Deep-Sea Research II 57 (2010) 412–430

Contents lists available at ScienceDirect

Deep-Sea Research II

journal homepage: www.elsevier.com/locate/dsr2

Biodiversity of the white coral bank off Cape Santa Maria di Leuca (Mediterranean Sea): An update

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ARTICLE INFO

Available online 1 September 2009

Keywords:
White coral
Biodiversity
Mediterranean Sea
Lophelia pertusa
Madrepora oculata
Deep-water fauna

ABSTRACT

The biodiversity of the Santa Maria di Leuca (SML) coral bank is summarized and its description is updated using data collected by means of underwater video systems, benthic samplers and fishing gears. A total of 222 living species have been recorded within the coral bank area in the depth range 280–1121 m. The most abundant benthic taxa recorded are Porifera (36 species) followed by Mollusca (35) and Cnidaria (31). The scleractinian corals *Madrepora oculata* and *Lophelia pertusa* are the main colonial species in the structure of the SML bank. Annelida, Crustacea and Bryozoa have been found with 24, 23 and 19 species, respectively. A total of 40 species of demersal fish have been recorded. Other faunal taxa were found with small numbers of species. One hundred and thirty-five species are new for the SML bank, 31 of which represent new records for the north-western Ionian Sea (2 Porifera, 17 Cnidaria, 1 Mollusca, 3 Annelida, 2 Crustacea, 4 Bryozoa and 4 Echinodermata). The finding of the annelid *Harmothoë vesiculosa* represents the first record for the Mediterranean Sea. The SML coral bank represents a biodiversity "hot-spot" on the bathyal bottoms of the Mediterranean Sea.

1. Introduction

The white coral banks, mainly consisting of the scleractinian *Madrepora oculata* and *Lophelia pertusa*, have a complex three-dimensional structure providing several ecological niches for a large diversity of associated species (Rogers, 1999). At the same time they act as a refuge for prey as well as a spawning and nursery area for many species including some of economic interest (Tursi et al., 2004). Therefore, the white coral ecosystem represents a biodiversity "hot-spot" at the edge of the continental shelf and upper slope (McCloskey, 1970; Connell, 1978; Jensen and Frederiksen, 1992; Mortensen, 2001; Mortensen and Fosså, 2006).

Lophelia pertusa was considered near to extinction in the Mediterranean Sea (Rogers, 1999; Taviani et al., 2005a) before its rediscovery in the Santa Maria di Leuca (SML) bank, in the Ionian Sea (Mastrototaro et al., 2002). Zibrowius (1980) reported only two potential occurrences of small branches of living *L. pertusa* off Banyuls sur Mer (Gulf of Lion) and from Cabo de Gata (Alboran Sea). Other small branches have been found in the northern Aegean Sea (Vafidis et al., 1997) and in the Sicily Strait (Taviani et al., 2005a).

Madrepora oculata is more widespread than *L. pertusa* in the Mediterranean and living build-ups of this species have been found from the Alboran Sea to the Aegean Sea (Reyss, 1964; Bourcier and Zibrowius, 1973; Zibrowius, 1980; Vafidis et al., 1997; Tunesi and Diviacco, 1997; Orejas et al., 2003; Tursi et al., 2004; Álvarez-Pérez et al., 2005). Recently, living banks of *L. pertusa* and *M. oculata* have been found off the southern and south-western coast of Malta (Schembri et al., 2007).

Off Cape SML, *Lophelia* and *Madrepora* coral banks are patchily distributed over an area of about 1000 km^2. This area is characterized by the occurrence of several mounds (10–20 m high) formed by colonies of *M. oculata* and *L. pertusa* (Taviani et al., 2005b; Freiwald et al., 2009; Vertino et al., 2010). These consist of an outer stratum of living coral polyps growing over dead and decaying coral generally coated by Fe–Mn oxides mixed with sediment. The coral mounds are located between 300 and 1100 m depth off Apulia on a gently sloping plateau that shows a complex seabed topography. Chirp profiles show that the SML area is characterized by extensive seafloor erosion, possibly induced by bottom currents (Tursi et al., 2004; Taviani et al., 2005a; Malinverno et al., 2010; Savini and Corselli, 2010).

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0967-0645/$ - see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.dsr2.2009.08.021

The first samples from SML deep-water coral banks, collected using different gears, allowed the recovery of 61 benthic taxa (Mastrototaro et al., 2002; Rosso, 2003; Tursi et al., 2004). This number increased, thanks to the identification of other taxa mostly belonging to Porifera (Longo et al., 2005). Recently, additional samples have been collected within the FIRB APLABES project, coordinated by CoNISMa (National Inter-University Consortium for Marine Science). All samples have been carefully analyzed in order to improve the knowledge on the biodiversity of this peculiar habitat formed by the building activity of deep-water corals. An effort has been made to study several taxonomic groups, also looking at small cryptic species such as encrusting sponges, bryozoans and hydrozoans. Moreover, the new sampling programme allowed the collection of species living in the sediment and the epibenthic and swimming species dwelling on or between the coral structures. This paper is aimed at updating the knowledge on the biodiversity of the SML coral bank.

2. Materials and methods

The zones with the highest densities of coral mounds were identified using a multibeam echo sounder, a side-scan sonar, high-resolution seismics, and underwater video systems. Samples came mostly from four zones (MSA; MS1; MS4; MS6) in the 280–1121 m depth range (Fig. 1). Six cruises (INTERRG Italia-Grecia, Coralli Santa Maria di Leuca, CORAL 2, APLABES 1, APLABES 3 and CORSARO) were carried out from 2000 to 2006 to investigate the SML coral bank. A total of 76 samples were taken with 10 different types of sampling gear: rectangular dredge (9), epibenthic dredge with plankton nets (3), rocky circular dredge (1), grab (16), "ingegno" (28), longline (5), trap (4), Agassiz trawl (1), trawl net (7), and ROV (2 high-resolution video transects) (Table 1).

2.1. Sampling gear

The rectangular dredge consisted of an iron mouth with a net with 0.5 cm mesh size. The epibenthic dredge was a modified Sanders sledge dredge with a rectangular mouth ($70 \times 35.5\,cm^2$) and a mobile blade to regulate dredging according to the nature of the substrate. In order to catch the epibenthic fauna at different heights above the bottom, the sledge was equipped with an upper metal frame with two plankton nets (250 μm mesh size). The two epibenthic mouths were equipped with special jaws that were only opened when the dredge was on the bottom (Fig. 2). The rock dredge consisted of a heavy iron cylinder with dentate mouth. Two van Veen grabs of $0.02\,m^2$ in surface and $0.06\,m^3$ in volume were used. The modified "ingegno" is a special tool consisting of an iron bar (1 m long and 60 cm in diameter) with pieces of old fishing net attached. The "ingegno" was used during preliminary surveys within the "Coralli Santa Maria di Leuca" and "CORAL 2" (2001–2002) cruises to map areas in which living deep-water coral colonies were found. This special gear was used for several (28) short sampling sessions (max 5 min) in order to reduce to a minimum the damage to the coral colonies. Longlines were employed to capture the large fish species dwelling in the coral banks. They were 1000 m long with 500 hooks each. Four groups of 10 traps of different shapes were cast for about 24 h to catch the swimming fauna. The Agassiz trawl, having a rigid rectangular ($2 \times 1\,m^2$) iron frame opening, was used once during the last cruise (Corsaro) in 2006 after some unsuccessful attempts to sample living corals by grab. The trawl net consisted of a commercial fishing net used in the local fisheries, which accidentally sampled living coral colonies during the first cruise (INTERREG Italia-Grecia) devoted to the study of demersal resources of the North Ionian Sea during August 2000 (Anonymous, 2001; Mastrototaro et al., 2002). After this first cruise, this gear was used only on soft bottoms far from areas indicated as presumably colonised by corals by remote bottom analyses (side-scan sonar and underwater video). Underwater high-resolution video surveys were performed using PLUTO 1000 ROV from Gaymarine Ltd.

