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An illustrated key to species of *Palaemon* and *Palaemonetes* (Crustacea: Decapoda: Caridea) from European waters, including the alien species *Palaemon macrodactylus*

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A detailed illustrated key to the identification of the European species of the genera *Palaemon* and *Palaemonetes* is provided. This key has been elaborated taking into account recent changes in the species composition of both genera for European waters, such as the invalidity of *Palaemon garciacidi*, which is a synonym of *P. longirostris*, and the presence of an introduced species, *Palaemon macrodactylus* that has been recently recorded at different localities along the Atlantic coast. The key is based on external morphological characters to facilitate its use by non-specialists. Data on the coloration, habitat and distribution of all species are also given.

INTRODUCTION

Since the publications of the keys to identification of the species of *Palaemon* Weber, 1795 and *Palaemonetes* Heller, 1869 by Sollaud (1939), Zariquiey Álvarez (1968), Figueras (1987), Ashelby et al. (2004) and d'Udekem d'Acoz et al. (2005), two recent modifications of the species composition of the genus *Palaemon* in European waters have occurred: on the one hand, molecular as well as morphological studies (Cuesta et al., 2003; Cuesta et al., unpublished data; Cartaxana et al., unpublished data) show that *Palaemon garciacidi* Zariquiey Álvarez, 1968 is a junior synonym of *Palaemon longirostris* H. Milne-Edwards, 1837; and on the other hand, a new alien species, *Palaemon macrodactylus* Rathbun, 1902, has been recorded in European waters (Ashelby et al., 2004; Cuesta et al., 2004; d'Udekem d'Acoz et al., 2005). Taking into account these two recent modifications, a new key of these genera in European waters is needed to allow a correct identification of all species currently present in this area. Recently, Ashelby et al. (2004) and d'Udekem d'Acoz (2005) have also provided a Palaemonidae key, but restricted to more regional scales: to Great Britain and north-western Europe, respectively. However, the present illustrated key has been elaborated after a new review of all species of the genera *Palaemon* and *Palaemonetes* from European waters. Moreover, external morphological characters have been used in all cases and are illustrated, in order to facilitate the use of this new key by non-specialists in this field. For example, in previous keys, the absence or presence of mandibular palp or in combination with several other characters has been likely used as the first dichotomy between *Palaemonetes* and *Palaemon* genera, while in this new key, the rostral formulae, which do not need dissection or other specialized manipulation of the specimens, have been used to enable easier and faster identification.

MATERIALS AND METHODS

The species of the genera *Palaemon* and *Palaemonetes* presently inhabiting European waters are: *Palaemon adspersus* Rathke, 1837, *Palaemon elegans* Rathke, 1837, *Palaemon longirostris*, *Palaemon macrodactylus*, *Palaemon serratus* (Pennant, 1777), *Palaemon xiphias* Risso, 1816, *Palaemonetes antennarius* (H. Milne-Edwards, 1837), *Palaemonetes turcorum* Holthuis, 1961, *Palaemonetes varians* (Leach, 1814) and *Palaemonetes zariquieyi* Sollaud, 1939. In the elaboration of the present key and its illustrations, a morphological review of the characters of specimens of all these species has been carried out, with the exception of *P. turcorum*; for the latter species, since no specimens were available to us, all the information was obtained from the original description and illustration by Holthuis (1961).

Among the materials which have been used to elaborate this key, some specimens belong to the 'Zariquiey Álvarez Collection', currently deposited at the Centro Mediterráneo de Investigaciones Marinas y Ambientales (CMIMA-CSIC), Barcelona, Spain. The rest of the materials examined were recently collected from different localities and have also been deposited at the CMIMA-CSIC in the 'Colección Biológica de Referencia'. An inventory of the materials examined, giving the locality of the collection and their accession numbers, is provided in Table 1.

RESULTS

The morphological and meristic characters used in this key are: colour, number of rows of setae on the ventral margin and teeth of the rostrum, the upper antennular flagellum, the form of telson and numbers of telson plumose setae, the branchiostegal spine, the endopod of 1st pleopod of the male, the appendix masculina of the 2nd pleopod and the sixth abdominal segment.

Since the presence or absence of a mandibular palp is a valid character for differentiating European species of *Palaemon* from those of *Palaemonetes*, this has also been illustrated to give a more complete account of characters that allow accurate identification (Figure 1A,B). However, to facilitate identification by non-specialists in this field, this character is not used in the key. In Tables 2 and 3, the

Table 1. *List of specimens examined and illustrated, indicating locality of collection, accession number and collection where they are desposited.*

