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Marine biogeography of the Mediterranean Sea: patterns and dynamics of biodiversity

Bryozoan diversity in the Mediterranean Sea

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SUMMARY

The present study constitutes an updated evaluation of the Mediterranean bryozoan biodiversity after the paper by Harmelin (1992) based on Zabala and Maluquer (1988) list, and uses a new data base established using the most recent records of species from the area. This allowed the number of bryozoan taxa known from this sea to be incremented up to 476 species and 27 subspecies grouped into 195 genera and 89 families, thus outnumbering by 95 species the biodiversity evaluated by Harmelin (1992). The added species include: 1) newly described species from the Gibraltar Straits and the near Alboran Sea, whose distribution appears presently restricted to this area and species previously known from boreal, mostly deep-waters, of the eastern Atlantic and newly reported from the same area; 2) a few new species previously synonimised with Atlantic taxa from which they have been separated recently; 3) some species only recorded from the Adriatic Sea; 4) several species from the eastern basin; 5) a poor stock of "Non-Indigenous Species" (NIS). Comparisons have been made among Mediterranean bryozoan biodiversity and data from some well known areas and the world as a whole, from which it appears as Mediterranean bryozoans are not extremely diversified, also in relation to the peculiar geological, hydrological and climatic history of this basin. Taxonomic structure at order, family, genus and species rank together with the finding and distribution of some species and their meaning have been discussed.

INTRODUCTION

Bryozoans are colonial organisms, one of the most diversified benthic phyla, following arthropods, molluscs, cnidarians and annelids, somewhat paralleling echinoderms and sponges (cf. Bianchi and Morri, 2000). Recent bryozoans are differentiated into three classes with Phylactolaemata exclusively thriving in fresh waters and Stenolaemata and Gymolaemata almost exclusively represented by fully marine species. These latter show a wide range of morphological and ecological adaptations enabling them to colonize a great variety of habitats, from the shallow intertidal to abyssal environments, where suitable substrata are available and food supply is enough, only being limited in very starved biotopes and in high sedimentation rate conditions (McKinney and Jackson, 1989). Notwithstanding, their distribution covers all latitudes and they peak in non-tropical continental shelf bottoms largely contributing to benthic diversity (Taylor, 2000).

Presently, the living number of bryozoan species has been estimated to be 5600-5700 (Gordon, 1999; Todd, 2000). Harmelin (1992) studied the bryozoan biodiversity of the Mediterranean Sea pointing out how this systematic group is relatively well known, over all in the western basin both from a taxonomic and an ecological point of view. A high number of taxa has been already identified. Notwithstanding, the actual diversity (α-diversity) is still underestimated owing to differences in survey efforts in relation to different geographical areas and biotopes. This is well evident from the analysis of most of the newly described and recorded species, coming mainly from deep sea environments of the westernmost part of the basin, the Alboran Sea and the Gibraltar area (Harmelin and d'Hondt, 1992a; Lopez de la Quadra and Garcia Gomez, 1993). Last but not least, the substantial correspondence proven between genetic and morphological species (which allows to confidently discriminate also between closely similar species, using morphological and morphometrical analyses), at least for cheilostomes (Jackson and Cheetham, 1990, 1991), coupled with the increase of routinely used SEM analyses (allowing to put in evidence also very slight differences: cf. Harmelin, 1984; 1988; Bishop and Househam, 1987; Harmelin and Aristegui, 1988; Soule and Soule, 2002) have recently led to and will surely lead to a further increment in species diversity.

In this view, the present paper represents an up-dated review of the present knowledge on bryozoan biodiversity in the Mediterranean sea and a snapshot in a seemingly suddenly changing panorama.

MATERIALS

A data base, including the orders Cyclostomatida (Stenolaemata), Ctenostomatida and Cheilostomatida (Gymnolaemata), has been constructed using literature data and personal lists deriving from several surveys in the Ioanian Sea, the Tyrrhenian Sea and the Sicily Straits. A basic source were the keys for the identification of the Mediterranean bryozoans by Zabala and Maluquer (1988) together with recent papers containing extensive lists among which that by Harmelin (1969, 1976, 1978), Hayward (1974), Unsal and d'Hondt (1979), Castritsi-Catharios and Kiortsis (1984; 1985), d'Hondt (1988); Lopez de la Quadra and Garcia Gomez (1988); Rosso (1989, 1996a), Harmelin and d'Hondt (1992a,b), Zabala et al. (1993), Hayward and McKinney (2002) and the check-lists by Balduzzi and Emig (1995) and Novosel and Pozar-Domac (2001), for the Italian seas and the eastern Adriatic, respectively. Further data comes from recently published papers describing species new or not previously recorded from the Mediterranean (Harmelin and Aristegui, 1988; Harmelin et al. 1989; Lopez de la Quadra and Garcia Gomez, 1991; 1993, 1994a,b; Rosso, 1994, 1999, 2004; Hayward and Thorpe 1995; Reverter Gil and Fernandez Pulpeiro, 1995, 1997; 1999; Soule et al., 1999; Tilbrook 1999, 2000).

Systematic grouping at family level follows the working classification proposed by Gordon updated at 2002 (Gordon, pers. comm.) for cheilostomes and Hayward and Ryland (1985) for cyclostomes.

DISCUSSION

Using the above reported data, the present-day bryozoan fauna from the Mediterranean Sea numbers 476 species and 27 subspecies grouped into 195 genera and 89 families (Tab. I, Annex 1). This estimated bryozoan diversity outnumbers by 95 species that evaluated by Harmelin (1992) using only Zabala and Maluquer (1988) data.

If compared with the total estimated number of living bryozoans (5700) this value represents about 8.4%, a feature well comparable to the about 8% estimated by Harmelin (1992) in relation to the world total bryozoan diversity of 4830 species known at that time. However, this relative abundance is less than the 10% estimated by Bianchi and Morri (2000), which emphasise that the observed value is high in comparison with the relative abundance of the Mediterranean surface area *versus* the total ocean surface and, still more, its volume. Nevertheless, Mediterranean bryozoan diversity is not much higher than that (410 species) recently reported by Gordon (1999) for the British Isles, considered as "a species-poor area". Moreover it is worth noting, that the Mediterranean Sea is most probably one of the best investigated areas in the world from where some of the first bryozoan species were described by great naturalists since the 1600's and to whose faunas numerous monographic studies were addressed during the XIX and XX centuries. Thus, notwithstanding authors commonly agree that the total number of living bryozoan species is underestimated by about 25-50% (Winston, 1988 in Harmelin, 1992) or 30-40% (Gordon, 1999), it is likely that the recorded number of bryozoan species from the Mediterranean is nearer to the actual one more than in other, comparably less studied, geographical areas. Examples come from the New Zealand region from where Gordon (1999) recorded 853 species (30% of which created in the last twenty years) to which a further hundred of still undescribed species can be added only two years later (Gordon, pers. com., 2002) and the Magellan Strait from where 15 new species from the 220 presently known have been described after a single deep-water survey (Moyano, 2000). It could be expected that bryozoan Mediterranean biodiversity values will seemingly tend to a relative decrease against the world total number of bryozoan species, susceptible of more consistent increments due to deep gaps in the knowledge of wide geographical sectors such as Polynesia and the Pacific Ocean as a whole (e.g. Gordon and d'Hondt, 1997; Moyano, 2002), where also the revision of a single genus can lead to the description of several species (e.g. Tilbrook, 2001).

