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## THE REDISCOVERY OF *CERVERA ATLANTICA* (JOHNSON, 1861) (CNIDARIA: OCTOCORALLIA): NOTES ON ITS IDENTIFICATION, ECOLOGY AND GEOGRAPHICAL DISTRIBUTION

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Key words: Octocorallia, *Cervera atlantica*, *Cornularia cornucopiae*, identification, ecology, zoogeography.

### ABSTRACT

*Cervera atlantica*, a small stoloniferan octocoral, was described as *Cornularia atlantica* by James Yate Johnson in 1861 from Funchal, Madeira. It then remained unrecognized until 1972 when I discovered it on the Mediterranean coast of Spain. I have since confirmed its existence at the type locality and have traced its distribution around Madeira, throughout the Canary Islands, and on Portuguese and English coasts. In the Mediterranean Sea, I have found it along Spanish and French coasts, among the Balearic Islands and on the coast of Cyprus. *Cervera atlantica* is cryptic and photophobic, living under stones in shallow water (usually at 0-2 m) or in crevices and caves in massive intertidal rocks, protected from direct sunlight. Intolerant of rough water, it usually occurs in sheltered bays, on beaches protected by reefs, or in the lee of headlands. In common with *Cornularia cornucopiae*, it occurs throughout the Mediterranean, but only very rarely in the same habitat. There may have been confusion between these two species for many years, as *Cervera atlantica* is apparently rather more common than *Cornularia cornucopiae*, which hitherto has been generally regarded as the only non-scleritic stoloniferan existing in the Mediterranean. In the Atlantic, *Cervera atlantica* has a Lusitanian-Mauritanian distribution, occurring both north and south of the Strait of Gibraltar, although its limits are not yet known. Records of *Cornularia cornucopiae* in the Atlantic are rather rare, only to the north of Gibraltar. In view of the potential confusion with *Cervera atlantica*, those records need to be confirmed.

### INTRODUCTION

In 1861, James Yate Johnson published "an account of such Sea-Anemones as have occurred to me after much diligent search in the neighbourhood of Funchal, the capital of Madeira". He included a description of *Cornularia atlantica* sp. n., "for although not, strictly speaking, a Sea-Anemone, it closely resembles one in external appearance" (Johnson, 1861).

This small stoloniferan octocoral has been overlooked for well over a century, and as far as I know, no reference to it appeared in the scientific literature since it was originally described, until very recently (*viz.*, López-González, Ocaña, García-Gómez & Núñez, 1995; Williams, 1996). In 1972, I discovered *Cornularia atlantica* on the Mediterranean coast of Spain. In the ensuing years I have confirmed its presence at the type locality and have found it to be widespread and locally common around Madeira and the Canary Islands, as well as on the Atlantic coasts of the

Iberian Peninsula and southern England, and also throughout the Mediterranean Sea.

### HISTORICAL ACCOUNT

For ease of comparison with my own observations, the original description of *Cornularia atlantica* Johnson, 1861 is given here. The SI equivalents of the original imperial measurements are given in square brackets.

"Basal band narrow, inconspicuous, creeping irregularly, and bearing the polypes at uncertain distances. Column of a pale flesh-colour, subcylindrical, rather wider at the middle than above and below; destitute of spicula, but invested by a thin epidermis containing particles of sand; when retracted, forming a fleshy hemispherical button, one-fifteenth of an inch [1.7 mm] high; when expanded, the column has a length of about three-tenths of an inch [7.6 mm], with a diameter of one-twelfth of an inch [2.1 mm].

Eight pinnate tentacles, in one series, at the margin of the shallow cup forming the disk, the pinnae of about twelve pairs, ringed, as if showing a tendency to further division. Tentacle-stem subulate, about one-fourth of an inch [6.4 mm] in length, the bases of the tentacles broadening and coming in contact one with another on each side. When the animal is fully displayed, the tentacles and the upper part of the column are nearly colourless, and have the appearance of a transparent film. Abundant on stones near low-tide mark; sometimes attached to sea-weed." [Johnson, 1861: 298-299].

In an attempt to locate the type specimen(s) of *Cornularia atlantica*, I searched the three museum collections which seemed most likely to include material donated by J.Y. Johnson. The first two are in Funchal, Madeira. According to Norman (1909), Johnson's collection was held in 1908 by the Museu do Seminário, cared for by Padre Ernesto Schmitz. The collections of this museum were transferred in 1982 to the Jardim Botânico da Madeira to form the nucleus of the present Museu de História Natural. Unfortunately, little of Johnson's cnidarian material has survived there: a careful search of the available specimen tubes and microscope slides did not reveal any specimens of *Cornularia atlantica*. The other collection that I examined in Funchal, again without success, was that of the Museu Municipal do Funchal. Since Johnson frequently sent material to his friends in England, I also searched the cnidarian collection of the British Museum (Natural History), which, however, also contained no specimens of *Cornularia atlantica*. Examination of a small collection of microscope slides, now in my possession, that once belonged to Canon A. M. Norman, a friend of Johnson, revealed no relevant material.

