

THE OCTOPODA (MOLLUSCA: CEPHALOPODA) OF THE AZORES

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ARQUIPÉLAGO



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The study of octopods in the collection of the Department of Oceanography and Fisheries, University of the Azores (DOF/UA) and a review of the literature show that 14 species of the Octopoda have been found in Azorean waters.

In the material described here there are two new records for the region: *Scaevargus unicirrhus* (Orbigny, 1840) and *Octopus salutii* Vérany, 1837. The first one appears to be a common species on oceanic banks, the second is less frequent. Some of the other specimens identified confirm previous records. Some records referred to in the literature have not been observed again.

Octopus vulgaris is the commonest octopod in the Azores. In the littoral it is commercially exploited and is highly appreciated as food by the local population.

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O estudo da colecção de Octopoda do Departamento de Oceanografia e Pescas da Universidade dos Açores (DOP/UA) e a revisão bibliográfica permitiu identificar 14 espécies de Octopoda ocorrentes nas águas dos Açores.

O material existente na referida colecção contém duas novas espécies para a região: *Scaevargus unicirrhus* (Orbigny, 1840) e *Octopus salutii* Vérany, 1837. A primeira destas espécies parece ser comum nos bancos oceânicos, enquanto que a segunda é menos frequente. As outras espécies observadas confirmam ocorrências anteriores. Algumas das citações encontradas na literatura não voltaram a ser observadas.

Octopus vulgaris é a espécie de Octopoda mais frequente nos Açores, onde é explorada comercialmente por todo o litoral. O polvo comum é muito apreciado pelas populações locais, sendo um dos constituintes da gastronomia regional.

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INTRODUCTION

Most information about cephalopods from the Azores has been provided by authors from the last century and the beginning of this century (DROUËT 1858; DAUTZENBERG 1889; GIRARD 1892; JOUBIN 1895, 1900, 1920, 1924).

In the last 10 years, work on cephalopods from the Azores was resumed by local researchers (MARTINS 1982, MARTINS & PORTEIRO 1988, PORTEIRO & al. 1990, GONÇALVES 1991). These studies, however, have been concerned with aspects of the biology and fishery of the commercially exploited species, *Loligo forbesi* and *Octopus vulgaris*.

The collection of the Department of Oceanography and Fisheries, University of the Azores (DOF/UA), contains two species of

Octopoda not yet recorded for the region. An annotated list of all species of Octopoda that are at present known within 200 miles of the Azores is given here.

METHODS

The material collected and preserved in the collection of DOF/UA during the last 10 years was examined and identified. ROBSON (1929, 1932) ROPER & al. (1984), NESIS (1987) and MANGOLD & BOLETZKY (1987) were used for identifications as well as original descriptions when these were available.

The specimens were from strandings, diving and by-catch of demersal fisheries.

Lengths and weights of preserved specimens were recorded. Meristics are given in tables,

using the definitions given by ROPER & VOSS (1983). Abbreviations used here are: Date- date of capture; L- locality of capture; DPT- depth of capture (m); WT- weight (g); ML- dorsal mantle length (mm); VML- ventral mantle length (mm); TL- total length (mm); GiLC- number of outer gill lamella; WDI- web depth index (web/arm length as %); ALI- arm length index (arm/total length as %); SD- shell diameter (mm); SW- shell width (mm); KW- keel width (mm); RN- number of ribs; F- females and M- males.

RESULTS

The species of Octopoda occurring in the waters of the EEZ (200 miles distance from the coast) of the Azores are (Appendix 1):

1 - *Ocythoe tuberculata* Rafinesque, 1814

O. tuberculata is an epipelagic species in warm waters of the world (ROPER & SWEENEY 1975). A specimen from S. Miguel, reported by GIRARD (1892), is the first reference of the species for the Azores.

In the last 9 years, five females have been caught. Four of them were taken close to the surface in Horta harbour during June and July (see below). This suggests that females might come inshore regularly during that period.

