

# DECAPOD CRUSTACEANS COLLECTED BY THE "EXPEDITION AZORES 1989"

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## ARQUIPÉLAGO



PAULA, JOSÉ, ALEXANDRA CARTAXANA & HENRIQUE QUEIROGA. Decapod crustaceans collected by the "Expedition Azores 1989". - *Arquipélago*. Life and Earth Sciences 10: 67-74. Angra do Heroísmo. ISSN 0870-6581.

The littoral decapod crustacean populations of the islands of Faial and Pico were qualitatively sampled from 9 to 24 July 1989. Sampling methods consisted mainly of shore and SCUBA diving manual collecting on rocky substrates, but trawl nets and suction devices were also used on sandy bottoms. A total number of 41 species (16 families) were collected or observed. The following data are given under each species: locality(ies), depth and/or habitat, number, sex, ovigerous condition and sizes. Some faunistical, taxonomical and ecological remarks are made.

PAULA, JOSÉ, ALEXANDRA CARTAXANA & HENRIQUE QUEIROGA. Crustáceos decápodes colhidos pela "Expedição Açores 1989". - *Arquipélago*. Ciências da Natureza 10: 67-74. Angra do Heroísmo. ISSN 0870-6581.

As populações litorais de crustáceos decápodes das ilhas do Faial e Pico foram amostradas qualitativamente de 9 a 24 de Julho de 1989. Os métodos de amostragem consistiram, principalmente, em colheitas manuais em substrato rochoso, em praias e em mergulho com escafandro autónomo. Redes de arrasto e sugadoras foram também utilizadas sobre fundos de areia. Foram colhidas ou observadas um total de 41 espécies (16 famílias). Para cada espécie são fornecidos os seguintes dados: localidade(s), profundidade e/ou habitat, data de colheita, número, sexo, presença de ovas e tamanhos. São produzidas algumas considerações de ordem faunística, taxonómica e ecológica.

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## INTRODUCTION

The decapod crustacea fauna of the Azores archipelago is poorly studied. Bibliographical records are almost restricted to a few early works, mainly faunistical lists and single species records (e.g. BARROIS 1888; MILNE EDWARDS 1891; MILNE EDWARDS & BOUVIER 1900; NOBRE 1924, 1930; CHAPMAN & SANTLER 1955; FIGUEIRA 1959, 1960, 1964). Fewer papers were published on crustacean biology and ecology, as ALMAÇA (1987) and MARTINS (1985a, 1985b).

These references were recently compiled by MARTINS (1990). The general works by ZARIQUIEY-ALVAREZ (1968), INGLE (1980) and MANNING & HOLTHUIS (1981), although not referring

specificly to the Azores, remain the better works for identification purposes of the decapod fauna of the archipelago.

The "Expedition Azores 1989 - Ecology and Taxonomy of the Marine Littoral" took place during June and July 1989 in the islands of Faial and Pico. The general objectives of the expedition were to contribute to the understanding of the ecology of the littoral biotopes of these islands and to describe qualitatively and, wherever possibly, quantitatively, their communities. For more details see MARTINS & al. (1992). Several research teams contributed their efforts to a number of different themes. This paper lists and describes the material collected by the decapod crustacean group, as well as the material from the benthos destructive and non-destructive sampling and other dive and shore observations made during the ex-

pedition. Some faunistic, taxonomic and ecological considerations are presented.

## METHODS

Qualitative sampling was conducted from 9 to 24 July 1989. The sampling methods made possible the collection of material from the intertidal and infralitoral zones. These consisted of shore collecting and SCUBA diving. Special attention was paid to microhabitats such as crevices, boulders, piers and algal tufts.

One only successful night dive was made, and so the nocturnal species were poorly sampled. A few specimens were obtained from destructive sampling along a number of transects laid across rocky shores. Collecting was concentrated on rocky substrates, but material was also obtained from sandy and muddy substrates with the use of a suction device and nets. Fig. 1 shows the sampling sites.

Decapods were identified, sexed and measured and are now deposited at the Laboratório Marítimo da Guia, Cascais.

## RESULTS

### CHECK-LIST OF SPECIES AND MATERIAL EXAMINED

A total number of 41 species, comprising 16 families, were collected or observed. The species marked (\*) were not collected, only observed during diving work.

