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## A new species of *Pontocrates* Boeck, 1871 (Crustacea, Amphipoda, Oedicerotidae) from Cyprus

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### Abstract

A new species of the amphipod genus *Pontocrates* (Boeck 1871), family Oedicerotidae, is described from Cyprus in the south-eastern Mediterranean Sea. It is a sister taxon to *Pontocrates moorei* (Myers & Ashelby 2022), currently recorded solely from the British Isles. It is the third species of *Pontocrates* now known to occur in the Mediterranean Sea.

**Key words:** Amphipoda, Oedicerotidae *Pontocrates marmario*, new species, Cyprus, Mediterranean

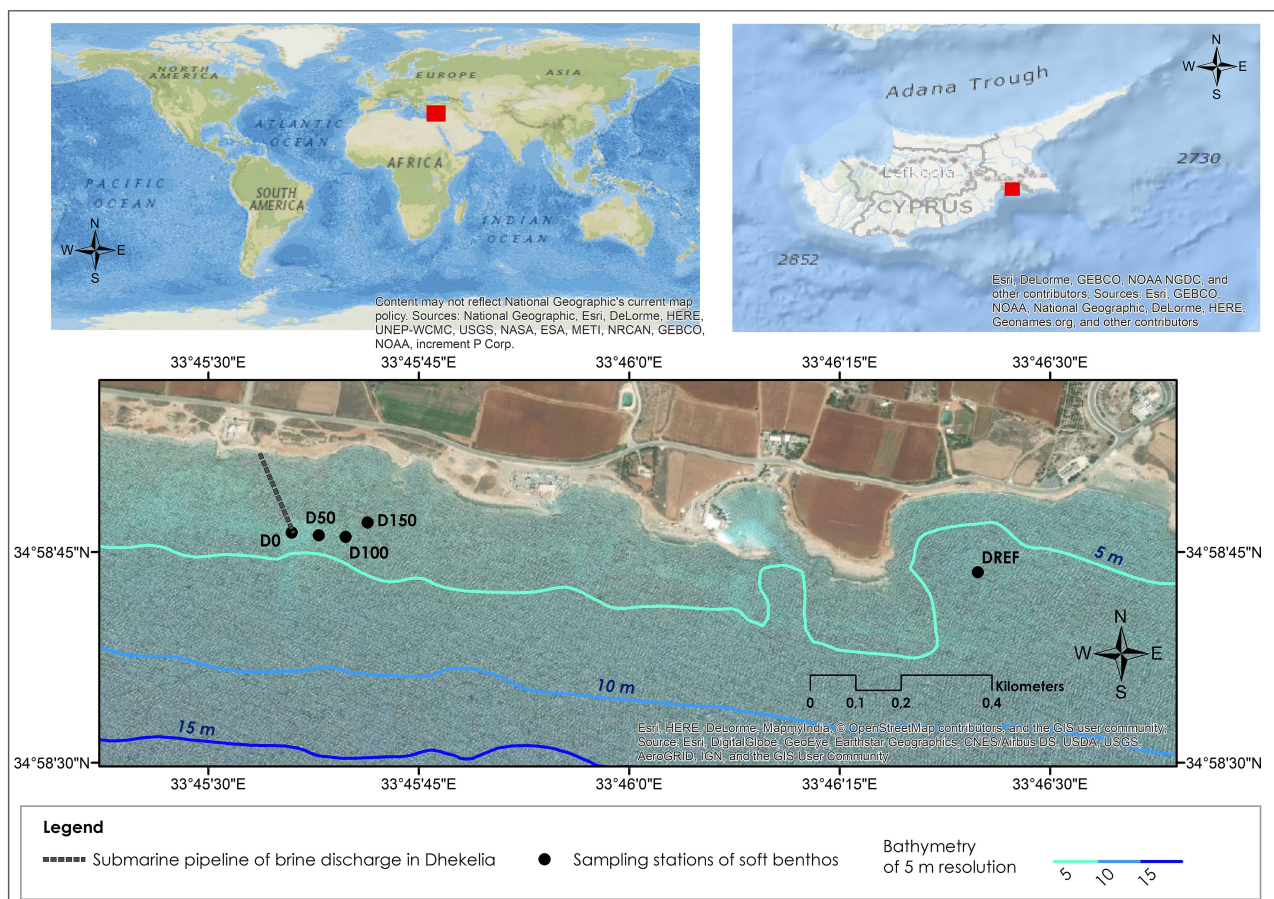
### Introduction

The genus *Pontocrates* (Boeck 1871) is classified in the family Oedicerotidae. Together with the Exoedicerotidae and Paracalliopidae, they form the parvorder Oedicerotidira, a sister taxon to the Eusiridira within the infraorder Amphilochida (Lowry & Myers 2017). Species of the genus *Pontocrates* are frequently collected in macrobenthic samples from a range of substrates including sands, muds, and shell gravels on the European continental shelf, from the intertidal region to around 200 metres depth. The genus was previously known to include five species worldwide: *P. arcticus* Sars 1895, *P. moorei* (Myers & Ashelby 2022), *P. arenarius* (Spence Bate 1858), *P. norwegicus* (Boeck 1860) and *P. altamarinus* (Spence Bate & Westwood 1863), all of which are endemic to the North Atlantic and Mediterranean Sea. Only three species had previously been reported from the Mediterranean, namely *P. arenarius*, *P. norwegicus* and *P. altamarinus*. Samples collected recently in Dhekelia Bay, southeast Cyprus, appeared on first examination to include specimens attributable to *Pontocrates moorei* (Myers & Ashelby 2022), but on close examination, these proved to represent an undescribed species, a sister taxon to *P. moorei*. The new species, *P. marmario* sp. nov. is described and figured here. It differs from its closest congener, *P. moorei* in numerous metric

aspects (in general the appendages are more slender than they are in *P. moorei*), but it is most readily recognised by the markedly different form of pereopod 6. In the description that follows, character states that distinguish *P. marmario* sp. nov. from its congener *P. moorei* are bolded. At the moment, *P. marmario* sp. nov. is known from the type locality only, in Dhekelia Bay in the south-eastern Mediterranean Sea at depths of 3.0 m and 4.8 m.