Material collected:

| Date | L | Sex | WT | ML | VML | TL | GiL |
|--------------|-------------|-----|--------|----|-----|------|-----|
| 1 - 19/07/82 | Horta | F | 138.3* | 87 | 69 | 220* | 21 |
| 2 - 24/02/84 | Condor Bank | F | 63.4 | 95 | 68 | 255 | - |
| 3 - 21/07/87 | Horta | F | 74.0 | 72 | 56 | 220 | - |
| 4 - 31/07/90 | Horta | F | 202.9 | 78 | 67 | 280 | 20 |
| 5 - 27/06/91 | Horta | F | 131.6 | 87 | 82 | 240 | 21 |

* broken arms

2 - *Argonauta argo* Linnaeus, 1758

Epipelagic and cosmopolitan species in tropical and subtropical areas. The first reference to the species from Azores was made by DROUËT (1858). All the animals in the collection came

from strandings on Faial beaches. A living animal has been observed only once (specm. 2).

Material observed (shell measurements):

| Date | L | Sex | SD | SW | KW | RN |
|--------------|----------|-----|-------|------|-----|----|
| 1 - 1981 | Faial | F | 52.1 | 20.5 | 4.4 | 44 |
| 2 - 12/01/89 | Faial | F | 185.0 | 55.0 | 7.2 | 81 |
| 3 - 29/08/89 | Faial | F | 65.6 | 23.0 | 5.0 | 51 |
| 4 - 6/7/91 | Graciosa | F | 74.2 | 31.1 | 5.5 | 41 |

3 - *Tremoctopus violaceus violaceus* Delle Chiaje, 1830

(= *Tremoctopus hyalinus* Joubin, 1895)

(= *Tremoctopus hironellei* Joubin, 1895)

Epipelagic species from tropical and subtropical waters of all oceans. THOMAS (1977) placed the two *Tremoctopus* species described by JOUBIN (1895) as synonyms of *Tremoctopus violaceus violaceus* Delle Chiaje, 1830. However, there is some uncertainty as to the validity of this synonym. In ROBSON's (1929) opinion, the first Joubin species (*T. hyalinus*) could also be *Eledonella*. THOMAS (1977) pointed out that the second Joubin species (*T. hironellei*) could also be a juvenile stage of *Argonauta* or *Ocythoe*.

The first specimen (1) in the DOF/UA collection was caught on the oceanic Princess-Alice bank, at the surface at night. The next two (2 and 3) were caught in Horta harbour at the surface during day-time. The last specimen (4) was stranded in Porto Pim beach (Faial).

Material collected:

| Date | Sex | WT | ML | VML | TL | GiLC |
|--------------|-----|--------|-----|-----|-----|------|
| 1 - 1986 | F | 1341.3 | 185 | 130 | 810 | 13 |
| 2 - 16/07/91 | F | 378.6 | 138 | 100 | 470 | 15 |
| 3 - 16/07/91 | F | 404.0 | 155 | 106 | 480 | 15 |
| 4 - 11/10/91 | F | 2242.1 | 250 | 185 | 940 | 14 |

4 - *Haliphron atlanticus* Steenstrup, 1861

(= *Alloposus mollis* Verrill, 1880)

A widely distributed (from tropics to boreal regions) species. Larvae and juveniles live in the pelagic (from epipelagic to bathypelagic) zone, mainly (but not exclusively) above slopes

and submarine rises, the adults on the bottom in the bathyal zone.

The holotype of *H. atlanticus* described by STEENSTRUP in 1861 (KRISTENSEN & KNUDSEN 1983) was the first record for the Azores. JOUBIN (1920) reconfirmed the presence of this species in the Azorean waters but as *Alloposus mollis*.

Beaks of *H. atlanticus* were commonly found in the stomachs of sperm whales caught during 1981-1984 in the Azores (H.R. Martins, pers. comm.). In the DOF/UA collection there are samples of fragments of this species, collected by J. Gordon (cetologist from University of Oxford) and his group on four different occasions, during the sperm whale surveys in the Azores, on the S/Y "Song of the Whale". However, there have been no new records of whole specimens.

This species appears to be common in the bathyal Azoren waters, being one of the commonest items in the diet of sperm whales in the region.

Material collected:

| Date | L | Notes |
|--------------------|---|---|
| 1 - 12/07/88 | 38° 51.15 N (two portions of arms and web) 28° 20.01 W | |
| 2 - 1989 Spring | 38° 25.80 N (three portions of arms and a 29° 26.30 W head fragment with funnel) | |
| 3 - 28/06/91 | South of Pico | (portion of the mantle muscle weighed 5.2 Kg), |
| 4 - 13/08/91 | South of S. Jorge | (portions of the mantle and arm weighed 4.9 Kg) |

5 - *Vitreledonella richardi* Joubin, 1918

(=*Vitreledonella richardi* Joubin, 1924)

(=*Vitreledonella alberti* Joubin, 1924)

Tropical and subtropical cosmopolitan bathypelagic species, juveniles living in epipelagic and mesopelagic zones (NESIS 1987). The presence of this species in the Azores was mentioned by JOUBIN (1924). There have been no new records from the Azores.