Data under each species entry conform to the format: Locality, depth and/or habitat, date:

number male/female/ female ov/juv, CL/CW;

where ov = ovigerous, juv = juvenile, CL = carapace length, CW = carapace maximum width.

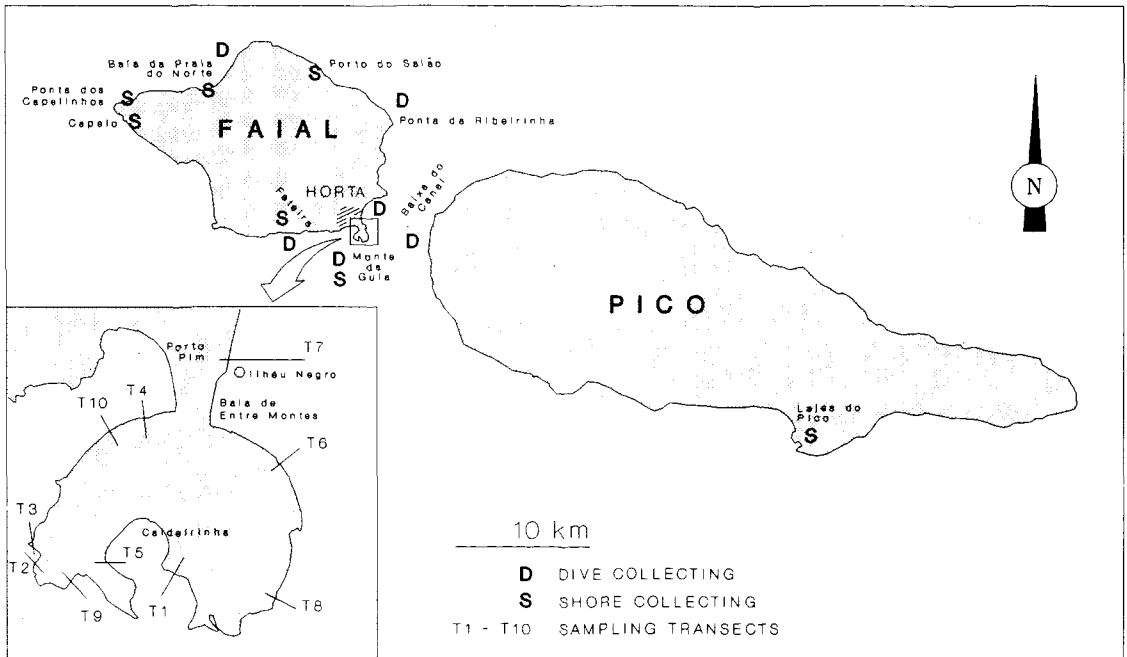


Fig. 1. Decapod crustaceans sampling sites in Faial and Pico.

**Family Rhynchocinetidae**

(\*) *Rhynchocinetes rigens* Gordon, 1936

**Family Gnathophyllidae**

*Gnathophyllum elegans* (Risso, 1816)

Caldeirinha (Faial), 10 m, 14.07.89: 1 male, CL- 10 mm.

**Family Palaemonidae**

*Palaemon elegans* Rathke, 1837

Capelo (Faial), intertidal, 11.07.89: 5 males, CL- 7, 7.5, 8, 8, 8.5 mm + 1 female ov, CL- 10 mm.

Capelinhos (Faial), intertidal, 11.07.89: 1 female, CL- 4.5 mm.

Lajes (Pico), intertidal, 20.07.89: 7 females ov, CL- 10, 10, 10.5, 11, 11, 11, 11 mm.

*Pontonia pinnophylax* (Otto, 1821)

Baixa do Canal (Faial/Pico), 25 m inside *Pinna nobilis*, 13.07.89: 1 male, CL- 7.5 mm.

Ponta da Ribeirinha (Faial), 15 m inside *Pinna nobilis*, 14.07.89: 1 male, CL- 11.5 mm + 1 female, CL- 13 mm.

**Family Pandalidae**

(\*) *Parapandalus narval* (Fabricius, 1787)

**Family Alpheidae**

*Alpheus macrocheles* (Hailstone, 1835)

Caldeirinha (Faial), 8 m in crevice, 13.07.89: 1 male, CL- 11 mm.

*Alpheus dentipes* Guérin, 1832

Feteira (Faial), 8 m on *Corallina/Jania*, 18.07.89: 1 female ov, CL- 7 mm.