## Materials and methods

Soft benthos was sampled close to the brine discharge outfall of the Dhekelia desalination plant in Cyprus as part of the investigation of brine impacts on the marine environment in the framework of the EU project WATER-MINING, following multi-year surveys of the same site by the Cyprus Government Department of Fisheries and Marine Research (Xevgenos et al., 2021). Five (5) sampling stations were established in distances of approximately 0 m (D0), 50 m (D50), 100 m (D100), 150 m (D150), and 1250 m (reference station—DRef) east from the brine discharge outfall (Figure 1). In total, four (4) seasonal sampling surveys were performed, namely in May 2022, August 2022, November 2022, and February 2023. Four (4) replicates of soft benthos were sampled at each sampling station using a Van Veen grab of surface area 0.05 m<sup>2</sup> on-board or corer of equivalent surface filled by divers. Benthos samples were sieved through 1.0 mm mesh, stained with rose bengal and preserved in formaldehyde (4%) or ethanol (96%). In the laboratory, benthic macroinvertebrates were sorted and identified with microscopy to the lowest taxonomic level possible. At the sampling stations, grain size distribution, total organic carbon (TOC), total Kjeldahl nitrogen (TKN), tin (Sn), iron (Fe) and magnesium (Mg) in bottom sediment were measured by a local certified laboratory as well as pH, conductivity, salinity, turbidity, nitrates (NO<sub>3</sub><sup>-</sup>), nitrites (NO<sub>2</sub><sup>-</sup>), ammonium (NH<sub>4</sub><sup>+</sup>), phosphates (PO<sub>4</sub><sup>3-</sup>) in bottom seawater.



**FIGURE 1.** Sampling station of soft benthos close to brine discharge outfall of Dhekelia desalination plant, south-eastern Mediterranean Sea, Cyprus.

## Results and discussion

### Systematic Section

#### Suborder Amphilochidea Boeck, 1871

#### Infraorder Amphilochida Boeck, 1871

#### Parvorder Oedicerotidira Lilljeborg, 1865

#### Superfamily Oedicerotoidea Lilljeborg, 1865

#### Family Oedicerotidae Lilljeborg, 1865

#### Genus *Pontocrates* Boeck 1871

Diagnosis. Cutting edge of mandible projecting and well toothed; molar medium, ridged. Inner lobes of lower lip poorly developed but separated from each other by incision, outer lobes thus widely gaped. Gnathopod 1 moderately stout, gnathopod 2 slender, carpus of both pairs with sharp strong posterior lobe projecting distalwards but partially (gnathopod 1) or especially (gnathopod 2) guarding propodus; palm of gnathopod 1 oblique, of gnathopod 2 chelate. Uropod 2 fully reaching end of rami on uropod 3. Uropod 3 well developed.

#### *Pontocrates marmario* sp. nov. Garcia Gomez & Myers

(Figures 2–5)

Type and other materials are in the collection of D100 and D150 respectively on February 08, 2023.

