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Tanaidacea (Crustacea: Malacostraca: Peracarida) from soft-sediment shelf habitats off the Mediterranean coast of Israel (Levant Sea) –taxonomy, faunistics and ecological aspects

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Abstract

A 74-year zoogeographic and faunistic description of the shelf soft substrate peracaridan Tanaidacea along the Israeli coast, the eastern-most part of the Mediterranean, is provided here. The presence of three apseudomorphan and ten tanaidomorphan families, with 28 species, is recorded, of which four are reported from the region for the first time, and five are new species in the genera *Araphura*, *Nippognathiopsis*, *Paratyphlotanais*, and *Typhlotanais*. In addition, a new genus is established for *Akanthophoreus nanopsenos*, *Leptochelia tanykeraia* is redescribed, and the presence of *Chondrochelia savignyi* is demonstrated. The tanaid shelf community essentially belongs to the Mediterranean zoogeographic province but has several Mediterranean-Atlantic species. Lessepsian (Erythrean) migration is currently indicated by the presence of one species, the Indo-Pacific kalliapseudid *Cristapseudes omercooperi*, which has established a population in the studied area. Its settlement strategy is demonstrated and discussed. The poor Indo-Pacific representation is possibly due to the lack of planktonic larvae in this peracarid group, reducing the chance of dispersion or transport from the Indo-Pacific realm via the Suez Canal.

Keywords: Tanaidacea; Eastern Mediterranean; Lessepsian migration; *Cristapseudes omercooperi*; benthos.

Introduction

Marine Tanaidacea (Crustacea: Malacostraca: Peracarida) inhabit a variety of benthic habitats and have no planktonic stage, hence completing their entire life cycle on the sea floor (Holdich & Jones, 1983a; Larsen, 2005; Błażewicz *et al.*, 2020). In the last two decades an increased focus has been directed to this group and its 'importance', or at least prevalence, in soft-sediment marine habitats (e.g., Błażewicz-Paszkowycz *et al.*, 2012). The focus of this study is the shelf benthic sediments ranging in depths 4-100 m, off the Israeli coast, in which Tanaidacea (tanaids) are a considerable component. The faunistics of the tanaids within this region of the eastern Mediterranean, principally of shallow water habitats, were previously described by Băcescu (1961) and Bamber *et al*. (2009), although several species from this region were also described during the intervening and subsequent years by Băcescu (1980; 1984), Guţu (2002), and Bamber (2012). The tanaid slope and bathyal plain communities were sampled at 2013 and initially listed by Lubinevsky *et al*. (2017). The shelf communities from the 5-15 m depth range that were sampled during the period 2005-2016 were presented in Lubinevsky *et al*. (2019). Both articles described the tanaids within broader macrofaunal ecological studies. Tanaids from the wider Levant Sea region are less well-known and have been described from the Egyptian and Lebanese shelf of the Mediterranean and throughout the Suez Canal (Omer-Cooper, 1927; Monod, 1931; Larwood, 1940, 1954). Records from the southern Turkish coast from the Gulf of Antalya eastwards, also part of the Levant region, include those by Mutlu & Ergev (2013) for the Cilician Shelf, and Çinar *et al*. (2012) from Mersin Bay.

The ~190-km Israeli Mediterranean province is divided into a continental shelf (<100 m depth), continental slope (between 100-1000 m depth) and a bathyal plain (1000-2000 m depth) and it is the shallow eastern part of the Levantine Basin. The 100 m depth as the dividing line between shelf and slope followed Harris *et al*. (2014). The Israeli coast bathymetry and terrain were described in Hall *et al*. (2015), Gvirtzman *et al*. (2015) and Kanari *et al*. (2020) while it has been intensively used for a variety of anthropogenic purposes, such as harbour and anchorage facilities, cooling of power stations, desalination plants, treated sewage disposal, gas exploration and production facilities, fisheries, recreation, and military activities. A striking biogeographic feature of this coast is the Lessepsian migration, i.e. an invasion of species of Indo-Pacific biogeographic origin into the Mediterranean Sea via the Suez Canal (Galil *et al*., 2018). The anthropogenic activities have been accompanied by intensive environmental studies done in the framework of governmental biotic monitoring programs and a variety of compliance monitoring surveys, most including infaunal sampling. The spatial distribution of all sites and regions of the Israeli Mediterranean coastal waters in which tanaids were sampled and identified between 1947-2020 is presented in Figure 1 and it includes both sites that were documented in the past and new ones reported here for the first time. The study refers to all tanaid shelf species, including those which are extended also into the bathyal.

New species and redescribed ones are presented here, faunistic temporal and spatial changes are monitored and the settlement strategy of the single Lessepsian tanaid migrant and its response to changing conditions is analysed. Finally, the study integrates 74 years tanaid existing data, documented and new, into a coherent and easy-to-follow presentation pattern, a beneficial informative approach by itself.

Materials and Methods

The results in this article combine new data with the data that have been previously published (principally Bamber *et al*., 2009). Together, the data cover a 74-year period between 1947-2020 and we summarise the zoogeographic and faunistic changes in the soft substrate continental shelf tanaid community along the Mediterranean coast of Israel, the eastern edge of the Levantine Basin. Shelf species with an extended distribution, i.e. deeper than 100 m, were also included in this study (Fig. 1). ~330,000 individuals were identified to species level during the 74-year period, of which ~224,500 were identified in the course of the present study.

The field sampling reported in this article used the following devices: a 0.11 m^2 Van-Veen grab (Kahlsico model WA265/SS214) and 0.0625 m^2 and 0.25 m^2 box corers (Ocean Instruments, San Diego, USA; BX 700 Al and BX-650, respectively) were used in surveys performed by the Israel Oceanographic and Limnological Research (IOLR) for government and private agencies, and a Smith-McIntyre grab and 0.25 m^2 modified Gray-O'Hara box corer (Benthic solutions, UK) were used by commercial environmental survey companies. The grabs were used mainly in shallow sandy habitats and the box corers in deeper muddy locations. Many of the historical records

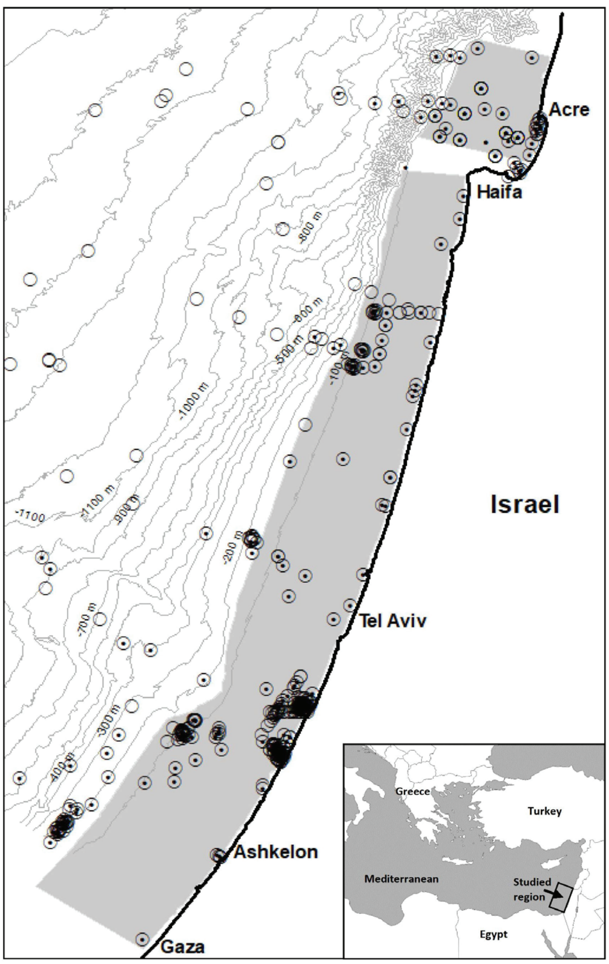

Fig. 1: Sites along the Mediterranean coastal waters of Israel from which tanaids were sampled during monitoring and basic science surveys in the period 1947–2020. Large grey spots - Sites in which tanaids were found. Black spots - Sites in which part or all the tanaids were identified to species-level. The grey areas are undetermined sampling sites mentioned in Băcescu (1961).

reported here (e.g., Băcescu, 1961) were part of a broad survey of benthic fauna carried out in the late 1940s and 1950s and the sample stations of tanaids and other benthic taxa are listed in Holthuis & Gottlieb (1958).

Recent samoles (2004) were sieved over a 250 µm mesh except one survey that used a 500 µm mesh (see below). The >250 µm or >500 µm residue was preserved on board in 99% ethanol only after 2013, or in 4% formaldehyde for older projects. In the laboratory, the samples were stained with an ethanol/Rose Bengal or eosin solution of ~1 mg/ml and left for at least 24 hours before further processing. The stained tanaids were sorted from the sediment under a stereoscope (Nion SMZ 1000) for future identification.

Drawings of the new taxa were made using an Olympus CX43 microscope with attached *camera lucida* and digitally inked using a WACOM tablet and Adobe Illustrator 2021. Some details were amended or supported by the use of imported photographs that were taken with a Dino-Eye (AnMo Electronics Corporation) eyepiece digital device. Terminology in the systematics section follows Bird (2019); this includes 'dorsal' and 'ventral' for the body, antennules, antennae and chelipeds, but 'superior' and 'inferior' for other appendages. 'Stiff seta' refers to relatively short, inflexible forms, including some that may be sensory on the carpus pereopods 4-6 (c.f. 'rod seta', Jakiel *et al.*, 2019). 'Bayonet spine' refers to slender cuspidate setae, sometimes finely serrate/pectinate, forms typical of the pereopods of some groups (e.g., Bird & Holdich, 1988). Setation on the main body segments, if in pairs, implies an equivalent seta on both sides of the segment. Comparisons of setal and segment counts are usually based on compatible life stages, primarily mature individuals, to minimise allometric influences. Ratios are mostly abbreviated, e.g., 'x ltb' for 'x longer than broad'. Types are deposited in the Steinhardt Museum of Natural History, Tel Aviv, Israel, and their accession numbers are prefixed SMNH-TAU. New nomenclatural acts are registered with ZooBank.

Bibliography and synonyms are kept to a minimum and focus on publications with illustrations of the taxa for identification purposes, but see Sieg (1983), Anderson (2016), or WoRMS Editorial Board (2021) for more complete accounts. Presently accepted species names are used throughout the article, following the designations of WoRMS unless older names are required for completeness or clarity. Distribution maps (Figs 1, 3 and 4) were prepared using the ArcGIS Desktop 10.8.1 (Esri, Inc.) software.

Results

The presence of 13 families and 28 species from the Israeli shelf < 100 m is reported here, and their temporal recording, zoogeography and, when available, their multiannual average density, are presented in Table 1. Other species of uncertain validity or attribution are discussed in the appropriate sections of the results below because they were previously reported from the region. These are: *Apseudopsis acutifrons* (G.O. Sars, 1882), *Apseudopsis ostroumovi* Băcescu & Carausu, 1947, and *Apseudopsis tridens* (Guţu, 2002). The novel faunistic data include four described species not recorded before from the area, and five new species.

The species in this part of the Levantine Basin primarily represent those of a Mediterranean zoogeographic province. Twenty-two are possibly Mediterranean endemic, with five also occurring in the Northeast Atlantic (*Chondrochelia savignyi* (Krøyer, 1842), *Leptognathiopsis attenuata* Holdich & Bird, 1986, *Paranarthrura lusitanus* Bird & Holdich, 1989, *Pseudoleptochelia anomala* (G.O. Sars, 1882), and *Tanais dulongii* (Audouin, 1826). Notably, 18 of the taxa listed in Table 1 were identified as new species in the eastern Levantine Basin between 1947-2020 and may be provisionally Mediterranean endemic. Over this period, four species, *Apseudes holthuisi* Băcescu, 1961, *Apseudes israeliticus* (Băcescu, 1961), *Apseudes orientalis* Băcescu, 1961, and *Hexapleomera satella* Bamber, 2012 were found in relatively small numbers only up to 1956 or 2007 and have not been recorded since. Other species were recorded from 2005 only. Nine species have been added to the inventory since the previous publication on the tanaids of the region (Bamber *et al*., *op. cit*).

Leptochelia tanykeraia Bamber, 2009, *Parakanthophoreus nanopsenos* (Bamber & Bird, 2009) **n. comb**., *Pseudotanais stiletto* Bamber, 2009, and *Tanaissus microthymus* Bird & Bamber, 2009 were not recorded by Băcescu (1961) but quite high population densities were reported by Bamber *et al*. (2009) and here (Table 1).

The depth range of the species reported from the coast of Israel is presented in Figure 2. Most of the species are continental shelf inhabitants but the intensive sampling efforts reported here have broadened the depth distribution range of a few, some extending down the continental slope, e.g., *Pseudakanthophoreus nanopsenos*, *Paranarthrura lusitanus*, *Typhlotanais scalenus*, *Pseudotanais stiletto* and *Araphura hyphalus.* The numerous shelf-break, slope, and bathyal plain species from the region, recorded only at depths greater than 100 m, have also been analysed and will be published elsewhere. The spatial distribution of each of the 28 reported species is presented in Figure 3.

The kalliapseudid *Cristapseudes omercooperi* (Larwood, 1954), is definitely a Lessepsian migrant and one of the two most abundant tanaidaceans in the region, the other being *Apseudopsis mediterraneus* (Băcescu, 1961). Because of their high abundance and frequency of occurrence in shallow benthic surveys, these two species dominate studies of the shallow benthos including that of Lubinevsky *et al.* (2019), who analysed over twelve years (2005-2016) the infaunal distribution patterns along a 5-15 m depth band of offshore sandy substrates, within the framework of the Israeli infaunal national monitoring program. Using data from that study, the multi-annual densities of *A. mediterraneus* and *C. omercooperi* were calculated for each depicted community during the 2005-2016 period (Fig. 4) and revealed a more even distribution of the Mediterranean *A. mediterraneus* compared to the high density and more localised distribution of the Lessepsian migrant *C. omercooperi* in the Haifa harbour

Table 1. Temporal appearance of tanaid species in the Mediterranean coast of Israel. **OR.** - species that were originally recorded and described as new species in the region between 1947–2020. **NR** – new record of species in the Israeli Mediterranean. Multi-annual density across the studied region was calculated when data were available with number of records in parentheses. It was replaced by total counts if not available. The abbreviations of zoogeographic provinces are: M-Mediterranean, L-Levantine basin, NEA-Northeast Atlantic, IP-Indo Pacific. Zoogeographic regions were determined according to the World Register of Marine Species (WoRMS) and literature depicted in this article.

		Sampling years									
Species	**OR.**	**47-50**	**51-54**	**55-56**	**70-73**	**05-08**	**09-12**	**13-16**	**17-20**	**Density [ind/m^2] or total counts**	**Zoogeographic origin**
Apseudes holthuisi	Yes									**87**	L
Apseudes israeliticus	Yes									**20**	L
Apseudes orientalis	Yes									**10**	L
Apseudopsis apocryphus	Yes									204±648 (25)	L
Apseudopsis elisae	Yes									**9**	M
Apseudopsis mediterraneus	Yes									1081±2029 (1736)	M
Apseudopsis minimus	Yes									64±137 (93)	M
Paradoxapseudes intermedius										39±53 (4)	M
Zoidbergus tenuimanus										**9**	M
Cristapseudes omercooperi										1151±2549 (392)	IP
Parapseudes francispori										**6**	L
Paranarthrura lusitanus	NR									78±134 (30)	M-NEA
Pseudakanthophoreus nanopsenos	Yes									24±21 (39)	L
Leptognathiopsis attenuata	NR									8±5 (17)	M-NEA
Nippognathiopsis levantae	Yes									82±87 (4)	L
Chondrochelia savignyi										25±36 (48)	M-NEA
Leptochelia tanykeraia	Yes									37±65 (54)	L
Pseudoleptochelia anomala	NR									**1**	M
Pseudotanais stiletto	Yes									48±114 (78)	L
Araphura hyphalus	Yes									14±10 (6)	L
Tanaissus microthymus	Yes									655±972 (571)	L
Tanaopsis laticaudata										24±33 (4)	M-NEA
Paratyphlotanais lilliputi	Yes									18±31 (6)	L
Typhlotanais angstromensis	Yes									29±40 (10)	L
Typhlotanais bisetosus	Yes									33±18 (4)	L
Typhlotanais scalenus	Yes									15±23 (7)	L
Hexapleomera satella	Yes									9±0 (1)	L
Tanais dulongii	NR									9±0 (2)	M-NEA

community. However, an apparent disappearance of *C. omercooperi* from the Haifa harbour community began in 2017 and has continued to the present time.

Sampling and identification of shallow-water tanaids were also carried out between 2015-2018 in a second region on the Israeli coast, in nine sites at a depth of 33-34 m, increasingly distant from a domestic treated-sewage disposal site both before (2015-16) and after disposal termination (2016-18). These infaunal communities were correlated to the level of total organic carbon (TOC), extracted from the results of the relevant monitoring program (Fig. 5). The tanaid assemblage was composed mostly of *C. omercooperi* but probably underestimated smaller tanaids, as the samples were sieved over 500 µm mesh compared with 250 µm in other post-2005 samples. The results indicate the filter-feeding *C. omercooperi* was flourishing in the presence of moderately high organic carbon (~1%), comparable to the organic carbon level in Haifa harbour (Fig. 4 and Lubinevsky *et al.*, 2019). However, *C. omercooperi* was sparsely present in the coastal regions near the drainage site (~10 m depth) in the southern part of the Israeli coast (Fig. 5).

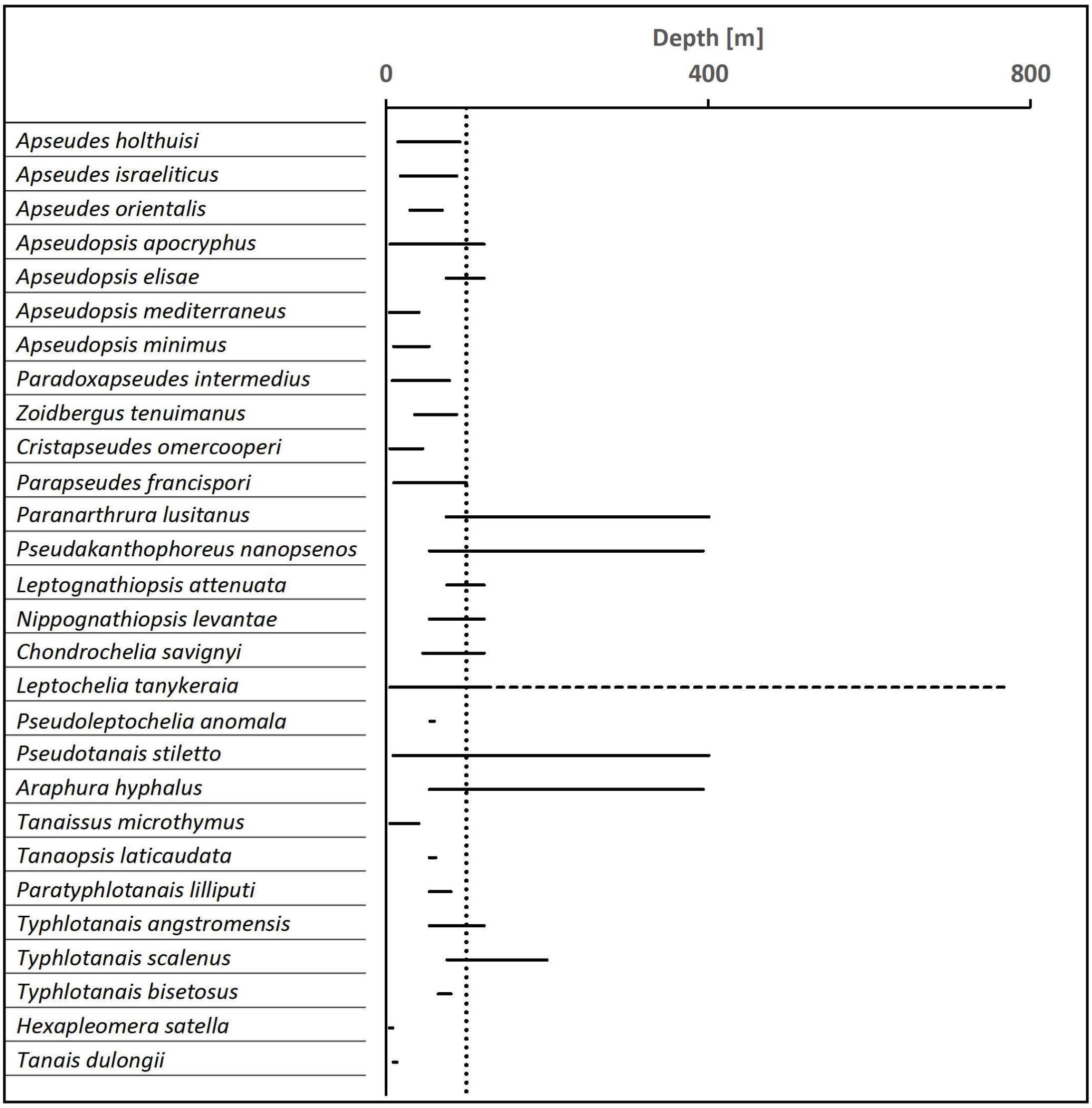

Fig. 2: Tanaid depth distribution off the Israeli coast. Vertical dotted line – 100 m shelf limit. One individual of *Leptochelia tanykeraia* was recorded in a depth of 771 m, hence labelled by a dashed line.

Systematics
Order Tanaidacea Dana, 1849
Suborder Apseudomorpha Sieg, 1980
Superfamily Apseudoidea Leach, 1814

FAMILY APSEUDIDAE Leach, 1814

***Apseudes holthuisi* Băcescu, 1961**
Apseudes holthuisi Băcescu, 1961: 146-147, figs 21-27; Bamber *et al.* (2009): 5-6.
Apseudes sarsi: Holthuis (1949): 187.
Apseudes talpa: Sars (1886): 267-282, plates 1-2.

Remarks. Băcescu (1961) reported this to be the third most frequent apseudomorphan species in Haifa Bay, 27-92 m (where data permits), after *Apseudopsis mediterraneus* and *Paradoxapseudes intermedius* (Hansen, 1895). Bamber *et al.* (2009) provided sixteen new records within the same depth range. Only one uncertain record has been obtained since then at a depth of 105 m.

The illustrations provided by Băcescu (1961) and Sars (1886) adequately represent the characteristics of this species that resembles *Apseudes spinosus* (M. Sars, 1858) rather than *Apseudes talpa* (Montagu, 1808). Holthuis (1949) provides a useful summary comparison between *A. holthuisi* (as *A. sarsi*) and *A. talpa*.

***Apseudes israeliticus* (Băcescu 1961)**
Apseudes robustus israeliticus Băcescu, 1961: 140-144, figs 7-20.
Apseudes robustus israeliticus: Băcescu (1984): 98 [comparison with *Apseudopsis erythraeicus* (Băcescu, 1984)].
Apseudes israeliticus (Băcescu, 1961): Esquete *et al.* (2019): 5.

Remarks. This species was originally described as a subspecies of *Apseudes robustus* G.O. Sars, 1882 from specimens collected off the Israeli coast, from sandy substrate at 18-88 m. No additional specimens have been recorded since then. Kirkim *et al.* (2005) have recorded *Apseudes robustus* from the Peacock's Tail brown alga *Padina pavonica* (Linnaeus) Thivy, 1960 on the Aegean coast of Turkey that might be conspecific with *A. israeliticus*. The original *A. robustus* was described from La Goulette (Tunis), while a third taxon, *A. robustus erythraeicus* Băcescu, 1984, from the Red Sea, has been

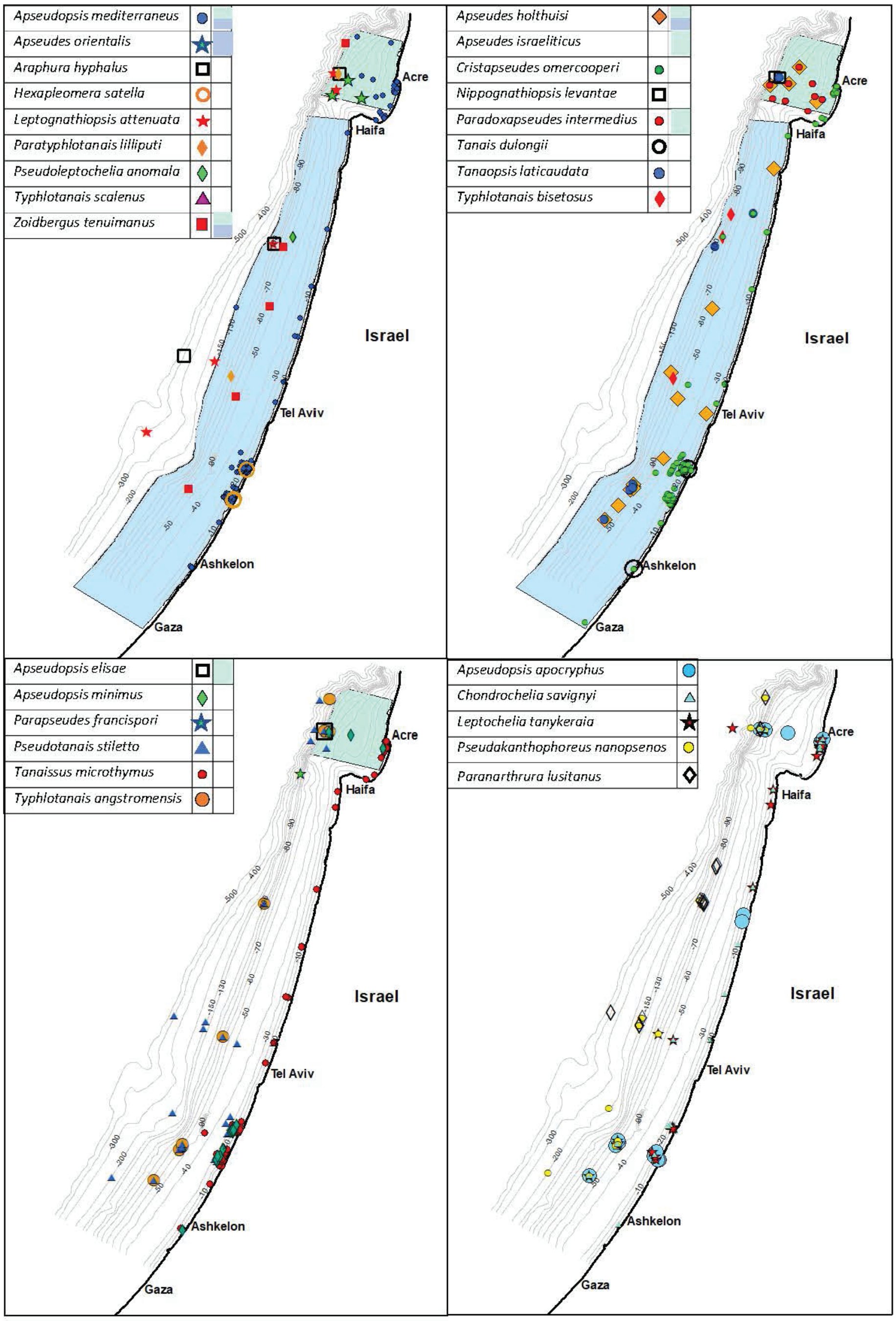

Fig. 3: Spatial distribution of the shelf tanaid species along the Mediterranean coast of Israel. The shaded cells in the inset tables label those which were recorded by Băcescu (1961) in the shaded areas on the map.

transferred to the genus *Apseudopsis* by Guţu (2006) as a distinct species, *A. erythraeicus*. This group of species requires more study, it is possible that *A. erythraeicus* intrudes into the Mediterranean via the Suez Canal.