Tab. I - Bryozoan biodiversity within the Mediterranean Sea: for each family the number of species and subspecies has been reported. Bold figures indicate the total number of families, genera, species and subspecies for each order, class and the phylum as a whole.

	Fam.	Gen.	Sp.	Ssp.
BRYOZOA	89	195	476	27
STENOLAEMATA	13	24	67	
Cyclostomatida	13	24	67	
Annectocymidae		1	5	
Crisiidae		4	18	
Diastoporidae		1	2	
Filisparsidae		1	1	
Frondiporidae		1	1	
Horneridae		1	2	
Lichenoporidae		2	7	
Mecynoecidae		1	1	
Oncousoeciidae		1	1	
Plagioecidae		6	15	
Stomatoporidae		1	2	
Terviidae		1	1	
Tubuliporidae		3	11	
GYMNOLAEMATA	75	175	418	27
Ctenostomatida	17	25	51	
Alcyonidiidae		2	9	
Arachniididae		2	3	
Benedeniporidae		1	2	
Buskiidae		1	2	
Clavoporidae		2	2	
Hypophorellidae		1	1	
Mimosellidae		1	3	
Nolellidae		1	2	
Paludicellidae		1	1	
Penetrantiidae		1	1	
Pherusellidae		1	2	
Spathiporidae		1	2	
Terebriporidae		1	1	
Triticellidae		3	4	
Valkeriidae		1	3	
Vesiculariidae		4	12	
Victorellidae		1	1	
Cheilostomatida	59	146	358	27
Adeonellidae		1	3	
Adeonidae		3	5	
Aeteidae		1	5	
Beaniidae		1	5	
Bitectiporidae		4	25	4
Bryocryptellidae		4	7	2
Bugulidae		4	17	2
Calescharidae		1	1	
Calloporidae		11	22	2
Candidae		3	13	
Cellariidae		2	5	
Celleporidae		8	27	
Chaperiidae		1	1	
Cheiloporinidae		1	1	
Chleidochasmatidae		3	3	
Chlidoniidae		2	2	
Chorizoporidae		1	1	
Crepidacanthidae		1	1	
Cribrilinidae		6	25	4
Cryptosulidae		1	1	
Cupuladriidae		2	3	
Electridae		3	12	
Epistomiidae		2	2	
Escharellidae		3	12	
Eucrateidae		1	2	
Exechonellidae		1	1	
Exochellidae		2	4	
Flustridae		7	10	2
Gigantoporidae		2	2	
Heliodomidae		1	3	
Hippopodinidae		1	2	
Hippoporidridae		2	2	
Hippothoidae		4	9	4
Jaculinidae		1	3	
Lacernidae		2	2	
Lanceoporidae		1	3	
Lepraliellidae		2	4	2
Margarettidae		1	1	
Membraniporidae		1	3	
Microporellidae		4	9	
Microporidae		5	7	2
Monoporellidae		1	1	
Myriaporidae		1	1	
Onychocellidae		2	4	
Phidoloporidae		11	33	2
Phoceanidae		1	2	
Savygniellidae		1	1	
Schizoporellidae		4	10	
Scrupariidae		1	2	
Setosellidae		1	2	
Smittinidae		5	17	
Stomachetosellidae		1	1	
Tendridae		1	1	
Tessaradomidae		1	1	
Teuchoporidae		1	1	
Thalamoporellidae		1	3	
Trypostegidae		1	2	
Umbonulidae		1	1	
Watersiporidae		1	3	
Unplaced Cheil.		4	8	1

It is worth noting (Tab. I) that cheilostomes largely prevail at all taxonomic hierarchical levels with 59 families, 146 genera and 358 species, respectively accounting for about 66, 75 and 75%. Moreover all the identified subspecies belong to cheilostomes. Cyclostomes and ctenostomes show the same value at generic level (12%). Nevertheless, ctenostomes more diversified at familial level (19%), account for a low percentage (11%) at species level in contrast with cyclostomes accounting for 15% and 14% respectively. The high relative abundance of cheilostomes is a common feature world-wide (Tab. II), although differences could be pointed out taking into account that the Mediterranean and the British Isles (with values around 74%) on one hand, and areas such as New Zealand, Australia and the Globe as a whole (where cheilostomes reach values of 84-90%), on the other. Harmelin (1992) suggested that such differences could be due to a major effort in cyclostome systematics (see Harmelin, 1976; Harmelin and d'Hondt, 1992b) in the Mediterranean than in other seas. Nevertheless, unusually high, not interpreted, number of cyclostome species have been recently recorded for the Galapagos Islands and, above all, for Easter Island where they represent 12 of the 37 known species, thus accounting for more than 32% (Moyano, 2002).

Mediterranean and British Isles biodiversity, although sharing similar values for cheilostomes, show species richness for cyclostomes and ctenostomes which are nearly inverse (Tab. II). The former, in fact, are dominant in the Mediterranean Sea from where 67 species have been recorded in spite of the 46 from the British Islands where, *vice versa*, ctenostomes appear to be more diversified with 61 species *versus* 51. These differences in species diversity between the two orders in the considered geographic areas are probably linked to the distribution of specialists. Nevertheless, considering that the relative percentage of ctenostomes in the British Island (14.9% of all bryozoans) is high not only in

Tab. II - Bryozoan biodiversity in the Mediterranean Sea and some of its sectors in comparison with the Earth as a whole and some well known geographical areas. B&E=Balduzzi and Emig (1995); N&-PD=Novosel and Pozar-Domac (2001); H-M=Hayward and McKinney (2002); H=Harmelin (1992); G=Gordon (1999).