**Family Scyllaridae**

(\*) *Scyllarus arctus* (Linnaeus, 1758)

(\*) *Scyllarides latus* (Latreille, 1803)

**Family Diogenidae**

*Clibanarius erythropus* (Latreille, 1818)

Baía de Entre-Montes (Faial), intertidal, 07.89: 1 female ov, CL- 4.6 mm.

Lajes (Pico), intertidal, 19.07.89: 6 males, CL- 7, 10, 10, 11, 13, 13 mm + 2 females ov, CL- 10, 10 mm.

*Calcinus ornatus* (Roux, 1830)

Caldeirinha T5 (Faial), 0 - 10 m, 07.89: 18 males, CL- 3.5, 4, 4.5, 6, 6, 6.5, 6.5, 6.5, 7, 7, 7, 7.5, 8, 8, 8, 8.5 mm + 8 females, CL- 3, 3.5, 4, 6, 6, 6.5, 6.5, 7 mm.

Caldeirinha T5 (Faial), 15 m, 17.07.89: 1 male, CL- 10 mm + 1 female ov, CL- 7 mm.

Baixa do Canal (Faial/Pico), 30 m, 17.07.89: 3 males, CL- 6.5, 7, 7.5 mm + 1 female, CL- 6 mm + 3 females ov, CL- 3.5, 6, 6.5 mm.

Feteira (Faial), intertidal pool, 17.07.89: 1 female, CL- 5 mm.

Monte da Guia T2 (Faial), 15 m, 07.89: 1 female ov, CL- 3.2 mm.

Monte da Guia T2 (Faial), 30 m, 14.07.89: 1 female ov, CL- 2.6 mm.

Monte da Guia (Faial), in labridae nest, 07.89: 1 male, CL- 2.2 mm.

Ilhéu Negro (Faial), 0 - 10 m, 24.07.89: 1 male, CL- 4 mm + 1 female, CL- 4.5 mm + 4 females ov, CL- 3.1, 4.0, 4.2, 4.2 mm.

Monte da Guia T4/T6 (Faial), 0 - 10 m, 07.89: 30 non-measured specimens.

*Dardanus callidus* (Risso, 1827)

Caldeirinha T5 (Faial), 5 m, 12.07.89: 1 female ov, CL- 18 mm.

Baía de Entre-Montes (Faial), 5 m, 15.07.89: 1 female, CL- 16 mm.

Baía de Entre-Montes T6 (Faial), 10 m, 17.07.89: 2 males, CL- 10, 12 mm + 2 females ov, CL- 14, 14 mm.

Baixa do Canal (Faial/Pico), 30 m, 17.07.89: 2 males, CL- 17.5, 27.5 mm + 1 female, CL- 9.8 mm + 1 female ov, CL- 16.3 mm.

Baía de Entre-Montes T6 (Faial), 10 - 15 m, 07.89: 5 males, CL- 14, 15, 21, 26.5, 31 mm + 1 female, CL- 19.5 mm.

**Family Paguridae**

*Pagurus cuanensis* Bell, 1846

Baía de Entre-Montes T6 (Faial), 10 m, 17.07.89: 1 male, CL- 9 mm.

Monte da Guia T2 (Faial), 30 m, 14.07.89: 1 female, CL- 6 mm.

Caldeirinha T1 (Faial), 5 - 10 m, 15.07.89: 6 males, CL- 7, 10, 10, 11, 12, 15 mm.

Lajes (Pico), intertidal pool, 19.07.89: 1 female, CL- 7 mm.

*Anapagurus* sp.

Monte da Guia T2 (Faial), 30 m, 14.07.89: 1 male, CL- 2.0 mm.

**Family Galatheidae**

*Galathea squamifera* Leach, 1814

Caldeirinha (Faial), 9 m, 22.07.89: 1 male, CL/CW- 13.5/9 mm.

(\*) *Galathea strigosa* (Linnaeus, 1767)

**Family Stenopodidae**

(\*) *Stenopus spinosus* Risso, 1827

**Family Dromiidae**

(\*) *Dromia personata* (Linnaeus, 1759)

**Family Portunidae**

*Liocarcinus holsatus* (Fabricius, 1798)

Porto Pim (Faial), trawl net 0 - 10 m, 24.07.89: 1 male.