Species	(Examined)	(Illustrated)	Locality	Accession numbers	Collection
Palaemon adspersus	(13)	(1)	Guadalquivir estuary	ICMD 5/2004	CBR-ICM
Palaemon elegans	(25)	(1)	Barbate (Cádiz)	ICMD 6/2004	CBR-ICM
Palaemon longirostris	(9)	(1)	Orio (Santander)	ICMZ 2/1993 1885	Zariquiey Álvarez-ICM
*Palaemon longirostris**	(78)	(2)	Guadalquivir river	ICMZ 6/1993 5423 (female) ICMZ 7/1993 5448 (male)	Zariquiey Álvarez-ICM
Palaemon macrodactylus	(54)	(1)	Guadalquivir estuary	ICMD 4/2004	CBR-ICM
*Palaemon macrodactylus***	(10)	(1)	Guadalquivir estuary	ICMD 116/2004	CBR-ICM
Palaemon serratus	(23)	(1)	Guadalquivir estuary	ICMD 3/2004	CBR-ICM
Palaemon xiphias	(6)	(1)	Cádiz Bay	ICMD 115/2004	CBR-ICM
Palaemonetes antennarius	(35)	(2)	Italy***	ICMZ 1560/1998 (male) ICMZ 1561/1998 (female)	Zariquiey Álvarez-ICM
Palaemonetes varians	(42)	(2)	Guadalquivir estuary	ICMD 7/2004	CBR-ICM
Palaemonetes zariquieyi	(7)	(1)	Torrente (Valencia)	ICMD 8/2004	CBR-ICM

*, as *Palaemon garciacidi*; **, larvae; ***, locality not specified.

characters used in the key are listed together with other characters that can be used to identify the different European species of both genera. In addition, the colour, habitat and distribution of each species are provided.

Key to identification of the species of Palaemon *and* Palaemonetes *of European waters*

1. The free part of shorter ramus of upper antennular flagellum smaller than fused part (Figure 1C); propodus of second pereiopod distinctly shorter than carpus (Figure 1G,H); rostrum frequently with two teeth on ventral margin (Figure 2A,C) . . . . . *Palaemonetes* (2)
— The free part of shorter ramus of upper antennular flagellum equal or longer than fused part (Figure 1D–F); propodus of second pereiopod longer than or equal to carpus (sometimes very slightly shorter than carpus) (Figure 1I–K); rostrum with three teeth or more on ventral margin (Figure 2B,D–J) . . . . . *Palaemon* (5)

2. Telson usually with two plumose setae on posterior margin (Figure 3A,C) 3
— Telson with >2 plumose setae on posterior margin (Figure 3B) . . . . . *Palaemonetes zariquieyi*

3. Branchiostegal spine situated on anterior margin of carapace (Figure 2A) 4
— Branchiostegal spine originating behind anterior margin of carapace (Figure 2C) *Palaemonetes antennarius*

4. Telson with terminal plumose setae shorter than spines (Figure 3C); endopod of first pleopod of male almost as long as exopod (Figure 3D); appendix masculina of second pleopod is far longer than the endopod of that pleopod (Figure 3E) . . . . . *Palaemonetes turcorum*
— Telson with terminal plumose setae longer than spines (Figure 3A); endopod of first pleopod of male does not reach the distal third of the exopod length (Figure 3F); appendix masculina of second pleopod does not reach the distal part of the endopod (Figure 3G) . . . . . *Palaemonetes varians*

5. Rostrum with three dorsal teeth on carapace behind posterior margin of orbit (Figure 2B,D) 6
— Rostrum with <3 dorsal teeth on carapace behind posterior margin of orbit (Figure 2E–J) 7

6. Rostrum strongly expanded ventrally being extremely high at the level of the first ventral tooth, with 7–9 dorsal teeth (including postorbital teeth but not the tooth of apical cleft) and a single row of setae on ventral margin (Figure 2B); shorter ramus of the outer flagellum of antennula fused for about 50–60% of its length to the longer ramus (Figure 1D); with a protuberance just above the posterolateral marginal spine of the sixth abdominal segment (Figure 4A); carapace and abdomen usually with a black colour transverse striped pattern. . *Palaemon elegans*
— Rostrum without a strong ventral expansion, with 9–15 dorsal teeth (including postorbital teeth but not the tooth of apical cleft) and a double row of setae on ventral margin (Figure 2D); shorter ramus of the outer flagellum of antennula fused for about 20% of its length to longer ramus (Figure 1E); without a protuberance above spine of the posterolateral margin of the sixth abdominal segment (Figure 4B); a few oblique transverse stripes on carapace, frequently translucent abdomen in males, and females quite pigmented with reddish spots covering all body surface and a whitish longitudinal stripe running all along the back . . . . . *Palaemon macrodactylus*

7. Branchiostegal spine slightly displaced from or situated on anterior margin of carapace (Figure 2B,D,F–J) . . 8
— Branchiostegal spine originating clearly behind anterior margin of carapace (Figure 2E) . . . . . *Palaemon xiphias*

8. Rostrum with two dorsal teeth behind posterior edge of orbit; rostrum without red dots on its lower half (Figure 2G–J) 9
— Rostrum with one dorsal tooth behind posterior edge of orbit (normally five or six dorsal teeth, including the postorbital tooth but not the tooth of apical cleft, and