Apseudes orientalis **Băcescu, 1961**
Apseudes africanus orientalis: Băcescu (1961): 156-158, 160, figs 48-57.

Remarks. No additional confirmed records of this species have been added since Băcescu (1961), as also reported by Bamber *et al.* (2009).

Apseudopsis acutifrons **(G.O Sars, 1882)**
Apseudes acutifrons: G.O Sars (1886): 295-299, plate 6.
Apseudes acutifrons: Guţu (2002): 21-22, fig 1.
Apseudopsis acutifrons: Guţu (2006): 61; Bamber *et al.* (2009): 9.

Remarks. Only a single record of this species, at 62 m, was reported by Bamber *et al.* (2009). The similar *Apseudopsis elisae* (Băcescu, 1961), also present in the region, differs in having more segments in the antennular flagellae (four inner segments, 4-8 outer ones, *versus* (*v*)three and 6-7), a superodistal spine on the pereopod-1 merus and five (not four) spines on the inferior margin of the propodus of the same appendage – see Esquete *et al.* (2019: table 2). It is possible that some Israel-Levantine records of *A. acutifrons* actually refer to *A. elisae* (and *vice versa*, see below).

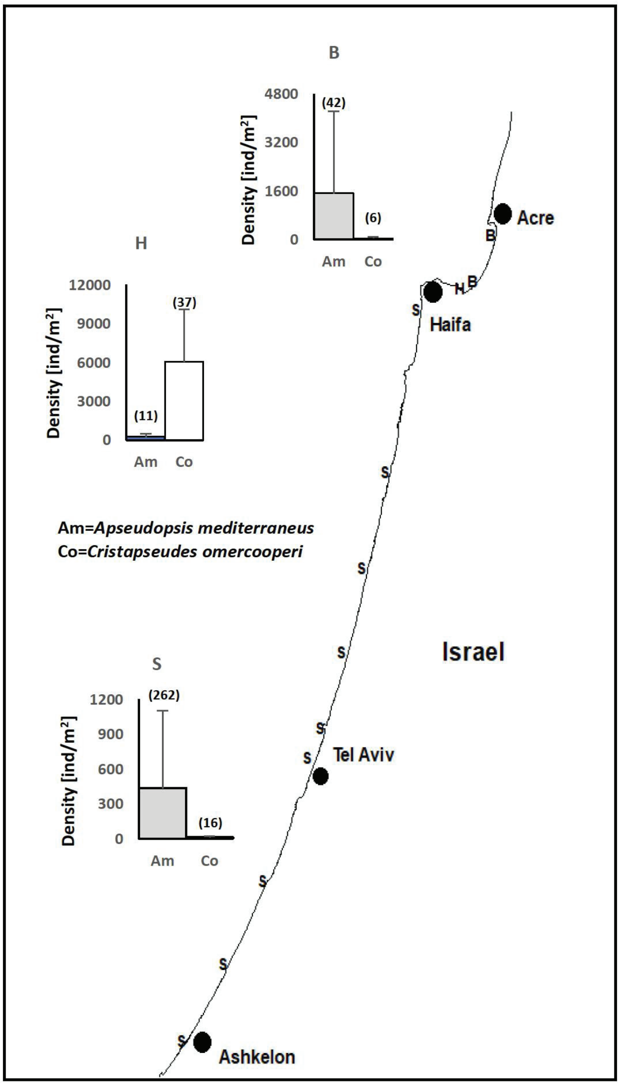

Fig. 4: Comparison of density and number of samples of occurrence (in parentheses) of *Apseudopsis mediterraneus* and *Cristapseudes omercooperi* inhabiting the 5–15 m sandy strip of the Israeli coast of the Mediterranean, among the three determined uniform infaunal communities (Lubinevsky *et al*., 2019): S - Southern coast; H - Haifa Harbor; B - Haifa Bay. The comparison was done for the period 2005-2016.

Apseudopsis apocryphus **(Guţu, 2002)**
(Fig. 6)
Apseudes apocryphus: Guţu, 2002: 31-33, fig.7.
Apseudopsis apocryphus: Guţu (2006): 61; Bamber *et al.* (2009): 6.

Remarks. An enigmatic species that is possibly assumed to be *A. mediterraneus* (and *vice versa*) with seven new records since the Bamber *et al.* (2009) paper at depths 10.5-34 m, and other records from 2019 at 60-120 m, off Haifa. Identification keys and tabulation (Esquete *et al*., 2012a, b; 2016; 2019) discriminate *A. apocryphus* using the hyposphenia on pereonites 3 (Fig. 6A) and 6, three-spined pereopod-1 propodus (Fig 6B) as well as a lack of lateral pereonal processes. The pereopodal character is not a reliable character on its own, as the sympatric *A. mediterraneus* and *A. minimus* (Guţu, 2002) also have three inferior spines, either as a developmental stage in the former or as a primary character in the latter. Rounded anterolateral pereonal processes are also present in *A. apocryphus* (Fig.7A), which are slightly larger than in *A. mediterraneus* but broader and less projecting than in *A. minimus* (Fig. 7B).

Apseudopsis elisae **(Băcescu, 1961)**
Apseudes elisae: Băcescu, 1961: 149−150, figs 28−41.
Apseudopsis elisae: Guţu (2006): 61.

Remarks. Three shallow-water records of this attractive *Apseudopsis* have been obtained since the paper by Bamber *et al.* (2009), one from 94 m depth and two at 122 m, off Haifa. Eight paratypes that formed part of the original description came from Haifa Bay, at 97 m, although the bulk of the material was from Monaco and the southern coast of France (Băcescu, 1961: 149, 151), indicating a widespread Mediterranean distribution. Some confusion may be possible with the similar *Apseudopsis acutifrons* (see above).

Apseudopsis mediterraneus **(Băcescu, 1961)**
Apseudes latreilli mediterraneus: Băcescu, 1961: 160-162, figs 46, 58-64, pl.1 fig.1.
Apseudes mediterraneus: Guţu (2002): 26-27, 29, fig. 4.
Apseudopsis mediterraneus: Guţu (2006): 61; Bamber *et al.* (2009): 7.

Remarks. This apseudid and the kalliapseudid *Cristapseudes omercooperi* are the two most abundant and common tanaids recorded on the shallowest sandy substrates off the Israeli coast (see above, Fig. 4). In Bamber *et al.* (2009) the depth range of *A. mediterraneus* was 5−28 m, but this is now extended to 4.3−41 m with most occurring <30 m. Two historical records mentioned by Băcescu (1961) from 64 and 137 m are probably not this species, as surmised by Bamber *et al.* (2009).

The high abundance of this resilient species, especially in spring when mancae and juveniles are released (maximum value recorded so far: 26227 individuals per m^2 at 19 m depth), might obscure some hidden diversity of *Apseudopsis* (and other apseudomorphan) species, particularly at smaller body sizes. Several keys and notes on its taxonomy and distribution have been published since 2009 (Esquete *et al.* 2012a, b; 2016; 2019). The records of *Apseudopsis latreilli* (Milne-Edwards, 1828) from the Turkish coast (Çinar *et al.*, 2012; Mutlu & Ergev, 2013) could refer to this species. Other *Apseudopsis* species tend to be recorded at slightly greater depths and muddier sediments. In this region, *Apseudopsis mediterraneus* can be recognised by the combination of weak rounded anterolateral processes and small hook-like posterolateral processes on pereonites 1-6, hyposphenia on pereonites 2 and 6 only, and four spines on the inferior margin of the pereopod-1 propodus – although small and juvenile individuals may have three spines, and large specimens, including some ovigerous females, five.

Apseudopsis minimus **(Guţu, 2002)**
(Fig. 6)
Apseudes minimus: Guţu, 2002: 33−35, fig 8.
Apseudopsis minimus: Guţu (2006): 61.

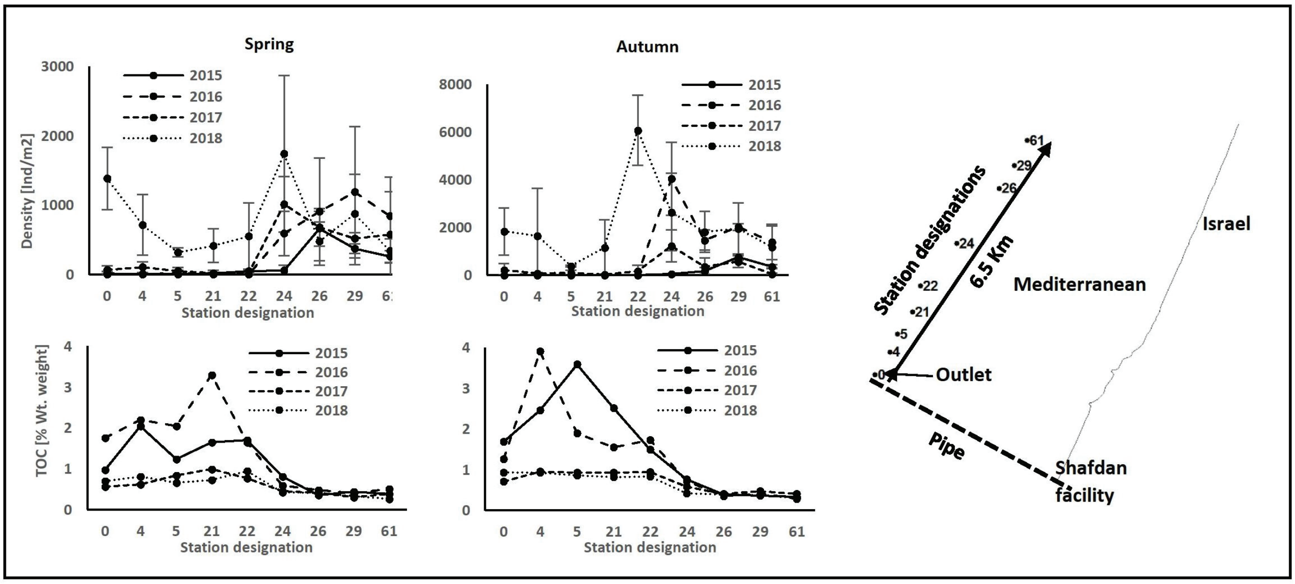

Fig. 5: Density of *Cristapseudes omercooperi* in various distances from the SHAFDAN treated domestic sewage outlet during the period 2015-2018, in spring and autumn (upper graphs) and the compatible TOC levels (lower graphs). Sewage discharge was terminated at the end of January 2017 and the last pre-termination sampling during summer 2016. The dominating current is North-west parallel to shore and the bottom depth is between 33-35 m. Only >500 µm mesh (sieve) data were selected in comparison to >250 µm mesh data used in all other projects (Figs 1 and 3).

Table 2. Comparison of *Araphura hyphalus* **n. sp.** with nearest geographical-neighbour species. Numbers/ratios based on Israeli holotype, *A. brevimanus* (Sieg & Dojiri, 1989: figs 8-11), and *A. macrobelone* (Błażewicz-Paszkowycz *et al.*, 2011: figs 1-3).

Character	***hyphalus* n. sp.**	***brevimanus***	***macrobelone***
Cephalothorax l/w	1.7x ltb	1.5x ltb	1.8x ltb
Pereonite lateral margins	slightly rounded/convex	sub-parallel	sub-parallel
Pereonites L/w	P2-3 ltb	none ltb	P2-4 ltb
Pereonite-1 shape	weakly trapezoidal	regular	regular
Pleon l/w	1.1x ltb	1.2x ltb	1.35x ltb
Antennule article-2 re articles 3-4	longer	slightly shorter	longer
Antenna article-2 dorsum	not raised	raised-convex	raised-convex
Antenna article-4 paired distal setae	absent	present	present
Mandible incisor	4-cusps	3-cusps	n/d
Maxilliped endite cusps	1 (low, rounded)	2	1 (toothlike)
Maxilliped endite setae	none	1	1
Maxilliped article-3 mesial setae	3	4	3
Cheliped palm dorsal margin	crenulate	smooth	smooth
Cheliped palm mesial comb	2 spines	≥ 5 spines	n/d
Cheliped palm ventral margin	weakly convex	weakly convex	strongly convex
Cheliped palm distolateral seta	present	present	absent?
Cheliped fixed finger incisive teeth	1 distal	2	2
Cheliped dactylus dorsal margin	crenulate	smooth	smooth
Pereopods 1-3 basis superior margin setae	simple seta on p-1, PSS on p1-3	PSS on p-3	none
Pereopods 1-3 merus inferodistal	spine and seta	2 setae	spine and seta
Pereopod-1 carpus spines	3	3	2
Pereopods 4-6 propodus superodistal spine [longest]	< dactylus	> dactylus	> dactylus
Pleopod exopod proximal seta	absent	present	present

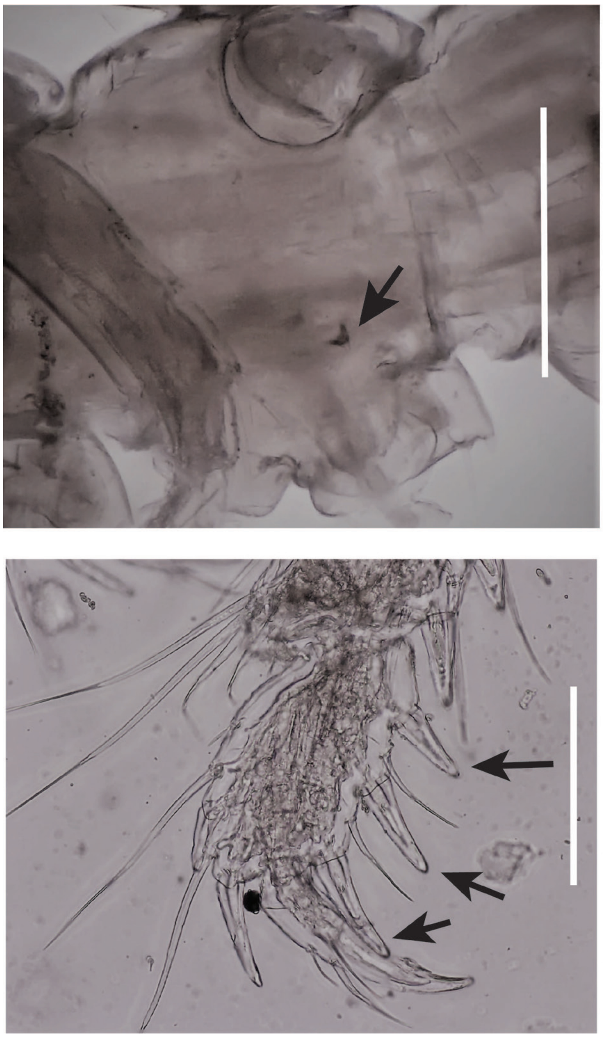

Fig. 6: *Apseudopsis apocryphus*, non-ovigerous female. A, sternite of pereonite-3 with small hyposphenium (arrowed); B, pereopod-1 propodus with three inferior spines (arrowed). Scale lines: 0.2 mm, A; 0.1 mm, B. Images by G. J. Bird.

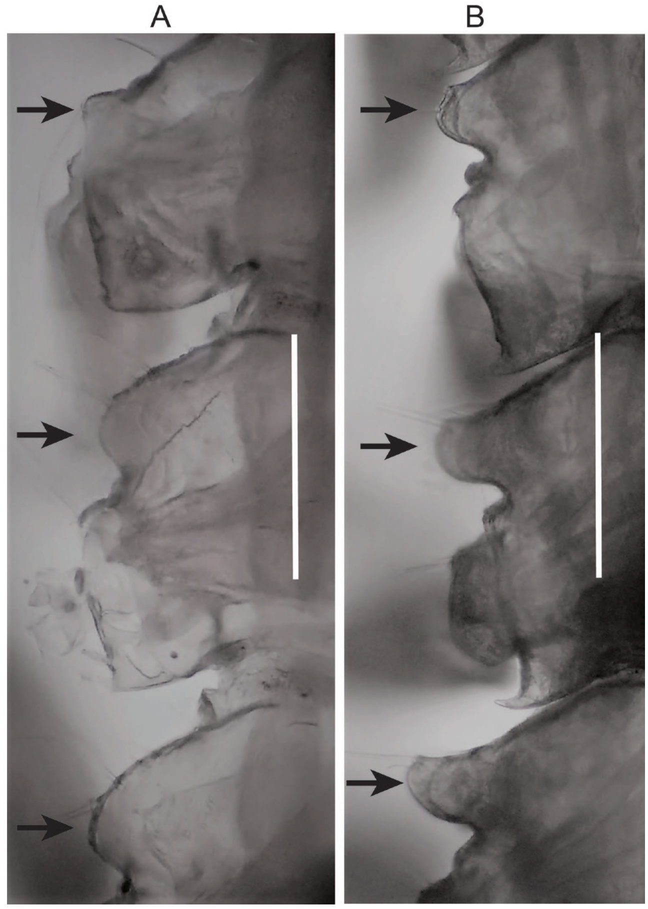

Fig. 7: *Apseudopsis apocryphus*, non-ovigerous female. A, arrows indicating broad anterolateral apophyses on pereonites 2-4. *Apseudopsis minimus*, non-ovigerous female. B, arrows indicate downcurved anterolateral apophyses on pereonites 3-5. Scale lines: 0.2 mm. Images by G. J. Bird.

Remarks. This relatively small *Apseudopsis* species was described from a single brooding female collected at Haifa. Up to 2020 there have been 93 records of *A. minimus* off the Israeli coast, at depths 13-31 m, with a maximum density of 791 individuals per m^2. It co-occurs in low numbers with *Apseudopsis mediterraneus* but can be easily distinguished, at least in post-manca stages (but sometimes as mancae, with care), by its prominent but near-ventrally deflected, round anterolateral processes on pereonites 3-6 (Fig. 7B), as well as three spines on the inferior margin of the pereopod-1 propodus (usually four in *A. mediterraneus*). A full re-description of this species, of various developmental stages, is in preparation (G.J. Bird & M. Guţu), with comments on pereopodal variation in *A. mediterraneus*.

Apseudopsis ostroumovi **Băcescu & Carausu, 1947**
Apseudopsis ostroumovi: Băcescu & Carausu (1947): 368-382, figs 1-6.
Apseudes ostroumovi: Guţu (2002): 24-26, fig. 3.
Apseudopsis ostroumovi: Guţu (2006): 61; Bamber *et al.* (2009): 7.

Remarks. A species with eight records from 7.5-62 m, originally described from the Black Sea. According to Guţu (2002) it differs little from *A. mediterraneus*, having hyposphenia on pereonites 1-6 in the female (only pereonites 2 and 6 in *A. mediterraneus*). The anterolateral apophyses are equally weak and rounded, although these are used as a distinguishing feature in the key to *Apseudopsis* species offered by Esquete *et al*., (2016: 257). In the original description at least one specimen was illustrated with a trifid rostrum (Băcescu & Carausu, 1947: fig.1) so could lead to confusion with *Apseudopsis tridens* (Gutu, 2002), see below.

Confirmation of the post-2007 records of *A. ostroumovi* is not possible, and it remains likely that all records of *A. ostroumovi* off the Israeli coast (ten individuals) are erroneous.

Apseudopsis tridens **(Guţu, 2002)**
Apseudes tridens: Guţu (2002): 35-36, fig. 9.
Apseudopsis tridens: Guţu (2006): 62.

Remarks. A single ovigerous female described from Haifa Bay, sampled in 1970, remains the only record of this species. It should be recognisable by its trifid rostrum from which the specific name is derived but supported by the character of hyposphenia on pereonites 3-6.

***Paradoxapseudes intermedius* (Hansen, 1895)**
Apseudes intermedius Hansen: Larwood (1940): 3-8, fig. 3.1; Băcescu (1961): 152-156, figs 42-45.
Paradoxapseudes intermedius: Guţu (2008): 24.

Remarks. This species was reported with many records from Haifa Bay at depths 18-79 m by Băcescu (1961) but there have been only nine more since then, at depths 7.87-15 m. It is a small species compared to those of *Apseudes* (its former parent genus) and *Apseudopsis*, but typical of the genus in that is widespread, especially in warm and tropical shallow-water environments. The nearest published records ex-area appear to be those of Larwood (1940) off Alexandria and, outside of the Levant, those of Gerovasileiou *et al.* (2015, 2016) who found it within sponges inhabiting marine caves in the northern Aegean.

***Zoidbergus tenuimanus* (G. O. Sars, 1882)**
Apseudes tenuimanus: Sars (1886): 282-286, pl.3.
Apseudes tenuimanus gottliebi: Băcescu (1961): 138-140, figs1-6.
Apseudes tenuimanus: Bamber *et al.* (2009): 5.
Zoidbergus tenuimanus: Jóźwiak (2014): 391.

Remarks. Since the Bamber *et al.* (2009) publication, where this elegant species was known as *Apseudes tenuimanus*, it has been transferred to the genus *Zoidbergus* Jóźwiak, 2014, along with six other *Apseudes* species. The subspecies *Apseudes tenuimanus gottliebi* was described by Băcescu from Haifa Bay but this classification is no longer accepted (WoRMS Editorial Board, 2021). Only one more record has been obtained from the Israeli coast in May 2014 at 66 m slightly further north and deeper than the record (58 m) in Bamber *et al.* (2009).

FAMILY KALLIAPSEUDIDAE. Lang, 1956

***Cristapseudes omercooperi* (Larwood, 1954)**
Kalliapseudes Omer-cooperi Larwood: Băcescu (1961): 162-165, figs 65-77.
Cristapseudes omercooperi: Bamber *et al.* (2009): 9.

Remarks. Together with *Apseudopsis mediterraneus*, the filter-feeding kalliapseudid *Cristapseudes omercooperi* is the most-recorded and abundant tanaid at shallow shelf depths. Bamber *et al.* (2009: 10) reported a maximum density of >7000 individuals per m^2 in Haifa Bay, but this was exceeded 16845 individuals per m^2 at the same site in 2015. High abundance of *C. omercooperi* with a maximum of 7008 individuals per m^2 was recorded in 2015-2018 also at a depth of 33 m near a site of excessive organic load (Fig. 5) but it was may have been present there before then and not identified. Bamber *et al.* (2009) also commented on its distribution, and it is probable that this is a Lessepsian immigrant from the Red Sea. Băcescu (1961) reported only one specimen off Gaza, collected in 1947, and it appears to be both spreading and generally increasing in abundance as detailed elsewhere in this paper.

FAMILY PARAPSEUDIDAE Guţu, 1981

***Parapseudes francispori* (Băcescu, 1980)**
Anuropoda francis-pori: Băcescu (1980): 311-384, fig. 1.
Parapseudes francispori: Guţu (2001): 66-67, fig. 1.

Remarks. This is a small species (ovigerous females 2.0-2.2 mm long) that was described from material (six specimens) collected in 1947 off Haifa at 100 m in muddy sediments. No records have been obtained since then. The similar parapseudid *Parapseudes latifrons* (Grube, 1864), described from the Croatian island Lošin (Lussino) in the northern Adriatic, was redescribed and figured by G.O. Sars (1886) from the Gulf of Spezia at 11-18 m depth and might also be expected in the Levant region. A few as-yet unidentified very small parapseudids have been collected in recent surveys along the Israeli coast but none of these appear to be conspecific with either *P. francispori* or *P. latifrons*.

Suborder Tanaidomorpha Sieg, 1880
Superfamily Paratanaoidea Lang, 1849

FAMILY AGATHOTANAIDAE Lang 1971

***Paranarthrura lusitanus* Bird & Holdich, 1989**
Paranarthrura lusitanus: Bird & Holdich (1989): 147-153, figs 5-6.

Remarks. Originally described from the NE Atlantic in the southern Bay of Biscay, off southwestern Spain and northwestern Morocco, and the western Mediterranean, at depths 173-641 m (*Ibid*), *P. lusitanus* is now recorded from the Levantine Sea. The 31 IOLR records range from 75-401 m thereby considerably elevating the upper bathymetric limit. Several of the records from <100 m were probable misidentifications of *P. insignis* Hansen, 1913 and *P. intermedia* Kudinova-Pasternak. *Paranarthrura lusitanus* is succeeded by *P. intermedia* and an undescribed *Paranarthrura* species at greater bathyal depths in the region.

FAMILY AKANTHOPHOREIDAE Sieg, 1986

***Pseudakanthophoreus* n. gen.**
urn:lsid:zoobank.org:act:6F4125ED-1B94-41A6-8208-72AD14FA7D7A
Akanthophoreus Sieg: Bamber *et al.* (2009): 11; in part, for *A. nanopsenos* Bamber & Bird, 2009 only.
Parakanthophoreus Larsen & Araújo-Silva (2014): 256, table 1; in part, for *P. nanopsenos* only.

Diagnosis. Akanthophoreiid with *pleon* sternites slightly raised, without spur on sternite-5. *Pleotelson* without lateral spurs. *Antennule* without terminal cap-like segment. *Maxilliped* endite with one mesial seta and two shallow sensory cusps. *Cheliped* carpus with ventral apophysis bearing two setae, without ventral shield; chela without distinct surface ornamentation, fixed finger without proximal denticulation on incisive margin. *Pereopods 1-3* carpus not longer than merus. *Pereopods 4-6* basis less than 2x as wide as those of pereopods 1-3; ischium with one seta. *Uropod* peduncle and endopod segment-1

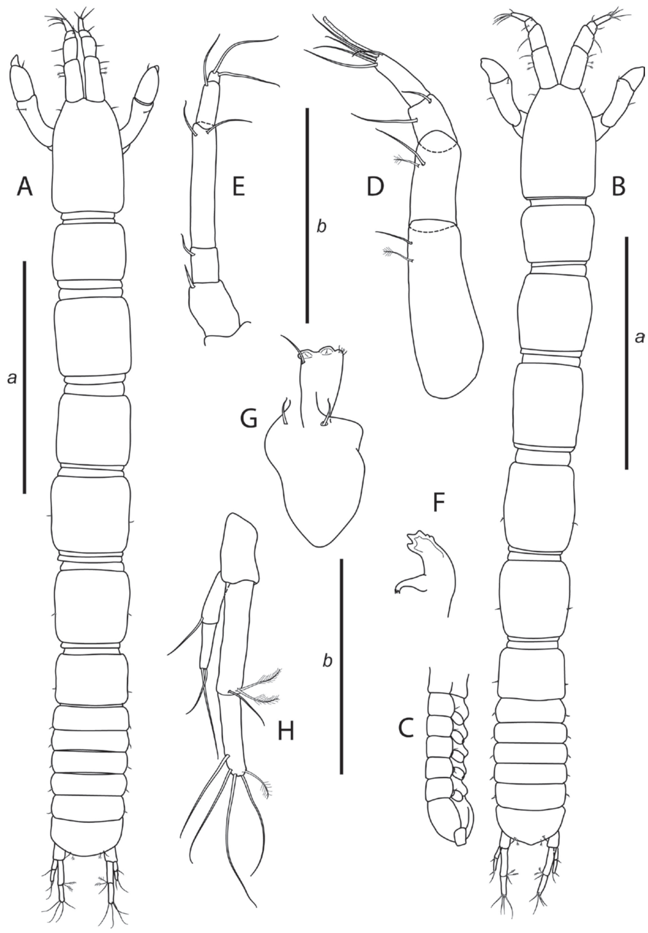

Fig. 8: *Pseudakanthophoreus nanopsenos*, non-ovigerous female. A, habitus; B, non-ovigerous female, habitus; C, pleon, lateral view, pleopod rami omitted for clarity; D, antennule; E, antenna; F, right mandible; G, maxilliped, one endite and palps omitted for clarity; H, uropod. Scale lines: a, 0.5 mm, A-C; b, 0.125 mm D-H.

