The hydrozoan fauna (Cnidaria: Hydrozoa) from the peaks of the Ormonde and Gettysburg seamounts (Gorringe Bank, NE Atlantic)

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Abstract

Twenty-seven species of hydroids were collected from the peaks (35–42 meters depth) of the Gorringe Bank (NE Atlantic) during the oceanographic campaign ‘LusoExpedição Olympus 2008’. Twenty-one of these species are new for the Gorringe Bank that now has published records for a total of 37 hydroid species. *Lafoeina tenuis*, *Sertularella ellisii* and *Clytia hemisphaerica* were the most abundant hydroid species collected. Results revealed spatial differences in the composition of species assemblages along the summits of the Gorringe, as only 14 of the species sampled were found both in the Ormonde and Gettysburg seamounts. The large density of algae at the peaks of the seamounts sustain a considerable hydrozoan diversity (23 species), but visibly inhibits the establishment of hydroids to the rocky substrates (only 2 species found). All the known hydrozoan species from the peaks of the Gorringe were exclusively collected during summer, thus sampling in other seasons may reveal further hydrozoan diversity due to seasonal patterns of growth of algae and hydroids. Nevertheless, the reasonably high levels of hydrozoan biodiversity demonstrated only from a small portion the summits of the Gorringe, corroborate its seamounts as ‘biodiversity hotspots’. In agreement with previous investigations with shallow-water molluscs and sponges, the shallow-water hydroid fauna of the Gorringe revealed greater biogeographical affinities with the Mediterranean and mainland Portugal. This is the first report of *Eudendrium armatum* outside of the Mediterranean.

Key words: Hydroids, Leptothecata, Anthothecata, Marine invertebrates, biogeography, taxonomy, Seamounts.

Introduction

Seamounts are prominent undersea mountains usually associated with volcanic activity (e.g. Epp & Smoot 1989; Rogers 1994). There is an estimation of over 30000 seamounts in the world’s oceans rising from the seabed to more than 1 Km height, of which around 20% are probably found in the Atlantic Ocean, mainly in the vicinity of the Mid Atlantic Ridge (Yesson et al. 2011). However, only a small fraction of these structures have been properly sampled and studied in terms of biodiversity (Stocks 2009), despite their well-recognized importance in terms of marine life (e.g. Rogers 1994).

Seamounts are known as ‘underwater oases’ because they host richer communities of seabed organisms (e.g. corals, sponges) and fishes than the surrounding environments (e.g. Rogers 1994; Koslow 1997; Koslow et al. 2001; Stocks 2004). The establishment of species is mainly due to the availability of hard substrata and interaction of seamounts with oceanic currents that tend to increase water-flow around these geologic structures, giving rise to hydrographic phenomena like upwelling, turbulence, Taylor cones and eddies (e.g. Eriksen 1991; Kunze & Stanford 1993; Rogers 1994; Koslow et al. 2001; Coelho & Santos 2003).

The Gorringe is a large submarine Bank, 5000 m high, located at about 210 Km west-southwest off Cape St. Vincent in SW Portugal (Fig. 1). It is included in a ridge with other seamounts oriented in a NE-SW direction, covering an area of about 9500 Km², over 180 Km long. The Gorringe has steep slopes (Fig. 1). It is flanked by the Tagus and Horseshoe abyssal plains (> 5000 m and ca. 4500 m deep, respectively) and at the isobath of the 1000 m the mountain bifurcates into two peaks each reaching the photic layer up to around 30 m depth: the Gettysburg (36°31’N, 11°34’W) and Ormonde (36°42’N, 11°09’W) seamounts (Fig. 1; Oceana 2005; Tourais 2008).
The Gorringe Bank is assumed to be one of the oldest Atlantic seamounts with 110–135 million years of age, and started to develop in the late Jurassic concurrent with the formation of the North Atlantic (Prichard & Mitchell 1979; Conti et al. 2004; Jiménez-Munt et al. 2010). It is located in an area of conjunction of the African and Euro-Asiatic tectonic plates, and has been associated to phenomena of geological seismicity (e.g. Purdy 1975; Moreira 1985).

The Gorringe is influenced by several important major currents that converge at or nearby the seamounts (e.g. the Gulf, Antarctic, Portugal, African and Mediterranean currents) (e.g. Oceana 2005; http://oceancurrents.rsmas.miami.edu/). The Gorringe also alters tidal and current flows, generating internal waves, deflecting eddies of Mediterranean origin, developing a large anticyclonic eddy and enhancing upwelling events, reasons for being thus a site potentially enriched of nutrients and consequently of fauna and algae (e.g. Coelho & Santos 2003; Gubbay 2003; Global Ocean Associates 2004; Bower et al. 1995; Oceana 2005).

Despite the topographic prominence of the Gorringe Bank, its relative proximity to shore and recognizable importance as biodiversity ‘hotspot’ that urge conservation (WWF 2001; Oceana 2005, 2011), since its discovery in the year 1875, the Gorringe has only been subject to few biological studies mainly published in recent years (Topsent 1928; Lévi & Vacelet 1958; Ramil & Vervoort 1992a; Waren & Gofas 1996; Ramil et al. 1998b; Gofas 2000; Gofas & Beu 2002; Beck et al. 2002; Ávila & Malaquias 2003; Gaspard 2003; Dijkstra & Gofas 2004; Gonçalves et al. 2004; Oceana 2005; Oliverio & Gofas 2006; Gofas 2007; Morato & Pauly 2007a, b; Xavier & van Soest 2007; Surugiu et al. 2008; Abecasis et al. 2009; Gordo 2009; Reveillaud et al. 2010; Moura et al. 2012a). Nevertheless, over the last years several oceanographic campaigns have been undertaken in the Gorringe (cf. Governo de Portugal 2012) and therefore overall knowledge regarding its ecology, hydrology and geology is bound to increase.

The hydrozoan fauna of the Gorringe Bank is little studied, including only published records of some deep-sea hydroids (Ramil & Vervoort 1992a; Ramil et al. 1998b) and very few shallow-water taxa (Oceana 2005). The latter study probably did not include a taxonomic revision by a hydrozoan specialist.

The aim of the present study was to identify the hydrozoan fauna from the peaks of the Gorringe Bank, which is the first comprehensive attempt for the shallow waters of that marine region. This study may also contribute to further arguments to support the implementation of a marine protected area at the Gorringe Bank, as well as for the knowledge of the biogeographical affinities of its fauna.

**FIGURE 1.** Geographical location of the Gorringe Bank.
Materials and methods

The hydrozoan samples were collected from the peaks of the Ormonde and Gettysburg seamounts (Gorringe bank), by scuba diving, at depths between 35 and 42 meters, between the 8th and 13th July 2008, during the ‘LusoExpedição Olympus 2008’. The expedition was on board of the NT ‘Creoula’ and was organized by the Universidade Lusófona (Lisbon, Portugal). The sampling of hydrozoans was qualitative and based on visual detection of hydrozoan colonies. The biological material studied was gathered from a total of ten dives (see section 'List of the stations and species'). The bottom time during dives was approximately 10 minutes, due to depth and scuba gear used, which constrained a more exhaustive sampling. Only the dives performed by CJM had the aim to sample uniquely hydrozoans; the hydrozoans herein presented obtained by other divers were sporadically or unintentionally collected and set apart on the boat deck by CJM. The hydrozoans were fixed in 96% ethanol to allow molecular studies.

The biological material was identified in the laboratory and the different species identified from each dive were preserved in separate vials with 96% ethanol. All the hydrozoans were deposited at the biological collection of the Department of Biology, University of Aveiro (DBUA), Portugal. For some specimens, DNA was extracted and mitochondrial 16S rRNA sequences were generated following the methods of molecular analyses described in Moura et al. (2011).

List of the stations and species

Stn 1: Ormonde peak, 10 June 2008, 16:00h, collector: C.J. Moura, 36°42.857′N 11°09.968′W, 35–37 m.
_Eudendrium armatum_ Tichomirolloff, 1887; _Eudendrium_ sp.; _Lafoeina tenuis_ G.O. Sars, 1874; _Filellum_ cf. _serratum_ (Clarke, 1879); _Sertularella ellisi_ (Deshayes & Milne Edwards, 1836); _Antennella secundaria_ (Gmelin, 1791); _Aglaoaphenia kirchenpaueri_ (Heller, 1868); _Orthopoxys integra_ (MacGillivray, 1842); _Clytia hemisphaerica_ (Linnaeus, 1767).

Stn 2: Ormonde peak, 13 June 2008, 12:00h, collector: J. Xavier, 36°42.839′N 11°09.944′W, ca. 40 m.
_Lafoeina tenuis_; _Sertularella ellisi_; _Plumularia setacea_ (Linnaeus, 1758); _Aglaoaphenia pluma_ (Linnaeus, 1758); _Clytia hemisphaerica_.

Stn 3: Ormonde peak, 13 June 2008, 16:00h, collector: J. Xavier, 36°42.945′N 11°09.313′W, unknown depth.
_Eudendrium_ sp.; _Lafoeina tenuis_; _Halecium_ sp.; _Sertularella ellisi_; _Sertularella ornata_ Broch, 1933; _Obelia dichotoma_ (Linnaeus, 1758); _Clytia hemisphaerica_.

Stn 4: Ormonde peak, 13 June 2008, 16:30h, collector: C.J. Moura, 36°42.833′N 11°09.956′W, 37–42 m.
_Eudendrium armatum_; _Eudendrium_ cf. _merulum_ Watson, 1985; _Eudendrium_ sp.; _Amphipnema_ cf. _dixema_ (Péron & Lesueur, 1810); _Coryne eximia_ Allman, 1859; _Lafoeina tenuis_; _Filellum_ cf. _serratum_; _Halecium pusillum_ (M. Sars, 1857); _Halecium_ sp.; _Sertularella ellisi_; _Obelia dichotoma_; _Obelia gniculata_ (Linnaeus, 1758); _Orthopoxys integra_; _Clytia_ cf. _rigracilis_ (M. Sars, 1850); _Clytia hemisphaerica_.

