carpus with paired distal setae.

Pleopods (Figure 17G) with rami slightly wider than those of female, distal setae nearly three times as long as rami. Uropods (Figure 17H) similar to those of female.

Etymology: named after the slender Italian dagger (diminutive of the Italian *stylo*, from the Latin *stylus*), with reference to the extremely fine mandibular pars molaris.

Remarks. With the spatulate (blade-like) spine on the carpus of pereopods 2 to 6, *P. stiletto* **sp. nov.** is a member of the nominate subgenus of *Pseudotanais*, and, with the diastema between the dactylus and fixed finger of the chela, it belongs to the *Pseudotanais* '*forcipatus*-group' *sensu* Bird and Holdich (1989), a suite of species also consistently showing a simple-pointed mandibular pars molaris and the ventral seta on the cheliped propodus proximal to the fixed finger origin. Sieg (1977) and Bird and Holdich (1989) gave comprehensive reviews of the species of *Pseudotanais* from the northeast Atlantic and Mediterranean regions. Since that time, the only two new species of the subgenus *Pseudotanais* which have been described are *P. (P) baresnauti* Bird, 1999 and *P. (P.) nipponicus* McLelland, 2007 (*P. (P) californiensis* Dojiri & Sieg, 1997 probably = *P. abyssi* Hansen 1913), neither of which are members of the '*forcipatus*-group'.

Of the six previously-described species of the '*forcipatus*-group', only *P. mexicoplos* Sieg, 1988, from the Gulf of Mexico, has eyes. However, that species, as all of the other five, has two segments in the uropod endopod. The only species of *Pseudotanais* described previously from the Mediterranean are *P. (P) macrochelis* Sars 1882, *P. (P) mediterraneus* Sars 1882 and *P. (P) unicus* Sieg 1977, of which only *P. (P) mediterraneus* has eyes, none have a 1-segmented uropod endopod, nor are they members of. the '*forcipatus*-group'.

Mature males of *Pseudotanais* are rarely recorded: Bird and Holdich (1989) found only preparatory males in their extensive north-east Atlantic material, while Sieg (1977) had a mature male only for *P. forcipatus*. The antennular structure of that male is similar to that of *P. stiletto*, and interestingly, the chela of that nominate species of the "*forcipatus*-group" is not forcipate, as found with the present species. However, the posterior leg dimorphism shown by *P. stiletto* was not present in P. *forcipatus*. The male of *P.* "*californiensis*" described by Dojiri and Sieg (1997) again shows a similar antennule morphology, but the chela is forcipate, and the posterior pereopods do not show extreme dimorphism. Only the male "*Pseudotanais* sp." of Kudinova-Pasternak (1970), again with the typical male antennule, appears to show longer, more slender posterior pereopods with an elongate dactylus (but a distinct cheliped, and different antennular peduncle proportions from *P. stiletto*).

All the specimens were found in deeper inshore waters, between 25 and 62 m depth, towards the south of the survey area.

Discussion

Previous studies of Mediterranean tanaidaceans over the last century (see Introduction) have mainly concentrated on the Apseudomorpha, while, geographically, little emphasis has been placed on the Levantine Basin. It is therefore perhaps no surprise that, of the material described herein, the six new species are either deep-water (one) or tanaidomorphs. While the use of a fine sieve-mesh may well account for the discovery of *Typhlotanais angstromensis* and *Akanthophoreus nanopsenos*, as well as the abundance of *Tanaissus microthymus*, the latter species and *Pseudotanais stiletto* should also be retained, albeit in lower density, in 0.5 mm-mesh sieving. Owing to the previous confused history of the genus, *Leptochelia tanykeraia* may have been missed previously as a distinct species. Other taxa of *Leptochelia* from epifaunal habitats have been discovered in this region recently and are awaiting description, but those are distinct from *L. tanykeraia*.

Ecologically, the suites of species in the sedimentary substrata off Israel were distinct. The shallower inshore sandy substrata supported a relatively uniform community of *Apseudopsis mediterraneus* (at 5 to 30 m depth) and *Tanaissus microthymus* (shallower than 20 m depth), with *Cristapseudes omercooperi* patchily abundant at 20 to 30 m depth. *Leptochelia tanykeraia* was occasionally present in this species-suite.

The deeper muddy stations (RFI, >50 m) supported an entirely distinct community, with further species of the Apseudidae (*Apseudes apocryphus*, *A. holthuisi*, and three rarer species, but no *Apseudopsis mediterraneus*) but dominated by tanaidomorph species, notably *Pseudotanais stiletto*, *Akanthophoreus nanopsenos* and *Typhlotanais angstromensis*; *Tanaopsis laticaudatus* was patchily present. Again, *Leptochelia tanykeraia* was occasionally present, the only tanaidacean species to occur in both habitats.

The distinction of these suites by depth is reinforced by the results of the Mekorot Ashdod survey in October 2007, where the shallower stations supported species typical of the *A. mediterraneus* / *T. microthymus* suite, while *C. omercooperi* and even *P. stiletto* appeared at stations below 20 m, only.

