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Census of Octocorallia (Cnidaria: Anthozoa) of the Azores (NE Atlantic) with a nomenclature update

ÍRIS SAMPAIO[1, 2, 3,7], ANDRE FREIWALD[3], FILIPE MORA PORTEIRO[2,4,5], GUI MENEZES[2,4,6], & MARINA CARREIRO-SILVA[1,2,4]

[1]*MARE—Marine and Environmental Sciences Centre of the Institute of Marine Research*
[2]*IMAR—University of the Azores, Rua Prof. Dr. Frederico Machado 9901-862, Horta, Açores, Portugal*
[3]*Senckenberg am Meer, Abteilung Meeresforschung, Südstrand 40, 26382, Wilhelmshaven, Germany*
[4]*OKEANOS Research Unit, Faculty of Science and Technology, University of the Azores, 9901-862, Horta, Açores, Portugal*
[5]*Regional Directorate for Sea Affairs (DRAM), Regional Secretariat for the Sea, Science and Technology, Azores Government, Horta, Portugal,*
[6]*Regional Secretariat for the Sea, Science and Technology, Azores Government, Horta, Portugal.*
[7]*Corresponding author. E-mail: irisfs@gmail.com*

Abstract

Zoological nomenclature revisions are essential for biodiversity studies and indispensable to avoid naming and description of already described species and should be valued in all subsequent studies considering biology, molecular biology, ecology or habitat mapping of deep-sea species. Herein, a thorough revision of the taxonomic literature on Octocorallia since the beginning of deep-sea exploration in the Azores is provided. Since 1870, when the first octocoral, *Virgularia mirabilis* (Müller, 1776), was recorded in the Azores a cyclic pattern on the taxonomical study of octocorals reveals the deep-sea investigation efforts made on the region at different periods: Prince Albert I of Monaco, Biaçores and recent expeditions. The first decade of this millennium was the peak on taxonomic research of cold-water octocorals in the Azores with 11 publications targeting gorgonians and soft corals (Alcyonacea) and specific sub-orders within it. Ninety-eight names of Octocorallia were found to be given in the economic exclusive zone of the Azores. While 25 names were changed or added to the known Azorean octocoral diversity, 3 species identified in the region and unreported in the reviewed literature, increase the number to 101 species. Twenty-five names were synonymized while three species names were unmasked as errors in need of taxonomical clarification. This is the highest species richness of Octocorallia found in Europe and in any Northern Atlantic archipelago so far, representing ~60% of the most diverse center of endemism of South Africa, with a part in the Eastern Atlantic. Further research on taxonomy may reveal new species to science.

Key words: Alcyonacea, Atlantic, Checklist, deep sea, Pennatulacea, taxonomy

Introduction

Octocorallia is a subclass within the phylum Cnidaria including gorgonians, soft corals, precious corals and sea pens (Bayer, 1956; 1981a, 1981b; Kükenthal, 1915). Octocorallian species are characterized by a distinct symmetry of polyps divided in eight (Octo) and with pinnate tentacles as opposed to the polyps of Hexacorallia, divided in multiples of twelve mesenteries (Actiniaria and Scleractinia), six mesenteries (Antipatharia) and others (Ceriantharia, Zoantharia and Rugosa). Commonly, these species are colonies by structure and organization composed of numerous polyps with a great diversity of forms (Bayer, 1973). An octocoral colony may resemble trees or bushes sometimes meters in height, but can also look like a single polyp, a mushroom, a spiral, a feather or skin-like when encrusting rocks.

Practical applications of octocorals are linked to some species intolerance to abnormal ranges in temperature or salinity, giving them a role as bioindicators of oceanographic conditions (Bayer 1981a). Also, some octocoral species accumulate chemical components in their skeleton being important climate archives of past oceanic conditions due to their extreme longevity, while others are promising sources of bioactive compounds in

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pharmaceutic and cosmetic industries (Sherwood *et al*. 2005; Rocha *et al*. 2011). Moreover, some corals, such as precious corals (Coralliidae) have a long history of cultural and commercial importance, as currency, jewelry, medicines and myths since the Paleolithic (Bayer 1981a; Bruckner 2014).

Octocorals are major components of the deep sea, where the ¾ of known species live (Cairns 2007, Watling *et al*. 2011), forming dense and extensive biotopes. They create structural habitat, such as coral gardens, sea pen communities and as part of coral reefs, are used during feeding, spawning and as nursery grounds for a range of organisms, including commercially important fish species (Roberts *et al*. 2009). Because cold-water corals (CWC), including cold-water octocorals (CWO), have long lifespans, slow growth and late maturity, they are particularly vulnerable to anthropogenic impacts (e.g. fishing, oil and gas extraction). Consequently, the habitats they form were recently designated as vulnerable marine ecosystems (VMEs) with high conservation priority under the OSPAR Convention (OSPAR 2010).

Global known biodiversity is high within Octocorallia. Current accounts give more than 3400 valid species inhabiting coastal areas, seamounts, canyons, coral mounds, continental slopes and continental shelfs through all oceans between 0 and 6400 m depth (Pérez *et al*. 2016).

Deep-sea exploration greatly contributed to our knowledge on CWO. In 1754, John Ellis received a collection of CWO from North Wales and Dublin. On a "Cabinet of the Curious" he studied the specimens and decided to employ fishermen to bring him more samples. Among others, a specimen of *Alcyonium* was brought to him alive by the fishermen. All the results were described and drawn in the first publication about octocorals, already with sclerites and skeleton structures used for species descriptions (Ellis 1755). Pallas (1766) followed, listing 31 species of CWO. The number of known species grew fast but, for a long time, knowledge about CWO, particularly gorgonians, was restricted to fishermen and some scientists. Key circumnavigational scientific campaigns like *Challenger* and *Valdivia* took place at the 19th and early 20th centuries, exponentially increasing our understanding of these invertebrates (Wright & Studer 1889; Kükenthal 1919). In the NE Atlantic, the scientific expeditions *Talisman* and *Biaçores* greatly advanced the knowledge of CWO in this geographic region (Tixier-Durivault & D' Hondt 1974). However, Prince Albert I of Monaco cruises in the central NE Atlantic, contributed the most to the study of deep-sea biodiversity of the Azores, including octocoral species (Studer 1901; Thomson 1927; Porteiro 2009; Braga-Henriques *et al*. 2013). During the 20th century, the numerous publications of Grasshoff became the taxonomic leading references for the gorgonians of the NE Atlantic Ocean (e.g. Grasshoff 1972, 1973, 1977). Likewise, Bayer's publications are considered leading references for gorgonians in the NW Atlantic (Bayer 1958, 1959, 1964) including the first published description of an octocoral species using scanning electron micrographs of sclerites (Bayer 1973). In Carpine & Grasshoff (1985), the specimens collected during Prince Albert of Monaco I campaigns were revised using scanning electron microscopy (SEM). More recently, Hall-Spencer *et al*. (2007) summarized records of corals collected during Prince Albert I of Monaco expeditions, Biaçores and other expeditions between 200 m and 2000 m depth. Later, Braga-Henriques *et al*. (2013) presented a synopsis of the knowledge on most of the deep-sea cold-water coral groups of the Azores archipelago. While Hall-Spencer *et al*. (2007) listed 46 species of deep-sea corals for the Azores, Braga-Henriques et al. (2013) increased the number to 164 species, the majority being alcyonaceans (79 species excluding pennatulaceans). Also in the Azores, CWC (orders Scleractinia, Antipatharia, Zoantharia (in part), subclass Octocorallia and family Stylasteridae) are mostly found sparsely distributed but they can also shape at least 27 known facies, 19 of which include CWO (Tempera *et al*. 2013; Davies *et al*. 2017). Nevertheless, additional knowledge on Azorean octocorals is still dispersed in several taxonomical papers and monographs that are hard to find and written in different languages, which presents a challenge for zoological nomenclature and taxonomic studies. Despite being usually side-lined, further taxonomic and nomenclatural efforts are essential for ecological research on CWO of the Azores, now the object of study by many deep-sea international projects. Updated revisions of the taxonomic literature are lacking but are essential to establish a useful reference list of species known to live in the region.

Through an extensive literature review of taxonomic historical records of the sub-class Octocorallia, the goal of this paper is to list the species names given for the Azores archipelago and adjacent seamounts. For the first time a partial chresonymy focused on the literature references and names of Azorean octocorals is revised and commented upon. Also, we present the first list of the order Pennatulacea from the Azores. This checklist provides a sound database for further taxonomic, ecological, molecular and conservation research on Azorean CWO.

Methods

Research area. The Azores Autonomous Region is a Portuguese archipelago formed by nine volcanic islands, forty-two identified seamounts, narrow shelves, steep island slopes, bathyal and abyssal plains and oceanic ridges, located in the central North Atlantic Ocean (Morato *et al*. 2013). The archipelago is composed of three main groups of islands intersected by the Mid-Atlantic Ridge (MAR), which divides the western group of islands (Flores and Corvo) from the central (Terceira, Graciosa, S. Jorge, Pico and Faial) and eastern (S. Miguel and S. Maria) groups, over the Azores plateau that rises from the adjacent abyssal plains from ca. 2000m. The Azores subarea of the Portugal's Economic Exclusive Zone (EEZ) covers about 1 million km^2, of which about 99% is deep sea (>600 m) (Fig. 1).

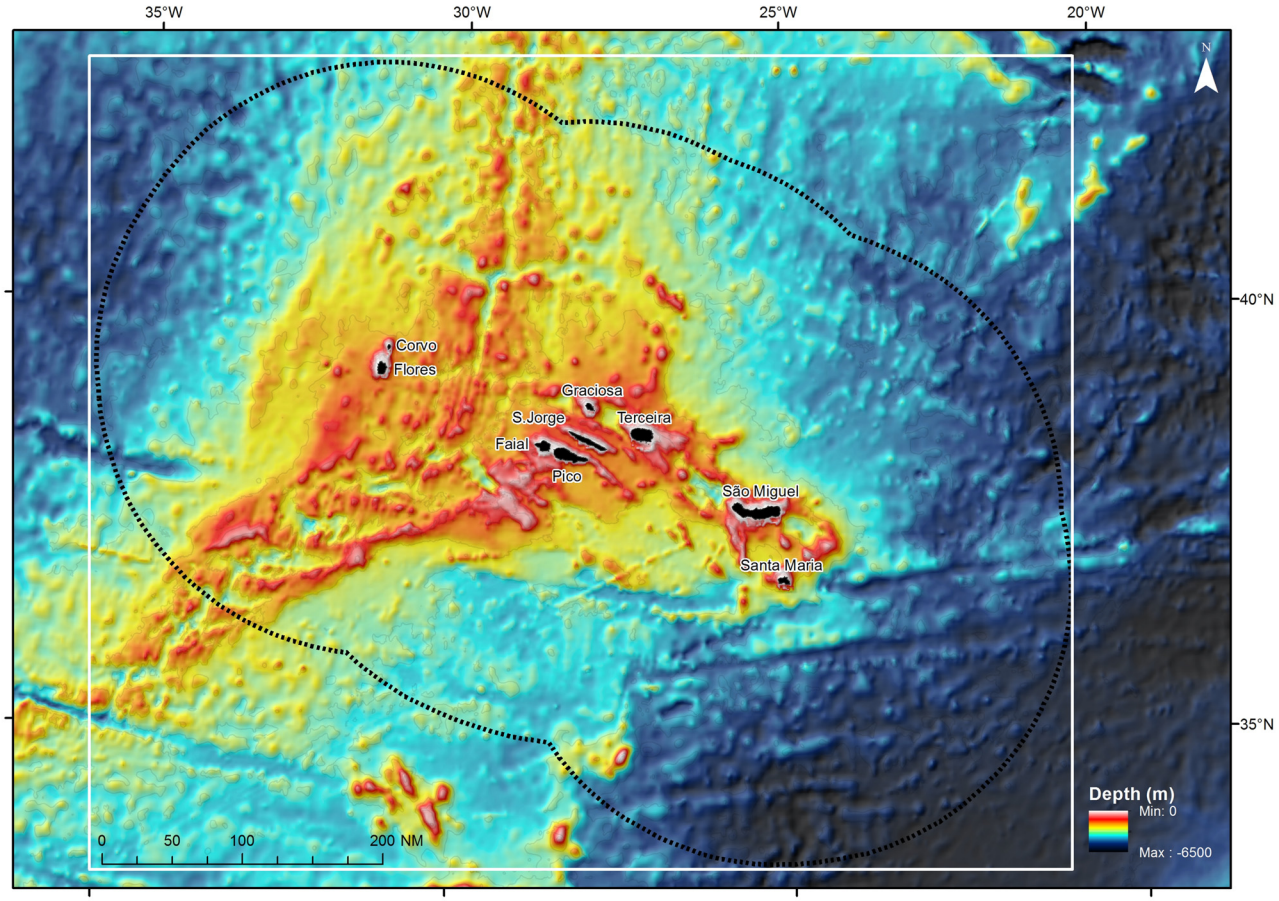

FIGURE 1. Bathymetry map of the study area surrounding the Azores EEZ. Bathymetry data credits: Amante and Eakins, 2008.

The archipelago lies in the vicinity of the North Atlantic subtropical convergence. Therefore, it is characterized by a complex oceanographic environment, which changes inter-annually in time and space, often seasonally, as other mid-latitude archipelagos and regions (Amorim *et al*. 2017). Laying between subtropical and temperate climates, the interaction of the oceanic circulation with the intricate seafloor topography plays a key role on the complexity of the oceanographic conditions of the Azores (Bashmachnikov *et al*. 2004; Morato *et al*. 2008). Oceanography in the region is influenced by two eastward currents branching from the Gulf Stream: the cold North Atlantic Current in the north and the warm Azores Current to the south (Alves & Verdière 1999; Bashmachnikov *et al*. 2004) and almost permanent complex mesoscale eddies with meanders and recirculation pattern (Reverdin *et al*. 2003). In deeper waters numerous water masses can be located: until 700 m depth the North Atlantic Central Water (NACW), at intermediate depths the Northern Sub-Polar Water (NSPW) and the Mediterranean Outflow Water (MOW) at ca. 800m and, below 2000 m depth, the North Atlantic Deep Water (NADW) (Amorim *et al*. 2017).

Seafloor in the Azores Triple Junction joins three tectonic plates on a triangular shaped Azores plateau with a diameter of about 500 km: the Eurasian, the African and the North American on a EEZ limited at a latitude of 33°46'N–42°57'N and longitude of 35°45'W–21°05'W (Fig. 1). Common topographic features of the Azorean deep

sea are island slopes, seamounts, hydrothermal vents and abyssal plains, the latter sometimes achieving more than 3200 m depth. The topographically rich seafloor is estimated to represent 37% of the EEZ with extreme importance for the open ocean and the deep-sea habitats containing a high diversity of pelagic and benthonic animals, living or visiting the Azorean archipelago (Morato *et al*. 2013; Braga-Henriques *et al*. 2013, Vandeperre *et al*. 2014). In this work, the area of study was delimited by a rectangle box between 3336´N–436´N (DM) and 3536´W–2051´W (DM) enclosing the EEZ of the Archipelago (Fig. 1).

Literature Survey and Octocoral Checklist. A vast variety of gear (i.e. dredges, trawling, 'barre fauberts', double and normal traps, trammel nets, epibenthic trawl and scuba diving), has been used for sampling CWO in the Azores, since the first known specimen of octocoral was sampled during the cruise on the RV *Josephine* in 1869 (Studer 1901; Aurivillius 1931; Tixier-Durivault & D'Hondt 1974; Grasshoff 1986).

Taxonomic literature from the 19th century onwards was consulted to extract records of CWO (orders Alcyonacea and Pennatulacea) reported to inhabit the deep sea of the Azores. Literature was compiled with the help of several taxonomists, from the Biodiversity Heritage Library and at the Archive.org. Papers and monographs were scrutinized in order to build a database of records of CWO for the Azores. Herein, the scientific name of a species is considered a record associated with a specimen or collection of specimens and associated collection data. Ecological papers were not considered in this study because they lack an accurate taxonomic approach to evaluate the identification of the species reported and, commonly, a specimen repository. Datasets with the publications list per decade and species richness per rank were deposited at the World Data Center Pangaea (https://doi.pangaea.de/10.1594/PANGAEA.889711).

A faunal list of the orders Alcyonacea and Pennatulacea inhabiting the Azores was built considering the name initially given to the species, authority, taxonomic references mentioning the species in the Azores, comments on local chresonyms, types and priority of names (see Dubois (2017) for definitions). Crosschecking on the validity of names was done by consulting the World Register of Marine Species (WORMS) database, the leading source on names of marine taxa. Moreover, onomaphore (type) and onymotope (type locality) details are provided for each species name. The classification system of Octocorallia orders used in this work is based on Bayer (1981b) and Grasshoff (1999), the currently accepted higher classification in the literature (Fig. 2).

