

SHORT COMMUNICATION

New occurrences of *Corallium* spp. (Octocorallia, Coralliidae) in the Central Northeast Atlantic

ÍRIS SAMPAIO, OSCAR OCAÑA, F. TEMPERA, A. BRAGA-HENRIQUES, V. MATOS
& F.M. PORTEIRO



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Corallium niobe Bayer, 1964 and *Corallium tricolor* (Johnson, 1899) are reported as new records from the central Northeast Atlantic. *C. niobe* was caught in the Azores and *C. tricolor* on the slope of the Irving Seamount (South Azores Seamounts). The presence of *Corallium johnsoni* Gray, 1860 in Azorean waters is confirmed. The sub-tropical Macaronesian islands and seamounts appear to be an important hot-spot for *Corallium* spp. Most colonies have been collected on seamounts and island slopes around Madeira, Canaries, Azores and the Cape Verde archipelagos. In the Azores most of these corals live below the normal depth of commercial fishing operations and are unlikely to be severely impacted by this activity.

Íris Sampaio (e-mail: irissampaio@uac.pt), Filipe M. Porteiro, Andreia Braga-Henriques & Valentina Matos, Departamento de Oceanografia e Pescas, Universidade dos Açores, PT-9901-862, Horta, Açores, Portugal; Fernando Tempera, Centro do IMAR da Universidade dos Açores, PT-9901-862 Horta, Açores, Portugal; Oscar Ocaña, Fundación Museo del Mar, Autoridad Portuaria de Ceuta, Muelle Cañonero, ES-51001 Ceuta.

INTRODUCTION

The family Coralliidae includes ca. 25 species of the genus *Corallium* Cuvier, 1797. *Corallium* species occur in the Indo-Pacific (3 sp.), Western, Central and Eastern Tropical Pacific (6, 6 and 3 sp., respectively), Indian (1 sp.) and in the Atlantic Ocean (6 sp.), at depths from 7 to 2405 m (Grigg 1974; Weinberg 1976; Bayer & Cairns 2003; CITES 2007). Seven species of this genus were removed to the genus *Paracorallium* Bayer & Cairns, 2003. Therefore, some of the *Corallium* species referred to here might belong to the new genus, thus changing the distribution of these two genera. In the Atlantic, all but *C. medea* Bayer, 1964 are reported to live in some restricted areas of the Northeast Atlantic: i.e. *C. johnsoni* Gray, 1860, *C. niobe* Bayer, 1964, *C. maderense*

Johnson, 1899, *C. tricolor* Johnson, 1899 and *C. rubrum* (Linnaeus, 1758) (Johnson 1899; Bayer 1964; Carpine & Grasshoff 1985; Altuna Prados & López-González 2003; Bayer & Cairns 2003; Brito & Ocaña 2004). *Corallium niobe* also occur in the western Atlantic. Except the well-known *C. rubrum*, all the other species in the northeast Atlantic are deep-water animals rarely collected and with poorly known distributions.

This contribution revises the distribution of some *Corallium* species in the Northeast Atlantic, giving new occurrences for three species in the region.

MATERIAL AND METHODS

Eight *Corallium* colonies were caught by bottom long-lines used by fishermen in the Azores during

fishery surveys carried out by the Department of Oceanography and Fisheries of the University of the Azores (DOP/UAz) (Table 1, Fig. 1). Four colonies were in a private collection and had no data about their capture. Nevertheless we know that they were caught at seamounts around the Azores islands. One colony was collected during the expedition EMEPC/LUSO/G3/AÇORES08, by the Portuguese ROV *Luso*, on board the R/V *Almirante Gago Coutinho*, at the Irving seamount (32°01' N, 28°11' W; dive 19, 14 November 2008). This gave us the opportunity to describe the habitat where the colony was found. The species were identified following Bayer (1964) and Brito & Ocaña (2004). The material is deposited at DOP/UAz reference collection (COLETA).