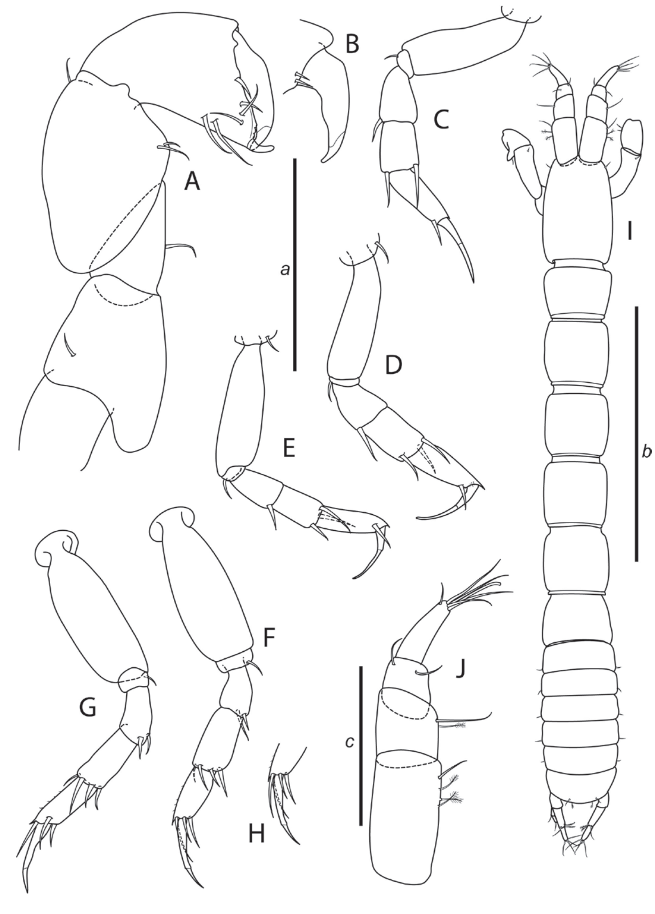

Fig. 9: *Pseudakanthophoreus nanopsenos*, non-ovigerous female. A, right cheliped; B, cheliped palm and dactylus, with mesial spine comb; C-G, pereopods 1-6 respectively; H, pereopod-6 propodus superodistal spines. Preparatory male, I, habitus; J, antennule. Scale lines: a, 0.125 mm, A-H; b, 0.5 mm, I; c, 0.125 mm, J.

simple, without spur; exopod bisegmented, slightly shorter than segment-1 of endopod.

Type species: *Pseudakanthophoreus nanopsenos* (Bamber & Bird, 2009) **n. comb.**; by designation.

Etymology: elided prefix *pseudo* and genus name *Akanthophoreus*; gender male.

Remarks. The complex family Akanthophoreidae was examined within a phylogenetic analysis by Larsen & Araújo-Silva (2014) and a new genus, *Parakanthophoreus* Larsen & Araújo-Silva, 2014*,* was established for those *Akanthophoreus* species lacking lateral spurs on the pleotelson. In their table 1, p. 256, listing the species transferred to *Parakanthophoreus*, a note was included suggesting that *P. nanopsenos* might represent a separate genus, and this is accepted here. This decision is based primarily on the lack of a ventral shield on the chelipedal carpus that is present to varying degrees in all other akanthophoreiids but includes other characters such as the two ventral setae on the same article, relatively short carpus on pereopods 1-3 (not clearly longer than the merus), and a single ischial seta on pereopods 4-6.

No *Akanthophoreus* or *Parakanthophoreus* species have yet been found at shelf or bathyal depths in the Levantine Sea.

Pseudakanthophoreus nanopsenos **(Bamber & Bird, 2009) n. comb.**

(Figs 8-9)

Akanthophoreus nanopsensos: Bamber *et al.* (2009): 11-15, figs 3-4.

Parakanthophoreus nanopsenos: Larsen & Araújo-Silva (2014): 256, table 1.

Material examined. 1 manca-3, 1 non-ovigerous (non-ov.) ♀, 2 preparatory (prep.) ♂♂ - 32.21°N 34.61°E, 158 m, 26/6/2013; 2 non-ov. ♀♀, 1 prep. ♂ - 32.51°N 34.76°E, 105 m, 18/6/2013; 2 non- ov. ♀♀, 2 prep. ♂♂ - 31.98°N 34.53°E, 214 m, 26/6/2013; 5 non- ov. ♀♀, 2 post-ovigerous (post-ov.) ♀♀, 3 prep. ♂♂ - 31.82°N 34.38°E, 198 m, 10/7/2013; 1 manca-3, 1 prep. ♂ - 33.02°N 34.93°E, 200 m, 22/11/2018; 4 non-ov. ♀♀, 1 ov. ♀, 2 post-ov. ♀♀, 9 prep. ♂♂ - 32.94°N 34.91°E, 122 m, 28/10/2018 and 32.19°N 34.61°E, 155 m, 23/10/2018; 4 non- ov. ♀♀, 1 post-ov. ♀, 3 prep. ♂♂ - 32.94°N 34.93°E, 54 m, 09/10/2019; 1 manca-3, 6 non-ov. ♀♀, 2 ov. ♀♀, 2 post-ov. ♀♀, 10 prep. ♂♂ - 32.94°N 34.91°E, 122 m, 09/10/2019; 12 non- ov. ♀♀ [SMNH-TAU AR30049], 3 ov. ♀♀ [SMNH-TAU AR30046], 7 post-ov. ♀♀ [SMNH-TAU AR30047], 11 prep. ♂♂, [SMNH-TAU AR30048] - 32.17°N 34.66°E; 76 m, 09/10/2019, and 32.19°N 34.61°E, 155 m, 09/10/2019.

Remarks. Examination of (unregistered) paratypes and newer post-2007 material shows that the original description and figures are misleading and inadequate for identification purposes. The habitus (Fig. 8A, B) is generally more slender than shown for the holotype (probably a specimen downcurved in relation to the observer, notably foreshortening the cephalothorax) with many or most stretched, with distinct interpereonal gaps. Twelve non-ovigerous and post-ovigerous females, measured 1.04-1.64 mm in length, are 10.2-11.7x ltb, with preparatory males (n=7) 1.06-1.22 mm in length, 9.3-12.3x ltb. However, the males have proportionately shorter pereonites (Fig. 9I) and longer pleons, 13.8-20.6% (average 17.7%) of body length, *v*. 13.6-17.7 (average 14.6%) in females.

Observation of other structures reveals extra detail not shown in Bamber *et al.* (2009) including the profile of the pleonal sternites (Fig. 8C), antennular setation and difference between female and preparatory male antennule shape (Figs 8D, 9J), right mandible shape (Fig. 8F), presence of basis and endite setae on the maxilliped (Fig. 8G), setae on the cheliped basis (Fig. 9A) and mesial face of the palm (Fig. 9B), refined setation of the pereopods (Fig. 9C-H) including the presence of a superodistal seta on the carpus of pereopods 4-6 (Fig. 9F-G), the presence of two superodistal spines on the propodus of pereopod-6, not three (Fig. 9H), and setation of the pleopod endopod (one superodistal seta and distal fringe of five setae).

This small species now has a wider recorded distribution than recorded by Bamber *et al.* (2009) with twelve new (station) records with a primarily shelf-shallow bathyal range, 54-393 m. It co-occurs with several other small and elongate tanaids of similar appearance, such as *Leptognathiopsis attenuata* Holdich & Bird, 1986 (see below) and various species of *Leptognathiella* Hansen, 1913 and *Tumidochelia* Knight, Larsen, & Heard, 2003 at these greater depths.

FAMILY COLLETTEIDAE Larsen & Wilson, 2002

***Leptognathiopsis attenuata* Holdich & Bird, 1986**
(Fig. 10)
Leptognathiopsis attenuata: Holdich & Bird (1986): 87-92, figs 5-7.

Material examined. 5 individuals (inds) – Several sites along the Israeli coast of the Mediterranean; 16-26/6/2013, 56-400 m; 7 inds [3 as SMNH-TAU AR30056], 1 non-ov. ♀ partly dissected on 1 microslide [SMNH-TAU AR30056] - 33.02°N 34.93°E; 22/11/2018; 200 m and 33.02°N 34.9°E; 22/11/2018; 650 m; 1 ind., NMI - 32.17°N 34.66°E; 25/9/2017; 76 m; 1 ind. - 32.94°N 34.91°E, 28/10/2018; 122 m; 18 inds - Along the Israeli coast of the Mediterranean; 9-13/9/2019; 76-155 m.

Remarks. Another new species for the region (and Mediterranean), few records of this small (0.9-1.1 mm) colletteid species have been obtained since 2018 (ten records from eight sites at depths of 76-630 m); only two of these are from <100 m, the others 105-630 m. Examination of topotypical specimens from the West Coast of Scotland, and from the Irish Sea (i.e. material used in the Holdich & Bird description) and comparison with the Israeli specimens indicates no clear differences (although the latter are slightly smaller) and they are assumed to be conspecific. The only other published record of *L. attenuata* that we are aware of is from the Sound of Canna, the channel between Rum and Sanday, in the Inner Hebrides, Scotland, at 97 m (NBN Atlas website at http://www.nbnatlas.org Accessed 20 April 2020) and one from the Faroe Plateau, at 283 m (BIOFAR Stn 100, G.J. Bird data). Records of *Leptognathia manca* Sars in Britain (Holdich & Jones, 1983a, b) proved to be *L. attenuata*, the former being a more Boreal species, and it is probable that other records of *L. manca* in the Mediterranean (e.g., Riggio, 1995; Bakalem *et al*., 2021) refer to another species.

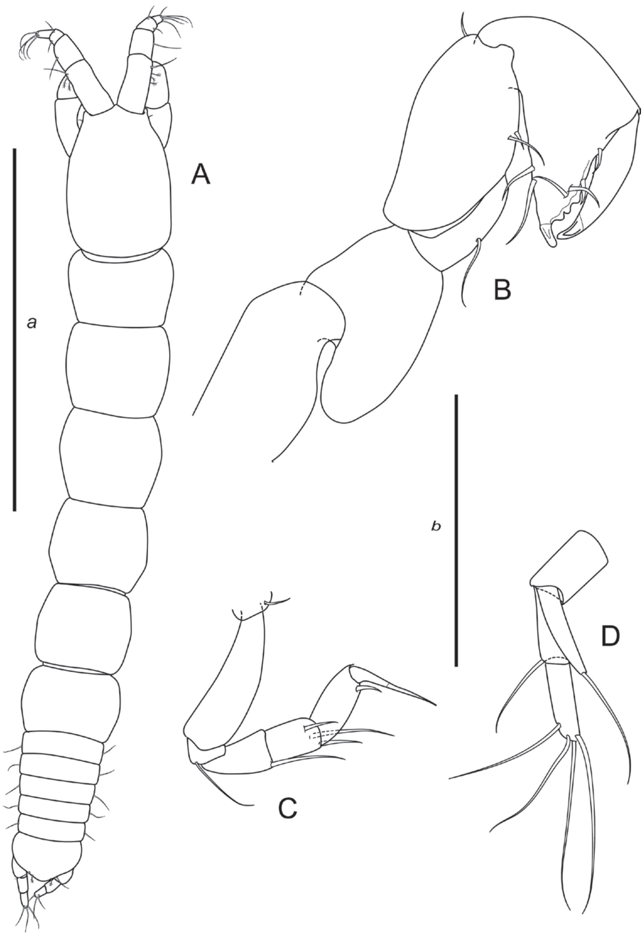

Fig. 10: *Leptognathiopsis attenuata*, non-ovigerous female, A, habitus; B, right cheliped; C, pereopod-1; D, uropod. Scale lines: a, 1 mm, A; b, 0.25 mm, B-D.

Leptognathiopsis attenuata is recognised primarily by the combination of its body shape (Fig. 10A) with its well-defined pereonites, relatively small tapered pleon with long epimeral setae and lacking pleopods in females, relatively large cheliped chela (Fig. 10B) in relation to the carpus, with three triangular teeth on the fixed finger incisive margin, long ischial seta and long meral spine on pereopods 1-3 (Fig. 10C), and long unisegmented uropod exopod (Fig. 10D). Males have pleopods and stouter antennules (see Holdich & Bird, 1986: fig 7).

***Nippognathiopsis levantae* Bird n. sp.**
(Figs. 11-13)
urn:lsid:zoobank.org:act:AB4B8AEE-C28F-4AC3-B01B-83F91F035526

Material examined: *Holotype*—non-ovigerous ♀, 1.24 mm [SMNH-TAU AR30022] - 34.9271°N, 32.9403°E, 54 m, 11/9/2017.

Allotype—preparatory ♂, 1.05 mm [SMNH-TAU AR30023], details as for holotype.

Paratypes—1 manca-3 [SMNH-TAU AR30024], 21 non-ov. ♀♀ [19 as SMNH-TAU AR30025], 2 non-ov. ♀♀ dissected on 3 microslides [SMNH-TAU AR30026-7], 1 ov. ♀ [SMNH-TAU AR30028], 2 post ov. ♀♀ [SMNH-TAU AR30029], 2 prep. ♂♂ [1 as SMNH-TAU AR30030], details as for holotype; 2 non-ov. ♀♀, 1 post-ov. ♀, - 32.1738°N 34.6569°E, 76 m, 25/9/2017; 1 post-ov. ♀, - 32.94°N 34.91°E, 122 m, 10-13/9/2019.

Type locality. Levant Sea, off Haifa, Israel.

Etymology. Feminine Latin genitive possessive of the study region (Levant Sea).

Diagnosis. *Nippognathiopsis* with pereonites 2 and 5-6 not longer than broad. *Antenna* article-2 with dorsodistal seta. *Cheliped* carpus with two dorsal setae. *Pereopods 1-3* merus with one inferodistal spine; claw at most as long as propodus.

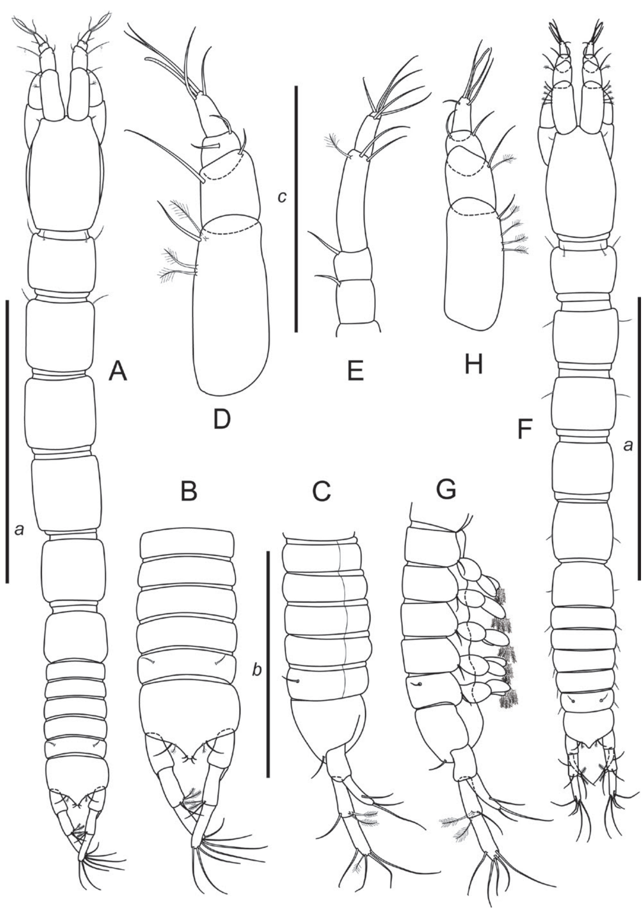

Fig. 11: *Nippognathiopsis levantae* **n. sp.** non-ovigerous female holotype, A, habitus; B-C pleon and pleotelson; D, antennule, E, antenna. Preparatory male allotype. F, habitus; G, pleon and pleotelson; H, antennule. Scale lines: a, 0.5 mm, A, F; b, 0.25 mm, B-C, G; c, 0.125 mm, D-E, H.

Description. *Holotype non-ovigerous female*. *Habitus* (Fig. 11A) slender, 8.7x ltb. *Cephalothorax* barrel-shaped, 1.5x ltb, just shorter than pereonites 1-2 combined, rostrum acute, slightly produced over base of antennules, carapace with anterolateral seta just posterior to antennules. *Pereon* slightly tapering posteriorly, pereonites 1-5 with weakly convex lateral margins; pereonite-6 shortest, pereonites 3-4 slightly longer than broad, others shorter than broad or equal; pereonite-1 with two anterodorsal setae, coxal setae visible from above. *Pleon* (Fig. 11B-C) parallel-sided, about as wide as pereon, 1.6x ltb, 14% of body length; sternites low, epimera weakly defined pleonite-5 with two dorsolateral setae. *Pleotelson* (Fig. 11B-C) as long as pleonites 4-5 and half of pleonite-3 combined, wider than pleon, about 0.8x as long as broad, lateral margins weakly tapering posteriorly, posterior margin acuminate, with two simple setae and two plumose sensory setae (PSS), with small deflexed acuminate apex with four setae.

Paratype non-ovigerous female. *Antennule* (Fig. 11D) about 0.78x cephalothorax length (holotype), article-1 about 0.6x entire length, 2.3x ltb, with two or three subdistal-lateral PSS (left and right antennules in this specimen), one distolateral seta and one distolateral PSS; article-2 overlapping about half of article-3, 1.2x ltb, with long distolateral seta, and shorter distomesial seta; article-3 as long as broad, with two setae; article-4 conical, as long as article-3, about 2x ltb, with four long setae and one aesthetasc [at least].

Antenna (Fig. 11E) 0.75x antennule length; article-1 short, naked; article-2 1.1x ltb, larger than article-3, with dorsodistal seta; article-3 shorter than broad, with dorsodistal seta; article-4 1.2x longer than articles 1-3 together, 3.7x ltb, entire, with two distal setae and (at least) one distal PSS; article-5 longer than article-3, 2.2x ltb, with distal seta; article-6 small, as long as broad, with four terminal setae.

Mouthparts (paratype). *Labrum* (Fig. 12A) hood shaped in lateral view, distally setulate. *Mandibles* (Figs. 12B-C) with left incisor with three cusps, lacinia narrow, almost as long as incisor, bicuspid; molar acuminate, with palmate array of about four spines; right incisor five-cusped, molar similar to that of left mandible, with five spines. *Labium* (Fig. 12D) inner lobes subovate, 1.4x ltb, naked; outer lobes absent (or much reduced). *Maxillule* (Fig. 12E) endite with ten terminal spines, four thicker than rest and one bifid. *Maxilla* not recovered.

Maxilliped (Fig. 12F-G) bases together deltoid, about as long as broad, on larger ovoid pedestal, each with distal seta; endites not fused, weakly flared, each with distolateral setulate process, short rounded medial tubercle and one distal seta; palp about as long as basis, article-1 longer than broad, naked, article-2 sub-triangular, with lateral seta, and three unequal (two large, one small) mesial setae; article-3 subrectangular, as large as article-2, with three unequal mesial setae (two large, one small simple); article-4 about as long as article-3, 2.5x ltb, with subdistal lateral seta and five unequal terminal setae. *Epignath* not recovered.

Cheliped (Fig. 12H-I) coxal sclerite large, subrectan-

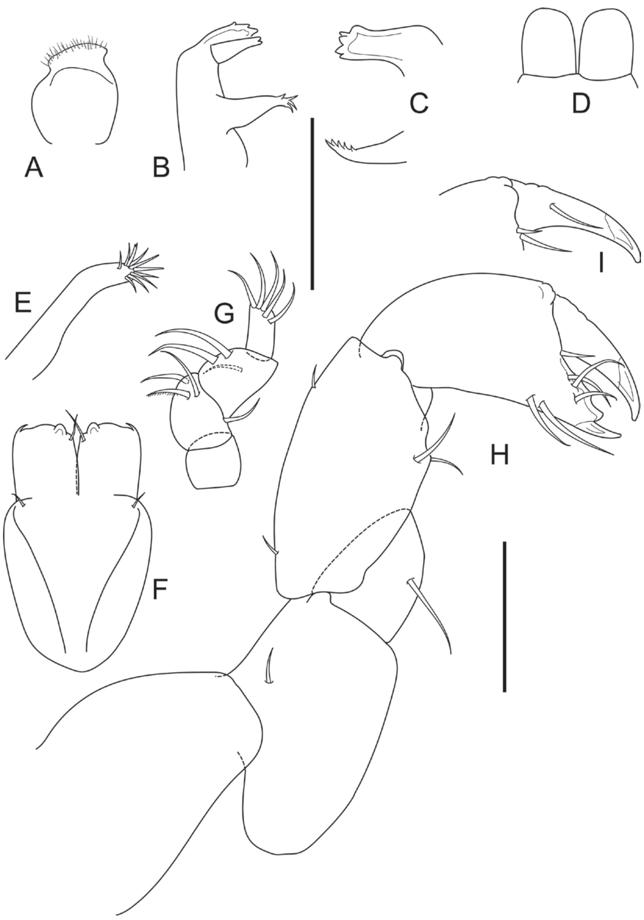

Fig. 12: *Nippognathiopsis levantae* **n. sp.** non-ovigerous female paratype. A, labrum, B-C left and right mandibles respectively; D, labium; E, maxillule endite; F, maxilliped bases and endites; G, maxilliped palp; H, cheliped; I, chela, mesial face. Scale lines: 0.05 mm.

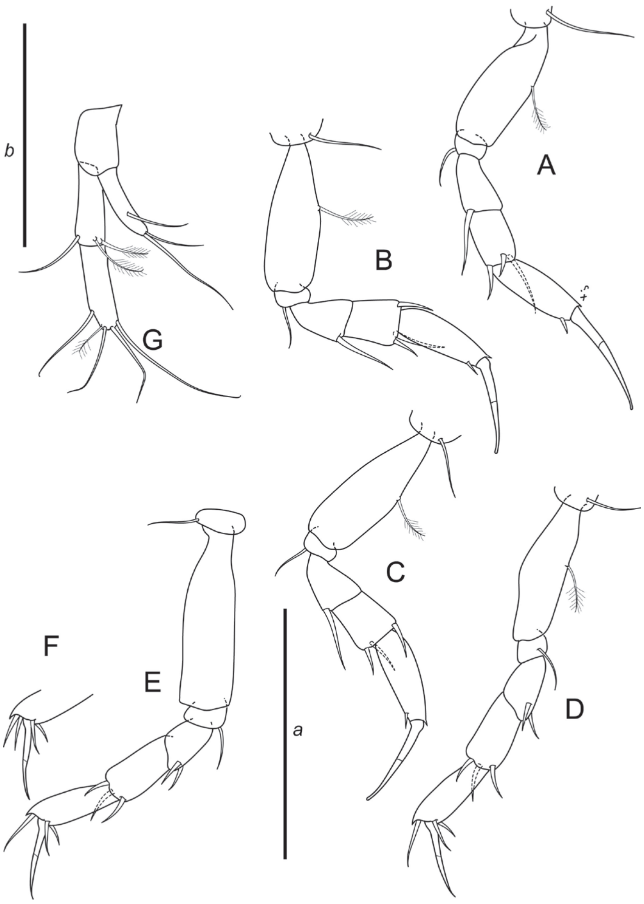

Fig. 13: *Nippognathiopsis levantae* **n. sp.** non-ovigerous female paratype. A-E, pereopods 1-5 respectively; F, pereopod-6 propodus; G, uropod. Scale lines: a, 0.1 mm, A-F; b, 0.1 mm, G.

gular, naked, attached to posterior-dorsum of basis; basis about 1.7x ltb, posterior lobe not reaching pereonite-1, both almost occluding ventrum of cephalothorax, shorter than anterior mass length, latter with dorsolateral seta; merus simple, ventral margin as long as that of carpus, with seta; carpus about 1.9x ltb, with short rounded posterior lobe, small proximal dorsal seta, one dorsodistal seta, and two unequal ventral setae; chela stout, as long and wide as carpus, 2.2x ltb, palm weakly flared (distal height 1.5x that of proximal), 1.2x ltb, dorsodistal margin weakly crenulate, with distolateral seta and mesial comb of two unequal spines (Fig. 12I); fixed finger 0.7x as long as palm, with two ventral setae, incisive margin with three lateral seta, and two subtriangular teeth; dactylus with mesial seta(Fig. 12I).

Pereopod-1 (Fig. 13A) coxa annular, with long distal seta; basis 2.7x ltb, superior margin with one long PSS; ischium with seta half as long as merus; merus about 1.7x ltb, with long inferodistal bayonet spine reaching distal of carpus; carpus as long as merus, 1.6x ltb, with three unequal bayonet spines; propodus narrower and 1.5x carpus length, 3x ltb, with small projection over dactylus (acuminate in lateral view)[1], with inferodistal spine; dactylus 0.4x claw length, together with unguis longer than propodus.

Pereopod-2 (Fig. 13B) similar to pereopod-1 but merus and carpus stouter. *Pereopod-3* (Fig. 13C) as pereopod-2.

Pereopod-4 (Fig. 13D) coxa with long seta; basis similar to those of pereopods 1-3, 3.3x ltb, and at least one inferior PSS; ischium with seta half as long as merus; merus about 1.7x ltb, with two unequal inferodistal spines; carpus longer than merus, 1.9x ltb, distal margin with three bayonet spines ; propodus about 1.1x carpus length, 2.7x ltb, with two spines, and longer superodistal spine; dactylus as long as unguis, together as long as propodus. *Pereopod-5* (Fig. 13E) as pereopod-4 but basis without PSS. *Pereopod-6* (Fig. 13F) like pereopods 4-5 but propodus with two slender superodistal spines.

Pleopod absent.

Uropod (Fig. 13G) 1.5x longer than pleotelson; peduncle 1.9x ltb; exopod unisegmented, slightly longer than peduncle, and reaching distal of endopod segment-1 length, with one subdistal and two unequal terminal setae; endopod bi-segmented, segment-1 as long as segment-2 length, with one long seta and two distomesial PSS, seg-

1 Present on most pereopods in following accounts

ment-2 with subdistal seta, four terminal setae and a PSS.

Intraspecific variation. *Manca-III*. *Habitus* similar to non-ovigerous female but pereon shorter overall, pereonite-6 half as long, bearing rudimentary pleopods; length 0.68 mm [n=1].

Non-ovigerous female. *Habitus* as holotype non-ovigerous female; length 0.84-1.26 mm (n=21). *Pleon* 12-15% of body length.

Ovigerous female. *Habitus* similar to non-ovigerous female but dorsoventrally compressed and with four pairs of oostegites; length 1.0 mm [n=1].

Post-ovigerous female. *Habitus* similar to ovigerous female oostegites absent (detached/lost); length 1.00-1.11 mm [n=3].

Preparatory male. *Habitus* (Fig. 11F) like non-ovigerous female; length 0.97-1.05 mm (n=3; allotype 1.05 mm). *Pleon* (Fig. 11G) proportionately slightly longer, 17.5-18% (n=3); epimera distinct, with posteriorly directed seta. *Antennule* (Fig. 11H) 4x ltb overall, articles 1-3 slightly thicker. *Pleopods* present, well-developed (Fig. 11G).

Depth range. Shelf and shallow bathyal, 54-122 m, in sediment depth fractions to 12 cm.