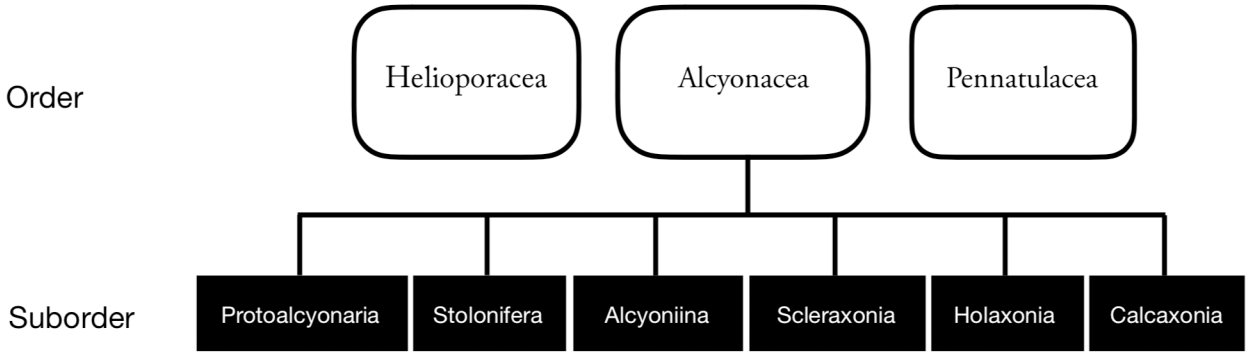

FIGURE 2. Octocoral classification system based in Bayer 1981b and Grasshoff 1999.

The following museum abbreviations are used herein: MCZ—Museum of Comparative Zoology, Harvard, USA; MMF—Museu Municipal do Funchal, Madeira, Portugal; MNHN—Muséum National d'Histoire Naturelle, Paris, France; MOM—Musée Océanographique, Monaco; MUHNAC—Museu Nacional de História Natural e da Ciência, Lisboa, Portugal; NBC—Naturalis Biodiversity Center, Leiden, The Netherlands, previously RMNH—Rijksmuseum van Natuurlijke Historie and ZMA—Zoölogisch Museum Amsterdam; NHM UIOslo—Natural History Museum, University of Oslo, Oslo, Norway; NHMUK—Natural History Museum, London, UK, previously BMNH—British Museum of Natural History, London, UK; NMINH—National Museum of Ireland Natural History, Ireland; SMF—Senckenberg Museum Frankfurt; SMNH—Swedish Museum of Natural History, Stockholm, Sweden; UCMNH—University of Copenhagen Museum of Natural History, Copenhagen, Denmark; RSMAS—Invertebrate Museum, Rosenstiel School of Marine & Atmospheric Science, University of Miami, USA, previously UMML, USNM—U.S. National Museum of Natural History, Washington, USA (Smithsonian); YPM—Yale Peabody Museum, USA; ZMH—Zoologisches Museum Hamburg, Germany; ZMMU—Zoological museum of Moscow University, Russia and ZMUB—Zoological Museum of the University of Bergen, Norway.

Results

Taxonomic effort on the study of Azorean octocorals

The taxonomic effort devoted to the study of Octocorallia in the Azorean archipelago changed over time in a cyclical pattern revealing pulses in their study. Since the 19th century, this effort fluctuated from 0 to 11 publications per decade until the present time. The first peak emerged in the beginning of the 20th century and the second after 8 decades, in the 1980's. However, the highest effort was made in the beginning of the 21st century (Fig. 3). In general, there have been more taxonomic studies targeting species of Alcyonacea than species of Pennatulacea (Fig. 3). Yet, since the 90's, the effort applied to the study of Azorean Alcyonacea rose, while the effort to study Pennatulacea kept low (Fig. 3).

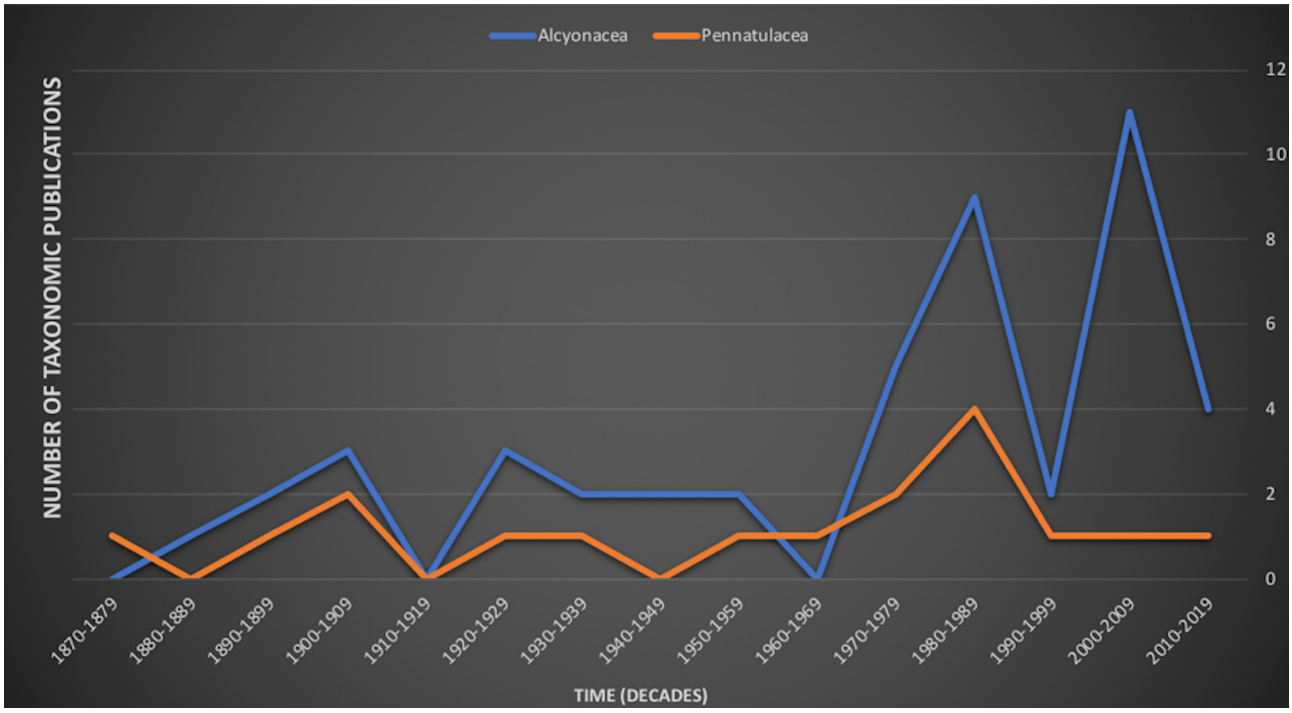

FIGURE 3. Taxonomic and nomenclatural effort on the study of Azorean Octocorallia over 15 decades.

Looking deeper within the order Alcyonacea, Calcaxonia was the most studied suborder featured in 24 publications, followed by Holaxonia featured in 21 publications. Stolonifera and Scleraxonia received lower attention (Fig. 4). The first research peak was focused mainly in Alcyoniina while the second was dedicated to Calcaxonia and Holaxonia. During the last period where higher taxonomic effort was applied, the study of octocorals was mostly dedicated to Calcaxonia but taxonomists also investigated all the suborders of gorgonians and soft corals (Fig. 4).

Octocoral checklist

Ninety-eight names of octocorals, belonging to 24 families, were identified in the literature as occurring in the Azores marine waters. Twenty-five names of species were changed or added to the previous list of octocorals of the Azores published in Braga-Henriques *et al*. (2013): 6 species of Alcyoniina; 3 species of Calcaxonia; 1 species of Holaxonia, 2 species of Scleraxonia; and 13 species of Pennatulacea.

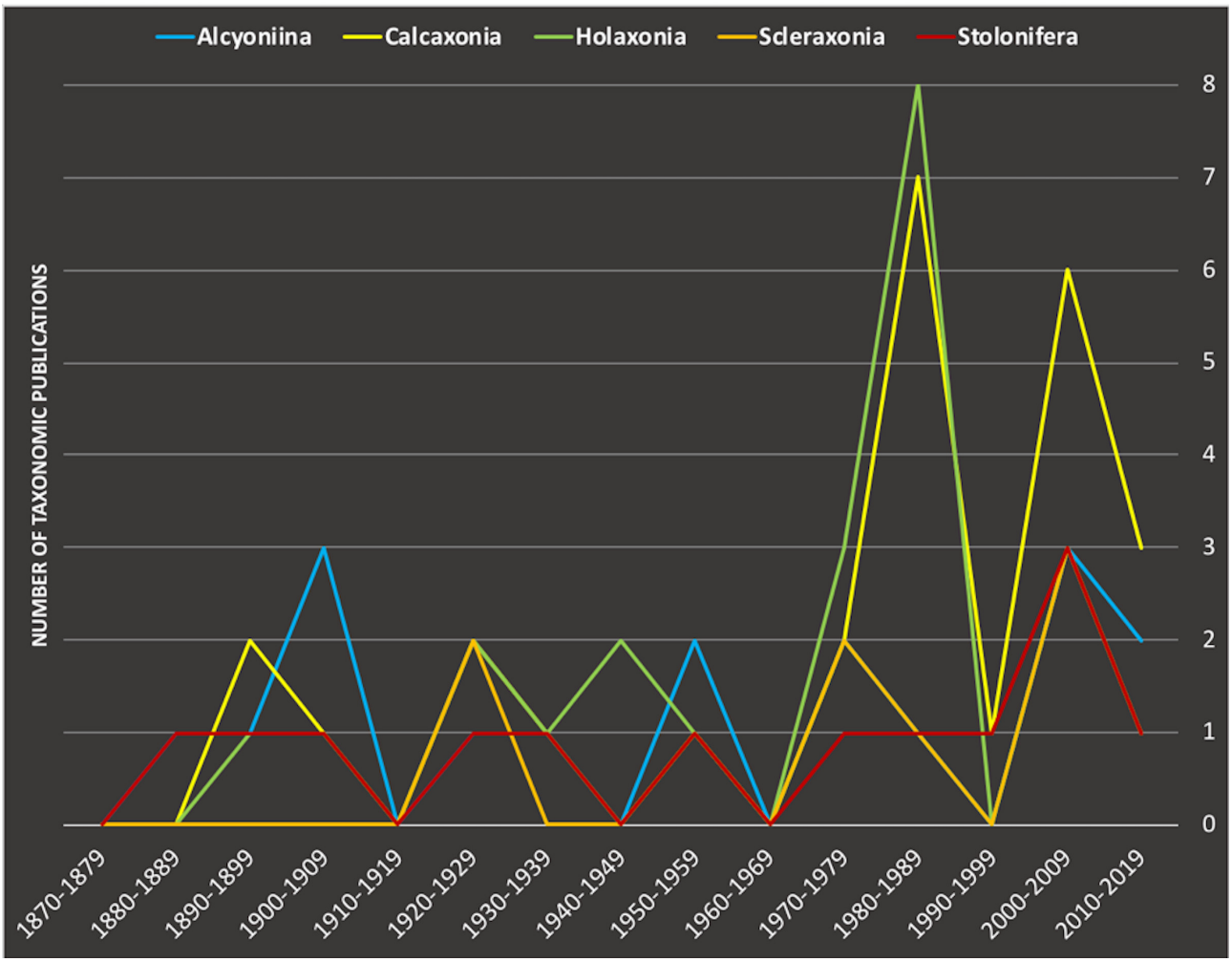

FIGURE 4. Taxonomic and nomenclatural effort on the study of Azorean Alcyonacea over 15 decades: sub-order Alcyoniina, Calcaxonia, Holaxonia, Scleraxonia and Stolonifera.

The sub-order Alcyoniina includes 3 families, 8 genera and 17 species of octocorals in the Azores (Fig. 5, 6 and Table 1, 2). Nonetheless, two of the species given for the Azores need further taxonomical study. Firstly, *Alcyonium glomeratum* (Hassall, 1843) is reported to occur in the region by Brito & Ocaña (2004) but no records or specimens are described for the Azores. Secondly, *Anthomastus agaricus* Studer, 1891 is revised in Molodtsova (2013), however, the specimens of Tixier-Durivault & D'Hondt (1974) are not included or transferred to the new genus.

Herein, five species are changed and added to the latest list of Alcyoniina of the Azores presented by Braga-Henriques *et al*. (2013): *Alcyonium acaule* Marion, 1878, *A. glomeratum*, *Heteropolypus sol* Molodtsova, 2013, *Pseudoanthomastus agaricus* (Studer, 1891) and *P. mariejoseae* Molodtsova, 2013. Additionally, *Alcyonium rubrum* Stokvis and van Ofwegen, 2006 has been declared a *nomen novum* being now named *Alcyonium burmedju* Sampaio, Stokvis & Ofwegen 2016, and *Alcyonium grandiflorum* (Tixier-Durivault and D'Hondt, 1974) is now considered to be part of the genus *Lateothela* within Scleraxonia (Moore *et al*. 2017) (Fig. 5b, 5d, 7d).

In the sub-order Calcaxonia, the Azorean deep sea harbors 5 families, 18 genera and 24 species (Fig. 8, 6 and Table 1, 2). *Chrysogorgia elegans* (Verrill, 1883) was listed for the Azores by Cairns (2001) based on specimens identified by Thomson (1927) as *Chrysogorgia flexilis* (Wright & Studer, 1889) while in Carpine & Grasshoff (1985) the same specimens were observed and identified as *Chrysogorgia agassizii* (Verrill, 1883). As Cairns (2001) had not seen the Azorean specimens, the name *Chrysogorgia elegans* (Verrill, 1883) should remain open to question until morphological analyses are made. Moreover, *Thouarella* (*Euthouarella*) *grasshoffi* (Cairns, 2006) was reported by Cairns (2006) included under a subgenus but later without it in Taylor et al. (2013). Three names are herein added to the list of Calcaxonia of the Azores published in Braga-Henriques *et al*. (2013): *Dendrobrachia*

multispina Opresko & Bayer, 1991 within the monospecific family Dendrobrachiidae; *Verrucella guernei* Studer, 1890 within Ellisellidae; and *Radicipes gracilis* (Verrill, 1884) within Chrysogorgiidae. Concerning *V. guernei* and despite the specimens described in Studer (1890) and Studer (1901) being assigned by Carpine & Grasshoff (1985) to *Nicella granifera* (Kölliker, 1865), the specimens of Tixier-Durivault & D'Hondt (1974) still keep the same name. In the third case, the name *Radicipes fragilis* (Wright & Studer, 1889) was synonymized to *Radicipes gracilis* (Verrill, 1884) (Cordeiro *et al*. 2017).

The Holaxonia sub-order is composed of 3 families, 10 genera and 19 species in the Azores (Fig. 9, 6 and Table 1, 2). Grasshoff (1977) split *Paramuricea annectens* (Thomson, 1927) into two species: *Muriceides sceptrum* (Studer, 1890) and *Paramuricea candida* Grasshoff, 1977. The former is synonymized to *Muriceides paucituberculata* (Marion, 1882) due to the priority of the name (Grasshoff 1986). Nonetheless, it is not clear which specimens are named as one species or the other. The 3 specimens of *P. annectens* collected during Biaçores in 3 different stations were mentioned in Grasshoff (1977) as sampled in one location (Station 180) designating one as holotype and the other two as paratypes of the new species *Paramuricea candida*. If all the specimens are type-specimens of *P. candida* it is not clear which specimen was identified as *M. sceptrum* (now *M. paucituberculata*) (Tixier-Durivault & D'Hondt 1974; Grasshoff 1977). *Acanthogorgia truncata* Studer, 1891 is added to the Azores list. While the same name is assigned by Carpine & Grasshoff (1985) to *Acanthogorgia hirsuta* Gray, 1857 and *Acanthogorgia pico* Grasshoff, 1973, specimens of Tixier-Durivault & D´Hondt (1974) still lack revision.

Within the sub-order Scleraxonia, the Azorean waters harbor 3 families, 5 genera and 7 species of octocorals (Fig. 10, 6 and Table 1, 2). *Paragorgia arborea* (Linnaeus, 1758) is added to the 5 species of Scleraxonia known for the Azores based in Mortensen *et al*. (2007) as is *Lateothela grandiflora* (Tixier-Durivault and D'Hondt, 1974) that was initially thought to be an Alcyoniidae (Moore *et al*. 2017).

Stolonifera in the Azores were not the main target of Octocorallia taxonomy and represent 2 families, 10 genera and 18 species (Fig. 6, 7 and Table 1, 2). Finally, the sea pens are represented in the Azores by a high systematic diversity of 8 families, 9 genera and 13 species (Figs. 7, 11 and Tables 1, 2).

Diversity of Azorean Octocorals

The majority of the species of Octocorallia inhabiting the Azorean waters belong to the order Alcyonacea (85 species) allocated as follows: 24 species of Calcaxonia, 19 species of Holaxonia, 18 species of Stolonifera, 17 species of Alcyoniina and 7 species of Scleraxonia. The diversity of families is also largest in Calcaxonia (5), followed by Alcyoniina, Holaxonia and Scleraxonia (3) and Stolonifera (2). Highest species richness was observed within sub-order Stolonifera in the family Clavulariidae (17 species in 9 genera), followed by the family Alcyoniidae (14 species in 5 genera) of the sub-order Alcyoniina and the family Plexauridae (12 species in 8 genera) of the sub-order Holaxonia. Lower octocoral species diversity belonged to monospecific families such as Dendrobrachiidae, Gorgoniidae and Cornulariidae (Fig. 6).

