



THREE NEW DECAPODS (ARISTEIDAE, CHIROSTYLIDAE, PANDALIDAE) FROM THE CAPE VERDE ISLANDS (NE ATLANTIC)

BY

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ABSTRACT

In the present article three benthic decapods, *Aristeus varidens* Holthuis, 1952 (Aristeidae), *Gastroptychus formosus* (Filhol, 1884) (Chirostylidae) and *Plesionika longicauda* (Rathbun, 1901) (Pandalidae), are recorded for the first time from the Cape Verde Islands. This is the southernmost record of *G. formosus*, as well as the northernmost of *P. longicauda* ever recorded from the eastern Atlantic. Preliminary data on batch fecundity and egg size of the pandalid shrimp are provided. Studied specimens were caught in the frame of a scientific trapping survey.

RESUMEN

En el presente informe tres decápodos bentónicos, *Aristeus varidens* Holthuis, 1952 (Aristeidae), *Gastroptychus formosus* (Filhol, 1884) (Chirostylidae) y *Plesionika longicauda* (Rathbun, 1901) (Pandalidae), son citados por primera vez en aguas de las Islas Cabo Verde. Se trata del registro más meridional de *G. formosus*, así como del registro más septentrional de *P. longicauda* en el Atlántico Oriental. Se aportan datos preliminares sobre la fecundidad parcial y el tamaño de huevos del camarón pandalido. Los ejemplares estudiados fueron capturados en el marco de campañas experimentales con nasas.

INTRODUCTION

The Cape Verde Islands are located in the north-eastern Atlantic. Lying within the 4000 m marine contour, the islands are separated from the coasts of West Africa by depths greater than 3000 m and located 570 km from Cape Verde, Senegal. Their volcanic characteristics are manifest by the absence of wide insular

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shelves, with a bottom depth of 300 m near the coast except around Boa Vista and Maio. These islands show an increase of age from west (<3 million years) to east (15.8 million years) (Ramalho, 2011). Their waters are under the influence of the North Equatorial Counter-Current and the Canary Current, with sea-surface temperature normally higher than 20°C over the year (González et al., 2009a). Biogeographically, the Cape Verde Islands ecoregion is included in the West African Transition province of the Tropical Atlantic realm (Spalding et al., 2007).

Nearly 35 years have passed since Türkay (1982) published his work on decapod crustaceans of the Cape Verde Islands (in German), where, apart from his contributions, he compiled records by Monod (1956) and Manning & Holthuis (1981) among others. After Türkay's work, Fransen (1991) enumerated or first recorded many decapod species collected in the Cape Verde Islands, and few brachyuran crabs (Türkay, 1986; Manning, 1993, 1996) were first described based on Cape Verdean specimens. González et al. (2004, 2009a, regional reports in Spanish and Portuguese) reported on some decapod species, mainly deep-sea forms from off the Cape Verdes. Also González et al. (2009b) reported the presence of the anomuran *Eumunida bella* de Saint Laurent & Macpherson, 1990 (presently placed within the Eumunididae A. Milne-Edwards & Bouvier, 1900) off the Cape Verde archipelago. The first checklist of brachyuran crabs from the Cape Verde Islands, with a biogeographic comparison with the Canary Islands has been compiled by González et al. (2017).

Within the Aristeidae Wood-Mason, 1891 (Dendrobranchiata), four pantropical benthic species have been reported to occur in waters of the Cape Verde Islands to date: *Cerataspis monstrosus* Gray, 1828 (Bouvier, 1905, as *Plesiopenaeus armatus*, at depths of 3000-3840 m off the Cape Verdes), *Aristeus antennatus* (Risso, 1816) (Bouvier, 1908, 250 m), *Hepomadus tener* Smith, 1884 (Fransen, 1991, as *Hepomades* [sic] *tener*, 3650-3850 m) and *Aristaeopsis edwardsiana* (Johnson, 1867) (González et al., 2004, 301-1000 m, with colour photo on page 31).