Stn 5: Gettysburg peak, 11 June 2008, 10:30h, collector: J. Xavier, 36°31.092′N 11°34.284′W, 35–37 m.
_Eudendrium armatum_; _Eudendrium_ sp.; _Coryne_ sp.; _Lafoeina tenuis_; _Filellum_ cf. _serpens_ (Hassal, 1848); _Sertularella ellisi_; _Sertularella ornata_; _Plumularia setacea_; _Aglaoaphenia pluma_; _Aglaoaphenia kirchenpaueri_; _Clytia_ cf. _rigracilis_; _Clytia hemisphaerica_.

Stn 6: Gettysburg peak, 11 June 2008, 11:00h, collector: P. Neves, 36°31.091′N 11°34.284′W, ca. 38 m.
_Filifera_ indet.; _Eudendrium_ sp.; _Lafoeina tenuis_; _Cuspidella_ sp.; _Sertularella ellisi_; _Plumularia setacea_; _Aglaoaphenia pluma_; _Aglaoaphenia kirchenpaueri_; _Clytia_ cf. _rigracilis_; _Clytia hemisphaerica_.

Stn 7: Gettysburg peak, 11 June 2008, 14:30h, collector: C.J. Moura, 36°31.076′N 11°34.277′W, 33–37 m.
_Bougainvilliiidae_ indet.; _Eudendrium armatum_; _Eudendrium_ sp.; _Lafoeina tenuis_; _Cuspidella_ sp.; _Halecium_ sp.; _Filellum_ cf. _serpens_; _Sertularella ellisi_; _Antennella secundaria_; _Aglaoaphenia pluma_; _Aglaoaphenia kirchenpaueri_; _Clytia_ cf. _rigracilis_; _Clytia hemisphaerica_.

Stn 8: Gettysburg peak, 12 June 2008, 10:30h, collector: J.P. Borges, 36°31.071′N 11°34.275′W, ca. 33 m.
_Eudendrium armatum_; _Eudendrium_ sp.; _Lafoeina tenuis_; _Halecium tenellum_ Hincks, 1861; _Sertularella ellisi_; _Plumularia setacea_; _Aglaoaphenia pluma_; _Aglaoaphenia kirchenpaueri_; _Clytia_ cf. _rigracilis_; _Clytia hemisphaerica_.

Stn 9: Gettysburg peak, 12 June 2008, 14:30h, collector: C.J. Moura, 36°31.071′N 11°34.275′W, 37–41 m.
_Filifera_ indet.; _Eudendrium armatum_; _Eudendrium_ sp.; _Filellum_ cf. _serratum_; _Lafoeina tenuis_; _Cuspidella_ sp.; _Halecium_ sp.; _Sertularella ellisi_; _Antennella secundaria_; _Aglaoaphenia pluma_; _Clytia_ cf. _rigracilis_; _Clytia hemisphaerica_.

_Eudendrium armatum_; _Eudendrium_ sp.; _Lafoeina tenuis_; _Halecium tenellum_; _Halecium pusillum_; _Sertularella gayi_ (Lamouroux, 1821); _Sertularella ellisi_; _Plumularia setacea_; _Aglaoaphenia pluma_; _Aglaoaphenia kirchenpaueri_; _Clytia_ cf. _rigracilis_; _Clytia hemisphaerica_.

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MOURA
Systematic account

PHYLUM CNIDARIA Verrill, 1865

SUBPHYLUM MEDUSOZOA Petersen, 1979

CLASS HYDROZOA Owen, 1843

SUBCLASS HYDROIDOLINA Collins, 2000

ORDER ANTHOATHECATA Cornelius, 1992a

SUBORDER FILIFERA Kühn, 1913

Filifera indet. (fig. 2A)

Material studied. Gettysburg, stn 6: on cauli of alga Zonaria tournefortii Linnaeus, orange color after preservation, DBUA1517.01. Gettysburg, stn 9: on cauli of alga Zonaria tournefortii, orange color after preservation, DBUA1517.02.

Remarks. Phenotype resembling Hydractiniidae species.

Family Bougainvilliidae Lütken, 1850

Bougainvilliidae indet. (fig. 2B)

Material studied. Gettysburg, stn 7: abundant, creeping on algae and Eudendrium arnatum, DBUA1505.01.

Remarks. Maximum shoot size is 1200 µm; undetermined nematocysts: 7x3 µm; perisarc tube usually annulated basally, occasionally distally, usually straight; pseudohydrotheca present, one whorl of filiform tentacles, hypostome salient and rounded-conical. The morphology is similar to that of Rhizorhagium roseum Sars, 1874. The absence of specimens with gonophores prevents an accurate identification. This is the first record of a Bougainvilliidae taxon in the Gorringe.

Family Pandeidae Haeckel, 1879

Amphinema cf. dinema (figs. 2C, D)

Material studied. Ormonde, stn 4: sparse polyps on cauli of some alga Zonaria tournefortii, DBUA1521.01, Genbank accession no. KM402032.

Remarks. The sample material was not fertile preventing an accurate identification of this species. The most similar 16S rRNA sequence in Genbank, in relation to the sequence determined for the present material, corresponds to a medusa collected in Plymouth, identified as Amphinema dinema (Genbank accession no. EU999223.1; Licandro et al. 2010), different in a single nucleotide position. Without doubt these sequences correspond to the same species, the Gorringe hydroids (figs. 2E, F) exhibit morphological differences in comparison to A. dinema hydroids reared under laboratory conditions (Rees & Russell 1937). Namely the tentacles of the present colonies are in higher number (ca. 12–17, instead of four to ten), proportionally smaller and thicker, and disperse along the distal third of polyps instead of in a single whorl. Although the hydranths may have changed appearance after preservation in alcohol (Rees 1956; Schuchert 1996: 62) and/or present an abnormal/different growth form under laboratory conditions. For now, this taxon can only be identified taxonomically up to the genus level.
Family Eudendriidae Agassiz, 1862

Eudendrium armatum (fig. 2E)

Eudendrium armatum Tichomiroff, 1887: 31, fig. 25, pl. 1 figs 3–4, pl. 2, figs 3–4.—Marques et al., 2000a: 82–84, figs 16–18.—Marques et al., 2000b: 202.—Schuchert, 2008: 744–746, fig. 35.

Material studied. Ormonde, stn 1: few colonies, on rock, epibionts: small algae, calcified Bryozoa (infesting a dead colony); DBUA1511.07. Ormonde, stn 4: one colony, on rock, epibionts: Clytia hemisphaerica, calcified Bryozoa and small algae; DBUA1511.01. Gettysburg, stn 5: some colonies on rocks (found amidst sponges), epibionts: algae and calcified Bryozoa; DBUA1511.02. Gettysburg, stn 7: many colonies (including large colonies), overgrowing rocks, algae, sponges and Bryozoa; fertile colonies; epibionts: Bougainvilliidae indet., Halecium sp., Clytia cf. gracilis, Foraminifera, calcified Bryozoa, polychaetes, algae; DBUA1511.03. Gettysburg, stn 8: few small colonies; epibionts: small algae; DBUA1511.04. Gettysburg, stn 9: large colonies, fertile, on rock and dead octocoral; epibionts: small algae, calcified Bryozoa and Foraminifera; DBUA1511.05. Gettysburg, stn 10: two colonies (one much larger), on rock, epibionts: small algae, two species of calcified Bryozoa, DBUA1511.06, Genbank accession no. KM402025.

Remarks. Molecular data confirmed the identity of this species. The 16S sequence determined from one colony of the Gettysburg presented no sequence divergence with samples from Berlengas–western Portugal and Mediterranean (Moura & Schuchert, unpublished sequences and analyses).

Reported distribution. Eastern Atlantic.—The present account is the first of E. armatum outside the Mediterranean. Species also found in Berlengas–western Portugal and Mediterranean (Moura & Schuchert, unpublished; see above).

Mediterranean.—Western and eastern Mediterranean: Gibraltar (Marques et al. 2000b); Spain (Marinopoulos 1992; Schuchert 2008); France (Marinopoulos 1992; Schuchert 2008); Italy (Boero & Fresi 1986; Marques et al. 2000a, b; Schuchert 2008; Puce et al. 2009); Greece (Morri et al. 1999; Schuchert 2008).

Elsewhere.—E. armatum was assumed to be endemic from the Mediterranean (e.g. Marques et al. 2000b). Its presence in the Gorringe represents the first report in the Atlantic.

Eudendrium cf. merulum (figs. 2F)

Eudendrium merulum Watson, 1985: 200, figs 53–58.—Bavestrello & Piraino, 1991: 200, figs 2–4.—Marques et al., 2000b: 203.—Peña Cantero & García Carrascosa, 2002: 30, fig. 5a–b.—Bouillon et al., 2004: 59, fig. 35A–G.


Material studied. Ormonde, stn 4: dense aggregations of monosiphonic, branched, tall and robust colonies (up to 7.5 cm in length), overgrowing sponges; epibionts: small algae; not fertile; DBUA1513.01, Genbank accession no. KM402023.