In the Azores the Pennatulacea order is composed by 13 known species, belonging to 8 families in which Umbellulidae has highest diversity (4 species) followed by Pennatulidae (3). All the remaining families are monospecific in the region (Fig. 6).

Discussion

The highest species richness on Octocorallia in the North Atlantic Ocean is reported for the Azores marine waters, central NE Atlantic Ocean, with 98 species (see comparison below). A systematic review of all the taxonomic nomenclature on the orders Alcyonacea and Pennatulacea, within the sub-class Octocorallia, led to the addition of specific names to the previous lists (Hall-Spencer *et al*. 2007; Braga-Henriques *et al*. 2013). The comprehensive list of names given herein in association with the development of the taxonomic effort applied to the study of Octocorallia in the Azores provides an historical context to the known biodiversity in the region.

Advance in Exploration. Overall the taxonomic effort on the study of Octocorallia in the Azores was not constant over time. Three peaks were revealed, being the most productive during the recent decade 2000–2009. The first peak coincides with end of the 19th century and the beginning of the 20th century, marked by 13 cruises of Prince Albert I of Monaco to the Azorean archipelago. Octocorallian species caught during the campaigns are

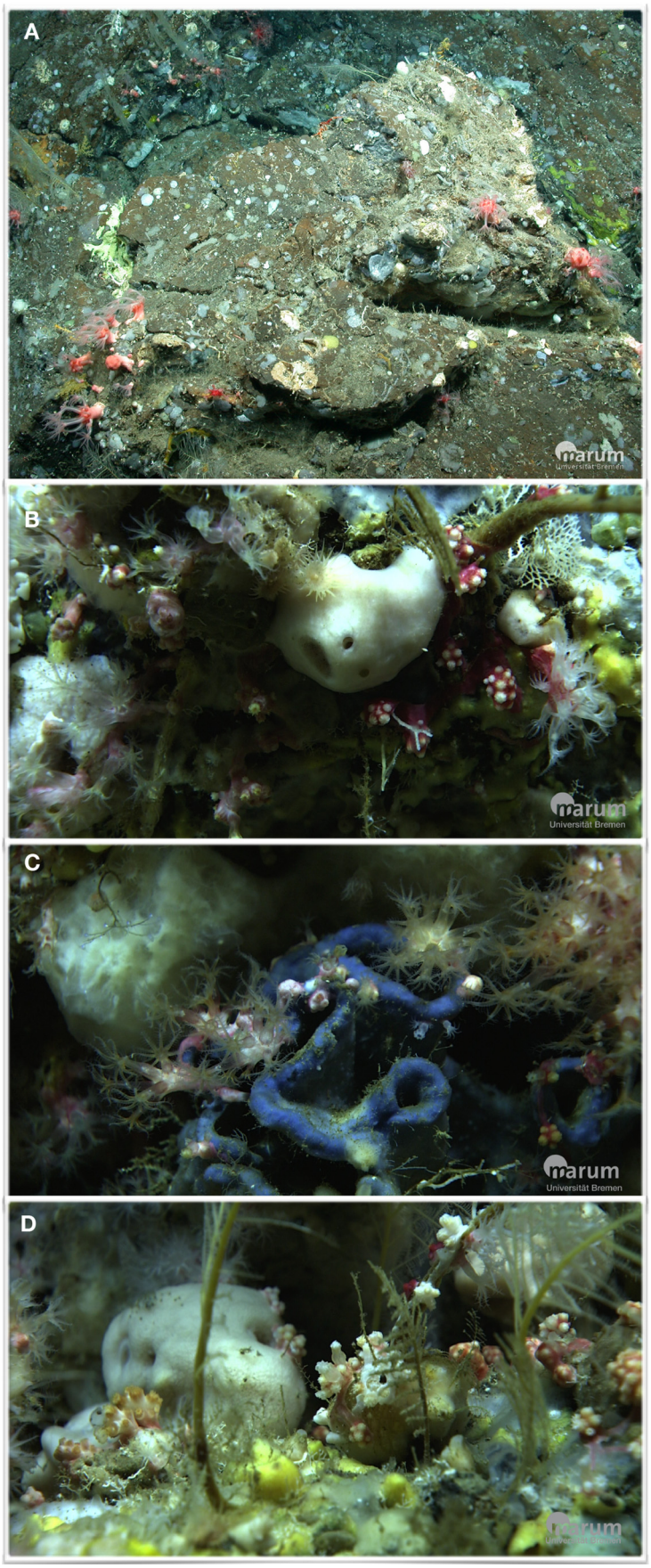

FIGURE 5. Underwater images of Alcyoniina of the Azores: a) *Pseudoanthomastus* sp. b) *Alcyonium maristenebrosi* c) *Alcyonium burmedju* and d) detail of the previous *Alcyonium* species. Copyright: MARUM, University of Bremen.

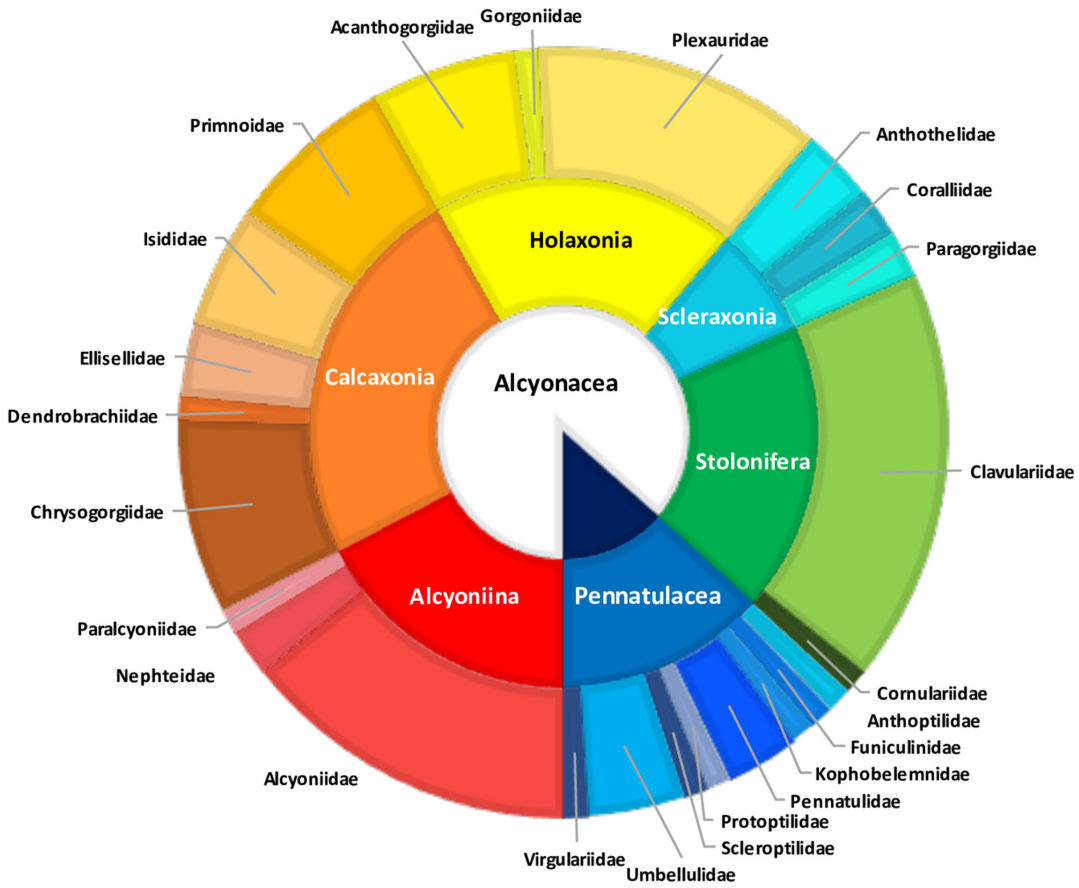

FIGURE 6. Species richness of Octocorallia of the Azores within taxonomic literature at three levels: orders, sub-orders and families.

described in two volumes, still representing the most complete record of Octocorallia fauna in the region (Studer 1901, Thomson 1927, García-Diez *et al*. 2005). The second peak was in the 70's and 80's of the 20th century representing the work of the leading expert in octocorals of the NE Atlantic Ocean, Dr. Manfred Grasshoff and by a monograph of the 1971 Biaçores campaign (Tixier-Durivault & D´Hondt 1974). From 2000 until 2009, the highest peak occurred revealing the higher number of publications of Octocorallia of any decade in the Azores. During that decade, deep-sea exploration and research grew in the Azorean archipelago and a new Portuguese research group studying CWC was created within the University of the Azores. Moreover, growing scientific interest and expeditions during the advent of underwater technology (e.g. ROVs enabling in situ observation and sampling) occurred in the region due to its central strategic position in the North Atlantic Ocean between Europe and North America and near the Mid-Atlantic Ridge. Currently, the taxonomic effort is falling, probably revealing a shift from exploratory surveys into habitat mapping surveys, where images and videos are priorities. Nonetheless, taxonomy is of critical importance if we aim to know and protect biodiversity in such an unknown environment as the deep sea (Thomson *et al.* 2018).

Different factors may be linked to a selective taxonomic focus. Alcyonacea was the most studied order of Octocorallia in the Azores featuring in 46 publications and higher taxonomic effort was applied to distinct suborders of Alcyonacea as revealed by various papers and monographs (Fig. 3). While the reports of Prince Albert I of Monaco expeditions include all the unknown biodiversity sampled in the area, papers published later are more focused in specific suborders of Alcyonacea, probably due to the scientific tendency towards brief papers. In the

Azores, Alcyonacea is the most diverse of the CWC of the Azores (Braga-Henriques *et al*. 2013) and the order with the most charismatic morphologies. Its high systematic diversity increases the probability of a specified taxonomic effort, especially considering the lower number of experts in CWO, mainly in the species that inhabit a deep and difficult-to-access area, such as the deep sea. Moreover, limited attention was focused on sea pens (Pennatulacea), an order with high systematic diversity (Fig. 3, Table 1, 2) and one of the most cited species for the Azores: *Gyrophyllum hirondellei* Studer, 1891. But, only one specimen of this species is present in our collection COLETA, the reference biodiversity collection of the Department of Oceanography and Fisheries of the University of the Azores, after many scientific expeditions within the archipelago. As Pennatulacea tend to inhabit deeper strata, probably octocorals of this order are not being sampled as often as in the old expeditions, when more depths were sampled.

FIGURE 7. Different morphologies of fresh specimens of Octocorallia of the Azores: a) *Acanella arbuscula* (Calcaxonia), b) *Bebryce mollis* (Holaxonia), c) *Anthothela grandiflora* and d) *Lateothela grandiflora* (Scleraxonia), e) cf. *Telestula* sp. and f) cf. *Clavularia* sp. (Stolonifera), g) and h) *Gyrophyllum hirondellei* (Pennatulacea). Copyright: Meri Bilan (a, f), Diana Catarino (b, g, h), Íris Sampaio (c, d, e).

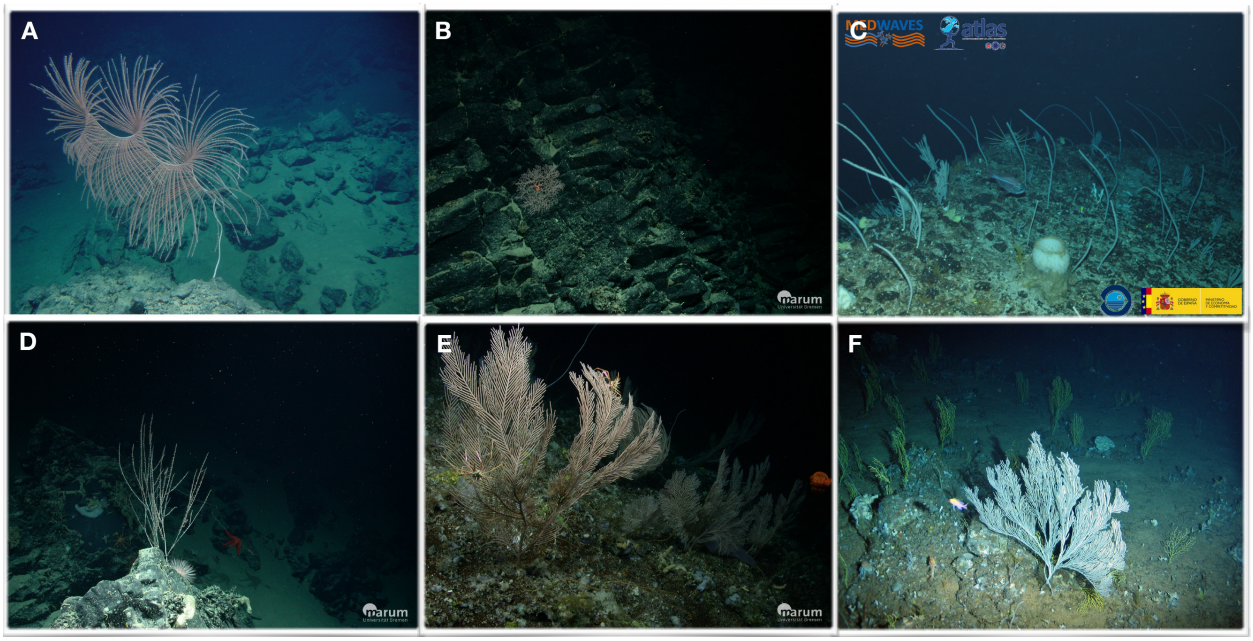

FIGURE 8. Underwater images of Calcaxonia of the Azores: a) *Iridogorgia magnispiralis*, b) top view of *Metallogorgia melanotrichos* c) coral garden of *Viminella flagellum*, d) cf. *Isidella* sp., e) *Callogorgia verticillata*, f) *Paracalyptrophora josephinae*. Copyright: MARUM, University of Bremen, MEDWAVES (c), Gavin Newman/Greenpeace (f).

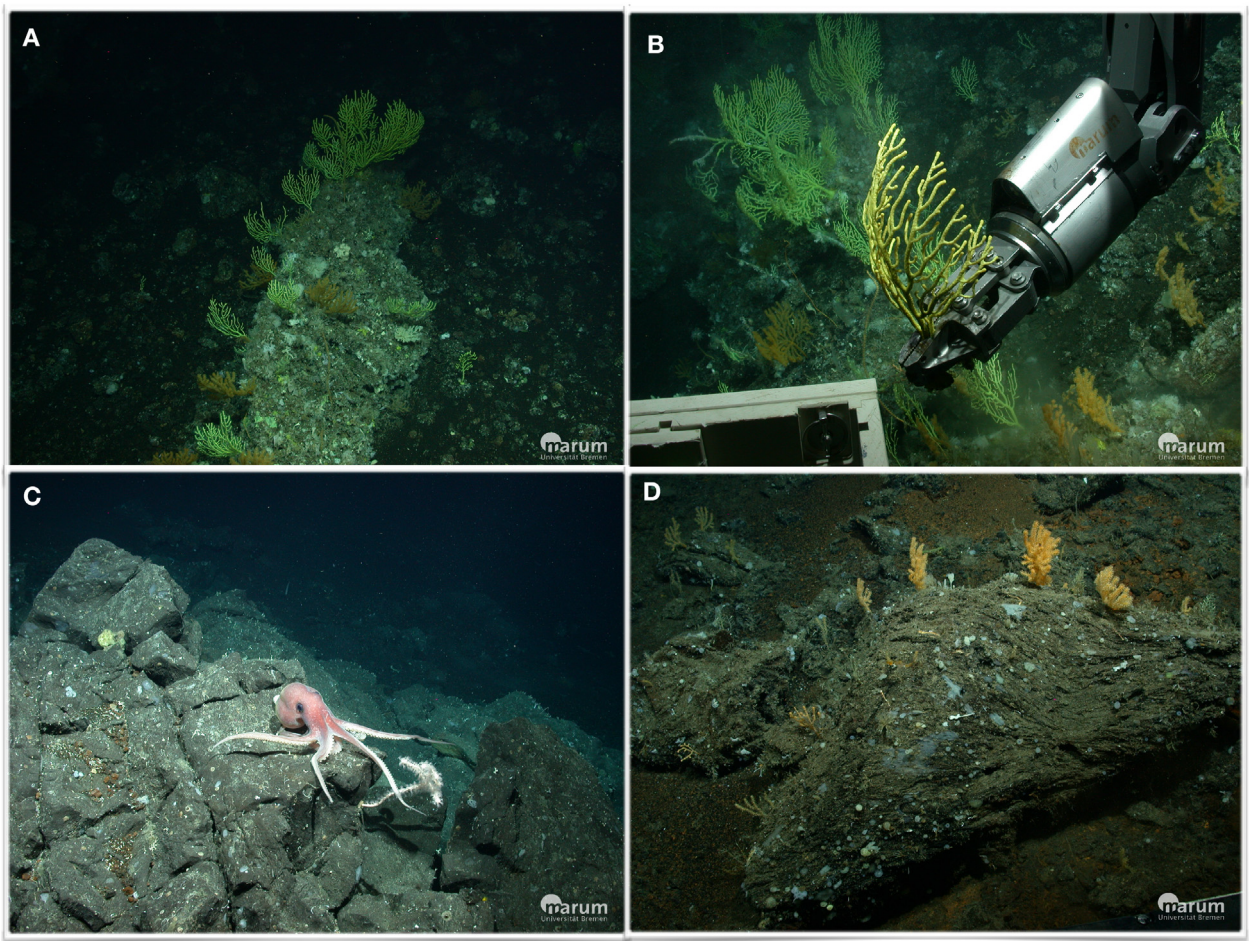

FIGURE 9. Underwater images of Holaxonia of the Azores: a) coral garden of *Dentomuricea* aff. *meteor* and *Acanthogorgia* sp. b) coral garden and one colony of *Dentomuricea* aff. *meteor*, c) Plexauridae, d) *Acanthogorgia armata*. Copyright: MARUM, University of Bremen.