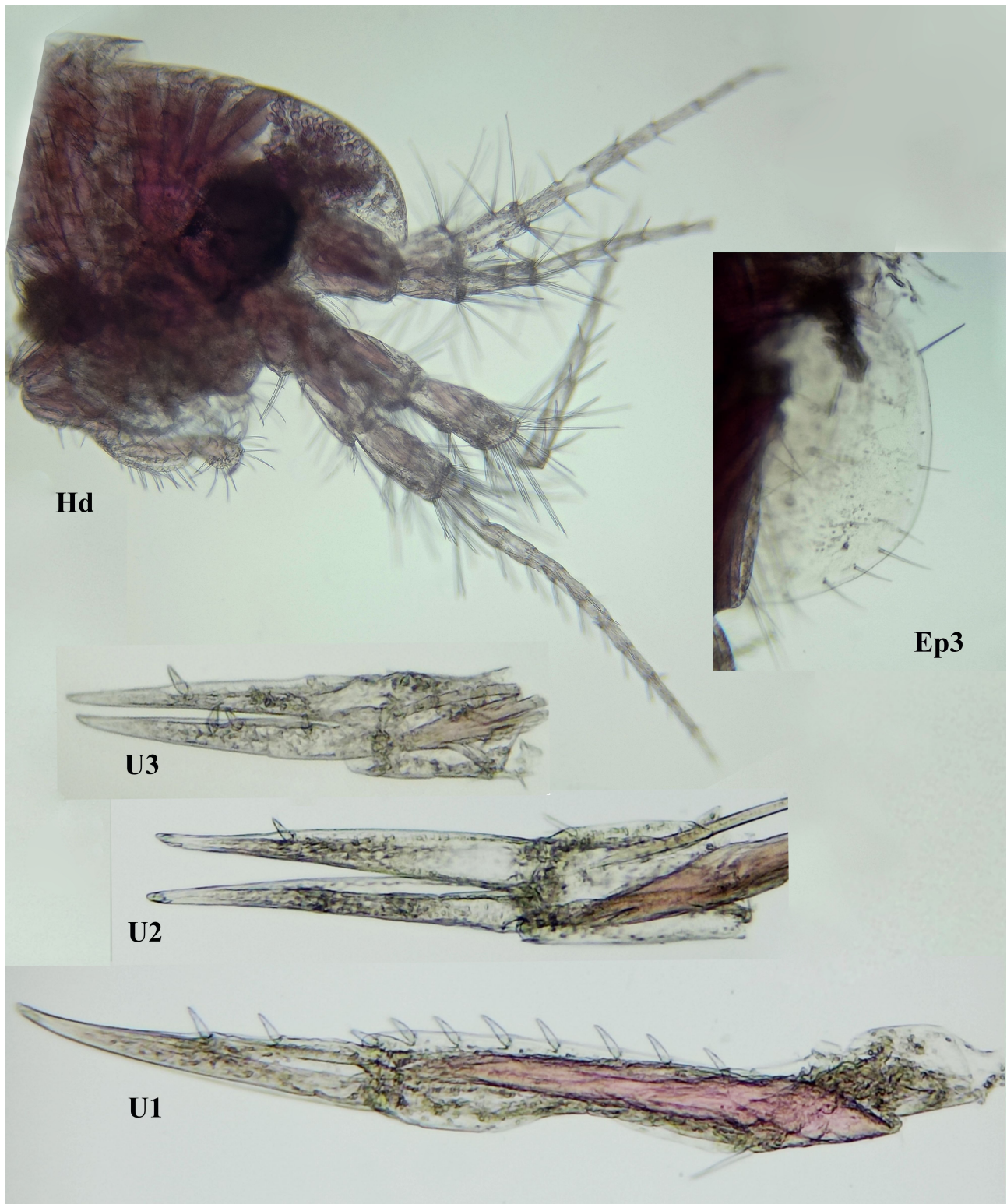
**Abbreviations used in figures.** Hd = head; C = coxa; G1–2 = gnathopods 1–2; P3–4, P6–7 = pereopods 3–4 and pereopods 6–7; Ep3 = epimeron 3; U1–3 = uropod 1–3.