Remarks. Presently recorded only from the Haifa section of the Israeli coast, this new colletteid species, one of several small and slender paratanaoids co-occurring at shelf and shallow bathyal depths, conforms well to the genus *Nippognathiopsis* Błażewicz-Paszkowycz, Bamber & Jóźwiak, 2013 that was originally described from the Sea of Japan at 517-1356 m. *Nippognathiopsis levantae* **n. sp.** differs from *N. petila* Błażewicz-Paszkowycz, Bamber & Jóźwiak, 2013 in having somewhat shorter pereonites, antennal article-2 with a superodistal seta, pereopods 1-3 merus has a single inferodistal spine, pereopod-1 propodus is longer, and the claw of pereopods 1-3 merus is relatively shorter. The mandible molars of *N. levantae* are acuminate with a distal rosette of small spines but those of *N. petila* are unknown. The size difference between the two species is small, although the female holotype of *N. petila* is larger, 1.6 mm long, the figured male 1.08 mm.

FAMILY LEPTOCHELIIDAE Lang, 1973

***Chondrochelia savignyi* (Krøyer, 1842)**
(Figs 14-18)
Leptochelia algicola Harger, 1878: Dollfus (1898): 41-43, fig. 5b, d.
Leptochelia dubia: Sars (1886): 317-326, pls. 10-11.
Leptochelia dubia: Smith (1906): 333-335, pl. 20 figs 1-17.
Leptochelia savignyi: Sars (1886): 326-329, pl.9 figs 4-9.
Leptochelia savignyi Krøyer: Dollfus (1898): 40-43, fig. 5a, c.
Leptochelia savignyi: Bamber (2010): 289-311, figs 1-9.
Chondrochelia savignyi (Krøyer): Guţu (2016): 51.
See also Bamber (2010).

Material examined: 8 non-ov. ♀♀, 1 prep. ♂, 1 ♂ dissected on 2 microslides [SMNH-TAU AR30058] - 32.9°N 35.07°E, 13.9 m, 15/5/2015; 3 non-ov. ♀♀, 1 ov. ♀ partly dissected on 1 microslide, [SMNH-TAU AR30059], 1 prep. ♂ - 32.9°N 35.07°E, 13.9 m, 4/5/2017; 1 manca-3, 5 non-ov. ♀♀, 1 ov. ♀, 1 prep. ♂ - 31.87°N 34.65°E, 23 m, 10/5/2018; 14 non-ov. ♀♀, 1 ov. ♀, 1 prep. ♂, various sites along the Israeli coast of the Mediterranean, 9.7-12.7 m, 3-4/8/2015; 1 non-ov. ♀ - 32.79°N 34.95°E, 9.7 m, 1/8/2016; 27 non-ov. ♀♀ [SMNH-TAU AR30061], 1 non-ov. ♀ dissected on 2 microslides [SMNH-TAU AR30060], 1 ov. ♀, 2 post-ov. ♀♀ - several sites along the Israeli coast of the Mediterranean, 8-10 m, 24/7/2017; 14 non-ov. ♀♀, 1 ♂- 32.79°N 34.95°E and 32.92°N 35.07°E; 20/7/2020; 8.5-9.7 m; 3 non-ov. ♀♀, 1 ov. ♀, 1 prep. ♂ - 31.94°N 34.7°E, 13.8 m, 19/05/2014; 1 non-ov. ♀ - 31.94°N 34.68°E, 22.5 m, 19/5/2015; 3 non-ov. ♀♀ - 31.94°N 34.69°E, 13.8 m, 4/6/2017; 1 manca-3, 1 non-ov. ♀ - 31.94°N 34.68°E, 22.5 m, 19/5/2015.

From wider collection of British/Irish material (G Bird/D.M. Holdich collection): 1 non-ov. ♀ (dissected on 2 microslides), Falmouth, Cornwall; 1 non-ov. ♀ (dissected on 2 microslides), Marazion, Cornwall; 1 non-ov. ♀ (dissected on 2 microslides), Guernsey, Channel Islands; 1 non-ov. ♀ (dissected on 2 microslides), Lough Ine, Cork, Ireland.

Description of Levant Sea form. *Non-ovigerous female. Habitus* (Fig. 14A) slender or fairly slender, 6.1-

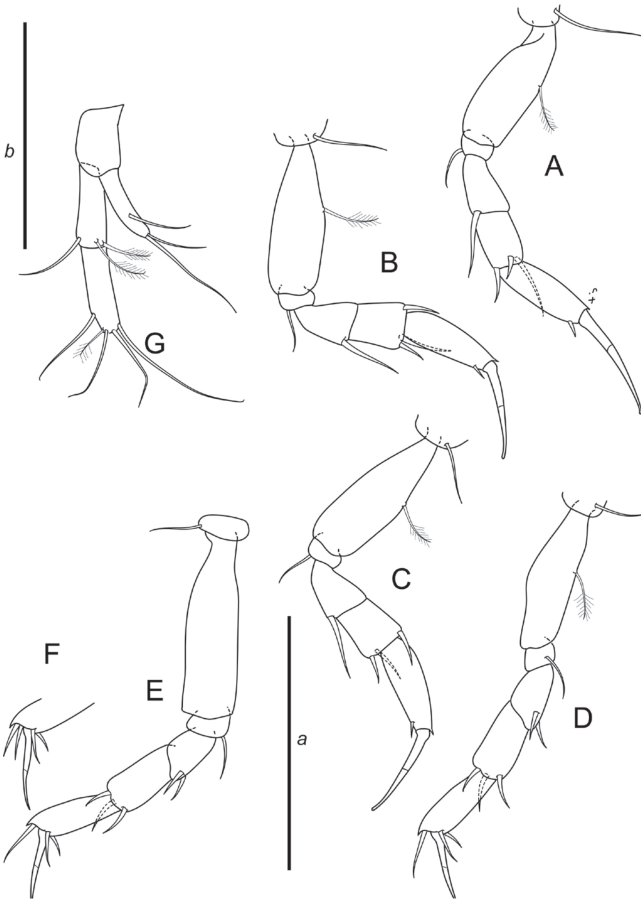

Fig. 14: *Chondrochelia savignyi* non-ovigerous female. A, habitus; B, pereonite-1, and posterior of cephalothorax; C, pleotelson, lateral; D, antennule; E, antenna; F, uropod. Post-ovigerous female (2.7 mm). G, uropod. Preparatory male (2.7 mm). H, antennule (*in situ*). Scale lines: a, 1 mm, A; b, 0.25 mm, B-C, F-G; c, 0.125 mm, D-E.

8.4x ltb (6.1x ltb, figured specimen), length 1.1-2.7 mm (figured specimen 2.4 mm). *Cephalothorax* (Fig. 14B) flask-shaped, 1.35x ltb, just longer than pereonites 1-2 and half of pereonite-3 combined; carapace entire, with anterolateral seta just posterior to eyes; cheliped sclerite and basis setae visible laterally. *Pereonites* all shorter than broad, with parallel or near-parallel lateral margins; pereonite-1 shortest, 0.4, 0.56, 0.6, 0.78, 0.76, and 0.56x ltb; pereonite-1 with four distal setae, pereonites 2-6 with two anterodorsal and two posterolateral setae (on tergite margin), pereonites 4-6 also with two anterolateral setae (on tergite margin). *Pleon* slightly wider than pleon, about as long as broad, 16% of body length; epimera with two setae. *Pleotelson* (Fig. 14C) longer than pleonite-5 only; setation typical, pair of apical setae long but reaching ventrum of pleotelson.

Antennule (Fig. 14D) about 0.8x as long as cephalothorax; article-1 3.7x ltb, with several fine basal setae, simple seta on mesial margin at half length, distomesial seta, and long distolateral seta and at least two PSS; article-2 2.1x ltb, with distomesial seta, and distolateral seta and PSS; article-3 4x ltb, 1.3x longer than article-2, with one two setae, one PSS and aesthetasc; cap-like terminal segment anaxial with article-3, with two setae.

Antenna (Fig. 14E) 0.8x as long as antennule; article-1 shorter than broad, naked; article-2 1.2x longer than article-3, with slender thornlike dorsodistal and ventrodistal spines, and with distomesial or distolateral seta; article-3 1.1x ltb, with strong dorsodistal spine; article-4 3.9x ltb, about 0.9x as long as articles 1-3 combined, with PSS at half length, three distal setae and at least two PSS; article-5 3.6x ltb, with two long distal setae and one PSS; article-6 small, with five unequal terminal setae.

Mouthparts. Labrum (Fig. 15A) typical of family; hood-shaped, distally setulate. *Mandibles* (Figs. 15B-C) typical of family; lacinia broad subtriangular, distal margin denticulate, extending beyond incisor; molars broad, longer than incisor, ridged with pectinate spines. *Labium* (Fig. 15D) typical of family, lobes about equal in size, distally setulate. *Maxillule* (Fig. 15E) typical of family, endite distally setulate and with eight or nine strong terminal spines.

Maxilliped (Fig. 15F-H), bases together 1.4x ltb, each with three long distal setae (two and three in figured individual); endites each with three distal teeth, peg-like, mesial shorter, and broader; palp article-2 with lateral seta and four unequal mesial setae; article-3 slightly larger than article-2, with ten mesial finely-plumose setae; article-4 with subdistal lateral seta and nine distal finely-plumose setae.

Cheliped (Fig. 15I-J) coxal sclerite triangular, with seta (Fig. 14A-B); basis about 1.5x ltb, posterior lobe reaching pereonite-1, smaller than anterior mass, latter with dorsolateral seta; merus simple, ventral margin 1.5x that of carpus, with three inferior setae and proximal mesial seta; carpus 2x ltb, superior margin with two proximal and one distal setae, inferior margin with three unequal setae; chela slightly shorter and narrower than carpus, 2.2x ltb, propodus palm 1.25x ltb, slightly flared (distal height about 1.1x that of proximal), with

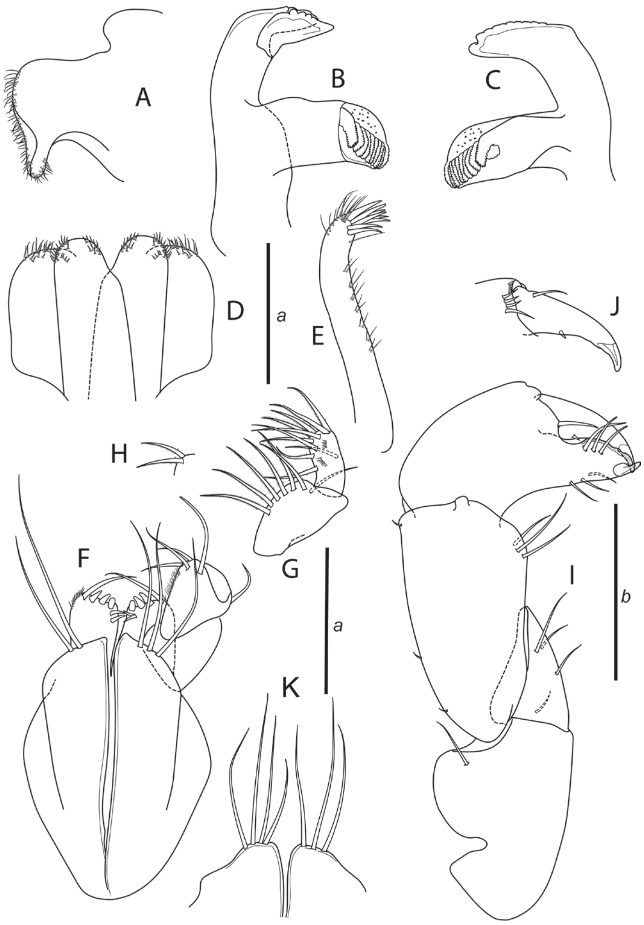

Fig. 15: *Chondrochelia savignyi* non-ovigerous female. A, labrum, lateral; B-C left and right mandibles, respectively; D, labium; E, maxillule endite; F, maxilliped (one palp omitted for clarity); G, maxilliped palp articles 3-4; H, maxilliped palp article-3 obscured mesial setae; I, right cheliped (dactylus distal obscured behind fixed finger); J, cheliped propodal mesial comb and dactylus. Post-ovigerous female (2.7 mm). K, maxilliped bases, distal. Scale lines: a, 0.125 mm, A-H, K; b, 0.25 mm, I-J.

mesial comb of four spines and several smaller setules (Fig. 15J); fixed finger with strong lateral spine, and five distal setae, with diastema and raised laminate incisive margin with weak distal teeth; dactylus with strong proximal (dorsomesial) seta and at least one peg-like spine in incisive margin (Fig. 15J).

Pereopod-1 (Fig. 16A) coxa with long distal seta; basis arcuate, 4x ltb, with small proximal superior PSS and simple seta; ischium with seta; merus 1.7x ltb, 1.1x longer than carpus, with one inferodistal (mesial) seta; carpus 1.5x ltb, with five distal setae, the superodistal seta about half propodus length; propodus 3.6x ltb, 0.9x as long as carpus and merus combined, with three superodistal setae and inferodistal seta; dactylus longer than unguis, with accessory seta, together with unguis 1.25x longer than propodus.

Pereopod-2 (Fig. 16B) coxa with distal seta; basis 2.9x ltb, slightly wider than that of pereopod-1, with two proximal superior PSS and simple seta; merus 1.2x ltb, as long as carpus, with peg-like inferodistal spine and inferodistal (mesial) seta; carpus 1.25x ltb, with two un-

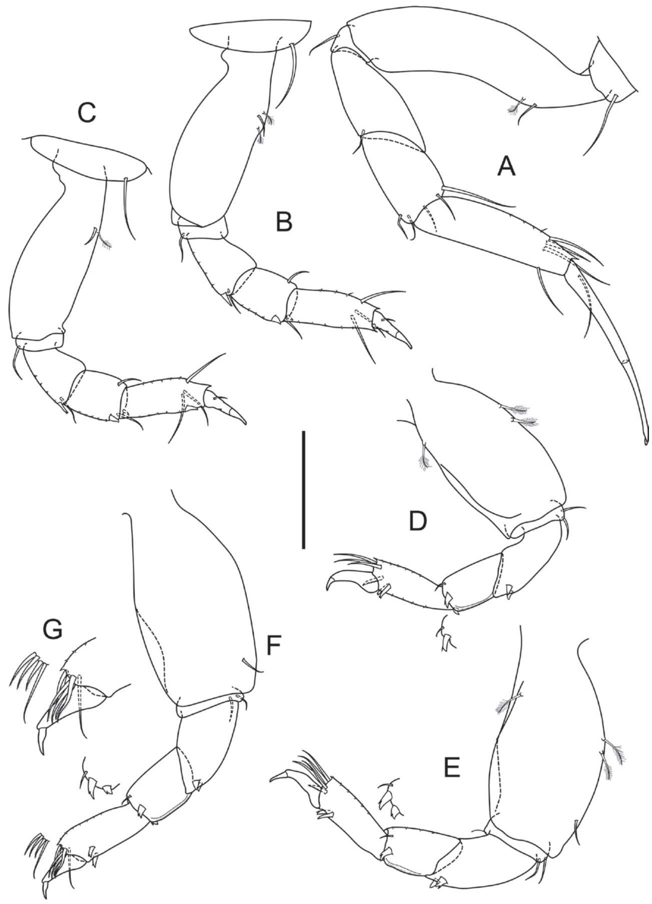

Fig. 16: *Chondrochelia savignyi* non-ovigerous female. A-F, pereopods 1-6 respectively, with details of obscured setation. Scale line: 0.125 mm.

equal peg-like inferodistal spines, superodistal seta, and inferodistal (mesial) seta; propodus 2.5x ltb, with three unequal superodistal/superolateral setae and inferodistal spine; dactylus with small accessory seta, together with unguis 0.6x as long as propodus. *Pereopod-3* (Fig. 16C) as pereopod-2 but basis with one PSS, merus, carpus, and propodus combined slightly shorter.

Pereopod-4 (Fig. 16D) basis stout, 1.9x ltb, with superodistal groove, two inferior PSS and proximal superior PSS; ischium short, with two unequal setae; merus geniculate, 1.7x ltb, longer than carpus, with two peg-like inferodistal spines; carpus 1.5x ltb, with three crotchets (of different shapes) and two superodistal setae; propodus 2.4x ltb, superior margin with few microtrichia, three long superodistal setae and one smaller weakly serrate spine, and two slender inferodistal crotchets; dactylus and unguis together 0.7x as long as propodus. *Pereopod-5* (Fig. 16E) as pereopod-4 but basis also with inferodistal simple seta; propodus with four slender superodistal setae. *Pereopod-6* (Fig. 16F) as pereopod-5 but basis without PSS [none observed]; propodus with distal crown of one superodistal slender seta and about seven shorter weakly pectinate setae, stouter pectinate seta absent.

Pleopod (not figured) peduncle as long as broad, with superior plumose seta; endopod 2x ltb, with superodistal seta and fringe of 13 setae with slight gap between proximal seta and others; exopod longer and slenderer than endopod, 2.7x ltb, with fringe of 24 setae, with slight gap between proximal circumplumose seta and others.

Uropod (Fig. 14F) peduncle 1.8x ltb, naked; endopod five-segmented, segment-3 longest, setation as figured; *exopod* unisegmented, 3.2x ltb, about 0.8x as long as segment-1 of endopod, with subdistal seta and two terminal setae.

Male (based on 2.3 mm individual): *Habitus* (Fig. 17A), fairly stout, 5.5x ltb. *Cephalothorax* flask-shaped, 1.3x ltb, as long as pereonites 1-3 and nearly half of pereonite-4 combined, with slight constriction posterior to eyes; rostrum spatulate, broad and shallow; eyes conical about 0.2x as long as cephalothorax; carapace with anterolateral seta just posterior to eyes; cheliped sclerite and basis setae visible laterally. *Pereonites* of differing shapes, pereonite-1 rectilinear, pereonites 2-3 with strongly convex lateral margins, pereonite-6 wider posteriorly; 0.24, 0.38, 0.39, 0.60, 0.53, and 0.34x ltb respectively; pereonite setation as female. *Pleon* 21% of body length, about as long as pereonites 5-6 and half of pereonite-4 combined; epimera with two setae. *Pleotelson* as female but apical setae short.

Antennule (Fig. 17B) 0.59x as long as body; article-1 slender, 7.5x ltb, 42% of entire length; article-2 about 0.55x as long as article-1, 3.9x ltb; article-3 0.47x as long as article-2, 2.5x ltb; flagellum nine-segmented, segments

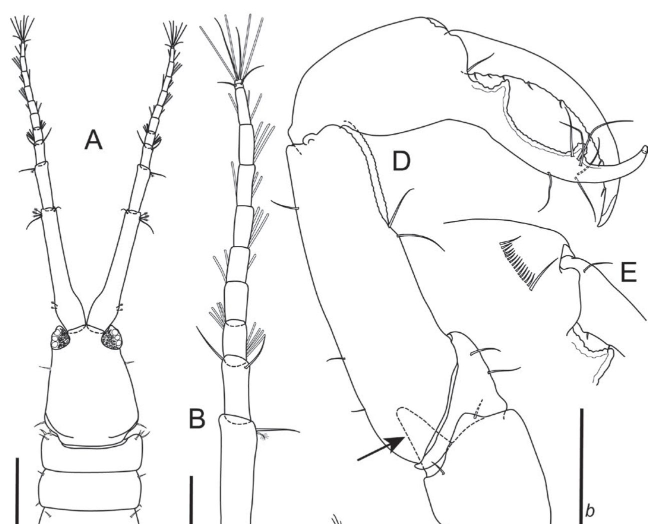

Fig. 17: *Chondrochelia savignyi* male. A, habitus (chelipeds removed); B, antennule; C, antenna; D, cheliped, dorsomesial spur of basis arrowed; E, left chela, mesial side; F, uropod peduncle, exopod and segment-1 of endopod. Scale lines: a, 1 mm, A; b, 0.25 mm, B-F.

8-9 small, segment-1 with two groups of long aesthetascs (four each), segments 2-8 with three or four aesthetascs; other setation as figured.

Antenna (Fig. 17C) about 0.4x length of antennule; article-1 short, naked; article-2 shorter than broad, with slender dorso- and ventrodistal spines, dorsal longer than ventral; article-3 smaller than article-2, with slender dorsodistal thorn-like spine as long as article; article-4 6.2x ltb, longer than articles 1-3 combined, with fusion line, with one subdistal PSS, and three distal setae and two distal PSS; article-5 half length of article-4, slender, 7.5x ltb, with two long setae; article-6 small, with six unequal setae.

Mouthparts atrophied or absent.

Maxilliped atrophied, bases small, triangular; palp possibly one-articled.

Cheliped (Fig. 17D–E) coxal sclerite triangular, reaching posterior of cephalothorax, with seta (visible in dorsal view); basis 1.7x ltb, posterior lobe reaching pereonite-1, 0.6x length of anterior mass, latter with dorsolateral seta and long conical mesial lobe; merus about 0.3x as long as ventral margin of carpus, with narrow extension to dorsal margin, with one proximomesial and two ventral setae; carpus 3.5x ltb, slightly narrower distally and ventral margin with shallow mesial and lateral distal shields, with three dorsal setae and two ventral setae. Chela as just longer and wider than carpus, 3.6x ltb; propodus palm axis bent, with lateral seta near articulation with dactylus, oblique mesial comb of 15 spines, the two outermost longest (Fig. 17E) and mesial subrectangular apophysis at dactylus articulation; fixed finger 1.5x longer than palm, narrow, incisive margin weakly rugose/crenulate, with subtriangular proximal apophyses and (smaller) subtruncate apophysis separated by wide gap, and long distal process bearing small terminal spine, with three lateral setae near incisive margin, one ventral seta and two distomesial setae; dactylus narrow and arcuate, with small proximomesial seta, and six or seven spinules on incisive margin; unguis small.

Pereopod-1 (Fig. 18A) coxa with seta; basis arcuate, about 9x ltb, with proximal superior seta and small PSS; ischium with seta; merus 2.2x ltb, distal margin strongly oblique with carpus, naked; carpus 0.8x as long as merus, 1.9x ltb, with four distal setae; propodus just longer than merus and carpus combined, 6x ltb, with three unequal superodistal/mesiodistal setae and one inferodistal seta; dactylus 1.4x longer than unguis, together with unguis 0.7x length of propodus.

Pereopod-2 (Fig. 18B) coxa with seta; basis straight, slightly broader than in pereopod-1, 4.8x ltb, with proximal superior seta and small PSS; ischium with one seta; merus 1.8x ltb, with inferodistal seta and spine; carpus 0.8x as long as merus, 1.6x ltb, with two superodistal setae, one inferodistal crotchet and one inferodistal seta, inferior margin weakly spinulate; propodus 5.3x ltb, about as long as merus and carpus combined, with two superodistal/mesiodistal setae and one inferodistal crotchet, inferior margin weakly spinulate; dactylus with small accessory seta and microtrichia, longer than unguis, together claw-like and nearly 0.4x length of propodus.

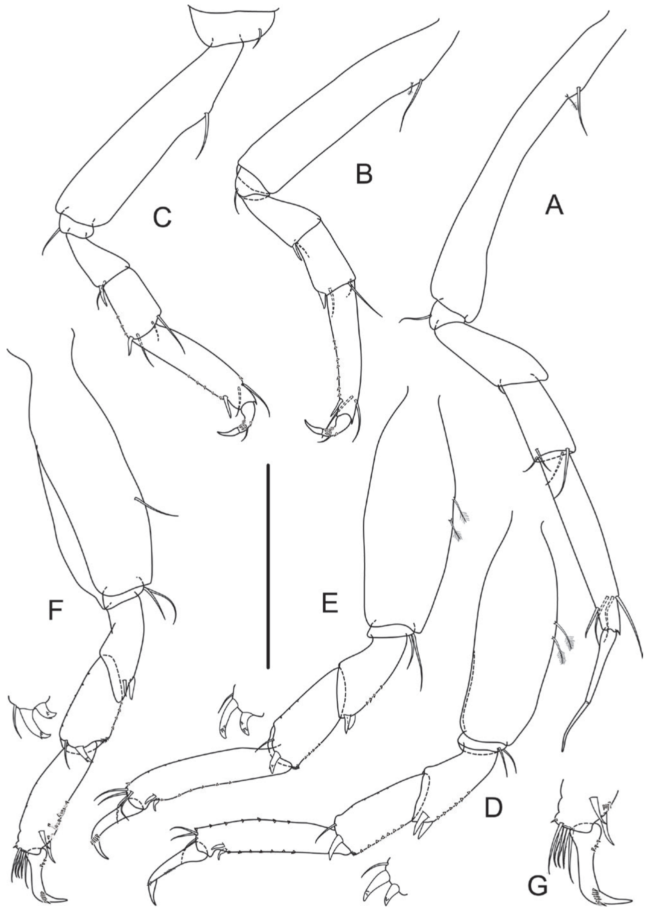

Fig. 18: *Chondrochelia savignyi* male. A-F pereopods 1-6 respectively, with details of obscured setation. Scale line: 0.125 mm.

Pereopod-3 (Fig. 18C) similar to pereopod-2 but basis apparently without PSS.

Pereopod-4 (Fig. 18D) basis broader than in pereopods 1-3, 3.1x as ltb, with shallow superodistal groove, and two inferior PSS; ischium short, with two unequal setae; merus geniculate, 1.7x ltb, with two equal inferodistal crotchets, inferior margin spinulate; carpus about 1.2x longer than merus, 2.1x ltb, subrectangular, with three distal crotchets (two closely-spaced), and two superodistal setae, inferior margin spinulate; propodus 1.5x longer than carpus, slender, 4.4x ltb, with three superodistal setae, and two inferodistal crotchets, superior and inferior margin spinulate; dactylus and unguis claw-like, about half length of propodus, dactylus longer than unguis and spinulate. *Pereopod-5* (Fig. 18E) like pereopod-4 but merus inferodistal crotchets unequal; propodus with four superodistal setae. *Pereopod-6* (Fig. 18F-G) like pereopod-5 but basis with distinct superodistal flange, without PSS but with one inferodistal seta; merus inferodistal crotchets more dissimilar; propodus with two slender superodistal setae and four shorter pinnate setae.

Pleopod (not figured) similar to female, but endopod 2.5x ltb, with superodistal seta and fringe of 14 setae; exopod longer and more slender than endopod, 3x ltb, with fringe of 21 setae.

Uropod (Fig. 17F) like that of female but peduncle with about four inferior setae.

Intraspecific variation. *Manca-III*. *Pereonite-6* short, with rudimentary pereopod-6; pleopods rudimentary; length 0.7-1.0 mm [n=2]. *Uropod* endopod three- or four-segmented.

Non-ovigerous female. As description, body length 1.07-2.74 mm [n=74]. *Uropod* endopod three-segmented (3% of recorded individuals, body length 1.3-1.5 mm), four-segmented (39%, 1.1-1.8 mm), five-segmented (16%, 1.5-2.5 mm), and six-segmented (27%, 1.6-3.0 mm) if three-segmented, segment-3 is long. *Maxilliped* basis with 2-4 setae, some individuals with n and n+1 setae.

Ovigerous female. As description, but body dorsoventrally compressed, body length 2.39-2.70 mm [n=4]. *Pereopods 1-4* coxa with oostegite plates, with or without brood. *Uropod* endopod five- or six-segmented (three of four recorded).

Post-ovigerous female. As description, but body dorsoventrally compressed, body length 1.99-2.34 mm [n=2]. *Pereopods 1-4* coxa with oostegite remnants. *Uropod* endopod six-segmented [n=1].

Preparatory male. *Habitus* as non-ovigerous female; length 2.00-3.04 mm [n=6]. *Antennule* (Fig. 14G) four-articled, article-3 naked, with small terminal segment. *Maxilliped* basis with 3-4 setae. *Uropod* endopod six-segmented [n=6].

Male. As description, body length 1.3-2.1 mm (n=2). *Antennule* flagellum with eight segments.

Depth range. Shallow shelf, 6.6-25.7 m.