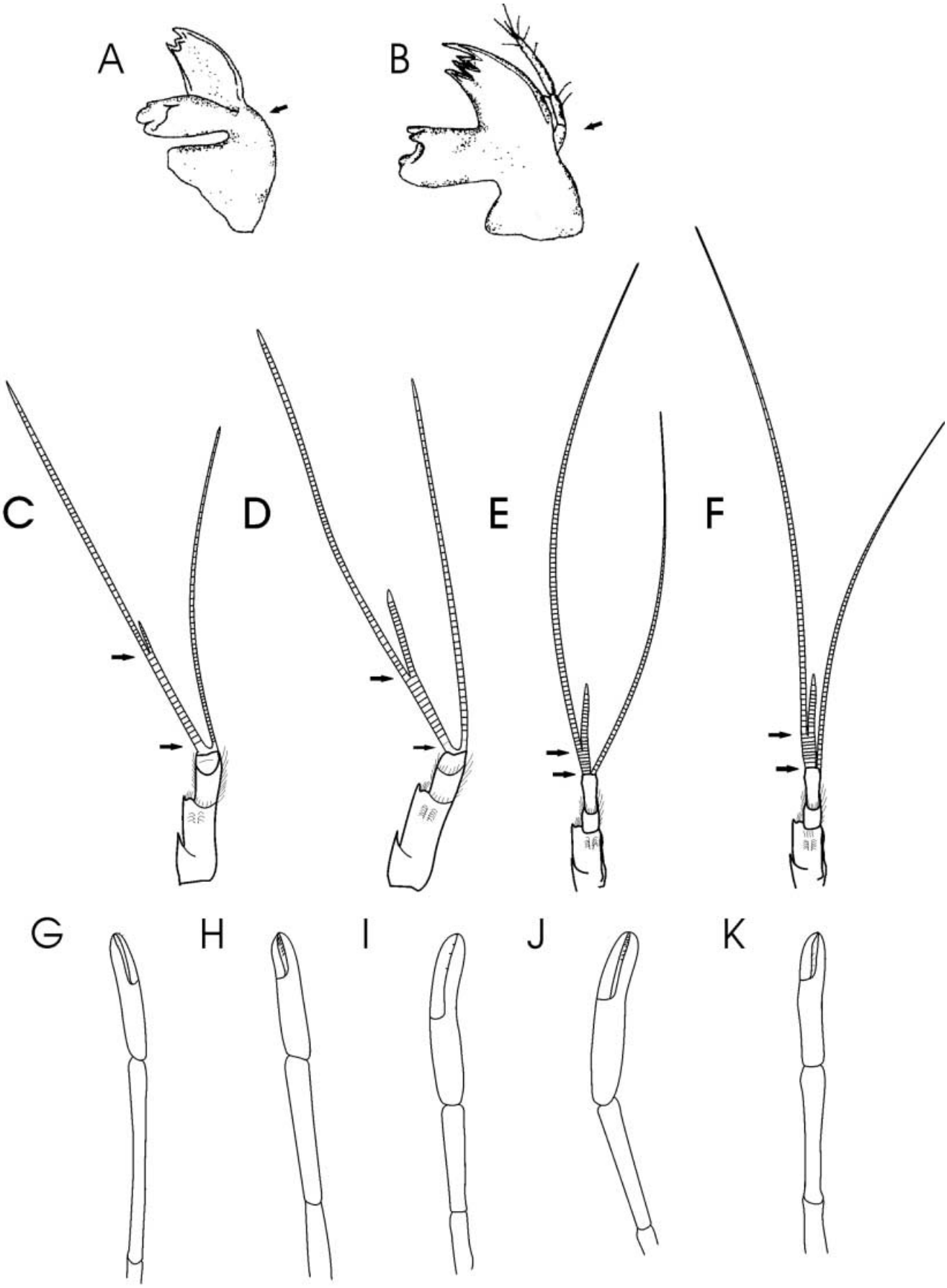

Figure 1. (A, B) Mandible (after Guerao, 1993); (C–F) antennule; (G–K) second pereiopod. (A, C, H) *Palaemonetes varians*; (B, I) *Palaemon serratus*; (D, K) *Palaemon elegans*; (E, J) *Palaemon macrodactylus*; (F) *Palaemon longirostris*; and (G) *Palaemonetes antennarius*.

Table 2. *Morphological differences between species of* Palaemonetes *from European waters.*

Structure	*P. antennarius*	*P. turcorum*	*P. varians*	*P. zariquieyi*
Rostrum				
dorsal teeth*	5–7	5–7	4–6 (usually 5)	4–6
Position of branchiostegal spine	slightly displaced from anterior margin	on anterior margin	on anterior margin	on anterior margin
Abdomen				
male first pleopod, endopod/exopod	endopod ≈ 1/2 exopod	endopod ≈ exopod	endopod ≈ 1/2 exopod	endopod ≈ 1/2 exopod
male second pleopod, appendix masculina/ endopod	appendix masculina < endopod	appendix masculina >> endopod	appendix masculina < endopod	appendix masculina < endopod
Telson				
ratio tl/spl	1.5	1.5	1	1.3
terminal setae	2	2	2 (usually)	3–8
Lt (mm)				
female (reference)	32–34 (Holthuis, 1961)	32–48 (Holthuis, 1961)	34–52 (Neves, 1970)	15–40 (Sanz, 1983)
male (reference)	39 (Holhuis, 1961)	28 (Holthuis, 1961)	29–36.5 (Neves, 1970)	15–37.5 (Sanz, 1983)

tl, telson length; spl, spine length; Lt, total length; *, including postorbital teeth but not the tooth of apical cleft.

