



## Discovery of the rare burrowing shrimp *Calliapagurops charcoti* de Saint Laurent, 1973 (Decapoda: Axiidea: Callianassidae) in shallow water: first record of the infraorder for Madeira Island

PETER C. DWORSCHAK<sup>1</sup> & PETER WIRTZ<sup>2</sup>

<sup>1</sup>Dritte Zoologische Abteilung, Naturhistorisches Museum, Burgring 7, A 1010 Wien, Austria.

E-mail: Peter.Dworschak@nhm-wien.ac.at

<sup>2</sup>Centro de Ciências do Mar, Universidade do Algarve, Campus de Gambelas, PT 8005-139 Faro, Portugal.

E-mail: peterwirtz2004@yahoo.com

The genus *Calliapagurops* was established by de Saint Laurent (1973) for the new species *C. charcoti* based on a damaged specimen lacking the abdomen and both third and fourth pereopods. The specimen was collected south of the Azorean island of Flores from shelly sand in 190–230 m depth. The original description by de Saint Laurent (1973) was rather short; a redescription and figures were later provided by Sakai (1999) and Ngoc-Ho (2003). Ngoc-Ho (2002) described a second species in this genus, *C. foresti*, based on four specimens (three of them complete) collected between 186 and 198 m depth east of Luzon, The Philippines.

During a night dive on 6 August 2010 with Scuba off Caniço, Madeira Island, two specimens of a burrowing shrimp were observed by one of us (PW) at their burrow opening on a shelly sand bottom in 19 m depth. The shrimp were subsequently baited with a dead fish and photographed (Fig. 1). Attempts to collect the shrimps by cutting off the retreat into the burrow with a knife yielded one specimen, unfortunately only its anterior body part. During a second dive on 27 August 2010, two further specimens (one complete) could be collected from shelly sediment at 20 m depth ca 300 m away from the first site. All specimens grabbed the fish bait with their chelipeds and attempted to pull it into their burrow.

The specimens were fixed in 96% ethanol and are deposited in the collection of the Museu Municipal do Funchal (História Natural), Madeira (MMF), and the Naturhistorisches Museum in Wien, Austria (NHMW). Size is expressed as total length (tl in mm) from the tip of the rostrum to the end of the telson and as carapace length (cl in mm) from the tip of the rostrum to the posterior median edge of the carapace.

### *Calliapagurops charcoti* de Saint Laurent, 1973

Figs 1–2.

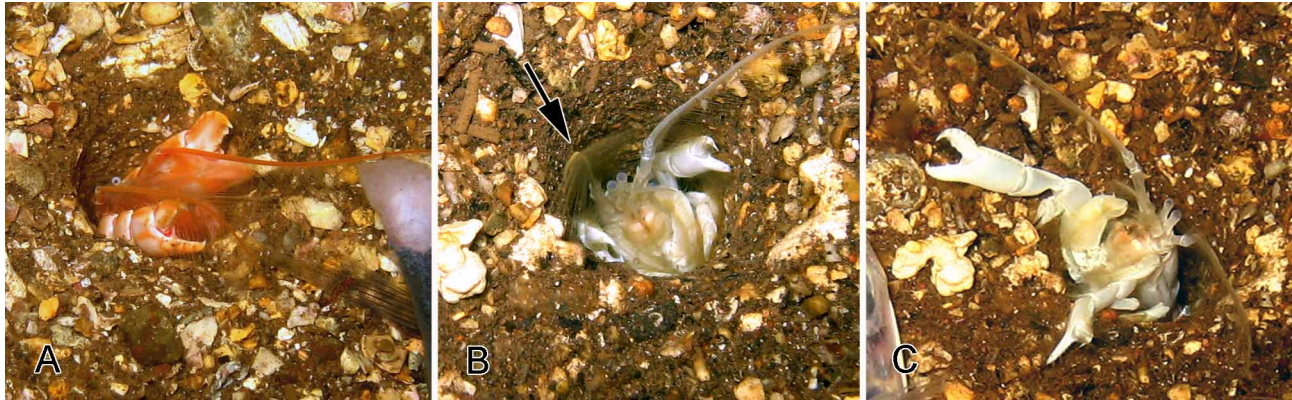
*Calliapagurops charcoti* de Saint Laurent, 1973: 515; Manning & Felder, 1991: 771; Sakai, 1999: 8, fig. 1; Tudge *et al.*, 2000: 141; Ngoc-Ho, 2002: 540; 2003: 487, fig. 16.