Remarks. Using the re-description by Bamber (2010) together with specimens from southern Ireland, Guernsey, and Cornwall this Levantine material could be compared with *C. savignyi sensu stricto*. Additionally, the Mediterranean species *Chondrochelia neapolitana* (Sars, 1886) and *C. corsica* (Dollfus, 1897) and the Azorean *Chondrochelia caldera* (Bamber & Costa, 2009) were considered as possible identities for the specimens from the Israeli coast, although Bamber (2010) considered *C. neapolitana* an unlikely synonym of *C. savignyi*.

Numerous morphological characters were examined across this group of species and the Levantine *Chondrochelia* taxon (exemplified by the figured non-ovigerous female specimen) differed from the other descriptions in a proportionately longer cephalothorax relative to pereonites 1-3 (>pereonites 1-2 and ½ pereonite-3), a stouter cheliped carpus (L/W 1.6x v. 1.9-2.4), a slightly stouter pereopod-1 carpus (L/W 1.45x v. 1.53-1.87), a slightly stouter pereopod-2 merus (L/W 1.12x v. 1.17-1.67), a stouter and relatively shorter basis (*re* merus-propodus) of pereopods 4-6 (L/W 1.94x v. 2.0-2.52), and a stouter and relatively shorter propodus (re merus-carpus) of pereopods 4-6 (L/W 2.42x v. 2.47-3.7). Many of these differences are minimal, although some other characters are near the end of the scale compared to the other species/forms.

Female setation largely matches the redescription of *C. savignyi*, but more so with the newly examined British and Irish material (assuming they are synonymous with the Madeiran type). However, in the Israeli form the number of setae on the mesial margin of maxilliped palp article-3 appears higher (10 v. 8), the cheliped merus has four setae (v. two *sensu* Bamber, 2010) and the carpus three dorsal setae (none, *ibid*), the pereopod-2 propodus has three superodistal setae (two, *ibid*), and the carpus of pereopods 4-6 has two superodistal setae (one, *ibid*).

The Israeli *Chondrochelia* male differs from the redescribed form and the Irish specimens (which are similar to each other) primarily in the shape of the cheliped chela, which is more gracile and has a much wider diastema between the pair of apophyses on the fixed finger incisive margin. This configuration is better matched by that shown for *C. savignyi* as *Tanais edwardsii* (Krøyer, 1842), *Leptochelia savignyi sensu* Dollfus (1898: fig 5a), *L. savignyi sensu* Riggio (1996: figs 39-40), and *L. savignyi sensu* Smith (1906: pl.20 fig.7). The relatively close-spaced fixed finger apophyses of the Madeiran and Irish material are similar to that shown by Dollfus (1898) for *L. algicola*, Sars (*op. cit*.) and the 'low males' of Smith (*op. cit*. pl. 20 figs 8-9). The incisive margin and apophyses also have a distinct rugosity as shown by Sars (*op.cit*. pl.11 fig. 11) and Smith for his 'high male' from Naples (*op. cit*. pl. 20 fig. 7). One feature that may be unique to the Levant form is the large dorsodistal lobe on the mesial face of the cheliped basis, possibly a 'stop' to limit inward movement of the carpus.

Overall, it is considered that this *Chondrochelia* from the coast of Israel is synonymous with *C. savignyi* and probably synonymous with *L. dubia sensu* Sars (1886), possibly with *C. neapolitana* (as proposed by Smith *op. cit*.) but not with *C. caldera* or *C. corsica*. It occurs at shallower depths than *L. tanykeraia* and may be the species reported from Beirut by Monod (1931) as *Leptochelia* sp. and possibly synonymous with the *Chondrochelia savignyi* from Alexandria (Hamdy & Dorghan, 2019). Molecular analysis of the populations extending from Madeira and SW Ireland in the West to the Levantine Sea in the East, are required to resolve the genetic diversity in this taxon.

Most of the records are from spring samples with densities up to 227 individuals per m^2.

***Leptochelia tanykeraia* Bamber, 2009**

Leptochelia tanykeraia: Bamber *et al.* (2009): 29-34, figs 12-14.

(Figs 19-23)

Material examined. 2 manca-3, 9 non-ov. ♀♀, 1 prep. ♀, 3 post-ov. ♀♀, 1 ♂♂, [SMNH-TAU AR30062], 1 post-ov. ♀ dissected on 2 microslides [SMNH-TAU AR30064], 1 ♂ dissected on 2 microslides [SMNH-TAU AR30063] - 32.94°N 34.93°E, 54 m, 11/9/2017; 6 non-ov. ♀♀, 1 post-ov. ♀ - 32.94°N 34.93°E, 54 m, 28/10/2018, and 32.16°N 34.69°E, 46 m, 23/10/2018; 4 manca-2, 14 manca-3, 153 non-ov. ♀♀, 7 ov. ♀♀ (1 dissected on 1 microslide), 1 ♂ - various sites along the Israeli coast of the Mediterranean, 46-122 m, 10-13/9/2019; 53, various sites along the Israeli coast of the Mediterranean, 55-80 m, 8-14.5.2015.

Redescription (partial, see also Bamber *et al.*, 2009). *Female preparatory, ovigerous and post-ovigerous). Habitus* (Fig. 19A) slender, 7.2-8.4x ltb, length 2.5-3.9

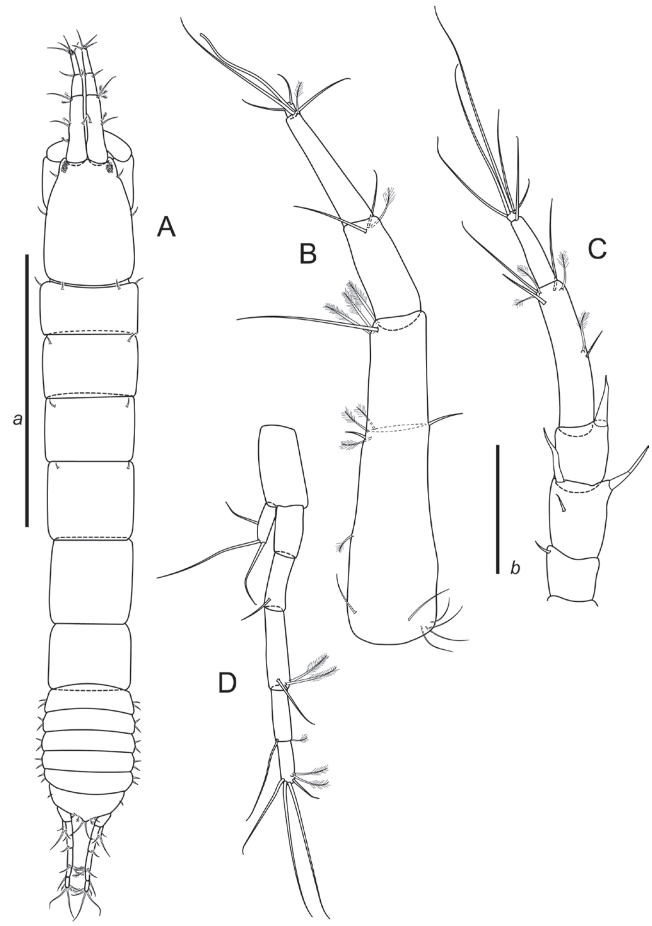

Fig. 19: *Leptochelia tanykeraia* non-ovigerous female. A, habitus; B, antennule; C, antenna; D, uropod. Scale lines: a, 1 mm, A; b, 0.125 mm, B-D.

mm (see below). *Cephalothorax* carapace with anterolateral seta just posterior to eyes; cheliped sclerite and basis setae visible laterally. *Pereonite-5* longest, slightly longer than broad; pereonites 1-4 with two anterolateral setae. *Pleotelson* pair of apical setae long.

Antennule (Fig. 19B) as Bamber *et al.* (2009) but article-1 with several fine basal setae, also with PSS on lateral margin at half length, vestigial articulation, and three distolateral PSS; article-2 also with distomesial seta and PSS; article-3 with two setae, one PSS and aesthetasc; cap-like terminal segment with two setae.

Antenna (Fig. 19C) as Bamber *et al.* (2009) but article-2 dorsodistal spine slender, thornlike, also with distomesial or distolateral seta; article-4 with short seta and PSS at half length, and three distal setae and three PSS; article-5 with distal seta; article-6 small with one short, two long, and three medium-length terminal setae, one of which is minutely serrate.

Mandibles (Figs. 20A-C) as Bamber *et al.* (2009) but lacinia broad subtriangular, distal margin denticulate; molars ridged with pectinate spines.

Maxillule (Fig. 20D) with ten closed-spaced terminal spines and numerous setules.

Maxilliped (Fig. 20E-I) as Bamber *et al.* (2009) but bases unfused, about as long as broad, each with four long distal setae (see below); endites each with three distal teeth, outer two peg-like, mesial shorter, molariform; palp article-2 with four unequal mesial setae; article-3 with eight mesial setae; article-4 (Fig. 20H-I) with subdistal lateral seta and eleven unequal terminal setae, two of which on a distal lobe.

Cheliped (Fig. 20J-K) as Bamber *et al.* (2009) but coxal sclerite triangular, with seta; basis with dorsolateral seta; merus simple, ventral margin 1.1x that of carpus, with three setae; carpus ventrodistal margin with slight shield, superior margin with one distal and two proximal setae; propodus palm slightly flared (distal height 1.25x that of proximal), with mesial comb of five unequal spines and several smaller setules (Fig. 20K); dactylus with strong proximal (dorsomesial) seta.

Pereopod-1 (Fig. 21A) as Bamber *et al.* (2009) but coxa with distal seta (visible in dorsal view); basis 5x ltb, with small proximal superior PSS and simple seta; ischium with long seta; merus about 1.8x ltb, with two inferodistal (mesial) setae; carpus 1.7x ltb, with small five distal setae, the superodistal seta about half propodus length; propodus about 5x ltb; dactylus with accessory seta.

Pereopod-2 (Fig. 21B) as Bamber *et al.* (2009) but coxa with distal seta; basis 2.75x ltb, with two proximal superior PSS and simple seta; merus 1.5x ltb, with peglike inferodistal spine and inferodistal (mesial) seta; car-

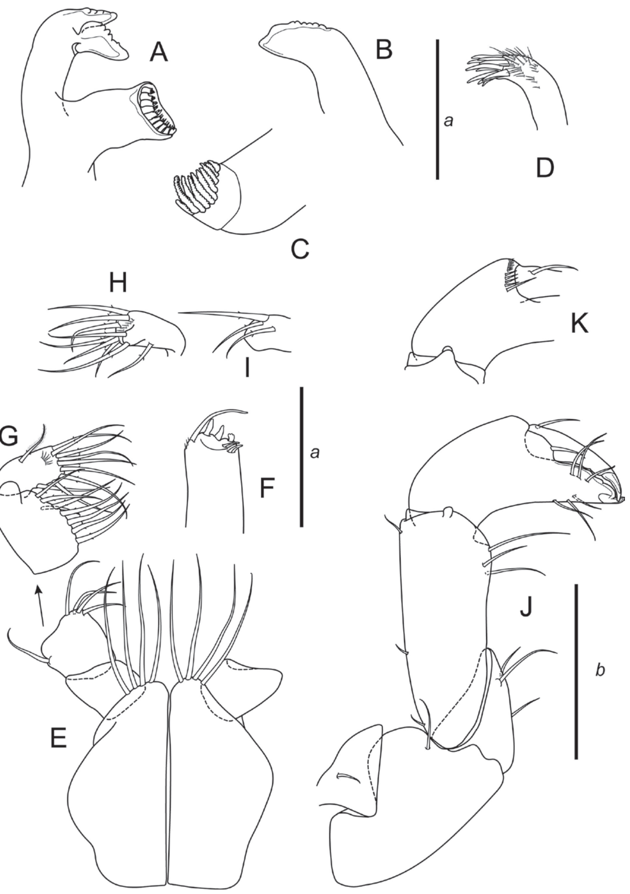

Fig. 20: *Leptochelia tanykeraia* non-ovigerous female. A, left mandible; B, right mandible incisor; C, right mandible molar; D, maxillule endite, distal; E, maxilliped bases, right palp articles 2-4, left palp articles 3-4, and endites omitted for clarity; F, maxilliped endite; G, maxilliped palp articles 3-4; H, maxilliped palp article-4; I, maxilliped article-4 obscured setae; J, right cheliped; K, left chela, mesial view. Scale lines: a, 0.125 mm, A-I; b, 0.25 mm, J-K.

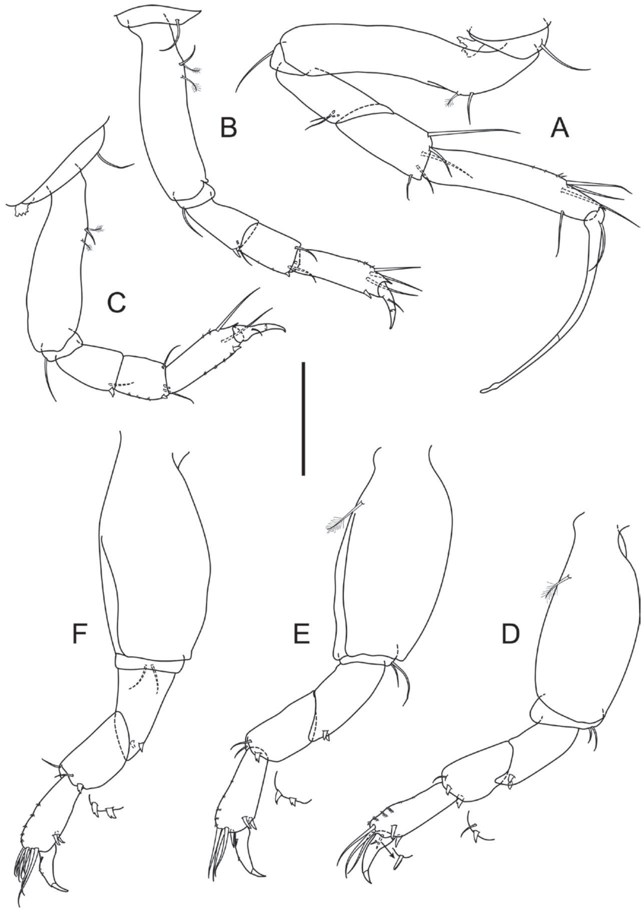

Fig. 21: *Leptochelia tanykeraia* non-ovigerous female. A-F, pereopods 1-6 respectively, D-E with obscured setae shown. Scale line: 0.125 mm.

pus 1.6x ltb, with small peg-like inferodistal spine, superodistal seta, minute distomesial spine and distomesial seta; propodus 3.4x ltb, with three unequal superodistal setae and inferodistal spine; dactylus with small accessory seta. *Pereopod-3* (Fig. 18C) as pereopod-2 but merus, carpus and propodus combined slightly shorter, and propodus with two superodistal setae.

Pereopod-4 (Fig. 21D) as Bamber *et al.* (2009) but basis 2.1x ltb, with superodistal groove and proximo-superior PSS; carpus 1.75x ltb, with three crotchets (of different shapes) and two superodistal setae; propodus 2.75x ltb, superior margin with few microtrichia, three long superodistal spines and one smaller weakly serrate spine, and thinner, smoother, superodistal spine; dactylus with at least two small spinules. *Pereopod-5* (Fig. 21E) as pereopod-4 but propodus with three slender superodistal setae and smaller pectinate spine. *Pereopod-6* (Fig. 21F) as Bamber *op.cit.* but carpus also with two superodistal setae.

Pleopod (not illustrated), as Bamber *et al.* (2009) but peduncle with superior plumose seta. endopod with superodistal seta and fringe of eleven setae with gap between proximal seta and others; exopod with fringe of 23 setae, with gap between proximal seta and others.

Uropod (Fig. 19D) as Bamber *et al.* (2009) but exopod also with subdistal seta; endopod segment-1 also with distal seta; segment-3 with distal simple seta and two PSS.

Intraspecific variation. *Manca-II*: pereonite-6 short, without pereopod-6; pleopods absent; length 0.8-0.83 mm [n=4]. *Uropod* endopod three-segmented, terminal segment short.

Manca-III. *Pereonite-6* short, with rudimentary pereopod-6; pleopods rudimentary; length 1.06-1.14 mm [n=8]. *Uropod* endopod three- or four-segmented.

Non-ovigerous female. As description, length 1.16-2.77 mm [n=19]. *Uropod* endopod three- to five-segmented; if three-segmented, segment-3 long.

Preparatory female. As description, body length 2.50-3.40 mm [n=8]. *Pereopods 1-4* coxa with oval oostegite buds. *Uropod* endopod five- or six-segmented.

Ovigerous female. As description, but body dorsoventrally compressed, length 2.97-3.88 mm [n=6]. *Pereopods 1-4* coxa with oostegite plates, with or without brood; pereopod-1 merus with one or two inferodistal setae. *Uropod* endopod five- or six-segmented (five of six recorded).

Post-ovigerous female. As description, but body dorsoventrally compressed, 2.52-3.60 mm [n=6]. *Pereopods 1-4* coxa with oostegite remnants. *Uropod* endopod five- or six-segmented.

Male (based on 2.2 mm individual). *Habitus* (Fig. 22A), slender, 6.9x ltb. *Cephalothorax* near-ovate, 1.29x

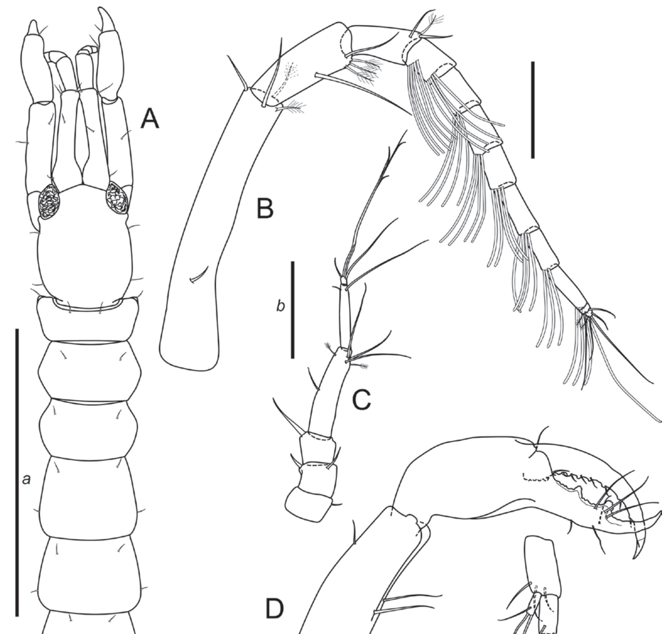

Fig. 22: *Leptochelia tanykeraia* male. A, habitus; B, antennule; C, antenna; D, right cheliped; E, uropod. Scale lines: a, 1 mm, A; b, 0.125 mm, B-E.

ltb, as long as pereonites 1-2 and half of pereonite-3 combined, with constriction posterior to eyes; rostrum broad and shallow; eyes large; carapace with anterolateral seta just posterior to eyes; cheliped sclerite and basis setae visible laterally. *Pereonites* of differing shapes, pereonite-1 trapezoidal, pereonites 2-3 with strongly convex lateral margins, pereonites 4-6 wider posteriorly; 0.29, 0.56, 0.59, 0.86, 0.71, and 0.56x ltb respectively; pereonites 1-6 with two anterolateral setae, pereonites 4-6 also with two posterolateral setae. *Pleon* 18% of body length, about as long as pereonites 5-6 combined; epimera with one seta except pleonite-5 with two setae. *Pleotelson* as female but apical setae short.

Antennule (Fig. 22B) 0.45x as long as body; article-1 slender, 6.1x ltb; article-2 about 0.4x as long as article-1, 2.5x ltb; article-3 0.6x as long as article-2, 2x ltb; flagellum nine-segmented, segments 8-9 small, segment-1 with two groups of long aesthetascs (five and four), segments 2-5 with four, segments 6-7 three, and segment-8 with one aesthetascs respectively; other setation as figured.

Antenna (Fig. 22C) as Bamber *et al.* (2009) but article-1 with ventrodistal seta; article-2 with dorsodistal spine and distolateral seta; article-3 with long thorn-like dorsodistal spine; article-4 with subdistal seta; other setation as figured.

Mouthparts vestigial.

Cheliped (Figs 22D, 23A-B) as Bamber *et al.* (2009) but sclerite with seta (Fig. 22A), visible in dorsal view; basis with dorsolateral seta and round dorsodistal (mesial) apophysis behind carpus; merus with three ventral setae (distalmost small); carpus 4.3x ltb, with ventrodistal groove, dorsal margin with one distal and two proximal setae; chela 3.4x ltb, propodus palm with oblique mesial comb of 18 spines (Fig. 23B); fixed finger with irregularly crenulate incisive margin (including two apophyses) and six distal/inferior setae; dactylus incisive margin regularly crenulate with associated setae.

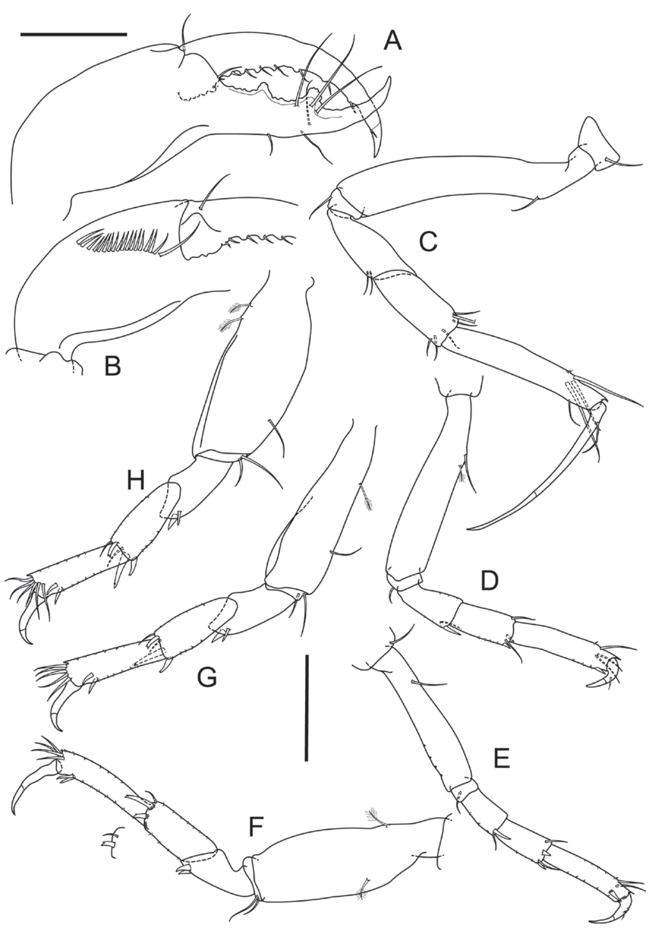

Fig. 23: *Leptochelia tanykeraia* male. A, right chela; B, left chela, mesial view; C-H, pereopods 1-6 respectively, F, with obscured setae shown. Scale lines: 0.125 mm.

Pereopod-1 (Fig. 23C) similar to female, but basis longer, 6x ltb, only with proximal superior seta; merus slightly more slender, 2x ltb; carpus slightly more slender, 2.1x ltb, with six distal setae; propodus longer, 5.9x ltb. *Pereopod-2* (Fig. 23D) similar to female, but basis more slender, 4.7x ltb, with only one superior PSS; merus, inferodistal spine longer than in female; carpus more slender, 2x ltb; propodus more slender, 4.3x ltb. *Pereopod-3* (Fig. 23E) similar to pereopod-2 but all articles slightly shorter, basis with only simple seta; propodus with two superodistal setae.

Pereopod-4 (Fig. 23F) basis narrower than in female, 2.9x ltb, with inferior and superior proximal PSS; ischium short, with two unequal setae; merus geniculate, 1.8x ltb, with two inferodistal spines, of slightly unequal size; carpus just longer than merus, 2.1x ltb, with three distal spines of unequal size, and two superodistal setae; propodus 4.8x ltb, with two slender inferodistal spines and four thin superior spines; dactylus and unguis 0.7x as long as propodus. *Pereopod-5* (Fig. 23G) similar to pereopod-4 but basis with inferior PSS and inferodistal simple seta; propodus with five superodistal spines. *Pereopod-6* (Fig. 23H) as Bamber *et al.* (2009) but see also pereopods 4-5 above; basis with two proximal superior PSS and inferodistal simple seta; merus with two unequal inferodistal spines; propodus with six superodistal setae.

Pleopods (not figured) similar to female but rami narrower; endopod with fringe twelve setae, exopod with 22.

Uropod (Fig. 22E) similar to female but peduncle with three ventrodistal setae; endopod six-segmented.

Male variation. Body length 1.74-3.02 mm [n=9]. *Antennule* flagellum 7-9 segmented. *Uropod* endopod 5-6 segmented, some individuals with both.

Depth range. Shelf and shelf break, 8-122 m but with a probably spurious occurrence at 771 m.

Remarks. The generic attribution remains *Leptochelia* even after this redescription, echoing the comment 'the status of the species *L. tanykeraia* remains doubtful' of Guţu (2016: 89). This statement was given partly due to perceived deficiencies in the original description by Bamber (*op. cit*.), but also its differences from the most likely alternative genus, *Chondrochelia*. Using his key (Guţu, 2016: 23-28) *L. tanykeraia* fails at couplet-10 as the male cheliped chela has denticles only on the proximal region of the dactylus, different from both *Kalloleptochelia* Guţu, 2016 (the females of which are unknown) and the succeeding genera, including *Chondrochelia*. Disregarding this, *L. tanykeraia* also fails at couplet-15, separating females of *Hargeria* Lang from *Chondrochelia*; it lacks a superodistal seta on the pereopod-1 merus. However, it does have three teeth ('spatulate spines;' 'gustatory cusps') on the maxilliped endites, not two as described by Bamber (Bamber *et al.*, 2009: 33, 34).

It inhabits generally deeper (and muddier) sites than *C. savignyi* and females of *L. tanykeraia* can be distinguished from those of that species at least by its proportionately shorter cephalothorax (relative to pereonites 1-3), longer pereonite-4, longer antennule article-3 (relative to article-2), and a more slender cheliped carpus. The male habitus is more gracile, with proportionately larger eyes, a more slender cheliped carpus and a denticulate incisive margin of the dactylus.

***Pseudoleptochelia anomala* (Sars, 1882)**

Heterotanais anomalus: Sars (1886): 333-337, pl. 13; Smith (1906): 336, pl. 21 figs 29-35.
H. algiricus: Dollfus (1898): 38-39, fig. 3.
H. magnus: Smith (1906): 336-337, pl. 21 figs 36-39.
Pseudoleptochelia anomala: Riggio (1996): 874, figs 32-36; Bamber (2013): 29-35, figs 13-16.

Remarks. Only a single specimen, a male, of this konariin leptocheliid species has been recorded off the Israeli coast, at 55 m in May 2014. The species was redescribed by Bamber (2013) based on material from the Balearic Islands and this may be compared with those of Mediterranean synonyms illustrated by other authors (see above). Females of *P. anomala* would be identifiable from the sympatric *Chondrochelia* and *Leptochelia* species by their stouter habitus and antennules, and distal cuff on the cheliped carpus, *inter alia* (Bamber, 2013).

FAMILY PSEUDOTANAIDAE Sieg, 1976

***Pseudotanais stiletto* Bamber, 2009**

Pseudotanais stiletto: Bamber *et al.* (2009): 34-39, figs 15-17.