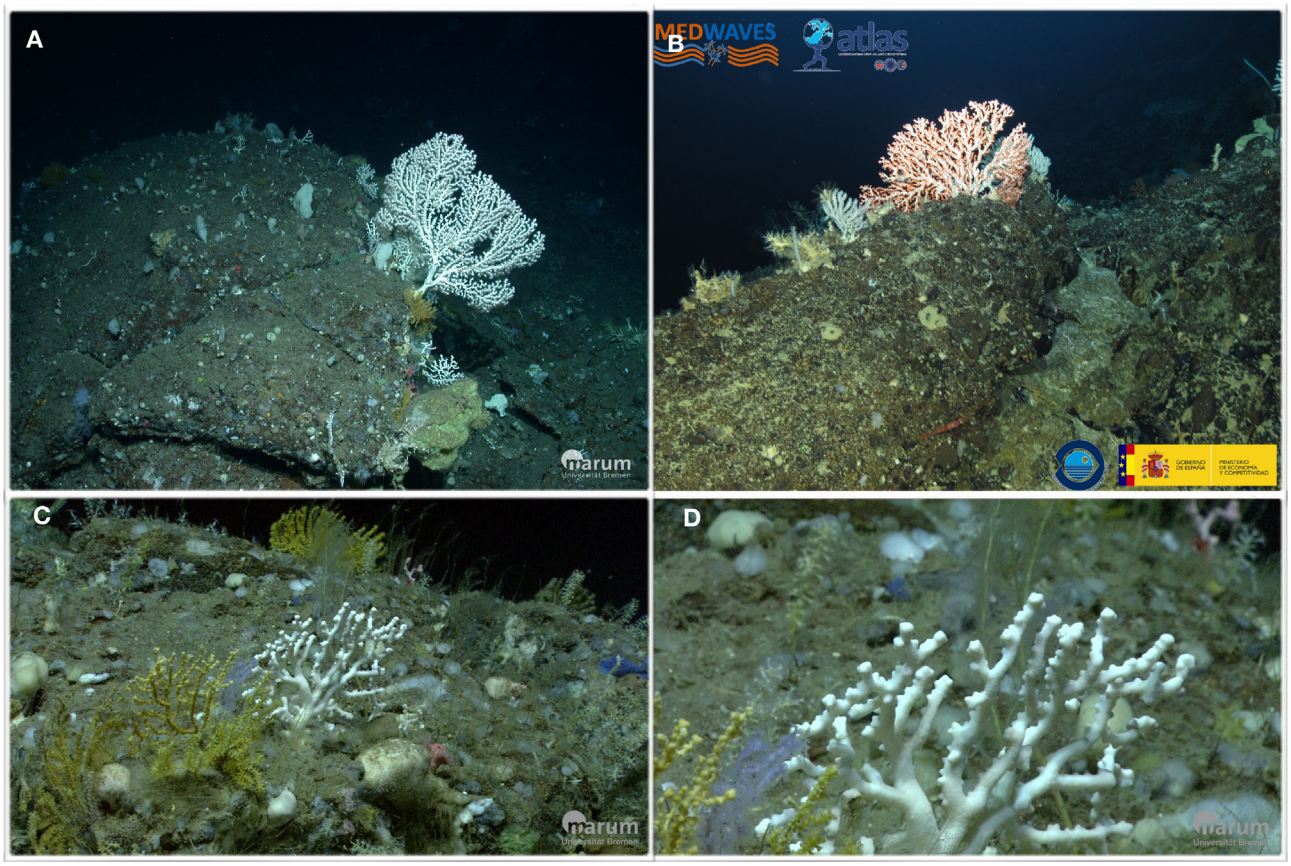

FIGURE 10. Underwater images of Scleraxonia of the Azores: a) *Paragorgia johnsoni*, b) *Corallium tricolor*, c) and d) *Corallium johnsoni*. Copyright: MARUM, University of Bremen and MEDWAVES (b).

Focused effort in specific octocorals can be explained by a) higher diversity and/or abundance sampled, b) the taxonomic expertise of the author or incitation to author specialization based in the availability of the material sampled, c) the selectivity of the sampling methods, which were more diverse in old scientific campaigns, d) the evolution of scientific publications towards brevity, and e) the size and three-dimensionality of the sampled octocorals (e.g. small epibenthic Stolonifera) (Sampaio *et al*. 2012). While, general species accumulation curves of CWC of the Azores indicate a sufficient sampling in the archipelago (Braga-Henriques *et al*. 2013), considering the high number of taxonomic ranks within Octocorallia, this is unlikely the case for all orders and sub-orders of Octocorallia (e.g. Pennatulacea, Stolonifera).

Shifts in Census of Biodiversity of Octocorallia. In our local chresonym list of Octocorallia of the Azores, the history of the *nomina* revealed that 72% (71 spp.) were validated directly, 26% (25 spp.) are synonyms or aponyms and 66% (65 spp.) are chresonyms (Table 1). There were also names changing due to the rule of priority (10 spp.), misspellings (7 spp.), sub-specific epithets excluded or changed to the specific level (2 spp.) and homonomy (1 sp., Sampaio *et al*. (2016)) (Table 1). Moreover, it indicated names referred by Tixier-Durivault & D'Hondt (1974) which were not revised in the latest taxonomic studies, such as *Anthomastus agaricus* in Molodtsova (2013) and *Verrucella guernei*, *Acanthogorgia muricata* Verrill, 1883 and *Acanthogorgia truncata* in Carpine & Grasshoff (1985). New chresonyms, synonyms or species may originate from a taxonomic revision of these records, especially considering that Tixier-Durivault identifications are frequently disputed (Pères *et al*. 2016). Another example is the family Acanthogorgiidae in the Azores, where 6 species names are available and valid. Nonetheless, after a revised description of some of the species, M. Grasshoff (pers. comm.) now considers only two species are valid within this family, *Acanthogorgia hirsuta* and *A. granulata* Grasshoff, 1973.

Causes of synonymies can be: a) the popularity of a taxon corresponding to more names linked to a single species, b) phenotypic plasticity forms and different life stages described as different species, or c) species recorded only once in old times and redescribed in recent studies due to an incomplete former description or lack of access to the scarce taxonomic literature (Costello & Chaudhary 2017). The majority of directly validated names of

Octocorallia of the Azores were not revised after their original publication. Furthermore, 42% of the names are singletons, mentioned only once in literature. These species may be rare in the archipelago of the Azores, may have been misidentified or may even no longer inhabit the islands slopes and seamounts of the area. An alternative explanation is the lack of knowledge on taxonomy of octocorals during scientific campaigns in the region. Indeed, cruise reports tend to list specimens identified above the species level or species already known from other areas. In the past, zoological specimens collected during scientific cruises were later analyzed for taxonomic descriptions. Nowadays, this is a rare practice that may lead to the incorrect identification of species. Lack of exploration and taxonomic revision of some groups of octocorals can lead to a higher number of unsampled or unidentified species or to more synonyms. Considering that 40% of the marine species names are synonyms (Costello & Chaudhary 2017), synonymies and chresonymies have a crucial role as sources of nomenclatural status, bibliographic and taxonomic information of a taxon and associated data gathered over centuries (Dubois 2000).

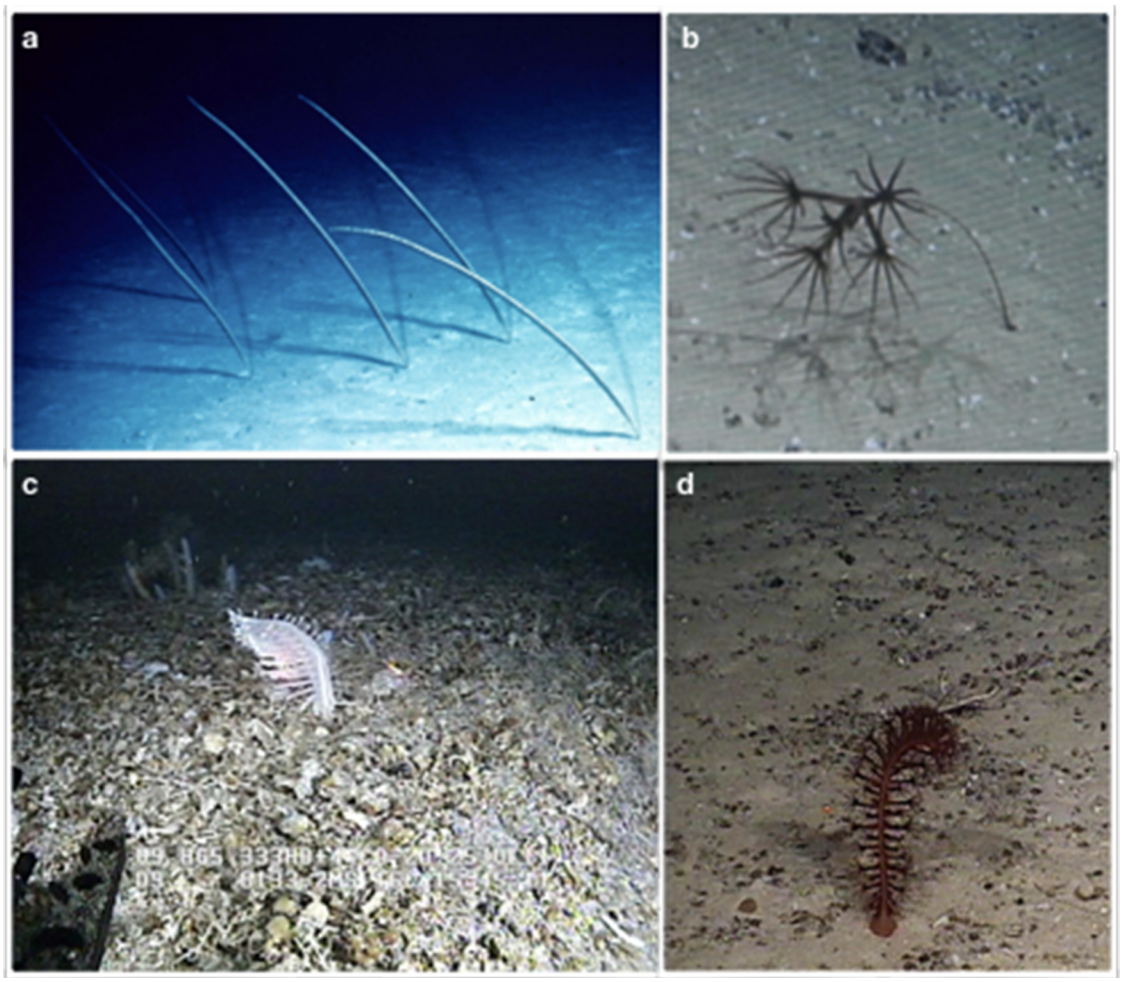

FIGURE 11. Underwater images of Pennatulacea of the Azores: a) Sea pen field b) *Umbellula* cf. *pallida*, c) *Pennatula* cf. *phosphorea* and d) cf. *Anthoptilum murrayi*. Copyright: French bathyscape Archimède Expedition Azores 1969/Station Marine d' Endoume, (a), EMEPC2019/Iris Sampaio (b), Project CoralFish/ ImagDOP (c) and Dr. Odd Aksel Bergstad, Project MARECO, Institute of Marine Research, Bergen (d).

Azores as a deep-sea Biodiversity Hotspot? We discovered the highest biodiversity of Octocorallia reported so far for the Azores marine waters, with 24 families, 60 genera and 98 known species (Fig. 6, Table 1, 2). The last checklist reported 79 species of Octocorallia inhabiting the Azores, improved in this checklist with an additional 19 species that mostly represent the previous unreported order Pennatulacea (13 spp.). An incorrect account of octocorals was later given for the Azores in Pèrez *et al*. (2016) with a lower number of 41 species. We suggest that up to now unreported biodiversity was caused by inadequate or insufficient coverage of the literature based on a sub-sample of old monographs or in incomplete current inventories. However, specimen-based work is essential for the continuation of this inventory. The number of species will probably increase when taxonomic studies reveal

new species or new species records for the Azores. For example, a new *Corallium* species (suborder Scleraxonia) was recently discovered onboard RV *Meteor* (Beier *et al*. 2017). In addition, new records of *Corallium tricolor* (Johnson, 1899) observed during MEDWAVES cruise in Formigas Bank (Orejas *et al*. 2017) and *Iridogorgia magnispiralis* Watling, 2007 (L. Watling pers. comm.) in an ROV image, will also contribute to increase the list of known Octocorallia to 101 species in the Azores.

The majority of octocorallian species (24 spp.) belong to the suborder Calcaxonia (Alcyonacea) while Scleraxonia (Alcyonacea) is the least diverse with only 7 (+1: the new species of *Corallium*) species living in the Azorean deep sea. Scleraxonia is also the suborder with the least number of studies focused on them (10) and with species being identified only recently in the archipelago (e.g. Sampaio *et al*. 2009). Stolonifera is the order with the family with the highest species richness in the deep sea of the Azores archipelago, Clavulariidae (17 spp.) followed by Alcyoniidae (Alcyoniina, 14 spp.), and Plexauridae (Holaxonia, 12 spp.). However, in families like Plexauridae there are some doubtful species boundaries. One of the most important distinguishable morphological characters among octocoral species is the sclerite form and size, which in Plexauridae is highly diverse and difficult to interpret as species or populations hypotheses. Moreover, the high diversity of species and the phenotypic plasticity (morphological adaptation prompted by the environment) within the same species can be misleading and wrongly interpreted in interspecific boundaries. Uncertain groups request further taxonomic revision that may lead to new species discovery or synonyms of previously described species.

In the context of the Atlantic, the Azores seems to represent a hotspot of biodiversity for Octocorallia. Azorean habitat heterogeneity and oceanography may be driving the high species richness. However, this number of records could also reflect the taxonomic long-term effort applied to the deep sea of this region, in comparison to the effort in less explored deep-sea areas.

Azores archipelago biogeographic context and endemism. Species names recorded in the taxonomic literature for the Azores represent three-quarters of the 129 species of Octocorallia recorded for Europe by European Register of Marine Species (ERMS) (Costello *et al*. 2001), the highest octocoral diversity among European countries. Also, it is 3 times greater than the number of octocorals known for the Mid-Atlantic Ridge (30 spp.), more than the double that of the Canaries species (44 spp.) and almost the double of species of octocorals known to occur in the Mediterranean Sea (54 spp.) (Brito & Ocaña 2004; Pérez *et al*. 2016). Even if compared with the most diverse center of endemism, with a part in the Eastern Atlantic of South Africa, the Azores has 58% of the number of species known to occur in that area (170 spp.). From a global perspective, the Azorean octocoral species richness represents 2.8% of the known octocoral species richness (3400 spp.). There is a high diversity of octocorals in the Azores that are also part of the shared species of CWC of the Atlantic, mainly with the Lusitanian-Mediterranean region and the Northwestern Atlantic Ocean (Braga-Henriques *et al*. 2013). Nonetheless, the known octocoral fauna of nearby regions may be linked to limited exploratory deep-sea effort. For example, the volcanic Canary islands located near the western African mainland were not a target of the main deep-sea cruises, like Prince Albert I of Monaco, but are expected to have many undescribed deep-sea fauna (Gofas *et al*. 2017).

Within Octocorallia, distinct proportions of the global specific fauna of octocorals are present in the Azores. Stolonifera of the Azores represent 37% of the global genera and Calcaxonia of the Azores 83% of the known families (Pérez *et al*. 2016).