Bryozoa	Italian seas	Adriatic	Aegean
	B & E, 1995	N-PD, 2001,H-M, 2002	present paper
Cyclostomatida	40 (13.6%)	33 (17.5%)	20 (10.8%)
Ctenostomatida	31 (10.5%)	18 (9.5%)	16 (8.6%)
Cheilostomatida	224 (75.9%)	138 (73,0%)	149 (80.6%)
Total	295	189	185
	Globe	Mediterranean	
	H, 1992	H, 1992	present paper
Cyclostomatida	200 (4.1%)	48 (12.6%)	67 (14.1%)
Ctenostomatida	298 (6.2%)	42 (11.0%)	51 (10.7%)
Cheilostomatida	4332 (89.7%)	292 (76.4%)	358 (75.2%)
Total	4830	382	476
	British Isles	New Zealand	Australia
	G, 1999	G, 1999	G, 1999
Cyclostomatida	45 (11.0%)	96 (11.2%)	77 (8.3%)
Ctenostomatida	61(14.9%)	45 (5.3%)	37 (4.0%)
Cheilostomatida	304 (74.1%)	712 (83.5%)	809 (87.7%)
Total	410	853	923

reference to the Mediterranean (10.1%) but still more to values from other known regions (New Zealand: 5.3%; Australia: 4.0%; Galapagos: 1.3%) and for the globe as a whole (6.2%), a concomitant cause could be looked for in an actual abundance of representatives of this order in the British Islands, probably linked to the availability and development of suitable habitats, mostly in the intertidal zone where *Fucus*, *Laminaria*, *Gigartina* and other macroalgae are densely colonised by ctenostome species (cf. Hayward, 1985).

The relatively low diversification of Mediterranean species in comparison to speciose areas such as Australia and New Zealand (see Gordon, 1999) is not paralleled at family rank. In fact, ratios of Mediterranean *versus* Australasian region at specific level range around 0.5-0.6 whereas values raise to about 0.8-0.9 at family level, high in comparison with the value of about 0.7 of the British Islands.

The most diversified families belong to cheilostomes with the Phidoloporidae comprising as many as 33 species followed by Celleporidae (27), Cribrilinidae and Bitectiporidae (with 25 species each) and Calloporidae (22). Also Smittinidae and Bugulidae (17), Candidae (13), Escharellidae and Electridae (12), Flustridae and Schizoporellidae (10) are well diversified. Similarly speciose families are present also within cyclostomes (Crisiidae: 18; Plagioeciidae: 15 and Tubuliporidae: 11 species) whereas among ctenostomes only the Vesicularidae reach 12 species. This behaviour is well illustrated by species/family and species/genus ratios within each order with the highest values for cheilostomes (6.1 and 2.5 respectively) and cyclostomes (5.2 and 2.8 respectively) whereas these ratios are 3.0 and 2.0 for ctenostomes. Some genera are particularly diversified, comprising numerous specific and subspecific taxa such as *Schizomavella* (20), *Puellina* (19), *Bugula* (15), *Crisia* (14) and *Reteporella* (13) followed by *Scrupocellaria* (11), *Turbicellepora* (9), *Alcyonidium*, *Electra* and *Escharella* (8), *Tubulipora*, *Schizoporella*, *Smittina* and *Celleporina* (7). Some examples are given in Fig. 1. Most genera, on the contrary, are represented by a unique or, at least, two species.

As above mentioned, an increment of 95 bryozoan species can be estimated for the Mediterranean during the latest 15 years (since the check-list by Zabala and Maluquer, 1988), which increases the total biodiversity by about 18%. This increment is due to:

1) Both newly described and newly reported species from the Gibraltar Straits and the near Alboran Sea (see Lopez de la Quadra and Garcia Gomez, 1991; 1993, 1994a,b; Harmelin, 1992; Harmelin and d'Hondt, 1992a,b, 1993; Reverter Gil and Fernandez Pulpeiro, 1999). This group is very numerous, as already pointed out by Harmelin (1992) himself and presently comprises a good 34 species: *Entalophoroecia balgimae*, *E. elegans*, *Bicrisia gibraltarensis*, *Crisia aculeata*, *Alcyonidium mamillatum*, *Metalcyonidium gautieri*, *Membranipora tenuis*, *Micropora normani*, *Callopora rylandi*, *C. depressa*, *Copidozoum balgimae*, *Chartella papyracea*, *Sessibugula barrosoi*, *Hincksina sceletos*, *Kinetoskias smitti*, *Euginoma*

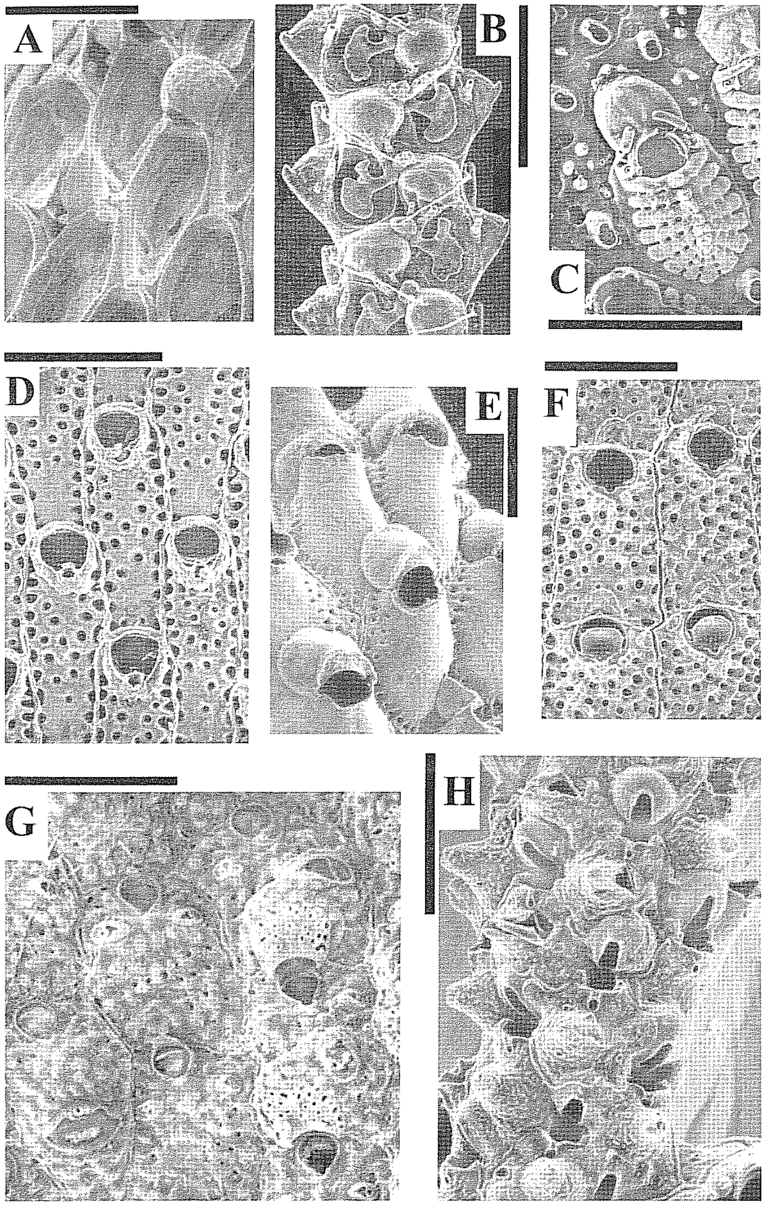

Fig. 1 - Examples from some bryozoan families well differentiated in the Mediterranean. *Copidozoum planum* (Hincks) (Family Calloporidae); *Scrupocellaria delilii* (Audouin) (Family Candidae); *Distansesharella seguenzai* Cipolla (Family Cribrilinidae); *Smittina landsborovii* (Johnston) (Family Smittinidae); *Escharella rylandi* Geraci (Family Escharellidae); *Schizobrachiella sanguinea* (Norman) (Family Schizoporellidae); *Schizomavella linearis linearis* (Hassall) (Family Bitectiporidae); *Schizoretepora solanderia* (Risso) (Family Phidoloporidae). All the specimens from off Catania (eastern Sicily in the Ionian Sea) except for *S. sanguinea* which comes from Banco Apollo (near Ustica, southern Tyrrhenian Sea). Bar = 500 micron.