Remarks. Records of this small pseudotanaid (with eyes) continue to be obtained during routine monitoring programmes at shelf (and upper bathyal) depths. When originally described, the depth range was given as 25-62 m, but this is now considerably extended, from 9-401 m. At the greater bathyal depths *P. stiletto* is sympatric with at least one other undescribed *Pseudotanais* species (without eyes) and an undescribed species of *Mystriocentrus* Bird & Holdich, 1989. The known latitudinal range has also extended northwards, from 31° 54'N (Bamber *et al.*, 2009) to 32.95°N (i.e. offshore from Haifa). Records of *Pseudotanais mediterraneus* from the area almost certainly refer to *Pseudotanais stiletto*. This differs in having chelae that are not obviously forcipate and the uropod endopod is bisegmented, *inter alia*.

FAMILY TANAELLIDAE Larsen & Wilson

***Araphura hyphalus* Bird n. sp.**

urn:lsid:zoobank.org:act:43F1871B-342F-424D-A405-831CB332F179
(Figs. 24-26)

Material examined: *Holotype*—non-ovigerous ♀, 2.0 mm [SMNH-TAU AR30031] - 32.94°N 34.93°E, 54 m, 11/9/2017.

Allotype—preparatory ♂, 1.6 mm [SMNH-TAU AR30032], details as for holotype.

Paratypes—one manca-2 - 32.51°N 34.76°E, 105 m, 18/6/13; one manca-2 - 32.23°N 34.53°E, 401 m, 23/10/2018; one manca-3 [SMNH-TAU AR30033], seven non-ov. ♀♀ [SMNH-TAU AR30036], one non-ov. ♀ dissected on two microslides [SMNH-TAU AR30065], three post-ov. ♀♀ [1 as SMNH-TAU AR30034], four prep. ♂♂ [SMNH-TAU AR30035], details as for holotype; two manca-3 - 32.94°N 34.93°E, 54 m, 28/10/2018.

Also, British material of *Araphura brevimanus* from various localities (Irish Sea, West Scotland, North Sea), part of G.J. Bird and D.M. Holdich collection.

Type locality. Levant Sea, off Haifa, Israel, 54 m.

Etymology. From the Greek ὕφαλος, *hyphalos,* 'under the sea, secret'.

Diagnosis. *Araphura* with *cephalothorax* elongate (>1.5x ltb); rostrum weakly produced, acute. *Pereonites 2-4* slightly longer than broad. *Pleotelson* shorter than broad. *Mandible* molar with about four small terminal spines. *Maxilliped* endite with one distal tubercle. *Cheliped* merus ventral margin just longer than that of carpus;

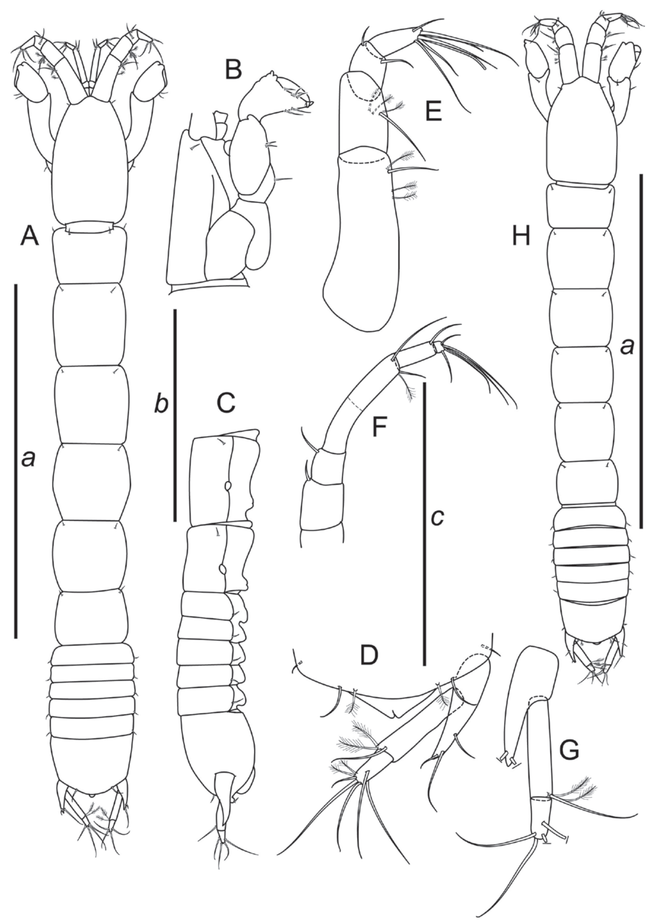

Fig. 24: *Araphura hyphalus* **n. sp.** non-ovigerous female holotype. A, habitus; B, cephalothorax, lateral; C, pereonites 5-6, pleon and pleotelson, lateral, pereopods and pleopods excluded; D, pleotelson apex, left uropod excluded. Non-ovigerous female paratype. E, antennule; F, antenna; G, uropod with some setae missing. Preparatory male. H, habitus. Scale lines: a, 1 mm, A, H; b, 0.5 mm, B-C; c, 0.25 mm, D-G.

carpus with two ventral setae; palm and dactylus dorsal margin crenulate, fixed finger incisive margin with single distal tooth. *Pereopods 1-3* merus with inferodistal spine and seta; carpus with three spines. *Pereopods 4-6* carpus with four distal spines and seta; propodus superodistal spines all shorter than dactylus. *Pleopods* present in female, exopod without proximal inferior seta. *Uropod* exopod reaching beyond half of endopod segment-1.

Description. *Holotype non-ovigerous female*. *Habitus* (Fig. 24A) slender, 9.1x ltb, length 2.0 mm. *Cephalothorax* (Fig. 24A-B) with gently convex lateral margins, 1.8x ltb (holotype), just shorter than pereonites 1-2 combined, rostrum rounded, slightly produced over base of antennules, carapace with anterolateral seta just posterior to antennules. *Pereon* parallel-sided, pereonite-1 weakly trapezoidal, pereonites 2-5 with slight lateral processes over pereopod insertions or smooth and pereonites 5-6 with small weakly bifid apophyses on posterior of sternum; pereonites 1 and 6 equal in length, 0.7x ltb, shortest, pereonites 2-4 about as long as broad or slightly shorter; pereonites 1-6 with two anterodorsal setae near segment articulation. *Pleon* (Fig. 24C) parallel-sided, wider than pereon, as long as broad, 13% of body length; sternites with low recurved triangular apophyses; epimera rounded, with seta. *Pleotelson* (Fig. 24D) as long as pleonites 3-5 combined, about 0.7x as long as broad, lateral margins weakly tapering posteriorly, posterior margin rounded (or weakly produced in some specimens depending on preservation) with two simple setae and two PSS, with small deflexed acuminate apex with two setae.

Paratype non-ovigerous female. *Antennule* (Fig. 24E) about 0.75x cephalothorax length (holotype), article-1 just over half entire length, 2.7x ltb, with two subdistal-lateral PSS, one distolateral seta and one or two distolateral PSS (one shown); article-2 1.7x ltb, about as long as articles 3-4, with distolateral seta and three PSS; article-3 as long as broad, with distolateral seta, and small distomesial seta; article-4 conical, 2.6x ltb, with one short subdistal seta, five long apical setae, and one aesthetasc.

Antenna (Fig. 24F) 0.75x antennule length; article-1 as long as broad, naked; article-2 1.2x ltb, with dorsodistal seta; article-3 0.8x length of article-2, just longer than broad, with dorsodistal seta; article-4 1.25x longer than articles 1-3 together, 5.4x ltb, with weak fusion line, two distal setae and at least one distal PSS; article-5 longer than article-3, 2.6x ltb, with distal seta; article-6 small, as long as broad, with subdistal seta, and four apical setae.

Mouthparts (paratype). *Labrum* (Fig. 25A) hood shaped in lateral view, distally setulate. *Mandibles* (Figs. 25B-C) with left incisor with four cusps, lacinia narrow, almost as long as incisor, molar acuminate, with palmate array of four spines; right incisor four-cuspid, molar similar to that of left mandible. *Labium* (Fig 25D) inner lobes subovate, 2.6x ltb, with small distolateral spur and sparse setules; outer lobes much reduced. *Maxillule* (Fig. 25E) endite with eight slender terminal spines. *Maxilla* simple, not recovered.

Maxilliped (Fig. 25F-H) bases together deltoid, about as long as broad, on larger ovoid pedestal, each with distal seta; endites not fused, weakly flared, each with dis-

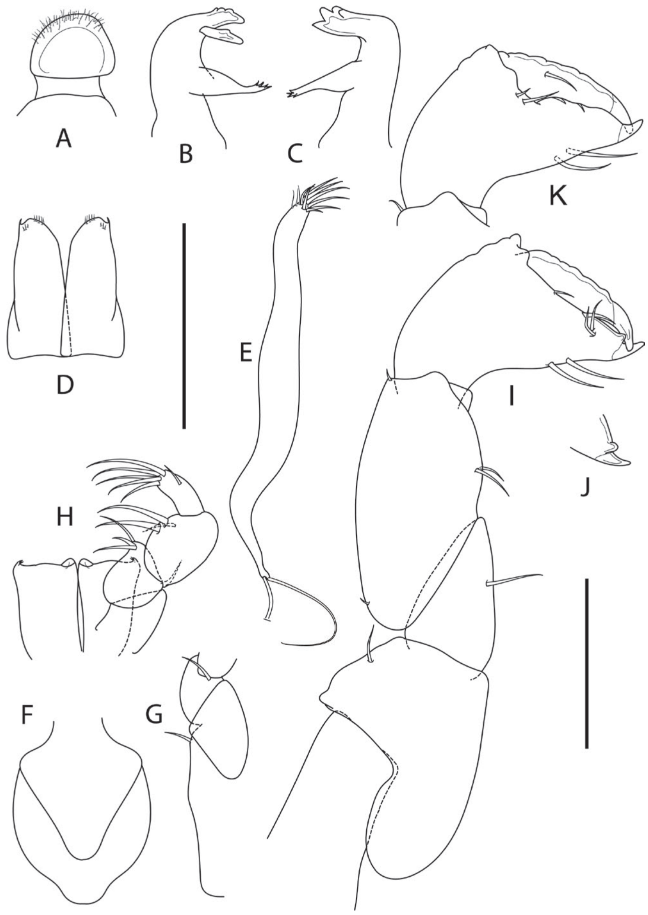

Fig. 25: *Araphura hyphalus* **n. sp.** non-ovigerous female paratype. A, labrum; B-C, left and right mandibles respectively; D, labium; E, maxillule; F, maxilliped bases, in situ; G, maxilliped basis and palp articles 1-2, lateral; H, maxilliped endites and palp; I cheliped; J, cheliped fixed finger apex; K, left chela, mesial face. Scale lines: 0.125 mm.

tolateral setulate process, short rounded medial tubercle and one distal seta; palp about as long as basis, article-1 longer than broad, naked, article-2 sub-triangular, with lateral seta, and three unequal mesial setae; article-3 subrectangular, longer than article-2, with three unequal mesial setae (two large weakly plumose, one small simple); article-4 about 0.75x article-3 length, 2.3x ltb, with subdistal lateral seta and five unequal terminal setae. *Epignath* not recovered.

Cheliped (Fig. 25I-K) coxal sclerite large, subrectangular, naked, attached to posterior-dorsum of basis; basis about 1.2x ltb, posterior lobe almost reaching pereonite-1, both almost occluding ventrum of cephalothorax, about half anterior mass length, latter with dorsolateral seta; merus simple, ventral margin 1.2x that of carpus, with seta; carpus about 2.1x ltb, with rounded posterior lobe, small proximodorsal seta, one dorsodistal seta and two unequal ventral setae; chela stout, as long as carpus and just broader, 1.9x ltb, palm strongly flared (distal height 1.75x that of proximal), as long as broad, dorsal margin weakly crenulate distally, with subtriangular dorsodistal spur, with distolateral seta and mesial comb of two unequal spines; fixed finger 0.9x as long as palm, with two ventral setae, incisive margin with three lateral seta (proximal thickest), and one small distal tooth; dactylus

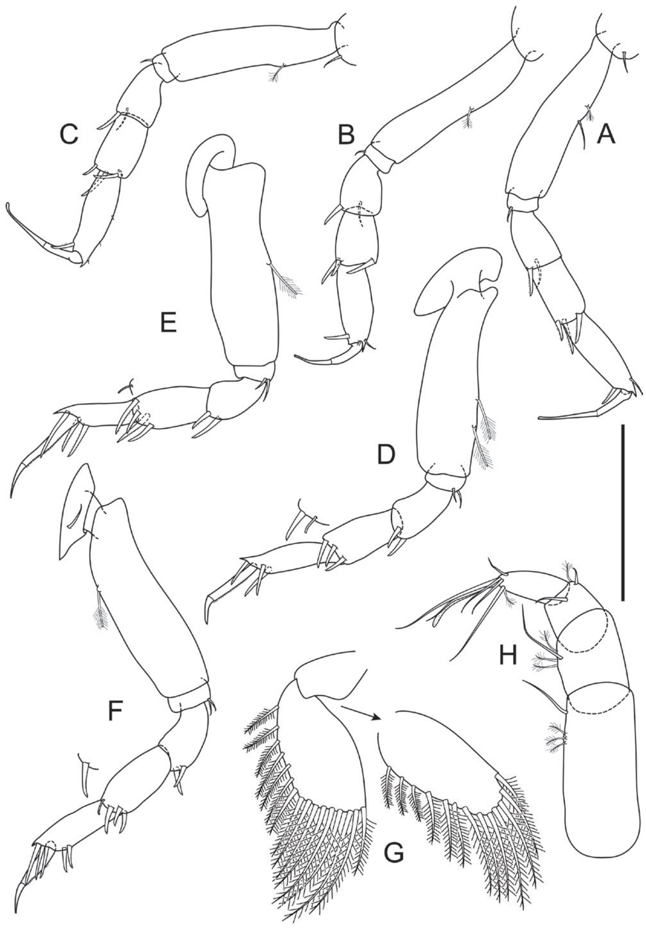

Fig. 26: *Araphura hyphalus* **n. sp.** non-ovigerous female paratype. A-F, pereopods 1-6 respectively, details of obscured carpal setae for p4-6 indicated; G, pleopod. Preparatory male. H, antennule. Scale line: 0.125 mm.

broad, dorsal margin crenulate, with small proximomesial seta and incisive margin with proximal spine.

Pereopod-1 (Fig. 26A) coxa annular, with distal seta, visible in dorsal view; basis 3.9x ltb, with small proximal superior PSS and seta; ischium with small seta; merus about 1.4x ltb, with inferodistal spine and seta; carpus just longer than merus, 1.6x ltb, with small distomesial seta and two finely serrate, superodistal and inferodistal spines; propodus narrower and 1.4x carpus length, 2.8x ltb, with small superodistal seta and inferodistal spine; dactylus 0.4x claw length, together with unguis about as long as propodus.

Pereopod-2 (Fig. 26B) similar to pereopod-1 but basis slightly narrower, without seta; merus and carpus slightly shorter, latter with additional (short) inferodistal spine; dactylus half claw length, together with unguis 0.8x propodus length. *Pereopod-3* (Fig. 26C) as pereopod-2.

Pereopod-4 (Fig. 26D) coxa weakly defined with seta; basis broader than those of pereopods 1-3, 3.6x ltb, with proximal spur at articulation with coxa, and two inferior PSS; ischium with two small setae; merus about 1.6x ltb, with two unequal finely serrate inferodistal spines; carpus as long as merus, distal margin with four unilaterally serrate spines and one stiff seta; propodus about 12x carpus length, 3.1x ltb, with two inferodistal weakly serrate spines, and thinner, smoother, superodistal spine; dactylus 2x unguis length, with inferior spinules, together with unguis as long as propodus. *Pereopod-5* (Fig. 26E) as pereopod-4 but basis with one inferior PSS; claw slightly longer *Pereopod-6* (Fig. 26F) like pereopods 4-5 but basis with proximo-superior PSS and propodus with three slender superodistal spines.

Pleopod (Fig. 26G) Peduncle as long as broad, naked. Endopod subovate, about 2x ltb, narrower than exopod, with superodistal seta and fringe of twelve setae; exopod 1.8x ltb, with fringe of 16 setae.

Uropod (Fig. 24D) almost as long as pleotelson; exopod 1.5x longer than peduncle, and reaching half endopod segment-1 length, with distal seta, apical spur and two unequal subterminal setae; endopod bi-segmented, segment-1 3x segment-2 length, with one long seta and two distomesial PSS, segment-2 with subdistal seta, four terminal setae and two PSS.

Intraspecific variation. *Manca-II*: Length 1.0 mm (n=1).

Manca-III. Length 1.2 mm (n=1).

Non-ovigerous female. *Habitus* slender, 7.6-8.8x ltb (n=8), length 1.3-2.1 mm (n=8). *Pleon* 1.1-1.4x ltb (n=8), 14-17% of body length.

Post-ovigerous female. *Habitus* like non-ovigerous female, 8.4-9.7x ltb (n=3), length 1.8-2.1 mm (n=3). *Pereon* somewhat dorsoventrally compressed and supracoxal process more obvious; pereonites 1-4 (i.e. oostegite bearing) proportionately slightly longer, 0.68, 1.02, 1.04, 1.02x ltb respectively compared to 0.65, 0.87, 0.88 and 0.89x ltb in non-ovigerous females (all averaged values).*Pereopods 1-3* merus inferodistal with two setae (cf. non-ovigerous female with spine and seta).

Preparatory male. *Habitus* (Fig. 24H) like non-ovigerous female; length 1.6-1.7 mm (n=5; allotype 1.6 mm). *Pereonites 1-4* proportionately slightly shorter, 0.63, 0.83, 0.83, and 0.82x ltb respectively (all averaged values). *Pleon* proportionately slightly longer, 16-18% (allotype 17%) of standard body length. *Antennule* (Fig. 26H) articles 1-3 slightly thicker, 4.5x ltb overall.

Depth range. Shelf, 54-105 m.

Remarks. Close examination shows that the *Araphura* species in these Levantine locations is not conspecific with *A. brevimanus* and is established as a new species, *Araphura hyphalus* **n.sp**. It differs from *A. brevimanus* in several respects, including the crenulation on the dorsal margin of the cheliped palm and dactylus, more divergent dorsal and ventral margins of the cheliped chela, proportionately longer pereopod-1 claw *v.* propodus, and more slender uropod endopod. This character is exhibited on other species of *Araphura*: *A. doutagalla* Błażewicz-Paszkowycz & Bamber, 2012, *A. elongata* (Shiino, 1970), *A. pygmothymos* Błażewicz-Paszkowycz & Bamber, 2012, and *A. whakarakaia* Bird, 2011. Other characters helping to separate *A. brevimanus* and *A. hyphalus*, as well as *A. macrobelone* Błażewicz-Paszkowycz *et al.*, 2011 that is known from the Gulf of Cadiz, are shown in Table 1.

All of the records are from the deeper half of the shelf region although there is one doubtful record from the bathyal at 394 m. Previous Israeli records of *Araphura* *brevimanus* [type species of the genus] from the study area include six at depths 55-434 m, but it is probable these should now be re-named as *A. hyphalus***.**

FAMILY TANAISSUIDAE Bird & Larsen, 2009

***Tanaissus microthymus* Bird & Bamber, 2009**
Tanaissus microthymus: Bamber *et al.* (2009): 20-28, figs 7-11.
Tanaissus microthymus: Esquete *et al.* (2015): 198, 199.

Remarks. Post-2007 records of this small and slender tanaid remain frequent at depths 4.4-27 m, and densities of up to 9618 individuals per m^2 at localities at 10 m depth exceed those reported by Bamber *et al.* (2800 individuals per m^2). The lower depth limit has been extended down from 16.2 m reported by Bamber *et al.* (2009). Another European species has since been described, *Tanaissus bamberi* Esquete, 2015 from the Atlantic Iberian coast, where it is sometimes sympatric with *T. lilljeborgi* (Stebbing, 1891), and an updated key to the *Tanaissus* species was also presented by Esquete *et al.* (2015). Most of the *Tanaissus* species frequent shallow sublittoral sand habitats and the low intertidal of beaches (Holdich & Jones, 1983b; Bird, 2002).

FAMILY TANAOPSIDAE Błażewicz-Paszkowycz & Bamber, 2012

***Tanaopsis laticaudata* (G.O. Sars, 1886)**
Leptognathia laticaudata Sars: Sars (1886) 353-358, figs 14-17.
Tanaopsis laticaudatus (Sars): Bamber *et al.* (2009) 15-16.

Remarks. This species, originally described from Messina (Sicily), is here still considered distinct from the Northeast Atlantic *T. graciloides* (Lilljeborg) as proposed by Bamber *et al.* (2009), although a full comparison is still pending. Five new records have been obtained since the 2009 paper, from 54-122 m (four from <100 m) that also cover the known bathymetric range in this area.

FAMILY TYPHLOTANAIDAE Sieg, 1984

***Paratyphlotanais lilliputi* Bird n. sp.**
urn:lsid:zoobank.org:act:6E1876CE-1340-4983-AB5F-D3EB6097C814
(Figs 27-28)

Material examined. *Holotype*—non-ovigerous ♀, 1.5 mm [SMNH-TAU AR30037] - 32.94°N 34.93°E, 54 m, 09/10/2019.

Paratypes—1 manca-3 [SMNH-TAU AR30038], 1 non-ov. ♀ dissected on 3 microslides [SMNH-TAU AR30040], 1 ov. ♀ [SMNH-TAU AR30041], 1 prep.♂? [SMNH-TAU AR30039] - 32.94°N 34.93°E, 54 m, 9/10/2019; 1 non-ov. ♀?, 1 prep. ♂? - 32.17°N 34.66°E, 76 m, 09/10/2019; 1 non-ov. ♀, 1 ov. ♀, 2 prep.♂, 32.532°N 34.78°E, 81 m, 14/5/2014.

Type locality. Shelf, Levant Sea, off Haifa, Israel.

Etymology. After the fictional land Lilliput, in *Gulliver's Travels* by the Irish writer Jonathan Swift; as Latin male genitive.

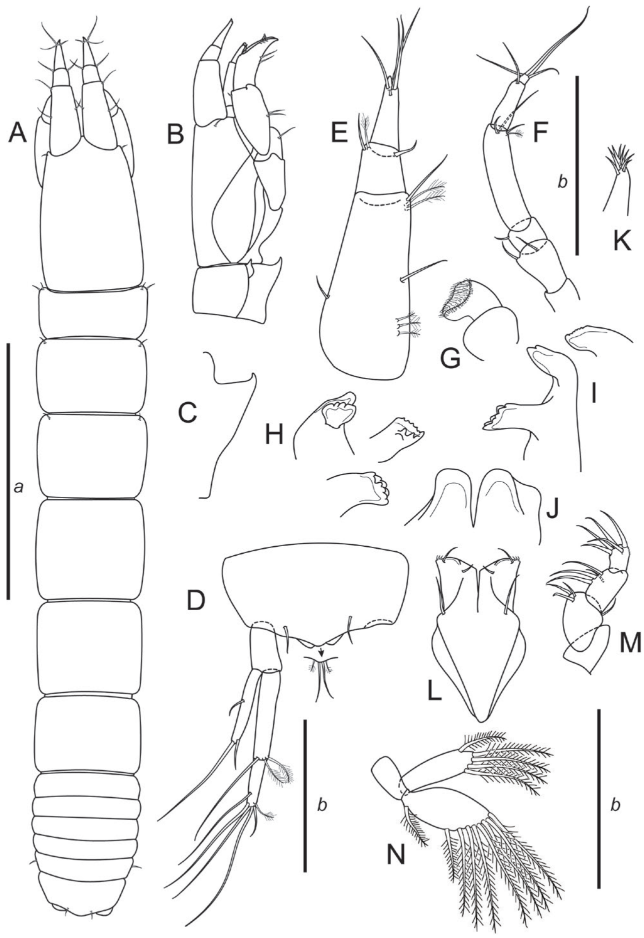

***Fig. 27:** Paratyphlotanais lilliputi* **n. sp.** non-ovigerous female holotype. A, habitus; B, cephalothorax, and pereonite-1, lateral; C, pereonite-1 hyposphenium; D, pleotelson and uropod. Non-ovigerous female paratype. E, antennule; F, antenna; G, labrum; H, left mandible; I, right mandible; J, labium; K, maxillule endite, distal; L, maxilliped bases and endites; M, maxilliped palp; N, pleopod. Scale lines: a, 0.5 mm, A, B; b, 0.125 mm, D-N.

Diagnosis. *Body* 7.5x ltb. *Cephalothorax* 1.5x ltb, longer than pereonites 1-2 combined. *Pereonite-1* 0.6x length of pereonite-2, sternite with hook-like hyposphenium. *Antennule* article-1 2.2x ltb. *Cheliped* merus with one ventral seta, carpus 2.3x ltb, with one dorsal seta; propodus as long as carpus; chela 3.7x ltb. *Pereopod-1* coxa with small triangular apophysis, pereopod-2 coxa simple. *Pereopods 1-3* ischium with one seta, pereopods 4-6 ischium with two setae. *Pereopods 4-6* carpus with three pectinate spines. *Uropod* about 2x as long as pleotelson; exopod unisegmented, 0.8x length of endopod segment-1.

Description. *Holotype non-ovigerous female*. *Habitus* (Fig. 27A) slender, 7.5x ltb, length 1.52 mm. *Cuticle* with hexagonal ornamentation. *Cephalothorax* (Fig. 27A-B) about 1.5x ltb, as long as pereonites 1-2 and half of pereonite-3 combined; rostrum narrow and acute, slightly produced over base of antennules; carapace with anterolateral seta. *Pereon* not tapered, pereonite-1 weakly trapezoidal, with hook-like hyposphenium (Fig. 27B-C), others subrectangular with slightly rounded lateral margins; all shorter than broad, 0.4, 0.69, 0.77, 0.89, 0.85 and 0.70x ltb respectively; pereonites 1-3 with small anterodorsal seta near segment articulation. *Pleon* as wide as pereon, as long as broad, 14% of body length; sternites with raised subtriangular apophysis; epimera rounded, with lateral seta. *Pleotelson* (Fig. 27D) just shorter than pleonites 4-5, 0.4x as long as broad, lateral margins weakly tapering posteriorly; apex weakly produced, with two simple setae, two PSS, and two deflexed apical setae.

Paratype non-ovigerous female. *Antennule* (Fig. 27E) about 0.75x cephalothorax length (holotype), conical 3.5x ltb; article-1 stout, about 0.6x entire length, 2.2x ltb, with one proximomedial seta, three proximolateral PSS, one lateral seta, one distolateral seta and at least two PSS; article-2 1.2x ltb, with distolateral and distomesial setae and one PSS; article-3 1.3x longer than article-2, 3.4x ltb, with apical spur, four long setae (two close-applied).

Antenna (Fig. 27F) 0.8x antennule length; article-1 as long as broad, naked; article-2 1.5x ltb, with dorsodistal seta on small apophysis, and with ventrolateral seta; article-3 about half length of article-2, just shorter than broad, with short dorsal seta; article-4 about as long as articles 1-3 together, 3.5x ltb, with three distal setae and at least one distal PSS; article-5 longer than article-3, 3x ltb, with distal seta; article-6 small, with four terminal setae (two possibly fused).

Mouthparts (paratype). *Labrum* (Fig. 27G) hood shaped in lateral view, distally setulate. *Mandibles* (Fig. 27H-I) with left incisor weakly bilobed, lacinia broad, crenate, molar crushing, with crenate and nodulose apex; right incisor with weakly crenulate distal margin, molar broad with nodulose apex. *Labium* (Fig. 27J) bilobed, lateral lobes reduced; mesial lobe sparsely setulate. *Maxillule* (Fig. 27K) endite with eight slender terminal spines. *Maxilla* not recovered.