Sampling was carried out using the oceanographic vessels "*Universitatis*" (CoNISMa) (grabs, dredges, traps), "*Urania*" (CNR) (grabs, dredges, "ingegno", Agassiz trawl, Modus ROV), a commercial vessel (trawl net and longline) and a Catamaran equipped with a dynamic positioning system (Pluto ROV).

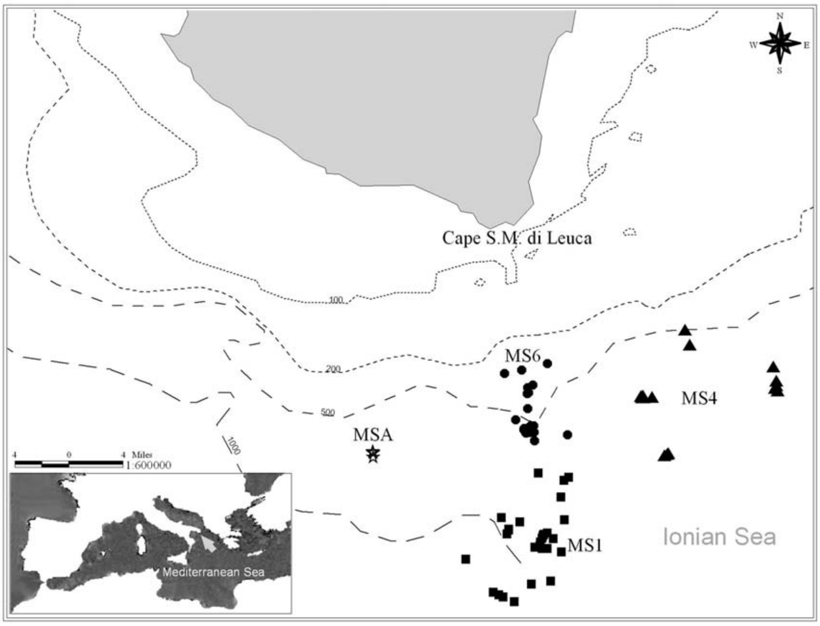

Fig. 1. Map of SML coral banks with indication of the four sub-areas MSA; MS1; MS4 and MS6.

Table 1
List of the samples obtained during the six research cruises in the Santa Maria di Leuca coral bank. The zone, gear, geographic coordinates and depths range of starting and ending points of the stations are indicated.

Start				End		Start					End		
zone	gear	LAT (N)	LON (E)	LAT (N)	LON (E)	depth (m)	zone	gear	LAT (N)	LON (E)	LAT	LON	depth (m)
MS4	Tn	39°38.69’	18°38.89’	39°37.16’	18°38.98’	630–678	MS6	Tn	39°38.27’	18°21.68’	39°42.04	18°29.80	310–324
MS1	Tn	39°27.28’	18°23.95’	39°26.68’	18°24.94’	800	MS4	Tn	39°41.04’	18°33.23’	39°36.97’	18°24.99’	500–540
MS1	Tn	39°23.99’	18°21.60’	39°24.93’	18°19.92’	1100	MS6	Tn	39°38.51’	18°22.79’	39°41.76’	18°32.00’	300–380
MS1	I	39°27.18’	18°23.62’	39°27.51’	18°24.01’	780–807	MS6	Ll	39°37.38’	18°23.16’	39°37.57’	18°22.78’	304–429
MS1	I	39°26.87’	18°25.32’	39°26.39’	18°25.60’	784–810	MS6	Ll	39°33.99’	18°23.61’	39°35.20’	18°23.84’	487–553
MS1	I	39°27.75’	18°24.11’	39°27.59’	18°23.23’	760–809	MS6	Ll	39°35.32’	18°22.40’	39°34.35’	18°23.20’	513–536
MS1	I	39°31.93’	18°23.86’	39°31.81’	18°25.29’	631–647	MS1	Ll	39°30.39’	18°25.31’	39°30.36’	18°25.08’	644–653
MS6	I	39°34.37’	18°25.71’	39°34.82’	18°25.93’	550–577	MS1	Ll	39°28.03’	18°21.84’	39°28.30’	18°21.70’	792–805
MS4	I	39°36.74’	18°31.11’	39°36.86’	18°31.39’	640–662	MS6	G	39°34.84’	18°23.30’	–	–	513
MS1	I	39°26.40’	18°19.22’	39°25.54’	18°19.05’	1045	MS6	G	39°34.85’	18°23.29’	–	–	506
MS4	I	39°37.78’	18°39.07’	39°37.42’	18°38.80’	642–665	MS6	G	39°34.84’	18°23.29’	–	–	506
MS4	I	39°37.17’	18°39.15’	39°37.15’	18°39.37’	664–674	MS6	G	39°34.84’	18°23.30’	–	–	506
MS4	I	39°33.10’	18°32.09’	39°32.70’	18°32.01’	785–798	MS6	De	39°34.52’	18°23.58’	39°34.29’	18°23.75’	525–536
MS1	I	39°24.31’	18°20.97’	39°23.98’	18°21.06’	1112–1116	MS6	De	39°34.50’	18°23.30’	39°34.49’	18°23.67’	528–530
MS1	I	39°23.70’	18°22.32’	39°23.60’	18°23.56’	1100–1121	MS6	G	39°34.46’	18°23.07’	–	–	530
MS1	I	39°25.01’	18°24.64’	39°25.13’	18°24.39’	895–910	MS6	G	39°34.64’	18°23.00’	–	–	528
MS1	I	39°24.82’	18°23.42’	39°25.61’	18°22.88’	1000–1045	MS6	G	39°34.57’	18°23.01’	–	–	525
MS6	I	39°36.98’	18°23.14’	39°37.34’	18°23.61’	425–469	MS6	G	39°34.60’	18°23.12’	–	–	535
MS6	I	39°38.90’	18°24.42’	39°39.51’	18°24.92’	280–374	MS4	G	39°36.79’	18°30.49’	–	–	649
MS1	I	39°27.51’	18°24.00’	39°27.72’	18°24.23’	780	MS4	G	39°36.73’	18°30.56’	–	–	655
MS1	I	39°27.30’	18°23.98’	39°26.84’	18°24.88’	807–813	MS4	G	39°36.79’	18°30.41’	–	–	648
MS1	T	39°27.08’	18°24.42’	39°27.28’	18°24.30’	780–788	MS4	G	39°36.72’	18°30.49’	–	–	638
MS1	I	39°27.10’	18°24.10’	39°26.18’	18°25.39’	818–828	MS4	G	39°36.83’	18°30.54’	–	–	644
MS1	I	39°28.79’	18°22.66’	39°29.00’	18°23.32’	756–784	MS1	De	39°28.00’	18°24.20’	39°27.38’	18°24.46’	765–790
MS1	T	39°29.08’	18°21.50’	39°29.31’	18°21.05’	758–767	MS1	G	39°28.09’	18°24.42’	–	–	747
MS1	I	39°27.72’	18°24.80’	39°28.33’	18°.23.39’	750–779	MSA	G	39°33.33’	18°13.25’	–	–	541
MS1	I	39°24.12’	18°21.32’	39°24.80’	18°19.73’	1108–1150	MSA	Dr	39°32.97’	18°13.27’	39°34.17’	18°13.03’	539–586
MS1	T	39°31.65’	18°25.79’	39°31.82’	18°25.76’	627–632	MSA	D	39°33.23’	18°13.28’	39°33.48’	18°13.13’	538–548
MS1	T	39°31.44’	18°25.50’	39°31.52’	18°25.46’	640–643	MSA	D	39°33.25’	18°13.28’	39°33.45’	18°13.18’	540–577
MS6	I	39°37.05’	18°23.22’	39°38.45’	18°25.04’	408–424	MS1	D	39°28.93’	18°25.52’	39°29.58’	18°25.92’	691–704
MS6	I	39°34.68’	18°22.92’	39°36.40’	18°22.97’	464–528	MS4	G	39°33.03’	18°31.92’	–	–	780
MS6	I	39°34.94’	18°23.54’	39°36.42’	18°23.13’	451–501	MS4	D	39°33.15’	18°32.15’	39°32.62’	18°31.17’	801–803
MS6	I	39°34.77’	18°22.94’	39°35.54’	18°22.96’	486–518	MS6	D	39°34.93’	18°23.37’	39°35.35’	18°23.65’	497–501
MS6	I	39°37.53’	18°23.51’	39°38.29’	18°22.17’	307–465	MS1	D	39°27.92’	18°24’15’	39°28.18’	18°24.42’	744–766
MS6	I	39°36.03’	18°23.17’	39°36.67’	18°23.42’	447–473	MS1	D	39°28.32’	18°21.97’	39°29.17’	18°22.22’	776–790
MS6	ROV	39°36.72’	18°30.49’	–	–	480–490	MS1	D	39°28.28’	18°21.97’	39°29.63’	18°22.50’	760–786
MS4	ROV	39°35.00’	18°23.38’	–	–	630–640	MS4	D	39°37.32’	18°38.98’	39°36.72’	18°38.63’	678–701
MS4	Tn	39°40.08’	18°33.52’	39°39.52’	18°24.41’	536–561	MS4	TA	39°37.48’	18°39.08’	39°38.12’	18°40.38’	671–679