*Liocarcinus corrugatus* (Pennant, 1777)

Feteira (Faial), intertidal pool, 17.07.89: 1 male, CL/CW- 15.5/18.1 mm.

Monte da Guia (Faial), in labridae nest, 07.89: 1 male, CL/CW- 9.6/10 mm.

*Portunus hastatus* (Linnaeus, 1767)

Porto Pim (Faial), night trawl net 0 - 10 m, 24.07.89: 1 male, CL/CW- 21.3/44.3 mm.

**Family Xanthidae**

*Pilumnus spinifer* H. Milne Edwards, 1834

Capelinhos (Faial), 2 m in barnacle shell, 11.07.89: 1 female, CL/CW- 9.9/14.8 mm.

*Eriphia verrucosa* (Forsk., 1775)

Feteira (Faial), intertidal, 18.07.89: 2 males, CL/CW- 16/23.1, 22.1/31.2 mm.

Capelinhos (Faial), intertidal, 11.07.89: 3 males, CL/CW- 21.0/29.8, 23.1/33.1, 28.8/43.0 mm + 1 female ov, CL/CW- 24.0/33.8 mm.

Lajes (Pico), intertidal, 20.07.89: 1 male, CL/CW- 32.1/47.1 mm + 3 females, CL/CW- 21/31.6, 22.1/32.2, 24.9/36.4 mm.

*Xantho incisus* (Leach, 1814)

Baía de Entre-Montes (Faial), 3 - 5 m, 15.07.89: 3 males, CL/CW- 9/13, 11/17, 17/24 mm + 7 females, CL/CW- 10/14, 11/16, 13/19, 13/19, 14/20, 14/21, 17/25 mm.

Caldeirinha T5 (Faial), 10 m, 12.07.89: 1 male, CL/CW- 16.1/24.6 mm + 1 female, CL/CW- 11.5/17.4 mm + 1 female ov, CL/CW- 11.8/16.8 mm.

Caldeirinha T5 (Faial), 10 - 15 m, 17.07.89: 3 males, CL/CW- 14/21, 18/27, 18/28 + 9 females, CL/CW- 10/15, 10/15, 11/16, 12/18, 13/19, 13/19, 14/21, 15/24, 17/26 mm.

Caldeirinha T5 (Faial), 3 m, 07.89: 1 male, CL/CW- 4.8/8.5 mm.

Caldeirinha T5 (Faial), 5 m, 10.07.89: 1 female, CL/CW- 13/20 mm.

Caldeirinha (Faial), 9 m, 22.07.89: 10 males, CL/CW- 6.0/8.9, 6.4/9.5, 6.5/8.9, 6.5/9.2, 6.8/10.0, 6.8/10.5, 7.3/10.8, 10.6/16.7, 11.9/17.7, 25.5/33.1 mm + 10 females, CL/CW- 4.4/6.0, 4.6/6.5, 5.2/7.7, 7.1/10.2, 11.5/17.6, 11.5/17.6, 12.3/19.5, 13.5/21.0, 15.4/23.9, 16.4/25.6 mm.

Monte da Guia T2 (Faial), 5 m, 07.89: 2 males, CL/CW- 4.2/6.1, 4.8/6.5 mm.

Baía de Entre-Montes T6 (Faial), 10 m, 17.07.89: 1 male, CL/CW- 22/34 mm + 1 juv, CL/CW- 6/9 mm.

*Xantho pilipes* A. Milne Edwards, 1867

Caldeirinha T5 (Faial), 10 m, 12.07.89: 1 female, CL/CW- 6.9/9.8 mm.

Caldeirinha T5 (Faial), 10 - 15 m, 17.07.89: 2 males, CL/CW- 9/13, 9/14 mm.

Caldeirinha (Faial), 9 m, 22.07.89: 2 males, CL/CW- 8.4/11.5, 12.4/17.6 mm + 3 females, CL/CW- 7.9/11.1, 8.1/11.3, 9.8/13.7 mm + 1 female ov, CL/CW- 10.5/15.0 mm.

Baía de Entre-Montes (Faial), 5 m, 15.07.89: 1 female, CL/CW- 8.6/12.1 mm.