**Type material. Holotype female 3.9 mm**, locality name: Dhekelia Bay, south-eastern Mediterranean Sea, sampling station: D100, depth: 3.0 m, collection date: February 08, 2023, collection method: Van Veen grab of surface 0.05 m<sup>2</sup>, collectors: Frithjof Küpper, Kleopatra Grammatiki, Myrsini Lymperaki, Vasilis Resaikos, repository: The Natural History Museum of Crete (NHMC) in Greece, Accession number: [To be provided soon]

**Other material.** Paratype female (dissected), locality name: Dhekelia Bay, south-eastern Mediterranean Sea, sampling station: D150, depth: 4.8 m, collection date: February 08, 2023, collection method: Van Veen grab of surface 0.05 m<sup>2</sup>, collectors: Frithjof Küpper, Kleopatra Grammatiki, Myrsini Lymperaki, Vasilis Resaikos, repository: Biological Research Collection, Department of Biology, University of Aveiro (CoBI-DBUA), Portugal, Accession number: CoBI-DBUA3242.01.

**Etymology.** The name used is a combination between Mar (Sea) and Mario with the latter being the name of the son of one of the authors who identified the specimens.

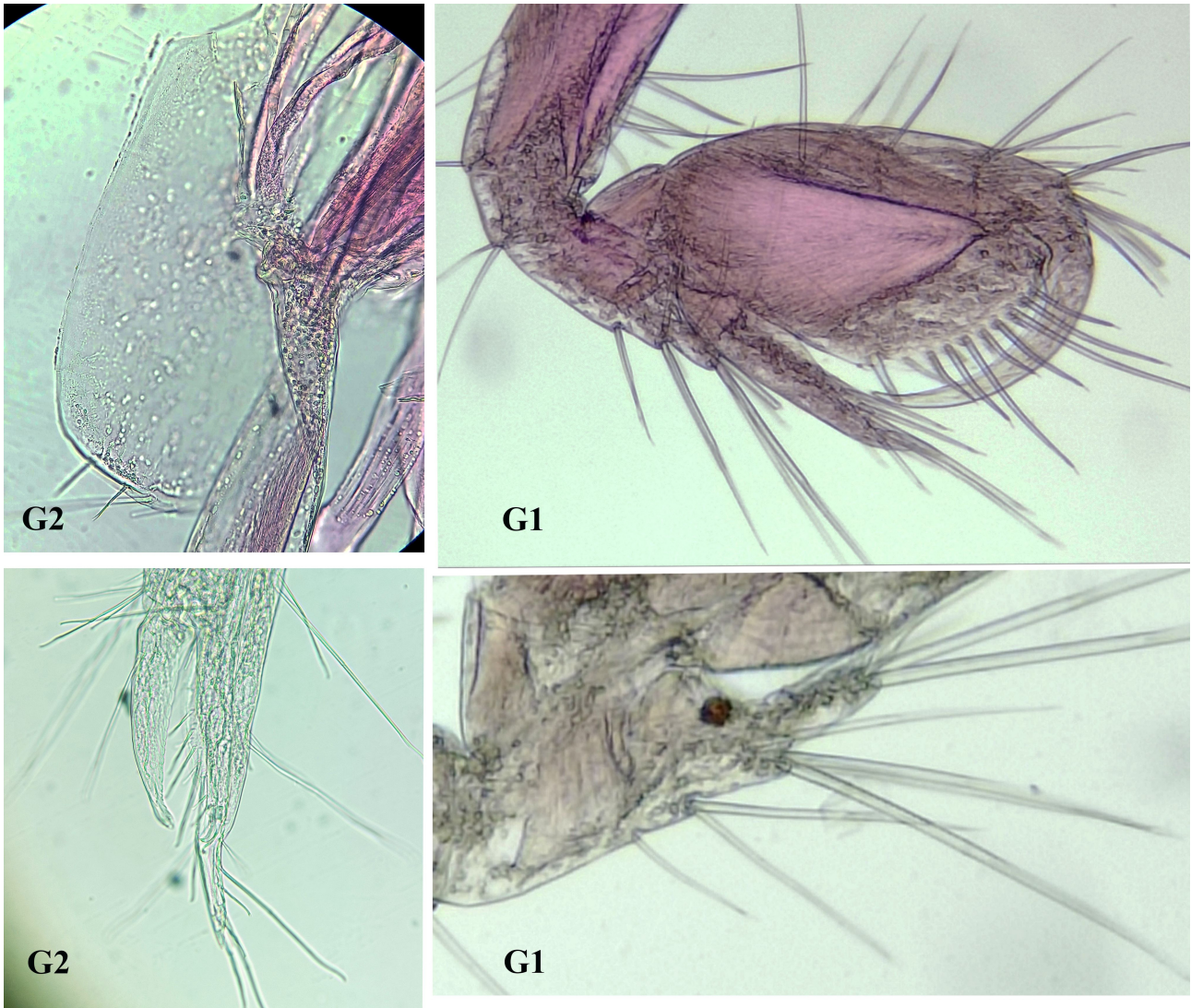
**Description (female holotype 3.9 mm) Head.** Head rostrum strongly deflected. Antenna 1 flagellum longer than peduncle, with 7 articles, Antenna 2 longer than 1; article 4 and 5 subequal in length; flagellum longer than peduncle with 9 articles.



