

Palaemon monsdamarum n. sp. (Crustacea, Decapoda, Palaemonidae) from the late Miocene of Mondaino (Rimini, Emilia-Romagna, Italy)

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Abstract - We report *Palaemon monsdamarum* n. sp. (Crustacea, Decapoda, Palaemonidae) from the tripoli of the Messinian (upper Miocene) of Mondaino (Rimini, Emilia-Romagna, Italy). The presence of a new caridean species expands the scarce knowledge on the distribution and environmental range for the genus, usually scarcely reported in the worldwide Cenozoic fossil record. This is the first report of a carideans from the Miocene of Italy.

Key words: Crustacea, Decapoda, Palaemonidae, Miocene, Italy.

Riassunto - *Palaemon monsdamarum* n. sp. (Crustacea, Decapoda, Palaemonidae) del Miocene superiore di Mondaino (Rimini, Emilia-Romagna, Italia).

Viene descritto *Palaemon monsdamarum* n. sp. (Crustacea, Decapoda, Palaemonidae) del tripoli Messiniano (Miocene superiore) di Mondaino (Rimini, Emilia-Romagna, Italia). La presenza di una nuova specie di carideo amplia le scarse conoscenze sulla distribuzione temporale e ambientale dei rappresentanti fossili di questo genere raramente segnalato nel record fossile del Cenozoico. Si tratta della prima segnalazione di un carideo nel Miocene italiano.

Parole chiave: Crustacea, Decapoda, Palaemonidae, Miocene, Italia.

INTRODUCTION AND GEOLOGICAL SETTING

Mondaino (Rimini, Emilia-Romagna) is located in the south-central Appennini Mountains (NE Italy) (43°51'21.24"N, 12°40'17.33"E). In the surrounding area some Messinian (upper Miocene) deposits crop out, distinguished by the presence of tripoli levels at the bottom of the evaporitic sequence known as "Formazione Gessoso Solfifera" (Bedini *et al.*, 1986). These laminated tinny white to yellow-grey levels are highly fossiliferous,

including mainly a well-studied marine fish fauna (Sorbin & Tirapelle Rancan, 1980; Bedini *et al.*, 1986; among others), whereas the associated fauna is scarce, including invertebrates, such as regular echinoids and flying insects (Coleoptera), the latter studied by Bonomi (1896), vertebrates (incomplete birds), and terrestrial plant remains. Among crustaceans only some rare ostracods were reported (see Bedini *et al.*, 1986).

The fossil ichthyofauna assemblage is peculiar of subtropical waters, with the presence of both colder and warmer waters species. At generic level the Mondaino fish assemblage shows affinities with the Plio-Pleistocene and extant Mediterranean ichthyofauna. According to Bedini *et al.* (1986) the marine tripoli depositional basin suggests a depth between 100 and 200 m., lacking currents and being poorly oxygenated at the bottom, located not very far from the coastline.

The studied specimen was found from a tripoli level, associated with some indeterminate poorly preserved small fishes.

This is the first report of a decapod crustacean from the late Miocene tripoli of Italy.

MATERIALS AND METHODS

One complete specimen in lateral view, flattened and slightly compressed transversally, preserved on a small tinny slab of laminated yellow-grey tripoli level. Due to the delicate nature of the studied specimen, it was fixed by a film of polyvinilic acetate for study and preservation. The studied specimen was investigated by natural and UV illumination in order to emphasize detailed parts of the delicate structures. Unfortunately UV method was unsatisfactory not emphasizing some characters due to the sediment not particularly sensitive to UV illumination.

The specimen is housed in the palaeontological collections of the Museo di Storia Naturale di Milano (MSNM).