RESULTS

Corallium johnsoni Gray, 1860

This species was described based on a specimen caught at Madeira. It was reported in the Azores by Thomson (1927), based on several fragments (see revision by Carpine & Grasshoff 1985) caught at 919 m depth, off Ponta Delgada (37.7° N, 25.97° W), during the Campaigns of Prince Albert of Monaco (station 3144). Three new specimens confirm the presence of the

species in the Azorean waters (Table 1, Fig. 1).

The species is also known from Portugal (Thomson 1927; Carpine & Grasshoff 1985) and from the European slope off Ireland (Stephens 1909) at 1241 m depth. Fuller et al. (2008) report it in the Northwest Atlantic off Canada, without additional comments.

Corallium johnsoni is similar to *Paragorgia johnsoni* Gray, 1862; it has a white creamy cortex, a white axis, double clubs with smooth heads, and the polyps are orange or yellow.

Corallium niobe Bayer, 1964

The holotype of this species was caught off Florida (659-677 m depth). Later Grasshoff (1982a, b, 1986, 1989), Carpine & Grasshoff (1985) and Brito & Ocaña (2004) studied material from the Northeast Atlantic, namely from Biscay Bay, Portugal, Morocco, Canaries (Lanzarote) and Cape Verde, caught between 500 and 1534 m depth.

Carpine & Grasshoff (1985) noted that *C. johnsoni* of Thomson (1927) from Cape Verde, Morocco and part of the material caught off Portugal were indeed *C. niobe*. Hartmann-Schröder (1985) describes the association between *C. niobe* and a polychaete (*Polynoe caeciliae*); the specimen was caught between Morocco and the Canary islands.

Table 1. Data of Coralliidae specimens at the DOP/UAz reference collection (July 2009).

Cat no.	DOP-397	DOP-3115	DOP-3472	DOP-0394	DOP-1058	DOP-1607	DOP-3511
Species	<i>C. johnsoni</i>	<i>C. johnsoni</i>	<i>C. johnsoni</i>	<i>C. niobe</i>	<i>C. niobe</i>	<i>C. niobe</i>	<i>C. tricolor</i>
Location	Caloura, S. Miguel	Azores	Azores	Caloura, S. Miguel	18 nm, South Faial	Azores	Irving seamount
Lat	37°66' N	-	-	37°66' N	38°29' N	-	32°01.8406' N
Long	25°49' W	-	-	25°49' W	28°85' W	-	28°11.7108' W
Depth	660-700 m	-	-	660-700 m	-	-	994 m
Gear	Longline	Longline	Longline	Longline	Longline	Longline	ROV <i>Luso</i>
Date	06-05-2005	2008	-	06-05-2005	14-11-2006	Jun-05	14-11-2008
Vessel	RV <i>Arquipélago</i>	FV <i>Manuel Arriaga</i>	FV <i>Manuel Arriaga</i>	RV <i>Arquipélago</i>	FV <i>Sandro</i>	FV <i>Manuel Arriaga</i>	RV <i>Gago Coutinho</i>
Survey	Arqdaço-24-P05	-	-	Arqdaço-24-P05	-	-	EMEPC/LUSO/G3/AÇORES08



Fig. 1. a), b), c) *Corallium johnsoni*; d), e), f) *Corallium niobe*; g) *Corallium tricolor*

The three colonies reported here, constitute the first record of this species in the Azorean waters (Table 1, Fig. 1). Two of these colonies had Cirripedia and the undescribed *Amphianthus* species attached to their axis.

Corallium tricolor (Johnson, 1899)

This species was first found at Madeira and named as *Pleurocorallium tricolor*. Later it has been reported from Morocco, the Canary and

Cape Verde Islands (Grasshoff 1986). Brito & Ocaña (2004) confirm the presence of the species in Canary Islands. *C. tricolor* has been caught between 598 and 1090 m depth.

