



First record of *Carangoliopsis spinulosa* Ledoyer, 1970 (Amphipoda: Carangoliopsidae) in the bathyal Israeli Mediterranean waters

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The occurrence of a carangoliopsid amphipod species in the bathyal eastern Mediterranean Sea is herein presented. The species *Carangoliopsis spinulosa* Ledoyer, 1970 belongs to a monotypic genus. Information about this species and its depth distribution is scattered as *C. spinulosa* has been recorded a few times. It is distributed in the Atlantic-Mediterranean region, recorded in the deep-sea habitat and it has not been documented with a relevant abundance further east than the Turkish coast (longitude 32.814 E).

This species has been described from western Mediterranean samples (Ledoyer 1970), collected along the Monaco coast, at depths between 300 and 1100 m and successively recorded from the central Mediterranean area, in the Adriatic basin along the Montenegro coast (Boka Kotorska) at depth of 52 m (Karaman & Schiecke, 1971) and Italian zone (Fossa di Pomo) at depths between 74 and 228 m (Frogliola *et al.* 2003). Other Mediterranean samples have been collected from the Catalan Sea (Spain) at depths between 389 to 506 m and along Besòs Canyon (Spain) at depths between 600 to 800 m; from the Tyrrhenian Sea in the Gulf of Naples (Italy) at a depth of 60 m and in Gioia Canyon (Italy) at depths between 499 and 538 m (Pola *et al.* 2020); and in the Aegean Sea in the Gulf of Antalya (Turkey) at depths between 100 and 200 m (Bakir & Katağan 2014). *Carangoliopsis spinulosa* has also been recorded in the Atlantic Ocean in Portuguese canyons, along Nazaré Canyon and Setúbal Canyon, at depths between 897 and 1001 m (Cunha *et al.* 2011), and in the Bay of Biscay (Cap Ferret canyon 747-1098 m depth Capbreton canyon 1000 m depth) (Bachelet *et al.* 2003 and references therein).

Some Mediterranean specimens are preserved at the Natural History Museum of Verona (Italy); specifically samples from the Tyrrhenian Sea (Ischia - Gulf of Naples; Gulf of Marseille), Adriatic Sea (Boka Kotorska; Fossa di Pomo), and from Levantine basin (Palestina).

In the course of national surveys of the deep-sea bottoms along the northern coast of Israel, samples were collected at depths between 198 and 1812 m (see for details Lubinevsky *et al.* 2017). *Carangoliopsis spinulosa* (Fig. 1) was one of the most abundant species recorded, with 73 specimens collected at depths between 198 and 1122 m at nine sites (Table 1). The Figure 2 shows a heatmap

elaborated to visualise the putative density and dispersion of the species abundance on the map; it is assumed that the red color corresponds to the highest abundance detected.



Figure 1. *Carangoliopsis spinulosa*. A) drawing of habitus by Karaman & Schiecke (1971); B and C) two specimens collected (the species typically loses most of the appendages).

Many appendages were lost, however, the identification could follow the redescription by Karaman & Schiecke (1971). The main morphological features used for species identification were the following. The head was subquadrate, anteriorly truncate, with lateral lobes anterodistally extending to a point. The eyes were absent. The first antenna 1 article was much longer than the first peduncular segment of antenna 2. The gnathopods 1 and 2 were subchelate. The gnathopod 1 was smaller than gnathopod 2. The gnathopod 2 carpus was strongly lobate. The peraeopods 5-7 basis showed parallel lateral margins, without posterior lobe, anterior margin with numerous spines, the posterior margin was serrate. The uropods 1 and 2 were strongly spinose, spines long, baso-facial spine strong; the uropod 3 was unequally biramous, with the outer ramus marginally long-spinose.