Putative endemic octocoral species (15) represent 15.3 % of the 98 species of octocorals known to occur in the Azores, a small increase of the 14% of endemic CWC in Braga-Henriques *et al*. (2013). However, what we call endemic today may mean that the species is simply an object of biased sampling effort, of limited taxonomic expertise or, simply unstudied in other regions. It can also be a rarely collected species known uniquely from its type locality but likely to be found in other areas. NE Atlantic endemism in seamounts may be low to non-existent (Hall-Spencer *et al*. 2007). An example of an octocoral species is the plexaurid *Dentomuricea* aff. *meteor* Grasshoff, 1977 described for the Great Meteor Bank and thought to be endemic, but also inhabiting the archipelago of the Azores and forming extensive coral gardens (Grasshoff 1977, Braga-Henriques *et al*. 2013). Since the discovery of life in the deep sea, the NE Atlantic has been the most explored oceanic area in the world, but taxonomic exploration in the archipelago of the Azores is still insufficient. With higher taxonomic effort, the number of putative endemic octocorals known to inhabit the Azores may decrease.

TABLE 1. Checklist of species names of Octocorallia (Alcyonacea and Pennatulacea) given to the Azores EEZ based on taxonomic literature. Taxonomic references were listed and analysed resulting in the final checklist of octocorals known to occur in the Azores. The table was divided in ranks (suborders and groups) for a better reading.

Order Alcyonacea
Suborder Alcyoniina

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
Alcyoniidae	*Alcyonium palmatum* var. *acaule* Marion, 1882	Thomson (1927)	Assigned by Weinberg (1977) to *Alcyonium acaule* Marion, 1878.	*Alcyonium acaule* Marion, 1878
	Pseudoalcyonium novum Tixier-Durivault and D'Hondt, 1974	Tixier-Durivault and D´Hondt (1974)	Assigned by Stokvis and van Ofwegen (2006) to *Alcyonium bocagei* (Kent, 1870). The authors mention that the species was described as *Bellonella bocagei* in Verseveldt and Bayer, 1988.	*Alcyonium bocagei* (Kent, 1870)
	Alcyonium rubrum Stokvis and van Ofwegen, 2006	Braga-Henriques *et al.* (2013)	Nonetheless, this name was previously given to other species described by Müller (1776) and mentioned by Hassall (1841). Consequently, it was declared a *nomen novum* and named *Alcyonium burmedju* Sampaio, Stokvis and Ofwegen.	*Alcyonium burmedju* Sampaio, Stokvis and Ofwegen, 2016
	Alcyonium glomeratum (Hassall, 1843)	Brito and Ocaña (2004)	No information of specimens collected in the Azores is provided.	[*Alcyonium glomeratum* (Hassall, 1843)]
	Alcyonium coralloides (Pallas, 1766)	Brito and Ocaña (2004); Braga-Henriques *et al.* (2013)	Brito and Ocaña (2004) identified *Alcyonium coralloides* (Pallas, 1766) in Canary islands; that specimen is assigned by Stokvis and van Ofwegen (2006) to *Alcyonium maristenebrosi (*Stiasny, 1937).	*Alcyonium maristenebrosi* (Stiasny, 1937)
	Alcyonium palmatum Pallas, 1766	Thomson (1927); Deichmann (1936); Braga-Henriques *et al.* (2013)		*Alcyonium palmatum* Pallas, 1766
	Alcyonium profundum Stokvis and van Ofwegen, 2006	Braga-Henriques *et al.* (2013)	No information of specimens collected in the Azores is provided.	*Alcyonium profundum* Stokvis and van Ofwegen, 2006
	Alcyonium bocagei (Kent, 1870)	Deichmann (1936)	Assigned by Tixier-Durivault and D´Hondt (1974) to *Bellonella bocagei* (Kent, 1870).	*Bellonella bocagei* (Kent, 1870)

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
	Bellonella bocagei (Kent, 1870)	Wright and Studer (1889); Pütter (1900); Studer (1901); Utinomi (1958); Tixier-Durivault and D´Hondt (1974); Verseveldt and Bayer (1988); Braga-Henriques *et al.* (2013)		*Bellonella bocagei* (Kent, 1870)
	Gersemia bocagei (Kent, 1870)	Thomson (1927)	Assigned by Tixier-Durivault and D´Hondt (1974) to *Bellonella bocagei* (Kent, 1870). Deichmann (1936) previously transferred it to *Alcyonium bocagei* (Kent, 1870) suggesting that probably it is another species.	*Bellonella bocagei* (Kent, 1870)
	Nidalia bocagei (Kent, 1870) = Gersemia bocagei (Kent, 1870)	Kükenthal (1906)	Assigned by Tixier-Durivault and D´Hondt (1974) to *Bellonella bocagei* (Kent, 1870).	*Bellonella bocagei* (Kent, 1870)
	Bellonella tenuis Tixier-Durivault and D'Hondt, 1974	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)		*Bellonella tenuis* Tixier-Durivault and D'Hondt, 1974
	Alcyonium clavatum Studer, 1890	Studer (1890); Studer (1901); Deichmann (1936); Pax and Müller (1954); Tixier-Durivault and D´Hondt (1974)	Assigned by Verseveldt and Bayer (1988) to *Bellonella variabilis* (Studer, 1891).	*Bellonella variabilis* (Studer, 1891)
	Bellonella variabilis (Studer, 1891)	Verseveldt and Bayer (1988); Braga-Henriques *et al.* (2013)		*Bellonella variabilis* (Studer, 1891)
	Gersemia variabilis (Studer, 1891)	Thomson (1927)	Assigned by Verseveldt and Bayer (1988) to *Bellonella variabilis* (Studer, 1891).	*Bellonella variabilis* (Studer, 1891)
	Heteropolypus cf. insolitus Tixier-Durivault, 1964	Molodtsova *et al.* (2008); Molodtsova (2013)	Assigned by Molodtsova (2013) to *Heteropolypus sol* Molodtsova, 2013.	*Heteropolypus sol* Molodtsova, 2013
	Anthomastus grandiflorus Verrill, 1878	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013); Molodtsova (2013)	Assigned by Molodtsova (2013) to *Heteropolypus sol* Molodtsova, 2013.	*Heteropolypus sol* Molodtsova, 2013

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
	Anthomastus agaricus Studer, 1891	Tixier-Durivault and D´Hondt (1974); Thomson (1927); Braga-Henriques *et al.* (2013); Molodtsova (2013)	Records of this species were considered misidentifications and were identified as other species by Molodtsova (2013). The record in Tixier-Durivault and D´Hondt (1974) is not considered as *Pseudoanthomastus agaricus*, but it is not identified as well. No description or image of the specimen is given in Tixier-Durivault and D´Hondt (1974). The record in Thomson (1927) is assigned by Molodtsova (2013) to *Pseudoanthomastus agaricus* (Studer, 1891).	*Anthomastus agaricus* Studer, 1891 sensu Tixier-Durivault and D´Hondt, 1974 *Pseudoanthomastus agaricus* (Studer, 1891)
	[partim] *Anthomastus canariensis* Wright and Studer, 1889	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013); Molodtsova (2013)	[partim] *Anthomastus canariensis* Wright and Studer, 1889 is assigned by Molodtsova (2013) to *Pseudoanthomastus agaricus* (Studer, 1890) while other [partim] *Anthomastus canariensis* Wright and Studer, 1889 is assigned to *Pseudoanthomastus mariejoseae* Molodtsova, 2013.	*Pseudoanthomastus agaricus* (Studer, 1891) *Pseudoanthomastus mariejoseae* Molodstova, 2013
	Pseudoanthomastus inusitatus Tixier-Durivault and D'Hondt, 1974	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013); Molodtsova (2013)	Assigned by Molodtsova (2013) to *Pseudoanthomastus agaricus* (Studer, 1890).	*Pseudoanthomastus agaricus* (Studer, 1891)
Nephtheidae	*Voeringia clavata* Danielssen, 1887	Studer (1890)	Assigned by Studer (1901) to *Paraspongodes clavata* (Danielssen, 1887). Utinomi (1961) transfers *Voeringia clavata* to the genus *Cersemia clavata* misspelling *Gersemia* in that particular species.	*Gersemia clavata* (Danielssen, 1887)
	Paraspongodes clavata (Danielssen, 1887)	Studer (1901)		*Gersemia clavata* (Danielssen, 1887)
	Scleronephthya macrospina Thomson, 1927	Thomson (1927); Pax and Müller (1954); Braga-Henriques *et al.* (2013)		*Scleronephthya macrospina* Thomson, 1927
Paralcyoniidae	*Paralcyonium elegans* Milne Edwards, 1857	Thomson (1927); Weinberg (1977)	Assigned by Weinberg (1977) to *Paralcyonium spinulosum* Delle Chiaje, 1822.	*Paralcyonium spinulosum* (Delle Chiaje, 1822)

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TABLE 1. (Continued)

Suborder Calcaxonia

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
Chrysogorgiidae	*Chrysogorgia flexilis* (Wright and Studer, 1889)	Thomson (1927) [partim.]; Carpine and Grasshoff (1985)	Assigned by Carpine and Grasshoff (1985) to *Chrysogorgia agassizi* (Verrill, 1883). The original spelling has an extra i in the end. Cairns (2001) assigned both records from Azores and Cape Verde islands in Thomson (1927) to ?*Chrysogorgia elegans* (Verrill, 1883). Nonetheless, the specimens were not examined by him and there is no description or illustrations in his publication.	*Chrysogorgia agassizii* (Verrill, 1883) ?*Chrysogorgia elegans* (Verrill, 1883)
	Chrysogorgia agassizi (Verrill, 1883)	Grasshoff (1981); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)	The original spelling has an extra i in the end.	*Chrysogorgia agassizii* (Verrill, 1883)
	Chrysogorgia elegans (Verrill, 1883)	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)	After Tixier-Durivault and D´Hondt (1974) this species was mentioned by Cairns (2001) to the Azores. Nonetheless, he did not saw it and presented no illustration or description of the specimen.	?*Chrysogorgia elegans* (Verrill, 1883)
	Chrysogorgia fewkesi Verrill, 1883	Thomson (1927); Tixier-Durivault and D´Hondt (1974); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)	Assigned by Carpine and Grasshoff (1985) to *Chrysogorgia quadruplex* Thomson, 1927. Cairns (2001) assigned it to *Chrysogorgia fewkesii* Verrill, 1883 with a ? from Thomson (1927) because the identification was based on fragmented specimens and it has no description, as a note that the specimens need to be analysed. The original spelling has an extra i in the end.	*Chrysogorgia quadruplex* Thomson, 1927 *Chrysogorgia fewkesii* Verrill, 1883
	Chrysogorgia quadruplex Thomson, 1927	Thomson (1927); Pax and Müller (1954); Grasshoff (1981); Carpine and Grasshoff, (1985); Braga-Henriques *et al.* (2013)		*Chrysogorgia quadruplex* Thomson, 1927
	Chrysogorgia squamata (Verrill, 1883)	Grasshoff (1981); Braga-Henriques *et al.* (2013)		*Chrysogorgia squamata* (Verrill, 1883)
	Iridogorgia pourtalesi Verrill, 1883	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)	The original spelling has an extra i in the end.	*Iridogorgia pourtalesii* Verrill, 1883
	Metallogorgia melanotrichos (Wright and Studer, 1889)	Thomson (1927); Carpine and Grasshoff, (1985); Pères (1992); Braga-Henriques *et al.* (2013)		*Metallogorgia melanotrichos* (Wright and Studer, 1889)

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
	Radicipes fragilis (Wright and Studer, 1889)	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)	Synonymized by Cordeiro *et al.* (2017) to *Radicipes gracilis* (Verrill, 1884).	*Radicipes gracilis* (Verrill, 1884)
Dendrobrachiidae	*Dendrobrachia multispina* Opresko and Bayer, 1991	Molodstova *et al.* (2008); Gebruk et al, (2010)		*Dendrobrachia multispina* Opresko and Bayer, 1991
Ellisellidae	*Verrucella guernei* Studer, 1890	Studer (1890); Studer, (1901); Tixier-Durivault and D´Hondt (1974); Carpine and Grasshoff, (1985)	Studer (1890) and Studer (1901) records were assigned by Carpine and Grasshoff (1985) to *Nicella granifera* (Kölliker, 1865). But Tixier-Durivault and D´Hondt (1974) maintained the same name. No description or image of the specimen is given in Tixier-Durivault and D´Hondt (1974).	*Nicella granifera* (Kölliker, 1865) *Verrucella guernei* Studer, 1890
	Gorgonella guernei (Studer, 1890)	Thomson (1927); Pax and Müller (1954); Carpine and Grasshoff, (1985)	Assigned by Carpine and Grasshoff (1985) to *Nicella granifera* (Kölliker, 1865).	*Nicella granifera* (Kölliker, 1865)
	Nicella granifera (Kölliker, 1865)	Deichmann (1936); Grasshoff (1972); Braga-Henriques *et al.* (2013)		*Nicella granifera* (Kölliker, 1865)
	Scirpearia flagellum (Johnson, 1863)	Studer (1891); Studer (1901); Thomson (1927); Deichmann (1936)	Assigned by Grasshoff (1972) to *Ellisella flagellum* (Johnson, 1863). Part of the records transferred to the genus *Viminella,* later *Scirpearia flagellum* (Johnson, 1863) in Thomson (1927) is assigned to *Viminella flagellum* (Johnson, 1883) in Brito and Ocaña (2004).	*Viminella flagellum* (Johnson, 1863)
	Scirpearia ochracea Studer, 1901	Studer (1891); Studer (1901); Pax and Müller (1954)	Assigned by Grasshoff (1972) to *Ellisella flagellum* (Johnson, 1863). Later it is transferred to the genus *Viminella* in Bayer and Grasshoff (1994).	*Viminella flagellum* (Johnson, 1863)
	Juncella extans Verrill, 1864	Deichmann (1936)	Assigned by Deichmann (1936) to *Scirpearia flagellum* (Johnson, 1863). Assigned by Grasshoff (1972) to *Ellisella flagellum* (Johnson, 1863). Later it is transferred to the genus *Viminella* in Bayer and Grasshoff (1994).	*Viminella flagellum* (Johnson, 1863)
	Ellisella flagellum (Johnson, 1863)	Grasshoff (1972); Grasshoff (1981); Carpine and Grasshoff (1985)	Species transferred to the genus *Viminella* by Bayer and Grasshoff (1994).	*Viminella flagellum* (Johnson, 1863)
	Ellisella flagella (Johnson, 1863)	Tixier- Durivault and D'Hondt (1974)	Assigned by Grasshoff (1981) to *Ellisella flagellum* (Johnson, 1863). Later it is transferred to the genus *Viminella* in Bayer and Grasshoff (1994).	*Viminella flagellum* (Johnson, 1863)
	Viminella flagellum (Johnson, 1863)	Weinberg and Grasshoff (2003); Brito and Ocaña (2004); Braga-Henriques *et al.* (2013)	Previous names attributed to the genus in the Azores are transferred to *Viminella* in Bayer and Grasshoff (1994). The type species is *Viminella flagellum* (Johnson, 1863).	*Viminella flagellum* (Johnson, 1863)

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
Isididae	*Acanella eburnea* (Pourtalès, 1868)	Studer (1890); Studer (1901); Thomson (1927); Tixier-Durivault and D´Hondt (1974)	Thomson (1927) [partim] and Tixier-Durivault and D´Hondt (1974) records assigned by Grasshoff (1981) and Grasshoff (1982b) to *Acanella arbuscula* (Johnson, 1862). Later the records in Studer (1890); Studer (1901) and Thomson (1927) [partim] are assigned by Carpine and Grasshoff (1985) to *Acanella arbuscula* (Johnson, 1862).	*Acanella arbuscula* (Johnson, 1862)
	Acanella normani (Johnson, 1862)	Thomson (1927)	Assigned by Grasshoff (1981); Grasshoff (1982b) and Carpine and Grasshoff (1985) to *Acanella arbuscula* (Johnson, 1862).	*Acanella arbuscula* (Johnson, 1862)
	Acanella arbuscula (Johnson, 1862)	Grasshoff (1981); Grasshoff (1982b); Carpine and Grasshoff (1985); Grasshoff (1986); Molodtsova *et al.* (2008); Gebruk *et al.* (2010); Braga-Henriques *et al.* (2013)		*Acanella arbuscula* (Johnson, 1862)
	Chelidonisis aurantiaca Studer, 1890	Studer (1890); Studer (1901); Pax and Müller (1954); Tixier-Durivault and D´Hondt (1974); Carpine and Grasshoff, (1985); Braga-Henriques *et al.* (2013)		*Chelidonisis aurantiaca* Studer, 1890
	Lepidisis longiflora Verrill, 1883	Grasshoff (1981); Grasshoff (1982a)	Assigned by Grasshoff (1986) to *Isidella longiflora* (Verrill, 1883).	*Isidella longiflora* (Verrill, 1883)
	Isidella longiflora (Verrill, 1883)	Grasshoff (1986); Braga-Henriques *et al.* (2013)		*Isidella longiflora* (Verrill, 1883)
	Ceratoisis palmae (Wright and Studer, 1889)	Thomson (1927)	Assigned by Carpine and Grasshoff (1985) to *Keratoisis grayi* Wright, 1869.	*Keratoisis grayii* Wright, 1869
	Ceratoisis grandis Nutting, 1908	Thomson (1927)	Assigned by Carpine and Grasshoff (1985) to *Keratoisis grayi* Wright, 1869.	*Keratoisis grayii* Wright, 1869
	Keratoisis ornata Verrill, 1878	Tixier-Durivault and D´Hondt (1974)	Assigned by Carpine and Grasshoff (1985) and Grasshoff (1989) to *Keratoisis grayi* Wright, 1869.	*Keratoisis grayii* Wright, 1869
	Keratoisis grayi Wright, 1869	Grasshoff (1982a); Grasshoff (1982b); Carpine and Grasshoff, (1985); Grasshoff (1989); Braga-Henriques *et al.* (2013)		*Keratoisis grayii* Wright, 1869