Maxilliped (Fig. 27L-M) bases together chordate, about 1.5x ltb, extending onto endites, with long distal seta; endites not fused, weakly flared, with distolateral setulate process, distolateral ridge (not cusp), and two distal setae; palp article-1 naked; article-2 sub-triangular, with lateral seta, and three unequal mesial setae (one stiffer and blunter); article-3 subrectangular, about as long as article-2, with four unequal mesial setae; article-4 shorter and narrower than article-3, 1.5x ltb, with subdistal seta and four unequal terminal setae, distolateral margin finely crenulate. *Epignath* not recovered.

Cheliped (Fig. 28A-B) coxal sclerite long, narrow, dorsal to basis; basis about basis-length anterior to cephalothorax posterior margin, about 1.1x ltb (greatest width/height), posterior lobe enfolded by cephalothorax sternite, both almost occluding ventrum of cephalothorax, anterior mass with three dorsal/dorsodistal apophyses, median with seta, and with ventrodistal lobe; merus triangular, ventral margin 0.7x as long as that of carpus, with seta; carpus about 2.3x ltb, with rounded posterior lobe, one mid-dorsal seta, and two ventral setae; chela slender, 3.7x ltb, shorter (0.9x) and narrower than carpus, palm not flared, 2.3x ltb, with distolateral seta near dactylus, and long mesial spine; fixed finger 0.7x as long as palm, with two ventral setae, incisive margin with three lateral

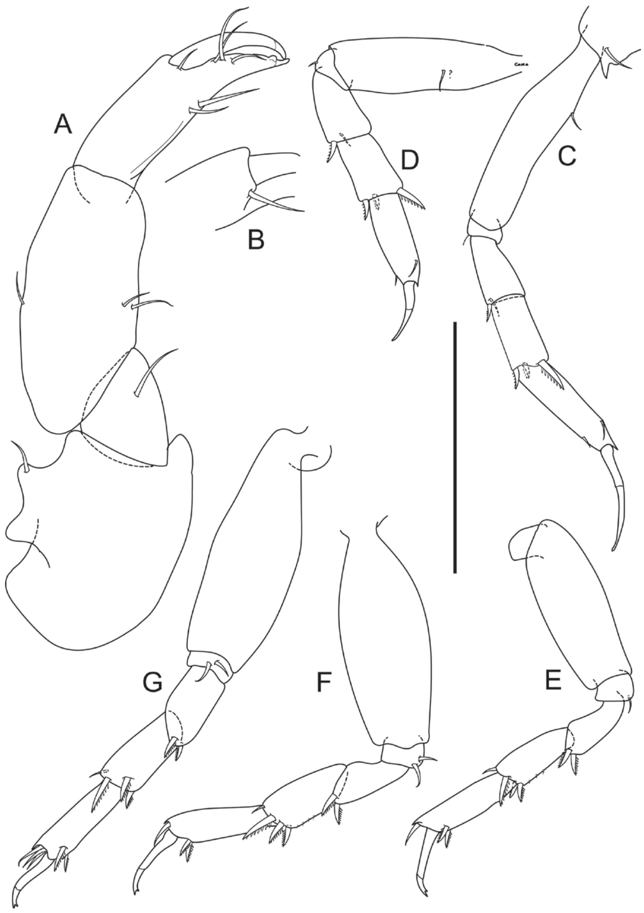

Fig. 28: *Paratyphlotanais lilliputi* **n. sp.** non-ovigerous female paratype. A, cheliped; B, chela, mesial face; C, pereopod-2; D-G, pereopods 4-6, respectively. Scale line: 0.125 mm.

seta (distal thickest), and one weak distal tooth; dactylus slender, naked.

Pereopod-1 (Fig. 28C) coxa annular but with small acute apophysis, with short seta; basis weakly arcuate, 4.7x ltb, with proximal superior seta; ischium with small seta; merus 1.7x ltb, with inferodistal stiff seta (mesial) and pectinate spine; carpus rectangular, about as long and wide as merus, 1.8x ltb, with three distal spines, two strongly pectinate, the superior longer; propodus 0.8x combined length of carpus and merus, 1.5x carpus length, 3.5x ltb, with superodistal seta and small inferodistal spine (or stiff seta); dactylus about third of claw length, together with unguis just shorter than propodus.

Pereopod-2 (Fig. 28D) similar to pereopod-1 but coxa without apophysis; basis slightly shorter and stouter, 3.9x ltb, setation not observed; merus stouter, 1.4x ltb; carpus shorter and stouter, 1.4x ltb; propodus shorter and stouter, 2.9x ltb; claw shorter, 0.6x propodus length. *Pereopod-3* (not figured) similar to pereopod-2.

Pereopod-4 (Fig. 28E) basis broader than those of pereopods 1-3, about 2.6x ltb, setation not observed; ischium with two short stiff setae; merus about 2.1x ltb, with two unequal pectinate inferodistal spines; carpus just longer than merus, 2.1x ltb, superodistal margin with small stiff seta, and with three distal strongly pectinate spines, superior longest; propodus about 0.7x combined length of carpus and merus, slightly narrower than either, 3.5x ltb, with two strongly pectinate inferodistal spines, and stiff superodistal spine longer half as long as dactylus; dactylus over 2x unguis length, together with unguis about 0.6x as long as propodus, unguis tip bifid. *Pereopod-5* (Fig. 28F) as pereopod-4 but slightly larger, basis 2.4x ltb. *Pereopod-6* (Fig. 28G) as pereopod-5 but propodus with three superodistal spines.

Pleopod (Fig. 27N) Peduncle longer than broad, naked. Endopod slender, subovate, about 3x longer than broad, with superodistal seta and distal fringe of four setae, without proximal seta; exopod larger than endopod, 2.1x ltb, with fringe of nine setae, with a proximal seta separated by distinct gap.

Uropod (Fig. 27D) about 1.7x longer than pleotelson; peduncle 2x ltb, naked; exopod unisegmented, slender, 6x ltb, about 1.5x longer than peduncle, about 0.7x length of endopod segment-1, with mid-distal seta, and two unequal terminal setae; endopod bisegmented, slender, 8.5x ltb, segment-1 longer than segment-2, with one long seta and two distomesial PSS, segment-2 with subdistal seta, and four terminal setae and one PSS.

Intraspecific variation. *Manca-3*: Length 0.83 mm (n=1).

Non-ovigerous female. Length 1.14-1.39 mm (n=4).

Ovigerous female. Length 1.41-1.65 mm (n=2).

Preparatory male. Length 1.28-1.33 mm (n=2).

Depth range. All the type material is from shelf depths <100 m, i.e. 54-76 m, and the other material from 81 m.

Remarks. This species appears to be similar to the other shallow-water European species, *P. microcheles* (G.O. Sars, 1882), but is smaller (*P. microcheles* 1.2-2.7 mm, available data) and indeed smaller than almost all the other species in the genus except *P. colouros* Błażewicz-Paszkowycz & Bamber, 2012 (holotype 1.6 mm). *Paratyphlotanais lilliputi* **n. sp.** also has a hyposphenium only on pereonite-1, the cheliped carpus and chela are more slender (chela: 3.7x ltb v 2.3x), and the uropod is longer relative to the pleotelson. Characters for comparing ten of the *Paratyphlotanais* species, thirteen of which are now known, are usefully presented by Segadilha *et al.* (2019: table 5, 334-335) and the equivalent details for *P. lilliputi* are given in the diagnosis above. *Paratyphlotanais richardi* (Dollfus, 1897) from the Azores was not included in that table, but this species is large (4 mm) and has hyposphenia on pereonites 1 and 2.

Typhlotanais angstromensis Błażewicz-Paszkowycz & Bamber, 2009

(Figs 29, 34)

Typhlotanais angstromensis: Bamber *et al.* (2009): 16-19, figs 5-6.

Material examined. 3 non-ov. ♀♀ - 32.51°N 34.76°E, 105 m, 18/6/2013; 1 non-ov. ♀, 33.02°N 34.93°E, 200 m, 22/11/2018; 1 non-ov. ♀ - 32.17°N 34.66°E, 76 m, 25/9/2017; 1 manca-3 [SMNH-TAU AR30050], 5 non-ov. ♀♀ [SMNH-TAU AR30052], 1 prep. ♂ [SMNH-TAU AR30051] - 32.94°N 34.93°E, 54 m, 09/10/2019, and 32.17°N 34.66°E, 76 m, 09/10/201; 32.53°N 34.78°E, 81 m, 14/5/2014.

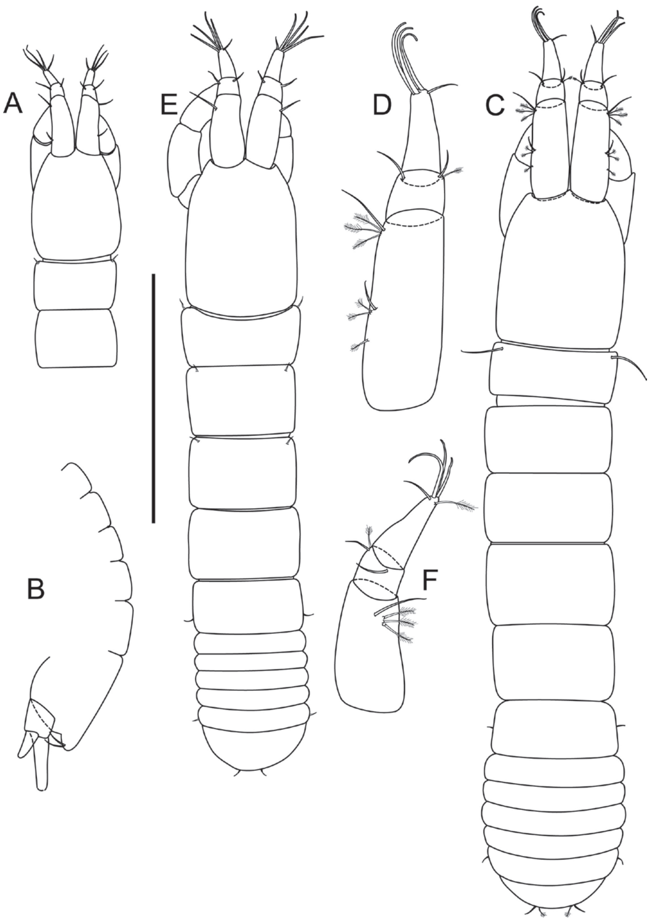

Fig. 29: *Typhlotanais angstromensis* non-ovigerous female. A, cephalothorax and pereonites 1-2; B, pleon dorsum and pleotelson lateral profile. *Typhlotanais bisetosus* **n. sp.** preparatory male paratype. C, habitus; D, antennule. *Typhlotanais scalenus* **n. sp.** E, habitus; F, antennule. Scale line: 0.5 mm, A, C, E; 0.25 mm, B, D, F.

Remarks. A few new records of this minute *Typhlotanais* species have been obtained since it was described in 2009, at depths 54-122 m (although predominantly <100 m). It is no longer the only typhlotanaid to have been recorded at depths <100 m in the area and two new *Typhlotanais* species, again both small, are described below. Some misidentifications, as *T. angstromensis,* are included among these materials. The recognition features of this species remain those given by Bamber *et al.* (2009), notably its small size (0.69-1.02 mm, n=16), rounded pereonite margins (Fig. 29A), relatively stout cheliped carpus and unisegmented uropod rami (Fig. 29B). In addition, the pleon in lateral view usually shows strong demarcation between the tergites and the pleotelson has a distinct overhanging apex (Fig. 29B). A few preparatory males have now been recorded, with body lengths 0.75-0.78 mm (n=3), their pleon slightly longer than in females (20-21% of body length, v. 16-21%, mean 18%), and antennules broader.

This species constructs elegant tubes (burrow linings) of small mineral grains and detritus, with a distinctive banded appearance (Fig. 34A).

Typhlotanais bisetosus Bird n. sp.

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60C631F8FC67
(Figs 29-31)

Material examined. *Holotype*—non-ovigerous ♀, 1.36 mm [SMNH-TAU AR30042] - 32.17°N 34.66°E, 76 m, 25/9/2017.

Paratypes—1 manca-2, 2 manca-3, 10 non-ov. ♀♀, 2 prep. ♂♂ - 32.17°N 34.66°E, 76 m, 25/9/2017; 2 manca-3 [SMNH-TAU AR30043], 14 non-ov. ♀♀ [SMNH-TAU AR30045], 1 non-ov. ♀ dissected on 3 microslides [SMNH-TAU AR30066], 4 prep. ♂♂ [SMNH-TAU AR30044] - 32.17°N 34.66°E, 76 m, 09/10/2019; 9 non-ov. ♀♀, 1 prep. ♂, - 32.53°N 34.78°E, 81 m, 14/5/2014; 1 non-ov. ♀ - 32.59°N 34.81°E, 65 m, 14/5/2014.

Type locality. Shelf, Levant Sea, off Haifa, Israel,76 m.

Etymology. Latin adjective, alluding to the pair of long dorsal setae on pereonite-1.

Diagnosis. *Body* slender. *Pereonites 1-6* parallel-sided, cuticle non-corrugate, pereonite-1 less than half as long as broad, dorsum with two long anterolateral setae. *Pleotelson* apex with simple setae. *Antenna* articles 2-3 ventral margin without spines. *Cheliped* basis posterior lobe free, ventral margin smooth; carpus dorsal margin with few setae (two). *Pereopods 1-3* coxa without apophysis; ischium with short seta; pereopod-1 merus 1.3x ltb, shorter than carpus; carpus superior margin naked; pereopods 1-3 basis with several simple setae (3-5); pereopods 2-3 propodus with inferodistal spine. *Pereopods 4-6* unguis tip simple. *Uropod* exopod bisegmented, about two-thirds as long as endopod; endopod bisegmented.

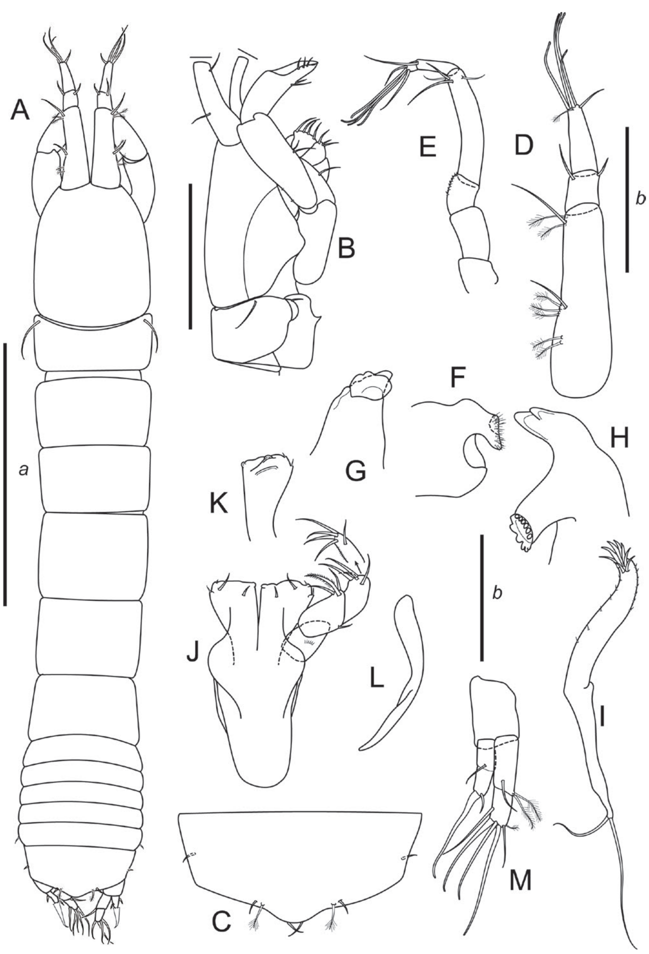

Fig. 30: *Typhlotanais bisetosus* **n. sp.** non-ovigerous female holotype. A, habitus. Non-ovigerous female paratype. B, antennule; C, antenna; D, labrum; E-F left and right mandibles, respectively; G, labium; H, maxillule; I, maxilliped bases and palp; J, maxilliped endite; K, uropod. Scale lines: a, 0.5 mm, A-B; b, 0.125 mm, C-K.

Description. *Holotype non-ovigerous female*. *Habitus* (Fig. 30A) fairly slender, 6.3x ltb, length 1.36 mm. *Cephalothorax* (Fig. 30A-B) about 1.3x ltb (holotype), as long as pereonites 1-2 and half of pereonite-3 combined; rostrum shallow-acute, slightly produced over base of antennules. *Pereon* weakly tapered, pereonite-1 shortest, with small hyposphenium, all shorter than broad, 0.36, 0.59, 0.58, 0.77, 0.73 and 0.54x ltb respectively; pereonite-1 with two long anterodorsal setae near segment articulation. *Pleon* wider than pereon, 0.91x as long as broad, 15% of body length; epimera rounded, with small marginal seta only on pleonite-5. *Pleotelson* (Fig. 30C) as long as pleonites 4-5 and half of pleonite-3 combined, 0.46x as long as broad, lateral margins weakly tapering posteriorly, with lateral seta just anterior to uropod attachment; apex rounded with two simple setae and two PSS, with two deflexed apical setae.

Antennule (Fig. 30D) about 0.9x cephalothorax length, article-1 0.65x entire length, 3.7x ltb, with two proximolateral PSS, one subdistal lateral seta and three subdistal lateral PSS, and distolateral group of one seta and two or three PSS; article-2 1.2x ltb, with distolateral and distomesial weakly-serrate setae; article-3 2x as long as article-2, 3x ltb, with one short seta, four or five long setae (three close-applied) with complex (spatulate) tips, and a small PSS.

Paratype non-ovigerous female. *Antenna* (Fig. 30E) 0.9x antennule length; article-1 as long as broad, naked; article-2 1.6x ltb, naked; article-3 0.6x length of article-2, just longer than broad, inferior margin with few setules; article-4 about as long as articles 1-3 together, 4.7x ltb, with two distal setae and at least two distal PSS; article-5 longer than article-3, 3.8x ltb, with distal seta; article-6 small, but longer than broad, with six terminal setae (two possibly fused).

Mouthparts (paratype). *Labrum* (Fig. 30F) hood shaped in lateral view, distally setulate. *Mandibles* (Figs. 30G-H) with left incisor without obvious teeth, lacinia broad, weakly crenate, molar as in right mandible; right incisor bicuspid, molar broad with nodulose apex. *Labium* not recovered. *Maxillule* (Fig. 30I) endite with series of small setules or microtrichia, with nine slender terminal spines. *Maxilla* not recovered.

Maxilliped (Fig. 30J-K) bases together chordate, about 2.3x ltb, distal setae not observed; endites not fused, strongly flared, each with two distolateral setulate processes, short rounded tubercle and two distal setae; palp article-1 longer than broad, naked; article-2 sub-triangular, with lateral seta, and three unequal mesial setae (one broader and distinctly pectinate); article-3 subrectangular, about as long as article-2, with four unequal mesial; article-4 about as long as but narrower than article-3 length, 3x ltb, with subdistal seta and four unequal terminal setae. *Epignath* (Fig. 30L) elongate, about as long as

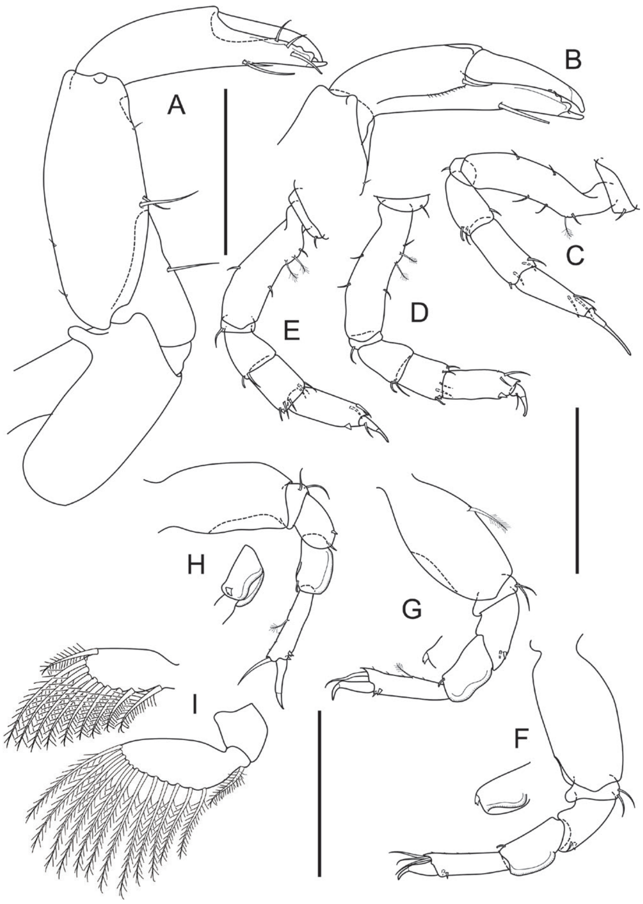

***Fig. 31:** Typhlotanais bisetosus* **n. sp.** non-ovigerous female paratype. A, cheliped; B left chela; C, cheliped dactylus; D-G, pereopods 1-4 respectively; H, pereopod-4 carpus, inferior aspect; I, pereopod-4 carpus, mesial aspect; J-K, pereopods 5-6 respectively; L, pereopod-6 ischium and merus, inferolateral aspect. Scale lines: 0.125 mm.

maxillule endite, naked.

Cheliped (Fig. 31A-B) coxal sclerite obscured; basis about 1.7x ltb (greatest width/height), posterior lobe almost reaching pereonite-1, not enfolded by cephalothorax sternite, both almost occluding ventrum of cephalothorax, anterior mass naked; merus simple, ventral margin as long as that of carpus, with seta; carpus about 2.5x ltb, with rounded posterior lobe, weak distolateral shield, two small proximodorsal setae, and three unequal ventral setae; chela slender, as long as carpus but narrower, 4x ltb, dorsal margin oriented medially, palm weakly flared (distal width 1.3x that of proximal), 2.3x ltb, with mesial ridge and spine; fixed finger 0.75x as long as palm, with two ventral setae, incisive margin with three lateral seta (distal thickest), and three distal teeth; dactylus slender, naked.

Pereopod-1 (Fig. 31C) coxa annular, with short seta; basis weakly arcuate, 4.1x ltb, superior margin with three small seta and one PSS, inferior margin with two setae; ischium with small seta; merus about 1.3x ltb, with superodistal seta and two inferodistal setae (one simple, one blunt/rod-like); carpus rectangular, 1.3x longer than merus, 1.8x ltb, with two superodistal setae and two inferodistal setae (one simple, one blunt, spiniform); propodus narrower and 1.1x carpus length, 3x ltb, with three superodistal seta and small inferodistal seta, small spiniform process over dactylus insertion; dactylus a third of claw length, together with unguis about 0.8x as long as propodus.

Pereopod-2 (Fig. 31D) similar to size to pereopod-1; coxa similar; basis slightly shorter and stouter, 3.6x ltb, with four simple setae, and two PSS on superior margin; ischium with longer seta; merus shorter and stouter, 1.2x ltb; carpus shorter and stouter, just shorter than merus, 1.1x ltb, with two superodistal setae, three inferodistal setae and minute inferodistal spine; propodus about 0.8x combined length of carpus and merus, 2.5x ltb, with two dissimilar superodistal setae and short inferodistal spine; dactylus half claw length, with accessory seta, together with unguis 0.4x propodus length. *Pereopod-3* (Fig. 31E) similar to pereopod-2 but basis slightly shorter and with three simple setae.

Pereopod-4 (Fig. 31F) basis broader than those of pereopods 1-3, about 2x ltb, with superodistal groove; ischium with two unequal setae; merus about 1.4x ltb, with two small unequal inferodistal spines (one narrow, one stout); carpus as long as merus, 1.4x ltb, superodistal margin with small stiff seta, one short crotchet (hook-like spine), and inferior margin with clinging apparatus/friction pad ('prickly tubercle' *sensu* Błażewicz-Paszkowycz 2007) of double row of minutely denticulate ridges; propodus about 0.8x combined length of carpus and merus, narrower than either, length, 4.1x ltb, with two small inferodistal spines, superior PSS, and stiff superodistal spine longer than dactylus; dactylus 2.5x unguis length, together with unguis about 0.7x as long as propodus. *Pereopod-5* (Fig. 31G) as pereopod-4 but basis with one inferior PSS. *Pereopod-6* (Fig. 31H) like pereopods 4-5 but basis without superior PSS; propodus without superior PSS and with three slender superodistal spines.

Pleopod (Fig. 31I) Peduncle about as long as broad, naked. Endopod subovate, about 2x ltb, with superodistal seta and fringe of nine setae; exopod larger than endopod, 2.7x ltb, with fringe of about 13 setae, with proximal seta (thickest) separated by a slight gap.

Uropod (Fig. 30M) about as long as pleotelson; peduncle 1.4x ltb, naked; exopod weakly bisegmented, as long as peduncle, longer than endopod segment-1, segment-1 with seta, segment-2 apex with thick seta and smaller simple seta; endopod weakly bisegmented, 4x ltb, segment-1 with one long seta and two distomesial PSS, segment-2 with subdistal seta, and four terminal setae and PSS.

Intraspecific variation. *Manca-2*: Length 0.58 mm (n=1).

Manca-3. Length 0.72-0.74 mm (n=2).

Non-ovigerous female. As description, length 0.9-1.6 mm (n=20).

Preparatory male. *Habitus* (Fig. 29C) similar to non-ovigerous female, length 1.08-1.17 mm (n=2). *Antennule* (Fig. 29D) broader.

Distribution and ecology. All the type material is from *ca*. 76 m, with other records from 81 and 122 m.

Remarks. This species appears to conform to the genus *Typhlotanais sensu stricto*, being similar to the type species *T. aequiremis* (Lilljeborg) in habitus, cheliped and pereopod morphology/setation. It differs from that species at least in having a stouter antennule article-3 and uropods, a less setose basis and carpus of pereopod-1, and different form of the carpal clinging apparatus of pereopods 4-6. *Typhlotanais mimosis* Błażewicz-Paszkowycz, 2007, from the abyssal Southern Ocean, shares the character of the long pereonite-1 setae but differs in the shape of its cephalothorax, antenna, pereopodal coxae, *inter alia* and probably belongs in another species group. A record from the slightly deeper (122 m) and northern part of the Israeli coast (Stn HS120, off Haifa) needs to be substantiated by additional material. Its tubes are soft, fragile, and silty, unlike those of *T. angstromensis* and the new species described below.

Typhlotanais scalenus **Bird n. sp.**

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(Figs 29, 32-34)

Material examined. *Holotype*—non-ovigerous ♀, 1.12 mm [SMNH-TAU AR30053] - 33.02°N 34.93°E, 200 m, 22/11/2018.

Allotype—prep. ♂, 1.0 mm [SMNH-TAU AR30054] - 32.94°N 34.91°E, 122 m, 09/10/2019.

Paratypes—10 non-ov. ♀♀, 1 ov. ♀, - 32.51°N 34.76°E, 105 m, 18/6/2013; 1 non-ov. ♀ dissected on 2 microslides [SMNH-TAU AR30055] - 32.17°N 34.66°E, 76 m, 25/9/2017; 1 non-ov. ♀, 32.6°N 34.80°E, 91 m, 28/5/2014.

Type locality. Shelf, Levant Sea off Israel.

Etymology. Directly from the Latin *scalenus*, 'uneven' or 'unequal', referring to the pereopod-1 merus and carpus; a similar allusion as in *T. inaequipes* Hansen, 1913 (see below).