Although not recognized as such, *Cornularia atlantica* was found in the Mediterranean Sea near Marseille, France, by Béranguier (1954), who described it as a new species, *Anthelia inermis*. Some extracts are given here from the original description of *A. inermis* and may be compared with the original description of *Cornularia atlantica* Johnson, 1861: the conspecificity of these taxa is immediately apparent (Williams, 1996) and their names are, therefore, formally synonymized here for the first time.

"Enfin, on rencontre, dans une calanque située devant la Station Marine d'Endoume, fixée sous les pierres, à une profondeur de 50 cm. environ, une espèce tout à fait particulière d'*Anthelia*. Les stolons membraneux de ces colonies d'*Anthelia* sont, le plus souvent, recouverts d'une couche mucilagineuse. Les polypes, isolés ou groupés en bouquets, sont presque globuleux lorsqu'ils sont complètement rétractés. Ils sont protégés par une gaine formée de corpuscules divers agglomérés. Epanouis, les polypes s'allongent beaucoup. Leurs tissus, très transparents, laissent voir le tube digestif. Les huit tentacules pinnés ont chacun un renflement à leur base ... [cette espèce] est totalement dépourvue de spicules." [Béranguier, 1954: 61].

Weinberg (1978), who had carried out a detailed survey of the Mediterranean circalittoral Octocorallia, was

unable to find *A. inermis* in the field, nor could he find any type material in several European museums, and commented that it "therefore remains rather enigmatic". However, he correctly concluded from the description of Béranguier (1954) that *A. inermis* belongs neither to the genus *Anthelia* (which has non-retractile polyps), nor to the genus *Clavularia* (which has sclerites). He also believed that it was not conspecific with *Cornularia cornucopiae* (Pallas, 1766), and suggested that it might belong to a genus of its own. It is therefore puzzling that he later (Weinberg, 1986) assigned *A. inermis* to the genus *Clavularia*; particularly since, in 1979, I gave him a specimen of a then unidentified stoloniferan without sclerites that I had collected from Benidorm, which he subsequently deposited under the name of *Anthelia inermis* in the Zoölogisch Museum, Universiteit van Amsterdam (Table I). Only later did I determine the Benidorm species as *Cornularia atlantica*.

The stoloniferan that Manuel (1979) reported to occur in Portland Harbour, England was misidentified as *Cornularia cornucopiae*. I have recently confirmed that this stoloniferan can still be found there and is, in fact, clearly identifiable with *Cornularia atlantica*.

#### SYSTEMATICS

Since the original typescript of this paper was written (an abstract has already appeared (Williams, 1996)), a paper by López-González *et al.* (1995) dealing with *Cornularia atlantica* has been published. I have thus been saved the trouble of establishing a new genus for *Cornularia atlantica*, an intention that I communicated to the two senior authors in a letter dated 29 April, 1991. Since *Cornularia atlantica* is now designated as the type species of *Cervera* López-González, Ocaña, García-Gómez & Núñez, 1995, it will hereafter be referred to as *Cervera atlantica*.

*Cervera atlantica* (Johnson, 1861)

Synonyms: *Cornularia atlantica* Johnson, 1861  
*Anthelia inermis* Béranguier, 1954  
 "Anthelia" *inermis*: Weinberg (1978)  
*Cornularia cornucopiae*: Manuel (1979, 1981, 1983, 1988); Picton *et al.* (1987)  
*Clavularia* ("Anthelia") *inermis*: Weinberg (1986)  
 ? *Cornularia inermis*: Roca (1986)  
*Cervera atlantica*: López-González *et al.* (1995)  
*Cornularia atlantica*: Williams (1996)

The following description is based upon specimens from all the localities in the Atlantic Ocean, the English Channel and the Mediterranean Sea where I have found *Cervera atlantica*. There are no marked differences between any of the colonies collected. Their features are also, on the whole, consistent with those described by Johnson (1861), Béranguier (1954), Manuel (1979, 1981, 1983, 1988) and