Table 3. *Morphological differences between species of* Palaemon *from European waters.*

Structure	*P. adspersus*	*P. elegans*	*P. longirostris*	*P. macrodactylus*	*P. serratus*	*P. xiphias*
Rostrum:						
dorsal teeth* (usually)	5–7	7–9	7–10 (8)	9–15 (10–13)	6–8 (7)	6–8 (7)
ventral teeth (usually)	3	3	3–5 (4)	3–5 (4)	5	5
postorbital teeth	1	3	2	3, rarely 2 or 4	2	2
row of setae along the inferior margin	single	single	single	double	single	single
shape upper margin	straight	straight or slightly concave	straight or slightly concave	straight	concave	concave
coloured	red blotches or line in the lower half of rostrum	not coloured	not coloured	not coloured	not coloured	not coloured
Position of branchio-stegal spine	on anterior margin	on anterior margin or slightly displaced	on anterior margin	slightly behind anterior margin	on anterior margin	distinctly behind from anterior margin
Number of articles on mandible palp	3	2	3	3	3	3
Lt (mm)						
female (reference)	27–71 (Guerao, 1993)	30–63 (Gurney, 1923)	50–77 (Gurney, 1923)	70 (Ashelby et al., 2004)	27–90 (Guerao, 1993)	21–71 (Guerao, 1993)
male (reference)	23–51 (Guerao, 1993)	28–50 (Gurney, 1923)	35–77 (Gurney, 1923)	26–40 (Present study)	25–63 (Guerao, 1993)	23–69 (Guerao, 1993)

tl, telson length; *, including postorbital teeth but not the tooth of apical cleft.

three ventral teeth); inferior half of rostrum with dark red dots (Figure 2F) . . . . . *Palaemon adspersus*

9. Rostrum with 9–15 dorsal teeth (usually 10–13, including postorbital teeth but not the tooth of apical cleft) and ventral margin with double row of setae (Figure 2D); without protuberance above spine of the posterolateral margin of the sixth abdominal segment (Figure 4B) . . . . . *Palaemon macrodactylus*

— Rostrum with 7–10 dorsal teeth, ventral margin with a single row of setae (Figure 2B,G,H); with a protuberance with different degree of development just above the posterolateral margin spine of the sixth abdominal segment (Figure 4A,C,D) 10

10. Rostrum approximately < 3 times longer than high, strongly expanded ventrally being extremely high at the level of the first ventral tooth (Figure 2B); third tooth above edge of orbit; shorter ramus of the outer flagellum of antennula fused to the longer for about 50–60% of its length (Figure 1D); both cephalothorax and abdomen usually with a black colour transverse striped pattern . . . . . *Palaemon elegans*

— Rostrum approximately three or four times longer than high (Figure 2G–J); shorter ramus of the outer flagellum of antennula fused for about 30% or less of its length to the longer ramus (Figure 1F); the colour is variable, almost colourless, with small red or blue chromatophores in margins of the abdominal segments or with well marked transverse lines 11