Remarks. The maximum size of colonies recorded was 7.5 cm. Nematocysts were found undischarged, and comprise two different size forms: small microbasic euryteles (7.5–9.5)x(3.5–4)μm, r= 2–2.6, and large capsules on the hydranth body (14.5–16.5)x(7–8.5)μm, r=1.7–2.1. The inconclusive cryptic biodiversity associated with this species, being doubtful whether these Gorringe specimens are conspecific with the E. merulum originally described from Australia (Watson 1985; see Schuchert 2008). The 16S sequence obtained for this material clusters, without sequence divergence, with a Mediterranean lineage of the E. "merulum" complex (Schuchert, unpublished data), revealing recent gene flow between the Gorringe and Mediterranean. Furthermore, Schuchert (2008) indicates that Atlantic, Mediterranean and Black Sea populations likely correspond to three different biological species. Consequently, the Gorringe specimens of E. "merulum" can only be linked, so far, as conspecific with the Mediterranean E. "merulum" based on molecular data.
FIGURE 2. A: Filifera indet.—polyp; Stn 9. B: Bougainvilliidae indet.—fragment of a colony; Stn 10. C, D: Amphinema cf. dinema—individual polyps detached from the colony; Stn 4. E: Eudendrium armatum—live bushy colony little exposed to sunlight; Stn 7. F: Eudendrium cf. merulum—dense tufts of well-developed monosiphonic colonies; Stn 4. G–I: Eudendrium sp.—pedicels with polyps (G); Stn 4 (left) and Stn 1 (right); small microbasic euryteles (H); large nematocysts (I). J: Coryne eximia—large colonies overgrowing a cable; Stn 4. K: Coryne sp.—part of a colony; Stn 5. Scale bars: 10 µm (H, I); 0.2 mm (A); 1 mm (B, C, D, G, K); 1 cm (F). Photo credits. C.J. Moura.
Whatsoever, these represent the deepest records of *Eudendrium "cf. merulum"*, previously recorded from 1 to 15 m depth (Schuchert 2008).

**Reported distribution.** Eastern Atlantic.—Canary Islands, Gulf of Biscaya and English channel (Schuchert 2008), but these records likely refer to different molecular cryptic species than the present one of the Gorringe specimens (see above; Schuchert 2008). The present account seems therefore the first for the Atlantic (and Gorringe).

Mediterranean.—Chafarinas Islands (Peña Cantero & García Carrascosa 2002); Italy (Bavestrello & Piraino 1991; Marques et al. 2000b; Schuchert 2008; Puce et al. 2009); Croatia (Marques et al. 2000b); Turkey: Sea of Marmara and Aegean Sea (Marques et al. 2000b); Lebanon (Morri et al. 2009).

Elsewhere.—*Eudendrium merulum* was originally described from Australia, where it is a quite rare species (Watson 1985). Later it has also been recorded in the eastern and western Mediterranean, Black Sea, Yemen and NE Atlantic (Bavestrello & Piraino 1991; Marques et al. 2000a,b; Schuchert 2008), but was possibly misidentified (Schuchert 2008).

**Eudendrium sp.**
(fig. 2G, H, I)

**Material studied.** Ormonde, stn 1: fertile colonies, frequent on cauli of alga *Zonaria tournefortii*, DBUA1514.01, Genbank accession no. KM402031. **Ormonde, stn 3**: few exemplars, delicate, unbranched and monosiphonic colonies, overgrowing cauli of *Zonaria tournefortii*; hydrocauli with few annulations, DBUA1514.07. **Ormonde, stn 4**: frequent on the alga *Zonaria tournefortii*, overgrowing other algae conjunctly with Orthopyxis integra; DBUA1512.02. **Gettysburg, stn 5**: fertile specimens; small, delicate and unbranched colonies; overgrowing *Zonaria tournefortii* and Aglaophenia pluma; DBUA1514.02. **Gettysburg, stn 6**: abundant on Zonaria tournefortii, fertile and monosiphonic colonies; DBUA1514.03; Genbank accession no. KM402026. **Gettysburg, stn 7**: frequent on cauli of *Zonaria tournefortii*, hydrocauli somewhat annulated, DBUA1514.04. **Gettysburg, stn 8**: fertile, predominantly on cauli of *Zonaria tournefortii*, less common on hydrorhizae of Sertularella ellisi; DBUA1512.01. **Gettysburg, stn 9**: abundant, on small shrimp and cauli of the alga *Zonaria tournefortii*, DBUA1514.05. **Gettysburg, stn 10**: few colonies on cauli of *Zonaria tournefortii*, pedicels strongly annulated, DBUA1514.06.

**Remarks.** This biological material consists of extremely small, monosiphonic and stolonal rarely branched colonies, developing sporosacs on hydranths. Perisarc is smooth, corrugated or have annulated stretches. Nematocysts identified correspond to small microbasic euryteles (5–7.4)x(2.7–3.6)μm, r= 1.5–2.4, and large unidentified capsules on the hydranth body (10.9–14)x(4.3–7.4)μm, r=2–2.8 (Figs. 2 H, I)

The present taxon resembles *Eudendrium album* Nutting, 1898 and *E. simplex* Pieper, 1884, but 16S haplotype data did not reveal any particular phylogenetic relationship with any of these species, as well as to a great variety of other *Eudendrium* species mainly found in the NE Atlantic and Mediterranean (Schuchert & Moura, unpublished phylogenetic analyses). Because both morphologically and molecularly, this biological material of *Eudendrium* is differentiated from the other herein reported, and because this is the only study reporting *Eudendrium* taxa in the Gorringe, this represents the first record of this inconspicuous species in the Gorringe.

The publication of 16S sequences obtained from samples of stations 1 and 6, is expected to allow a future correct taxonomic identification of this biological material.

**SUBORDER CAPITATA Kühn, 1913**

**Family Corynidae Johnston, 1836**

*Coryne eximia* Allman, 1859
(fig. 2J)

Material studied. — Ormonde, stn 4: very abundant on diving cable lost two years before; fertile colonies; epibionts: Lafoeina tenuis, Clytia cf. gracilis, small algae and calcified Bryozoa; DBUA1508.01; Genbank accession no. KM402029.

Remarks. This biological material was only found on anthropogenic materials at a single sampling station, and its 16S sequence is equal to others of colonies exclusively from the Mediterranean (Genbank accession: AJ878715.1; Schuchert 2005a). Essentially, this is a coastal species usually found in harbours, estuaries and on floating objects (e.g. Russel 1953). Therefore its presence at the Ormonde seamount suggests fairly recent gene-flow between the Gorringe and Mediterranean, perhaps mediated by an unintentional anthropogenic introduction, but further evidence is required to support this hypothesis.

Furthermore, this is the first record of C. eximia in the Gorringe, the southernmost in the northeast Atlantic, and apparently the deepest depth record (previous records had been from 25 m depth, Fey 1970).

Reported distribution. Eastern Atlantic.—British Isles (e.g. Allman 1859; Russell 1953; Schuchert 2001b), Denmark (Petersen 1990), Norway (Hartlaub 1907), Germany (Hartlaub 1894), Belgium (Leloup 1947, 1952; Massin et al. 2002), Netherlands (Leloup 1933), France (e.g. Boero & Bouillon 1968; Schuchert 2005a), north Spain (e.g. Altuna & ), Gorringe (present study).

Mediterranean.—France (Schuchert 2005a; Galea 2007), Lebanese coast (Goy et al. 1991), Italy (Puce et al. 2003; Schuchert 2005a) and Ligurian Sea (Goy 1972; Puce et al. 2003).

Elsewhere.—Circumglobal with preference for temperate waters; east coasts of Canada and USA, South Africa and Pacific (Alaska to California, Chile, New Zealand, Western Australia and Japan) (e.g. Schuchert 2001a,b, 2005a).

Coryne sp. (fig. 2K)

Material studied. Gettysburg, stn 5: scarce material, several shoots on caulus of Zonaria tournefortii, DBUA1509.01.

Remarks. Ramification up to first order; perisarc annulated throughout; stenotele length ca. 21 µm. The absence of fertile specimens makes accurate identification of this material impossible, but it shares morphological similarities with Coryne pusilla Gaertner, 1774. This biological material clearly corresponds to a species distinct from the remnant herein presented, representing the first record of this Corynidae species in the Gorringe Bank.

ORDER LEPTOTHECATA Cornelius, 1992a

SUBORDER CONICA Broch, 1910

Family Campanulinidae Hincks, 1868

Lafoeina tenuis
(fig. 3A)

Lafoeina tenuis G.O. Sars, 1874: 95, 119–121, pl. 5 figs. 1–5.—Cornelius, 1995a: 197–199, fig. 45.—Vervoort, 2006: 225–226, figs. 7 no. 4; 8 no. 1; 10d–i.—Bouillon et al., 2004: 131, figs. 69E–G.

FIGURE 3. A: \textit{Lafonea tenuis}—hydrotheca with hydranth (right) and nematotheca (left); Stn 10. B: \textit{Cuspidella} sp.—hydrotheca with hydranth; Stn 9. C: \textit{Halecium pusillum}—part of a colony, hydrothecae and hydranths; Stn 10. D: \textit{Halecium tenellum}—part of a colony; Stn 10. E: \textit{Halecium} sp.—portion of a colony; Stn 4. F: \textit{Filellum cf. serpens}—hydrotheca; Stn 7. G: \textit{Filellum cf. serratum}—hydrotheca; Stn 4. Scale bars: 0.2 mm (A); 0.5 mm (B, C–G); 1 mm (D). Photo credits. C.J. Moura.
Reported distribution. Northeast Atlantic.—Widely distributed in the Northeast Atlantic: Azores (Cornelius 1992, 1995a; Vervoort 2006), Madeira (Cornelius 1995a), Gorringe (present study), mainland Portugal (personal observation), Spain (García-Corrales et al. 1979; Ramil 1988; Altuna & García-Carrascosa 1990; Álvarez-Claudio 1993; Altuna 1994a, b; Álvarez-Claudio & Anadón 1995; Medel & López-González 1996; Ramil et al. 1998a); Bay of Biscay (Gourret 1906); British Isles (e.g. Hincks 1868; Cornelius 1995a; Howson & Picton 1997; France (Cornelius 1995a); Iceland (Hincks 1874); Norway (Sars 1869, 1874; Hincks 1874; Christiansen 1972); Sweden (Jagerskiold 1971; Calder 2012); Baltic Sea/North Sea (Brock 1928).