Abbreviations

lcp: carapace length
mpx3: third maxilliped
P1-P5: pereopods 1-5
s1-s6: pleonal somites 1-6
wcp: carapace width

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SYSTEMATIC PALAEOLOGY

Infrorder Caridea Dana, 1852

Superfamily Palaemonoidea Rafinesque, 1815

Family Palaemonidae Rafinesque, 1815

Genus *Palaemon* Weber, 1795

Type species: *Palaemon adpersus* Rathke, 1837, by original designation.

Fossil species: *Palaemon antonellae* Garassino & Bravi, 2003; *P. exul* Fritsch, 1872; *P. monsdamarum* n. sp. (this study); *P. mortuus* Smirnov, 1929; *P. vesolensis* Bravi, Coppa, Garassino & Patricelli, 1999.

Palaemon monsdamarum n. sp. (Fig. 1)

Diagnosis: Carapace subrectangular; rostrum elongate, with single tip and 3-4 dorsal granule-shaped spines; P1-P2 chelate; uropodal exopod without diaeresis.

Etymology: from *Mons Damarum* (= Fallow's deer mount), ancient name of Mondaino, fossiliferous locality where the studied specimen was collected.

Holotype: MSNM i29208.

Type locality: Mondaino (Rimini, Emilia-Romagna).

Geological age: late Miocene (Messinian).

Material and measurements: One specimen in lateral view (lcxp: 7 mm, excluding rostrum; wxcp: 4 mm).

Description: Small-sized caridean with thin, smooth exoskeleton. Carapace – Carapace subrectangular, elongate, narrowing slightly anteriorly due to slight curvature of the ventral margin; dorsal margin nearly straight; ridged posterior margin, gently sinuous and slightly concave in upper third; ventral margin curvilinear more inflated posteriorly; dorsal margin with thin longitudinal dorsal carina extending into long pointed, dorsally serrate rostrum; rostrum with a short rim of very small-sized granular suprarostal teeth decreasing in size towards the tip; ventral margin not observable; ocular incision narrow, shallow; antennal spine present; hepatic spine absent; no traces of grooves, carinae, or spines on carapace lateral surface. Cephalic appendages – Cephalic appendages incomplete; antennulae triflagellate; laminar scaphocerite present. Pleon – Pleon with s1, s3-s5 subtriangular ventrally, pointed and similar in length; s2 pleura subrounded, partially overlapping those of s1 and s3; s6 subrectangular, elongate, with curved ventral margin, narrowing posteriorly, longer than the others; anterior margin of s1, s3-s5 slightly sinuous; s4-s5 posteriorly projecting; tail fan longer than telson; triangular telson, poorly preserved; uropodal exopod without diaeresis, with thin longitudinal medial carina. Thoracic appendages – Mpx3 short, narrow, and spineless; P1-P5 similar in length; P1-P2 chelate; P1-P2 chelae very small and thin; P3-P5 achelate. Pleonal appendages – Pleopods not preserved.

Discussion. The fossil record of carideans from the Cenozoic deposits are very scarce. According to Schweitzer *et al.* (2010) only four genera are known to date from the Cenozoic, *Bechleja* Houša, 1956, *Propalaeomon* Woodward, 1903, *Pseudocaridinella* Martins-Neto & Mezzalira, 1991, and *Palaemon* Weber, 1795.

Bechleja Houša, 1956 is known with four species, as follows: *B. inopinata* Feldmann, Grande, Birkhmer, Hannibal & McCoy, 1981 (Eocene, Green River Fm., Wyoming, USA); *B. bahiaensis* (Beurlen, 1950) and *B. robusta* Martins-Neto & Mezzalira, 1991 (Oligocene, Brazil); *B. inopinata* Houša, 1956 (Oligocene-Miocene, Czech Republic) (Beurlen, 1950; Houša, 1956; Feldmann *et al.*, 1981; Martins-Neto & Mezzalira, 1991). According to Houša (1956) and Martins-Neto & Mezzalira (1991) the main diagnostic characters for the genus are the dorsally and ventrally serrate rostrum, a single filament antennule (instead two filament antennule according to Feldmann *et al.*, 1981), P1 with short chela, and P2 with elongate chela. However, we raise doubt about the diagnosis of the genus. Indeed, Houša (1956) described *B. inopinata* as a palaemonid with dorsally serrate rostrum, Feldmann *et al.* (1981) reported *B. rostrata* as a palaemonid with ventrally serrate rostrum, whereas Martins-Neto & Mezzalira described *B. robusta* as a palaemonid with short spineless rostrum. Though these characters fit more or less with the diagnosis made by the above-mentioned authors, it would be important to revise the type species (*B. inopinata*) of *Bechleja* in order to establish its real diagnostic characters, avoiding to consider it as a “basket” genus.

