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## Decapoda from Antipatharia, Gorgonaria and Bivalvia at the Cape Verde Islands

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**Abstract** The shrimps *Balssia gasti*, *Palaemonella atlantica*, *Periclimenes platalea*, *Periclimenes wirtzi*, *Pontonia manningi*, *Pontonia pinnophylax*, *Pontonia* sp. nov., *Pseudocoutierea wirtzi* and the crabs *Galathea intermedia* and *Micropisa ovata* were collected from Antipatharia, Gorgonaria and Bivalvia at São Tiago Island, Republic of Cape Verde. Most of the associations between decapods and invertebrate hosts are reported here for the first time. This is also the first record of *B. gasti* and of *P. wirtzi* for the Cape Verde Islands. We briefly review the literature on littoral decapod crustaceans of the Cape Verde Islands.

**Keywords** Symbiosis · Crustacea · Caridea

### Introduction

In 1982, Türkay summarized the history of research on decapod crustaceans of the Cape Verde Islands and the state of knowledge at that time, with Ribeiro (1968) being the only paper overlooked in this publication. To our knowledge, the following additional papers have since been published on the littoral Decapoda of the Cape Verde archipelago: Türkay (1986a,b), Wirtz et al. (1988), Forest and Garcia Raso (1990), Holthuis (1991), Fransen (1991, 2000), Manning (1993), Garcia-Gomez (1994), Forest (1995), Galil and Clark (1996), d'Udekem d'Acoz (1996a, 2000, 2001), Fransen and Wirtz (1997), Abed-Navandi (2000), Dworschak et al. (2000). We report on Decapoda associated with Antipatharia, Gorgonaria and

Bivalvia, collected by the first author at the Cape Verde Islands.

Caridean shrimps are common associates of black coral and horny coral in tropical and subtropical waters (e.g. Criales 1980; Fransen 1994a; Spotte et al. 1994, 1995; Goh et al. 1999). A survey of *Antipathes wollastoni* bushes in Madeira, the Azores and the Canary Islands resulted in the discovery of a new species, *Periclimenes wirtzi* d'Udekem d'Acoz, and the presence of this and/or other species of decapods on Antipatharia could be expected for the Cape Verde archipelago. Caridean shrimps are frequently associated with bivalve molluscs (reviewed by Fransen 1994b) and therefore such associations were searched for at the Cape Verde Islands.

### Materials and methods

Samples were collected by the first author during 37 SCUBA dives in the Bay of Tarrafal, northwestern coast of São Tiago Island, Cape Verde Islands, in December 1998 and in February 2000. Bushes of Antipatharia and Gorgonaria were wiped with a small hand net, in a depth range of 15–30 m. Several species of shrimps were photographed in situ.

The whip coral *Stichopathes lutkeni* Brook, 1889 is common at the Cape Verde Islands from about 10 m downwards. More than 50 whip corals were searched visually for associated decapods. Shrimps were photographed in situ and collected by hand. Bivalve molluscs were opened under water, at a depth of between 3 and 15 m, with the help of a large screwdriver. Shrimps were noted, photographed in situ, and collected.

Most specimens were deposited in the Institut Royal des Sciences Naturelles de Belgique, Brussels; specimens of *Pontonia* were deposited in the collection of the Nationaal Natuurhistorisch Museum at Leiden, The Netherlands.

### Results

#### Decapoda from Antipatharia

The two most common *Antipathes* species at the Cape Verde Islands are a large (up to 1.5 m high), sparsely branched, soft, scraggly looking, light-pink to grey-

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brown species, tentatively identified as *Antipathes subpinnata* Ellis and Solander, 1786 by D. Opresco, and a short (usually not more than 20 cm high), densely branched, stout, scratchy, greenish-brown species, tentatively identified as *Antipathes spinescens* Gray, 1857 by D. Opresco. These two species were called *A. barbadensis* and *A. tanacetum* by Morri and Bianchi (1995). Decapods collected from the two *Antipathes* species in 1998 were mixed and it is therefore sometimes impossible to know if the species listed below are restricted in their association to only one of these two species of black coral.