Gear: D: rectangular dredge; De: Epibenthic dredge with planktonic nets; Dr: rock dredge; G: grab; I: ingegno; Ll: longline; T: trap; TA: Agassiz Trawl; Tn: Trawl net; ROV: Remotely operated vehicle.

Fig. 2. Epibenthic Sanders sledge dredge equipped with two plankton nets.

2.2. Biological sampling

Soft-bodied animals such as Cnidaria, Sipuncula, Annelida and Echinodermata (Holoturidea) were immediately anaesthetized with a saturated solution of menthol in sea water for from 2 to 4 h according to the nature and size of the individual or colonies. All benthic and bentho-pelagic species were fixed on board in 5% formaldehyde solution with sea water and afterwards preserved in 70% ethanol.

All specimens were identified in the laboratory to the lowest possible taxonomic level and counted. The invertebrate species identification was made using a stereomicroscope. Moreover, for sponges, some gorgonian and holoturian species, slides of dissociated skeletal elements were prepared and observed with an optical microscope. The nomenclature adopted for the different taxonomic groups is that reported in the relevant update check-list.

From the species composition of the samples and using side-scan sonar as well as video images, the distribution of the different species was attributed to four substrates: Living Coral (LC), Dead Coral (DC), Coral Rubble (CR), no Coral substrates (nC) (i.e. hard substrates (HS), soft substrates (SS) and free space around the coral colonies).

However, the explorative character of the surveys, the difficulties of sampling in the coral areas, the unbalanced use of the different gears, and variations in the research staff examining samples collected collectively affected the results, which therefore must be considered as qualitative.

3. Results

To date, a total of 222 living taxa have been identified (1 Foraminifera, 36 Porifera, 31 Cnidaria, 2 Sipuncula, 35 Mollusca, 24 Annelida, 23 Crustacea, 19 Bryozoa, 2 Brachiopoda, 1 Chaetognatha, 8 Echinodermata, 40 Pisces), 202 of which were identified at species level, 15 at genus level and only 6 at a higher taxonomic level (Table 2). Solitary species dominate with 144 species, whereas 77 species are colonial.

3.1. Gear efficiency

From the van Veen grab samples 89 species were identified. This gear sampled both the coral colonies and associated substrates. The frame-building species *M. oculata* and *L. pertusa* were sampled together, with their main encrusting species such as sponges, hydroids, annelids and bryozoans as well as the species that live inside the soft sediments such as sipunculids, molluscs and echinoderms.

A total of 59 species were sampled using the "ingegno", which collected large fragments of colonies of *M. oculata*, *L. pertusa* and the black coral *Leiopathes glaberrima*. Using the rectangular and the modified Sander dredge, 52 and 51 species were sampled and identified, respectively. These species included the building coral species *M. oculata*, *L. pertusa*, the polyps of the solitary coral *Desmophyllum dianthus* and *Stenocyathus vermiformis* and some gorgonians, hydroids, molluscs and annelids that live both on the living and dead coral colonies. Species that live around the coral mounds on the hard substrates, such as some encrusting sponges, hydrozoans, annelids and bryozoans, were sampled with the modified Sanders dredge, used in the areas without corals colonies. Moreover, species that live in the coral rubble and on the soft substrates around the coral colonies were also collected. They were mostly represented by bivalves, ostracods and echinoderms. The species collected using the two plankton nets on the modified Sanders dredge were mainly the Euphasiacean *Stylocheiron suhmii*, the arrow worm *Flacisagitta exaptera* and copepod and cumacea species yet to be identified.

Only 2 and 5 living species were sampled using the rock dredge and the traps, respectively. The trawl net (66 species), Agassiz trawl (34 species) and longlines (17 species) also made it possible to sample the mobile and swimming megafauna mainly consisting of fishes, crustaceans and cephalopods that live in and around the SML banks (D'Onghia et al., 2010). Finally, ROV allowed identification of 16 taxa.

3.2. Species composition and distribution

Only 30 out of 222 (about 13% of the total species) were recorded directly on living branches of corals (LC), including *M. oculata* that settled its larvae on living *L. pertusa* branches and vice versa, forming mixed colonies of *Madrepora* and *Lophelia*. In detail, the species found on living coral colonies were the foraminifer *Planopulvinulina dispansa* (courtesy of Donata Violanti); the massive sponges *Pachastrella monilifera* and *Poecillastra compressa* together with the encrusting *Desmacella inornata*; 2 actinian species *Amphianthus dohrni* and *Sargatia troglodytes*; an undetermined *Epizoanthus* species growing on the polyps of coral species; the solitary polyps of *Desmophyllum dianthus* and *Stenocyathus vermiformis* using the colonies of *M. oculata* and *L. pertusa* to settle their larval stage, and 4 hydroid species, namely *Acryptolaria conferta*, *Halecium labrosum*, *Nemertesia antennina* and *N. ramosa*. Six mollusc species were found: 4 gasteropods (*Alvania cimicoides*, *Danilia tinei*, *Discotectonica discus* and *Putzeysia wiseri*) and 2 bivalves (*Delectopecten vitreus* and *Spondylus gussonii*). Four

Table 2
List of the species collected during the six research cruises in the Santa Maria di Leuca coral bank with indication of new records and depth range (m) (nr: new record; NWI: North Western Ionian Sea, SML: Santa Maria di Leuca Coral Bank).