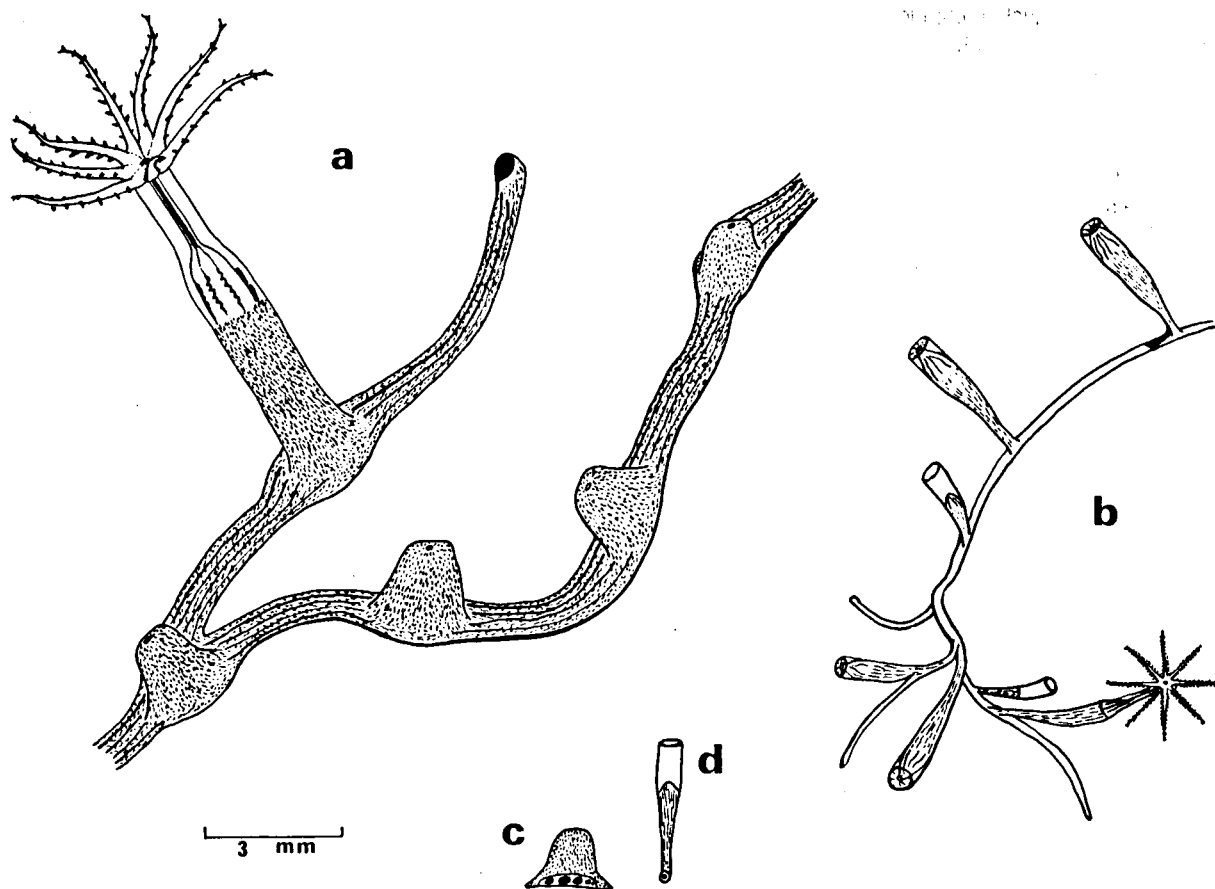


Fig. 1. Comparative diagrams, to the same scale, of parts of colonies of *Cervera atlantica* (Johnson, 1861) (from Arrecife, Lanzarote) and *Cornularia cornucopiae* (Pallas, 1766) (from Kato Pyrgos, Cyprus).

**a**, *Cervera atlantica* with expanded and contracted polyps; **b**, *Cornularia cornucopiae* with expanded and contracted polyps; **c**, cross-section of stolon of *Cervera atlantica* immediately adjacent to a contracted polyp; **d**, cross-section of stolon of *Cornularia cornucopiae* immediately adjacent to a contracted polyp.

López-González *et al.* (1995). Differences between the observations of these authors and my own are noted where appropriate.

Ideal colonies for the demonstration of morphological features are those growing on black basaltic rock, with no other macro-organisms growing amongst their stolons. The internal features of such colonies are visible through the thin, translucent cuticle, against the dark substrate. All the features described here are visible with a hand-lens (x10 magnification) or a stereomicroscope (up to x40 magnification).

When the polyps are contracted, the visible part of the anthostele is uniformly pale orange or peach-coloured. When they are expanded, the anthostele and tentacles are practically colourless, sometimes with a faint orange tinge, and the pale orange actinopharynx is visible through the polyp wall. No sclerites are visible. Their absence may be confirmed by placing a polyp, with adjacent stolons, on a cavity slide and adding some sodium hypochlorite solution (ca 10% available chlorine). The tissues, with the exception of the cuticle, are eventually destroyed, leaving

no sclerites. Should any sclerites have been present originally, they would have resisted destruction by chlorine.

The stolons typically run in straight or slightly curved lines with single polyps arising every 1-6 mm or so (Fig. 1a). They have four or more relatively large longitudinal canals (Fig. 1c). Stolons occasionally bifurcate at the base of a polyp, but are not reticulated, although occasionally one stolon may grow across another. They are translucent and strap-like, about 0.2 mm thick and 0.5-0.75 mm wide, although somewhat wider where a polyp arises (Fig. 1a).

A polyp base is as wide as the stolon where it arises (1.0-1.5 mm). When contracted into the anthostele, the polyp forms a sub-hemisphere about 1.5 mm high. The upper part of the flexible anthostelar cuticle is introverted when a polyp contracts. When expanded, the column is approximately cylindrical, the anthostele (covered by the cuticle) constituting about the lower 4 mm, and the whole polyp being up to 8 mm high to the tentacle bases (Fig. 1a). The polyps of the specimens (misidentified as *Cornularia cornucopiae*) collected from Portland Harbour (England) by Manuel (1979; plate IA) were, judging by the

scale bar, up to 17.5 mm high. However, in Manuel (1981; Fig. 7) and in Manuel (1988; Fig. 7), the same polyps are drawn about 9.8 mm high. It is concluded that the latter measurement is the correct one, since specimens of *Cervera atlantica* that I collected from Portland Harbour in 1996 were no larger than those I had found elsewhere. Manuel's original specimens were not retained, so they cannot be re-examined (R.L. Manuel, pers. comm.).

