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The family Penaeidae from the Canary Islands (Northeastern Atlantic), with first record of *Penaeus kerathurus*

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With 5 figures

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ABSTRACT: The prawn genus *Penaeus* is recorded for the first time from the Canary Islands based on the first record of *P. kerathurus*. A brief account on all Penaeidae species occurring in the Canary Islands waters is also included, with data relevant for their natural history.

Keywords: Crustacea, Decapoda, Penaeidae, *Penaeus kerathurus*, new record, Canary Islands, NE Atlantic.

RESUMO: Neste artigo é assinalada pela primeira vez para as ilhas Canárias uma espécie de camarão, *Penaeus kerathurus*. É incluída uma breve resenha de todas as espécies de Penaeidae que ocorrem nas águas das ilhas Canárias, com dados relevantes para a sua história natural.

Palavras-chave: Crustacea, Decapoda, Penaeidae, *Penaeus kerathurus*, novo assinalamento, Arquipélago das Canárias, NE do Oceano Atlântico.

INTRODUCTION

Within the decapod crustaceans, the suborder Dendrobranchiata Spence Bate, 1888 and in particular the family Penaeidae Rafinesque, 1815, have received poor attention from carcinologists in waters around the Canary Islands. SANTAELLA (1973) excluded this group from his catalogue of decapods from the Canaries. In his annotated and illustrated catalogue on the Canarian decapods, GONZÁLEZ (1995) compiled all information available on Penaeidae, including previous records of three species of the genus *Funchalia* Johnson, 1868 and a dubious new record of *Penaeopsis serrata* Spence Bate, 1881. In his impressive compilation, D'UDEKEM D'ACÓZ (1999) included only two species of *Funchalia* from the Canaries and validated GONZÁLEZ (1995) record of *P. serrata*.

QUILES *et al.* (2001) published the first documented record of *P. serrata* from the Canary Islands, and GONZÁLEZ & QUILES (2003) included the above-mentioned four Penaeidae species in their checklist of the Canary Islands marine biota.

Recently LANDEIRA & FRANSEN (2012) identified 29 species of mesopelagic shrimps collected between 200 and 750 m of depth from off the western islands of the Canary Archipelago, including both Dendrobranchiata and Caridea.

As a result of the above mentioned studies, the family Penaeidae is represented at least by two genera and four species in the waters of the Canary Islands: *Funchalia danae* Burkenroad, 1940, *Funchalia villosa* (Bouvier, 1905), *Funchalia woodwardi* Johnson, 1868, and *P. serrata*.

In the last years, underwater professional photographers have provided us with some photographs of a shallow-water Penaeid species from the Canaries, which is not yet recorded from this archipelago. Moreover, a local fisherman provided us with one specimen of this uncommon and unrecorded Penaeidae.

The goal of the present paper is to gather all available data relevant for the natural history of the Penaeidae occurring in the Canary Islands waters, including the first record of a 5th species of this family from this archipelago with a discussion on its most probable ways of colonisation.

MATERIAL AND METHODS

A thorough bibliographic search was done in order to compile the relevant information on the Penaeidae of the Canary Islands.

Examined specimens were measured according to standard carcinological procedures and preserved in

70% ethanol afterwards. Specimens were registered and deposited in the study collection (ICCM) of the Biology Department of the University of Las Palmas de Gran Canaria.

Abbreviations used: CL – Carapace length.

SYSTEMATICS

Funchalia danae Burkenroad, 1940

A single record (holotype) from West of Lanzarote Island (BURKENROAD, 1940). All further references were based on this record (GONZÁLEZ, 1995; PÉREZ FARFANTE & KENSLEY, 1997; D'UDEKEM D'ACÓZ, 1999; GONZÁLEZ & QUILES, 2003). The species was not found by LANDEIRA & FRANSEN (2012) during the surveys around this archipelago, where it seems to be rare.

F. danae is a pelagic species, capable to migrate to surface at night (CROSNIER & FOREST, 1973). It occurs in the northwest Pacific, south-central Indian Ocean, Arabian Sea and eastern Atlantic (Congo), including the Azores, Madeira, Canary and Saint Helena Islands (GRIPPA, 1987; PÉREZ FARFANTE & KENSLEY, 1997; D'UDEKEM D'ACÓZ, 1999).

Funchalia villosa (Bouvier, 1905)

This species was firstly recorded from the Canary Islands by LENZ & STRUNCK (1914), as *Funchalia vanhoeffeni*. Further specimens were collected by FOXTON (1970), BORDES (2009) and LANDEIRA & FRANSEN (2012). Further references were based on these records (GONZÁLEZ, 1995; PÉREZ FARFANTE & KENSLEY, 1997; D'UDEKEM D'ACÓZ, 1999; GONZÁLEZ & QUILES, 2003).

F. villosa is a pelagic species occurring at daytime down to 2608 m of depth, usually between 350 and 950 m (CROSNIER, 1985) and migrating at night to a depth of 50 m (FOXTON, 1970). It occurs in the Antarctic, southwest and eastern Indian Ocean, Australia, western Atlantic (Gulf of Mexico and the Caribbean Sea), eastern Atlantic off Madeira and Canary Islands, western Mediterranean and southern Atlantic off Tristan da Cunha and Valdivia Bank (GRIPPA, 1987; PÉREZ FARFANTE & KENSLEY, 1997; D'UDEKEM D'ACÓZ, 1999).