#### *Balssia gastii* (Balss, 1921)

Samples taken from *Antipathes* contained several adult and juvenile *B. gastii*. The species is known as an associate of various anthozoans and sponges in the western Mediterranean Sea and in the eastern Atlantic from the Azores to Guinea (Mori et al. 1994; Wirtz 1998a; d'Udekem d'Acoz, in press). A colour photo of an animal associated with the zoantharian *Gerardia savaglia* was provided by Wirtz (1998b). This is the first record of *B. gastii* from the Cape Verde Islands.

#### *Galathea intermedia* Lilljeborg, 1851

A sample of *A. spinescens*, collected at 13 m depth, contained several specimens of *G. intermedia*. This species is known in the Mediterranean Sea and in the eastern Atlantic from the Lofoten Islands to South Africa (d'Udekem d'Acoz 1999). *G. intermedia* has been collected in a wide range of habitats and from many different substrates, but until now has never been reported in association with Antipatharia (d'Udekem d'Acoz 1999).

#### *Micropisa ovata* Stimpson, 1858

A sample of *A. spinescens* collected at 13 m depth contained a single crab of the species *M. ovata*. This species is known in the eastern Atlantic, from the Canary Islands to the Cape Verde Islands. Until now, the species has never been reported in association with other invertebrates (d'Udekem d'Acoz 1999). The association of *M. ovata* with *A. spinescens* is probably due to chance.

#### *Palaemonella atlantica* Holthuis, 1951

A single adult *P. atlantica* was collected from *Antipathes*. The species has previously been recorded in Gabon, the Cape Verde Islands (the type locality), and in the Canary Islands (Fransen and Wirtz 1997). The Cape Verdean specimen referred to by Türkay (1982) also came from *Antipathes*. The Canarian specimen was found in

association with the sea anemone *Telmatactis cricoides* (Duchassaing, 1850) (Wirtz 1997).

#### *Periclimenes platalea* Holthuis, 1951

Several specimens belonging to the species *P. platalea* were found in samples taken from *Antipathes* bushes. The species was described by Holthuis (1951) on the basis of three specimens from São Vicente Island, Cape Verde, and six specimens from Guinea. It has apparently never been recorded since its original description.

#### *Periclimenes wirtzi* d'Udekem d'Acoz, 1996

The samples from *Antipathes* contained several adult and juvenile specimens of *P. wirtzi*. The species has previously been reported from *Antipathes wollastoni* in the Azores, Madeira, and the Canary Islands (Wirtz 1996; d'Udekem d'Acoz 1996b; Fransen and Wirtz 1997). A colour photo was provided in Debelius (2000).

#### *Pseudocoutierea wirtzi* d'Udekem d'Acoz, 2001

The species *P. wirtzi*, which is common on Gorgonaria (see below), was encountered only twice on the whip coral *Stichopathes lutkeni* Brook, 1889. More than 50 whip coral were searched but only a solitary male at 20 m depth and a solitary female, also at 20 m depth, were seen. These two animals were larger than those on gorgonarians, having a total length of 12 mm (male) and 15 mm (female), whereas the animals on gorgonarians had a total length of up to 10 mm (d'Udekem d'Acoz 2001).

#### Decapoda from Gorgonaria

All Gorgonaria sampled turned out to be *Leptogorgia gaini* Stiasny 1940, a tropical species that reaches its northern limit at the Cape Verdes (Grasshoff 1982).

#### *Balssia gastii* (Balss, 1921)

An underwater photo taken by the first author at 18 m depth shows an individual of *B. gastii* on *L. gaini*. The samples collected from this gorgonarian did not contain specimens of *B. gastii*; however this photo documents the association of *B. gastii* and *L. gaini*.

#### *Periclimenes platalea* Holthuis, 1951

A single specimen of *P. platalea* was found on a *L. gaini* at 21 m depth. See above for additional notes on this species.

This species was found on all 16 colonies of gorgonarians investigated for the presence of decapods. The peculiar flattened body and the shape of the walking legs in this species (d'Udekem d'Acoz 2001) may well be an adaptation to its association with gorgonarians; the shrimp remaining flattened against the stem of its host, the walking legs grasping around it. The species appears to live in large numbers on its gorgonarian host, whereas the two much larger individuals found on *Stichopathes lutkeni* were solitary.