The tentacles have contiguous bases and are about 3.0-4.0 mm long with 5-11 pairs of pinnules per tentacle (Fig. 1a). Johnson (1861) recorded about 12 pairs per tentacle; Bérenquier (1954; plate II, fig. C), 6-9 pairs; Manuel (1979; plate IA), 9-12 pairs; and Manuel (1981; Fig. 7 and 1988; Fig. 7), 8 pairs. López-González *et al.* (1995) stated 12-14 pairs, which is outside the ranges of observations of other authors, but their Fig. 11 shows only 9 pairs.

The stolons and anthosteles are invested with a soft, flexible, greyish, translucent cuticle; hence its description as "une couche mucilagineuse" by Bérenquier (1954). The cuticle frequently may have tiny sand grains and organic material embedded in it, when it appears brownish. The whole colony has a soft, delicate consistency.

A colony rarely covers an area greater than about 50 cm<sup>2</sup> and is more usually about 15 cm<sup>2</sup> in size. The density of the polyps in a colony from Balaia, Portugal, was up to 33 per cm<sup>2</sup>.

#### CHARACTERISTIC FEATURES OF *CERVERA ATLANTICA* AND DIFFERENTIATION FROM SYMPATRIC STOLONIFERANS

*Cervera atlantica* can easily be differentiated from other stoloniferans to be found within its known geographical range. With the exception of *Cornularia cornucopiae* only, all these are assigned to genera with sclerites, viz., *Sarcodictyon* and *Clavularia* (Weinberg, 1978, 1986). These genera may be recognized by gently palpating the colony with the tip of a finger, when the rigidity of the upstanding anthosteles can be easily felt. By running a finger-nail or a steel needle across an anthostele, a rough, scratchy sensation can be perceived that confirms the presence of sclerites, which may be visible with a hand-lens (x10 magnification). It then remains only to establish the differences between *Cervera atlantica* and *Cornularia cornucopiae*.

If the tests described in the preceding paragraph are applied to *Cervera atlantica*, its lack of sclerites is immediately apparent by its soft texture, confirmed with a lens. Consistent characteristics are the pale orange colour of the anthosteles and stolons, the cross-sectional shape of the strap-like stolons and the sub-hemispherical contracted polyps that arise from the stolon with no narrowing of the lower parts of the flexible anthosteles; and the more or less cylindrical column of an expanded polyp (Fig. 1a, c). The upper part of the anthostele is introverted when a polyp is contracted. The multiple longitudinal canals in the flat stolons (Fig. 1c) may be revealed under a stereomicroscope by making a cut with a scalpel obliquely to the upper

surface of a stolon. Then, by squeezing an adjacent polyp with a pair of forceps, the coelenteric fluid can be seen to be expelled from the cut ends of the stolon canals.

In contrast, the colourless polyps of *Cornularia cornucopiae* cannot contract maximally in the same way as those of *Cervera atlantica*, because the pale brown to yellow anthosteles are relatively stiff and non-introvertible, and stand proud like bristles (up to 3 mm high) from the tubular stolon, each in the form of a veritable cornucopia (Fig. 1b). The anthostele is thus markedly narrower at its base than at its top, and the polyp can be seen to withdraw into the anthostele, leaving the upper part of the cornucopia empty (Fig. 1b). The procedure of cutting a stolon and squeezing an adjacent polyp reveals, in this case, only a single canal in the cylindrical stolon (Fig. 1d). If the incident light is adjusted appropriately, the stolon canal can sometimes be seen without dissection.

Any attempt to detach, say with a thumb-nail, a living colony of *Cervera atlantica* from its substrate will result in its destruction, on account of its soft texture combined with the marked tenacity of its stolons. However, a similar attempt on *Cornularia cornucopiae* will usually be successful, because its stolons are much tougher and tend to form reticula which adhere less tenaciously. This distinction, together with the differences in size, shape, colour and texture of the anthosteles, and the differences in the numbers of canals and cross-sectional shape of the stolons (Fig. 1c, d), allows rapid and accurate differentiation of these two species.

In view of the widespread distribution and common occurrence of *Cervera atlantica* in suitable habitats, it is surprising that it has remained unrecognized for so long, particularly in the well searched waters of the Mediterranean. In my experience, *Cervera atlantica* is apparently rather more common there than *Cornularia cornucopiae*, if judged on the basis of searches made by wading and snorkelling to a maximum depth of 2 m, when I found *Cervera atlantica* six times more frequently than *Cornularia cornucopiae*. Since the scientific and popular literature states that *Cornularia cornucopiae* is the only non-scleritic stoloniferan to be found in the Mediterranean, some records of this allegedly common species may be misidentifications of *Cervera atlantica* (cf. the case of the specimens recorded by Manuel (1979) in England). Both species are easily overlooked, because of their small size and cryptic, photophobic habits. Also, the shallow-water *Cervera atlantica* would usually be missed by the common collecting methods used in the Mediterranean, such as diving, dredging or trawling. It should be noted that the extensive survey of Weinberg (1977, 1978) was carried out by SCUBA diving and dredging in the circalittoral zone to 100 m depth: *Cervera atlantica* occupies the mid-littoral and infralittoral zones (cf. Augier, 1982).