- Baía de Entre-Montes T6 (Faial), 12 m, 17.07.89: 1 male, CL/CW- 9/1 mm + 1 female ov, CL/CW- 8.7/12.6 mm.
- Microcassiope minor* (Dana, 1852)
- Caldeirinha T5 (Faial), 10 m, 12.07.89: 3 males, CL/CW- 4.7/6.8, 4.9/7.1, 5.6/8.1 mm + 1 female, CL/CW- 5.0/6.8 mm.
- Caldeirinha (Faial), 6 - 9 m, 22.07.89: 7 males, CL/CW- 4.0/6.0, 4.5/6.0, 5.4/7.6, 5.5/7.7, 5.6/7.9, 7.3/10.3, 8.2/12.3 mm + 5 females, CL/CW- 4.0/5.6, 4.5/6.5, 5.0/7.1, 5.2/7.3, 5.2/7.4 mm + 1 female ov, CL/CW- 4.9/7.1 mm.
- Ilhéu Negro (Faial), ?, 24.07.89: 1 female, CL/CW- 5.5/7.6 mm.
- Nanocassiope melanodactyla* (A. Milne Edwards, 1867)
- Ponta da Ribeirinha (Faial), 15 m on *Pinna nobilis* shell, 17.07.89: 1 male, CL/CW- 6.0/9.0 mm.
- Caldeirinha T5 (Faial), 5 m, 10.07.89: 3 females ov, CL/CW- 4.5/7.0, 5.2/8.4, 5.3/8.7 mm.
- Caldeirinha T5 (Faial), 8 m, 12.07.89: 1 male, CL/CW- 7.9/11.7 mm + 3 females, CL/CW- 5.6/8.7, 5.6/9.0, 6.0/8.9 mm.
- Caldeirinha T5 (Faial), 10 m, 17.07.89: 1 male, CL/CW- 8.0/11.0 mm + 1 female, CL/CW- 7.0/10.0 mm.
- Caldeirinha (Faial), 9 - 12 m, 22.07.89: 1 female, CL/CW- 5.5/8.2 mm + 1 female ov, CL/CW- 4.0/6.4 mm.
- Monte da Guia T2 (Faial), 10 m, 12.07.89: 1 female ov, CL/CW- 3.4/5.2 mm.
- Monte da Guia T2 (Faial), 10 m, 14.07.89: 3 males, CL/CW- 3.4/5.2, 3.5/5.5, 5.0/7.7 mm.
- Monte da Guia T2 (Faial), 15 m, 12.07.89: 1 female ov, CL/CW- 2.7/3.6 mm.
- Monte da Guia T2 (Faial), 20 m, 07.89: 1 female ov, CL/CW- 2.9/4.5 mm.
- Feteira (Faial), 8 m, 13.07.89: 2 females, CL/CW- 3.8/5.6, 3.8/6.0 mm + 2 females ov, CL/CW- 3.3/5.2, 4.2/6.5 mm.
- Ilhéu Negro (Faial), ?, 24.07.89: 1 female, CL/CW- 5.5/8.2 mm.
- Baía de Entre-Montes T6 (Faial), 10 m, 17.07.89: 1 male, CL/CW- 5.2/7.6 mm + 2 females, CL/CW- 4.4/6.6, 5.5/8.2 mm.

## Family Grapsidae

### *Grapsus grapsus* (Linnaeus, 1758)

- Porto do Salão (Faial), intertidal, 14.07.89: 1 male, CL/CW- 31.7/36.0 mm + 1 female, CL/CW- 24.4/27.5 mm.
- Lajes (Pico), intertidal, 20.07.89: 1 male, CL/CW- 44.0/47.6 mm.

### *Pachygrapsus marmoratus* (Fabricius, 1787)

- Feteira (Faial), intertidal, 18.07.89: 2 males, CL/CW- 18.5/21.7, 29.4/33.5 mm + 1 female, CL/CW- 17.6/20.7 mm.
- Lajes (Pico), intertidal, 20.07.89: 4 males, CL/CW- 23.9/27.3, 26.8/30.8, 31.7/37.0, 31.9/36.8 mm.

- Capelo (Faial), intertidal, 11.07.89: 16 males, CL/CW- 6.4/7.5, 7.4/8.9, 7.6/8.7, 7.7/9.0, 7.7/9.0, 8.1/9.4, 8.1/9.5, 8.2/9.5, 8.2/9.8, 8.4/9.5, 8.7/10.0, 9.4/10.6, 10.6/12.3, 11.6/13.4, 12.3/14.4, 12.9/14.7 mm + 5 females, CL/CW- 7.4/8.7, 7.4/8.9, 12.1/13.6, 13.4/15.5, 14.5/16.9 mm + 3 females ov, CL/CW- 9.2/10.8, 12.3/13.9, 17.3/20.7 mm.