Species	nr	Depth (m)
Foraminifera		
Planopulvinulina dispansa (Brady, 1884)		464–528
Porifera		
Demospongiae		
Axinella cannabina (Esper, 1794)		642–665
Bubaris sp.		631–790
Cliona sp.[a]		640–662
Crellastrina alecto (Topsent, 1898)		640–809
Desmacella annexa (Schmidt, 1870)		631–647
Desmacella inornata (Bowerbank, 1866)		425–1121
Erylus papulifer Pulitzer-Finali, 1983		497–809
Eurypon clavatum (Bowerbank, 1866)	SML	747
Geodia nodastrella Carter, 1876		513–674
Haliclona (*G.*) *flagellifer* (Ridley & Dendy, 1886)		513–809
Hamacantha (*H.*) *implicans* Lundbeck, 1902		662–1121
Hamacantha (*H.*) *johnsoni* (Bowerbank, 1864)		425–662
Hexadella dedritifera Topsent, 1913		513–790
Hymedesmia (*H.*) *mutabilis* (Topsent, 1904)		513–809
Isops anceps (Vosmaer, 1894)		644–809
Jaspis incrustans (Topsent, 1890)		631–809
Leiodermatium cfr. *lynceus* Schmidt, 1870		425–469
Pachastrella monilifera Schmidt, 1868		425–513
Pachastrissa pathologica (Schmidt, 1868)		642–665
Plakina monolopha Schulze, 1880	NWI	747
Plakortis simplex Schulze, 1880		425–747
Plocamionida ambigua (Bowerbank, 1866)	NWI	640–809
Plocamiopsis signata Topsent, 1904		747–807
Poecillastra compressa (Bowerbank, 1866)		497–809
Sceptrella insignis (Topsent, 1892)		425–809
Siphonidium ramosum (Schmidt, 1870)		631–674
Spiroxya heteroclita Topsent, 1896[a]		640–662
Spiroxya levispira Topsent, 1898[a]		642–809
Spongosorites sp.	SML	513–790
Stoeba plicata (Schmidt, 1868)	SML	513–747
Suberites sp. 1	SML	747–790
Suberites sp. 2	SML	747
Thrombus abyssi (Carter, 1873)		425–809
Timea chondrilloides (Topsent, 1904)		631–647
Vulcanella (*V.*) *gracilis* (Sollas, 1888)		780–807
Hexactinellida		
Tretodictyum cfr. *tubulosum* Schulze, 1886		760–809
Cnidaria		
Gorgonacea		
Acanthogorgia hirsuta Gray, 1857		538–809
Bebryce mollis Philippi, 1842	NWI	671–790
Callogorgia verticillata (Pallas, 1766)		425–910
Dendrobrachia cfr. *fallax* Brook, 1889	NWI	747
Paramuricea macrospina (von Koch, 1882)	NWI	538–826
Swiftia pallida Madsen, 1970	NWI	518–766
Antipatharia		
Antipathes dichotoma Pallas, 1766	NWI	630–640
Leiopathes glaberrima (Esper, 1792)		671–790
Actiniaria		
Actiniaria species	NWI	539–586
Amphianthus dohrni (von Koch, 1878)	NWI	497–701
Kadophellia bathyalis Tur, 1991	NWI	506–803
Sagartia troglodytes (Prince in Johnston, 1847)	NWI	538–548
Sagartia elegans (Dalyell, 1848)	NWI	497–766
Peachia cylindrica (Reid, 1848)	NWI	528–530
Scleractinia		
Caryophyllia calveri Duncan, 1873	NWI	538–747
Dendrophyllia cornigera (Lamarck, 1816)		447–501
Desmophyllum dianthus (Esper, 1794)		525–1100
Lophelia pertusa (Linnaeus, 1758)		469–1100
Madrepora oculata Linnaeus, 1758		425–1100
Stenocyathus vermiformis (Pourtalès, 1868)		464–747
Zoantharia		
Epizoanthus sp.	NWI	671–790
Scyphozoa		
Nausithoe sp.	SML	506–790
Hydrozoa		
Acryptolaria conferta (Allman, 1877)	NWI	513–701
Clytia linearis (Thornely, 1900)	SML	538–577

Table 2 (*continued*)

Species	nr	Depth (m)
Clytia sp.	SML	513
Halecium labrosum Alder, 1859	NWI	513–577
Hybocodon cfr. *prolifer* (Agassiz, 1862)	SML	497–506
Laodicea undulata (Forbes & Goodsir, 1851)	SML	776–790
Mitrocoma annae Haeckel, 1864	SML	513–577
Nemertesia antennina (Linnaeus, 1758)	NWI	541
Nemertesia ramosa (Lamarck, 1816)	NWI	513
Sipuncula		
Apionsoma murinae bilobatae (Curter, 1969)	SML	765–790
Aspidosiphon muelleri[b] Diesing, 1851	SML	528–530
Mollusca		
Gastropoda		
Alvania cimicoides (Forbes, 1844)	SML	644–655
Benthonella tenella (Jeffreys, 1869)	SML	655
Danilia tinei (Calcara, 1839)	SML	538–548
Discotectonica discus (Philippi, 1844)	SML	538–548
Emarginula adriatica O. G. Costa, 1829		780
Euspira fusca (Blainville, 1825)	SML	671–790
Nassarius lima (Dillwin, 1817)	SML	538–548
Putzeysia wiseri (Calcara, 1842)	SML	528–535
Bivalvia		
Abra longicallus (Scacchi, 1834)	SML	513–704
Asperarca nodulosa (Müller, 1776)		464–1150
Bathyarca pectunculoides (Scacchi, 1834)	SML	649–790
Bathyarca philippiana (Nyst, 1848)		630–1150
Delectopecten vitreus (Gmelin, 1791)		451–1100
Ennucula aegeensis (Forbes, 1844)	SML	506–530
Kelliella abyssicola (Forbes, 1844)	SML	648–649
Limatula subauriculata (Montagu, 1808)	SML	525–649
Notolimea crassa (Forbes, 1844)	SML	644–655
Parvamussium fenestratum (Forbes, 1844)	SML	530
Pseudamussium sulcatum (O. F. Müller, 1776)	NWI	538–679
Spondylus gussonii Costa O. G., 1829		513–813
Yoldiella lucida (Loven, 1846)	SML	644–790
Yoldiella philippiana (Nyst, 1845)	SML	530
Scaphopoda		
Antalis agilis Sars M., 1872	SML	649
Cephalopoda		
Eledone moschata (Lamarck, 1798)	SML	300–380
Heteroteuthis dispar (Rüppell, 1844)	SML	536–561
Illex coindetii (Verany, 1839)	SML	300–380
Loligo forbesii Steenstrup, 1856	SML	310–324
Octopus salutii Verany, 1839	SML	310–324
Pteroctopus tetracirrhus (Delle Chiaje, 1830)	SML	300–561
Rondeletiola minor (Naef, 1912)	SML	310–324
Rossia macrosoma (Delle Chiaje, 1830)	SML	300–561
Scaeurgus unicirrhus (Delle Chiaje, 1841)	SML	300–680
Sepietta oweniana (D'Orbigny, 1841)	SML	300–561
Todarodes sagittatus (Lamarck, 1798)	SML	310–561
Todaropsis eblanae (Ball, 1841)	SML	300–561
Annelida		
Polychaeta		
Eunice norvegica (Linnaeus, 1767)		451–1100
Filograna implexa Berkeley, 1828		630–807
Filogranula gracilis Langerhans, 1884		497–807
Filogranula stellata (Southward, 1936)		630–678
Harmothoë vesiculosa Ditlevsen, 1917	NWI	538–790
Hesionidae sp.	SML	765–790
Hyalopomatus madreporae Sanfilippo, 2009		513
Janita fimbriata (Delle Chiaje, 1822)	SML	671–679
Leiochrides sp.	SML	538–638
Leocrates atlanticus (McIntosh, 1885)	SML	691–704
Lumbrineris sp.	SML	538–790
Lumbrineris latreilli Audouin & Milne-Edwards, 1834	SML	528–530
Metavermilia multicristata (Philippi, 1844)		497–807
Nephtys cfr. *paradoxa* Malm, 1874	NWI	528–530
Nothria conchylega (M. Sars, 1835)	SML	744–790
Owenidae sp.	SML	513
Phalacrostemma sp.	NWI	765–790
Pholoë sp.	SML	765–790
Phyllodoce mucosa Oersted, 1843	SML	513–679
Subadyte cfr. pellucida (Ehlers, 1864)	SML	513
Serpula vermicularis Linnaeus, 1767		497–665
Terebellidae sp.	SML	506
Vermiliopsis eliasoni Zibrowius, 1970		497–1146
Vermiliopsis monodiscus Zibrowius, 1968	SML	497–747