Although ROBSON (1932) considers the two Joubin specimens different species, he thought that they probably were different sexes of the same species. After the revision by THORE (1947 as cited in NESIS 1987), only one species

is considered to belong to the Family Vitreledonellidae.

6 - *Japetella diaphana* (Hoyle, 1885)

(=*Eledonella diaphana* Hoyle, 1885; Joubin 1900)

(=*Bolitaena (Eledonella) diaphana* Hoyle, 1885; Joubin 1924)

Tropical and subtropical cosmopolitan bathypelagic species, juveniles also found in epipelagic and mesopelagic zones (NESIS 1987).

The only record from the Azores was made by JOUBIN (1920).

ROBSON (1932) considers the two Joubin specimens to be *J. diaphana* (Hoyle, 1885).

7 - *Grimpoteuthis umbellata* (Fisher, 1883)

(=*Cirroteuthis umbellata* Fisher, 1883; Joubin 1900)

Benthic species that lives in lower bathyal and abyssal (1100 to 5400 m) zones. It is known to occur in tropical, northern subtropical and boreal Atlantic (Reykjanes Ridge to north-western Africa), Nova Scotia and Caribbean Seas (NESIS 1987)).

Recorded from the Azores by FISCHER (in GIRARD 1892) and JOUBIN (1900).

8 - *Opisthoteuthis grimaldii* (Joubin, 1903)

(=*Cirroteuthis grimaldii* Joubin, 1903; Joubin 1920)

(=*Grimpoteuthis grimaldii* Joubin, 1903)

VOSS (1988) established synonymy between *G. grimaldii* and *O. grimaldii*. Like *Grimpoteuthis umbellata* the species is benthic and lives in the lower bathyal zone. Occurs in the Northeastern Atlantic (off Azores, Bay of Biscay). The species was first recorded in the Azores by JOUBIN (1920) as *Cirroteuthis grimaldii*. No new records are known from the Azores.

9 - *Pteroctopus tetracirrhus* (Delle Chiaje, 1830)

(=*Scaevurgus tetracirrhus* (Delle Chiaje) Tiberi 1880; Joubin 1900)

According to NESIS (1987), this species lives in tropical-subtropical zones of the Atlantic on lower sublittoral-upper bathyal bottoms. JOUBIN (1900) gives the only record of the species from the Azores as *Scaevurgus tetracirrhus*. This specimen was caught by trawl in 1897 at 599 m depth, west of Faial island.

10 - *Benthooctopus* sp.

(=*Octopus levis* Joubin, 1900)

(=*Benthooctopus* (?) *pseudonymus* Grimpe, 1922; Robson 1932)

The only record of this species was made by JOUBIN (1900) as *O. levis* Hoyle, 1885. This species is only known from one specimen, the type-locality, caught off the Azores islands (South of Flores) at a depth of 1600 m in 1896. JOUBIN (1900) pointed out that the specimen was similar to *Octopus januari* Steenstrup.

ROBSON (1932) considered the Joubin's type-specimen synonymous with *Benthooctopus* (?) *pseudonymus* (Grimpe), but he considers the specimen problematic with respect to determining the genus or species. In ROBSON's opinion (1932), this specimen has affinities with *B. ergasticus* and *B. piscatorum*, but it seems more similar to the latter.

In TOLL's (1981) redescription of *Benthooctopus januarii* (Hoyle, 1885), the Joubin's type-specimen is not considered a synonym of this species.

Due to the uncertainties surrounding the identification of this specimen, it is safer to refer to it as *Benthooctopus* sp.

11 - *Scaevurgus unicolor* (Orbigny, 1840)

(= *S. patagiatus* Berry, 1913)

This species is recorded here for the first time for the Azores.

This genus is restricted to tropical and warm temperate waters. The geographic distribution of this species extends from the Atlantic to the Indian ocean and in the Mediterranean sea (TOLL 1988). It is found on many submarine banks and on the tops of seamounts, mainly at depths of 100-400 m (NESIS 1987).