Funchalia woodwardi Johnson, 1867

A single record from the Canary Islands (SUND, 1920) based on material collected at West of Lanzarote Island. Further references were based on this record (GONZÁLEZ, 1995; GONZÁLEZ & QUILES, 2003). PÉREZ FARFANTE & KENSLEY (1997) and D'UDEKEM D'ACÓZ (1999) do not mention this species for the Canary Islands. Also it was not recorded by LANDEIRA & FRANSEN (2012) from around this archipelago, where it seems to be rare.

F. woodwardi is a pelagic species living from 27 m to 1544 m of depth and migrating at night to shallow waters

(D'UDEKEM D'ACÓZ, 1999). It occurs in the Indo-Pacific Ocean (Australia), Arabian Sea, and eastern Atlantic, from Norway to South Africa, including the Azores, Madeira (type locality), Canaries and western Mediterranean (JOHNSON, 1867; PÉREZ FARFANTE & KENSLEY, 1997; D'UDEKEM D'ACÓZ, 1999).

Penaeopsis serrata Spence Bate, 1881

Material examined: ICCM-006, CL = 26 mm, female, 27° 40' N 15° 44' W, 499 m, off Arguineguín, SW of Gran Canaria Island, 29 October 2004, F/V Juan Carlos Primero, cruise Pandcan4, sta. 10, bottom trap.

Additional material was also examined for comparison purposes: ICCM-155, CL = 35 mm, female, 36° 47' N 08° 33' W, 505 m, off Cape of San Vicente, Algarve, Portugal, 15 September 2006, F/V Atardecer, cruise APPE-29/2005, sta. 12, bottom trawl.

The first record of this species from the Canary Islands was made by GONZÁLEZ (1995) based on a colour photograph of one specimen collected off Tenerife at unknown depth, the identity of which was later validated by D'UDEKEM D'ACÓZ (1999). QUILES *et al.* (2001) published the first documented record of this species from the Canaries, based on the collection of 12 specimens off several islands. Further references were based on these records (D'UDEKEM D'ACÓZ, 1999; GONZÁLEZ & QUILES, 2003).

P. serrata is a littoral to bathyal benthic species, found on muddy and muddy-sandy substrates. Off the Canaries it has been collected between 284 m and 600 m of depth, sometimes reported as prey of fishes such as the stout beardfish *Polymixia nobilis* (Polymixiidae) or the rosy dory *Cyttopsis rosea* (Parazenidae) (QUILES *et al.*, 2001). Elsewhere, it occurs from 120 m to 750 m of depth. It is an amphi-Atlantic species. In the north-western Atlantic, it occurs from New Jersey to Brazil and in the north-eastern Atlantic, from southern Portugal to Mauritania, including the Canary Islands (PÉREZ FARFANTE & KENSLEY, 1997; D'UDEKEM D'ACÓZ, 1999).

The species was not collected during the Dutch CANCAP expeditions to the waters of the Canaries, Cape Verde Islands and Mauritania (1976-1986) (FRANSEN, 1991). Off the Canary Islands this species seems to be uncommon, as occasional catches of few individuals have been made by local small-scale fisheries with bottom traps. The material from Cape S. Vicente, confirms south Portugal as the northern limit of the species' distribution in the East Atlantic Ocean.

Penaeus kerathurus (Forskål, 1775) (Figs. 1-5)

Material examined: ICCM-398 (Figs. 1-2), CL = 31 mm, male, 28° 08' N 15° 25' W, 8-10 m, outside the outer seawall

of a marina ('Muelle Deportivo') at Las Palmas de Gran Canaria, NE of Gran Canaria Island, 5 June 2014, bottom shrimp-trap.



Fig. 1 – *Penaeus kerathurus* (Forskål, 1775), ICCM-398, CL = 31 mm, male, freshly caught (photo by anonymous fisherman).

Additional material: Two more specimens observed amongst the catch of a trammel net set in a nearby locality. Both localities are situated in the close vicinity of the 'Puerto de La Luz y de Las Palmas', which is one of the largest harbours in Africa.

P. kerathurus is a demersal species occurring in shallow coastal marine and brackish waters, living on sandy, sandy-muddy, muddy sand or shell gravel substrates (FRANSEN, 1991; D'UDEKEM D'ACÓZ, 1999), from 0.5 m (juveniles) to 90 m of depth, mainly between 5 m and 40 m (D'UDEKEM D'ACÓZ, 1999). It occurs in the eastern Atlantic, from southern England to Atlantic Morocco and Mauritania, southwards to northern Angola, the entire Mediterranean Sea and the Suez Canal (PÉREZ FARFANTE & KENSLEY, 1997; D'UDEKEM D'ACÓZ, 1999).



Fig. 2 – *Penaeus kerathurus* (Forskål, 1775), ICCM-398, CL = 31 mm, male, fixed.