Within the Chirostylidae Ortmann, 1892 (Pleocyemata, Anomura), just one eastern Atlantic cold-temperate benthic species, *Uroptychus concolor* (A. Milne-Edwards & Bouvier, 1894) (A. Milne-Edwards & Bouvier, 1900, as *Diptychus nitidus concolor*, 495-618 m), has been reported from the Cape Verdes to date.

Within the Pandalidae Haworth, 1825 (Pleocyemata, Caridea), 14 species have been recorded from the Cape Verde Islands to date. *Heterocarpus grimaldii* A. Milne-Edwards & Bouvier, 1900 (Richard, 1902, Guinean, pelagic, 659-975 m), *Heterocarpus ensifer* A. Milne-Edwards, 1881 (Gurney & Lebour, 1941, amphiatlantic of warm affinity, benthic, 104-559 m) and *Heterocarpus laevigatus* Spence Bate, 1888 (Crosnier & Forest, 1973, pantropical, benthic, 790-1060 m).

Bitias stocki Fransen, 1990 (Fransen, 1990, ampho-Atlantic of warm affinity, benthic, 1100-1300 m). *Plesionika acanthonotus* (Smith, 1882) (ampho-Atlantic of warm affinity, benthic, 525 m), *Plesionika rossignoli* Crosnier & Forest, 1968 (Guinean, pelagic, 400-750 m) and *Stylopandalus richardi* (Coutière, 1905) (cosmopolitan, pelagic, 3825-4025 m) were recorded by Fransen (1991). *Plesionika edwardsii* (Brandt, 1851) (66-515 m, with colour photo on page 48), *Plesionika ensis* (A. Milne-Edwards, 1881) (104-426 m, with colour photo on page 31), *Plesionika martia* (A. Milne-Edwards, 1883) (216-805 m, with colour photo on page 50) and *Plesionika williamsi* Forest, 1964 (205-710 m, with colour photo on page 53), all them pantropical benthic species, were reported by González et al. (2004). *Plesionika holthuisi* Crosnier & Forest, 1968 (ampho-Atlantic of warm affinity, 196-364 m) and *Plesionika narval* (Fabricius, 1787) (pantropical, 66-302 m), both benthic, were recorded by González et al. (2009a). Recently, *Plesionika antigai* Zariquiey Álvarez, 1955 (Neves et al., 2016, Atlanto-Mediterranean, benthic, no depth data).

The present account records *Aristeus varidens* Holthuis, 1952 (Aristeidae), *Gastroptychus formosus* (Filhol, 1884) (Chirostylidae) and *Plesionika longicauda* (Rathbun, 1901) (Pandalidae) for the first time from the Cape Verde Islands.

MATERIAL AND METHODS

Six exploratory trapping surveys of the bottom megafauna of the Cape Verde Islands were carried out off the islands of Boa Vista, Santiago, São Vicente, Santa Luzia, Sal and São Nicolau, between 2003 and 2012, at depths down to 1000 m. Collecting operations during the first two cruises (2003 and 2005) covered a depth range between 435 m and 1060 m, in order to search for new living resources off the islands of Boa Vista, which is characterized by a sediment-covered broad shelf and slope, and Santiago, with a narrow shelf and slope dominated by hard substrata. The remaining cruises (2010-2012) were mainly directed to the stock assessment of *P. edwardsii* between 66 m and 458 m depth and covered four additional islands (González et al., 2014). In all cruises bottom traps (BT) and semifloating shrimp traps (SFST, operated around 2.4 m above the seafloor) were used as baited fishing gear (González et al., 1992, 2004, 2014) (fig. 1).

For *P. longicauda* all six preserved ovigerous females were used to estimate fecundity. Attached eggs were removed from pleopods, and egg masses were then placed on 100-mm mesh and washed. A subsample of 20% in weight from each selected female was then counted by means of a dissection microscope. The batch fecundity, defined as the egg production by batch, was estimated by the gravimetric method (Tuset et al., 2011; Triay-Portella et al., 2014, 2016).