Five of the seven specimens observed have been caught on the oceanic banks. Almost all the specimens examined were caught during demersal long-line fisheries. The species appears to be common on the oceanic banks of the Azores.

Specimen 4 was caught at a very shallow depth with a triangular dredge by the R/V "Sea Diver" from the Harbor Branch Oceanographic Institution.

Material collected:

| Date | L | Sex | WT | ML | TL | GL | LC | DPT | WDI |
|------------|-------------------------|-----|-------|----|-----|----|-----|-----|-----|
| 1-26/01/80 | off Monte da Guia-Faial | M | 112.5 | 65 | 270 | 13 | 270 | 19% | |
| 2-8/08/89 | Azores Bank | M | 66.7 | 58 | 220 | 14 | 325 | 15% | |
| 3-7/05/90 | Princess Alice Bank | F | 99.3 | 85 | 385 | 14 | 380 | 16% | |
| 4-2/08/90 | off Feteira Faial | F | 9.9 | 33 | 110 | 14 | 50 | 24% | |
| 5-12/8/90 | South Pico Seamount | M | 161.1 | 90 | 355 | 14 | 300 | 17% | |
| 6-15/5/91 | Princess Alice Bank | M | 116.2 | 85 | 385 | 14 | 360 | 26% | |
| 7-26/8/91 | Princess Alice Bank | M | 44.9 | 75 | 300 | 14 | 400 | 18% | |

12 - *Octopus salutii* Vérany, 1837

This species is recorded here for the first time for the Azores.

It lives in the East Atlantic ocean and in the Mediterranean (MANGOLD & BOLETZKY 1988). MANGOLD & al. (1976), based on the existence of a planktonic larval stage, supposed that the distribution of this species is greater than formerly assumed (i.e. endemic to the Mediterranean).

Three specimens have been caught until now. The first in a tide pool at night by a fisherman on Faial island, and the others on oceanic banks. MANGOLD-WIRZ (1963) has records of this species from between 70 and 400 m depth, but later, MANGOLD & BOLETZKY (1987)

changed the depth range to between 30 and 600 m.

O. salutii appears to be less frequent than *S. unicirrhus*, although both were found in similar depths and habitats.

Material collected:

| Date | L | DPT | Sex | WT | ML | TL | GiLC | ALI | WDI |
|------------|------------|-----|-----|-------|-----|--------|------|-----|-----|
| 1- 9/6/89 | Pasteleiro | 1 | F | 287.1 | 110 | 910.0 | 10 | 86% | 12% |
| 2- 30/3/91 | Condor | 280 | F | 512.0 | 130 | 1045.0 | 10 | 89% | 13% |
| | Bank | | | | | | | | |
| 3-4/4/91 | South Pico | 305 | F | 53.7 | 63 | 440.0 | 9 | 90% | 18% |
| | Seamount | | | | | | | | |

13 - *Octopus macropus* Risso, 1826

(=*Octopus bermudensis* Hoyle, 1885)

(=*Octopus cuvieri* D'Orbigny et Férussac, 1835; Girard 1892)

Tropical Atlantic Indo-West Pacific species, in the western Atlantic mainly near the islands, Bermuda and Bahamas, southern Florida to Brazil, Caribbean Sea, Mediterranean Sea, western Africa to the Gulf of Guinea, Ascension and St. Helena Islands.

The first report by DROUËT (1858) was thought to be doubtful, however, DAUTZENBERG (1889) confirmed the report of this species in the Azores.

Both specimens examined here were caught in the littoral by divers (<10 m). The species lives near the coast, like the common octopus, but is much less common.

Material collected:

| Date | L | Sex | WT | ML | TL | ALI | GiLC |
|--------------|-----------|-----|--------|-----|------|------|------|
| 1 - 30/08/84 | Faial | F | 81.2 | 75 | 550 | 85% | 12 |
| 2 - 04/89 | Caloura | F | 262.8* | 72 | 510* | 84%* | 12 |
| | S. Miguel | | | | | | |
| 3 - 07/03/91 | S. Cruz | F | 367.0* | 103 | 990* | 86% | 11 |
| | Flores | | | | | | |

* broken arms

14 - *Octopus vulgaris* Cuvier, 1797

(=*Octopus vulgaris* Lamarck, 1798)

(=*Octopus granulatus* Lamarck, 1799; Joubin 1900; Hoyle 1886)

The common octopus is the most thoroughly studied octopod (see MANGOLD 1983 and WELLS 1978 for reviews).