**Material.** 1 male (cl 18.3, left fourth pereopod and abdomen missing), Madeira, off Hotel Roca Mar, Caniço de Baixo, 19 m depth, P. Wirtz coll. 6 August 2010, MMF 41170; – 1 female (cl ca 15, posterior carapace damaged, both fifth pereopods and abdomen missing), NHMW 25025; 1 female (tl ca 77, cl ca 17, broken in the middle of cephalothorax, third abdominal somite damaged), NHMW 25026, Madeira, Caniço de Baixo, off Hotel Galomar, 20 m depth, P. Wirtz coll. 27 August 2010.

**Additional description.** Carapace ca 0.2 times total length. Adult individuals with distinct dorsal oval (Fig. 2B). Antennal flagella exceeding in length twice carapace length; flagella with long setae ventrolaterally on both sides of each segment (spacing 210 µm), setae between 3 (distally) and 6 mm (proximally) long, with short (50 µm) setulae. Third maxilliped (Fig. 2C) merus with 4 to 6 spines on distal border. First pereopods' coxa with strong, anteriorly curved spine mesially. Chelipeds sexually dimorphic, male major cheliped (Fig. 2D) more massive than that of female (Fig. 2H), propodus ca 1.4 times length (including fixed finger) and ca 1.5 times height that of female, which is similar in shape but slightly smaller than male minor cheliped. Male minor cheliped with propodus 1.2 times as long and ca 1.5 times as high as that of female. Abdomen (Fig. 2N) long, dorsal length ratio (along midline) of first to sixth abdominal somites 1.0:

1.35: 1.0: 0.84: 1.0: 1.0. Telson (Fig. 2O) subrectangular, 1.4 times as broad as long, broadest at midlength, posterior border slightly concave. Uropod (Fig. 2P) exceeding telson, endopod elongate-ovate, more than twice as long as wide, exopod with distinct dorsal plate. Female first pleopod (Fig. 2Q) consisting of two articles of same length, second article with shoulder. Female second pleopod (Fig. 2R) biramous, protopod expanded mesially, exopod slender, longer and more slender than endopod, latter with appendix interna.

**Colour.** Entirely white (female NHMW 25025, and female in Fig. 1B, C) or white with reddish-brown bands on chelipeds and dorsally on abdominal somites, red antennal peduncles and flagella (MMF 41170, see Fig. 1A; female NHMW 25026).



**FIGURE 1.** *Calliapagurops charcoti* de Saint Laurent, 1973 in situ at the burrow opening. A, male (cl 18.3 mm), MMF 41170; C, D, presumably female (not collected). Note spread setae on antennal flagellum (arrow).

**Remarks.** Ngoc-Ho (2002, 2003) described the dorsal oval of both *Calliapagurops* species as faint. The specimens from Madeira, however, have a very pronounced dorsal oval, the anterior depression distinct and deep. This difference seems to depend on the size of the specimens; the male from Madeira has twice the size as the holotype from the Azores. The dorsal oval is usually less distinct also in small specimens of the genera *Corallianassa* Manning, 1987 and *Neocallichirus* Sakai, 1988 when compared to larger individuals (PCD, pers. obs.).