Table 2 (*continued*)

Species	nr	Depth (m)
Crustacea		
Ostracoda		
Bairdia conformis (Terquem, 1878)	SML	506–790
Bythocypris obtusata (Sars, 1866)	SML	506–790
Euphausiacea		
Stylocheiron suhmii G. O. Sars, 1883	SML	525–790
Decapoda		
Acanthephyra eximia S. I. Smith, 1884		758–1100
Alpheus platydactylus Coutière, 1897	NWI	538–679
Aristaeomorpha foliacea (Risso, 1827)		500–678
Aristeus antennatus (Risso, 1816)		800–1100
Bathynectes maravigna (Prestandrea, 1839)		627–767
Ebalia nux A. Milne Edwards, 1883		464–779
Geryon longipes A. Milne-Edwards, 1882	SML	671–679
Macropipus tuberculatus (Roux, 1830)	SML	310–324
Monodaeus cfr. guinotae Forest, 1976		530–790
Monodaeus couchii (Couch, 1851)		447–813
Munida intermedia A. Milne Edwards & Bouvier, 1899		447–528
Munida tenuimana G. O. Sars, 1872	SML	750–828
Nephrops norvegicus (Linnaeus, 1758)		300–561
Pandalina profunda Holthuis, 1946	NWI	525–536
Parapenaeus longirostris (Lucas, 1846)		300–380
Plesionika acanthonotus (S. I. Smith, 1882)		630–1100
Plesionika heterocarpus (A. Costa, 1871)	SML	300–380
Plesionika martia (A. Milne Edwards, 1883)	SML	500–1100
Polycheles typhlops Heller, 1862	SML	280–1150
Rochinia rissoana (Roux, 1828)	SML	538–548
Bryozoa		
Cyclostomatida		
Anguisia verrucosa Jullien, 1882	NWI	506–790
Crisiidae sp.	SML	506–790
Idmidronea sp.1	SML	513–790
Tervia barrieri Rosso, 1998	NWI	513–790
Ctenostomatida		
Undetermined Ctenostome	SML	513–747
Cheilostomatida		
Aetea sica (Couch, 1844)	SML	506
Copidozoum exiguum (Barroso, 1920)		513–790
Herentia hyndmanni (Johnston, 1847)	SML	506–747
Puellina p. pseudoradiata Harmelin & Aristegui 1988	SML	747
Puellina pedunculata Gautier, 1956	SML	528
Reteporella sparteli (Calvet, 1906)	SML	513–747
Schizomavella fischeri (Jullien, 1882)	NWI	513–528
Schizoporella neptuni (Jullien, 1882)		513
Scrupocellaria delilii (Audouin, 1826)	SML	513–747
Setosella folini Jullien, 1882	NWI	513–790
Setosella vulnerata (Busk, 1860)	SML	513–528
Setosellina capriensis (Waters, 1926)	SML	513–655
Smittina crystallina (Norman, 1867)		513–747
Tessaradoma boreale (Busk, 1860)	SML	506–790
Brachiopoda		
Gryphus vitreus (Born, 1778)	SML	497–790
Megerlia truncata (Linnaeus, 1767)		464–528
Chaetognatha		
Flaccisagitta hexaptera d'Orbigny, 1836	SML	525–536
Echinodermata		
Asteroidea		
Odontaster mediterraneus Marenzeller, 1891	NWI	671–786
Ophiuroidea		
Amphiura filiformis (O. F. Muller, 1776)	SML	497–548
Echinoidea		
Brissopsis atlantica mediterranea Mortensen, 1913	NWI	671–679
Echinus acutus Lamarck, 1816	SML	671–790
Echinus melo Lamarck, 1816	NWI	671–679
Cidaris cidaris (Linnaeus, 1758)		464–1150
Holothuroidea		
Mesothuria intestinalis (Asc. Rathke, 1867)	NWI	671–679
Eostichopus regalis (Cuvier, 1817)		408–424
Pisces		
Chondrichthyes		
Centrophorus granulosus (Schneider, 1810)	SML	792–805
Chimaera monstrosa Linnaeus, 1758		500–678
Dalatias licha (Bonnaterre, 1788)		500–767
Etmopterus spinax (Linnaeus, 1758)		500–1100
Galeus melastomus Rafinesque, 1810		300–1100

Table 2 (*continued*)

Species	nr	Depth (m)
Hexanchus griseus (Bonnaterre, 1788)	SML	792–805
Leucoraja circularis (Couch, 1838)	SML	500–653
Dipturus oxyrinchus (Linnaeus, 1758)		653–1100
Osteichthyes		
Argentina sphyraena Linnaeus, 1758	SML	310–324
Arnoglossus rueppelii (Cocco, 1844)	SML	310–324
Bathypterois dubius Vaillant, 1888		1100
Benthocometes robustus (Goode & Bean, 1886)		464–678
Brama brama (Bonnaterre, 1788)	SML	644–653
Caelorinchus caelorhincus (Risso, 1810)		300–1100
Capros aper (Linnaeus, 1758)	SML	300–380
Chlorophthalmus agassizii Bonaparte, 1840	SML	300–561
Conger conger (Linnaeus, 1758)		300–805
Coryphaena hippurus Linnaeus, 1758	SML	487–553
Gadiculus argenteus Guichenot, 1850	SML	300–380
Gaidropsarus biscayensis (Collet, 1890)	SML	310–324
Helicolenus dactylopterus (Delaroche, 1809)		300–678
Hoplostethus mediterraneus Cuvier, 1829		500–800
Hymenocephalus italicus Giglioli, 1884		300–678
Lepidion lepidion (Risso, 1810)		1100
Lepidopus caudatus (Euphrasen, 1788)	SML	310–536
Lepidorhombus boscii (Risso, 1810)	SML	300–380
Lophius budegassa Spinola, 1807	SML	300–561
Lophius piscatorius Linnaeus, 1758	SML	310–324
Macroramphosus scolopax (Linnaeus, 1758)	SML	310–324
Merluccius merluccius (Linnaeus, 1758)	SML	300–653
Micromesistius poutassou (Risso, 1826)	SML	300–636
Molva dipterygia (Pennant, 1784)	SML	310–636
Mora moro (Risso, 1810)		500–1100
Nezumia sclerorhynchus (Valenciennes, 1838)		500–1100
Notacanthus bonaparte Risso, 1840		800–1100
Pagellus bogaraveo (Brünnich, 1768)	SML	487–553
Phycis blennoides (Brünnich, 1768)		300–805
Ruvettus pretiosus Cocco, 1833	SML	792–805
Trachyrincus scabrus (Rafinesque, 1810)	SML	500–561
Trigla lyra Linnaeus, 1758	SML	300–380

[a] endolithic species
[b] in gastropod and scaphopod shell.

annelids *Eunice norvegica*, *Harmothoë vesiculosa*, *Hyalopomatus madreporae* and *Subadyte* cfr. *pellucida* (courtesy of Ruth Barnich) were also found. Finally, 5 crustacean decapods *Bathynectes maravigna*, *Ebalia nux*, *Munida intermedia*, *M. tenuimana* and *Rochinia rissoana* were found in the cavities between the three-dimensional structure of the coral.