**FIGURE 2.** *Pontocrates marmario* sp. nov. female 3.9 mm long, Dhekelia Bay, south-eastern Mediterranean Sea, Cyprus.

**Pereon.** Gnathopod 1 coxa distal margin substraight; basis moderately stout, about 4 x as long as broad, anterior margin **substraight**; merus with distal extension; propodus subovoid, less than twice as long as broad, palm smooth, oblique, merging imperceptibly with posterior margin and without club-shaped robust setae. Gnathopod 2 coxa subrectangular, anterior and posterior margins substraight; basis elongate, slender; carpus small but with elongate spur that extends beyond tip of propodus; propodus very elongate, slender, chelate, fused throughout its

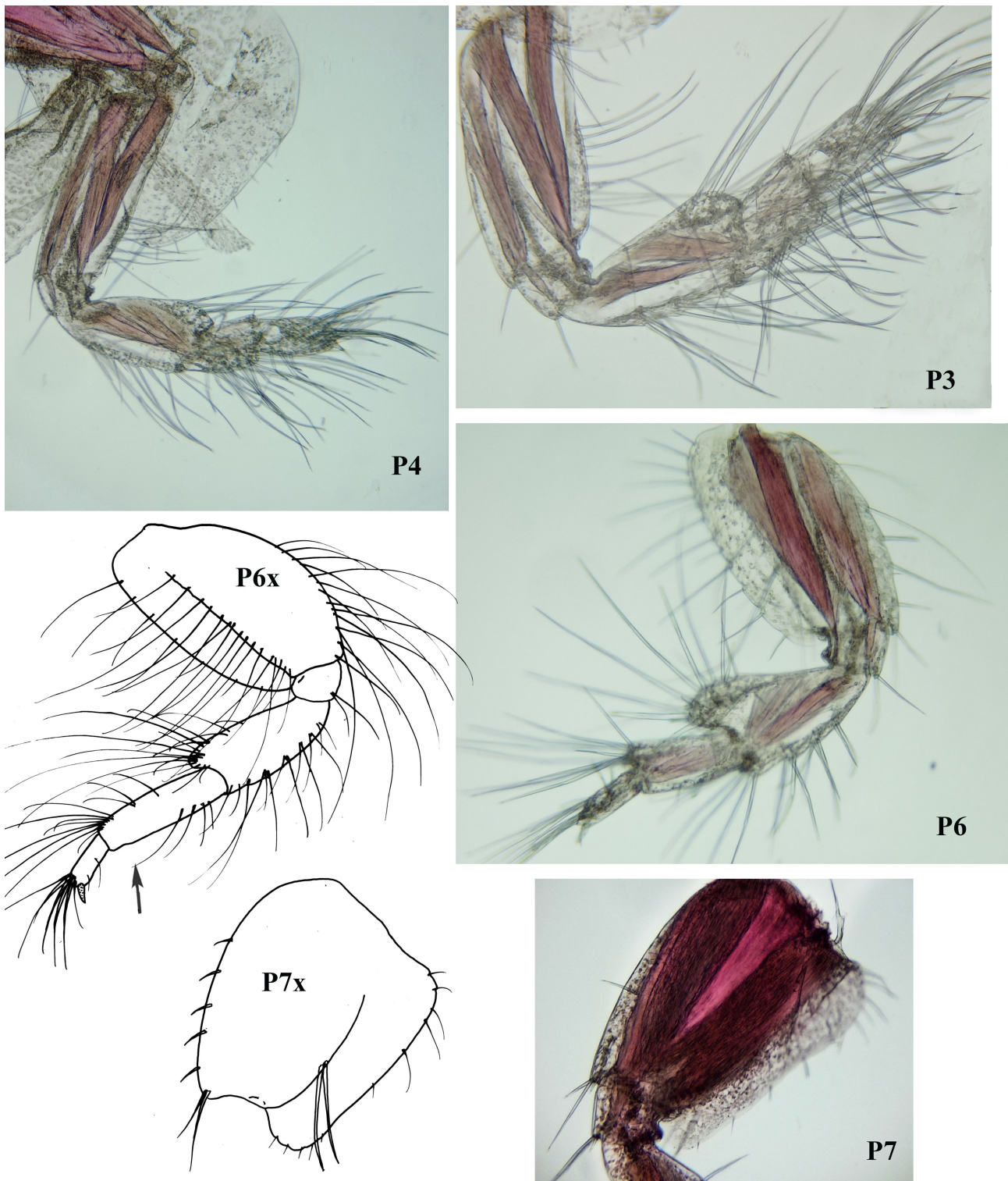
length with the carpus. Pereopod 3 coxa subovoid; **basis broad, about 2 x as long as broad, anterior margin substraight, merus anterior margin substraight**; carpus and propodus short; propodus a little longer than carpus, subrectangular, distally truncate; carpus and propodus posterior margins with many stout, robust setae; merus and propodus anterodistal margins clothed in very long slender setae; dactylus small. Pereopod 4 similar to pereopod 3 but basis more slender, over than 3 x as long as broad. Pereopod 5 basis anterior margin convex; merus anterodistal margin strongly convex and with exceedingly long setae; carpus short, posterior margin with long setae; propodus longer than carpus, slender, anterior margin with long setae; dactylus elongate, slender. Pereopod 6 basis anterior margin weakly convex; **merus anterodistal margin strongly produced into convex lobe overhanging carpus; carpus broad, about twice as long as broad; propodus slender, about twice as long as broad**. Pereopod 7 very long, more than half body length, basis subquadriform, distinctly longer than broad the posterior margin straight to weakly concave and with a distinct posterodistal lobe; merus, carpus, propodus and dactylus very long and slender.