First recorded from the Azores by DROUËT (1858) from S. Miguel island, this octopus is the most common octopod in the Azores, living near the coast down to 150-200 m depth. In the littoral it is commercially exploited and is highly appreciated as food by the local population, being part of the traditional gastronomy of the Islands. A study on the biology and fishery of this species has been carried out at the DOF/UA (GONÇALVES 1991).

DISCUSSION

There are 12 worldwide families in the Order Octopoda (Voss 1977), 8 of them occur in Azorean waters.

MANGOLD & BOLETZKY (1988) list 14 species of octopods for the Mediterranean Sea whilst REES & MAUL (1956) have listed 10 species for Madeira islands. Fourteen species are recorded from Azorean waters of which 8 are represented in the DOF/UA collection. The geographic position of the islands, between the American and European coasts, and the Mediterranean influence, could contribute to this richness of teuthofauna.

In the future, with more sampling effort, probably more species of octopods will be found in the Azores, especially in the bathyal and abyssal regions. Until now, no systematic effort has been made to collect these cephalopods. Nevertheless, two new records to the region are made here: *Scaevargus unicirrhus* (Orbigny, 1840) and *Octopus salutii* Vérany, 1837.

It is reasonable to believe that for instance *Octopus defilippi* Vérany, 1851 and *Eledone cirrhosa* (Lamarck 1798) also might be found in Azorean waters, as it occurs in the Mediterranean Sea (MANGOLD & BOLETZKY 1988), along the south coast of Portugal (SOUSA REIS & al. 1984), as well as on the Western Atlantic coasts (ROPER & al. 1984), and have a sufficiently long planktonic larval stage to reach the islands.

On the other hand, *Eledone moschata* Lamarck, 1797, a species of the Mediterranean sea and of the European coast, do not have a planktonic larval stage and are unlikely to be found at the Azores.

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APPENDIX I - LIST OF OCTOPODA SPECIES OCCURRING IN AZORES

- Order OCTOPODA Leach, 1818
 Suborder CIRRATA Grimpe, 1916
 Family STAUROTEUTHIDAE Verrill, 1879
 Genus GRIMPOTEUTHIS Robson, 1932
Grimpoteuthis umbellata (Fisher, 1883)
 Genus OPISTHOTEUTHIS Verrill, 1883
Opisthoteuthis grimaldii (Joubin, 1903)
 Suborder INCIRRATA Grimpe, 1916
 Family BOLITAENIDAE Steenstrup, 1859
 Genus JAPETELLA Hoyle, 1885
Japetella diaphana (Hoyle, 1885)
 Family VITRELEDONELLIDAE Robson
 Genus VITRELEDONELLA Joubin, 1918
Vitreledonella richardi Joubin, 1918
 Family OCTOPODIDAE
 Subfamily OCTOPODINAE Grimpe, 1845
 Genus OCTOPUS Lamarck, 1798
Octopus salutii Verrany, 1837
Octopus macropus Risso, 1826
Octopus vulgaris Cuvier, 1797
 Genus SCAEURGUS Troschell, 1857
Scaurgus unicolor (Orbigny, 1840)
 Genus PTEROCTOPUS Fisher, 1882
Pteroctopus tetracirrus (Delle Chiaje, 1830)
 Subfamily BATHYPOLYPODINAE Robson
 Genus BENTHOCTOPUS Grimpe, 1921
Benthoctopus sp.
 Family TREMOCTOPODIDAE Brock, 1882
 Genus TREMOCTOPUS Delle Chiaje, 1829
Tremoctopus violaceus violaceus Delle Chiaje, 1830
 Family OCYTHOIDAE Gray, 1849
 Genus OCYTHOE Rafinesque, 1814
Ocythoe tuberculata Rafinesque, 1814
 Family ARGONAUTIDAE Naef, 1912
 Genus ARGONAUTA Linnaeus, 1758
Argonauta argo Linnaeus, 1758
 Family ALLOPOSIDAE Verrill, 1882
 Genus HALIPHRON Steenstrup, 1861
Haliphron atlanticus Steenstrup, 1861