A total of 83 species, accounting for 37% of the total diversity, were found on the dead coral branches (DC). The foraminifer *P. dispansa*; both encrusting and massive sponges (36 species), that use the coral structure as hard substrate; 11 cnidarians species; 5 mollusc species among which the very abundant Arcidae *Asperarca nodulosa* and *Bathyarca philippiana*; 9 annelid species among which *E. norvegica* and 8 serpulids; 5 species of crustacean decapods; 15 bryozoan species; and the brachiopod *Megerlia truncata*.

Fifty-nine species (~27% of the total species diversity) were found in the coral rubble (CR). The occurrence of some gorgonian species was recorded settling on fragments of coral colonies, such as *Acanthogorgia hirsuta*, *Bebrice mollis*, *Callogorgia verticillata*, *Dendrobrachia* cfr. *fallax*, *Swiftia pallida* (courtesy of Pablo J. Lopez-Gonzalez) and *Paramuricea macrospina*.

Adjacent to the coral build-ups and isolated coral colonies 156 species were found: 9 sponges, 17 cnidarians, 2 sipunculans, 29 molluscs, 17 annelids, 20 crustaceans, 12 bryozoans, 1 brachiopod, 1 chaetognath, 8 echinoderms and 40 fish (8 Chondrichthyes and 32 Osteichthyes). Forty-four living species were found on hard substrates (HS) and 51 on soft substrates (SS).

3.3. Underwater videos

The high-resolution PLUTO 1000 ROV video surveys, as previously reported in Tursi et al. (2004), confirmed the patchy distribution of the SML coral banks. Moreover, the video showed the presence of two different living *facies* within the white coral biocoenosis. The first *facies* is characterized by the occurrence of massive sponges (*Poecillastra compressa*, *Pachastrella monilifera*, *Erylus papulifer*) and the second by the presence of the black coral *L. glaberrima*. So far, it seems that the first *facies* with fan-shaped colonies of *M. oculata* and massive sponges is located on muddy bottoms at the base of the coral mounds while the more bush-shaped colonies of *L. pertusa* and *M. oculata* and the arborescent colonies of the black coral *L. glaberrima* are distributed at the top and on the slope of the mounds (Rosso et al., 2010; Vertino et al., 2010). Moreover, the underwater video showed, on and around the coral colonies, abundant zooplankton and particulate matter that is food not only for the most widespread coral species (*M. oculata* and *L. pertusa*) but also for other zooplanktivourous species that live in this particular biocoenosis (Costello et al., 2005).

3.4. Main taxa

3.4.1. Foraminifera

Specimens of the large-sized species *Planopulvinulina dispansa* were common in some samples but other foraminiferan species thrive on the SML coral bank bottoms.

3.4.2. Porifera

A total of 36 species of Porifera were recorded (35 Demospongiae, 1 Hexactinellida) (Table 2), 5 of which are identified to genus level only, due to the very small size of the collected specimens and/or lack of relevant diagnostic characters.

The single Hexactinellida species belongs to the order Hexactinosida, family Tretodictyidae. The remaining species are Demospongiae, mostly belonging to the subclasses Tetractinomorpha and Ceractinomorpha. Among Tetractinomorpha, the order Astrophorida is the most represented with 5 families (Ancorinidae, Calthropellidae, Geodiidae, Pachastrellidae, Thrombidae) and 10 species. With regard to the Ceractinomorpha, the most represented order is Poecilosclerida, with 7 families (Microcionidae, Crellidae, Hymedesmiidae, Desmacellidae, Hamacanthidae, Latrunculiidae, Raspaillidae) and 10 species. The third subclass, Homoscleromorpha, is present with only 2 species belonging to the family Plakinidae. The Lithistid group is represented by 2 families (Azoricidae, Siphonidiidae) and 2 species.

According to Longo et al. (2005) the sponge assemblage associated with the SML coral bank is poorly known and contains numerous interesting species such as the Atlantic deep species *Crellastrina alecto*, *Plocamiopsis signata* and *Geodia nodastrella*.

The specimens previously recorded as *Antho* sp. (Longo et al., 2005) have been properly identified as *Plocamionida ambigua*. Four species (*Eurypon clavatum*, *Plakina monolopha*, *Plocamionida ambigua* and *Stoeba plicata*) and 3 taxa identified at *genus* level (*Spongosorites* sp., *Suberites* sp. 1, *Suberites* sp. 2) (Fig. 3a) are new records for the SML coral bank. Moreover, *P. monolopha* and *P. ambigua* represent two new records for the north-western Ionian Sea. The remaining 2 species (*E. clavatum* and *S. plicata*) are widely distributed in the Mediterranean Sea (Pansini and Longo, 2003).

P. monolopha and *S. plicata* are well-known species in the North Atlantic and Mediterranean Sea down to depths of 45 and 100 m, respectively (Borojevic et al., 1968; Pansini and Longo, 2003; Topsent, 1895; Vosmaer, 1933–1935). Moreover, *P. monolopha* has

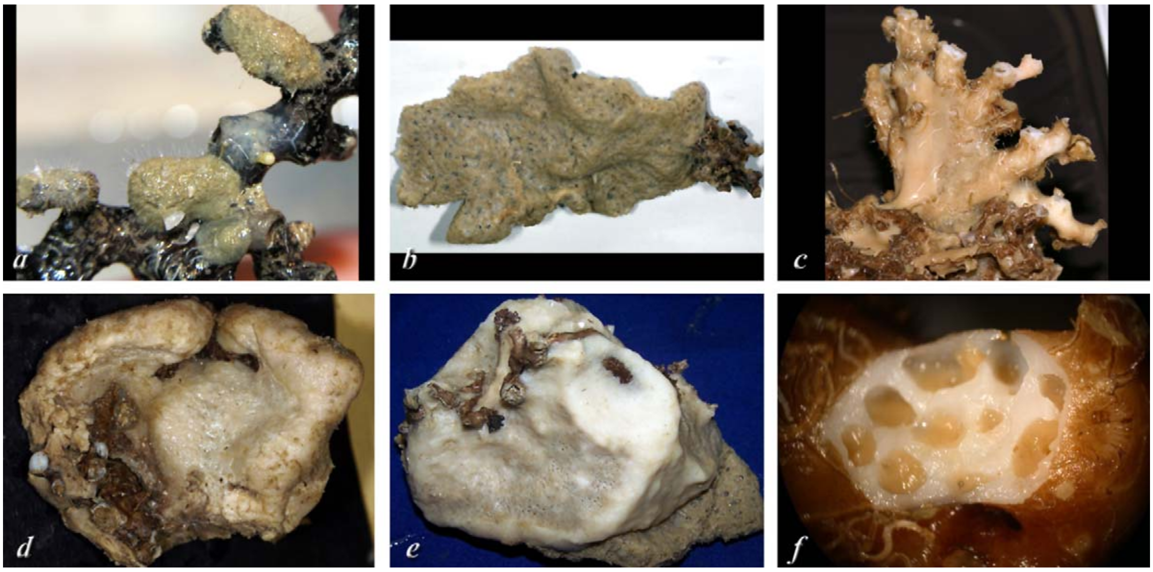

Fig. 3. Sponges associated with the white corals collected off Cape Santa Maria di Leuca. (a) *Spongosorites* sp.; (b) *Poecillastra compressa*; (c) *Thrombus abyssi*; (d) *Pachastrella monilifera*; (e) *Erylus papulifer*, (f) *Spiroxya levispira*.

been recorded at 70–120 m in the Alboran Sea associated with red coral bottoms (Maldonado, 1992). *E. clavatum* and *P. ambigua*, found deeper than the previous species, have been reported on stones and associated with *Lophelia* reefs in the North Atlantic (Arndt, 1935; Rogers, 1999; van Soest and Lavaleye, 2005) and in the Mediterranean Sea down to depths of 420 and 1750 m, respectively (Vacelet, 1969; Uriz and Rosell, 1990).