Diagnosis. *Body* slender. *Pereonites* 1-6 parallel-sided, cuticle non-corrugate, pereonite-1 half as long as broad. *Pleotelson* apex with simple setae. *Antenna* articles 2-3 ventral margin without spines. *Cheliped* basis posterior lobe occluded by sternite, ventral margin smooth; carpus dorsal margin with few setae (two). *Pereopods 1-3* coxa without apophysis; ischium with short seta; pereopod-1 merus 2.3x ltb, carpus superior margin naked; pereopods 2-3 basis naked; propodus with inferodistal spine. *Pereopods 4-6* unguis tip simple. *Uropod* exopod bisegmented, about half as long as endopod; endopod unisegmented.

Description. *Holotype non-ovigerous female*. *Habitus* (Fig. 32A) slender, 7.3x ltb, length 1.12 mm. *Cephalothorax* about 1.5x ltb, as long as pereonites 1-2 and half of pereonite-3 combined; lateral margins parallel; rostrum shallow-acute, slightly produced over base of antennules. *Pereon* of equal width throughout, pereonite-1 with small hyposphenium (Fig. 30A; pereonites 1 and 6 shortest, all shorter than broad, 0.46, 0.63, 0.0.63, 0.76, 0.71 and 0.49x ltb respectively; pereonite-1 with two short antero-dorsal setae near segment articulation. *Pleon* as wide as pereon, as long as broad, 16% of body length; pleonite-5 longest; epimera rounded, epimera-5 with lateral seta. *Pleotelson* as long as pleonite-5, half as long as broad, lateral margins weakly tapering posteriorly, with lateral

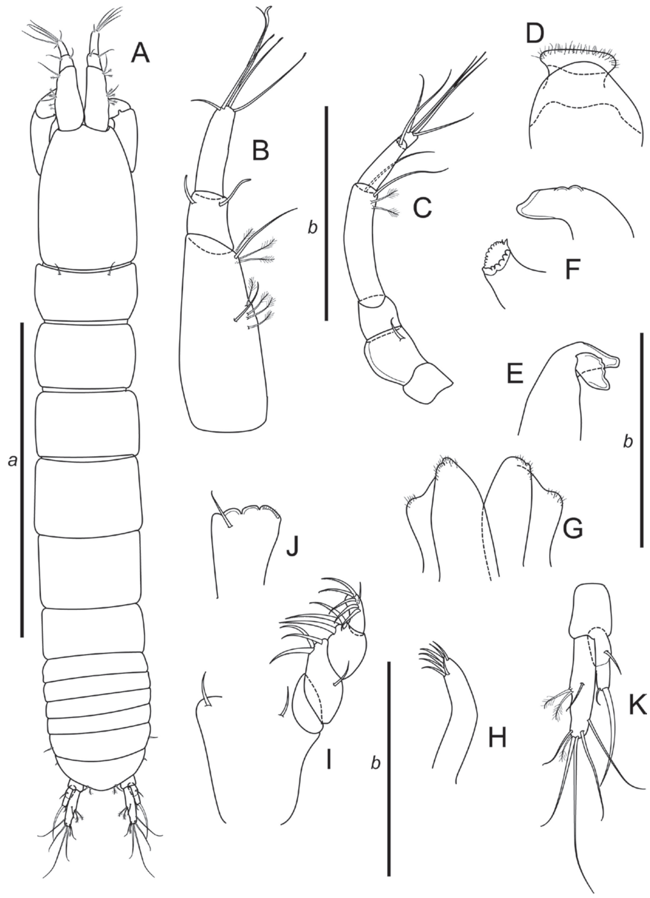

Fig. 32: *Typhlotanais scalenus* **n. sp.** non-ovigerous female holotype. A, habitus; D, antennule; E, antenna; F, labrum; G-H left and right mandibles, respectively; I, maxillule; J, maxilliped bases and palp; K, maxilliped endite; L, epignath; M, uropod. Scale lines: a, 0.5 mm, A; 0.25 mm, B; 0.125 mm, C-K.

seta just anterior to uropod attachment; apex rounded, with two simple setae and two PSS, with two deflexed apical setae.

Antennule (Fig. 32B) about 0.7x cephalothorax length, 4.5x ltb; article-1 0.65x entire length, 2.9x ltb, with two proximolateral PSS, one subdistal lateral seta and three subdistal lateral PSS, and distolateral group of one seta and two or three PSS; article-2 1.2x ltb, with distolateral and distomesial weakly-serrate setae; article-3 1.6x longer than article-2, 3.3x ltb, with one short setae, and five long setae (three close-applied), with complex (spatulate) tips.

Paratype non-ovigerous female. *Antenna* (Fig. 32C) 0.9x antennule length; article-1 as long as broad, naked; article-2 as long as broad, dorsal margin raised, with inferodistal seta; article-3 0.7x length of article-2, as long as broad, naked; article-4 about as long as articles 1-3 together, 3.9x ltb, with two distal setae and at least two distal PSS; article-5 longer than article-3, 3.5x ltb, with distal seta; article-6 small, but longer than broad, with five terminal setae (three possibly fused).

Mouthparts (paratype). *Labrum* (Fig. 32D) hood shaped in lateral view, distally setulate. *Mandibles* (Figs. 32E-F) with left incisor without obvious teeth, lacinia broad, weakly crenate and large distal lobe/tooth, molar as in right mandible; right incisor weakly bicuspid, molar broad with nodulose and spinose apex. *Labium* (Fig. 32G) mesial lobes with setulate distal margin; lateral lobes shorter, also with partly setulate margin. *Maxillule* (Fig. 32H) endite with at least seven slender terminal spines. *Maxilla* not recovered.

Maxilliped (Fig. 32I-J) bases together chordate, with strong distal seta; endites not fused, strongly flared, each with distolateral setulate margin, two shallow tubercles/cusps and strong mesial seta; palp article-1, naked; article-2 sub-triangular, with lateral seta, and three unequal mesial setae (one broader); article-3 subrectangular, about as long as article-2, with four mesial setae; article-4 about as long as but narrower than article-3 length, 3x ltb, with subdistal seta and five terminal setae. *Epignath* not recovered.

Cheliped (Fig. 33A-D) coxal sclerite obscured; basis about 2x ltb (greatest width/height), posterior lobe enfolded by cephalothorax sternite (Fig. 33A), both almost occluding ventrum of cephalothorax, anterior mass with distolateral seta; merus simple, ventral margin about 0.8x as long as that of carpus, with seta; carpus slender, 2.5x ltb, with rounded posterior lobe, weak distolateral shield, two small proximodorsal setae, and three unequal ventral setae; chela slender, about as long as carpus but narrower, 3.5x ltb, dorsal margin oriented medially, palm weakly flared (distal width 1.2x that of proximal), 1.9x ltb, with mesial ridge and spine; fixed finger 0.8x as long as palm,

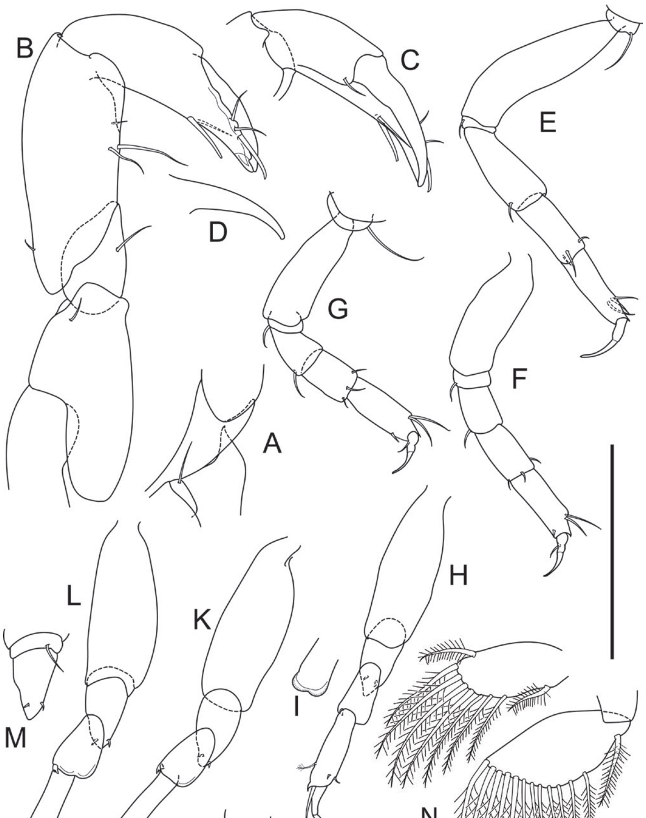

Fig. 33: *Typhlotanais scalenus* **n. sp.** non-ovigerous female paratype. A, cheliped; B left chela; C-H, pereopods 1-6 respectively, with detail of carpus mesial aspect (reflected); I, pleopod. Scale line: 0.125 mm.

with two ventral setae (proximal strong and blunt), incisive margin with three lateral seta (distal long, strong and blunt), and three low distal teeth; dactylus slender, naked.

Pereopod-1 (Fig. 33E) coxa annular, with long seta; basis weakly arcuate, 3.8x ltb, marginal setae not observed; ischium with small seta; merus 2.3x ltb, with inferodistal seta; carpus rectangular, 0.7x as long as merus, 2.1x ltb, with three distal setae; propodus narrower and 1.2x carpus length, 3.3x ltb, with three superodistal seta, and small spiniform process over dactylus insertion; dactylus about 0.4x claw length, with accessory seta, together with unguis about 0.8x as long as propodus.

Pereopod-2 (Fig. 33F) shorter than pereopod-1; coxa similar; basis slightly shorter and stouter, 3x ltb, marginal setae not observed; ischium with seta; merus stouter, 1.3x ltb, with inferodistal seta; carpus 1.3x longer than merus, 1.6x ltb, with at least one superodistal seta (see pereopod-3); propodus about 0.75x combined length of carpus and merus, 2.7x ltb, with two superodistal setae and short inferodistal spine; dactylus 0.6x claw length, with accessory seta, together with unguis 0.6x propodus length. *Pereopod-3* (Fig. 33G) similar to pereopod-2 but carpus slightly shorter and stouter, 1.3x ltb, just longer than merus, with three distal setae.

Pereopod-4 (Fig. 33H-J) basis broader than those of pereopods 1-3, 2.9x ltb, marginal setae not observed; ischium with one seta; merus about 1.8x ltb, with two small inferodistal spines; carpus just shorter than merus, superodistal margin with one short crotchet (hook-like spine), and inferior margin with clinging apparatus/friction pad ('prickly tubercle' *sensu* Blaze) of double row of lobate (in dorsal/ventral view) ridges; propodus about 0.8x combined length of carpus and merus, narrower than either, 3.6x ltb, with two minute inferodistal spines, small superior PSS, and stiff superodistal spine longer than dactylus; dactylus at least 2x unguis length, together with unguis about half as long as propodus. *Pereopod-5* (Fig. 33K) as pereopod-4. *Pereopod-6* (Fig. 33L-M) like pereopods 4-5 propodus without superior PSS and with three slender superodistal spines.

Pleopod (Fig. 33N) Peduncle about as long as broad, naked. Endopod subovate, about 2x ltb, with superodistal seta, proximal seta, and fringe of seven or eight setae; exopod larger than endopod, 1.7x ltb, with fringe of about twelve setae, with proximal seta (thickest) separated by a slight gap.

Uropod (Fig. 32K) 1.7x longer than pleotelson; peduncle 1.5x ltb, naked; exopod weakly bisegmented, just longer than peduncle, about half length of endopod, segment-1 with seta, segment-2 apex with thick seta and smaller simple seta; endopod unisegmented, 4.4x ltb, with one seta and two mesial PSS at midlength, and five subdistal and terminal setae and one small PSS.

Non-ovigerous female: as above, length 0.74-1.20 mm (n=8).

Ovigerous female: as above, but pereon somewhat dorso-ventrally compressed and with oostegites on pereopods 1-4; length 1.08 mm.

Preparatory male. *Habitus* (Fig. 29E) similar to non-ovigerous female but pleon proportionally slightly longer, 19% of body length.; length 1.00 mm. *Antennule* (Fig. 29F) stouter than that of female, 3.5x ltb.

Depth range. Recorded at depths of 76, 105 and 200 m, about 13 km NW of Tel Aviv, 12 km WSW of Caesarea, and 15 km W of Nahariyya, respectively.

Remarks. This tiny typhlotanaid probably does not belong in *Typhlotanais sensu stricto* but fits in an *ad hoc* sister-group centred on *Typhlotanais inaequipes* Hansen, 1913, i.e. an 'inaequipes-gp'. Hansen's species is relatively common in the bathyal Iceland-Rockall-Biscay region of the NE Atlantic along with three undescribed species (*Typhlotanais* spp. AM#37-39) that share its main characteristics (Bird ined.); another undescribed species exists in the bathyal of New Zealand's waters. Along with *Typhlotanais scalenus* **n. sp**., they share a similar habitus of a straight-sided cephalothorax and pereon but notably a long merus on pereopod-1 (e.g., Hansen 1913: plate VI fig 1c).

Typhlotanais scalenus has been recorded only three times (from five samples) since the 2009 publication, possibly because of its small size and potential for being misidentified as *T. angstromensis*. Its tube is more fragile than that of *T. angstromensis* and composed of finer particles (Fig. 34B).

Superfamily Tanaidoidea Nobili, 1906

FAMILY TANAIDIDAE Nobili, 1906

***Hexapleomera robusta* (Moore, 1894)**
Hexapleomera robusta: Bamber *et al.* (2009): 10.

Remarks. It is doubtful that any records of *H. robusta*, an ectoparasite/commensal on marine vertebrates such as turtles and manatees (*ibid*), exist from Israeli waters, and those mentioned in the earlier publication are of the following species, *H. satella*. Its inclusion here is pragmatic and contingent on future confirmation.

***Hexapleomera satella* Bamber, 2012**
Hexapleomera robusta: Bamber *et al.* (2009): 10.
Hexapleomera satella: Bamber (2012): 63-68, figs 6-8.
Hexapleomera satella: Esquete & Fernandez-Gonzalez (2016): 11 [key to species].

Remarks. The enigmatic and complex genus *Hexapleomera* was reviewed by Bamber (2012) with a focus on discriminating the various morphotypes held under the type species *Hexapleomera robusta*. This genus was first known as an epizooid/commensal on turtle carapaces, but other habitats are used such as algal and epifaunal turfs on natural and artificial (fouling) surfaces (e.g., boat hulls, pier pylons). Several other species have since been recorded in the European-Mediterranean region, namely *H. bultidactyla* Esquete & Fernandez-Gonzalez, 2016, *H. satella*, and *H. wombat* Bamber, 2012. Of these, *H. satella* was described partly with material collected from the Israeli coast at a depth of 4.4-4.7 m in sandy substrates (Bamber, 2012: 63). It was originally reported from the region as *Hexapleomera robustus* by Bamber *et al.* (2009). It is also known from the Lebanese coast at Tripoli and Beirut at 0.5-8 m on a variety of substrates such as *Spirobranchus* concretions, jetty walls, among ascidians, and the algae *Dictyopterus* and *Sargassum* (*Ibid*: 63). Esquete & Fernandez-Gonzalez (2016: 11) present a key to the known species of *Hexapleomera* but the differences between the species are quite subtle.

***Tanais dulongii* (Audouin, 1826)**
Tanais dulongii: Sieg (1980): 91-105, figs 23-24.

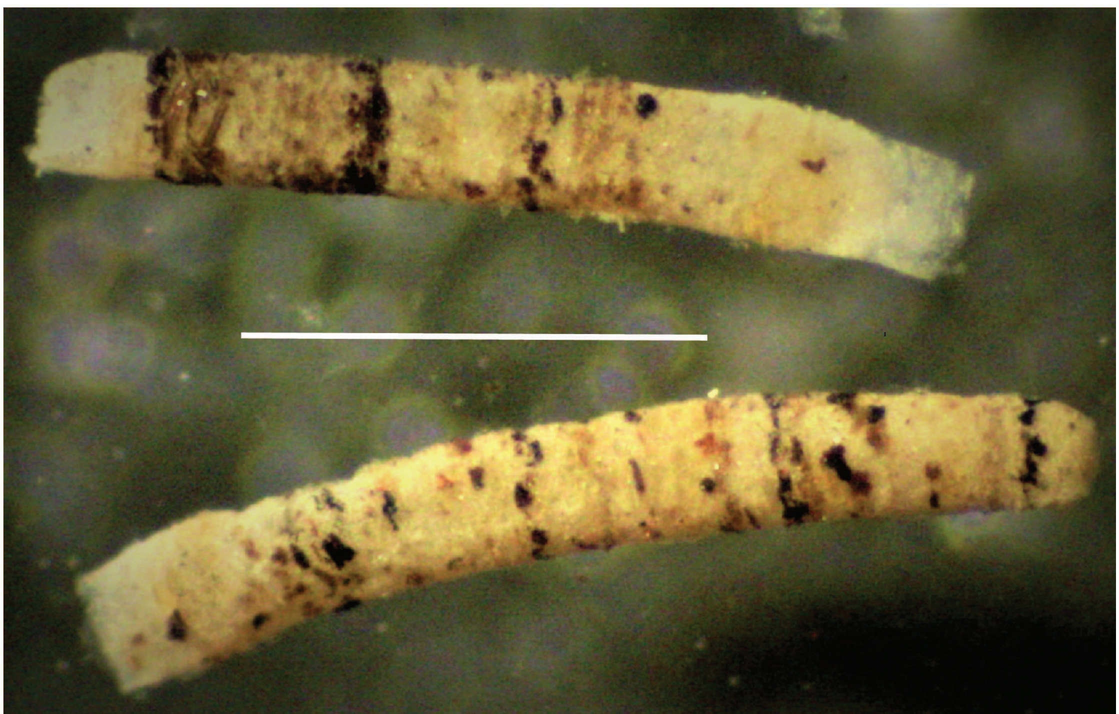

Fig. 34: Typhlotanaid tubes. A, *Typhlotanais angstromensis*; B, *Typhlotanais scalenus* **n. sp.** Scale lines: 0.5 mm. Images by G. J. Bird.

Remarks. Only two sublittoral records of this predominantly littoral/turf-dwelling species (Holdich & Jones, 1983b) are held by us, from 2012 and 2017 at depths 9.6 and 13.8 m, but it is an addition to the region's tanaidid inventory. It is possible that another species, *T. Grimaldii* Dollfus, 1897 could be found in the region, differing from *T. dulongii* in having three-segmented uropods (excluding peduncle), not bisegmented, *inter alia* (see Sieg, 1980: 84-91, fig. 21).

Băcescu (1961) reported '*Tanais*' together with other tanaids in Haifa Bay but this could be either *Tanais sensu stricto* or, more likely, *Hexapleomera satella*. It is probably widespread in the Levant region in suitable habitats such as bryozoan mats in Alexandria Harbour (e.g., Hamdy & Dorghan, 2019).

Discussion

The tanaid fauna of the Israel shelf contains a prominent novel component identified as new species in this Levantine Sea zoogeographic area. As defined in the Marine Ecoregions of the World (MEOW) classification (Spalding *et al.*, 2007) this is an ecoregion within the Mediterranean Sea Province that is itself within the Temperate Atlantic Realm. A comparison with two temperate ecoregions (North Sea and Celtic Seas) in the same realm is useful, especially as they have a broader geography and greater variety of habitats. Compared to the 28 species listed here for the Israeli shelf, 27 species were reported by Holdich & Jones (1983b) from the British Isles down to 200 m, although subsequent publications (Jones & Holdich, 1983; Holdich & Bird, 1986; Bird, 2002; Bamber, 2012) have raised this to at least 33 species. It is likely that other tanaid species exist in littoral habitats along the Israeli coast, and in hard or complex subtidal substrates, but these appear to be unreported or under-collected. There is some apparent commonality at the species level between these two areas (*Chondrochelia savignyi*, *Leptognathiopsis attenuata*, and *Tanais dulongii*). However, there are more apseudomorphan species in the Israeli Levant (even with only half the bathymetric range covered in the British examples) with 14 in three families (45% of the fauna) compared with five in two families (15%). The number of tanaids recorded from the Israeli coast compares well with the 52 species from all depths in the Mediterranean listed by Bird (2001) and also with the 28 species of Isopoda enumerated from the (primarily) Lebanese coast (Castelló *et al.*, 2020).

Comparison with tanaid faunas from elsewhere in the Mediterranean (e.g., Riggio, 1995; Bakalem *et al.*, 2020, 2021; Koulouri *et al.*, 2020; Herrero *et al*, 2021) indicates a degree of similarity, 18-39% shared species (Supplementary table 1), but with a probable higher biodiversity and dissimilarity of apseudomorphans further west, as on the Algerian coast (16 species of which only 38% are shared with the Israel fauna). It may also suggest non-recording (possibly due to unsampled habitats) of shallow-water species such as *Apseudes africanus* Tattersall, *A. talpa* (Montagu, 1808), *A. miserai* Băcescu, 1980, *Heterotanais oerstedi* (Krøyer, 1842), *Pseudoparatanais batei* (G.O. Sars, 1882), *Typhlotanais messinensis*, and several *Zeuxo* species, all recorded from Italy, and several from further west in the Mediterranean and Northeast Atlantic. Equally, some very small tanaidomorphs such as *Leptognathiopsis attenuata*, *Nippognathiopsis levantae*, and various typhlotanaids recorded in the eastern Mediterranean may yet be found further west.

In addition to these general characterizations, smaller scale temporal changes can be observed. The population densities of some of the new species identified by Bamber *et al*. (2009) were quite high, i.e. *Leptochelia tanykeraia*, *Parakanthophoreus nanopsenos*, *Pseudotanais stiletto*, and *Tanaissus microthymus*. They were not recorded in Băcescu (1961) but rather than considering them to be new immigrants from the western Mediterranean or Indo-Pacific, it is more likely they were not collected adequately due to their small size and because Băcescu (and Guţu) tended to concentrate on larger apseudomorphan taxa. Tiny species (i.e. about 1 mm total length or less) are also represented in the present study, such as *T. bisetosus* and *T. scalenus*, and are easy missed (under-collected) in sampling or misidentified. The small size of many of the Levantine Basin tanaids compared to relatives elsewhere is notable and will be discussed in connection with the future analyses of the deeper water tanaid fauna of the region.

Five shelf species, *Apseudes holthuisi*, *Apseudes israeliticus*, *Apseudes orientalis*, *Hexapleomera satella* and *Parapseudes francispori* were found up to 2007 and have not been recorded since then. Although recovered in small numbers previously (Table 1), their apparent absence might be real in view of the intensive sampling effort since 2007, although *H. satella* is least likely to be recovered from soft sediments than the others. *Apseudes israeliticus* was found only in 1955-56 and a possible mistake in identification is discussed above. A possible explanation for their recent absence is global warming, which might account for the disappearance of a variety of other species from the Israeli shores (e.g., Albano *et al*., 2021). Whatever the reasons for the temporally dependent presence of soft substrate tanaids in the eastern Mediterranean, it is clear that the western Mediterranean is a major source of intermittent or stable immigration of this benthic (and other) biota (Lubinevsky *et al*., 2019).

Only three species were collected from the Suez Canal in 1924. '?*Tanais robustus* Moore' was listed by Omer-Cooper (1927). *Cristapseudes omercooperi* (as *Kalliapseudes omer-cooperi*) from the southern part of the Canal, and *Chondrochelia savignyi* (as *Leptochelia dubia*) from the Bitter Lakes, were reported by Larwood (1954). The identity of the tanaidid *Hexapleomera robusta*, possibly synonymous with Omer-Cooper's record and the '*Tanais* (*Anatanais*) sp.' of Larwood (1954) is uncertain following the revision of the genus *Hexapleomera* by Bamber (2012). The leptocheliid *Alloleptochelia erythraea* (Kossman), a Red Sea species, also recorded by Larwood (1954) from the Gulf of Suez, has apparently not yet been found in the Mediterranean, neither along the Israeli (Table 1) nor along the Egyptian coast

(Larwood, 1940). Another leptocheliid, *Chondrochelia savignyi*, recorded in the northern part of the canal and off Alexandria (Larwood, 1940) is recorded here for the first time in the Israeli Levant (but see *Leptochelia* sp. *sensu* Monod, 1931), but its putative distribution that encompasses the Mediterranean and warm-temperate eastern Atlantic makes it unlikely to be a Lessepsian intruder. Monod's 1931 survey along the Lebanese coast revealed only two species, the Mediterranean *Chondrochelia savignyi* (listed by him as *Leptochelia dubia*) and *Apseudes hibernicus* Walker. It is difficult to place the latter species as recorded at Beirut harbour by Monod, because of his own doubts about its identity. Strictly, it should be synonymised with *Apseudes talpa* (Montagu, 1808) although no records of that species exist for the Levant region. Several records of *Apseudes holthuisi* Băcescu, 1961 have been obtained. However, it is doubtful that Monod (apparently familiar with both species) failed to recognise a taxon more resembling *A. talpa* rather than *Apseudes spinosus* (M. Sars) and the similar *A. holthuisi*. No depth was given for this record of only two individuals.

The Israeli Levant tanaid community includes only one certain Lessepsian migrant, *C. omercooperi*. A possible explanation for the scarcity of western Indo-Pacific tanaid species even on the shelf, which is rich in Indo-Pacific and other Lessepsian immigrant fauna (Galil *et al*., 2018), is the benthic nature of the tanaid life cycle reducing the probability of dispersion or anthropogenic transport. Only one *C. omercooperi* individual was reported by Băcescu (1961), but thousands were reported by Bamber *et al.* (2009), making it one of the two most abundant species in the eastern Mediterranean shelf tanaid community. Although sparsely located along the entire coast, high density of *C. omercooperi* is found in restricted habitats where it probably has a survival advantage. These are characterized by a high organic carbon content due to anthropogenic interferences. One site is adjacent to the Kishon river mouth, therefore exposed to intermittent floods and heavy sediment suspension loads. The second site is located near a treated sewage drainage site south to Tel Aviv at a depth of 33 m. It seems that the effect of the local organic load is complex. Up to 1% TOC levels the *C. omercooperi* population density is increased but above this level it declines (Fig. 5). Starting from 2017, a sudden *C. omercooperi* disappearance from the entire 5-15 m depth range was observed. However, it has to be noted that *C. omercooperi* density remains high at 33 m near the sewage drainage site. This was even observed in 2017 and 2018 when the distribution pattern changed following the termination of the treated sewage function (Fig. 5). These density changes of *C. omercooperi* are part of broader infaunal density reduction accompanied by the disappearance of many other benthic species. This issue will be discussed elsewhere in correlation with other sediment parameters although it seems that TOC is the major stressor here. On top of the broader macrofaunal density reduction, an even more prominent reduction occurred in the Haifa Harbor sampling site, probably due to the construction of the new Bay Harbor causing this sampling site to be located inside the harbour pool.

The present article and similar future taxon-related long-term studies will contribute to updated faunistics, zoogeography and improved taxonomy of the Eastern Mediterranean shallow benthos. Perhaps more importantly, they will facilitate identification of smaller scale phenomena such as the settlement strategies of invasive species that allow establishment of new populations and will further highlight the anthropogenic effects on the studied taxonomic groups.

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Supplementary Data

The following supplementary information is available online for the article:

Table S1. Comparison of the Tanaidacea fauna from the Mediterranean coasts of Algeria (Bakalem *et al.*, 2021), Egypt (Larwood, 1940), Iberian Peninsula (Herrero *et al*., 2021), Israel (this study and associated references), Italy (Riggio., 1995) and Greece (Koulouri *et al.*, 2020); not corrected for bathymetric compatibility. [1] formerly *A. africanus orientalis*; [2] possible synonym of *A. mediterraneus*; [3] uncertain identity; [4] includes *L. magna* Smith, 1906; [5] possible synonym of *T. laticaudata*; [6] may include synonyms *H. crassa* and *H. satella.*