#### Decapoda from Bivalvia

##### *Pontonia manningi* Fransen, 2000

Four large *Spondylus* (the common species at the Cape Verde Islands, presumably *Spondylus senegalensis* Schreibers, 1793) were opened at depths between 5 and 15 m. One of them, at about 10 m depth, contained a pair of *Pontonia manningi*. This species is known from the Gulf of Mexico to North Carolina in the western Atlantic, and from the Canary Islands and the Cape Verde Islands in the eastern Atlantic, inhabiting bivalves of the genera *Spondylus*, *Pecten*, *Aequipecten*, *Pteria*, and *Chlamys*. The two specimens previously recorded from the Cape Verde Islands were trawled from 50–80 m depth (Fransen 2000).

##### *Pontonia pinnophylax* (Otto, 1821)

Approximately 30 *Pinna rudis* were visually checked (by looking into the gap between the valves of the living mussel) while SCUBA diving at a depth range of 5–20 m. At least one, occasionally two, *Pontonia* were seen in every one of them! One *P. rudis* was opened and a single female of *Pontonia pinnophylax* was found inside. The species, which is common in the eastern Atlantic and the Mediterranean Sea, has previously been recorded from the Cape Verde Islands (Türkay 1982). A colour photo (by the first author) of a pair of *P. pinnophylax* from the Azores was published in Debelius (2000).

##### *Pontonia* sp. nov

Four bivalves of the species *Pseudochama radians* (Lamarck, 1819), family Chamidae, were opened. One of them, at a depth of about 10 m, contained a single female of an undescribed species of the genus *Pontonia*. The species will probably be described by C.H.J.M. Fransen (Nationaal Natuurhist. Museum, Leiden, The Netherlands).

## Discussion

Most of the above-mentioned associations of decapods with invertebrate hosts are reported here for the first time. The shrimp *Periclimenes wirtzi* may be an obligate associate of black coral since, until now, it has only been found on *Antipathes* bushes.

As summarized by Fransen (1994b), some species of the genus *Pontonia* live in bivalves of the families Pinidae (6 species of *Pontonia*), Pteriidae (1 species), Pectinidae (2 species), and Chamidae (1 species), while others live in tunicates. Fransen (2000) describes *Pontonia manningi* from Spondylidae, Pectinidae, Pteriidae and Chamidae. The as yet undescribed *Pontonia* species reported here is therefore the third member of the genus living in a bivalve of the family Chamidae.

Symbiotic crustaceans show great variation in social structures, from those that live alone and in pairs to those living in large groups (cf. Wirtz 1997; Dellinger et al. 1997, and references therein). The same species may differ in social structure, depending on its host (Dellinger et al. 1997). The species of *Pseudocoutierea wirtzi* provides another example for this observation: on gorgonarians it lives in groups of many individuals (as does *Pseudocoutierea antillensis* in the Caribbean; Spotte and Bubucis 1996), whereas on the whip coral *Stichopathes lutkeni* only solitary animals are encountered.

The associations reported are likely to benefit the decapods involved. They obtain protection from predators and probably feed on particles collected by their hosts. It is unknown if the host species benefit from the presence of the crustaceans. Symbiotic decapods are known to sometimes feed on host tissues, and some of these associations might be parasitic rather than mutualistic, in particular during times of food shortage for the crustacean. See Wirtz (1997) and Goh et al. (1999) for a general discussion of possible costs and benefits of such associations to the symbionts.