reticulata, Crepis longipes, Cribrilina alcicornis, Puellina (Cribrilaria) arrecta, P. (C.) scripta, P. (Glabrilaria) orientalis lusitanica, Membraniporella marcusi, Reptadeonella insidiosa, Bryocryptella koehleri, Escharella immersa, E. prealta, Hemicyclopora dentata, H. discrepans, Smittina affinis, Teuchopora edwardsi, Phoceana columnaris, Calyptotheca obscura, Turbicellepora cantabra and *Reteporella beaniana.*

Some of these species, such as *Copidozoum balgimae, Callopora depressa* and *Sessibugula barrosoi*, have been only recently described and their distribution appears presently restricted to this area.

In contrast most species were previously known from boreal, mostly deep-waters, of the eastern Atlantic, thus the Alboran Sea and the Gibraltar Straits seem to represent the southernmost limit for their geographical distribution and meanwhile their eastward "outpost" into the Mediterranean. Harmelin (1992) and Harmelin and d'Hondt (1993) hypothesized that these distributions could be linked mainly to the favourable local trophic conditions, well different from the Mediterranean oligotrophy, rather than to physical and physiological barriers, dramatic not only for shelf species but particularly for the deep-water ones. In discussing some of the above recorded species, these authors pointed out that only a few of them live in the Alboran Sea while several can be found going towards the Strait and westernmost-ward to the sill and the Atlantic, although some of them live in typical Mediterranean outflowing waters.

If these distributions represent a recent or present income from the Atlantic or, on the contrary, a relic of past wider distributions is still a matter of debate. An element supporting the latter hypothesis could be the fossil record. Most of the above-mentioned species, in fact, possess fossilizable skeletons and it is worth noting that some of them lived in the Mediterranean in the geological past as their remains have been found in Plio-Pleistocene sediments as *Crepis longipes* (Pleistocene deep-waters: Rosso, in press; Di Geronimo et al., in press), *Bryocryptella koehleri* (Pleistocene deep-waters: Rosso and Di Geronimo, 1998) and *Reptadeonella insidiosa* (Pliocene shelf environments: Cipolla, 1921 and pers. observ.).

Finally, *Escharina johnstoni*, which has been found in the Alboran Sea (Lopez de la Quadra and Garcia Gomez, 1994a) and, although with extremely rare populations, in the open shelf off western (Rosso, 1996b) and eastern (pers. observ.) Sicily, could have lived in the Mediterranean although, until now, this well calcified species has been not recorded from fossil deposits (see Rosso, 1996b).

2) A relatively few newly described species which have been often identified and described from old collections housed in European palaentological museums since one hundred years ago or more as for *Stylopoma inchoans* (Tilbrook, 2000), a feature to keep in mind when relationships with closely related species or very recent incomings or transport are investigated.

This group consists mainly of species previously comprised within the ranges of variability of widely distributed species and/or confused and thus synonymised with other taxa, usually from the Atlantic. Some of these species have been only recently recognised as separate taxonomic entities. *Amphiblestrum (Aviculamphiblestrum) ruggeroi*, a species previously confused with *Ramphonotus minax* and *A. flemingi* (see Rosso, 1999) is an example together with *Plesiocleidochasma mediterraneum* (Chimenz Gusso and Soule, 2003) previously confused with *Schedocleidochasma porcellanum* (Busk), a taxon seemingly absent from the Mediterranean. Also revisions of the genus *Schizomavella* by Hayward and Thorpe (1995) and Reverter-Gil and Fernandez-Pulpeiro (1995) led to separate new species within a genus comprising numerous closely related species, which differ in minute details of the orifice and the suboral avicularium. These features, previously overlooked, become well evident using SEM analyses, a modern indispensable tool to perform observations on fine morphological characters, which become more and more useful to confidently separate species, at least for cheilostomes, as demonstrated by Jackson and Cheetham (1990, 1991).

Almost surely new species will be added to the present list comparing mediterranean specimens with types, mainly designated on Atlantic material, with the aim of evaluating their actual con-specificity. This will significantly affect biodiversity estimates as cosmopolitan or very widely distributed species often hidden complexes of closely related or cryptic species as suggested for *Phylactella labrosa* (see Rosso 1996b, 2004) and recently demonstrated for "*Parasmittina trispinosa*" (Johnston) from the north-eastern Pacific by Soule and Soule (2002) and Soule et al. (2002). Careful revisions could also point out significant cline differences within Atlantic, the Gibraltar Strait zone and the Mediterranean populations, as outlined by Harmelin and d'Hondt (1993) for *Puellina venusta* and *Crassimarginatella crassimarginata*.

3) Species seemingly restricted to the Adriatic Sea from where they were originally described, mainly by Heller (1867) together with Atlantic species only recorded from this area. Most of these species are quoted only in local papers (see Novosel and Pozar-Domac, 2001) but are absent from general lists probably owing to language difficulties not allowing data circulation. A further 40 specific names have been omitted from the Annex 1 list as doubtful and/or recorded only once in the past and not rediscovered in the recent review by Novosel and Pozar-Domac (2001). This gap has been only partly overwhelmed by Hayward and McKinney (2002) who find and redescribe some of these species but intensive studies of such areas are needed and hoped for.

4) Several species which are presently localised in the eastern Mediterranean. Some of them are seemingly restricted to the Levantine basin (from where four ctenostomes, i.e., *Amathia distans*, *A. tortuosa*, *Valkeria atlantica*, and *Mimosella crosslandi* were recorded by d'Hondt, 1988) and others to the Aegean Sea, mainly recorded by Hayward (1974; 1975). Most of these latter species, such as *Retevirgula akdenizae*, *Puellina (Glabrilaria) orientalis orientalis*, *Calyptotheca*

triarmata, *Cellepora posidoniae*, *Hippoporidra picardi* and *Reteporellina delicatula*, appear to be presently restricted to this sector of the Mediterranean, being recorded from single localities, whereas they have been not recorded from any survey conduced in the western basin. In contrast, other species including *Adeonella pallasii*, *Cosciniopsis ambita* and *Calyptotheca rugosa*, originally described from the Adriatic or the Aegean extend westernwards to the Ionian Sea (Di Geronimo et al., 1998; Rosso, pers. observ.) and *Cleidochasmidra çanakkalense*, already recorded from this area (Rosso, 1996a,b), has been recently collected also in the Tyrrhenian sea (Chimenz Gusso et al., 2004). It is likely that most of such species are not actually widening their geographical distribution at present but they are incompletely known as probably overlooked (for their little-sized colonies) or misidentified.