#### HABITAT

*Cervera atlantica* is a cryptic, photophobic species. In the Mediterranean Sea, it is found in shallow water, usually 0-

2 m deep, only rarely being exposed to the air by the small tidal range. (The colonies found at 3-12 m by López-González *et al.* (1995) at Ceuta seem to be exceptional.) The species occurs in similarly shallow water in the Atlantic Ocean, where it is frequently left exposed by low tides. In general, it is commonly found, with the polyps hanging downwards, growing in depressions in the undersides of stones or boulders on the seabed, a habit which keeps it clear of the sand or mud. It may also occur in caves and crevices or under overhangs amongst massive intertidal rocks. Whilst it is occasionally found on bare rock without any other macro-organisms, it more usually occurs amongst encrusting sponges, bryozoans, tunicates, tube-worms and algae. It always seems to grow on the undersides of horizontal faces or overhangs, or attached to vertical faces in crevices; I have never found it orientated facing upwards on either horizontal or sloping surfaces. Johnson (1861) mentioned that it may occur on seaweeds, but I have never seen it in such a situation, although Roca (1986) found what may have been this species on the rhizomes of *Posidonia* on the coast of Mallorca.

*Cervera atlantica* occurs in moderately to extremely sheltered positions with no input of fresh or brackish water, protected from direct sunlight. If left exposed by a low tide, it seems to be tolerant of high temperatures, as long as the microenvironment remains humid and shaded. Typical localities are in sheltered harbours, in the lee of headlands and in small, protected coves (*cf.* the "calanque" where Béranguier (1954) discovered *Anthelia inermis*). It may live on open beaches, but usually only in areas enclosed by reefs that protrude from the sea sufficiently to reduce the wave force significantly, or in other topographical situations that achieve the same effect (*e.g.*, sites 1 and 26 in Table I). Exceptionally, it may occur on an extremely exposed coast, but within the protection of a cave (*e.g.*, site 16).

In the Mediterranean Sea, *Cervera atlantica* occurs in the biocenosis of relatively Calm-water Infralittoral Photophilic Algae (CIPA), in the infralittoral zone (classification of Augier, 1982). In the Atlantic Ocean, it occurs in the equivalent of the Mediterranean biocenosis of the Midlittoral Fringe (MF), one of the biocenoses of the lower sub-zone of the mid-littoral zone (Augier, 1982). This may explain why it was overlooked by Weinberg (1978) who observed octocorals in deeper water by SCUBA diving and dredging in the circalittoral zone down to 100 m depth (Weinberg, 1977); this zone comprises the Mediterranean infralittoral and circumlittoral zones according to the French terminology (Augier, 1982). A diver would presumably spend little or no time at depths of <2 m, and furthermore would be making observations of species immediately visible on hard surfaces, rather than turning over stones and rocks under water. All the stoloniferan species of the genera *Cornularia*, *Sarcodictyon* and *Clavularia* reported so far in the Mediterranean seem to have been observed on upper surfaces of rocks or on vertical faces and overhangs, rather than under stones (*e.g.*, Schmidt, 1972; Weinberg, 1979, 1980).

Since no details have been published by previous authors (*e.g.*, Johnson, 1861; Béranguier, 1954; Manuel, 1979; López-González *et al.* 1995), ecological data for the various sites where I have found *Cervera atlantica* are given here. The site numbers refer to those given in Table I, a complete list of all the confirmed records known to me.

- 1) West of the lighthouse at Maspalomas (Gran Canaria) on a gently sloping beach (about 1:333 slope at the lowest tide level) that reduces the effect of incoming waves, *Cervera atlantica* occurred with sponges on the undersides of boulders resting on sand at lower tide levels. At the western end of the beach is a low rocky platform where *Cervera atlantica* also occurred under sponge encrusted stones in pools up to mid-tide level.
- 2) North of Melenara (Gran Canaria) in a tide-pool on the landward side of a rocky outcrop, *Cervera atlantica* occurred under an overhang exposed at low tide but protected from the sun.
- 3) Below the sewage outfall just north of San Juan harbour (Tenerife), *Cervera atlantica* was exposed at low water with sponges and tunicates on the wall of a deep north-facing tide-pool, sheltered from the sun by massive rocks.
- 7) This is a very sheltered shallow area between Punto de la Lagarta and Playa del Reducto, adjacent to Arrecife harbour (Lanzarote), almost enclosed on the seaward side by a rocky reef. The reef and a large area of boulders are exposed at low tide. At low tide, *Cervera atlantica* occurred under stones in *ca* 20 cm of water or, at higher levels, was exposed to the air, but protected from direct sunlight.
- 8) *Cervera atlantica* was found under stones in tide-pools at the highest tide level (Lanzarote). Although still submerged, it was subjected to high temperatures at low tide.
- 9) *Cervera atlantica* occurred under stones in shallow tide-pools (Lanzarote).
- 11) In a cove just to the west of the Gorgulho rock (off the Lido), Funchal, Madeira, *Cervera atlantica* occurred among sponges on the cliff face under overhangs at about mid-tide level.
- 12) *Cervera atlantica* was found under stones about low-tide level and on exposed rock faces among algae and sponges up to 20 cm above low neap tides on a sheltered beach (Madeira).
- 13) *Cervera atlantica* occurred under stones in tide-pools up to 50 cm deep, sheltered between massive craggy rocks (Madeira).
- 15) At the western end of Santa Eulalia beach, east of the headland (Balaia, Portugal), *Cervera atlantica* was found under stones in up to 2 m of water, but mostly under overhangs on exposed massive rocks of the headland. The density of the polyps in one particular colony was up to 33 per cm<sup>2</sup>.
- 16) This is a very exposed, wave-swept length of coast (Porto Covo, Portugal) with massive rocks, where only one colony of *Cervera atlantica* was found, growing on the vertical wall of a sheltered cave, exposed at low