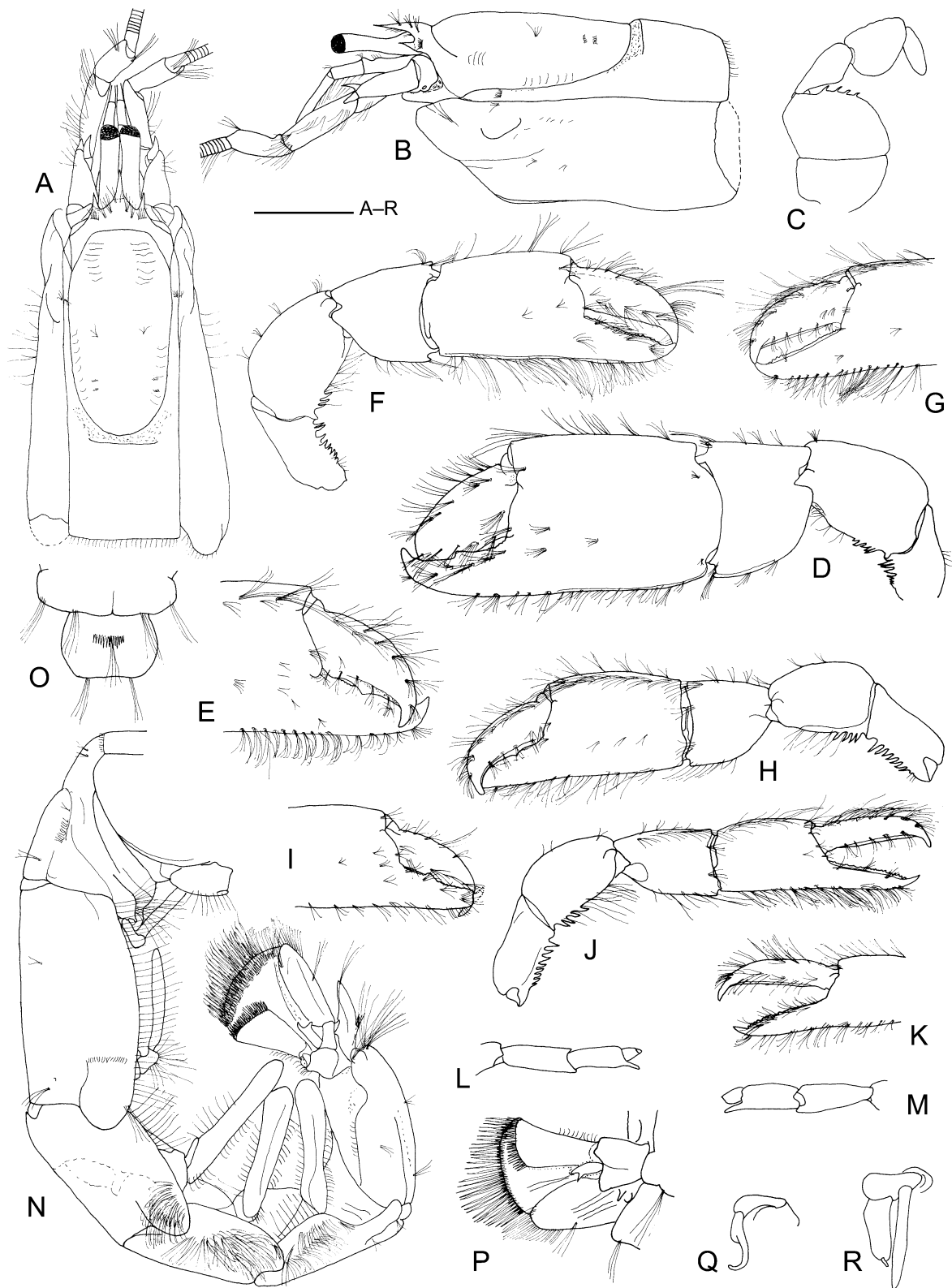
Manning & Felder (1991) placed *Calliapagurops* in the subfamily Callianassinae. Sakai (1999) introduced the monotypic subfamily Calliapaguropinae for this genus. Ngoc-Ho (2002) showed that *Calliapagurops* is very close to *Corallianassa* and argued that it is better placed into the subfamily Callichirinae Manning & Felder, 1991.

The behaviour of *Calliapagurops* observed in Madeira is also similar to that reported for *Corallianassa*, namely appearing at the burrow opening, catching drifting objects, which are pulled into the burrow (see Dworschak *et al.*, 2006, Kneer, 2008).

One of the unique features of *Calliapagurops* is the strong antennal peduncles and antennal flagella beset with long setae. The antennae with spread setae are held up into the water column (Fig 1B) and are probably used for suspension feeding – which would represent a feeding mode not yet reported for any species of the infraorder Axiidea.

The shallow-water fauna of Madeira is a mixture of species from the temperate Mediterranean-Atlantic region, species with boreal origin and a strong component of tropical species (Wirtz, 1998). Several recent surveys have revealed numerous new species and new records for this area (e.g. Wirtz, 1998, 1999, 2006). Up to now, no burrowing shrimp (Axiidea and Gebiidea) have yet been found in Madeira. This may be mainly due to their cryptic lifestyle because most species live in deep burrows (Dworschak, 2000); some probably are night-active and easily overlooked if not specifically targeted. The second author has, however, noted burrow openings likely belonging to this species during numerous dives along the south coast of Madeira Island, usually at depths greater than 30 m.