Mediterranean.—Widely spread across the western Mediterranean: Spain (Gili 1986; García Carrascosa 1981; Roca 1986); France (Picard 1951b; Bellan-Santini 1970; Galea 2007), and Italy (e.g. Rossi 1961; Montanari & Morri 1977; Morri 1979, 1980, 1981). Recently recorded in the Eastern Mediterranean (Morri et al. 2009), although records of *L. tenuis* from the Mediterranean may correspond to a different species—*Lafoeina vilaevelebiti* Hadži, 1917 (e.g. Cornelius 1995a; Vervoort 2006).

Elsewhere.—Boreal distribution (Boero & Bouillon, 1993). Sometimes recorded in the NW Atlantic (e.g. Kramp 1932; Calder 2003), Gulf of México (Deevey 1954), Caribbean (Vervoort 1968) and Arctic seas (e.g. Linko 1912; Berezina 1948; Brotskaya et al. 1963; Sirenko 2001). However, many authors question the possibility of cryptic diversity within this nominal morphologically simple species (e.g. Cornelius 1995a; Schuchert 2001a; Vervoort 2006).

*Cuspidella* sp.  
(fig. 3B)

Material studied. Gettysburg, stn 6: relatively frequent, on cauli of *Zonaria tournefortii*, DBUA1510.01.  
Gettysburg, stn 7: many polyps detected on caulus of one specimen of *Zonaria tournefortii*, DBUA1510.02.  
Gettysburg, stn 9: relatively frequent, on cauli of *Zonaria tournefortii* and dead branches of octocorals, DBUA1510.03.

Remarks. Basal line in hydrothecal cusps present. This is the first record of this taxon in the Gorringe.

Family Haleciidae Hincks, 1868

*Halecium pusillum*  
(fig. 3C)

*Eudendrium pusillum* M. Sars, 1857: 154, pl. 1 figs 14–16.  

Material studied. Ormonde, stn 4: few colonies, on algae; DBUA1518.02. Gettysburg, stn 10: few colonies; on *Aglaophenia kirchenpaueri*, *Sertularella gayi* and algae; DBUA1518.01; Genbank accession no. KM402027.

Remarks. An exemplar from station 10 confirmed the identity of this species with 16S haplotype data. It clusters with high nodal support with 16S sequences of samples from Roscoff (Genbank accession number FJ550499) and western Portugal (unpublished sequence), although with some sequence divergence (Moura, unpublished analyses).

Reported distribution. Eastern Atlantic.—Belgium (Leloup 1952), France (e.g. Billard 1927; Philbert 1935; Teissier 1965; Fey 1970), UK (e.g. Medin 2011), N Spain (e.g. Rioja 1906; Aguirrezaabalaga et al. 1984; Isasi 1985; Ramil 1988; Altuna & García Carrascosa 1990; Alvarez 1993; Altuna 1994a), mainland Portugal (Da Cunha 1944, 1950), S Spain (Ramil & Vervoort 1992b), Gorringe (present study) and Madeira (Wirtz, 2007).

Mediterranean.—Western side: Adriatic (Brock 1912, 1933; Babic 1913), Italy (Sars 1857; Rossi 1961; Boero 1981a, b; Boero & Fresi 1986; Piraino & Morri 1980; Puce et al. 2009), France (e.g. Motz-Kossowska 1911; Stechow 1919; Leloup 1934a; Picard 1951b, 1952) and Spain (e.g. García Corrales et al. 1978; García Carrascosa 1981; Gili 1986; Gili et al. 1984; Templado et al. 1986; Medel et al. 1998) including Balearic Islands (Gili & García Rubies 1985; Roca 1986, 1989) and Chafarinas Islands (Peña Cantero & García Carrascosa 2002).
Elsewhere.—With sparse (perhaps dubious) records from the western Atlantic (French Guayana: Leloup 1960), Indian Ocean (Indochina: Leloup 1937), and western and eastern Pacific (Korea: Park 1993; Japan: Hirohito 1995, and Galapagos Islands: Calder et al. 2003).

**Halecium tenellum**
(fig. 3D)


**Material studied. Gettysburg, stn 8:** on Zonaria tournefortii and Sertularella ellissii. **Gettysburg, stn 10:** common on Sertularella ellissi and Sertularella gayi; DBUA1520.01; Genbank accession no. KM402024.

**Remarks.** The 16S sequence determined from a specimen of station 10 clustered with low sequence divergence with samples of *H. tenellum* from the Azores, UK and northern Portugal (Moura, unpublished). This species was previously recorded in the Gorringe at a depth of 54–62 meters by Ramil et al. (1998b).

**Reported distribution.** Eastern Atlantic.—British Isles (e.g. Hincks 1861, 1868; Cornelius 1975b), Belgium (Leloup 1952; Muller 2004), France (e.g. Teissier 1965; Fey 1970), N of Spain (Rioja 1906; Aguirrezabalaga et al. 1984, 1988; Altuna & García Carrascosa 1990; Álvarez Claudio 1993; Altuna 1994a), mainland Portugal (Da Cunha 1944, 1950), Seine and Ampère banks (Ramil et al. 1998b), Gorringe (Ramil et al. 1998b; present study), Madeira (Wirtz 2007), Azores (Pictet & Bedot 1900; Medel & Vervoort 2000), western part of the Strait of Gibraltar (Ramil & Vervoort 1992b), Morocco (Patrioti 1970; Ramil & Vervoort 1992b), Cape Verde Islands (Medel & Vervoort 2000) and off Guinea-Bissau (Vervoort 1959).

Mediterranean.—Strait of Gibraltar (Medel et al. 1998); Spain (e.g. García Carrascosa 1981; Gili 1982, 1986; Gili et al. 1984; Roca, 1986, 1989), Alboran Sea (Templado et al. 1986; Ramil & Vervoort 1992b), Algeria (Picard 1955), France (Motz Kossowska 1911; Stechow 1919; Leloup 1934a; Picard 1951b; Marinopoulos 1981), Italy (Rossi 1961; Boero 1981a; Boero & Fresi, 1986; Puce et al. 2009) and Adriatic (Broch 1933).

Elsewhere.—Apparently cosmopolitan; across the Atlantic, Indo-Pacific, Arctic and Antarctic (e.g. Millard 1975; Álvarez Claudio, 1993; Broch, 1918; Stepan'yants, 1979). However, Cornelius (1975b) and Calder (1991) considered as doubtful records of this species from the poles (and some other localities).

**Halecium sp.**
(fig. 3E)

**Material studied. Ormonde, stn 3:** few colonies overgrowing Zonaria tournefortii; DBUA1519.01; Genbank accession no. KM402022. **Ormonde, stn 4:** some colonies, on cauli of Zonaria tournefortii; DBUA1519.02; Genbank accession no. KM402028. **Gettysburg, stn 7:** abundant, some well-developed colonies, on: Eudendrium armatum, sponges, different species of algae; DBUA1519.03. **Gettysburg, stn 9:** few colonies, on Zonaria tournefortii, DBUA1519.04.

**Remarks.** This species seems phylogenetically close to, but distinct from *Halecium muricatum* (Ellis & Solander, 1786) by comparison using 16S haplotype data of Haleciidae taxa (results not shown). It shares morphological similarities with a boreal-arctic species present in northern Europe: *Halecium textum* Kramp, 1911, notably for presenting small monosiphonic colonies irregularly branched in different planes, with irregularly occurring annulations or corrugations frequently interspaced by smooth stretches of perisarc, and by the everted rim of hydrothecae (e.g. in agreement with descriptions of Schuchert (2001a, 2005b)), although the absence of gonothecae prevented an accurate identification. It is expected that in the future its two 16S sequences herein published will allow a more accurate identification of these small colonies. Anyway, this taxon is distinct, both morphologically and molecularly, from any other *Halecium* taxon ever recorded in the Gorringe, representing another new record.
Family Lafoeidae Hincks, 1868

*Filellum* cf. *serpens*  
(fig. 3F)

*Campanularia serpens* Hassall, 1848: 2223.  
*Coppinia mirabilis* Hassall, 1848: 2223.

**Material studied.** Gettysburg, stn 5: one colony with few hydrothecae on *Zonaria tournefortii*, DBUA1515.02.  
Gettysburg, stn 7: abundant on *Eudendrium armatum*, less common on *Zonaria tournefortii*, DBUA1515.01.

**Remarks.** *Filellum serpens* has been imprecisely described and lacks diagnostic trophosomal features, being extremely difficult to ensure a correct identification of this species (e.g. Peña Cantero *et al.* 1998; Marques *et al.* 2011) solely with morphological characters (Moura *et al.* 2012b). The absence of coppinia prevented an accurate classification of this small and morphologically simple animal. Nevertheless, this biological material is remarkably different from the remnant, representing therefore the first record of this species in the Gorringe.

**Reported distribution.** *Filellum serpens* is regarded as cosmopolitan but the majority of the records are dubious (e.g. Peña Cantero *et al.* 1998; Marques *et al.* 2011; Moura *et al.* 2012b).

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*Filellum* cf. *serratum*  
(fig. 3G)

*Lafoëa serrata* Clarke, 1879: 242, pl. 4 fig. 25.

**Material studied.** Ormonde, stn 1: few polyps found on the hydrocaulus of *Aglaophenia kirchenpaueri*; DBUA1516.03.  
Ormonde, stn 4: few polyps on cauli of *Zonaria tournefortii*, DBUA1516.01.  
Gettysburg, stn 9: some polyps encrusting *Zonaria tournefortii*, DBUA1516.02.

**Remarks.** Transversal perisarc ridges visible on the basal upper-parts of hydrothecae. The absence of coppinia impeded an accurate identification of this material. Furthermore, the type locality of *Filellum serratum* is Cuba and the recent molecular evidences of many cryptic diversity within the genus *Filellum* (Moura *et al.* 2012b) increase doubt on the nominal identity of this taxon herein reported from the Gorringe.

The unique morphological traits of this biological material confirms it is a distinctive species not previously detected in the Gorringe.

