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Redescription of *Palaemon antennarius* H. Milne Edwards, 1837 and *Palaemon migratorius* (Heller, 1862) (Crustacea, Decapoda, Palaemonidae) and description of two new species of the genus from the circum-Mediterranean area

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Abstract

Palaemon antennarius H. Milne Edwards, 1837 and *Palaemon migratorius* (Heller, 1862) are redescribed and differentiated from other circum-Mediterranean members of the genus on the basis of the following characters: (a) lack of mandibular palp, (b) form of first maxilliped endites, (c) form of maxillula palp, (d) number and length of plumose setae at the distal end of telson, and (e) shape of the fifth abdominal pleuron. In addition, two new species of the genus, *P. colossus* **sp. nov.** and *P. minos* **sp. nov.**, are described from Rhodes and Crete, respectively. The new species are distinguished from the hitherto known congeners by the following set of key characters: (a) shape of the fifth abdominal pleuron, (b) number and length of the plumose setae at the distal end of the telson, (c) shape of the endopod of the first pleopod, (d) form of thoracic and abdominal sternal armature and (e) number of the lanceolate setae on the ventral margins of telson.

Key words: *Palaemon*, new species, taxonomy, freshwater shrimps, circum-Mediterranean

Introduction

One of the most abundant taxa of Decapoda is the family Palaemonidae, which includes shrimps with worldwide distribution and consist of numerous and variform species that have successfully colonized marine, river, limnic and estuarine habitats.

Recently, the phylogenetic work of Ashelby *et al*. (2012) has demonstrated the indubitable need for an appraisal of the taxonomic status of some Palaemoninae genera. Subsequently, De Grave & Ashelby (2013) proposed the genera *Palaemonetes* Heller, 1869, *Exopalaemon* Holthuis, 1950 and *Coutierella* Sollaud, 1914 to be junior synonyms of *Palaemon* Weber, 1795. Consequently, the genus *Palaemon* today contains 83 species.

Until recently, six species have been known from the inland waters of the circum-Mediterranean area (d' Udekem d' Acoz, 1999; De Grave & Ashelby, 2013). These species, formerly members of the genus *Palaemonetes* Heller, 1869 are: (a) *Palaemon varians* Leach, 1813, distributed from the Scandinavian peninsula to Spain and from Morocco to Tunisia and Camargue of France (Lagardère, 1971; Noël, 1992; d' Udekem d' Acoz, 1999; Gelin & Souty-Grosset, 2006), (b) *P. zariquieyi* (Sollaud, 1938), endemic to Valencia, Spain (Zariquiey Alvarez, 1968), (c) *P. mesogenitor* (Sollaud, 1912), known from inland waters of Tunisia and Algeria (Sollaud, 1938; Azzouna, 1994; d' Udekem d' Acoz, 1999), (d) *P. mesopotamicus* (Pesta, 1913), distributed in the inland waters of Syria (Pesta, 1913; Sollaud, 1938) and Turkey (Özcan *et al.* 2013), (e) *P. turcorum* (Holthuis, 1961), reported from the region of Ankara, Turkey (Holthuis, 1961) and, (f) *P. antennarius* H. Milne Edwards, 1837, known from countries of Eastern and Central Mediterranean. *P. antennarius* has been reported from Italy (Froglia, 1978; Cottiglia, 1983), Balkan countries around the Adriatic sea (Noël, 1992), Greece and Turkey (Holthuis, 1961; Kocatas, 1981). In Greece, *P. antennarius* has been reported from the Ionian Islands (Corfu and Zakynthos) (Holthuis, 1961), western mainland and the Aegean islands, such as Crete, Kos and Rhodes (Santucci, 1928; Holthuis, 1961; Lewinsohn, 1976, Anastasiadou et al. 2002).

Heller (1869) established the genus *Palaemonetes* and separated it from *Palaemon* based on the absence of

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Key to identification of the inland *Palaemon* species from the circum-Mediterranean area

1. Fifth pleuron distal end not rounded (Figures 2E, 7B, 10A) 2
- Fifth pleuron distal end rounded (Figure 6B, 9B) 7
2. Fifth pleuron distal end strongly pointed (Figure 2E, 7B) 3
- Fifth pleuron distal end subquadrate and not pointed (Figure 10A) 6
3. Telson with two plumose setae on posterior margin (Figures 5A, 5B, 8C, 10C); third maxilliped exopod equal or longer than isciomerus (Figure 3H); endopod of first pleopod of male clearly shorter than exopod (Figures 4F, 8A); appendix masculina shorter than the endopod of the second pleopod (Figure 4G) 4
- Telson with 2–6 plumose setae on posterior margin (Figure 13 in Azzouna, 1994); third maxilliped exopod shorter than isciomerus (Figure 7 in Azzouna, 1994); endopod of first pleopod of male slightly shorter than exopod (Figure 12 in Azzouna, 1994); appendix masculina longer than the endopod of the second pleopod (Figure 12 in Azzouna, 1994) . . . . . *P. mesogenitor*
4. Telson plumose setae fail to overpass the inner spines (Figure 5B); first maxilliped endites separated with their inner edges forming an obtuse angle (Figure 3F); branchiostegal tooth originating just before anterior margin of carapace (Figure 2C) . . . 5
- Telson plumose setae overpass the inner spines (Figure 10C); first maxilliped endites are arranged almost in a straight line forming just a notch between them (Figure 10F); branchiostegal tooth marginal (Figure 2A in González-Ortegón & Cuesta, 2006) . . . . . *P. varians*
5. Telson with 40–50 pairs of marginal lanceolate setae (Figures 8C, 8D); in males, endopod of the first pleopod deeply concave on the mesial portion of inner margin (Figure 8A); in females, endopod of the first pleopod with concave inner margin and rounded tip (Figure 8B) . . . . . *P. colossus* **sp. nov.**
- Telson with 0–6 pairs of marginal lanceolate setae just proximally (Figure 5A); in males, endopod of the first pleopod slightly concave on the mesial portion of inner margin (Figure 4F); in females, endopod of the first pleopod lanceolate (Figure 4H) . . . . . *P. antennarius*
6. Telson with two plumose setae on posterior margin (Figure 6c in Holthuis, 1961); endopod of first pleopod of male almost as long as exopod (Figure 8c in Holthuis, 1961); appendix masculina longer than the endopod of the second pleopod (Figure 8d in Holthuis, 1961) . . . . . *P. turcorum*
- Telson with 4–6 plumose setae on posterior margin (Figure 10E); endopod of first pleopod of male clearly shorter than the exopod; appendix masculina shorter than the endopod of the second pleopod . . . . . *P. zariquieyi*
7. Telson always with two plumose setae on posterior margin (Figure 9C) . . . . . *P. minos* **sp. nov.**
- Telson with 4–12 plumose setae on posterior margin (Figures 6F, 10D) 8
8. Telson with 10–12 plumose setae on posterior margin (Figure 10D); third maxilliped exopod shorter than ischiomerus (Figure 10G); outer margin of scaphocerite concave (Figure 10H) . . . . . *P. mesopotamicus*
- Telson with 4–7 plumose setae on posterior margin (Figure 6F); third maxilliped exopod equal or longer than ischiomerus; outer margin of scaphocerite straight . . . . . *P. migratorius*

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