Further study of the tanaidacean fauna of shallower fine substrata, or deeper sandy substrata, will help to distinguish the controlling relevance of these two environmental parameters of depth and granulometry.

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Appendix 1. Station data for National Monitoring Israel (NMI) and Agan (AGAN) Stations
("coarse" and "fine" show percentages of sediment particles of greater than 250 µm and less than 125 µm diameter, respectively; detailed data unavailable for Agan stations)

Station	Lat–Long	Depth	% coarse	% fine
NMI 3	32⁰ 47.360'N 34⁰ 56.852'E	9.7 m	5.9	13.1
NMI 7	32⁰ 32.696'N 34⁰ 53.717'E	12.5 m	1.3	15.3
NMI 10	32⁰ 54.054'N 34⁰ 04.330'E	9.2 m	3.55	36.7
NMI 11	32⁰ 24.012'N 34⁰ 51.370'E	12.6 m	1.1	16.2
NMI 13	32⁰ 09.524'N 34⁰ 47.211'E	10.2 m	1.4	19.2
NMI 16	32⁰ 06.394'N 34⁰ 45.976'E	11.8 m	1.4	21.9
NMI 19	32⁰ 56.710'N 34⁰ 41.901'E	11.4 m	0.9	30.5
NMI 23.1	32⁰ 49.921'N 34⁰ 02.536'E	9.3 m	2.6	35.7
NMI 24	31⁰ 48.195'N 34⁰ 37.458'E	11.0 m	3.7	25.0
NMI 27	32⁰ 49.246'N 35⁰ 01.187'E	11.25 m	21.3	22.4
NMI 28	31⁰ 41.328'N 34⁰ 33.326'E	8.9 m	3.1	16.5
NMI 28.1	31⁰ 41.293'N 34⁰ 33.380'E	7.3 m		
NMI 28.2	31⁰ 41.393'N 34⁰ 33.204'E	12 m		
NMI 28.3	31⁰ 41.497'N 34⁰ 33.030'E	14.7 m		
NMI 41	32⁰ 16.381'N 34⁰ 49.394'E	9.7 m	1.0	18.3
NMI 71	32⁰ 45.057'N 34⁰ 56.565'E	10.3 m		
AGAN 1	31°51.582'N 034°39.170'E	12.3	all coarse sand with shell and grit	
AGAN 2	31°51.603'N 034°39.171'E	12.3		
AGAN 4	31°51.702'N 034°39.222'E	11.4		
AGAN 5	31°52.283'N 034°39.527'E	11.4		
AGAN 6	31°51.342'N 034°39.050'E	11.8		
AGAN 7	31°51.446'N 034°39.453'E	7.4		
AGAN 8	31°51.707'N 034°38.855'E	11.3		
AGAN 10	31°52.827'N 034°39.779'E	11.6		
AGAN 11	31°51.014'N 034°38.992'E	10.1		
AGAN 12	31°53.344'N 34°40.063'E	12.5		

Appendix 2A. Numbers of *Apseudopsis mediterraneus* and *Tanaissus microthymus* sp. nov. per NMI station (0.3 m²) from all surveys

Species	*Apseudopsis mediterraneus*			*Tanaissus microthymus*		
Date	August 2005	August 2006	August 2007	August 2005	August 2006	August 2007
NMI H3	3	0	0	19	43	103
NMI H7	19	11	19	414	838	155
NMI H10		0			2	
NMI H11	66	28	36	181	71	20
NMI H13	12	77	40		7	26
NMI H16	42	19	8	295	376	41
NMI H19	10	5	13	170	207	252
NMI H23		11	216		0	0
NMI H24	25	22	38	153	389	195
NMI H27	179	4	0	0	0	0
NMI H28	26	71	71	5	16	5
NMI H28.1		26			3	
NMI H28.2		466			7	
NMI H28.3		825*			2	
NMI H41	29	5	126	14	1453	2
NMI H71		0			718	

Blanks represent no sample; zeros represent a sample with no animals of that species.
* registered specimens listed in text.

Appendix 2B. Numbers of *Apseudopsis mediterraneus* and *Tanaissus microthymus* sp. nov. per AGAN station (0.3 m²) from all surveys

Species	*Apseudopsis mediterraneus*					*Tanaissus microthymus*				
Date	May 2005	September 2005	May 2006	May 2007	October 2007	May 2005	September 2005	May 2006	May 2007	October 2007
AGAN 1	53	3	41	21	20	0	2	4	1	0
AGAN 2	39	9	67			3	0	2		
AGAN 4	30	33	63	7	68	0	7	21	0	2
AGAN 5	164	23	106	17	44	107	196	78	19	11
AGAN 6	105	6	64	18*	7	84	10	116	57*	35
AGAN 7	1		3	8*	0	2	17	339	18*	21
AGAN 8	46	164	25	16	39	0	1	2	0	0
AGAN 10	115	9	189	45		116	7	10	1	
AGAN 11	7	10	13	53*	13	1	6	80	47*	0
AGAN12				11	31				10	2

Blanks represent no sample; zeros represent a sample with no animals of that species.
* registered specimens listed in text.