**Reported distribution.** Dubious. *Filellum serratum* is regarded as cosmopolitan species but previous records of this nominal species likely correspond to a complex of species (Peña Cantero *et al.* 1998; Marques *et al.* 2011; Moura *et al.* 2012b).

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Family Sertulariidae Lamouroux, 1812

*Sertularella ellisi*  
(fig. 4A; table 1)

*Sertularia Ellisi* Deshayes & Milne Edwards, 1836: 142–143.  
*Sertularella ellisi ellisi*.—Picard, 1956: 264–265, fig. 3d.—Peña Cantero & García Carrascosa, 2002: 124–125, fig. 24a–c.  
*Sertularella ellisi*.—Ramil *et al.*, 1992: 503–507, figs. 6, 7.—Medel, 1996: 201–205, fig. 75.—Moura *et al.*, 2011: 524, 525, fig. 3.

**Material studied.** Ormonde, stn 1: abundant, on *Zonaria tournefortii*, fertile colonies, epibionts: small algae and calcified Bryozoa; DBUA1527.10.  
Ormonde, stn 2: abundant, on *Zonaria tournefortii*, epibionts: algae and calcified Bryozoa; DBUA1527.01.  
Ormonde, stn 3: abundant, fertile colonies, on *Zonaria tournefortii*; epibionts: small algae and calcified Bryozoa; DBUA1527.02.  
Ormonde, stn 4: very abundant, fertile colonies, on *Zonaria tournefortii*, epibionts: calcified Bryozoa, small algae and *Clytia hemisphaerica*; DBUA1527.03.  
Gettysburg, stn 5: few colonies, on *Zonaria tournefortii*, overgrown by small algae, DBUA1527.04.  
Gettysburg, stn 6: abundant, fertile colonies, on *Zonaria tournefortii* and hydrocauli of *Aglaophenia pluma*, epibionts: algae; DBUA1527.05.
Gettysburg, stn 7: on Zonaria turnefortii, epibionts: Bryozoa; DBUA1527.06. Gettysburg, stn 8: many colonies, fertile specimens, on Zonaria turnefortii, epibionts: Halecium tenellum, Eudendrium sp. (on hydrorhiza), Clytia cf. gracilis; DBUA1527.03. Gettysburg, stn 9: abundant, fertile colonies, on Zonaria turnefortii, epibionts: Lafoeina tenuis, small algae, Bryozoa. Gettysburg, stn 10: some specimens, on Zonaria turnefortii, epibionts: Lafoeina tenuis and Halecium tenellum; DBUA1527.09.

Remarks. Morphological measurements (Table 1) when compared with those presented by Moura et al. (2011) for Sertularella lineages, place the Gorringe specimens more similar to the lineage of S. ellisii from W Portugal published by Moura et al. (2011), but hydrothecae of Gorringe specimens are slightly larger. After revelation of cryptic diversity within the S. ellisii species complex (Moura et al. 2011), taxonomic confidence with this S. 'ellisii' identification will only occur after molecular phylogenetic studies containing the Gorringe material and a greater haplotype representation of S. ellisii morphologically similar specimens from their whole geographical areas of occurrence, including type localities of taxa that has already been synonymized (e.g. S. ellisii, Sertularella fusiformis (Hincks, 1861) and Sertularella lagenoides Stechow, 1919, but also species originally described from the southern hemisphere: Sertularella gaudichaudi (Lamouroux, 1824) and Sertularella picta (Meyen, 1834)). Moura et al. (2011) already demonstrated the validity of the nominal species Sertularella polyzonias (Linnaeus, 1758), Sertularella mediterranea Hartlaub, 1901 and Sertularella ornata, that have been sometimes regarded as synonyms of S. ellisii, and share indeed close phylogenetic affinities.

**TABLE 1.** Measurements of **Sertularella ellisii** in μm.

<table>
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<tr>
<th></th>
<th>Stn 4</th>
<th>Stn 6</th>
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<td>620–680</td>
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<td>370–440</td>
<td>460–670</td>
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<td>length adnate part abcauline wall</td>
<td>300–360</td>
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</tr>
<tr>
<td>cusps</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

**Reported distribution.** Eastern Atlantic.—Gorringe (present study), mainland Portugal (Cornelius 1979; Moura et al. 2011), S Spain (Medel 1996), N Spain (e.g. Altuna et al. 1984; Isasi & Saiz 1986; Altuna & García-Carrascosa 1990; García Corrales et al. 1980; Ramil et al. 1992), France (Teissier 1965; Fey 1970), Belgium (Muller 2004). Probably misidentified in the Azores (Medel & Vervoort 1998; Vervoort 2006) after detection of cryptic diversity within S. ellisii and also S. fusiformis that has been regarded as conspecific to S. ellisii (Moura et al. 2011). Records from Madeira (Vervoort 2006; Wirtz 2007), Selvagens, Canary Islands, Cape Verde and Mauritania (e.g. Medel & Vervoort 1998; Vervoort 2006) may be therefore dubious too, after molecular analyses of Moura et al. (2011) that demand higher haplotype sampling of Sertularella populations in the Macaronesian region to clarify the taxonomy of this group.

Mediterranean.—Spain (e.g. García-Corrales et al. 1980; García-Carrascosa 1981; Gili 1986; Medel 1996), Chafarinas Islands (Peña Cantero & García Carrascosa 2002); Algeria (Picard 1955), France (e.g. Leloup 1934b; Picard 1956), Italy (e.g. Boero & Fresi 1986; Di Camillo et al. 2006; Puce et al. 2009), Adriatic (Broch 1933), Aegean Sea (Morri & Bianchi 1999), Turkey (Marinopoulos 1979), Israel (Vervoort 1993), Lebanon (Morri et al. 2009).

Elsewhere.—Some (dubious) records in the western Atlantic and Pacific (e.g Cairns et al. 2002).
**Sertularella gayi**  
(fig. 4B)

*Sertularella gayi.*—Lamouroux, 1821: 12, pl. 66 figs. 8, 9.—Cornelius, 1979: 284–287, fig. 21.—Ramil & Vervoort, 1992b: 219–222, fig. 61.—Ramil et al. 1992: 496, figs. 1a, 2, 3.—Cornelius, 1979: 284–287, fig. 21.—Cornelius, 1995b: 71–73, fig. 16.—Schuchert, 2001: 98, fig. 83, table 4.—Moura et al., 2011: 524, 525, fig. 3.

**Material studied.** Gettysburg, stn 10: nine well-developed colonies, on rock; epibionts: *Halecium tenellum, Halecium pusillum, Clytia cf. gracilis, Clytia hemisphaerica, Lafoeina tenuis*, Bryozoa and small algae; DBUA1528.01.

**Remarks.** Oceana (2005) refers the occurrence of a *Sertularella* species in the Gorringe that could correspond to *S. gayi*. The present study corroborates the presence of *S. gayi* in shallow waters of the Gorringe Bank.

**Reported distribution.** Eastern Atlantic.—Relatively widespread species in shallow and deep waters of the NE Atlantic (Moura et al. 2011): Norway (Leloup 1940), Iceland, Greenland, Faroe Islands, Scotland (Broch 1918), UK (e.g. Lamouroux 1821; Hincks 1868; Cornelius 1979), Ireland (Erwin 1990), N Spain (e.g. Allman 1874; Aguirrezabalaga et al. 1984; Altuna & García-Carrascosa 1990; Alvarez Claudio 1993; Ramil 1988; Cornelius 1979), Portugal (Billard 1906; Nobre 1931; Da Cunha 1944; Moura et al. 2011), Gulf of Cadiz (Billard 1906; Ramil & Vervoort 1992b; Moura et al. 2011), Madeira and Azores (Medel & Vervoort, 1998; Vervoort 2006; Moura et al. 2011), Selvagens (Vervoort 2006), Canary Islands (Medel & Vervoort 1998; Vervoort 2006), Cape Verde (Medel & Vervoort 1998; Vervoort 2006), Mauritania (Medel & Vervoort 1998), Senegal (Vervoort 1959), Congo (Vervoort 1966).

Mediterranean.—Few times reported in Mediterranean coasts of Spain (e.g. De Buen 1934; Gili 1986; Roca 1986; Templado et al. 1986; Medel et al. 1991; Ramil & Vervoort 1992b).

Elsewhere.—Some (dubious) records from S Atlantic islands, NW Atlantic, South Africa and Pacific (Ritchie 1907, 1909; Fraser 1944; Rees & Thursfield 1965; Ralph 1961; Vervoort 1972; Park & Rho 1986; Hirohito 1995).

**Sertularella ornata**  
(fig. 4C)

*Sertularella fusiformis ornata* Broch, 1933: 74–76, fig. 29.

*Sertularella ellisi ornata.*—Picard, 1956: 265, fig. 3f.—Medel, 1996: 206–208, fig. 76.—Peña Cantero & García Carrascosa, 2002: 126–128, fig. 24D.

*Sertularella ornata.*—Medel et al., 1991: 526, fig. 10.—Moura et al., 2011: 524, 525, fig. 3.

**Material studied.** Ormonde, stn 3: ca. 30 cormoids on cauli of *Zonaria tournefortii*, fertile. Gettysburg, stn 5: ca. 15 cormoids and some fragments, on *Zonaria tournefortii* and sponge, epibionts: *Aglaophenia kirchenpaueri*, small algae and calcified Bryozoa; DBUA1527.03.

**Remarks.** Moura et al. (2011) demonstrated with molecular data the distinctiveness and validity of the nominal species *Sertularella ornata*, many times regarded as a variety or subspecies of *S. ellisi*.

**Reported distribution.** Eastern Atlantic.—Cape Verde (Medel & Vervoort 1998), Madeira (Wirtz 2007), W Portugal (Moura et al. 2011) and Gorringe (present study).