The finding of *Calliapagurops charcoti* in shallow waters at Madeira is surprising. The bathymetric range of the species between 20 and more than 200 m is one of the widest ever reported for this group (Dworschak, 2000). The potential novel feeding mode using the antenna for suspension feeding will be subject of further studies.



**FIGURE 2.** *Calliapagurops charcoti* de Saint Laurent, 1973. A–G, male (cl 18.3 mm), MMF 41170; H–R, female (cl 17 mm), NHMW 25026. Carapace in dorsal (A) and ventral (B) view; C, third maxilliped, lateral aspect (in situ, setae omitted); major (D) and minor (F) cheliped, lateral aspect (in situ, ischium not flat); fingers of major (E) and minor (G) cheliped in mesial view; major (H) and minor (J) cheliped in mesial view; fingers of major (I) and minor (K) cheliped in lateral view; distal articles of fourth pereopod in lateral (L) and mesial (M) view (setae omitted); N, abdomen in lateral view; O, telson; P, left uropod; Q, first right pleopod, ventral view (setae omitted); R, second right pleopod, posterior view (setae omitted). Scale is 5 mm.

## References

- Dworschak, P.C. (2000) Global diversity in the Thalassinidea (Decapoda). *Journal of Crustacean Biology*, 20, 238–245.
- Dworschak, P.C., Koller, H. & Abed-Navandi, D. (2006) Burrow structure, burrowing and feeding behaviour of *Corallianassa longiventris* and *Pestarella tyrrhena* (Crustacea, Thalassinidea, Callianassidae). *Marine Biology*, 148, 1369–1382.
- Kneer, D., Asmus, H. & Vonk, J.A. (2008) Seagrass as the main food source of *Neaxius acanthus* (Thalassinidea: Strahlaxiidae), its burrow associates, and of *Corallianassa coutierei* (Thalassinidea: Callianassidae). *Estuarine Coastal and Shelf Science*, 79, 620–630.
- Manning, R.B. (1987) Notes on Western Atlantic Callianassidae (Crustacea: Decapoda: Thalassinidea). *Proceedings of the Biological Society of Washington*, 100, 386–401.
- Manning, R.B. & Felder, D.L. (1991) Revision of the American Callianassidae (Crustacea, Decapoda, Thalassinidea). *Proceedings of the Biological Society of Washington*, 104, 764–792.
- Ngoc-Ho, N. (2002) A new species of *Calliapagurops* de Saint Laurent from the Philippines with a discussion of the taxonomic position of the genus (Thalassinidea, Callianassidae). *Crustaceana*, 75, 539–549.
- Ngoc-Ho, N. (2003) European and Mediterranean Thalassinidea (Crustacea, Decapoda). *Zoosystema*, 25, 439–555.
- Saint Laurent, M. de. (1973) Sur la systématique et la phylogénie des Thalassinidea: définition des familles des Callianassidae et des Upogebiidae et diagnose de cinq genres nouveaux (Crustacea Decapoda). *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences, Paris*, 277D, 513–516.
- Sakai, K. (1988) A new genus and five new species of Callianassidae (Crustacea: Decapoda: Thalassinidea) from Northern Australia. *The Beagle, Records of the Northern Territory Museum of Arts and Sciences*, 5, 51–69.
- Sakai, K. (1999) Synopsis of the family Callianassidae, with keys to subfamilies, genera and species, and the description of new taxa (Crustacea: Decapoda: Thalassinidea). *Zoologische Verhandlungen*, 326, 1–152.
- Tudge, C.C., Poore, G.C.B. & Lemaitre, R. (2000) Preliminary phylogenetic analysis of generic relationships within the Callianassidae and Ctenochelidae (Decapoda: Thalassinidea: Callianassoidea). *Journal of Crustacean Biology*, 20, 129–149.
- Wirtz, P. (1998) Twelve invertebrate and eight fish species new to the marine fauna of Madeira, and a discussion of the zoogeography of the area. *Helgoländer Meeresuntersuchungen*, 52, 197–207.
- Wirtz, P. (1999) Opisthobranch molluscs from the archipelago of Madeira. *Vita Marina*, 46, 1–18.
- Wirtz, P. (2006) Ten invertebrates new for the marine fauna of Madeira. *Arquipélago. Life and Earth Sciences*, 23A, 27–30.