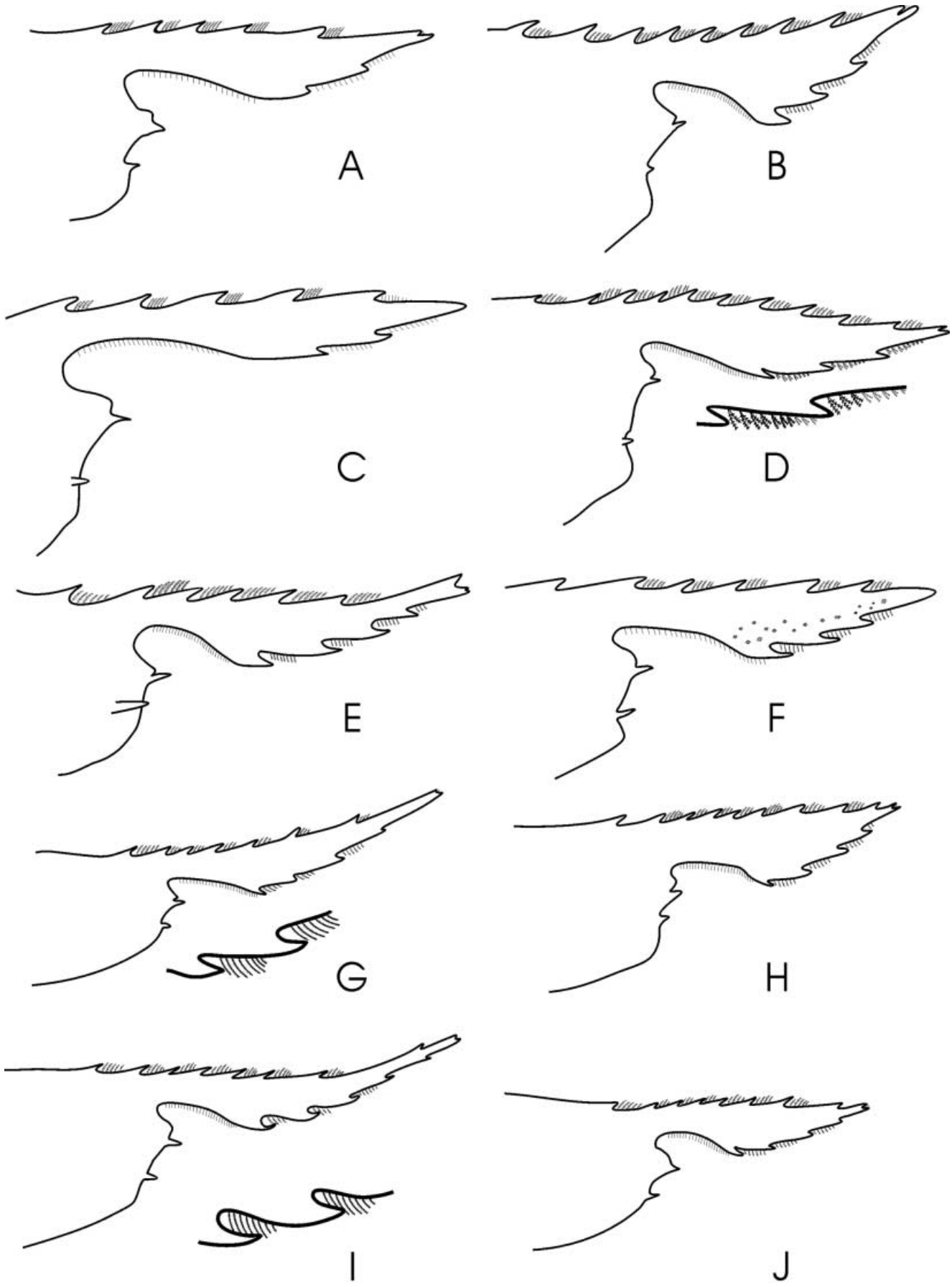

Figure 2. Anterior part of cefalothorax in lateral view. (A) *Palaemonetes varians*; (B) *Palaemon elegans*; (C) *Palaemonetes antennarius*; (D) *Palaemon macrodactylus*; (E) *Palaemon xiphias*; (F) *Palaemon adspersus*; (G) *Palaemon longirostris* (female from Guadalquivir river); (H) *Palaemon longirostris* (female from Orio); (I) *Palaemon serratus*; and (J) *Palaemon longirostris* (male from Guadalquivir river).