- Capelinhos (Faial), intertidal, 11.07.89: 3 males, CL/CW- 18.5/20.9, 30.1/34.4, 32.0/36.1 mm + 2 females ov, CL/CW- 20.8/24.4, 30.5/35.1 mm.

### *Pachygrapsus maurus* (Lucas, 1846)

- Porto do Salão (Faial), intertidal, 14.07.89: 2 males, CL/CW- 10.7/9.2, 14.5/11.8 mm + 2 females ov, CL/CW- 15.5/18.5, 16.7/18.9 mm.

- Monte da Guia T2 (Faial), intertidal, 08.07.89: 1 female ov, CL/CW- 10.0/11.6 mm.

- Monte da Guia T3 (Faial), intertidal, 07.89: 1 male, CL/CW- 7.4/8.6 mm.

- Capelo (Faial), intertidal, 11.07.89: 9 males, CL/CW- 5.2/6.3, 5.8/7.1, 6.3/7.4, 6.4/7.4, 7.3/8.4, 7.7/9.5, 8.2/9.5, 8.3/9.7, 12.3/13 mm + 1 female, CL/CW- 8.2/10.0 mm + 6 females ov, CL/CW- 6.8/8.1, 6.9/8.5, 7.3/8.7, 10.0/11.9, 12.9/15.0, 14.2/16.5 mm.

- Capelinhos (Faial), intertidal, 11.07.89: 7 males, CL/CW- 6.3/7.4, 8.7/10.2, 8.9/10.0, 9.2/11.0, 11.3/12.7, 16.0/18.2, 18.2/21.5 mm + 1 female, CL/CW- 10.3/12.4 mm + 14 females ov, CL/CW- 5.5/6.8, 6.5/7.7, 7.1/8.7, 7.3/8.5, 7.4/8.5, 9.4/11.0, 11.1/13.2, 11.1/13.4, 11.1/13.4, 14.0/16.8, 14.5/17.3, 14.7/17.4, 16.2/18.5, 17.1/20.5 mm.

*Planes minutus* (Linnaeus, 1758)

Lajes (Pico), on buoy with goose barnacles,  
09.07.89: 1 male, CL/CW- 11.1/11.4 mm +  
1 female ov, CL/CW- 17.3/17.7 mm.

*Percnon gibbesi* (Herbst, 1804)

Praia do Norte (Faial), 5 m, 14.07.89: 3 males,  
CL/CW- 25.0/23.9, 30.8/29.2, 31.3/29.7  
mm + 2 females, CL/CW- 13.6/12.6,  
17.1/16.3 mm + 2 females ov, CL/CW-  
29.9/29.7, 31.7/30.5 mm.

#### Family Parthenopidae

c.f. *Parthenope expansa* (Miers, 1879)

Ponta da Ribeirinha (Faial), 15 m on *Pinna  
nobilis* shell, 17.07.89: 1 male.

#### Family Majidae

(\*) *Maja squinado* (Herbst, 1788)

*Eurynome aspera* (Pennant, 1777)

Monte da Guia T2 (Faial), 20 m, 15.07.89: 1  
male, CL/CW- 6.0/5.5 mm + 1 female ov,  
CL/CW- 5.4/4.2 mm.

Ponta da Ribeirinha (Faial), 15 m on *Pinna  
nobilis* shell, 17.07.89: 1 female ov,  
CL/CW- 4.8/4.0 mm.

*Acanthonyx lunulatus* (Risso, 1816)

Lajes (Pico), 0 m, 20.07.89: 1 male + 3 fe-  
males ov.

*Acanthonyx brevifrons* A. Milne Edwards, 1869

Feteira (Faial), 8 m, 18.07.89: 1 female ov,  
CL/CW- 15.9/12.3 mm.

c.f. *Inachus guentheri* (Miers, 1879)

Porto da Horta (Faial), 12 m, 24.07.89: 1 male,  
CL/CW- 4.0/3.0 mm.

*Achaeus cranchii* Leach, 1817

Porto da Horta (Faial), 8 m, 24.07.89: 1 female  
ov, CL/CW- 5.0/4.5 mm.