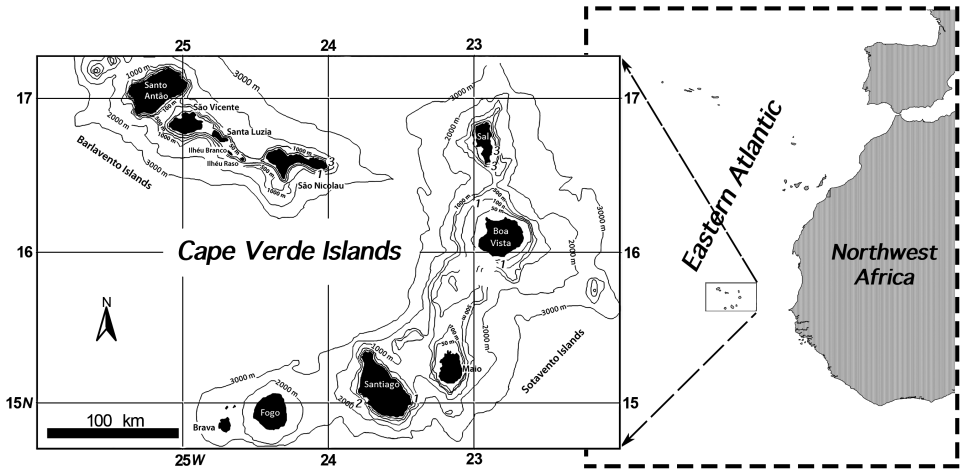


Fig. 1. Map of the study area, the Cape Verde Islands (northeastern Atlantic) with the collection locations: 1, *Aristeus varidens* Holthuis, 1952; 2, *Gastroptychus formosus* (Filhol, 1884); 3, *Plesionika longicauda* (Rathbun, 1901).

Voucher specimens were labelled, curated, data-based and deposited, available for verification (Turney et al., 2015), in the ICCM study collection at the University of Las Palmas de Gran Canaria.

The abbreviations CL and CW stand for carapace length and carapace width, respectively, and are measured with a digital calliper in millimetres. For *G. formosus*, overall body length and cheliped lengths were also taken.

RESULTS

Three decapod species have been newly recorded for the Cape Verde Islands herein.

Systematics

Suborder DENDROBRANCHIATA Spence Bate, 1888

Superfamily PENAEOIDEA Rafinesque, 1815

Family ARISTEIDAE Wood-Mason, 1891

Genus *Aristeus* Duvernoy, 1840

***Aristeus varidens* Holthuis, 1952**

Material examined.— ICCM432, three females, 27.8-30.0 mm CL, cruise Camarão-1, station 4, 15°10'N 23°47'W, off Ponta Água Doce, Santiago Island, 220-258 m, rocks, 19.xi.2011, BT. ICCM433, one female, 31.3 mm CL, cruise Camarão-2, station 1-D3, 16°15'N 23°05'W, off Ponta do Sol, Boa Vista Island, 219-237 m, pebbles, 11.iii.2012, BT. ICCM434, one female, 27.6 mm

CL, cruise Camarão-2, station 18, 15°56'N 22°53'W, East of Ponta Taráfe, Boa Vista Island, 192-236 m, rocks, 14.iii.2012, SFST. ICCM435, one female, 30.7 mm CL, cruise Camarão-3, station 32(9), 16°33'N 24°22'W, off Tarrafal, São Nicolau Island, 426 m, rocks, 25.vii.2012, BT.

Remarks.— The specimens collected agree well with the descriptions and colour pattern given for the species (Lagardère, 1981; Fransen, 2014). A subtropical/tropical Atlantic (Guinean) benthic species. Known from the southwestern of Western Sahara (Rio de Oro, 24°N), Senegal, Guinea, southward to Angola (Cabinda) and south-western Africa (Namibia, 18°S) (Holthuis, 1980; Lagardère, 1981). Young individuals are found at depths of 300 m and below to 1134 m, while adults occur between 400 and 600 m, on muddy bottoms (Holthuis, 1980; Lagardère, 1981; Fransen, 2014). The maximum trawl yields are obtained at night, suggesting that the species may dig into the substrate by day (Lagardère, 1981; Fransen, 2014). Its life span is about 2 years and reproduction begins at the end of the cold season (Lagardère, 1981; Fransen, 2014). Feeds on crustaceans, fishes and polychaete worms (Fransen, 2014). Maximum total length reported up to 12 cm (males) and 20 cm (females) (Holthuis, 1980; Lagardère, 1981; Fransen, 2014). The studied specimens measured up to 31.3 mm CL.