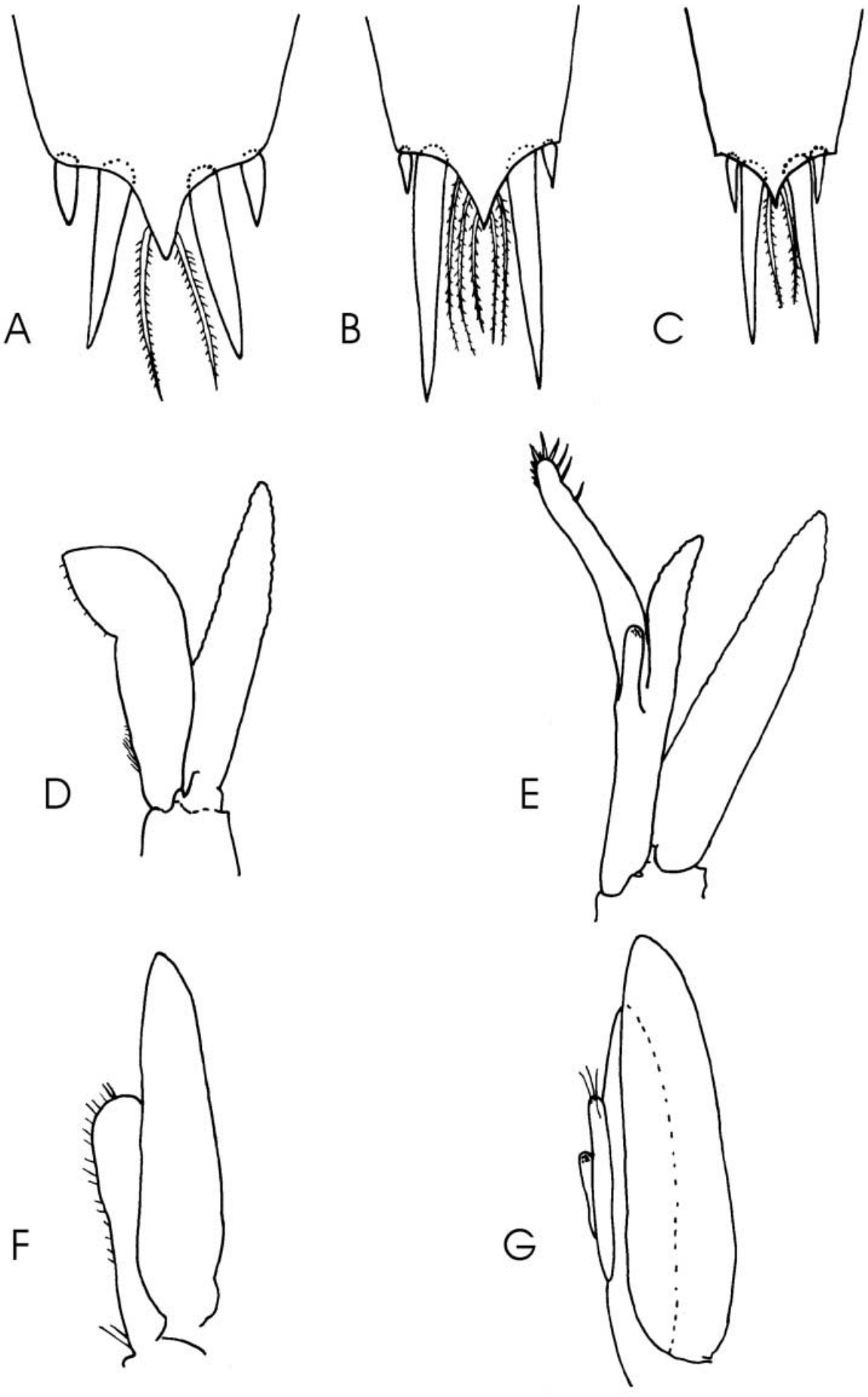

Figure 3. (A–C) Telson; (D–F) first pleopod; (E–G) second pleopod. (A, F, G) *Palaemonetes varians*; (B) *Palaemonetes zariquieyi*; and (C, D, E) *Palaemonetes turcorum*.

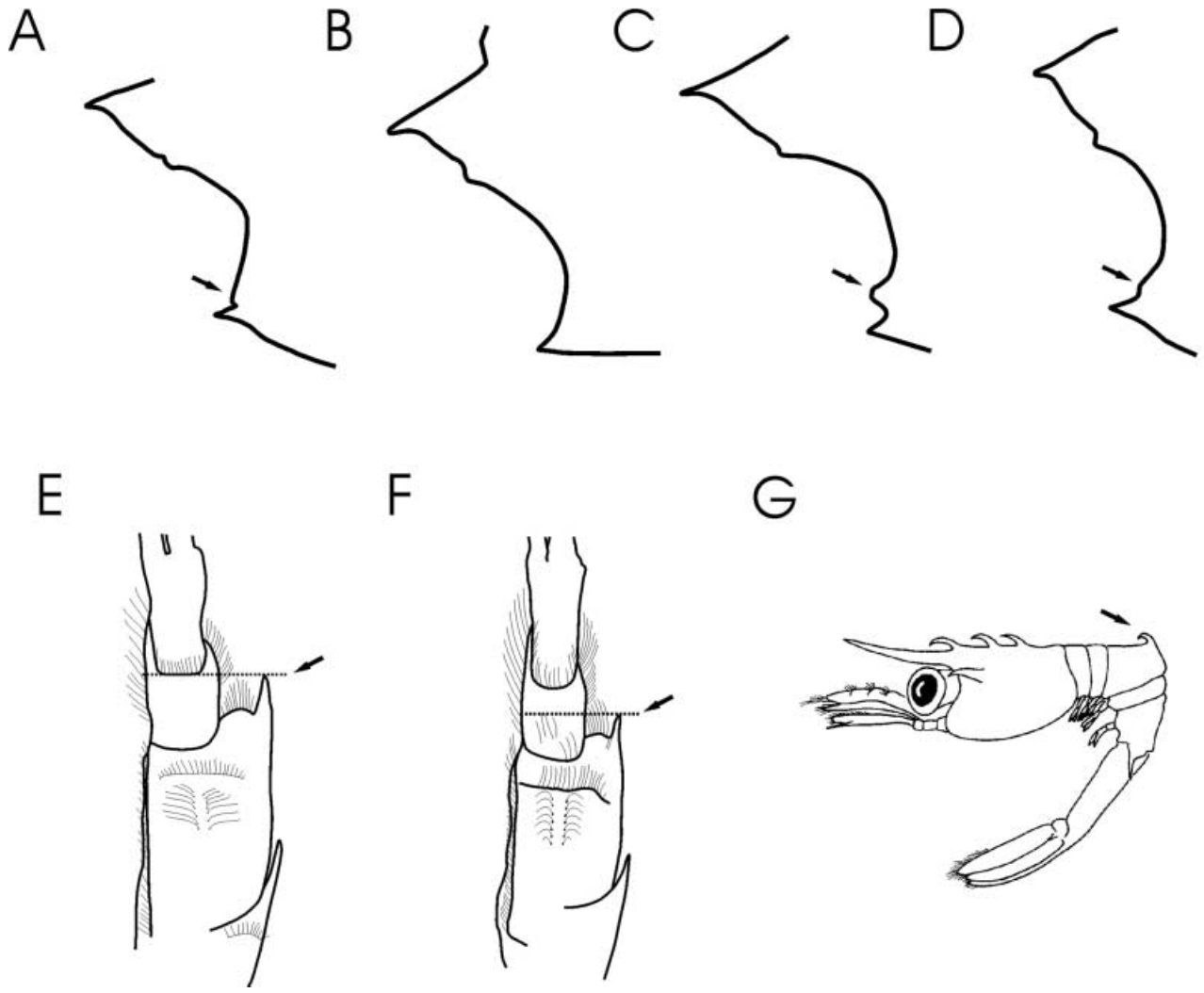

Figure 4. (A–D) Posterolateral view of sixth abdominal segment; (E, F) antennule; (G) lateral view of zoea V collected from Guadalquivir estuary plankton. (A) *Palaemon elegans*; (B, G) *Palaemon macrodactylus*; (C, E) *Palaemon serratus*; and (D, F) *Palaemon longirostris*.