Ilhéu Negro (Faial), ?, 24.07.89: 1 male,  
CL/CW- 5.5/4.5 mm.

Monte da Guia T2 (Faial), 10 m, 12.07.89: 1  
female ov, CL/CW- 6.0/5.5 mm.

Caldeirinha T1 (Faial), 10 m, 14.07.89: 2  
males, CL/CW- 8.2/6.8, 8.1/6.5 mm + 1 fe-  
male ov, CL/CW- 6.1/4.5 mm.

Caldeirinha T1 (Faial), 10 m, 03.07.89:  
1(damaged).

Caldeirinha T1 (Faial), 19 m, 04.07.89: 1  
male, CL/CW- 8.0/6.0 mm + 1 female ov,  
CL/CW- 6.0/5.0 mm.

Baixa do Canal (Faial/Pico), 56 m, 17.07.89: 1  
male, CL/CW- 6.7/5.2 mm.

*Achaeus gracilis* (O. Costa, 1839)

Monte da Guia T2 (Faial), 15 m, 12.07.89: 1  
female ov, CL/CW- 5.5/5.0 mm.

*Achaeus* sp.

Caldeirinha T1 (Faial), 10 m, 14.07.89: 1 fe-  
male ov, CL/CW- 6.5/6.1 mm.

#### FAUNISTICAL/TAXONOMICAL REMARKS

A few species presented a degree of morphologi-  
cal variation relative to the original descriptions.  
Although the material still needs a more exhaus-  
tive study, the following comments may be made.

Two forms of *Acanthonyx* were found, corre-  
sponding to the species *A. lunulatus* and *A. brevifrons*. These two species were originally con-  
sidered as varieties of *A. lunulatus*. The specimens  
collected that were assigned to *A. lunulatus* show  
intermediate features between the two species, es-  
pecially concerning the characters that are used to  
separate them, as the form and armature of the ca-  
rapace (see MANNING & HOLTHUIS 1981). This  
fact raises again the question of the validity of the  
species *A. brevifrons*.

Although some variation has been described  
concerning *Achaeus cranchii*, the specimens col-  
lected show a higher degree of variability, espe-  
cially in the form of the rostral spines. Another  
form of this genus was found that could not be as-  
signed to any of the species recorded in the East-  
ern Atlantic. The identity of this specimen thus re-  
mains unsolved for the moment.

A small specimen, tentatively identified as *In-  
achus guentheri*, is difficult to distinguish from a  
juvenile of *I. leptochirus*. Since *I. guentheri* was  
previously recorded only from the west coast of  
Africa (MANNING & HOLTHUIS 1981), a larger  
sample of this form is needed for its correct as-  
signment.

## ECOLOGICAL REMARKS

The abundance of the intertidal grapsid species, *Grapsus grapsus*, *Pachygrapsus marmoratus* and *Pachygrapsus maurus*, was found to be related to substrate type especially to the presence of crevices, boulders, algal tufts or any other features that may serve as shelters for the crabs. These three species present different vertical distributions. *G. grapsus* is essentially a supralittoral species that may extend to low intertidal during low tide. *P. marmoratus* occurs in the upper part of the intertidal where algal growth is scarce. It was found to be abundant in Capelo boulder beach. *P. maurus* occupies the lower intertidal in small crevices and among algal tufts.

The xanthid *Eriphia verrucosa* was found at the same level of *Pachygrapsus maurus*, preferring deep crevices and holes.

*Acanthonyx lunulatus* was collected among *Cystoseira* and *Pterocladia* in the extreme lower intertidal and in rock pools.

Also in rock pools were collected the hermit crab *Clibanarius erythropus* and the prawn *Palaeomon elegans*. The hermit crab *Calcinus ornatus* is the shallower of the infralittoral species, extending from near the surface down to about 10 m, occasionally at 30 m at Baixa do Canal.

In the *Corallina/Jania* complex, between 5 and 15 m, were found *Achaeus* spp., *Alpheus dentipes*, *Pagurus cuanensis* and *Nanocassiope melanodactyla*.

The shallow bottoms of blocks and boulders down to 15 m are a particular rich habitat. Intensive collecting was made in the inner Caldeirinha, where xanthid species were very abundant. The following species were collected or observed: *Xantho incisus*, *Xantho pilipes*, *Microcassiope minor*, *Nanocassiope melanodactyla*, *Galathea strigosa*, *Galathea squamifera*, *Scyllarides latus*, *Alpheus macrocheles* and *Gnathophyllum elegans*.