Corallium tricolor was observed (ROV *Luso*) and caught at 985 m on the Irving Seamount slope (Table 1, Fig. 1). This is the first report of the species in the central Northeast Atlantic. The sample was found living on a crust of carbonate seabed covered by white sediment. Large sponges

and several other cold-water corals (i.e. *Acanella arbuscula* (Johnson, 1862), *Chrysogorgia quadruplex* Thomson, 1927, *Madrepora oculata* Linnaeus, 1758 and *Pliobothrus symmetricus* Pourtalès, 1871 were observed in low densities at the same spot. Some ophiurids and colonies of *Desmophyllum cristagalli* Milne Edwards & Haime, 1848 were attached to the colony studied.

DISCUSSION

The North Atlantic is the best studied oceanic basin concerning deep-water benthic organisms (Mironov & Gebruk 2006). Nevertheless, even in this region, data about the distribution of many cold water coral species are still scarce. This lack of information may result from: 1) the absence of sampling in most deep-sea areas; 2) difficulties with identification of the species sampled or in collections; or 3) they may simply be naturally rare across their distribution range. On a global scale little information about species of *Corallium* spp. without commercial value probably results from a combination of these three factors.

Despite the relatively high sampling effort in the Central North Atlantic, i.e. around the Azores and on the Great Meteor Seamounts complex, only several fragments (see Carpine & Grasshoff 1985) of *Corallium johnsoni* had been reported from these waters by Thomson (1927) (see for instance Studer 1901; Tixier-Durivault & d'Hondt 1974; Grasshoff 1981, 1985; without records of *Corallium*). The additional specimens of this species studied by us confirm this record in the Azores, being those of *C. tricolor* and *C. niobe* new for the area (see Bayer & Cairns 2003; Mironov & Krylova 2006).

Most *Corallium* species live in restricted geographical areas. The Western and Central Pacific (from Japan to northern Philippines and Hawaii) and the Northeast Atlantic are hot-spots for these gorgonians. *Corallium rubrum* in the Mediterranean and other seven species from the Western Pacific and Hawaii form large aggregations in the upper bathyal (to 500 m), and support local fisheries (Parrish & Baco 2007). However, and as far as we know, all the *Corallium* species living in the Northeast Atlantic (except *C. rubrum*) occur in low abundances well

below 600 m on seamounts and islands slopes of Cape Verde, Canaries, Madeira and Azores archipelagos, and continental slopes off Morocco and Portugal (Johnson 1899; Thomson 1927; Carpine & Grasshoff 1985; Grasshoff 1986; Altuna Prados & López-González 2003; Brito & Ocaña 2004). Outside this subtropical belt, there are records from off Ireland and the Bay of Biscay (Stephens 1909; Bayer 1964; Grasshoff 1982b, 1986; CITES 2007). Apparently, these species do not aggregate, are uncommon throughout the area, and their biology is virtually unknown. In the western Atlantic the genus is less diversified, and according to Watling & Auster (2005) only two species are known from that region: the amphiatlantic *C. niobe* and *C. medea*, which is restricted to the American slopes. In this context, the Macaronesian deep-sea rocky bottoms emerge as a probable radiation center for these species. Nevertheless, as exploration of deep-sea environments goes on, it is expected that more colonies of *Corallium* will be discovered inside and outside this region. A biogeographic study of this gorgonian genus is limited by the scarcity of the existing data. The scrutinizing of the phylogenetic relationships between these corals species, will give important information to interpret their actual distribution patterns.

As for other cold water corals, *Corallium* spp. are highly sensitive to anthropogenic disturbances: they have slow growth rates, relatively late maturity, long life spans, and limited dispersal potential (CITES 2007). The commercial exploitation of *Corallium* spp. in the Mediterranean, Western Pacific and Hawaii, showed to be unsustainable, and countries like USA, are calling for their protection (namely under CITES 2007; Grigg 1993). All but one colony studied by us was caught accidentally by long-lines, while fishing for bottom finfish in seamounts and island slopes. However, the long-line fishery in the Azores operates mainly above 600 m depth (Silva & Pinho 2007), which is the upper limit of the vertical distribution of the species known to live in the area. Therefore, it seems that *Corallium* species from the central Northeast Atlantic are less affected by fisheries, than the other coral species that live in shallower depth horizons (Sampaio et al. 2008, 2009).

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