11. Rostrum upcurved (Figure 2G,I). 12
— Rostrum straight (Figure 2H,J) . *Palaemon longirostris**

12. Rostrum with a clear toothless space, of about 30% or more of its length, between a distal tooth (normally, tooth of apical cleft) and basal series; teeth on ventral margin with recurved tips (Figure 2I); anterolateral spine of basal segment of antennula reaching the base of third segment (Figure 4E); the distal half of dactylus of the second pereiopod just overlapping the tip of the rostrum; abdomen with a red colour striped pattern . . . . . *Palaemon serratus*
— Rostrum without a clear toothless space, teeth more uniformly distributed; teeth on ventral margin with straight tips (Figure 2G); anterolateral spine of basal segment of antennula reaching about half length of second segment (Figure 4F); the distal half of dactylus of the second pereiopod always beyond the tip of the rostrum; abdomen with a slightly orange striped pattern . . . . . *Palaemon longirostris***

*, Usually all males and only females from North Atlantic populations.
**, Females from southern North Atlantic populations.

TAXONOMIC AND ECOLOGICAL ACCOUNTS

Palaemonetes Heller, 1869

Palaemonetes antennarius (H. Milne-Edwards, 1837) (Figures 1G, 2C & 3C)

Colour: body generally almost colourless and translucent. Seldom with a few black chromatophores.

Habitat: lakes and rivers, sometimes lagoons and estuaries. Freshwater species, but may sometimes be found in brackish waters (Cottiglia, 1983).

Distribution: Italy (Cottiglia, 1983), Balkans, Greece, Turkey (Holthuis, 1961; d'Udekem d'Acoz, 1999).

Palaemonetes turcorum Holthuis, 1961 (Figure 3D,E)

Colour: body generally almost colourless and translucent.

Habitat: freshwater.

Distribution: Turkey (Holthuis, 1961)

Palaemonetes varians (Leach, 1814) (Figures 1A,C,H, 2A & 3A,F,G)

Colour: body generally almost colourless and translucent. Sometimes, the whole body of females appears with small greenish chromatophores.

Habitat: brackish waters, from very low salinity (2) to higher than seawater (>45‰), but never in freshwater. Stagnant and slow-running waters, irrigation channels and salt marshes.

Distribution: Atlantic, from southern Norway (Dolmen, 1997) to Morocco (Lagardère, 1971). Some scattered locations in the Mediterranean Sea: France (Camargue), north coast of north-western Africa to Tunisia (Jayachandran, 2001; Falciai, 2001).

Palaemonetes zariquieyi Sollaud, 1939
(Figure 3B)

Colour: body generally almost colourless and translucent. Cephalothorax with a dark coloured striped pattern.

Habitat: freshwater and slightly brackish water. Irrigation channels and marshes.

Distribution: endemic to Gulf of Valencia, from Ebro Delta to Alicante (Spain) (Sollaud, 1939; Sanz, 1983, 1988).

Palaemon Weber, 1795

Palaemon adspersus Rathke, 1837
(Figure 2F)

Colour: this species has no bands of colour either on thorax or abdomen, but the body appears a uniform yellowish grey colour, due to small black or reddish-black chromatophores scattered irregularly. The lower half of the rostrum is covered with chromatophores in the form of red blotches. The long flagella and the peduncle of the antennules are also strongly red coloured, and the joints of the legs have yellow bands.

Habitat: lagoons, bays and estuaries, brackish waters. Commonly associated with sea grasses and algae.

Distribution: Atlantic, from Norway (up to 60°N) to Morocco (Lagardère, 1971) and Baltic Sea (Jażdżewski & Konopacka, 1993). All the Mediterranean, Black and Caspian Seas (d'Udekem d'Acoz, 1999).

Palaemon elegans Rathke, 1837
(Figures 1D,K, 2B & 4A)

Colour: both cephalothorax and abdomen with a black coloured striped pattern. The joints of the leg are marked by yellow bands and the palm of the chela of the second legs is blue. However, such coloration may be different in specimens living in turbid waters: in such case the stripes can be almost completely faded away.

Habitat: common in tidal rockpools, and in *Zostera*, *Posidonia* and *Cymodocea* sea grasses. Also it can be found in slightly brackish water close to river mouths (Lagardère, 1971).

Distribution: Atlantic, from western Norway (Bergen) to Namibia, Azores, Madeira, Canary, and Cape Verde Islands. All the Mediterranean, Black and Caspian Seas (d'Udekem d'Acoz, 1999).

Palaemon longirostris H. Milne-Edwards, 1837
(Figures 1F, 2G,H,J &4D,F)

Colour: variable, almost colourless (especially males) and with small red or blue chromatophores on the margins of the abdominal segments, sometimes giving the appearance of distinct bands, like *Palaemon elegans* and *Palaemon serratus*.

Habitats: inhabitant of estuarine regions. It is capable of living either in salt or in freshwater, but prefers brackish water in the large rivers.

Distribution: Atlantic, from north-western Germany (Geeste river, González-Ortegón et al., 2005) to Morocco (Lagardère, 1971). Guadiaro estuary in the Mediterranean basin (González-Ortegón et al., unpublished). Other reports in the Mediterranean Sea are uncertain and need confirmation (d'Udekem d'Acoz, 1999).