*Percnon gibbesi* was found on bottoms with large blocks, and was very abundant at Praia do Norte.

The hermit crabs *Dardanus callidus* and *Pagurus cuanensis* were collected in a range of substrates.

*Ponthonia pinnophylax* was found inside the bivalve *Pinna nobilis*. Two other species, *Eury-*

*nome aspera* and *?Parthenope expansa*, were found on the shell of the same bivalve.

During the night dive along the Horta harbour wall, *Stenopus spinosus*, *Scyllarus arctus* and *Dromia personata* were observed.

The samples collected with the trawl net in the sandy bottom of Porto Pim produced only two species; *Portunus hastatus* and *Liocarcinus hol-satus*.

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## REFERENCES

- ALMAÇA, C. 1987. Egg number and size in *Pachygrapsus maurus* (Lucas, 1846) from Praia da Laginha (Faial, Azores Islands). - *Investigación Pesquera* 51 (Suppl.1): 157-163.
- BARROIS, T.H. 1888. *Catalogue des Crustacés Marins, recueillis aux Açores*. Lille, 1988. 100 pp.
- CHAPMAN, G. & J.E. SANTLER 1955. Aspects of the Fauna and Flora of the Azores. V. Crustacea. - *Annals and Magazine of Natural History*. Series 12, 8: 371-376.
- FIGUEIRA, A.J.G. 1959. On a specimen of *Stenopus spinosus* Risso from the Azores. - *Bocagiana* 3: 1-6.
- FIGUEIRA, A.J.G. 1960. On a small collection of decapod crustaceans from the Azores. - *Bocagiana* 6: 1-13.
- FIGUEIRA, A.J.G. 1964. A new record of *Paramola cuvieri* (Risso) from the Azores (Crustacea, Decapoda, Thelxiopeidae). - *Açoreana* 6 (1): 69-71.
- INGLE, R.W. 1980. *British Crabs*. Oxford University Press, Oxford. 222 pp.
- MANNING, R.B. & L.B. HOLTHUIS 1981. West African Brachyuran Crabs (Crustacea, Decapoda). - *Smithsonian Contributions to Zoology* 306: 1-379.
- MARTINS, H.R. 1985a. Biological studies of the exploited stock of the Mediterranean locus lobster *Scyllarides latus* (Latreille, 1803) (Decapoda:

- Scyllaridae) in the Azores. - *Journal of Crustacean Biology* 5 (2): 294-305.
- MARTINS, H.R. 1985b. Some observations on the nauplisoma and phyllosoma larvae of the Mediterranean locus lobster *Scyllarides latus*, (Latreille, 1803), from the Azores. - *International Council for the Exploitation of the Sea* (ICES) CM 1985/K: 52. 13pp.
- MARTINS, H.R. 1990. A selected bibliography of the marine fauna and flora of the Azores. - *Arquipélago*. Life and Earth Sciences 8: 35-44.
- MARTINS, H.R., R.S. SANTOS, S.J. HAWKINS & R.D.M. NASH 1992. Expedition Azores 1989: Ecology and taxonomy of the fauna and flora of the marine littoral. An introduction. - *Arquipélago*. Life and Earth Sciences 10: 39-43.
- MILNE EDWARDS, A. 1891. Campagnes scientifiques de S. A. Le Prince de Monaco. Pagurides nouveaux des Açores. - *Bulletin de la Société Zoologique de France* 16: 131-135.
- MILNE EDWARDS, A. & E.L. BOUVIER 1900. *Heterocarpus grimaldii*, espèce nouvelle recueillie par le "Talisman", l'"Hirondelle" et "la Princesse Alice". - *Bulletin de la Société Zoologique de France* 25: 58.
- NOBRE, A. 1924. Contribuição para a fauna dos Açores. - *Anais do Instituto de Zoologia da Universidade do Porto* 1: 1-94.
- NOBRE, A. 1930. *Materiais para o estudo da fauna dos Açores*. Instituto de Zoologia da Universidade do Porto. 108pp.
- ZARIQUYEI-ALVAREZ, R. 1968. Crustáceos Decápodos Ibéricos. - *Investigación pesquera* 32: 1-510.

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