**FIGURE 3.** *Pontocrates marmario* sp. nov. female 3.9 mm, Dhekelia Bay, south-eastern Mediterranean Sea, Cyprus.

**Pleon.** Epimera 1–3 rounded, with evenly separated long fine marginal setae. Uropods 1–2 slender; peduncles extending about the same length; peduncles longer than subequal rami. Uropod 3 slender; subequal rami longer than peduncle. Telson distally rounded, not incised.

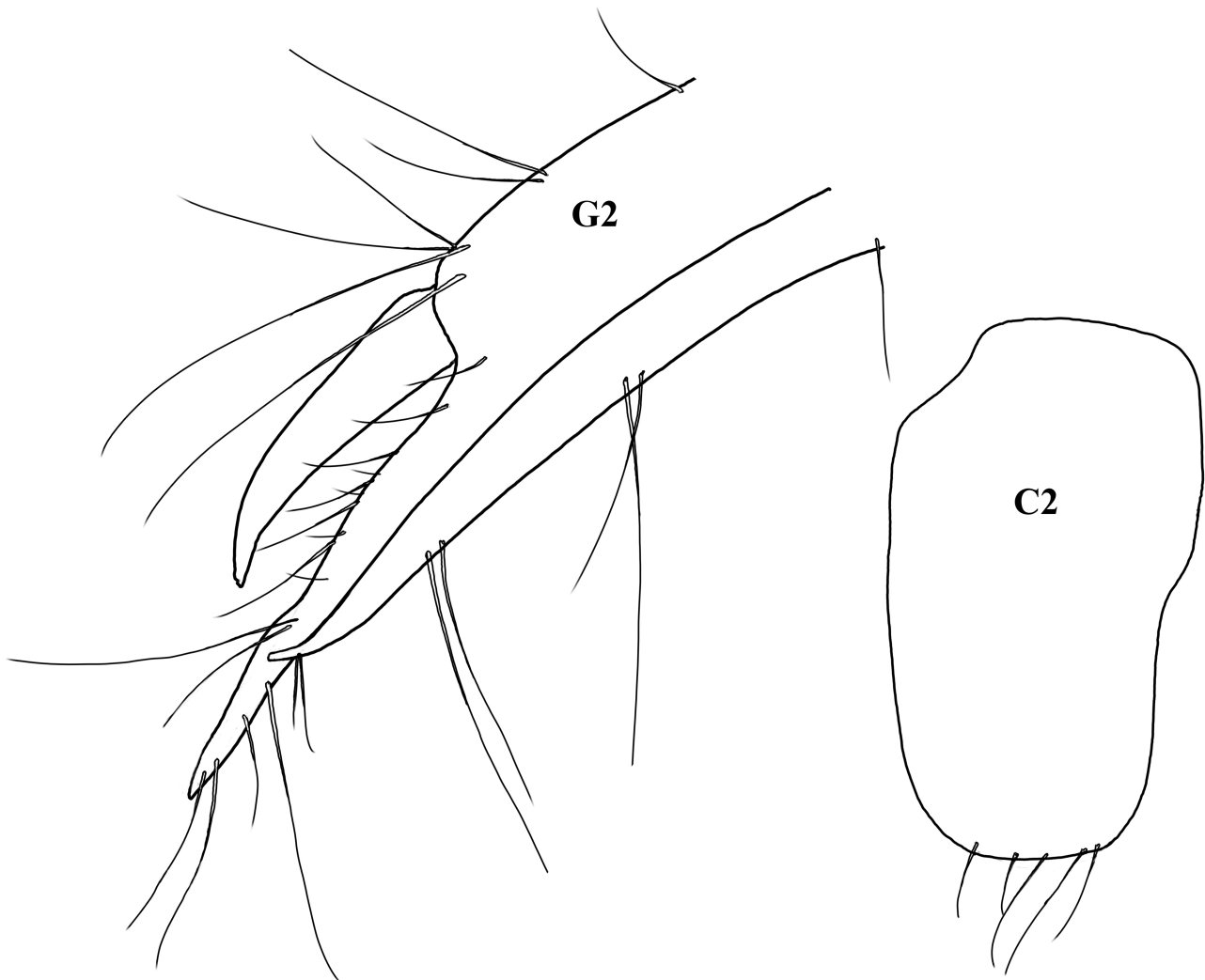
**Male unknown.**



**FIGURE 4.** *Pontocrates marmario* sp. nov. female 3.9 mm, Dhekelia Bay, south-eastern Mediterranean Sea, Cyprus; x = *P. moorei* Myers & Ashelby, female, 4.0 mm, Ryde Sands, England.

**Habitat.** Considering the grain size distribution and statistical (Blott & Pye 2001) analysis results, the sediment in D100 was characterized as sand and in D150 as slightly gravelly sand following the Folk classification for fine-grained sediment (Folk, 1954). Around the stations D100 and D150, there was mainly hard substrate, however spots of soft substrate were observed around the patches or meadows of seagrass *Posidonia oceanica*. The study of Xevgenos *et al.* 2021 as well as the macroscopic observations during diving surveys of May 2022, August 2022,

November 2022, and February 2023 demonstrated a very localised impact of the brine discharge on *Posidonia oceanica* meadows, with the impact reduced markedly at 150 m from the discharge point. At stations D100 and D150, the measurements of physicochemical parameters in bottom seawater and soft benthos do not show a significantly impacted environment from anthropogenic pressures. More specifically, pH and turbidity values for D100 and D150 were within typical range while conductivity values were higher in these stations, i.e., 51.64 mS/cm for D100, 51.94 mS/cm for D150 in comparison to the value of 41.23 mS/cm in DRef. The concentration of nutrients in water were low as it was expected for the oligotrophic sea