This species seems to be the most abundant of the deep-water shrimps off tropical West Africa, with traditional fishing grounds (commercially bottom trawled) at the continental slopes off Senegal, Guinea and Angola (Holthuis, 1980; Lagardère, 1981; Fransen, 2014). The studied specimens, collected from both windward (São Nicolau) and leeward (Boa Vista and Maio) island chains of the Cape Verdes, were adults caught on (benthic) or over (epibenthic) hard bottoms (rocks, pebbles), between 192 and 426 m of depth, a bathymetric interval shallower than those reported for the African continental slopes.

This is the first record for this species from the Cape Verde Islands, representing the fifth aristeid and the second *Aristeus* species recorded for this archipelago.

Suborder PLEOCYEMATA Burkenroad, 1963

Infraorder ANOMURA MacLeay, 1838

Superfamily CHIROSTYLOIDEA Ortmann, 1892

Family CHIROSTYLIDAE Ortmann, 1892

Genus *Gastroptychus* Caullery, 1896

***Gastroptychus formosus* (Filhol, 1884)**

Material examined.— ICCM431, one male, 8.3/7.4 mm CL/CW, overall body length 22.8/19.7 mm with/without rostrum, cheliped length 79.9/78.0 mm right/left, cruise Cabo Verde 2005-06, station 208/210, 15°02'N 23°46'W, Ponta Covinha, Santiago Island, 525-630 m, mixed substrate, 16.vi.2005, BT.

Remarks.— The collected specimen agrees well with the description and colour pattern given for the species (Filhol, 1884; Zariquiey Álvarez, 1968; Hayward &

Ryland, 1990). An amphi-Atlantic benthic species of wide distribution. Previous records of this species are scarce, although it has been reported across the Atlantic Ocean from Nova Scotia, Canada to Ireland, Scotland, off Rochefort, France, Bay of Biscay and south to the Azores along the Mid-Atlantic Ridge, the Canary Islands (Milne-Edwards & Bouvier, 1900, as *Ptychogaster formosus*; Bouvier, 1922; Zariquiey Álvarez, 1968; González, 1995), and NW Morocco (Hayward & Ryland, 1990; Pohle & Macpherson, 1995; Baba et al., 2008) and south to Cape Bojador, Western Sahara (A. Milne-Edwards & Bouvier, 1900). Reported at depths between 699 and 1786 m (Pohle & Macpherson, 1995; d'Udekem d'Acoz, 1999; Baba et al., 2008), it has been found on corals, sand with rocks, and mixed substrates (González, 1995). This species forms a close association with deep-sea cold-water corals in the North Atlantic; the adults have very specific habitat preferences, being only found on gorgonian and antipatharian corals with strong preference for *Leiopathes* sp. as a host (Le Guilloux et al., 2010). Overall body length 44–52 mm, chelipeds length up to 121 mm (Zariquiey Álvarez, 1968; Hayward & Ryland, 1990). The studied specimens measured 22.8 mm in overall body length (including rostrum) and 79.9 mm in chelipeds length (right).

This is the first record for this species from the Cape Verde Islands and the southernmost one ever recorded, representing the second chirostylid and the first *Gastroptychus* species recorded for this archipelago.