Though the studied specimen shares two diagnostic characters for the genus, such as the dorsally serrate rostrum and the P1 with short chela, we can exclude its belonging to this genus not only for the triflagellate antennule, but also because *Bechleja* is known as freshwater genus, whereas the studied specimen inhabited a strictly marine environment.

Propalaeomon Woodward, 1903 is known with two species, as follows: *P. osborniensis* Woodward, 1903 (late Eocene, Isle of Wight, Great Britain) and *P. longispinata* Martins-Neto & Mezzalira, 1991 (Oligocene, Brazil) (Woodward, 1863; Woods, 1925; Martins-Neto & Mezzalira, 1991). Woodward (1903) described also *P. minor*, including small specimens from the late Eocene of Isle of Wight that he considered more convenient to treat as a distinct species though they could be juvenile forms of *P. osborniensis*. According to Gaudant & Quayle (1988) *P. minor* has to be considered as a juvenile synonymous with the type species *P. osborniensis*. According to Gaudant & Quayle (1988) the main diagnostic characters for the genus are the dorsally serrate rostrum with bifid tip, short hepatic spine, P1 and P2 chelate with P2 longer than P1.

Based upon the main characters for the genus, we can exclude the belonging of the studied specimen to *Propalaeomon* in having a rostrum with a single tip and lack of hepatic spine.

Pseudocaridinella Martins-Neto & Mezzalira, 1991 is known with two species from the Oligocene of Brazil, as follows: *P. tremembeensis* (Beurlen, 1950) and *P. roxoi* (Beurlen, 1950) (Beurlen, 1950; Martins-Neto & Mezzalira, 1991). According to Martins-Neto & Mezzalira (1991) the main diagnostic characters for the genus are: rostrum smooth, P2 carpus excavated, and moderate dilatation of s2 base.

Based upon the main characters for the genus, we can exclude the belonging of the studied specimen to *Pseudocaridinella* in having dorsally serrate rostrum.