of Cyprus. The ratio of organic carbon to Kjeldahl nitrogen (TOC/TKN) in bottom sediment at both sampling stations was greater than 10 showing anthropogenic influence (Boehm 1983). Concentration of metals—especially iron, magnesium, and tin—were found to be at similar levels with the reference station. No significant difference in species composition of benthic macroinvertebrates was observed at the sampling stations D100 and D150. Species richness and abundance were low as expected for the oligotrophic condition of the marine environment in Cyprus.



**FIGURE 5.** *Pontocrates marmario* sp. nov. female 3.9 mm, Dhekelia Bay, south-eastern Mediterranean Sea, Cyprus. G2 showing fusion of carpus and propodus; G2 coxa.

**Distribution.** Currently known only from the type locality at Dhekelia Bay, Cyprus. More specifically, this taxon was found in the soft benthos samples of the stations D100 (X: 33°45.663' E, Y: 34°58.768' N, coordinate system WGS 84, depth: 3.0 m) and D150 (X: 33°45.689' E, Y: 34°58.785' N, coordinate system WGS 84, depth: 4.8 m) during the 4th sampling survey conducted in February 2023.

**Remarks.** In having pereopod 3 and 4 carpus short, gnathopod 1 with a drawn-out meral distal extension and coxa 2 posterior margin straight, *P. marmario* sp. nov. is closely similar to *P. moorei* (Myers & Ashelby 2022),

from the British Isles. It differs in the shape of pereopod 6 that has the anterodistal margin of the merus strongly produced into a convex lobe (weakly produced in *P. moorei*—Figure 4) and the carpus short about twice as long as broad (almost 4 x as long as broad in *P. moorei*). It differs from *P. moorei* also in the basis of pereopod 3 in which the anterior margin is substraight without proximal concavity (sinuous with strong proximal concavity in *P. moorei*) and in the basis of pereopod 7 that is longer than broad (almost as broad as long in *P. moorei*—Figure 4).