The most common species, occurring at almost all the stations where sponges were found, are *Desmacella inornata*, *Poecillastra compressa* (Fig. 3b) and *Sceptrella insignis. Erylus papulifer* and *Thrombus abyssi* (Fig. 3c) were found in 6 stations, whereas a large number of the remaining species were only found at one station.

Sponges were mostly found overgrowing the dead branches of coral colonies and no sponge colonizing soft bottoms was found.

The sponge assemblage consists of a high number of small and encrusting species whereas few massive species occur, mainly belonging to the Astrophorida order, *Pachastrella monilifera* (Fig. 3d), *Pachastrissa pathologica*, *E. papulifer* (Fig. 3e), *Isops anceps* and *P. compressa* (Fig. 3b), together with *Leiodermatium* cfr. *lynceus*.

According to the literature (Jensen and Frederiksen, 1992; Longo et al., 2005; van Soest and Lavaleye, 2005) the present study confirms a rather scarce presence of boring sponges in dead coral colonies of *L. pertusa* and *M. oculata*, with only three taxa recorded: *Cliona* sp., *Spiroxya heteroclite* and *S. levispira* (Fig. 3f).

3.4.3. Cnidaria

A total of 31 cnidarian species were collected (6 Gorgonacea, 2 Anthipataria, 6 Actiniaria, 6 Scleractinia, 1 Zoantharia, 1 Scyphozoa and 9 Hydrozoa), 21 of which are reported for the first time in the SML coral banks and 15 for the first time in the north-western Ionian Sea (Table 2). Indeed, they were not reported in Tursi et al. (2004) or in Morri et al. (2008).

Four out of the 6 gorgonian species represent new records for the north-western Ionian Sea: *Bebryce mollis* (Fig. 4a), *Swiftia pallida* (Fig. 4b), *Paramuricea macrospina* (Fig. 4c) and *Dendrobrachia* cfr. *fallax* (Fig. 4d). The first 3 species often colonize rocky bottoms, from the continental shelf and the upper slope, down to 300 m in depth (Carpine and Grasshoff, 1975) while on the SML bank they have been found down to about 800 m. *D.* cfr. *fallax* is a very rare species found for the first time in the Mediterranean Sea by Zibrowius and Taviani (2005) in the Sicily Strait and in the Alboran Sea and for the first time the on SML banks at a depth of 747 m.

The antipatharian *Anthipathes dichotoma* with its typical dichotomic colonies (Fig. 9d, e, Vertino et al., 2010) represents the first record in the north-western Ionian Sea. In fact this area is not included in the geographic distribution of this species (Morri et al., 2008). Moreover, the underwater video showed beautiful large-sized colonies of *L. glaberrima* (Fig. 4i) with double pigmentation of the polyps (cream and orange).

All of the 5 actinian species represent new records for the north-western Ionian Sea. Three of these, namely *Amphianthus dohrni* (Fig. 4e), *Sagartia elegans* (Fig. 4f) and *S. troglodytes*, are commensal species (Buhl-Mortensen and Mortensen, 2004) of *M. oculata*, *L. glaberrima* and *P. macrospina. Kadophellia bathyalis* (courtesy of Helmut Zibrowius) (Fig. 4g), a bathyal species recently described by Tur (1991) and found in the biological samples taken on Mediterranean Seamount (Galil and Zibrowius, 1998), is very common on dead coral colonies and on hard substrates from the SML banks. Finally, *Peachia cylindrica* (Fig. 4h) has been found in soft substrates at 530 m. The undetermined Actiniaria (Fig. 4j and k), was found near coral banks in soft substrates at about 550 m in depth.

Six scleractinian species were recovered, namely the colonial frame-building species *M. oculata* and *L. pertusa*, the colonial species *Dendrophyllia cornigera* (Fig. 4l) alive down to 501 m depth and 3 solitary species *Desmophyllum dianthus*, *Stenocyathus vermiformis* and *Caryophyllia calveri* (Fig. 4m). The first two species are widespread on living and dead coral colonies and also on all hard substrates while *C. calveri*, recorded for the first time from the area, was only found on hard bottoms. Dead specimens of the latter species are used as a substrate by juveniles belonging to the same species as observed for the Eratosthenes Seamount (Galil and Zibrowius, 1998).

One Zoantharia belonging to the genus *Epizoanthus* was found as a parasite on *M. oculata* and *L. glaberrima* that are progressively overgrown (Galil and Zibrowius, 1998). *Epizoanthus* sp. showed a yellowish colour that turned red (Fig. 4n) in formalin-preserved specimens (Zibrowius and Taviani, 2005).

Finally, a great number of Stephaniscyphistoma, the benthic stage of bathypelagic medusae (Scyphozoa) (family Coronatae)

Fig. 4. Cnidarians associated with the white corals collected off Cape Santa Maria di Leuca. (a) *Bebryce mollis*; (b) *Swiftia pallida*; (c) *Paramuricea macrospina*; (d) *Dendrobrachia* cfr. *fallax*; (e) *Amphianthus dorhni*; (f) *Sargatia elegans*; (g) *Kadophellia bathyalis*; (h) *Peachia cylindrica*, (i) *Leiopathes glaberrima*; (j) and (k) undetermined Actiniaria; (l) *Dendrophyllia cornigera*; (m) *Caryophyllia calveri*; (n) *Epizoanthus* sp., (o) *Nausithoe* sp., (p) *Nemertesia antennina*.

belonging to the genus *Nausithoe* (Fig. 4o), was found as reported for other coral banks (Jarms et al., 2003).

Nine Hydrozoan species were found (Table 2), 4 of which are new records for the north-western Ionian coast: *Halecium labrosum*, *Acryptolaria conferta*, *Nemertesia ramosa* and *Nemertesia antennina*. Indeed, these species are not reported for the north-western Ionian Sea in the check-list of Hydrozoa (Gravili and Boero, 2008).

Within the family Tubulariidae, only *Hybocodon prolifer* (Bouillon et al., 2004) has been recorded with some doubt, due to the bad condition of the specimens. It was found in the SML bank at about 500 m in depth. This widely distributed species (Bouillon et al., 2004), was previously known only from the western Mediterranean (Gili, 1986; Medel and López-Gonzáles, 1996).