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## References

- Abed-Navandi D (2000) Thalassinideans (Decapoda) new to the fauna of Bermuda and the Cape Verde Islands. *Ann Naturhist Mus Wien* 102 B:291–299
- Criales MM (1980) Commensal caridean shrimps of Octocorallia and Antipatharia in Curaçao and Bonaire. *Stud Fauna Curaçao Other Caribb Isl* 61:68–85

- Debelius H (2000) Crustacea guide of the world. IKAN, Frankfurt
- Dellinger T, Davenport J, Wirtz P (1997) Comparisons of social structure of Columbus crabs living on loggerhead sea turtles and inanimate floats. *J Mar Biol Assoc UK* 77:185–194
- Dworschak PC, Anker A, Abed-Navandi D (2000) A new genus and three new species of alpheidids (Decapoda: Caridea) associated with thalassinids. *Ann Naturhist Mus Wien* 102 B:301–320
- Forest J (1995) Crustacea Decapoda Anomura : Révision du genre *Trizopagurus* Forest, 1952 (Diogenidae), avec l'établissement de deux genres nouveaux. In: Crosnier A (ed) Résultats des Campagnes MUSORSTOM, volume 13. *Mém Mus Natl Hist Nat Paris* 163:9–149
- Forest J, Garcia Raso JE (1990) *Trizopagurus rubrocinctus* sp. nov. des îles du Cap Vert (Decapoda, Diogenidae). *Bull Mus Natl Hist Nat Paris*, ser 4, Sect. A 12:187–195
- Fransen CHJM (1991) Preliminary report on Crustacea collected in the eastern part of the North Atlantic during the CANCAP and Mauritania expeditions of the former Rijksmuseum van Natuurlijke Historie, Leiden. Nationaal Natuurhistorisch Museum, Leiden, pp 1–200
- Fransen CHJM (1994a) Marine palaemonid shrimps of the Netherlands Seychelles Expedition 1992–1993. *Zool Verh Leiden* 297:85–152
- Fransen CHJM (1994b) Shrimps and molluscs. *Vita Mar* 42(4): 105–113
- Fransen CHJM (2000) *Pontonia manningi*, new species, a new bivalve-associated shrimp from the tropical and subtropical Atlantic (Decapoda: Palaemonidae). *J Crustac Biol* 20:101–108
- Fransen CHJM, Wirtz P (1997) Contribution to the knowledge of decapod crustaceans from Madeira and the Canary Islands. *Zool Med Leiden* 71:215–230
- Galil BS, Clark PF (1996) A revision of *Cryptosoma* Brullé, 1837 and *Cycloes* de Haan, 1837 (Crustacea: Brachyura: Calappidae). *Zool J Linn Soc* 117:175–204
- García-Gómez J (1994) The systematics of the genus *Anapagurus* Henderson, 1886, and a new genus for *Anapagurus drachi* Forest, 1966 (Crustacea: Decapoda: Paguridae). *Zool Verh Leiden* 295:1–131
- Goh NKC, Ng PKL, Chou LM (1999) Notes on the shallow water gorgonian associated fauna on coral reefs in Singapore. *Bull Mar Sci* 65:259–282
- Grasshoff M (1982) Die Flachwasser-Gorgonaria (Octocorallia, Gorgonaria) der Kapverdischen Inseln. *Cour Forschungsinst Senckenb* 52:11–14
- Holthuis LB (1951) The Caridean Crustacea of Tropical West Africa. *Atl Rep* 2:7-187
- Holthuis LB (1991) Marine lobsters of the world. FAO species catalogue, vol 13. FAO Fisheries Synopsis No 125, vol 13, Rome, pp i-viii + 1–292
- Manning RB (1993) West African pinnotherid crabs, subfamily Pinnotheridae. *Bull Mus Natl Hist Nat Paris* ser 4, vol 15, no 1–4, pp 125–177
- Mori M, Morri C, Bianchi CN (1994) Notes on the life history of the pontonine shrimp *Balssia gasti* (Balss, 1921). *Oebalia* 20:129–137
- Morri C, Bianchi CN (1995) Cnidarian zonation at Ilha do Sal (Arquipelago de Cabo Verde). *Beitr Paläontol* 20:41–49
- Ribeiro A (1968) Sur une collection de crustacés décapodes macroures de l'archipel de Cabo Verde. *Mem Junta Invest Ultramar* ser 2, no 54, pp 9–54