Mediterranean.—Strait of Gibraltar (Medel et al. 1991; Medel 1996), Spain (e.g. García Carrascosa 1981, Gili 1986, Medel et al. 1991, Medel 1996), Chafarinas Islands (Peña Cantero & García Carrascosa 2002), Algeria (Picard 1955), Italy (Rossi 1961; Boero & Fresi 1986), Adriatic (Broch 1933), Aegean Sea (Morri & Bianchi 1999) and Israel (Vervoort 1993).

Elsewhere.—Not found.

**Family Halopterididae Millard, 1962**

*Antennella secundaria*  
(fig. 4D)

*Sertularia secundaria* Gmelin, 1791: 3856.
HYDROIDS FROM SUMMITS OF THE GORRINGE BANK


Material studied. Ormonde, stn 1: scarce material, on Zonaria tournefortii and Aglaophenia kirchenpaueri; DBUA1504.02; Genbank accession no. KM402030. Gettysburg, stn 7: abundant, on Zonaria tournefortii; DBUA1504.01. Gettysburg, stn 9: few shoots on Zonaria tournefortii, DBUA1504.03.

Remarks. This species was previously recorded in the Gorringe, but from deep waters: 250–320 meters (Ramil et al. 1998b). The 16S sequence herein published of A. secundaria collected from the Ormonde seamount, presents an exclusive haplotype in an unpublished sequence database with several Antenella specimens from mainland Portugal, deep waters of the Gulf of Cadiz, shallow and deep waters of the Azores, and coastal waters of Madeira, Mediterranean, N France, NW Atlantic and NE Pacific (Moura et al., unpublished). The 16S haplotype from the Gorringe presented higher phylogenetic affinities with shallow-water specimens from mainland Portugal, but is not too divergent to a sample from shallow waters of the Azores (Moura, unpublished 16S data and analyses). Nevertheless, there is a possibility that in the future the haplotype of A. secundaria discovered in the Gorringe might also be found elsewhere, or might reveal higher phylogeographic affinities with other geographical areas.

Reported distribution. Eastern Atlantic.—Widespread (see Ansín Agís et al. 2001)

Mediterranean.—Widespread (see Peña Cantero & García Carrascosa 2002)

Elsewhere.—Considered to have a worldwide distribution from temperate to tropical seas, both at shallow and deep waters (e.g. Rees & Thursfield 1965; Millard 1975; Gili et al. 1989; Schuchert 1997; Ansín Agís et al. 2001). Uncommon at high latitudes (García Carrascosa 1981).

Family Plumulariidae Hincks, 1868

Plumularia setacea

(fig. 4E)

Sertularia setacea Linnaeus, 1758: 813.


Material studied. Ormonde, stn 2: few stems, fertile, on hydrorhiza and hydrocauli of one colony of Aglaophenia plumula; DBUA1526.03. Gettysburg, stn 5: small and fertile colonies, on two colonies of Aglaophenia plumula; with hydrocladia ramified; DBUA1526.01. Gettysburg, stn 6: some shoots on four cormoids, fertile, on Aglaophenia plumula; DBUA1526.02. Gettysburg, stn 8: some small colonies on cormoids of Aglaophenia kirchenpaueri, DBUA 1526.03. Gettysburg, stn 10: some small cormoids on hydrocauli of two cormoids of Aglaophenia kirchenpaueri; DBUA 1124.01; Genbank accession no. JN714608.

Remarks. This species was previously recorded in the Gorringe Bank at 250 meters depth (Ramil et al. 1998b). Some colonies of stations 2 and 5 had ramified hydrocladia. The 16S sequence determined of a colony from the Gettysburg seamount (stn 8) retrieved an exclusive haplotype that falls in a clade, with low sequence divergence, with a range of specimens from the European coasts, western Mediterranean and Azores (Moura et al., 2012). Because P. setacea was originally described from the UK (Ellis 1755: 19, as Corallina setacea; Linnaeus, 1758), molecular phylogenetic analyses further corroborated the taxonomic identification of the Gorringe specimens (Moura et al. 2012a).

Preliminary phylogenetic analyses of Moura et al. (2012a) already suggested that a complex of cryptic species have been identified under the name P. setacea (see also Schuchert 2014), being necessary the resurrection of some described species presently in its synonymy, as well as description of cryptic taxa, basing on more extensive molecular and morphological analyses.

Reported distribution. Eastern Atlantic.—Iceland (Broch 1918), Faroes (Naumov 1969), Shetland Islands (Rees & Thursfield 1965), Norway (Bonnevie 1899; Christiansen 1972), Sweden (e.g. Jäderholm 1909; Calder.
Heligoland (Broch 1928), North Sea (e.g. Broch 1928; Vervoort 1942; Rees & Thursfield 1965), Ireland (e.g. Guiry & Guiry 2011), UK (e.g. Hincks 1868; Cornelius, 1995b), Netherlands (e.g. Leloup 1933; Vervoort 1946b), Belgium (e.g. Van Beneden 1867; Leloup 1947, 1952), Channel Islands (Philibert 1935), France (e.g. Billard 1902, 1904), Bay of Biscay (Browne 1907), Spain (e.g. Arévalo 1906; Rioja 1906; Ramil 1988; Medel & López-González 1996), Portugal (e.g. Nobre 1931; Da Cunha 1940, 1944, 1950; Moura et al. 2012a), the Gulf of Cadiz (Billard 1906), Strait of Gibraltar (Broch 1913; Ramil & Vervoort 1992b; Medel & Vervoort 1995), Gorringe (Ramil et al. 1998b; Moura et al. 2012a; present study), Ampère Bank (Ramil et al. 1998b), Azores (e.g. Pictet & Bedot 1900; Rees & White 1966; Ansín Agís et al. 2001; Moura et al. 2012a), Madeira (Billard 1906; Patriti 1970; Ansín Agís et al. 2001; Wirtz 2007), Selvagens (Ansín Agís et al. 2001), Canary Islands (Ansín Agís et al. 2001), Morocco (Billard 1906; Patriti 1970; Ansín Agís et al. 2001), Western Sahara (Vervoort 1946a), Cape Verde (Bedot 1921; Ansín Agís et al. 2001), Mauritania (Ansín Agís et al. 2001), Senegal (Picard 1951a; Patriti 1970), Guinea Bissau (Gili et al. 1989), Ghana (Buchanan 1957), Angola (Broch 1914), Namibia (Broch 1914; Gili et al. 1989), South Africa (e.g. Stechow 1925; Millard 1975).

Mediterranean.—Strait of Gibraltar (Ramil & Vervoort 1992b; Medel & Vervoort 1995), Spain (e.g. De Haro 1965; García Corrales et al. 1978; García Carrascosa 1981; Gili & García Rubies 1985; Roca 1986; Medel & López-González 1996), Alborán Sea (Ramil & Vervoort 1992b; Peña Cantero & García Carrascosa 2002), France (e.g. Stechow 1919; Leloup 1934b; Picard 1951b, 1952), Algeria (Picard 1955), Italy (e.g. Rossi 1961; Boero & Flesi et al. 2009), Adriatic (e.g. Broch 1912, 1933; Riedl 1970), Greece (Yamada 1965), the Aegean Sea (Morri & Bianchi 1999), Turkey (Marinopoulos 1979).

Elsewhere.—Assumed to be circumglobal but possibly absent in polar regions (e.g. Ansín Agís et al. 2001), although many taxonomic identifications seem erroneous due to cryptic diversity (Moura et al. 2012a; Schuchert 2014; see Remarks above).

Family Aglaopheniidae Marktaner-Turneretscher, 1890

Aglaophenia kirchenpaueri
(fig. 4F)

Plumularia kirchenpaueri Heller, 1868: 40, 82, pl. 2 fig. 4.


Material studied. Ormonde, stn 1: one colony on Zonaria tournefortii, epibionts on hydrocauli: Filellum cf. serratum and Antenella secundaria; DBUA 1258.02; Genbank accession no. JN560126. Gettysburg, stn 5: eight cormoids, on Zonaria tournefortii and Sertularella ornata, epibionts: Clytia cf. gracilis; DBUA 1258.01; Genbank accession no. JN560124.

Gettysburg, stn 6: seven cormoids, on calcified Bryozoa possibly encrusting on rock, epibionts: calcified Bryozoa; DBUA 1258.03; Genbank accession no. JN560127.


Mediterranean.—Western Mediterranean: Strait of Gibraltar (Medel & Vervoort 1995), Alborán Sea (Templado et al. 1986; Ramil & Vervoort 1992b), Spain (e.g. García Corrales et al. 1978; Gili & García Rubies 1985).
1985; Roca 1986; García Carrascosa et al. 1987; Svoboda & Cornelius 1991), Chafarinas Islands (Peña Cantero & García Carrascosa 2002), Algeria (Picard 1955), Tunisia (Marktanner-Turneretscher 1890), France (Stechow 1919; Picard 1952), Italy (e.g. Rossi 1961; Svoboda 1979; Svoboda & Cornelius 1991), Adriatic (Heller 1868; Riedl 1970).

Elsewhere.—Not found.

**Aglaophenia pluma**
(fig. 4G; table 2)

Sertularia pluma Linnaeus, 1758: 811.


**Material studied.** Ormonde, stn 2: abundant (more than 50 cormoids collected), on Zonaria tournefortii, epibionts: Plumularia setacea, Clytia hemisphaerica and algae; some cormoids ramified; DBUA1503.07.

Gettysburg, stn 5: abundant, fertile colonies, on Zonaria tournefortii, epibionts: algae, Foraminifera, Clytia hemisphaerica, Plumularia setacea and Eudendrium sp.; DBUA1503.01.

Gettysburg, stn 6: abundant (about 70 cormoids collected), fertile colonies, some colonies ramified, on Zonaria tournefortii, epibionts: algae, Foraminifera, Plumularia setacea and Sertularella ellisii; DBUA1503.02.

Gettysburg, stn 7: one small cormoid on Zonaria tournefortii, DBUA1503.03.

Gettysburg, stn 8: abundant (about 70 cormoids collected), fertile colonies, on Zonaria tournefortii, some cormoids ramified, DBUA1503.04.