5) An extremely poor stock of "Non Indigenous Species" (NIS) previously not identified. Presently it is represented by *Electra tenella* (see Rosso, 1994) and *Tricellaria inopinata* (d'Hondt and Occhipinti Ambrogi, 1985; Occhipinti Ambrogi, 1991). To them three probable lessepsian immigrants may be added. They are *Triphyllozoon hirsutum*, recorded by Unsal and d'Hondt (1979) from the Turkish coasts and *Reteporella jermanensis* and *Smittina malleolus*, reported by d'Hondt (1988) from the Israel coasts. "Non-Indigenous Species" are still poorly known among bryozoans, and presently they represent about 1% of the total Mediterranean bryofaunas. Their incidence is very low and it is probably due to the near absence of recent data about easternmost Mediterranean bryozoans and of specific studies addressed to their detection. Moreover, unlike other benthic invertebrates, bryozoans are not object of aqua-culture and thus they could be introduced accidentally if living associated with commercial species or transported as fouling on ships or floating materials.

CONCLUSIONS

The rapid increase in species richness in the last decade points to the probability that Mediterranean bryozoan biodiversity is still underestimated.

New species can be added by improving identification methods and tools, mainly to detect cryptic species, on the one hand, and searching in some still not well known habitats and geographical and physiographical areas, on the other. The poorly investigated eastern Mediterranean could be one of them. The possibility of increasing Mediterranean bryozoan biodiversity by looking for in this basin is proved by the relatively high number of species detected in single surveys at the Chios Island (Aegean Sea) from where several species have been described by Hayward (1974; 1975) and along the Israel coasts, where d'Hondt (1988) found several species absent from the western and central Mediterranean, and, more recently by the recovery of *Retevirgula akdenizae* by Chimenz et al.

(1997). Further possibilities could be given by deep-water environments. Like other Mediterranean benthic deep-water organisms, bryozoans appear to be low diversified, in relation to the world oceans and the Plio-Pleistocene times in the same area (Rosso and Di Geronimo, 1998), owing to the peculiar homothermic and oligotrophic conditions deriving from palaeogeographic and palaeohydrological history of this basin (Harmelin, 1992; Harmelin and d'Hondt, 1993; Rosso and Di Geronimo, 1998). Only the westernmost Alboran Sea seems to host a relatively high diversity whereas a few species presently live in the other areas (d'Hondt, 1977; Harmelin, 1979; Rosso and Di Geronimo, 1998). Nevertheless, some species could be probably recovered with extensive and accurate surveys: skeletons of the widely distributed *Gemellipora eburnea* (Smitt), a species known in the area from the Tertiary, but so far unrecorded from the Recent Mediterranean, have been recently found in Holocene sediments seemingly not older than two or three thousand years (Di Geronimo et al., 2001). Moreover, although bryozoan species are long living, species and/or subspecies could have been differentiated only recently in the Mediterranean (or could be differentiating) evolving from Atlantic taxa incoming the Mediterranean during the Plio-Pleistocene "recolonisation".

In recent time, owing to policy increasing interest on environment monitoring and safeguard, biodiversity (as species richness in a given area) and its evaluation are becoming more and more important. Unfortunately, such an evaluation usually neglects the so-called minor groups of organisms overlooking small sized and economically unimportant taxonomic groups as already emphasised by Soule and Soule (2002). Nevertheless, careful taxonomic studies, also involving minor groups, among which bryozoans, are needed to correctly evaluate the total biodiversity of an area.

Finally, the great majority of the bryozoan species posses a fossilizable skeleton, which enable them to be used in paleobiological studies. Following the recent "rediscovery" of the importance of taxonomic studies in evaluating biodiversity of Recent biota, an effort is needed, and hoped for, in supporting also palaeotaxonomy within biological programs (see Jackson, 2001), as the knowledge of past biodiversity will be useful, if not indispensable, to better evaluate the real meaning of the present day biodiversity and its origin (see also Gordon, 1999; Taylor, 2000).

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Annex 1 - Systematic list of all the bryozoan taxa identified from the Mediterranean, updated to 2004.

Stomatoporidae
Stomatopora gingrina Jullien
Stomatopora sp.
Oncousoecidae
Anguisia verrucosa Jullien
Tubuliporidae
Tubulipora aperta Harmer
Tubulipora hemiphragmata Harmelin
Tubulipora liliacea (Pallas)
Tubulipora notomale (Busk)
? *Tubulipora phalangea* Couch
Tubulipora plumosa Harmer
Tubulipora ziczac Harmelin
Exidmonea triforis (Heller)
Exidmonea coerulea Harmelin
Exidmonea flexuosa Harmelin & d'Hondt
Platonea stoechas Harmelin
Plagioecidae
Entalophoroecia balgimae Harmelin & d'Hondt
Entalophoroecia deflexa Couch
Entalophoroecia elegans (Norman)
Entalophoroecia gracilis Harmelin
Entalophoroecia robusta Harmelin
Eurystrotos compacta (Norman)
Eurystrotos occulta (Harmelin)
Microecia corrugata Harmelin
Plagioecia dorsalis (Waters)
Plagioecia inoedificata (Jullien)
Plagioecia patina (Lamarck)
Plagioecia platydiscus Harmelin
Plagioecia sarniensis (Norman)
Diplosolen obelium (Johnston)
"*Cardioecia*" *watersi* (O'Donoghue & De Watteville)
Terviidae
Tervia irregularis (Meneghini)
Diastoporidae
Liripora amphorae (Harmelin)
Liripora violacea (Harmelin)
Annectocymidae
Annectocyma arcuata (Harmelin)
Annectocyma indistincta (Canù & Bassler)
Annectocyma major (Johnston)
Annectocyma tubulosa (Busk)
Annectocyma sp.
Filisparsidae
Filisparsa profunda Harmelin & d'Hondt
Mecynoecidae
Mecynoecia delicatula (Busk)
Frondiporidae
Frondipora verrucosa (Lamouroux)
Crisiidae
Filicrisia geniculata (Milne-Edwards)
Filicrisia sp. Harmelin & d'Hondt
Crisidia cornuta (Linnaeus)
Bicrisia gibraltarensis Harmelin
Crisia aculeata Hassall
? *Crisia cuneata* Maplestone