Table I. An inventory of records of *Cervera atlantica*. RBW = present author.

Site	Ocean or sea	Locality	Co-ordinates	Date	References and notes
1	Atlantic	Playa de Las Mujeres, Gran Canaria	27°44'N.15°36'W	7 November 1992; 8 February 1996	RBW (unpublished)
2	Atlantic	Playa del Hombre, Gran Canaria	27°59'30"N.15°22'W	5 November 1992	RBW (unpublished)
3	Atlantic	San Juan, Tenerife	28°11'N.16°49'W	17 & 22 April 1991	RBW (unpublished)
4	Atlantic	Punta Hidalgo, Tenerife	28°21'N.16°22'W	9 March 1990	López-González <i>et al.</i> (1995)
5	Atlantic	La Tejita, Tenerife	28°30'N.16°33'W	20 January 1990	López-González <i>et al.</i> (1995)
6	Atlantic	Candelaria, Tenerife	28°34'30"N.16°20'W	4 February 1989	López-González <i>et al.</i> (1995)
7	Atlantic	Arrecife, Lanzarote	28°57'N.13°33'W	21, 26 & 28 April 1990	RBW (unpublished)
8	Atlantic	Playa Roca, Lanzarote	28°59'N.13°30'W	2 May 1990	RBW (unpublished)
9	Atlantic	Playa Bastián, Lanzarote	28°59'N.13°29'30"W	22 April 1990	RBW (unpublished)
10	Atlantic	Funchal, Madeira	32°40'N.16°55'W	before 1861	Johnson (1861) [as <i>Cornularia atlantica</i> sp. n.]
11	Atlantic	Funchal, Madeira	32°40'N.16°55'W	2 October 1993	RBW (unpublished) [topotype material deposited in Zoölogisch Museum Amsterdam (ZMA COEL 8477)]
12	Atlantic	Canical, Madeira	32°44'N.16°46'W	9 October 1993	RBW (unpublished)
13	Atlantic	Porto Moniz, Madeira	32°52'N.17°12'W	10 October 1993	RBW (unpublished)
14	Atlantic	Santa María del Mar, Spain	36°31'N.06°17'W	30 February 1990	López-González <i>et al.</i> (1995)
15	Atlantic	Balaia, Portugal	37°05'N.08°15'W	17-19 October 1994	RBW (unpublished)
16	Atlantic	Porto Covo, Portugal	37°50'N.08°49'W	25 October 1994	RBW (unpublished)
17	Atlantic	Portland Harbour, England	50°34'N.02°26'W	February 1977	Manuel (1979) [as <i>Cornularia cornucopiae</i> ]
18	Atlantic	Portland Harbour, England	50°34'N.02°26'W	31 August 1996	RBW (unpublished)
19	Strait of Gibraltar	Isla de Tarifa, Spain	36°00'48"N.05°36'W	6 February 1991	López-González <i>et al.</i> (1995)
20	Strait of Gibraltar	Ceuta (Spain), North Africa	35°53'N.05°16'W	15-17 August 1991	López-González <i>et al.</i> (1995)
21	Mediterranean	Mijas Costa, Spain	36°31'N.04°44'W	17 November 1988; 6 March 1992	RBW (unpublished)
22	Mediterranean	Benidorm, Spain	38°33'N.00°09'W	8 June 1972; 6 October 1974; 24 February 1979; 29 April 1980	RBW (unpublished) [1979 material deposited in Zoölogisch Museum Amsterdam (ZMA COEL 7903) as " <i>Anthelia inermis</i> "]
23	Mediterranean	Porto Petro, Mallorca	39°21'N.03°14' E	21-22 April 1994	RBW (unpublished) [material deposited in The Natural History Museum, London (1996.1196)]
24	Mediterranean	Marseille, France	43°18'N.05°22'E	before 1954	Bérenquier (1954) [as <i>Anthelia inermis</i> sp. n.]
25	Mediterranean	Antibes, France	43°35'N.07°07'E	28 November 1990	RBW (unpublished)
26	Mediterranean	Kato Pyrgos, Cyprus	35°11'N.32°40'E	17 October 1995	RBW (unpublished)