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
	Lepidisis cyanae Grasshoff, 1986	Braga-Henriques *et al.* (2013)		*Lepidisis cyanae* Grasshoff, 1986
Primnoidae	*Plumarella grimaldii* Studer, 1890	Studer (1890); Studer (1901)	Assigned by Carpine and Grasshoff (1985) to *Callogorgia verticillata* (Pallas, 1766).	*Callogorgia verticillata* (Pallas, 1766)
	Caligorgia verticillata (Pallas, 1766)	Studer (1901)	Assigned by Carpine and Grasshoff (1985) to *Callogorgia verticillata* (Pallas, 1766).	*Callogorgia verticillata* (Pallas, 1766)
	Calligorgia verticillata (Pallas, 1766)	Thomson (1927)	Thomson (1927) [partim.] assigned by Carpine and Grasshoff (1985) to *Callogorgia verticillata* (Pallas, 1766).	*Callogorgia verticillata* (Pallas, 1766)
	Cricogorgia grimaldii (Studer, 1890)	Pax and Müller (1954)	Assigned by Carpine and Grasshoff (1985) to *Callogorgia verticillata* (Pallas, 1766).	*Callogorgia verticillata* (Pallas, 1766)
	Callogorgia verticillata (Pallas, 1766)	Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)		*Callogorgia verticillata* (Pallas, 1766)
	Stenella imbricata (Johnson, 1862)	Thomson (1927)	Assigned by Tixier-Durivault and D´Hondt (1974) to *Candidella imbricata* (Johnson, 1862).	*Candidella imbricata* (Johnson, 1862)
	Candidella imbricata (Johnson, 1862)	Tixier-Durivault and D´Hondt (1974); Grasshoff (1981); Carpine and Grasshoff (1985); Grasshoff (1986); Brito and Ocaña (2004); Braga-Henriques *et al.* (2013)		*Candidella imbricata* (Johnson, 1862)
	Stachyodes trilepis (Pourtalès, 1868)	Studer (1890); Studer (1901)	Assigned by Carpine and Grasshoff (1985) to *Narella bellissima* (Kükenthal, 1915).	*Narella bellissima* (Kükenthal, 1915)
	Narella regularis (Kükenthal, 1915)	Tixier-Durivault and D´Hondt (1974)	Assigned by Grasshoff (1986) to *Narella bellissima* (Kükenthal, 1915).	*Narella bellissima* (Kükenthal, 1915)
	Narella bellissima (Kükenthal, 1915)	Carpine and Grasshoff (1985); Grasshoff (1986); Braga-Henriques *et al.* (2013)		*Narella bellissima* (Kükenthal, 1915)
	Stachyodes versluysi Hickson, 1909	Thomson (1927)	Assigned by Grasshoff (1982b) to *Narella versluysi* (Hickson, 1909).	*Narella versluysi* (Hickson, 1909)

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
	Narella versluysi (Hickson, 1909)	Grasshoff (1982b); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)		*Narella versluysi* (Hickson, 1909)
	Stachyodes josephinae (Lindström, 1877)	Studer (1901)	Assigned by Carpine and Grasshoff (1985) to *Paracalyptrophora josephinae* (Lindström, 1877).	*Paracalyptrophora josephinae* (Lindström, 1877)
	Calyptrophora josephinae Lindström, 1877	Kükenthal (1924); Thomson (1927); Carpine and Grasshoff (1985)	Assigned by Bayer (2001) to *Paracalyptrophora josephinae* (Lindström, 1877) who discusses the previously ignored genus described by Kinoshita (1908).	*Paracalyptrophora josephinae* (Lindström, 1877)
	Paracalyptrophora josephinae Lindström, 1877	Cairns and Bayer (2004a); Braga-Henriques *et al.* (2013)		*Paracalyptrophora josephinae* (Lindström, 1877)
	Thouarella hilgendorfi (Studer, 1879)	Thomson (1927); Deichmann (1936); Tixier-Durivault and D´Hondt (1974); Carpine and Grasshoff (1985)	Assigned by Cairns (2006) to *Thouarella (Euthouarella) grasshoffi* (Cairns, 2006) and later without the subgenus name in Taylor *et al.* (2013).	*Thouarella (Euthouarella) grasshoffi* Cairns, 2006
	Thouarella grasshoffi Cairns, 2006	Cairns (2006); Braga-Henriques *et al.* (2013); Taylor *et al.* (2013)		*Thouarella grasshoffi* Cairns, 2006
	Thouarella variabilis Wright and Studer, 1889	Thomson (1927); Tixier-Durivault and D´Hondt (1974); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)	Not examined in Cairns, 2006 or Taylor *et al.* (2013).	*Thouarella variabilis* Wright and Studer, 1889

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TABLE 1. (Continued)

Suborder Holaxonia

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
Acanthogorgiidae	*Acanthogorgia granulata* Grasshoff, 1973	Grasshoff (1973)	Assigned by Grasshoff (1981) to *Acanthogorgia armata* Verrill, 1878.	*Acanthogorgia armata* Verrill, 1878
	Acanthogorgia hirsuta Gray, 1857	Studer (1901); Braga-Henriques *et al.* (2013)	Assigned by Carpine and Grasshoff (1985) to *Acanthogorgia armata* Verrill, 1878.	*Acanthogorgia armata* Verrill, 1878
	Acanthogorgia muricata Verrill, 1883	Studer (1901)	Assigned by Grasshoff (1981) to *Acanthogorgia armata* Verrill, 1878.	*Acanthogorgia armata* Verrill, 1878
	Acanthogorgia verrilli Studer, 1891	Thomson (1927); Tixier-Durivault and D´Hondt (1974)	Assigned by Grasshoff (1981) to *Acanthogorgia armata* Verrill, 1878.	*Acanthogorgia armata* Verrill, 1878
	Acanthogorgia armata Verrill, 1878	Thomson (1927) [partim.]; Stiasny (1940), Grasshoff (1981); Grasshoff (1982b); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)	Assigned by Carpine and Grasshoff (1985) to *Acanthogorgia armata* Verrill, 1878.	*Acanthogorgia armata* Verrill, 1878
	Acanthogorgia aspera Pourtalès, 1867	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)	Grasshoff (1973) assigned the specimen described in Studer (1901) to *Acanthogorgia pico* Grasshoff, 1973. No further analysis were done on the specimens of Tixier-Durivault and D´Hondt (1974). No description or image are given in Tixier-Durivault and D´Hondt (1974).	*Acanthogorgia aspera* Pourtalès, 1867
	Acanthogorgia truncata Studer, 1891	Thomson (1927)	Assigned by Grasshoff (1973) to *Acanthogorgia hirsuta* Gray, 1857 but later in Carpine and Grasshoff (1985) [partim] assigned to *Acanthogorgia pico* Grasshoff, 1973 and [partim] assigned to *Acanthogorgia hirsuta* Gray, 1857.	*Acanthogorgia hirsuta* Gray, 1857 *Acanthogorgia pico* Grasshoff, 1973
	Acanthogorgia muricata Verrill, 1883	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)	While the same species is assigned by Carpine and Grasshoff, 1985 to *Acanthogorgia armata* Verrill, 1878, the records of Tixier-Durivault and D´Hondt, 1974 were not revised.	*Acanthogorgia muricata* Verrill, 1883
	Acanthogorgia aspera Pourtalès, 1867	Studer (1901)	Assigned by Carpine and Grasshoff (1985) to *Acanthogorgia pico* Grasshoff, 1973.	*Acanthogorgia pico* Grasshoff, 1973

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
	Acanthogorgia armata Verrill, 1878	Thomson (1927) [partim.]; Braga-Henriques *et al.* (2013)	Assigned by Carpine and Grasshoff (1985) to *Acanthogorgia pico* Grasshoff, 1973.	*Acanthogorgia pico* Grasshoff, 1973
	Acanthogorgia truncata Studer, 1891	Tixier-Durivault and D´Hondt (1974)	While the same species is assigned by Carpine and Grasshoff (1985) to *Acanthogorgia hirsuta* Gray, 1857 and *Acanthogorgia pico* Grasshoff, 1973; the records of Tixier-Durivault and D´Hondt (1974) were not revised.	*Acanthogorgia truncata* Studer, 1891
Gorgoniidae	*Eunicella dubia* Studer, 1890	Studer (1890); Studer (1901); Thomson (1927); Pax and Müller (1954); Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)	Most records assigned by Grasshoff (1981) to *Eunicella modesta* Verrill, 1883. Carpine and Grasshoff (1985) synonymizes the species with the reference of Pax and Müller (1954), the Studer's holotype.	*Eunicella modesta* Verrill, 1883
	Eunicella modesta Verrill, 1883	Grasshoff (1981); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)		*Eunicella modesta* Verrill, 1883
Plexauridae	*Bebryce stellata* Thomson, 1927	Tixier-Durivault and D´Hondt (1974)	Assigned by Grasshoff (1977) and Carpine and Grasshoff (1985) to *Bebryce mollis* Philippi, 1842.	*Bebryce mollis* Philippi, 1842
	Bebryce mollis Philippi, 1842	Studer (1901); Aurivillius (1931); Stiasny (1940); Stiasny (1942); Grasshoff (1977); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)		*Bebryce mollis* Philippi, 1842
	Dentomuricea aff. *meteor* Grasshoff, 1977	Braga-Henriques *et al.* (2013)		*Dentomuricea* aff. *meteor* Grasshoff, 1977
	Clematissa sceptrum Studer, 1890	Studer (1890); Studer (1901); Thomson (1927)	Assigned by Grasshoff (1986) to *Muriceides paucituberculata* (Marion, 1882).	*Muriceides paucituberculata* (Marion, 1882)
	Clematessa sceptrum (Studer, 1890)	Pax and Müller (1954)	Assigned by Carpine and Grasshoff (1985) to *Muriceides sceptrum* (Studer, 1890) but *Muriceides paucituberculata* (Marion, 1882) is the name with priority, as Grasshoff (1986) mentions later. Carpine and Grasshoff (1985) assigned also Pax and Müller (1954) reference to Studer's holotype.	*Muriceides paucituberculata* (Marion, 1882)

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
	Echinomuricea annectens Thomson, 1927	Thomson (1927); Pax and Müller (1954)	Assigned by Grasshoff (1977) to *Muriceides sceptrum* (Studer, 1890) but *Muriceides paucituberculata* (Marion, 1882) is the name with priority as Grasshoff (1986) mentions later.	*Muriceides paucituberculata* (Marion, 1882)
	Muriceopsis bayeri (Tixier-Durivault and D´Hondt, 1974)	Tixier-Durivault and D´Hondt (1974)	Assigned by Grasshoff (1977) to *Muriceides sceptrum* (Studer, 1890) but *Muriceides paucituberculata* (Marion, 1882) is the name with priority, as Grasshoff (1986) mentions later.	*Muriceides paucituberculata* (Marion, 1882)
	Muriceides echinata Thomson, 1927	Thomson (1927); Pax and Müller (1954)	Assigned by Carpine and Grasshoff (1985) to *Muriceides sceptrum* (Studer, 1890) but *Muriceides paucituberculata* (Marion, 1882) is the name with priority, as Grasshoff (1986) mentions later.	*Muriceides paucituberculata* (Marion, 1882)
	Muriceides furcata Studer, 1890	Studer (1890); Studer (1901); Thomson (1927), Pax and Müller (1954), Tixier-Durivault and D´Hondt (1974)	Assigned by Grasshoff (1977) to *Muriceides sceptrum* (Studer, 1890) but *Muriceides paucituberculata* (Marion, 1882) is the name with priority, as Grasshoff (1986) mentions later.	*Muriceides paucituberculata* (Marion, 1882)
	Muriceides sceptrum (Studer, 1890)	Tixier-Durivault and D´Hondt (1974); Grasshoff (1977); Grasshoff (1981); Carpine and Grasshoff (1985)	Tixier-Durivault and D´Hondt (1974) record is assigned by Grasshoff (1977) to *Muriceides sceptrum* (Studer, 1890). The other records are assigned by Grasshoff (1986) to *Muriceides paucituberculata* (Marion, 1882). Carpine and Grasshoff (1985) record is also assigned later by Grasshoff (1989).	*Muriceides paucituberculata* (Marion, 1882)
	Paramuricea annectens (Thomson, 1927)	Tixier-Durivault and D´Hondt (1974) [partim.]	Assigned by Grasshoff (1977) to *Muriceides sceptrum* (Studer, 1890) but *Muriceides paucituberculata* (Marion, 1882) is the name with priority, as Grasshoff (1986) mentions later. Nonetheless, it is not clear which part is assigned to this species and which part is assigned to *Paramuricea candida* Grasshoff, 1977. Tixier-Durivault and D´Hondt (1974) collects 3 specimens in 3 different stations and Grasshoff (1977) assigns 3 specimens collected at St. 180 to this species and also to the new species he describes: *Paramuricea candida*, one as holotype and the other two as paratypes.	*Muriceides paucituberculata* (Marion, 1882)
	Trachymuricea hirta (Pourtalès, 1867)	Tixier-Durivault and D´Hondt (1974)	Assigned by Grasshoff (1977) to *Muriceides sceptrum* (Studer, 1890) but *Muriceides paucituberculata* (Marion, 1882) is the name with priority, as Grasshoff (1986) mentions later.	*Muriceides paucituberculata* (Marion, 1882)
	Muriceides paucituberculata (Marion, 1882)	Carpine and Grasshoff (1985); Grasshoff (1986); Grasshoff (1989); Braga-Henriques *et al.* (2013)	This name is older than *M. spectrum* so it has priority.	*Muriceides paucituberculata* (Marion, 1882)

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
Plexauridae	*Muriceides lepida* Carpine and Grasshoff, 1975	Grasshoff (1981); Braga-Henriques *et al.* (2013)		*Muriceides lepida* Carpine and Grasshoff, 1975
	Paramuricea annectens Thomson, 1927	Tixier-Durivault and D´Hondt (1974) [partim.]	Assigned by Grasshoff (1977) to the new species *Paramuricea candida* Grasshoff, 1977. Nonetheless, it is not clear which part is assigned to this species and which part is assigned to *Muriceides paucituberculata* (Marion, 1882) as *M. sceptrum* (Studer, 1890). Tixier-Durivault and D´Hondt (1974) collects 3 specimens in 3 different stations and Grasshoff (1977) assigns 3 specimens collected at St. 180 to this species and also to *M. sceptrum* (Studer, 1890).	*Paramuricea candida* Grasshoff, 1977
	Paramuricea intermedia (Thomson, 1927)	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)	Assigned by Grasshoff (1977) to *Paramuricea candida* Grasshoff, 1977.	*Paramuricea candida* Grasshoff, 1977
	Muriceides tenuis (Nutting, 1908)	Thomson (1927); Pax and Müller (1954)	Assigned by Grasshoff (1977) and Carpine and Grasshoff (1985) to *Placogorgia becena* Grasshoff, 1977.	*Placogorgia becena* Grasshoff, 1977
	Placogorgia becena Grasshoff, 1977	Grasshoff (1977); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)		*Placogorgia becena* Grasshoff, 1977
	Echinomuricea intermedia Thomson, 1927	Thomson (1927); Pax and Müller (1954); Braga-Henriques *et al.* (2013)	Assigned by Grasshoff (1977) and Carpine and Grasshoff (1985) to *Placogorgia intermedia* (Thomson, 1927).	*Placogorgia intermedia* (Thomson, 1927)
	Echinomuricea atlantica (Johnson, 1862)	Thomson (1927); Thomson (1929); Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)	Assigned by Grasshoff (1977) and Carpine and Grasshoff (1985) to *Placogorgia intermedia* (Thomson, 1927).	*Placogorgia intermedia* (Thomson, 1927)
	Acamptogorgia bebrycoides (Koch, 1887)	Thomson (1927); Braga-Henriques *et al.* (2013)	Assigned by Grasshoff (1977) and Carpine and Grasshoff (1985) to *Placogorgia intermedia* (Thomson, 1927).	*Placogorgia intermedia* (Thomson, 1927)
	Echinomuricea borealis (Johnson, 1862)	Thomson (1927)	Assigned by Grasshoff (1977) and Carpine and Grasshoff (1985) to *Placogorgia terceira* Grasshoff, 1977.	*Placogorgia terceira* Grasshoff, 1977