- Spotte S, Bubucis PM (1996) Diversity and abundance of caridean shrimps associated with the slimy sea plume *Pseudoptero-gorgia americana* at Pine Cay, Turks and Caicos Islands, British West Indies. *Mar Ecol Prog Ser* 133:299–302
- Spotte S, Heard RW, Bubucis PM (1994) Pontoniine shrimps (Decapoda: Caridea: Palaemonidae) of the northwest Atlantic. IV. *Periclimenes antipathophilus*, new species, a black coral associate from the Turks and Caicos Islands and eastern Honduras. *Bull Mar Sci* 55:212–227
- Spotte S, Bubucis PM, Overstreet RM (1995) Caridean shrimps associated with the slimy sea plume (*Pseudoptero-gorgia americana*) in midsummer at Guyana Island, British Virgin Islands, West Indies. *J Crustac Biol* 15:291–300.3
- Türkay M (1982) Marine Crustacea Decapoda von den Kapverdischen Inseln mit Bemerkungen zur Zoogeographie des Gebietes. *Cour Forschungsinst Senckenb* 52:91–129
- Türkay M (1986a) *Mithrax caboverdianus* n. sp. eine neue See-spinnen-Art von den Kapverdischen Inseln (Crustacea: Decapoda: Brachyura: Majidae). *Cour Forschungsinst Senckenb* 81:7–11
- Türkay M (1986b) Die Deutung von *Xantho minor* Dana, 1852 mit Festlegung eines Neotypus (Crustacea : Decapoda : Brachyura : Xanthidae). *Cour Forschungsinst Senckenb* 81:13–15
- Udekem d'Acoz C d' (1996a) The genus *Hippolyte* Leach, 1914 (Crustacea, Decapoda, Caridea, Hippolytidae) in the East Atlantic Ocean and the Mediterranean sea, with a checklist of all species in the genus. *Zool Verh Leiden* 303:1–133
- Udekem d'Acoz C d' (1996b) Description of *Periclimenes wirtzi* sp.nov., a new pontoniine shrimp from Madeira and Azores, with a checklist of eastern Atlantic and Mediterranean Pontoniinae (Crustacea, Decapoda, Caridea). *Bull Inst R Sci Nat Belg (Biol)* 66:133–149
- Udekem d'Acoz C d' (1999) Inventaire et distribution des crustacés décapodes de l'Atlantique orientale, de la Méditerranée et des eaux continentales au nord de 250 N. *Collection Patrimoine Naturels* 40:i-x + 1–383 (Service du Patrimoine Naturel, Muséum National d'Histoire Naturelle, Paris)
- Udekem d'Acoz C d' (2000) First record of *Janicea antiguenis* (Chace, 1972) from the Cape Verde Islands and in the Eastern Atlantic (Decapoda, Caridea, Hippolytidae). *Crustaceana* 73: 1163–1166
- Udekem d'Acoz C d' (2001) Description of *Pseudocoutierea wirtzi* n.sp., a new cnidarian-associated pontonine shrimp from Cape Verde Islands, with decalcified meral swellings in walking legs (Crustacea, Decapoda, Caridea). *Bull Inst R Sci Nat Belg (Biol)* 70:69–90
- Udekem d'Acoz C d' (in press) Remarks on the genera *Balssia* Kemp, 1922 and *Acanthonyx* Latreille, 1828 in the Azores, and first record of *Calappa tuerkayana* Pastore, 1995 in the Atlantic Ocean (Crustacea, Decapoda). *Arquipelago Life Mar Sci*
- Wirtz P (1996) Garnelen an Schwarzen Korallen. *Aquarien Terrarien Z* 49:420–422
- Wirtz P (1997) Crustacean symbionts of the sea anemone *Telmatactis cricoides* at Madeira and the Canary Islands. *J Zool* 242:799–811
- Wirtz P (1998a) Twelve invertebrate and eight fish species new to the marine fauna of Madeira, and a discussion of the zoogeography of the area. *Helgol Meeresunters* 52:197–207
- Wirtz P (1998b) Symbiotische Garnelen und karibische Schnecke. *Aquarien Terrarien Z* 51:62–63
- Wirtz P, Müller B, Nahke P (1988) The Caribbean shrimp *Tuleariocaris neglecta* Chace 1969 found in association with *Diadema antillarum* at Madeira, and two new records of decapod crustaceans from the Cape Verde Islands. *Cour Forschungsinst Senckenb* 105:169–171