Gettysburg, stn 9: two small cormoids on Zonaria tournefortii, DBUA1503.05.

Gettysburg, stn 10: twelve cormoids on Zonaria tournefortii (some are ramified), DBUA1503.06.

**Remarks.** Aglaophenia tubiformis Marktanner-Turneretscher, 1890 was previously reported in the Gorringe Bank by Ramil et al. (1998b), collected at 54–62 meters. The present material (Fig. 4G, Table 2) can also be identified as A. tubiformis, using the taxonomic key provided by Svoboda & Cornelius (1991). Moura et al.’s (2008, 2012c) 16S sequence data recover polyphyletic clades with low sequence diverge for morphotypes of Aglaophenia pluma, A. tubiformis and A. octodonta, suggesting these three nominal species are likely synonymous and that clades of the A. pluma complex seem to be rather segregated by geographical region. Moreover, neotype material of A. pluma is from S England and type material of A. tubiformis is from the N Adriatic (Svoboda, 1979; Svoboda & Cornelius, 1991), and Moura et al. (2012c) found very small genetic distances between Mediterranean and British samples. Therefore, because molecular evidence suggests synonymy of A. tubiformis and A. pluma, the present biological material and that of Ramil et al. (1998b) identified as A. tubiformis, is herein identified as A. pluma.

Additionally, the undetermined species of Aglaophenia referenced by Oceana (2005) from the Gorringe peaks, probably correspond to this species, as it was the most abundant Aglaophenia species collected and is from similar depths.

**TABLE 2.** Measurements of Aglaophenia pluma in μm.

<table>
<thead>
<tr>
<th>Stn 2</th>
<th>Stn 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocladial internode, length</td>
<td>420–480</td>
</tr>
<tr>
<td>Diameter at node</td>
<td>100–120</td>
</tr>
<tr>
<td>Hydrotheca, depth</td>
<td>340–420</td>
</tr>
<tr>
<td>Diameter at rim</td>
<td>200–230</td>
</tr>
<tr>
<td>Length of free part abcauline wall</td>
<td>120–160</td>
</tr>
</tbody>
</table>
Reported distribution. Eastern Atlantic.—Gorringe Bank (Ramil et al. 1998b; present study), Morocco (Patriti 1970; Svoboda & Cornelius 1991), Portugal (e.g. Nobre, 1931; Svoboda & Cornelius 1991; Moura et al. 2012c), Spain (e.g. García Corrales et al. 1978; Ramil 1988; Medel & López-González 1996), France (e.g. Bedot 1911; Teissier 1965; Svoboda & Cornelius 1991), Ireland (e.g. Hincks 1868; Svoboda 1979), UK (e.g. Hincks 1868; Svoboda & Cornelius 1991; Moura et al. 2012c), North Sea (Broch 1928; Naumov 1960), Holland (e.g. Leloup 1933), Belgium (e.g. Leloup 1952; Muller 2004), Madeira (Wirtz 2007), Canary Islands (Izquierdo et al. 1986), Cape Verde (Bedot 1921), Ivory Coast (Redier 1971), French Guinea (Vervoort 1959), Congo and Namibia (Broch 1914), South Africa (e.g. Broch 1914; Millard 1957) and Azores (e.g. Bedot 1921; Rees & White 1966; Moura et al. 2012c)

Mediterranean.—Strait of Gibraltar (Medel & Vervoort 1995), Spain (e.g. Rioja 1906; García Carrascosa 1981; Gili 1986; Roca 1986; Medel & López-González 1996), Chafarinas Islands (Peña Cantero & García Carrascosa 2002), France (e.g. Stechow 1919; Svoboda & Cornelius 1991), Malta (Svoboda & Cornelius 1991), Italy (e.g. Muller-Calé & Krüger 1913; Boero & Fresi 1986; Svoboda & Cornelius 1991), Adriatic (Broch 1912; Riedl 1970), Bosnia (Svoboda & Cornelius 1991), Greece (Yamada 1965; Svoboda & Cornelius 1991), Aegean Sea (Morri & Bianchi 1999), Egypt (Billard 1936), Israel (Picard 1958b).


SUBORDER PROBOSCOIDEA Broch, 1910

Family Campanulariidae Hincks, 1868

Obelia dichotoma
(fig. 4H)

Sertularia dichotoma Linnaeus, 1758: 812.


Material studied. Ormonde, stn 3: few scattered colonies, on Zonaria tournefortii, DBUA1523.01. Ormonde, stn 4: abundant on tuff of algae, well-developed colonies, epibionts: small algae; DBUA1523.02.

Reported distribution. Eastern Atlantic.—Widespread from Iceland (Kramp 1938) to South Africa (Millard 1975). Herein reported for the first time in the Gorringe Bank.

Mediterranean.—Widespread (e.g. García-Corrales et al. 1978; Vervoort 1993; Peña Cantero & García Carrascosa 2002).

Elsewhere.—Eurybathic species, apparently with nearly worldwide distribution (e.g. Cornelius 1995b).

Obelia geniculata
(fig. 4I)

Sertularia geniculata Linnaeus, 1758: 812.


Laomedea geniculata.—Da Cunha, 1944: 61, fig. 35.

Material studied. Ormonde, stn 4: fertile colonies, very abundant on the brown alga Laminaria ochroleuca Bachelot de la Pylaie; DBUA1524.01.
Remarks. Oceana (2005) reported an *Obelia* species, possibly corresponding to *O. geniculata*. The present manuscript confirms this species presence at the top of the Ormonde seamount.

**Reported distribution.** Eastern Atlantic.—Widespread, from Iceland (Broch 1918) to South Africa (Millard 1975).

Mediterranean.—Widespread (e.g. García Corrales et al. 1978; Peña Cantero & García Carrascosa 2002).

Elsewhere.—Historically considered a cosmopolitan species (e.g. Picard 1958a; Millard 1975), but Govindarajan et al. (2005) found considerable genetic differentiation, indicative of cryptic speciation, between specimens from the North Atlantic, Japan and New Zealand. *O. geniculata* was originally described from Dover, UK (Linnaeus 1758; Cornelius 1975a) being thus probable that the Gorringe specimens are correctly identified.

**Orthopyxis integra**
(fig. 4J)

*Campanularia integra* Macgillivray, 1842: 465.  
*Campanularia compressa*—Patriti, 1970: 34, fig. 43.  

**Material studied.** Ormonde, stn 1: abundant, covering algae (not *Zonaria tournefortii*). Ormonde, stn 4: very abundant, on different species of algae (not *Zonaria tournefortii*), DBUA1525.02.

**Reported distribution.** Eastern Atlantic.—Widely distributed from the Arctic (Broch 1918) to South Africa (Millard, 1975) (e.g. Cornelius 1982; Medel & Vervoort 2000). In the Portuguese territory this species was only seen in the Azores (Cornelius 1992; Medel & Vervoort 2000). I found it already at various localities of mainland Portugal, but the species remain unseen at the Madeira and Selvagens archipelagos (unpublished dataset). This is the first record of *O. integra* in the Gorringe.

Mediterranean.—Widespread (e.g. Medel & Vervoort 2000; Peña Cantero & García Carrascosa 2002).

Elsewhere.—Supposedly one of the most cosmopolitan shallow-water hydroids, although not found in some geographical areas, such as Kattegat, Skagerrak, Baltic Sea and Dutch waters (Cornelius 1982). The species has been more often detected at warmer waters (Medel & Vervoort 2000).

**Clytia cf. gracilis**  
(fig. 4K)


**Material studied.** Ormonde, stn 4: considerable number of hydrothecae on one colony of *Coryne eximia*, DBUA1506.01. Gettysburg, stn 5: few polyps, on *Aglaophenia kirchenpaueri* and *Zonaria tournefortii*; DBUA1506.02. Gettysburg, stn 6: few hydrothecae, on *Zonaria tournefortii* (especially on caulii), DBUA1506.03. Gettysburg, stn 7: few colonies, on algae and *Eudendrium armatum*, DBUA1506.04. Gettysburg, stn 8: few hydrothecae on *Sertularella ellisi* and *Zonaria tournefortii*; DBUA1506.05. Gettysburg, stn 9: several hydrothecae, on *Zonaria tournefortii* and calcified Bryozoa, DBUA1506.06. Gettysburg, stn 10: considerable number of hydrothecae on some colonies of *Sertularella gayi*, DBUA1506.07.

**Reported distribution.** *Clytia gracilis* was assumed to be near-cosmopolitan in shallow waters, being also reported in deep waters (e.g. see Cornelius 1995b). However, Lindner et al. (2011) already evidenced highly divergent cryptic taxa within the nominal species, solely with few taxa from the western Atlantic. The type locality of *C. gracilis* is in Norway. Molecular phylogenetic analyses with specimens identifiable as *Clytia gracilis* from the NE Atlantic (and many other geographical localities) are still needed to comprehend the extent of cryptic diversity and resolve synonymies in order to resurrect unused species names and to name new species, as well as to
confirm the identity of the herein presented specimens from the Gorringe. It would also be desirable morphological information on the medusae produced by these hydroids, although (apparently) the medusae may be of little taxonomic value (e.g. Bouillon & Boero 2000).

This is the first record of this Clytia species in the Gorringe.

**Clytia hemisphaerica**

(fig. 4L)

Medusa hemisphaerica Linnaeus, 1767: 1098.  
Campanularia johnstoni.—Da Cunha, 1940: 109, 118.—Da Cunha, 1944: 9, 59, fig. 34;  


Remarks. Clytia hemisphaerica was the most abundant and frequent hydroid species collected. Pedicels of hydrothecae in some colonies are extremely annulated. This is the first record of this species in the Gorringe.  

**Reported distribution.** Eastern Atlantic.—Very common (e.g. Russell 1953; Cornelius 1982; Medel & Vervoort 2000), from Iceland (Broch 1918) to South Africa (Millard 1975). Herein reported for the first time in the Gorringe.  