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
	Placogorgia terceira Grasshoff, 1977	Grasshoff (1977); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)		*Placogorgia terceira* Grasshoff, 1977
	Placogorgia coronata Carpine and Grasshoff, 1975	Grasshoff (1981); Braga-Henriques *et al.* (2013)		*Placogorgia coronata* Carpine and Grasshoff, 1975
	Stenogorgia miniata (Valenciennes, 1855)	Studer (1901); Thomson (1927)	Assigned by Grasshoff (1977) and Carpine and Grasshoff (1985) to *Swiftia pallida* Madsen, 1970. Both records posteriorly assigned to *Swiftia dubia* (Thomson, 1929)	*Swiftia dubia* (Thomson, 1929)
	Swiftia rosea (Grieg, 1887)	Tixier-Durivault and D´Hondt (1974)	Assigned by Grasshoff (1977) and Brito and Ocaña (2004) to *Swiftia pallida* Madsen, 1970. Grasshoff (1977) records posteriorly assigned to *Swiftia dubia* (Thomson, 1929).	*Swiftia dubia* (Thomson, 1929)
	Swiftia pallida Madsen, 1970	Grasshoff (1977); Grasshoff (1981); Grasshoff (1982a); Carpine and Grasshoff (1985); Weinberg and Grasshoff (2003); Brito and Ocaña (2004)	Assigned by Grasshoff (1985); Grasshoff (1986) and Grasshoff (1989) to *Swiftia dubia* (Thomson, 1929). Weinberg and Grasshoff (2003) and Brito and Ocaña (2004) go back to the name *Swiftia pallida* Madsen, 1970. Nonetheless, the first does not mention any of the previous records. Here we assume that the valid name is *Swiftia dubia* (Thomson, 1929) as argued by Grasshoff in previous works.	*Swiftia dubia* (Thomson, 1929)
	Swiftia dubia (Thomson, 1929)	Grasshoff (1985); Grasshoff (1986); Grasshoff (1989); Braga-Henriques *et al.* (2013)		*Swiftia dubia* (Thomson, 1929)
	Eumuricea rigida Thomson, 1927	Thomson (1927); Pax and Müller (1954); Braga-Henriques *et al.* (2013)	Assigned by Carpine and Grasshoff (1985) to *Thesea rigida* (Thomson, 1927). In Pax and Müller (1954) there is a typing error of the genus name as *Eumurica*.	*Thesea rigida* (Thomson, 1927)
	Acamptogorgia bebrycoides (Koch, 1887)	Studer (1901), Stiasny (1940) as *Paracamptogorgia bebrycoides*	Assigned by Grasshoff (1977) and Carpine and Grasshoff (1985) to *Villogorgia bebrycoides* Koch, 1887.	*Villogorgia bebrycoides* Koch, 1887
	Villogorgia nigrescens Duchassaing and Michelotti, 1860	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)	Assigned by Grasshoff (1977) and Brito and Ocaña (2004) to *Villogorgia bebrycoides* Koch, 1887.	*Villogorgia bebrycoides* Koch, 1887

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TABLE 1. (Continued)

Suborder Scleraxonia

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
Anthothelidae	*Anthothela grandiflora* (Sars, 1856)	Thomson (1927); Thomson (1929); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)		*Anthothela grandiflora* (Sars, 1856)
	Parerythropodium grandiflorum Tixier-Durivault and D'Hondt, 1974	Tixier-Durivault and D´ Hondt (1974); Weinberg (1977); Stokvis and van Ofwegen (2006)	Assigned by Stokvis and van Ofwegen (2006) to *Alcyonium grandiflorum* (Tixier-Durivault and D'Hondt, 1974). Assigned to a new suborder, family and genus *Lateothela grandiflora* by Moore *et al.* (2017).	*Lateothela grandiflora* (Tixier-Durivault and D'Hondt, 1974)
	Titanideum obscurum Thomson, 1927	Thomson (1927); Pax and Müller (1954); Carpine and Grasshoff (1985); Braga-Henriques *et al.* (2013)		*Titanideum obscurum* Thomson, 1927
Coralliidae	*Corallium johnsoni* Gray, 1860	Thomson (1927); Carpine and Grasshoff (1985); Sampaio *et al.* (2009); Braga-Henriques *et al.* (2013)		*Corallium johnsoni* Gray, 1860
	Corallium niobe Bayer, 1964	Sampaio *et al.* (2009); Braga-Henriques *et al.* (2013)		*Corallium niobe* Bayer, 1964
Paragorgiidae	*Paragorgia arborea* (Linnaeus, 1758)	Mortensen *et al.* (2007)		*Paragorgia arborea* (Linnaeus, 1758)
	Paragorgia johnsoni Gray, 1862	Braga-Henriques *et al.* (2013)		*Paragorgia johnsoni* Gray, 1862

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TABLE 1. (Continued)

Suborder Stolonifera

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
Clavulariidae	*Azoria bayeri* López-González and Gili, 2001	López-González and Gili (2001)	Assigned by López-González and Gili (2008) to *Azoriella bayeri* (López-González and Gili, 2001).	*Azoriella bayeri* (López-González and Gili, 2001)
	Azoriella bayeri (López-González and Gili, 2001)	López-González and Gili (2008); Braga-Henriques *et al.* (2013)		*Azoriella bayeri* (López-González and Gili, 2001)
	Bathytelesto rigida (Wright and Studer, 1889)	Bayer (1981c); Braga-Henriques *et al.* (2013)		*Bathytelesto rigida* (Wright and Studer, 1889)
	Telesto rigida (Wright and Studer, 1889)	Wright and Studer (1889)	Assigned by Bayer (1981c) to *Bathytelesto rigida* (Wright and Studer, 1889).	*Bathytelesto rigida* (Wright and Studer, 1889)
	Clavularia arctica (Sars, 1861)	Thomson (1927); Braga-Henriques *et al.* (2013)		*Clavularia arctica* (Sars, 1861)
	Clavularia armata Thomson, 1927	Thomson (1927); Pax and Müller (1954); Braga-Henriques *et al.* (2013)		*Clavularia armata* Thomson, 1927
	Clavularia elongata Wright and Studer, 1889	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)		*Clavularia elongata* Wright and Studer, 1889
	Clavularia marioni von Koch, 1891	Thomson (1927); Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)		*Clavularia marioni* von Koch, 1891
	Clavularia tenuis Tixier-Durivault and D'Hondt, 1974	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)		*Clavularia tenuis* Tixier-Durivault and D'Hondt, 1974
	Clavularia tubaria Wright and Studer, 1889	Studer (1891); Studer (1901); Thomson (1927); Braga-Henriques *et al.* (2013)		*Clavularia tubaria* Wright and Studer, 1889
	Rhizoxenia rosea (Ehrenberg, 1834)	Thomson (1927); Braga-Henriques *et al.* (2013)	Assigned by Ocaña *et al.* (2000) to *Rolandia coralloides* de Lacaze-Duthiers, 1900.	*Rolandia coralloides* de Lacaze-Duthiers, 1900
	Rolandia coralloides de Lacaze-Duthiers, 1900	Ocaña *et al.* (2000); Braga-Henriques *et al.* (2013)		*Rolandia coralloides* de Lacaze-Duthiers, 1900

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
	Sarcodictyon catenatum Forbes, 1847	Tixier-Durivault and D´Hondt (1974); Ocaña *et al.* (2000); Braga-Henriques *et al.* (2013)		*Sarcodictyon catenatum* Forbes, 1847
	Sarcodictyon charcoti Tixier-Durivault and D'Hondt, 1974	Tixier-Durivault and D´Hondt (1974); Ocaña *et al.* (1992); Ocaña *et al.* (2000); Braga-Henriques *et al.* (2013)	Ocaña *et al.* (1992) and Ocaña *et al.* (2000) mentions that this species should be transfered to the genus *Clavularia* because it presents ´needle-like sclerites´. Until further research this name is kept.	*Sarcodictyon charcoti* Tixier-Durivault and D'Hondt, 1974
	Schizophytum echinatum Studer, 1891	Studer (1891); Studer (1901); Pax and Müller (1954); Tixier-Durivault and D ´Hondt (1974); Braga-Henriques *et al.* (2013)		*Schizophytum echinatum* Studer, 1891
	Scleranthelia musiva var. *eugeniae* Aurivillius, 1931	Aurivillius (1931)	Assigned by Bayer (1981c) to *Scleranthelia rugosa* (Pourtalès, 1867).	*Scleranthelia rugosa* (Pourtalès, 1867)
	Scyphopodium ingolfi (Madsen, 1944)	Bayer (1981c); Braga-Henriques *et al.* (2013)		*Scyphopodium ingolfi* (Madsen, 1944)
	Telesto humilis Thomson, 1927	Thomson (1927) [partim.]; Pax and Müller (1954) [partim.]	Assigned by Weinberg (1990) to *Telestula batoni* Weinberg, 1990.	*Telestula batoni* Weinberg, 1990
	Telesto humilis Thomson, 1927	Thomson (1927) [partim.]; Pax and Müller (1954) [partim.]; Braga-Henriques *et al.* (2013)	Assigned by Weinberg (1990) to *Telestula humilis* (Thomson, 1927).	*Telestula humilis* (Thomson, 1927)
	Telesto humilis Thomson, 1927	Thomson (1927) [partim.]; Pax and Müller (1954) [partim.]	Assigned by Weinberg (1990) to *Telestula kuekenthali* Weinberg, 1990.	*Telestula kuekenthali* Weinberg, 1990
Cornulariidae	*Cornularia cornucopiae* (Pallas, 1766)	Tixier-Durivault and D´Hondt (1974); Braga-Henriques *et al.* (2013)		*Cornularia cornucopiae* (Pallas, 1766)

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TABLE 1. (Continued)

Order Pennatulacea

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
Anthoptilidae	*Anthoptilum murrayi* Kölliker, 1880	Carpine (1972); Tixier-Durivault and D´Hondt (1974); Carpine and Grasshoff (1985)		*Anthoptilum murrayi* Kölliker, 1880
Funiculinidae	*Funiculina quadrangularis* (Pallas, 1766)	Tixier-Durivault and D´Hondt (1974); Grasshoff (1981)		*Funiculina quadrangularis* (Pallas, 1766)
Kophobelemnidae	*Kophobelemnon stelliferum* (Müller, 1776)	Thomson (1927); Carpine and Grasshoff (1985)		*Kophobelemnon stelliferum* (Müller, 1776)
Pennatulidae	*Gyrophyllum hirondellei* Studer, 1891	Studer (1891); Studer (1901); Thomson (1927); Pax and Müller (1954); Tixier-Durivault and D´Hondt (1974); Carpine and Grasshoff (1985); Grasshoff (1989)		*Gyrophyllum hirondellei* Studer, 1891
	Pennatula aculeata Danielssen, 1860	Tixier-Durivault and D´Hondt (1974)		*Pennatula aculeata* Danielssen, 1860
	Pennatula phosphorea var. *aculeata* Kölliker, 1872	Studer (1891), Studer (1901)	Assigned by Molodtsova *et al*. (2008) to *Pennatula phosphorea* Linnaeus, 1758.	*Pennatula phosphorea* Linnaeus, 1758
Protoptilidae	*Protoptilum carpenterii* Kölliker,1872	Tixier-Durivault and D´Hondt (1974); Grasshoff (1982a)		*Protoptilum carpenterii* Kölliker,1872
Scleroptilidae	*Scleroptilum grandiflorum* Kölliker, 1880	Carpine (1972); Carpine and Grasshoff (1985); Pères (1992); Molodstova *et al*. (2008); Gebruk *et al.* (2010)		*Scleroptilum grandiflorum* Kölliker, 1880

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TABLE 1. (Continued)

Family	Records in the Taxonomic Literature	Taxonomic References in the Azores	Remarks	Regarded as
Umbellulidae	*Umbellula durissima* Kölliker, 1880	Carpine and Grasshoff (1985)		*Umbellula durissima* Kölliker, 1880
	Umbellula encrinus Linnaeus, 1758	Thomson (1927)	Assigned by Carpine and Grasshoff (1985) to *Umbellula durissima* Kölliker, 1880.	*Umbellula durissima* Kölliker, 1880
	Umbellula guentheri Kölliker, 1880	Tixier-Durivault and D´Hondt (1974)	Assigned by Molodtsova *et al.* (2008) to *Umbellula thompsoni* Kölliker, 1874 but with a misspelling of an extra p. The valid name is *Umbellula thomsonii* Kölliker, 1874.	*Umbellula thomsonii* Kölliker, 1874
	Umbellula lindahlii Kölliker, 1875	Thomson (1927); Tixier-Durivault and D´Hondt (1974)	Thomson, 1927 specimen assigned by Carpine and Grasshoff (1985) to *Umbellula pallida* Lindahl, 1874 while Tixier-Durivault and D´Hondt (1974) mantains the name.	*Umbellula pallida* Lindahl, 1874 *Umbellula lindahlii* Kölliker, 1875
Virgulariidae	*Virgularia lyungmanii* Kölliker, 1870	Kölliker (1870); Studer (1901)	Studer (1901) refers this species with the name *Virgularia ljungmani*. Assigned by Jurgensen (1904) to *Virgularia mirabilis* (Linnaeus, 1758).	*Virgularia mirabilis* (Linnaeus, 1758)
	Virgularia mirabilis (Müller, 1776)	Jurgensen (1904); Deichmann (1936); Pax and Müller (1962); Grasshoff (1989)		*Virgularia mirabilis* (Linnaeus, 1758)

TABLE 2. Type localities, types and mode of designation of types of Octocorallia (Alcyonacea and Pennatulacea) from the Azores EEZ based on taxonomic literature, museum databases and curators consultation. Mode of designation follows the code: mo – fixation of type (s) specimen (s) by monotypy or syntypy without clear designation, od – fixation of type (s) specimen (s) by original designation, sd – fixation of type (s) specimen (s) by subsequent designation, si– fixation of type (s) specimen (s) by subsequent inference (based in Fouquette and Dubois, 2014).

Family	Species	Type Locality	Types	Mode of designation
Alcyoniidae	*Alcyonium acaule* Marion, 1878	Entry of port of Algiers	-	-
	Alcyonium bocagei (Kent, 1870)	Mouth of the river Sado, near Setubal, Portugal	Syntype BMNH 1872.2.3.121	sd of Verseveldt and Bayer (1988)
	Alcyonium burmedju Sampaio, Stokvis and Ofwegen, 2016	south of Raso islet, Cape Verde Archipelago	Holotype RMNH Coel. 33879, paratypes RMNH Coel. 33880	od
	[*Alcyonium glomeratum* (Hassall, 1843)]	County Dublin	Holotype	mo. In unkown location.
	Alcyonium maristenebrosi (Stiasny, 1937)	Cap Blanc, Mauritania	ZMA Holotype COEL. 3010. Paratypes in MNHN	sd of van Soest (1979)
	Alcyonium palmatum Pallas, 1766	Mediterranean Sea	-	-
	Alcyonium profundum Stokvis and van Ofwegen, 2006	Mid Atlantic Ridge	Holotype MNHN-IK-2006-1	od
	Bellonella bocagei (Kent, 1870)	Mouth of Sado River, Setubal, Portugal	Syntype BMNH 1872.2.3.121	sd of Verseveldt and Bayer (1988)
	Bellonella tenuis Tixier-Durivault and D'Hondt, 1974	Southwest of S. Miguel, Azores	Holotype MNHN-IK-2000-24	od
	Bellonella variabilis (Studer, 1891)	Gulf of Biscay	Lectotype MOM Sta 57 (Studer, 1901, Fig. 7). Paralectotypes MOM St 57, St58, St 247, St 866, St 633 l'Hirondelle 1896	sd of Verseveldt and Bayer (1988)
	Heteropolypus sol Molodstova, 2013	NE Atlantic	Holotype ZMMU Ec-111. Paratypes ZMMU Ec-112	od
	[*Anthomastus agaricus* Studer, 1891 sensu Tixier-Durivault and D´Hondt, 1974]	off Newfoundland, NW Atlantic	Holotype, MOM INV-6080	sd of Pax and Müller (1954)

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TABLE 2. (Continued)