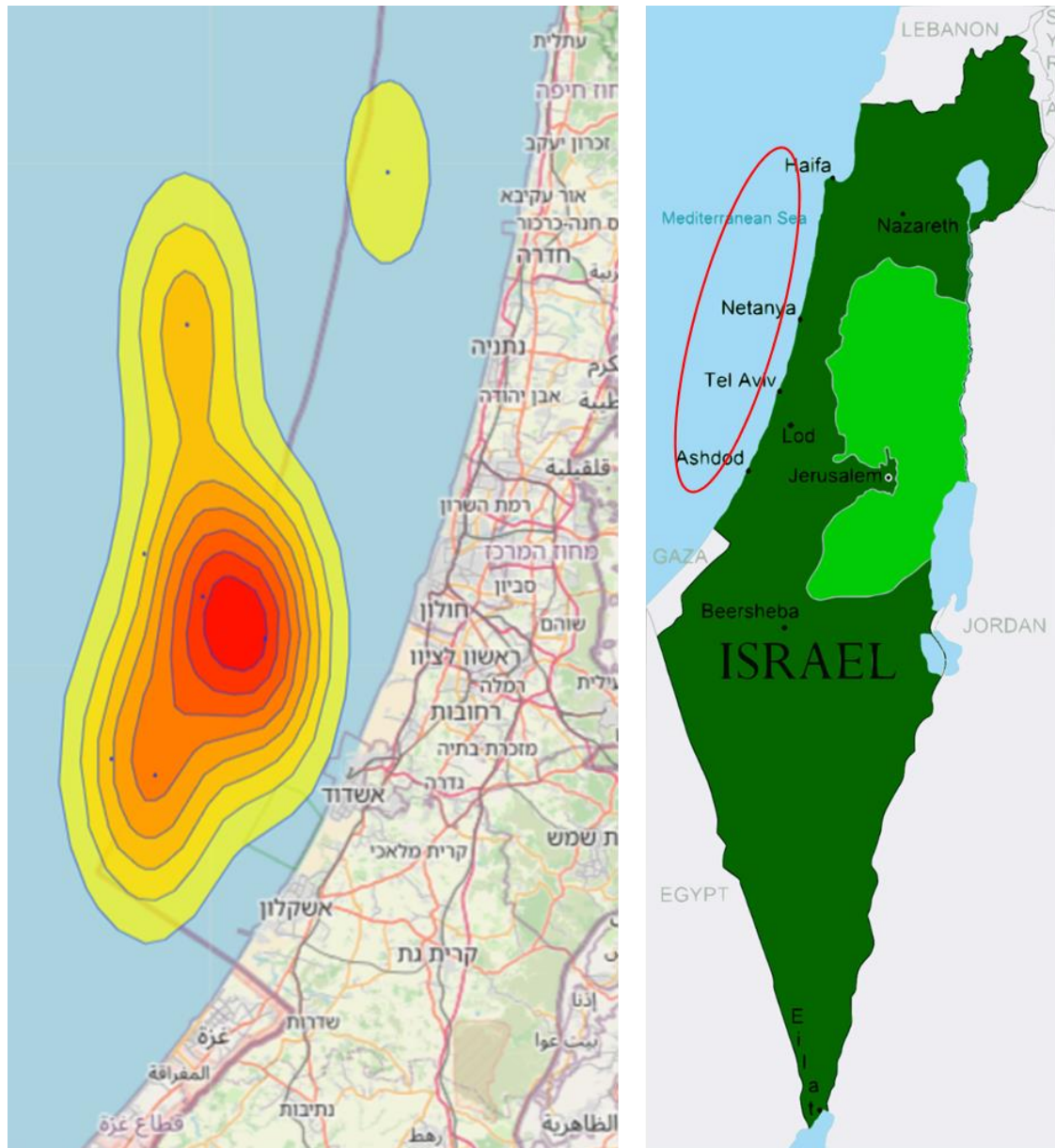


Figure 2. Heatmap (on the left) based on the abundance dataset where the species' distribution across the sampling area is visualised. The Israeli sampling area (on the right) from where the locations indicated in Table 1 are plotted in the heatmap.

This species was recorded in the Bay of Biscay (Bachelet *et al.* 2003), representing the northernmost record, while the present records from the Israeli coast represent the southeasternmost limit.

The low mobility of benthic amphipods and lack of pelagic larval stage would restrict the dispersal of deep-sea amphipods. Such records demonstrate that the geographic species range extends from the eastern Atlantic to the Levantine basin, showing that deep-sea amphipod fauna is more widespread than expected and should be more investigated. The circalittoral and bathyal bathymetric distribution of the species could guarantee dispersal.

The wide depth distribution is also of interest considering the mobility under the changing conditions along the deep-sea water column, such as temperature. In this regard, the species could be an interesting model for investigating processes in the Mediterranean bathyal ecosystem.

Ecological traits of the species are still unknown as the species could be overlooked due to the fragile body and lacking appendages during sampling and sorting procedures.

Table 1. Israeli stations where *Carangoliopsis spinulosa* was collected.

Site	Depth (m)	Latitude (N)	Longitude (E)	N
H02	303	32.920217	34.880217	2
g18	1122	32.355661	34.420973	11
s2_02	422	32.535824	34.701768	5
S3_01	214	31.98365	34.529895	20
S3_02	400	32.033503	34.443068	16
S3_03	682	32.084166	34.361072	1
S4_01	198	31.821225	34.37614	13
S4_02	452	31.840608	34.315066	4
HS360	394	32.94577	34.89029	1

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References

- Bakir, A. K. & Katağan, T. (2014) Distribution of littoral benthic amphipods off the Levantine coast of Turkey with new records. *Turkish Journal of Zoology*, 38(1), 23-34.
- Bachelet, G., Dauvin, J.C. & Sorbe, J. C. (2003) An updated checklist of marine and brackish water Amphipoda (Crustacea: Peracarida) of the southern Bay of Biscay (NE Atlantic). *Cahiers de Biologie Marine* 44(2), 121-151.
- Cunha, M. R., Paterson, G. L., Amaro, T., Blackbird, S. & de Stigter, H. C. I. (2011) Biodiversity of macrofaunal assemblages from three Portuguese submarine canyons (NE Atlantic). *Deep Sea Research Part II: Topical Studies in Oceanography*, 58(23-24), 2433-2447.
- Frogliola, C., Krapp, T. & Ruffo, S. (2003) Bathyal Amphipods from Fossa di Pomo and adjacent trawling grounds (Adriatic Sea). *Bollettino del Museo Civico di Storia Naturale di Verona*, 27, 2003 Botanica Zoologia: 13-22
- Ledoyer, M. (1970) Les Amphipodes des vases profondes des côtes corses et monégasques. *Bulletin de l'Institut Océanographique Monaco*, 69, 1406, S. II-13.
- Lubinevsky, H., Hyams-Kaphzan, O., Almogi-Labin, A., Silverman, J., Harlavan, Y. *et al.*, (2017) Deep-sea soft bottom infaunal communities of the Levantine Basin (SE Mediterranean) and their shaping factors. *Marine Biology*, 164, 1-12.
- Karaman, G. & Schiecke, U. (1971) Neubeschreibung eines interessanten Mediterranen amphipoden: *Carangoliopsis spinulosa* Ledoyer 1970 (Gammaridea, Haustoriidae). *Memorie del Museo di Storia Naturale di Verona*, XIX, pp. 91-108, 6 figg.
- Pola, L., Cerrano, C., Pica, D., Markantonatou, V., Gambi, M. C. *et al.*, (2020) Macrofaunal communities in the Gioia canyon (southern Tyrrhenian Sea, Italy). *The European Zoological Journal*, 87(1), 122-130.