Palaemon macrodactylus Rathbun, 1902
(Figures 1E,J, 2D & 4B,G)

Colour: translucent, with reddish spots covering the entire body surface, joints of the leg marked by yellow bands, the rostrum covered with chromatophores in form of red blotches and a very distinctive dorsal colourless stripe running along its cephalothorax and abdomen. Sometimes, this colour pattern is stronger in females.

Habitat: estuaries, protected harbours, bays, ponds, tidal creeks. This species tolerates a very broad range of ecological conditions.

Distribution: original distribution: north coast of China (Peitaiho, Tangku, Chefoo, and Yangmatao), Korea (Gensan, Jinsen, Pusan), and Japan (Aomori, Matsushima, Tokyo Bay, Sagami Bay, Atumi Bay, Nagasaki). Introduced in: Pacific coast of North America (California: Monterey Bay, Los Angeles Harbour, San Francisco Bay; Oregon: Coos Bay), Australia (d'Udekem d'Acoz et al., 2005), Argentina (Mar del Plata harbour) (Spivak et al., 2005), and Europe: Spanish waters (Guadalquivir, Guadalete and Guadiana estuaries, and San Pedro and Salado rivers) (Cuesta et al., 2004; González-Ortegón et al., 2005), British waters (Ashelby et al., 2004), Germany (Geeste estuary, González-Ortegón et al., 2005), Belgium (yacht harbour of Zeebrugge and Ostend sluice dock) and The Netherlands (Westerschelde estuary and IJmuiden) (d'Udekem d'Acoz et al., 2005).

Palaemon serratus (Pennant, 1777)
(Figures 1A,I, 2I & 4C,E)

Colour: with red chromatophores on the margins of the abdominal segments giving the appearance of well-marked transverse lines. However, as for *P. elegans*, these lines may be reduced or absent in specimens living in turbid waters.

Habitat: rocky bottoms with or without algae, sea grasses. In the reproductive season, it can be found in the lower part of the estuaries, close to the river mouth.

Distribution: Atlantic, from Scotland and Denmark to Mauritania (Lagardère, 1971). Azores, Madeira, and Canary Islands. All the Mediterranean Sea, and Marmara and Black Sea (d'Udekem d'Acoz, 1999).

Palaemon xiphias Risso, 1816
(Figure 2E)

Colour: body uniformly greenish grey coloured, but without coloured bands on thorax and abdomen.

Habitat: *Zostera* and *Cymodocea* sea grass meadows, and shallow rocky bottoms frequently with sea grass and rarely among algae (Lagardère, 1971; d'Udekem d'Acoz, 1999).

Distribution: Mediterranean Sea. In the Atlantic only recorded from Madeira, Canary Islands, and Morocco (Lagardère, 1971) and Gulf of Cadiz (López de la Rosa, 1999).

Remarks

A molecular phylogeny study of the genera *Palaemon* and *Palaemonetes* (Cuesta et al., 2003; Cuesta et al., in preparation) has recently been carried out on ten of the 11 species presently recognized as inhabiting European waters (*Palaemonetes turcorum* was the species not included in this study). The study results support the taxonomic validity of nine of the ten species included in the study. The exception was *Palaemon garciacidi*, which turned out to be a junior synonym of *P. longirostris* (Cuesta et al., 2003; Cuesta et al., unpublished; Cartaxana et al., unpublished). Nevertheless, two different morphological forms can be distinguished among the populations of *P. longirostris*: the north-east Atlantic form (from North Sea to Cantabrian Sea); and the south-east Atlantic (from North Portugal to Mauritania) and Mediterranean Sea (Guadiaro estuary) form (Cartaxana et al., unpublished data). These two different phenotypes, which are especially evident in females, are considered in the key.

Furthermore, an introduced species, *Palaemon macrodactylus*, has recently been recorded at different localities along the Atlantic coast of Europe (Cuesta et al., 2004; González-Ortegón et al., 2005). Larvae of this species are easily identifiable from the presence of a dorsal hooked spine on the third abdominal segment (Figure 4G), which is not present in any other known European Palaemonidae larvae (Guerao, 1993). This peculiar larval morphology may help in monitoring the expansion of this species in European waters.

Palaemon macrodactylus collected in European waters does not present morphological differences with respect to its original populations. However, since differences in rostral formulae have been observed in several specimens even from the same population, this feature has been considered in the key with a double entry. *Palaemon elegans*, which also presents variations in the number of rostral teeth, has a double entry in the key, too.

Teratological characters have been described for *Palaemonetes zariquieyi* (Sanz, 1983, 1988) and *P. varians* (Gurney, 1923; De Grave, 1999), affecting especially the number of spines and setae on the telson. These characters should be taken into account since they are of systematic importance for separating *Palaemonetes* species. Furthermore, other characters, such as habitat, geographical distribution, and those listed in Table 2, should be considered for an accurate identification.

We would like to thank Antonio Sanz for providing us with specimens of *Palaemonetes zariquieyi*, César Vilas, and Manuel Ruiz, for their help in estuaries sampling, and Pere Abelló and Conchita Allue, from CMIMA-CSIC, for allowing us to use their facilities to study material from the Zariquiey Álvarez and CBR-ICM collections. Also thanks are due to Guillermo Guerao, Enrique Macpherson, Cédric d'Udekem d'Acoz, Pilar Drake and an anonymous referee for their suggestions and criticism that clearly improved an earlier version of the manuscript.

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