Family	Species	Type Locality	Types	Mode of designation
	Pseudoanthomastus agaricus (Studer, 1891)	off Newfoundland, NW Atlantic	Holotype, MOM INV-6080	sd of Pax and Müller (1954)
	Pseudoanthomastus mariejoseae Molodtsova, 2013	NW Atlantic Ocean	Holotype NHMUK2012.46. Paratypes ZMUB 88017	od
Nephteidae	*Gersemia clavata* (Danielssen, 1887)	Vestfjord, Norway	Syntypes	-
	Scleronephthya macrospina Thomson, 1927	off the Azores	Holotype MOM 12 0122 (INV-6115)	sd of Pax and Müller (1954)
Paralcyoniidae	*Paralcyonium spinulosum* (Delle Chiaje, 1822)	Naples	Holotype. ZMA COEL-7864	sd of Imahara (2013)
Chrysogorgiidae	*Chrysogorgia agassizii* (Verrill, 1883)	off George's Bank, off New England Coast	Lectotype MCZ CNID-4870, Paralectotypes MCZ CNID-4682a	sd of Cairns (2001)
	?*Chrysogorgia elegans* (Verrill, 1883)	off Barbados,	Lectotype MCZ CNID-4860, Paralectotypes MCZ CNID-4860a, 67072	sd of Cairns (2001)
	Chrysogorgia quadruplex Thomson, 1927	Azores	Holotype MOM 12 0087 MCZ CNID-4860	sd of Pax and Müller (1954) and Carpine and Grasshoff (1985)
	Chrysogorgia fewkesii Verrill, 1883	off St. Vincent, Lesser Antilles	Lectotype MCZ-CNID-4850, Paralectotype MCZ CNID-66529	sd of Cairns (2001)
	Chrysogorgia squamata (Verrill, 1883)	off southwestern Barbados, Lesser Antilles	Lectotype MCZ CNID- 4862 (12cm height), Paralectotypes MCZ CNID-6528	sd of Cairns (2001)
	Iridogorgia pourtalesii Verrill, 1883	off Dominica	Holotype MCZ-CNID-4863	sd of Watling (2007)
	Metallogorgia melanotrichos (Wright and Studer, 1889)	Ascension Island	Holotype NHMUK ZOO1889.7.9.1-6	mo

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TABLE 2. (Continued)

Family	Species	Type Locality	Types	Mode of designation
	Radicipes gracilis (Verrill, 1884)	off Massachusetts	Syntypes USNM 9118, USNM 8877, USNM 9350, USNM 26030, USNM 30283, USNM 33570, YPM 8768, YPM 10045	sd of Cordeiro *et al.* (2017)
Dendrobrachiidae	*Dendrobrachia multispina* Opresko and Bayer, 1991	Straits of Florida, west of Cay Sal Bank, Bahamas	Holotype, USNM 87770	od
Ellisellidae	*Nicella granifera* (Kölliker, 1865)	off the coast of Africa	Holotype (previously at ZMH, potentially lost during the war)	od
	Verrucella guernei Studer, 1890 sensu Tixier-Durivault and D´Hondt, 1974	east of Pico and east of Graciosa, Azores	Syntypes MOM 12 0035	sd of Pax and Müller (1954) and Carpine and Grasshoff (1985)
	Viminella flagellum (Johnson, 1863)	Madeira	Syntypes BMNH	mo
Isididae	*Acanella arbuscula* (Johnson, 1862)	Câmara de Lobos, Madeira	Holotype BMNH	mo
	Chelidonisis aurantiaca Studer, 1890	east of Graciosa, Azores	Holotype MOM-120029	sd of Pax and Müller (1954) and Carpine and Grasshoff (1985)
	Isidella longiflora (Verrill, 1883)	Off Morro light, off Dominica, off Santa Cruz, off Grenada	Syntypes MCZ CNID-4899, CNID-4900, CNID-4906	si
	Keratoisis grayii Wright, 1869	off Setubal, on the coast of Portugal	Holotype MUHNAC (destroyed in fire), BMNH, NMINH 1910.127	mo
	Lepidisis cyanae Grasshoff, 1986	Bay of Biscay	Holotype MNHN-IK-2000-219	od
Primnoidae	*Callogorgia verticillata* (Pallas, 1766)	Mediterranean Sea, Atlantic Ocean	-	-
	Candidella imbricata (Johnson, 1862)	Madeira	Syntypes, BMNH 1863.1.31.1	sd of Cairns and Bayer (2004b)

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TABLE 2. (Continued)

Family	Species	Type Locality	Types	Mode of designation
	Narella bellissima (Kükenthal, 1915)	south of Pico, off Azores	Syntypes MOM 12 0011	sd of Carpine and Grasshoff (1985)
	Narella versluysi (Hickson, 1909)	off Ireland	Five syntypes NHMUK 1962.7.20.172	sd of Cairns (2007)
	Paracalyptrophora josephinae (Lindström, 1877)	Madeira Tore Ridge (Atlantic)	Holotype SMNH 1113	sd of Bayer and Cairns (2004a)
	Thouarella grasshoffi Cairns, 2006	Manning Seamount, North Atlantic Ocean	Holotype USNM 1078188, YPM 35377, YPM 35378. Paratypes USNM 1014915, YPM 36360, YPM 35976, YPM 36997, YPM 36999, YPM 37000 YPM 36983, YPM 36984, YPM 35495 and YPM 36719.	od
	Thouarella variabilis Wright and Studer, 1889	off Prince Edward Island	Syntypes (NMINH 1910.73) NHMUK ZOO 1889.6.8.26-27, NHMUK ZOO 1889.6.8.28-31	si
Acanthogorgiidae	*Acanthogorgia armata* Verrill, 1878	Off Nova Scotia, Off George's Bank	Syntypes YPM IZ 008604.CNA, YPM IZ 010027.CN	si
	Acanthogorgia aspera Pourtalès, 1867	off Havana	Holotype YPM IZ 006547.CN	mo
	Acanthogorgia hirsuta Gray, 1857	unknown (suggestion of Ponta do Pargo, Madeira by Johnson, 1862)	Holotype NHMUK ZOO 1924.1.7.1	sd of Grasshoff (1973)
	Acanthogorgia pico Grasshoff, 1973	Pico, Azores	Holotype MOM-120012	od
	Acanthogorgia muricata Verrill, 1883 sensu Tixier-Durivault and D´Hondt, 1974	off Barbados	Syntype MCZ CNID-4710	si
	Acanthogorgia truncata Studer, 1890 sensu Tixier-Durivault and D´Hondt, 1974	Golf of Biscay	Holotype MOM-120005	sd of Pax and Müller (1954) and Carpine and Grasshoff (1985)
Gorgoniidae	*Eunicella modesta* Verrill, 1883	Blake Plateau, South Carolina (USA)	Syntype MCZ CNID-4556	si

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TABLE 2. (Continued)

Family	Species	Type Locality	Types	Mode of designation
Plexauridae	*Bebryce mollis* Philippi, 1842	near Naples	-	- (image of Philippi (1842) considered for ID in Gray (1869))
	Dentomuricea aff. *meteor* Grasshoff, 1977	Plateau of Great Meteor Bank, NE Atlantic	Holotype SMF 2088	od
	Muriceides lepida Carpine and Grasshoff, 1975	West coast of Corsega	Holotype SMF 3005	od
	Paramuricea candida Grasshoff, 1977	North of S. Miguel, Azores	Holotype and Paratypes in MNHN	od
	Placogorgia becena Grasshoff, 1977	Azores	Holotype MOM 12 0126	od
	Placogorgia intermedia (Thomson, 1927)	Azores	Syntypes MOM 12 0081	sd of Pax and Müller (1954) and Carpine and Grasshoff (1985)
	Placogorgia terceira Grasshoff, 1977	Josephine Bank	Holotype MOM (not in the museum) and SMF 2178	od
	Placogorgia coronata Carpine and Grasshoff, 1975	Canyon of Cassidaigne, Marseille	Holotype SMF 3004	od
	Swiftia dubia (Thomson, 1929)	Golf of Biscay	Holotype MOM 12 0354	sd of Pax and Müller (1954) and Carpine and Grasshoff (1985)
	Thesea rigida (Thomson, 1927)	Azores	Holotype MOM 12 0099	sd of Pax and Müller (1954) and Carpine and Grasshoff (1985)
	Villogorgia bebrycoides Koch, 1887	between Capri and Ischia, Napoli	Holotype	mo. In unkown location

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TABLE 2. (Continued)

Family	Species	Type Locality	Types	Mode of designation
Anthothelidae	*Anthothela grandiflora* (Sars, 1856)	Øksfjord, Finnmark, Norway	Holotype NHM UIOslo B1365	sd of Moore *et al.* (2017)
	Lateothela grandiflora (Tixier-Durivault and D'Hondt, 1974)	North of S. Miguel, Azores	Holotype MNHN-IK-2000-130, Paratypes MNHN-IK-2000-131.	od
	Titanideum obscurum Thomson, 1927	Pico, Azores	Holotype MOM 12 0214	sd of Pax and Müller (1954) and Carpine and Grasshoff (1985)
Coralliidae	*Corallium johnsoni* Gray, 1860	Madeira	Holotype NHMUK 1889.4.10.1, Schizoholotype NHMUK 1960.12.1.175	sd of Tu *et al.* (2012)
	Corallium niobe Bayer, 1964	Straits of Florida, east of St. Lucie Inlet, Florida	Holotype USNM 52515, Paratype UMML no. 7-259.	od
Paragorgiidae	*Paragorgia arborea* (Linnaeus, 1758)	Norwegian Sea	-	-
	Paragorgia johnsoni Gray, 1862	Madeira	Holotype NHMUK ZOO 1862.7.5.1	sd of Grasshoff (1979)
Clavulariidae	*Azoriella bayeri* (López-González and Gili, 2001)	Monte Brasil, Terceira, Azores	Holotype MMF 32884	od
	Bathytelesto rigida (Wright and Studer, 1889)	west of the Azores	Syntypes NHMUK ZOO 1890.4.11.33	sd of Bayer (1981c)
	Clavularia arctica (Sars, 1861)	Varangerfjorden at Vadsø, Norway	Syntypes NHM UIOslo B1203, B1204	sd of Weinberg (1986)
	Clavularia armata Thomson, 1927	Azores	Syntypes MOM 12 0103 (INV-6032)	sd of Pax and Müller (1954)
	Clavularia elongata Wright and Studer, 1889	off the Azores	-	-
	Clavularia marioni von Koch, 1891	Naples	-	-

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TABLE 2. (Continued)

Family	Species	Type Locality	Types	Mode of designation
	Clavularia tenuis Tixier-Durivault and D'Hondt, 1974	South of S. Miguel, Azores	Holotype, MNHN-IK-2000-179. Paratypes MNHN-IK-2000-180, MNHN-IK-2000-181, MNHN-IK-2000-182	od
	Clavularia tubaria Wright and Studer, 1889	near Sombrero island, West Indies	-	-
	Rolandia coralloides de Lacaze-Duthiers, 1900	Cap d'Abeille, Algeria, Africa	-	-
	Sarcodictyon catenatum Forbes, 1847	Youghal, Ireland, Loch Fine, west coast of Scotland	-	-
	Sarcodictyon charcoti Tixier-Durivault and D'Hondt, 1974	Northeast to Northwest of S. Maria, Azores	Holotype. MNHN-IK-2000-185. Paratypes	od
	Schizophytum echinatum Studer, 1891	East of Pico, Faial-Pico channel, Azores	Syntypes MOM 120025 (INV-6045), MOM 120037 (INV-6046)	sd of Pax and Müller (1954)
	Scleranthelia rugosa (Pourtalès, 1867)	off Havana	-	-
	Scyphopodium ingolfi (Madsen, 1944)	south of Iceland	Holotype UCMNH ANT-000112	od
	Telestula batoni Weinberg, 1990	Azores	Paralectotype of *Telesto humilis* Thomson, 1927 MOM 120295	od
	Telestula humilis (Thomson, 1927)	Azores, Cape Verde, Morocco	Lectotype MOM 12 0117 (INV-6052) Paralectotypes MOM 12 0073 (INV-6051), MOM 12 0692 (INV-6053)	sd of Pax and Müller (1954) and Weinberg (1990)
	Telestula kuekenthali Weinberg, 1990	Azores	Paralectotype of *Telesto humilis* Thomson, 1927 MOM 120101	od
Cornulariidae	*Cornularia cornucopiae* (Pallas, 1766)	American and Mediterranean Sea	-	-
Anthoptilidae	*Anthoptilum murrayi* Kölliker, 1880	south of Halifax, North Atlantic	Holotype NHMUK ZOO	mo

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TABLE 2. (Continued)

Family	Species	Type Locality	Types	Mode of designation
Funiculinidae	*Funiculina quadrangularis* (Pallas, 1766)	Mediterranean Sea	-	-
Kophobelemnidae	*Kophobelemnon stelliferum* (Müller, 1776)	Denmark and Norway	-	-
Pennatulidae	*Gyrophyllum hirondellei* Studer, 1891	between Pico and S. Jorge, Azores	Holotype MOM 120036	sd of Pax and Müller (1954) and Carpine and Grasshoff (1985)
	Pennatula aculeata Danielssen, 1860	Khristiansund, Norway	-	-
	Pennatula phosphorea Linnaeus, 1758	Ocean	-	-
Protoptilidae	*Protoptilum carpenterii* Kölliker,1872	Celtic Sea (48° 31' N 10° 0,8' W)	-	-
Scleroptilidae	*Scleroptilum grandiflorum* Kölliker, 1880	east of Japan, North Pacific	Syntypes	-
Umbellulidae	*Umbellula durissima* Kölliker, 1880	south of Yeddo, Japan, North Pacific	Holotype NHMUK ZOO 1881.2.11.21	sd of Dolan (2008)
	Umbellula thomsonii Kölliker, 1874	between the Portuguese and Spanish coast (Cap Finisterre) and Madeira	Lectotype NHMUK ZOO 1881.2.11.23	sd of Dolan (2008)
	Umbellula pallida Lindahl, 1874	Uummannaq Fjord, Greenland (70° 43' N 53° 3' W)	-	-
	Umbellula lindahlii Kölliker, 1875	Baffinsbay (70° 43'N 52° 3'W), Uummannaq Fjord, North Greenland (71° 27' 53° 58'W)	Syntypes, SMNH	-
Virgulariidae	*Virgularia mirabilis* (Linnaeus, 1758)	Off the coast of Norway	-	-

Perspectives in Octocorallia knowledge. We have made a thorough review of all available literature to compile all the nomenclatural knowledge on Octocorallia of the Azores for the first time. Our main goal was to detail valid, available and unavailable names of Octocorallia species of the Azores that resulted in the highest diversity of octocorals ever recorded for a European country or the Northeast Atlantic Ocean area. The comprehensive bibliographic review and nomenclatural evaluation lead to a basic reference work of biodiversity of octocorals of the NE Atlantic Ocean with potential for deep-sea research areas dealing with biodiversity (e.g. ecology, conservation biology).

Checklists are important for posterior studies because they avoid search for taxonomic literature, visits to museums, or naming species already described. While requiring expertise in zoological nomenclature, checklists are advantageous in providing the space for nomenclatural corrections, hampering conclusions drawn based on a sub-sample of the available knowledge (Dubois 2017). Additionaly, current invalid nomina harbor important information previously attached to a species that is lost if only valid names are taken into account (Dubois 2000). Despite the effort to present a nomenclaturally accurate work of the octocorals in the Azores covering the last 148 years, it is possible that other studies hidden in the library or a museum can still hold more information on octocoral species records for the Azores. Moreover, while zoological nomenclature is accurate, taxonomy is not stable, giving checklists the same ongoing status (Dubois 2017).

While not substituting a revision work, we provide a robust analysis of species richness exhaustively collected in bibliographic references, crucial to integrate further works since most subsisting problems are herein addressed. It is useful for specific taxonomic revisions, broader established databases to inform long-term evaluations of climate changes and biogeography of octocorals affected by anthropogenic impacts, providing data for habitat-mapping and predictive habitat-suitability models and large-scale patterns of distribution in Octocorallia, which are essential tools for management of deep-sea habitats. It will allow quality control in future studies by enabling a cross-check that helps to avoid records of not well identified species of octocorals in the Azores. It is also a temporary estimation of the local biodiversity of Octocorallia based only on zoological nomenclature, while taxonomic revisions are not made. For now, 101 species (1 being described) of Octocorallia were counted in the Azores, but an exact number is impossible to achieve.

Further research should focus in Octocorallia taxonomy which is of utmost need for the characterization of deep-sea ecosystems, where many species need to be described and identified. Higher taxonomic effort should be applied to less studied taxonomic ranks like the Scleraxonia (Fig. 4) and smaller species of Stolonifera in the Azores. However, it is important to consider the limitations of Octocorallia taxonomy. Old taxonomic monographs lack important morphological and molecular characters used currently to distinguish species and a number of specimens representative of the morphological variability within a species. There are several type specimens with unknown locality, taxa with high instraspecific variation, widespread homoplasy and lack of more optimized molecular markers in Octocorallia (Table 2, Pères *et al*. 2016). But by focusing on integrative taxonomy and zoogeography and integrating old and new methodologies, a better knowledge on the species diversity will be obtained for the archipelago. Discovery of new species and records in CWO is foreseen considering the strategic location and oceanographic richness around the islands and seamounts of the Azorean EEZ, prone to colonization from adjacent areas like the Mediterranean and the nearby Macaronesian archipelagos. Yet, on the framework of a lack of Octocorallia experts, retired or soon to be retired, and increasing deep-sea NE Atlantic exploration with lower level of expertise in taxonomy, Octocorallia taxonomic expertise should be encouraged by including taxonomy in European funded projects, if we aim a better understanding of important ecosystems of the deep sea. We must increase the effort on their study, as hidden diversity is still to be discovered, not only in unexplored areas but also in unexplored collections.

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