Infraorder CARIDEA Latreille, 1817
 Superfamily PANDALOIDEA Haworth, 1825
 Family PANDALIDAE Haworth, 1825
 Genus *Plesionika* Spence Bate, 1888
***Plesionika longicauda* (Rathbun, 1901)**

Material examined.— ICCM425, three ovigerous females (BT), 16.7–16.9 mm CL, one non-ovigerous female (BT), 14.7 mm CL, ICCM426, two males (SFST), 12.1–15.2 mm CL, cruise Camarão-3, station 19, 16°45'N 22°52'W, off Salão Azul, Sal Island, 105–120 m, rocks, 17.vii.2012. ICCM427, one ovigerous female, 15.6 mm CL, ICCM428, three males, 13.3–13.6 mm CL, cruise Camarão-3, station 22, 16°45'N 22°52'W, off Calhetinha, Sal Island, 125–130 m, rocks, 18.vii.2012, SFST. ICCM429, two ovigerous females (SFST), 16.3–17.4 mm CL, one male (NB), 13.1 mm CL, cruise Camarão-3, station 19-D2, 16°45'N 22°52'W, off Salão Azul, Sal Island, 99–123 m, rocks, 18.vii.2012. ICCM430, one non-ovigerous female, 16.4 mm CL, one male, 9.6 mm CL, cruise Camarão-3, station 25(2), 16°33'N 24°03'W, off Ponta de Leste, São Nicolau Island, 90–135 m, rocks, 23.vii.2012, SFST.

Additional material.— Four individuals caught off Sal Island during cruise Camarão-3 and used for chemical analyses: one 17.0 mm CL ovigerous female, station 19, 16°45'N 22°52'W, off Salão Azul, 105–120 m, rocks, 17.vii.2012, BT; one 15.2 mm CL ovigerous female, station 19-D2, 16°45'N 22°52'W, off Salão Azul, 99–123 m, rocks, 18.vii.2012, BT; one 9.8 mm CL non-ovigerous specimen, station 20, 16°45'N 22°52'W, off Salão Azul, 130–167 m, rocks, 17.vii.2012, BT; one

12.5 mm CL non-ovigerous specimen, station 14-D2, 16°37'N 22°50'W, off Serra Negra, rocks, 126-154 m, 20.vii.2012, BT.

Remarks.— The specimens collected agree well with the description given for the species (Chan & Crosnier, 1991). An amphi-Atlantic benthic species of warm affinity distributed along the West African coast from south of Senegal (16°32'N) to Angola (10°10'S), and the western Atlantic from the Gulf of Mexico, Caribbean Sea to off Suriname, including Bahamas (Chan & Crosnier, 1991). These authors examined material from Senegal, Liberia, Ivory Coast, Gabon, Congo and Angola, but they did not include the Cape Verde Islands in the species' geographical range. However, in the remarks section of their paper they surprisingly wrote "It is interesting that specimens from southern Senegal lack an epipod on maxilliped III but those from Cape Verde Islands and further north all have well-developed epipods". It inhabits depths from 55 to 500 m. This species appears to live in shoals (Chan & Crosnier, 1991). The largest specimen 18 mm CL, the smallest ovigerous female 12 mm CL (Chan & Crosnier, 1991). The studied specimens measured between 9.6 and 17.4 mm CL, the smallest ovigerous female 15.2 mm CL.

Batch fecundity estimate from six ovigerous females (15.6-17.4 mm CL) ranged from 3065 to 6852 eggs; mean value was 5518 ± 1682 eggs, which is consistent with similar values found for *Plesionika* species in the eastern Atlantic (González et al., 1997; Triay-Portella et al., 2016). Also Crosnier & Forest (1973, as *Parapandalus narval*) reported on one 11 mm CL ovigerous female of *P. longicauda* carrying about 5500 small eggs (0.45 × 0.55 mm).

This species has been often confused with *P. narval*, but Chan & Crosnier (1991) cleared its identity and distribution. The studied material was caught in the bathymetric interval of 90-167 m, which is included in the previously known species' vertical distribution. They were equally caught on (benthic) or over (epibenthic) rocky bottoms. Present sporadic catches do not seem to indicate that the species live in shoals. The present material ($n = 19$ individuals) includes 8 ovigerous females (15.2-17.4 mm CL) collected in July.

This is the first documented record for this species from the Cape Verde Islands and the northernmost one ever recorded in the eastern Atlantic, extending its distribution area to 16°45'N. This represents the fourteenth pandalid and the ninth *Plesionika* recorded for this archipelago.

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