### Key to the Mediterranean species of *Pontocrates* Boeck

1. Pereopods 3–4 carpus short only a little longer than broad ..... 2
- Pereopods 3–4 carpus much longer than broad ..... *P. altamarinus* (Spence Bate & Westwood)
2. Gnathopod 1 merus with long distal finger-like extension. .... 3
- Gnathopod 1 merus distally blunt or with small short distal spine ..... *P. norwegicus* (Boeck)
3. Coxa 2 posterior margin sinuous ..... *P. arenarius* (Spence Bate)
- Coxa 2 posterior margin substraight. .... *P. marmario* sp. nov.

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### References

- Blott, S.J. & Pye, K. (2001) GRADISTAT: a grain size distribution and statistics package for the analysis of unconsolidated sediments. *Earth Surface Processes and Landforms*, 26, 1237–1248.  
<https://doi.org/10.1002/esp.261>
- Boeck, A. (1860) Bemserkninger angaaende de ved de norske Kyster forekommende Amphipoder. *Forhandlinger ved de Skandinaviske Naturforskeres, Kobenhavn*, 8–14 Juli, 1860, 631–676. [N.B. This edition of the Forhandlinger is printed with the date 1861, however, the edition in the Oslo Museum archives, where Boeck worked, has a handwritten note: 1860, so that date is accepted here as the official publication year]
- Boeck, A. (1871) Crustacea Amphipoda borealia et arctica. *Forhandlinger i Videnskabs-Selskabet i Christiania*, 1870, 81–280 + i–viii. [index]  
<https://doi.org/10.5962/bhl.title.2056>
- Boehm, P.D. (1983) Chemical contaminants in Northeast United States marine sediments. *NOAA Technical Report NOS 99*. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Rockville, Maryland, 84 pp. [[https://repository.library.noaa.gov/view/noaa/2778/noaa\\_2778\\_DS1.pdf](https://repository.library.noaa.gov/view/noaa/2778/noaa_2778_DS1.pdf)]
- Folk, R.L. (1954) The distinction between grain size and mineral composition in sedimentary-rock nomenclature. *Journal of Geology*, 62, 344–359.  
<https://doi.org/10.1086/626171>
- Lilljeborg, W. (1865) *Bidrag till kannedomen om underfamiljen Lysianassina inom underordningen Amphipoda bland kraftdjuren. Nova Acta Regiae Societatis Scientiarum Upsaliensis III Serie*. Akademiska bokhandeln, Upsala, 25 pp.
- Lowry, J.K. & Myers, A.A. (2017) A phylogeny and classification of the Amphipoda with the establishment of the new order Ingolfiellida (Crustacea: Pericarida). *Zootaxa*, 4265 (1), 1–89.  
<https://doi.org/10.11646/zootaxa.4265.1.1>
- Myers, A.A & Ashelby, C.W. (2022) A revision of the genus *Pontocrates* Boeck, 1871 (Amphipoda, Oedicerotidae) with a description of *P. moorei* sp. nov. and the re-establishment of *P. norwegicus* (Boeck, 1860). *Zootaxa*, 5115 (4), 582–598.  
<https://doi.org/10.11646/zootaxa.5115.4.8>
- Sars, G.O. (1895) n.k. In: *An account of the Crustacea of Norway, with short descriptions and figures of all the species. Parts 31/32 Appendix*. Cammermeyers, Christiania and Copenhagen, pp. 673–711, supplement pls. 1–8.

- Spence Bate, C.S. (1858) On some new genera and species of Crustacea Amphipoda. *Annals and Magazine of Natural History*, Series 3, 1, 361–362.  
<https://doi.org/10.1080/00222935808696932>
- Spence Bate, C.S. & Westwood, J.O. (1863) *A History of the British Sessile-eyed Crustacea. Vol. 11.* John Van Voorst, London, 136 pp. [pp. 401–536]  
<https://doi.org/10.5962/bhl.title.9917>
- Xevgenos, D., Marcou, M., Louca, V., Avramidi, E., Ioannou, G., Argyrou, M., Stavrou, P., Mortou, M. & Küpper, F.C. (2021) Aspects of environmental impacts of seawater desalination: Cyprus as a case study. *Desalination and Water Treatment*, 211 (1), 15–30.  
<https://doi.org/10.5004/dwt.2021.26916>