The present material represents the first record of this species from the Canary Islands. In the last five years, several underwater professional photographers have provided us with some superb photographs of this species taken in waters of Lanzarote (Figs. 3-5), Gran Canaria and Tenerife Islands. At last, a local fisherman provided us with one specimen of this uncommon and yet unrecorded Penaeidae.



Fig. 3 – *Penaeus kerathurus* (Forskål, 1775) on a sandy bottom in Lanzarote Island; lateral view (photo by Arturo Telle).



Fig. 4 – *Penaeus kerathurus* (Forskål, 1775) on a sandy bottom in Lanzarote Island; lateral view (photo by Arturo Telle).

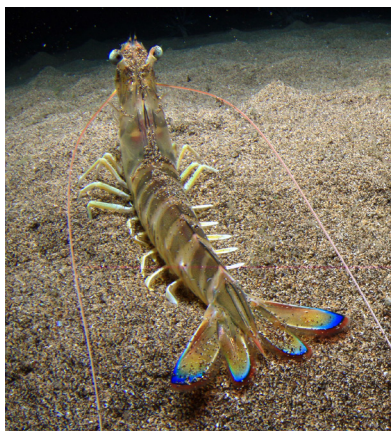


Fig. 5 – *Penaeus kerathurus* (Forskål, 1775) on a sandy bottom in Lanzarote Island; dorsal view (photo by Arturo Telle).

DISCUSSION

To date, and according to the present account, the family Penaeidae is represented in the Canary Islands by three genera (*Funchalia* Johnson, 1868, *Penaeopsis* Spence Bate, 1881 and *Penaeus* Fabricius, 1798) and five valid species: *F. danae*, *F. villosa*, *F. woodwardi*, *P. serrata*, and *P. kerathurus*, all of them rare or uncommon.

Species of *Funchalia* are clearly pelagic, migrating into surface waters at night.

Penaeopsis serrata is mainly a benthic species, but since it has been caught in the Canary Islands' waters with semi-floating shrimp traps, set 2.4 m above seabed (ARRASATE-LÓPEZ *et al.*, 2012), it can be also considered as nektobenthic or benthopelagic.

Penaeus kerathurus is a demersal shallow-water species occurring in both marine and brackish habitats. Three hypotheses can be put forward to explain the recent colonisation of the Canary Islands by this species.

It is widely known that the members of the genus *Penaeus* are very prolific and undergo 11 larval stages (5 nauplii, 3 protozoae and 3 mysis) until adulthood. These larvae are planktonic and therefore carried by currents toward the shore where they arrive as postlarvae. These postlarvae usually penetrate inshore brackish waters, abandon their planktonic way of life and become bottom dwellers living in shallow areas (e.g., PÉREZ FANFANTE, 1978; LAGARDÈRE, 1981). *P. kerathurus* is distributed along the Atlantic Moroccan and Western Saharan coasts, *i.e.* less than 100-120 km from the easternmost Canary Islands, Fuerteventura and Lanzarote. On the other hand, the Canaries are under the influence of the Eastern Central Atlantic subtropical gyre, which could facilitate the transport of marine larvae from the Northwest African coast to the archipelago (e.g. AGUILERA *et al.*, 1994; BARTON *et al.*, 1998). Moreover, a mesoscale distribution of larval fish and crustaceans has been recently described in filaments of the upwelling system from the African coast, reaching the southeast of this archipelago (RODRÍGUEZ *et al.*, 2004; BÉCOGNÉE *et al.*, 2009). These studies have demonstrated that short-lived African larvae are arriving to the Canary Islands transported by currents or upwelling filaments, since a quasi-permanent flow of this type of organisms has been documented. So, the first hypothesis is a natural colonisation and perhaps *Penaeus kerathurus* postlarvae find the vicinity of ports and marinas of the Canary Islands, where adults are frequently photographed by scuba-divers, as the most hyposaline (brackish) suitable environments. This distribution pattern is similar to the

one off the Spanish coast in the Iberian Peninsula, where this prawn species is more abundant in brackish waters near the mouth of some rivers. The absence of permanent freshwater streams in the Canary Islands could explain the rarity of *Penaeus* species on their shores.

In the early 1980's, different aquaculture experiments with *P. kerathurus* were carried out in nearby ground facilities onshore. The authors have interviewed some of the scientists and technicians responsible for these experiments, who have recognized the real possibility of accidental escapes of larvae and/or postlarvae into the sea. This second hypothesis points towards a man-made unintentional introduction.

Finally, it would be worth mentioning ballast waters, in particular from oilrigs, discharged close to or in the surroundings of main harbours. *Penaeus* larvae could well be pumped in ballast waters, somewhere in the African coast. Transport of species by drilling platforms has been documented in the past elsewhere (BERCAW, 1993; FERREIRA *et al.*, 2006).

Over the last five years, oilrig transits between neighbouring African coast and major ports of the Canaries, situated precisely on the islands of Gran Canaria, Tenerife and Lanzarote, have substantially increased due to repair and maintenance works. This third hypothesis represents another man-made unintentional introduction and if true, puts in evidence the changes of biodiversity due to human activities, which are of particular importance in island ecosystems.

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