Crisia denticulata (Lamarck)
Crisia eburnea (Linnaeus)
Crisia elongata (Milne-Edwards)
Crisia fistulosa Heller
Crisia cf. *kerguelensis* Busk
Crisia occidentalis Trask
Crisia oranensis Waters
Crisia ramosa Harmer
Crisia recurva Heller
Crisia sigmoidea Waters
Crisia tenella Calvet
Crisia sp. 2 Harmelin
Horneridae
Hornera frondiculata Lamouroux
Hornera lichenoides (Linnaeus)
Lichenoporidae
Patinella mediterranea de Blainville
Patinella radiata (Audouin)
? *Patinella verrucaria* (Fabricius)
Patinella n.sp. Zabala & Maluquer
? *Patinella* sp. Harmelin & d'Hondt
Disporella hispida (Fleming)
Disporella fimbriata (Waters)
Benediporidae
Benedipora catenata Pergens
Benedipora delicatula d'Hondt & Geraci
Alcyonididae
Alcyonidium albidum (Alder)
Alcyonidium cellarioides (Calvet)
Alcyonidium duplex Prohuo
Alcyonidium gelatinosum (Linnaeus)
? *Alcyonidium mamillatum* Alder
Alcyonidium mytili Dalyell
Alcyonidium polyoum (Hassall)
Alcyonidium variegatum Prohuo
Lobiancopora hyalina Pergens
Clavoporidae
Metalcyonidium gautieri d'Hondt
Clavopora hystricis (Busk)
Pherusellidae
Pherusella tubulosa (Ellis & Solander)
Pherusella brevituba Soule
Victorellidae
Victorella pavida Saville Kent
Nolellidae
Nolella dilatata (Hincks)
Nolella stipata (Gosse)
Paludicellidae
? *Paludicella artciculata* (Ehrenberg)
Vesiculariidae
Vesicularia spinosa (Linnaeus)
Amathia distans Busk
Amathia lendigera (Linnaeus)
Amathia pruvoti (Calvet)
Amathia semiconvoluta (Lamouroux)
Amathia tortuosa Tennison-Woods
Amathia vidovici (Heller)
Zoobothryon verticillatum (Delle Chiaie)
Bowerbankia gracilis (Leidy)

Bowerbankia gracillima (Hincks)
Bowerbankia imbricata (Adams)
Bowerbankia pustulosa (Ellis & Solander)
Buskiidae
Buskia nitens Alder
Buskia socialis Hincks
Triticellidae
Farrella repens (Farre)
Triticella flava Dalyell
Triticella pedicellata (Alder)
Triticellopsis tissieri Gautier
Valkeriidae
Valkeria atlantica Busk
Valkeria tuberosa (Heller)
Valkeria uva (Linnaeus)
Mimosellidae
Mimosella crosslandi d'Hondt
Mimosella gracilis (Hincks)
Mimosella verticillata (Heller)
Hypophorellidae
Hypophorella expansa Ehlers
Arachniidae
Arachnidium hippothoides (Hincks)
Arachnoidea annosciae d'Hondt & Geraci
Arachnoidea (Arachnoidella) protecta Harmer
Terebriporidae
Terebripora orbignyana Fischer
Spathiporidae
Spathipora comma Soule
Spathipora sertum Fischer
Penetrantidae
Penetrantia brevis Silen
Membraniporidae
Membranipora membranacea (Linnaeus)
Membranipora savartii (Audouin)
Membranipora tenuis Desor
Electridae
Electra crustulenta (Pallas)
Electra monostachys (Busk)
Electra pilosa (Linnaeus)
Electra posidoniae Gautier
Electra repiachovi Ostroumoff
Electra tenella (Hincks)
Electra cf. *tenella* (Hincks)
Electra verticillata (Ellis & Solander)
Pyripora catenularia (Fleming)
Pyripora sp.
Conopeum reticulum (Linnaeus)
Conopeum seurati (Canu)
Aeteidae
Aetea anguina (Linnaeus)
Aetea lepadiformis Waters
Aetea longicollis (Jullien)
Aetea sica (Couch)
Aetea truncata (Landsborough)
Scrupariidae
Scruparia ambigua (d'Orbigny)
Scruparia chelata (Linnaeus)
Eucrateidae

Eucratea loricata (Linnaeus)
Eucratea sp.
Calloporidae
Alderina imbellis (Hincks)
? *Amphiblestrum flemingi* (Busk)
Amphiblestrum lyrulatum Calvet
Amphiblestrum (Aviculamph.) ruggeroi Rosso
? *Ramphonotus minax* (Busk)
Aplousina capriensis (Waters)
Aplousina filum (Jullien)
Callopora depressa Lopez de la Q. & Garcia G.
Callopora dumerilii dumerilii (Audouin)
Callopora dumerilii pouilleti (Alder)
Callopora lineata (Linnaeus)
Callopora rylandi Bobin & Prenant
Daisyella minuta (Harmelin)
Ellisina gautieri Fernandez P. & Reverter G.
Copidozoum balgimae Reverter G.& Fernandez P.
Copidozoum exiguum (Barroso)
Copidozoum planum (Hincks)
Copidozoum tenuirostre (Hincks)
Crassimarginatella crassimarginata (Hincks)
Crassimarginatella maderensis (Waters)
Crassimarginatella solidula (Hincks)
Retevirgula akdenizae Chimenz Gusso et al.
Parellisina curvirostris (Hincks)
Chaperiidae
Chaperiopsis annulus (Manzoni)
Tendridae
Tendra zostericola (Nordmann)
Heliodomidae
Setosellina capriensis (Waters)
Setosellina roulei Calvet
Cupuladriidae
? *Cupuladria biporosa* (Canu & Bassler)
? *Cupuladria multispinata* (Canu & Bassler)
? *Reussirella doma* (d'Orbigny)
Flustridae
? *Carbasea carbasea* Ellis & Solander
Chartella papyrea (Pallas)
Chartella papyracea (Ellis & Solander)
Chartella tenella (Hincks)
? *Flustra foliacea* (Linnaeus)
Hincksinoflustra octodon (Busk)
Securiflustra securifrons (Pallas)
Hincksina flustroides flustroides (Hincks)
Hincksina flustroides crassispinata Calvet
Hincksina sceletos (Busk)
Gregarinidra gregaria (Heller)
Bugulidae
Bugula aperta Hincks
Bugula avicularia (Linnaeus)
Bugula calathus calathus Norman
Bugula calathus minor Ryland
Bugula flabellata (Thompson *in* Gray)
Bugula fulva Ryland
Bugula gautieri Ryland
Bugula germanae Calvet
Bugula gracilis Busk