- tide but in semi-darkness. It occurred adjacent to a small colony of the corallimorpharian *Corynactis viridis* Allman, 1846, and some individuals of the actinarian *Actinothoe sphyrodeta* (Gosse, 1858) and the solitary coral *Balanophyllia regia* Gosse, 1853.
- 18) *Cervera atlantica* grew with sponges, bryozoans and tunicates under overhangs or on stones wedged in crevices on the landward side of a low reef close to the shore, within the breakwaters of Portland Harbour (England). It was exposed to the air at low spring tides.
  - 21) On the sheltered landward sides of low reefs (Mijas Costa, Spain), *Cervera atlantica* was growing with sponges on stones wedged in crevices in the rocks, shaded from the sun.
  - 22) *Cervera atlantica* was originally found under stones in 1-2 m of water sheltered behind Benidorm harbour quay (Spain) on a stony bottom. It was present in 1972, 1974, 1979 and 1980, but by 1993, this habitat had been overcome by sand, the harbour was spoiled by rubbish and diesel oil pollution, and *Cervera* could no longer be found there.
  - 23) At the inland extremity of a narrow, shallow bay behind Punta de sa Torre (Mallorca), part of a complex, almost landlocked series of inlets with practically no wave action, *Cervera atlantica* occurred under boulders at 1.3 m on the sandy bottom. It also occurred under stones at the bottom of an isolated pool, 30-40 cm deep, connected by a narrow entrance to the bay, and therefore even more sheltered from wave action.
  - 25) About 100 m west of the Bastion St André (Antibes, France), in a shallow area about 50 cm deep protected by a wide sweep of rocks protruding from the water up to about 50 cm at low tide, *Cervera atlantica* occurred under boulders up to 60 cm across on a bottom of stones and gravel.
  - 26) This is an expansive horizontal rock shelf with a few gulleys in a bay backed by cliffs (Kato Pyrgos, Cyprus), protected from strong wave surges by a headland and the shallow water at the bay entrance. Only one colony of *Cervera atlantica* was found here, under a large boulder in a 70 cm deep gulley below the cliffs, but *Cornularia cornucopiae* was rather common. This is the only site where I have found the two species together.

#### GEOGRAPHICAL DISTRIBUTIONS OF *CERVERA ATLANTICA* AND *CORNULARIA CORNUCOPIAE*

Until very recently, the only published record of *Cervera atlantica* was that from the type locality at Funchal, Madeira (Johnson, 1861). The discovery of the spuriously named and hitherto unrecognized *Anthelia inermis*, established here as conspecific with *Cervera atlantica*, extended the distribution to the Mediterranean Sea at Marseille, France (Béranguier, 1954). My subsequent work has established that the species is widespread, with a Mediterranean-Atlantic distribution.

Over the last 24 years, I have confirmed the presence of *Cervera atlantica* at its type locality and added a further

16 localities throughout Madeira and the Canary Islands, and the coasts of England, Portugal, Spain and the Balearic Islands, France and Cyprus (Table I; Fig. 2). This has extended its known range about 4,500 km [2,800 miles] east of the type locality, 1,970 km [1,230 miles] north and 560 km [350 miles] south; but, even now, the ultimate limits remain to be determined. The few recent records of López-González *et al.* (1995) fall well within this range, being concentrated around the Strait of Gibraltar and Tenerife (see Table I and Fig. 2).

It is, therefore, now well established that *Cervera atlantica* occurs throughout the Mediterranean Sea, and has a Lusitanian-Mauritanian distribution (classification of Ekman, 1967) in the Atlantic Ocean (Fig. 2). To the north of the Strait of Gibraltar, I have traced it up the west coast of Portugal, thus establishing it in the Lusitanian region, but I still have not searched the Açores, nor the Atlantic coasts of Spain and France. However, an illustration by Manuel (1983; photograph 83, p. 7) appears to show a colony of *Cervera atlantica*, recorded from "W. France", although it is identified as *Cornularia cornucopiae*. This record remains uncertain, but further north, I have found undoubted *Cervera atlantica* at the exact place in Portland Harbour (south coast of England) where Manuel (1979) recorded the stoloniferan that he misidentified as *Cornularia cornucopiae*. However, in recent attempts to find *Cervera atlantica* on the north and south coasts of the south-west peninsula (Devon and Cornwall) of England, I have been unsuccessful.

As would be expected from its occurrence on the southern Iberian coast, *Cervera atlantica* has also been found on the south side of the Strait of Gibraltar, at Ceuta (López-González *et al.*, 1995). However, although the species abounds throughout the Canary Islands, it has not yet been recorded on the Atlantic coast of North Africa. The African coast is very poorly studied; the only major survey of Cnidaria off north-west Africa (Patrioti, 1970) failed to reveal *Cervera atlantica* off Morocco, but this may have been because of a lack of suitable habitats, or failure to recognize the species. *Cornularia cornucopiae* was not recorded, either.

The range of *Cervera atlantica* overlaps that of *Cornularia cornucopiae* where the two species co-occur throughout the Mediterranean Sea. However, the latter species is the less widespread in the Atlantic Ocean, apparently having a discontinuous Lusitanian (see Ekman, 1967) distribution. Thus, *Cornularia cornucopiae* is not known south of the Strait of Gibraltar (see Weinberg, 1978), but has been reported from a few isolated localities to the north, *viz.*, Portugal (Saldanha, 1974), northern Spain (Ocharan & Anadón, 1981), the French coast of the English Channel (Teissier, 1965) and as far west as the Açores (Tixier-Durivault & d'Hondt, 1974).