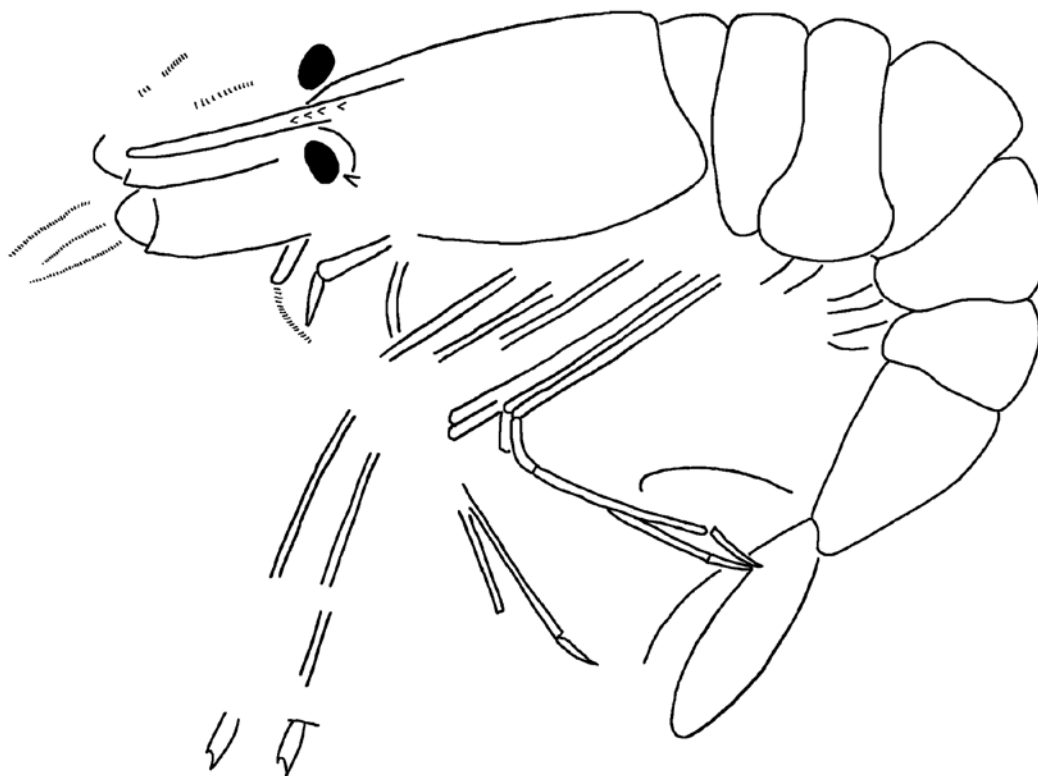


Fig. 1 - *Palaemon monsdamarum* n. sp., Holotype, MSNM i29208. A) General view (x 5.7). B) Line drawing.

According to Schweitzer *et al.* (2010) *Palaemon* Weber, 1795 is known with six species, as follows: *P. vesolensis* Bravi, Coppa, Garassino & Patricelli, 1999 and *P. antonellae* Garassino & Bravi, 2003 (Late Cretaceous, Italy); *B. bahiaensis* Beurlen, 1950 (Oligocene, Brazil); *P. mortuus* Smirnov, 1929 (Miocene, Caucasus), *P. fabricii* Michelotti, 1861 (Miocene, Italy); and *P. exul* Fritsch, 1872 (Miocene, Bohemia) (Michelotti; 1861; Fritsch, 1872; Smirnov, 1929; Beurlen, 1950; Bravi *et al.* 1999; Garassino & Bravi, 2003). However, according to Martins-Neto & Mezzalana (1991) *P. bahiaensis* has to be considered a species of *Bechleja*, whereas *P. fabricii* has to be considered a species of *Penaeus vanzii* Beschin & Garassino, 1999 according to Beschin & Garassino (1999). Finally, Houša (1956) attested that *P. exul* should not be included in this genus “because it differs from it by several important characters” that, however, that author did not clarify why. According to Glaessner (1969) the main diagnostic characters for the genus are elongate dorsally and ventrally serrate rostrum; antennal and branchiostegal spines present; hepatic spine absent; antennule triflagellate; and telson with four apical spines.

The studied specimen, sharing some diagnostic characters for the genus, such as the dorsally serrate rostrum, the antennal spine, the lack of the hepatic spine, and the antennule triflagellate, is assigned to *Palaemon*.

The genus is known from the Miocene fossil record with two species, *P. mortuus* and *P. exul*. *Palaemon monsdamarum* n. sp. differs from the type species, *P. mortuus*, in having a rostrum with 3-4 granule-shaped dorsal spines (vs. rostrum with 4-5 strong dorsal spines in *P. mortuus*). The bad quality of the drawing reported by Fritsch (1872) of *P. exul* hampers the comparison with the new species. Indeed the rostrum appears broken and the carapace seems to have a complex groove and carina system. As already pointed out by Houša (1956) a new genus should be erected to accommodate this species.

Based upon these observations, *P. monsdamarum* n. sp. is the first report of carideans from the Miocene of Italy.

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