Bugula neritina (Linnaeus)
Bugula plumosa (Pallas)
Bugula robusta (Mc Gillivray)
Bugula simplex Hincks
Bugula spicata Hincks
Bugula stolonifera Ryland
Bugula turbinata Alder
Bicellariella ciliata (Linnaeus)
Sessibugula barrosoi Lopez de la Q. & Garcia G.
Kinetoskias smitti Danielssen
Beaniidae
Beania hirtissima (Heller)
Beania cylindrica (Hincks)
Beania magellanica (Busk)
Beania mirabilis Johnston
Beania robusta (Hincks)
Epistomiidae
Epistomia bursaria (Linnaeus)
Synnotum egyptiacum (Audouin)
Candidae
Caberea boryi (Audouin)
Scrupocellaria aegeensis Harmelin
Scrupocellaria bertholleti (Audouin)
Scrupocellaria delilii (Audouin)
Scrupocellaria incurvata Waters
Scrupocellaria macrorhyncha Gautier
Scrupocellaria maderensis Busk
Scrupocellaria reptans (Linnaeus)
Scrupocellaria scrupea Busk
Scrupocellaria scruposa (Linnaeus)
Scrupocellaria spathulata (d'Orbigny)
S.(Retiscrupocellaria) jolloisi (Audouin)
Tricellaria inopinata d'Hondt & Occhipinti Ambrogi
Microporidae
Micropora coriacea (Johnston)
Micropora normani Levinsen
Calpensia nobilis (Esper)
Rosseliana rosselii (Audouin)
Stereachmella buski Lagaaij
? *Mollia patellaria patellaria* (Moll)
Mollia patellaria multijuncta (Waters)
Mollia circumcincta (Heller)
Monoporellidae
Monoporella fimbriata carinifera Canù & Bassler
Calescharidae
Coronellina fagei (Gautier)
Setosellidae
Setosella cavernicola Harmelin
Setosella folini (Jullien)
Setosella vulnerata (Busk)
Onychocellidae
Onychocella angulosa (Reuss)
Onychocella marioni (Jullien)
Onychocella vibraculifera Neviani
Rectonychocella disjuncta Canu & Bassler
Thalamoporellidae
Thalamoporella gothica (Busk)
Thalamoporella harmelini Soule, Soule & Chaney
Thalamoporella rozieri (Audouin)

Chlidonidae
Chlidonia pyriformis (Bertoloni)
Crepis longipes Jullien
Cellariidae
Cellaria fistulosa (Pallas)
Cellaria normani Hastings
Cellaria salicornioides Audouin
Cellaria sinuosa (Hassall)
Euginoma reticulata d'Hondt
Cribrilinidae
Cribrilina alcicornis Jullien
? *Cribrilina "punctata"* (Hassall)
Collarina balzaci (Audouin)
Puellina (Puellina) gattyae (Landsborough)
Puellina (P.) setosa (Waters)
Puellina (Cribrilaria) arrecta Bishop & Househam
Puellina (C.) cf. *arrecta* Zabala & Maluquer
Puellina (C.) cassidainsis Harmelin
Puellina (C.) hincksi (Friedl)
Puellina (C.) innominata (Couch)
Puellina (C.) minima Harmelin
Puellina (C.) picardi Harmelin
Puellina (C.) p. pseudoradiata Harmelin & Aristegui
Puellina (C.) radiata (Moll)
Puellina (C.) scripta (Reuss)
Puellina (C.) setiformis romana Harmelin & Aristegui
Puellina (C.) venusta (Canù & Bassler)
Puellina (Glabrilaria) pedunculata Gautier
Puellina (G.) corbula Bishop & Househam
Puellina (G.) o. orientalis Harmelin & Aristegui
Puellina (G.) orientalis lusitanica (Harmelin)
Puellina "pseudoflabellifera" in Harmelin
Figularia figularis (Johnston)
Membraniporella marcusi Cook
Membraniporella nitida (Johnston)
Distansescharella seguenzai Cipolla
Savignyellidae
Savignyella lafontii (Audouin)
Hippothoidae
Hippothoa divaricata Lamouroux
Hippothoa flagellum Manzoni
Celleporella hyalina (Linnaeus)
Haplopoma bimucronatum bimucronatum (Moll)
Haplopoma bimucronatum occiduum (Waters)
Haplopoma graniferum graniferum (Johnston)
Haplopoma graniferum carinatum (Calvet)
Haplopoma impressum (Audouin)
Haplopoma sciaphilum Silen & Harmelin
Trypostegidae
Trypostega claviculata (Hincks)
Trypostega venusta (Norman)
Chorizoporidae
Chorizopora brongniartii (Audouin)
Exechonellidae
Exechonella antillea (Osburn)
Adeonidae
Adeonellopsis distoma (Busk)
Adeonellopsis multiporosa Aristegui
Reptadeonella violacea (Johnston)

Reptadeonella insidiosa (Jullien)
Anartropora monodon (Busk)
Adeonellidae
Adeonella calveti Canù & Bassler
Adeonella pallasii Heller
? *Adeonella polystomella* (Reuss)
Lepraliellidae
Buchneria fayalensis (Waters)
? *Hagiosynodos kirchenpaueri kirchenpaueri* (Heller)
? *Hagiosynodos kirchenpaueri tregoubovii* (Gautier)
Hagiosynodos hadros Hayward & McKinney
Hagiosynodos lata (Busk)
Bryocryptellidae
Rhamphostomella argentea (Hincks)
Porella concinna concinna (Busk)
Porella concinna tubulata Calvet
Porella minuta (Norman)
Porella tubulata (Busk)
Porella laevis (Fleming)
Palmiskenea skenei (Ellis & Solander)
Bryocryptella koeleri (Calvet)
Exochellidae
Escharoides coccinea (Abildgaard)
Escaroides mamillata (Wood)
Escharoides megarostris (Canu & Bassler)
Hippopleurifera pulchra (Manzoni)
Escharellidae
Escharella acuta Zabala, Maluquer & Harmelin
Escharella immersa (Fleming)
Escharella longicollis (Jullien)
Escharella prealta (Calvet)
Escharella octodentata (Hincks)
Escharella rylandi Geraci
Escharella variolosa (Johnston)
Escharella ventricosa (Hassall)
Hemicyclopora dentata Lopez de la Quadra et al.
Hemicyclopora discrepans (Jullien & Calvet)
Hemicyclopora multispinata (Busk)
Neolagenipora eximia (Hincks)
Umbonulidae
Umbonula ovicellata Hastings
Tessaradomidae
Tessaradoma boreale (Busk)
Smittinidae
Parasmittina raigii (Audouin)
? *Parasmittina trispinosa* (Johnston)
Parasmittina tropica (Waters)
Parasmittina rouvillei (Calvet)
Smittina affinis (Hincks)
Smittina cervicornis (Pallas)
Smittina colleti (Jullien)
Smittina crystallina (Norman)
Smittina landsborovii (Johnston)
Smittina malleolus (Hincks)
Smittina remotorostrata Canù & Bassler
Prenantia cheilostoma (Manzoni)
Prenantia lygulata (Manzoni)
Smittoidea marmorea (Hincks)
Smittoidea ophidiana (Waters)