Mediterranean.—Well dispersed (e.g. Medel & Vervoort 2000; Peña Cantero & García Carrascosa 2002)  

Elsewhere.—Nearly cosmopolitan through shallow waters, possibly absent from the Antarctic and Arctic, but many old records of the species are dubious (e.g. Ralph 1957; Kramp 1961; Calder 1991; Cornelius 1995b). The type locality of the species is in Belgium.

**Discussion**

A total of 27 hydroid species were collected during the ‘LusExpedição Olympus 2008’; 21 of these species represent new records for the Gorringe Bank (Table 3, in red). The total number of hydroid species presently known from the Gorringe increases to 37 (Table 3; Ramil *et al.* 1992a, 1998b), Oceana (2005) and present study). With sampling concentrated on the summits of the seamount, this study contributes to our knowledge of hydroid diversity with an increase of over 130% of new records of hydroid species in the Gorringe.  

This study detected 20 hydroid species in the Ormonde peaks and 21 in the summits of the Gettysburg, 14 of these species were found in both seamounts. *Lafoeina tensa*, Sertularella ellisi and Clytia hemisphaerica were the most frequently found hydroid species. *Eudendrium armatum*, *Aglaophenia pluma*, *A. kirchenpaueri* and Clytia cf. gracilis were also common on the Gettysburg, but more sporadically found on the Ormonde seamount. Bougainvilliiidae indet., *Amphinema cf. dinema*, *Eudendrium cf. merulum*, Coryne eximia, *Coryne* sp., *Sertularella gayi* and *Obelia geniculata* were the taxa less common. While sampling is still limited to determine and explain differences of species composition in both seamounts, the present account reveals different species assemblages, and therefore habitat heterogeneities, across the peaks of the Gorringe Bank.
### TABLE 3. List of hydroid species recorded from the Gorringe Bank (in red: first records for the Gorringe; in green: species not recorded; in blue: species previously recorded and found in this study) and zoogeographical affinities of shallow-water hydroids.

Symbols: ‘?’—Oceana (2005); ‘#’—Ramil et al. (1996); ‘##’—Ramil & Vervoort (1992a); ‘*’—presence; ‘+’—biogeographic affinity established with 16S rRNA data; ‘*’—species only found in the Gorringe in deep waters.

Abbreviations: 'LC'—Life cycle; 'g'—fixed gonophores, 'm'—medusae, 'mg'—liberable medusoids or swimming gonophores, '?'—doubtful, 'St.'—Station; 'MED'—Mediterranean; 'PT'—mainland Portugal; 'MAD'—Madeira; 'NSP'—Northern Coast of Spain; 'BRI'—British Isles; 'MOR'—Morocco; 'CAN'—Canary Islands; 'AZO'—Azores.

<table>
<thead>
<tr>
<th>Species</th>
<th>Gorringe Bank</th>
<th>Nearby areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ormonde</td>
<td>Present Study</td>
</tr>
<tr>
<td>Frithera indet.</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Bougainvilliiidae indet.</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Amphiphractea cl. dionea</td>
<td>m</td>
<td>+</td>
</tr>
<tr>
<td>Exulis tardo armatum</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>Exulis tardo merulum</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>Exulis tardo sp.</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>Veletella velella</td>
<td>m</td>
<td>+</td>
</tr>
<tr>
<td>Coryne clemens</td>
<td>m</td>
<td>+</td>
</tr>
<tr>
<td>Coryne sp.</td>
<td>?</td>
<td>+</td>
</tr>
<tr>
<td>Lafootere tetes</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>Cuciplomela sp.</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>* Haliclinum braennii</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>Haliclinum puillum</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>* Haliclinum secalis</td>
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<td>+</td>
</tr>
<tr>
<td>Haliclinum tenellum</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>Haliclinum sp.</td>
<td>g</td>
<td>+</td>
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<td>Filletum cl. serreanum</td>
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<td>+</td>
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<tr>
<td>Sertulariella elissi</td>
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<tr>
<td>Sertularia gaiyi</td>
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<td>+</td>
</tr>
<tr>
<td>Sertularia ornata</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>* Kirchenpaueriia bourneriae</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>* Kirchenpaueriia pinnata</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>Antennula secundaria</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>Plumatella setacea</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>* Pseudoepithulaura tabularia</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>* Nematocera antennula</td>
<td>g</td>
<td>+</td>
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<tr>
<td>Aglaophenia kirchenpaueri</td>
<td>g</td>
<td>+</td>
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<tr>
<td>Aglaophenia phasma</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>* Aglaophenia tubulifera</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>* Cladocarthus elongatus</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>* Streptobasus corneliae</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>* Eulysia coriophyllum</td>
<td>g</td>
<td>+</td>
</tr>
<tr>
<td>Obelia albitoleta</td>
<td>m</td>
<td>+</td>
</tr>
<tr>
<td>Obelia goniculata</td>
<td>m</td>
<td>+</td>
</tr>
<tr>
<td>Orthopyxis integra</td>
<td>mg</td>
<td>+</td>
</tr>
<tr>
<td>Clytie cl. gracilis</td>
<td>m</td>
<td>+</td>
</tr>
<tr>
<td>Clytie heinshiassa</td>
<td>m</td>
<td>+</td>
</tr>
</tbody>
</table>

| SIMILARITY (shared species) | 20 | 21 | 18 | 16 | 14 | 13 | 12 | 9 |

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The tight biogeographic relations between the shallow waters of the Mediterranean and the Gorringe are evidenced: 1) by the presence of supposedly Mediterranean-endemic lineages of *Eudendrium armatum* and *E. "cf. merulum"* in the Gorringe, without 16S sequence variation for haplotypes of both taxa in the Mediterranean and Gorringe; 2) all the 17 hydroid species herein reported from the shallow waters of the Gorringe accurately identified at the species level, are also present in the Mediterranean (Table 3). In addition, the present study suggests that the shallow water hydroid fauna of the Gorringe also share, at a slightly lesser extent, close biogeographic affinities with the Lusitanian coast and the Madeira, northern Spain and British faunas (Table 3, and see above remarks on phylogeographic inferences with 16S haplotype data for *Eudendrium armatum*, *Halecium pusillum*, *H. tenellum*, *Antenella secundaria* and *Plumularia setacea*). These biogeographical inferences are consistent with those made for mollusks (Ávila & Malaquias 2003) and sponges (Xavier & Van Soest 2007) of the Gorringe, and also with geographical distances and sea-surface currents (e.g. US Hydrographic Office 1959; Lobo et al. 2000; Barton 2001; Hernández-Molina et al. 2006).

The majority of the hydroids were found as epibionts of algae and/or of other hydroids. Only *Eudendrium armatum* and *Sertularella gayi* were found directly attached to the rock mountain. The extremely high density of algae populating the summits of Gorringe’s seamounts (Oceana 2005; Moura, pers. observations) visibly prevents the establishment of hydroids directly on the rocky substrate. *Eudendrium armatum* and *S. gayi* were the only found on solid substrata, and in relatively high abundances, but only at vertical walls with limited sunlight exposure and consequently fewer algae. On the other hand, the high abundance and diversity of algae at the Gorringe peaks facilitated the direct attachment of 23 hydroid species. Rafting on algae (but also on other kinds of substrates) transported by oceanic currents (e.g. Cornelius 1992) could have therefore also contributed to the arrival of some of these hydroids to the Gorringe. Furthermore, while many of these hydroids do not present a dispersive medusoid phase (Table 3), some might also develop floating colonies or photosynthetic planulae, able to disperse for long time periods and distances (Pagliara et al. 2000). On the other hand, the fact that the majority of the species found develop fixed sporosacs (i.e. have short-lived planktonic stages) instead of free medusae or medusoids, similarly to what was found on other seamounts (Millard 1966; Calder 2000), may ensure higher retention of taxa in high hydrodynamic settings (Johannesson 1988; Calder 1993, 2000), although the ratio of reproductive strategies of hydroids in surrounding coastal areas is similar (pers. observations).

**Conclusions**

This study is the first devoted to investigate the shallow-water hydroid fauna of a seamount in the eastern Atlantic. No endemics, but relatively common taxa of adjacent coastal areas were found, eventually important for explaining colonization of nearby oceanic islands and seamounts through stepping-stone dispersion. All the known hydrozoan species from the peaks of the Gorringe were uniquely collected during summer, thus sampling in other seasons may reveal further hydrozoan diversity due to seasonal patterns of growth of algae and hydroids (e.g. Llobet et al. 1991; Fraschetti et al. 2002; Montañés et al. 2006; Cunha & Jacobucci 2010). Despite that many unreported species are still to be found in the Gorringe at other depths and seasons, the present study already revealed a relatively high species richness of hydroids in a small depth range from the summits of the Gorringe Bank seamounts.

**Acknowledgements**

This research would have not been possible without the invitation of Universidade Lusófona (Portugal) to CJM for the participation in the ‘LusoExpedição Olympus 2008’. I acknowledge in particular the professors Pinto de Abreu and Gonçalo Calado, Mónica Albuquerque, José Tourais and his technical diving team, my diving colleagues and who also collected hydroids: José Pedro Borges, Joana Xavier and Pedro Neves. All the crew of NTM ‘Creoula’ and the other participants of this fabulous research expedition were fantastic. Estibaliz Becerril kindly identified informally some of the algae mentioned in this study. Prof. Peter Shuchert kindly resolved the taxonomy of a few Anthoathecata taxa and shared unpublished 16S mRNA data and analyses with CJM. The professors Alex Rogers, Ferdinando Boero and Antonio Marques, and one anonymous referee, provided useful corrections and comments. Dr. Allen Collins considered this manuscript for publication in Zootaxa and made a last revision. Carlos J. Moura acknowledges FCT financial support (SFRH/BD/31155/2006; SFRH/BPD/84582/2012).
HYDROIDS FROM SUMMTS OF THE GORRINGE BANK

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