It should be remembered that the specimens from Portland Harbour, England, identified as *Cornularia cornucopiae* by Manuel (1979) were actually *Cervera atlantica*. All the references to the existence of *Cornularia cornucopiae* in England (*viz.*, Manuel, 1979, 1981, 1983, 1988; Picton *et al.*, 1987) are based upon that single erroneous

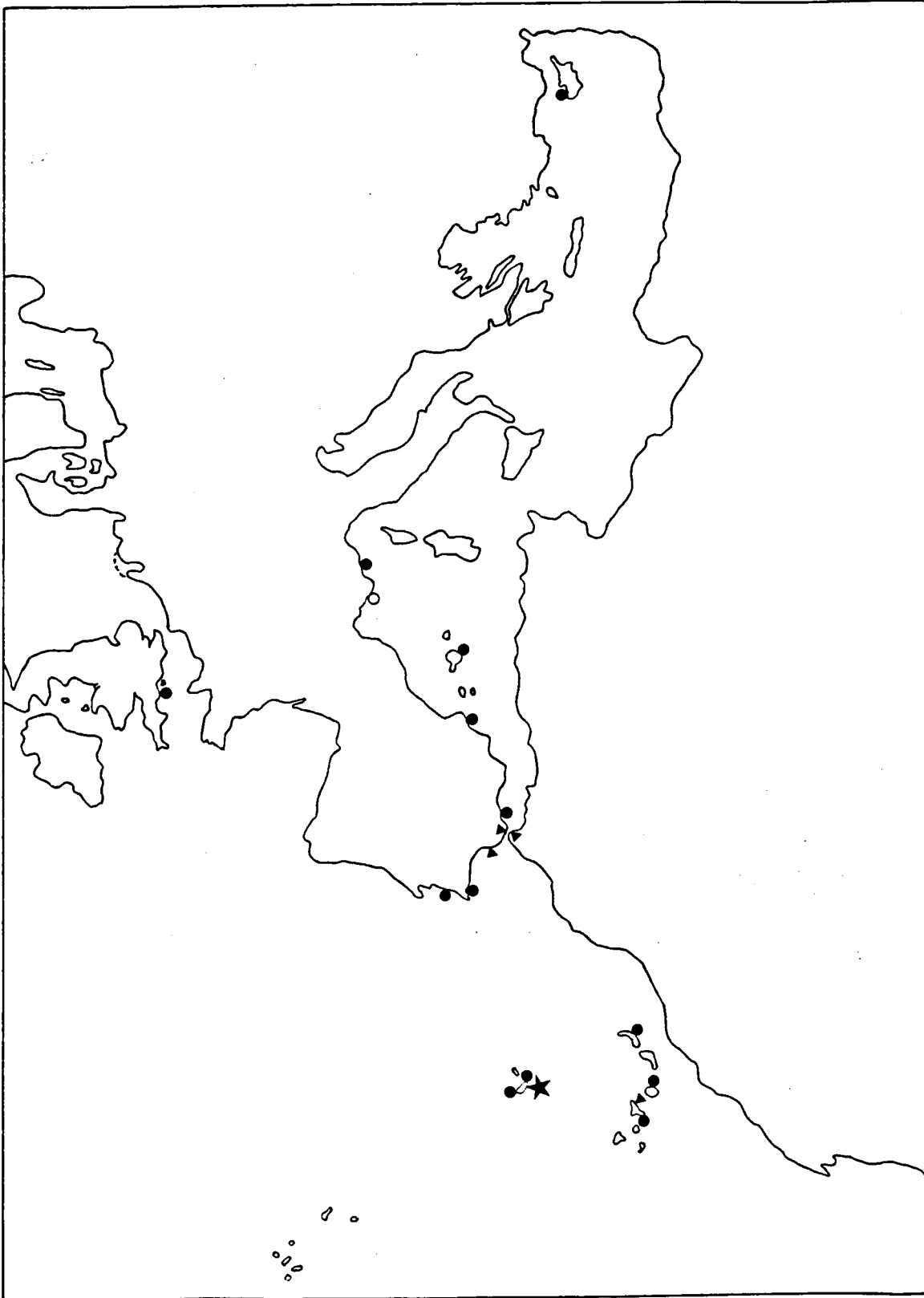


Fig. 2. The geographical distribution of records of *Cervera atlantica* (Johnson, 1861).  
 ★ type locality of *Cervera atlantica*, the species confirmed here in 1993 by RBW;  
 ○ type locality of *Anthelia inermis* Bérenquier, 1954;  
 ● unpublished records by RBW;  
 ▲ other confirmed published records.  
 Each symbol in the Canary Islands represents from one to three sites (cf. Table I).



record. Since all the Atlantic records of *Cornularia cornucopiae* were published before the rediscovery of *Cervera atlantica* was made known (Williams, 1996; López-González *et al.*, 1995), the identifications should be checked by re-examining the original specimens if possible.

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