Smittoidea reticulata (Mac Gillivray)
Phylactella mediterranea Rosso
Bitectiporidae
Hippoporina pertusa (Esper)
Hippoporina lineolifera (Hincks)
Pentapora fascialis fascialis (Pallas)
Pentapora fascialis foliacea (Ellis & Solander)
Pentapora ottomuelleriana (Moll)
Schizomavella arrogata (Waters)
Schizomavella asymetrica (Calvet)
Schizomavella cornuta (Heller)
Schizomavella discoidea (Busk)
Schizomavella gautieri Reverter-G. & Fernandez-P.
Schizomavella hastata (Hincks)
Schizomavella hirsuta (Calvet)
Schizomavella inordinata (Canù & Bassler)
Schizomavella leontiniensis (Waters)
Schizomavella linearis linearis (Hassall)
Schizomavella linearis crucifera (Norman)
Schizomavella mamillata (Hincks)
Schizomavella marsupifera (Busk)
Schizomavella monoecensis (Calvet)
Schizomavella ochracea (Hincks)
Schizomavella rudis (Manzoni)
Schizomavella subsolana Hayward & McKinney
Schizomavella teresae Reverter-G. & Fernandez-P.
Schizomavella triangularis Reverter-G. & Fernandez-P.
Schizomavella sp.
Metroperiella lacunata Hayward & Hansen
Metroperiella lepralioides (Calvet)
Watersiporidae
Watersipora complanata (Norman)
? *Watersipora cucullata* (Busk)
? *Watersipora subtorquata* (d'Orbigny)
Schizoporellidae
Schizoporella dunkeri (Reuss)
Schizoporella errata (Waters)
Schizoporella magnifica (Hincks)
Schizoporella mutabilis Calvet
Schizoporella neptuni (Jullien)
Schizoporella tetragona Reuss
Schizoporella unicornis (Johnston)
Schizobrachiella sanguinea (Norman)
Stylopoma inchoans Tilbrook
Phaeostachys spinifera (Johnston)
Stomachetosellidae
Trematoecia turrita (Smitt)
Margarettidae
Margaretta cereoides (Ellis & Solander)
Myriaporidae
Myriapora truncata (Pallas)
Hippopodinidae
Hippopodina fegeensis (Busk)
Hippopodina iririchiensis Tilbrook
Gigantoporidae
Cylindroporella tubulosa (Norman)
Cosciniopsis ambita Hayward
Lanceoporidae
Calyptotheca obscura Harmelin et al.

Calyptotheca sp.
Calyptotheca rugosa Hayward
Cheiloporinidae
"Cheiloporina" circumcincta (Neviani)
Cryptosulidae
Cryptosula pallasiana (Moll)
Teuchoporidae
Theuchopora edwardsi (Jullien)
Phoceanidae
Phoceana columnaris Jullien
Phoceana tubulifera (Heller)
Microporellidae
Calloporina decorata (Reuss)
Microporella appendiculata (Heller)
Microporella ciliata (Pallas)
? *Microporella marsupiata* (Busk)
Microporella orientalis Harmer
Microporella umbracula (Audouin)
Fenestrulina joannae (Calvet)
Fenestrulina malusii (Audouin)
Diporula verrucosa (Peach)
Crepidachantidae
Crepidachantha poissonii (Audouin)
Lacernidae
Arthropoma cecilii (Audouin)
Cribellopora trichotoma (Waters)
Jaculinidae
Jaculina blanchardi (Jullien)
Jaculina parallelata (Waters)
Jaculina tessellata (Hayward)
Cleidochasmatidae
Cleidochasmidra canakkalense Unsal & d'Hondt
Characodoma mamillatum (Seguenza)
? *"Cleidochasma" oranense* (Waters)
Celleporidae
Cellepora adriatica Hayward & McKinney
Cellepora posidoniae Hayward
Cellepora "pumicosa" (Waters)
Celleporina canariensis Aristegui
Celleporina decipiens Hayward
Celleporina globulosa (d'Orbigny)
Celleporina hassallii (Johnston)
Celleporina siphuncula Hayward & McKinney
Celleporina tubulosa (Hincks)
Celleporina lucida (Hincks)
Lagenipora lepralioides (Norman)
Lagenipora sp. Zabala & Maluquer
Palmicellaria aff. *aviculifera* Canù & Bassler
Palmicellaria elegans Alder
Buskea dichotoma (Hincks)
Buskea nitida (Heller)
Omalosecosa ramulosa (Linnaeus)
Turbicellepora avicularis (Hincks)
Turbicellepora camera Hayward
? *Turbicellepora cantabra* (Barroso)
Turbicellepora coronopus (Wood)
Turbicellepora coronopusoida (Calvet)
Turbicellepora crenulata Hayward
Turbicellepora magnicostata (Barroso)

Turbicellepora torquata Hayward
Turbicellepora tubigera (Busk)
Buffonellaria divergens (Smitt)
Hippoporidridae
? *Hippoporella hippopus* (Smitt)
Hippoporidra picardi Gautier
Phidoloporidae
Schedocleidochasma porcellaniforme Soule et al.
Plesiocleidochasma mediterraneum Chim.& Soule
Reteporellina delicatula Hayward
Reteporella aporosa (Waters)
Reteporella beaniana (King)
Reteporella complanata (Waters)
Reteporella couchii couchii (Hincks)
Reteporella couchii biaviculata (Waters)
Reteporella elegans Harmelin
Reteporella feuerboni Hass
Reteporella grimaldii (Jullien & Calvet)
Reteporella harmeri Hass
Reteporella jermanensis (Waters)
Reteporella mediterranea (Smitt)
Reteporella sparteli (Calvet)
Reteporella soudbournensis Gautier
Stephanollona armata (Hincks)
Rhynchozoon bispinosum (Johnston)
Rhynchozoon digitatum (Waters)
Rhynchozoon lareyi (Audouin)
Rhynchozoon neapolitanum Gautier
Rhynchozoon pseudodigitatum Zabala & Maluquer
Rhynchozoon quadrispinatum Zabala & Maluquer
Rhynchozoon sp.1 Hayward
Rhynchozoon revelatus Hayward & McKinney
"Dentiporella" sardonica (Waters)
Schizotheca fissa (Busk)
Schizotheca serratimargo (Hincks)
Schizotheca tuberigera (Jullien)
Schizoretepora imperati (Busk)
Schizoretepora longisetae (Canù & Bassler)
Schizoretepora solanderia (Risso)
Hippellozoon mediterraneum (Waters)
? *Triphyllozoon hirsutum* (Busk)
Unplaced Cheilostomes
Hippaliosina depressa (Busk)
Escharina dutertrei protecta Zabala et al.
Escharina hyndmanni (Johnston)
Escharina porosa (Smitt)
Escharina johnstoni (Quelch in Ryland)
Escharina vulgaris (Moll)
Hippomenella mucronelliformis (Waters)
Incertae sedis Onchoporidae