Regarding the species belonging to the family Haleciidae, *H. labrosum* (Bouillon et al., 2004) was found on a living coral bank and on the bottoms around the coral banks in a depth range from 513 to 577 m. It is a boreal species recorded from both the eastern and western Mediterranean (Motz-Kossowska, 1911; Gili, 1986;

Medel and López-Gonzáles, 1996), the Ligurian Sea (Rossi, 1961; Sarà et al., 1978; Morri and Bianchi, 1983; Boero and Fresi, 1986), and from the Adriatic Sea (Pieper, 1884; Bouillon et al., 2004). This species is also recorded from the eastern and western Atlantic, Pacific, Arctic (Bouillon et al., 2004). *H. labrosum* is common between 0.5 and 20 m depth in the Ligurian Sea (Boero and Fresi, 1986) while Cornelius (1995) reported a depth range from 5 to 200 m. This species had not previously been recorded from Apulian Waters and the present record is probably the deepest one ever reported.

Concerning the Lafoeidae family, *A. conferta* (Bouillon et al., 2004) was found at 513 m. It is a cosmopolitan species, common on coral fragments even at depths of 1000 m (Ramil and Vervoort, 1992). It has been previously recorded from the Spanish Mediterranean coast (Ramil and Vervoort, 1992; Medel and López-Gonzáles, 1996), the French Mediterranean coast (Marinopoulos, 1981), the Ligurian Sea (Rossi, 1950) and the Tyrrhenian Sea (Lo Bianco, 1903; Avian et al., 1995).

As for the Laodiceidae family, *Laodicea undulata* (Bouillon et al., 2004) has been found on bottoms around coral build-ups at 790 m. *L. undulata*, recorded from the western and eastern Mediterranean Sea (Bouillon et al., 2004), is a tropical-Atlantic species. It was found, in the medusa stage, from the Ionian Sea (Messina) (Gegenbaur, 1856), the Adriatic Sea (Graeffe, 1884; Neppi and Stiasny, 1913) and the Tyrrhenian Sea (Brinckmann-Voss, 1987). The polyp stage is known from the Tyrrhenian Sea (Riedl, 1959), the Ligurian Sea (Repetto et al., 1977; Boero and Fresi, 1986) and from along the Apulian Ionian coast (De Vito et al., 2006).

Concerning the Mitrocomidae family, *Mitrocoma annae* (Bouillon et al., 2004) has been identified with some doubt due to specimen conditions. It was found on sea bottoms around coral banks at 540 m. *M. annae* is endemic to the Mediterranean Sea and has been recorded, in the medusa stage, from the western Mediterranean Sea (Spagnolini, 1877; Vanhöffen, 1913; Caziot, 1921), the Ligurian Sea (Rossi, 1950), the Tyrrhenian Sea (Lo Bianco, 1909; Neppi, 1919; Brinckmann-Voss, 1987), the Adriatic Sea (Benovic and Lucic, 1996), and, in the polyp stage, from the eastern Mediterranean Sea (Morri and Bianchi, 1999; Morri et al., 1999), the Ligurian Sea (Boero and Fresi, 1986) and from the Apulian coasts (Faucci and Boero, 2000).

For the family Plumulariidae, *N. antennina* (Bouillon et al., 2004) was found on the SML living coral banks at 513 m. It is a cosmopolitan species present in the western Mediterranean, Ligurian, Tyrrhenian, and Adriatic Seas (Bouillon et al., 2004) and has been recorded along the Apulian Adriatic coast by Marano et al. (1991). The collected specimens showed a "propagular formation" at the top of the colony (Fig. 4p), never previously described for this species. It might be detached from the colony to enhance dispersal. A fertile specimen of *N. ramosa* (Bouillon et al., 2004) was found on living corals at 513 m. This species shows a tropical-Atlantic distribution as well as throughout the Mediterranean (Bouillon et al., 2004), including Italian Waters and the Apulian Adriatic coast (Marano et al., 1991).

Finally, for the family Campanulariidae, *Clytia linearis* (Bouillon et al., 2004) was found on the hydrozoan *H. labrosum* and on a coral fragment at 548 and 577 m. It is one of the most common Mediterranean hydroid species (Bouillon et al., 2004; Boero et al., 2005) and has been recorded from the Ligurian Sea (Rossi, 1961; Sarà et al., 1978; Boero, 1981a; Boero and Fresi, 1986; Morri et al., 1991), the Tyrrhenian Sea (Riedl, 1966; Boero, 1981b; Ardizzone et al., 1982; Fresi et al., 1982; Morri et al., 1991; Balduzzi et al., 1995; Piraino et al., 1999), the Ionian Sea (Miglietta et al., 2000; Boero et al., in press), the Adriatic Sea (Miglietta et al., 2000; Boero et al., in press), the Spanish coast (Gili, 1986; Medel and López-Gonzáles, 1996), the Alboran Sea off the Moroccan coast (Ramil and Vervoort, 1992), the French coast (Marinopoulos, 1981), and from the eastern Mediterranean Sea (Marinopoulos, 1979; Morri and Bianchi, 1999). This circumtropical species (Bouillon et al., 2004) has recently been widening its distribution along the Atlantic coast of the Iberian peninsula (Altuna Prados, 1995). *C. linearis* is commonly reported from 1 to 20 m depth (Rossi, 1961; Boero and Fresi, 1986; Gili, 1986). Only a few authors have reported its occurrence from deeper waters up to 200 m (Marinopoulos, 1979; Ramil and Vervoort, 1992). The present record below 500 m is the deepest in the Mediterranean.

3.4.4. Sipuncula

Two Sipuncula species new for the SML bank have been found, namely *Apionsoma murinae bilobatae* and *Aspidosiphon muelleri*. The former, a northern Atlantic species also well known in the Mediterranean Sea, was found on soft substrate at about 780 m depth. The latter, a common species often found within gastropod and scaphopod shells (Pancucci-Papadopoulou et al., 1999; Pancucci-Papadopoulou, 2006), was collected at about 530 m depth.

3.4.5. Mollusca

The Mollusca phylum is represented by 35 living species (8 Gastropoda, 14 Bivalvia, 1 Scaphopoda and 12 Cephalopoda). Thirty of them are new records for SML banks; moreover, the bivalve *Pseudamussium sulcatus* is a new record for the north-western Ionian Sea, not yet reported in the recent check-list of Bivalvia (Schiaparelli, 2006).

The gastropods *Danilia tinei* (Fig. 5a), *Discotectonica discus* (Fig. 5b), *Putzeysia wiseri* (Fig. 5c) and *Alvania cimicoides* were found on living colonies of *M. oculata*. *Emarginula adriatica* (Fig. 5d) was found on dead coral colonies while *Benthonella tenella*, *Euspira fusca* (Fig. 5e) and *Nassarius lima* were collected on soft substrates around coral colonies.

Regarding the species that live on white coral colonies, *D. tinei* is the only Mediterranean Trochidae with a characteristic thickened external *labium* evident in the adult specimens. In contrast, the juvenile specimens of this species showed a shell shape that was similar to the shell of the co-generic species *D. costellata*. *Danilia tinei* is widespread in the Mediterranea Sea and along the Atlantic coast of Portugal (Ghisotti and Melone, 1971). *Discotectonica discus* is the largest Architectonicidae of the Mediterranean Sea (Melone and Taviani, 1985). It is distributed in the Mediterranean and north-eastern Atlantic. *Putzeysia wiseri*, described as a fossil by Calcara (1842), seldom was found alive (Ghisotti and Melone, 1971; Guidastri et al., 1984). *Alvania cimicoides* is a detrivorous of bathyal muddy bottom (Fretter and Graham, 1978). Finally, *E. adriatica* is a Fissurellidae widespread throughout the Mediterranea Sea (Oliverio, 2006). It has been found at about 800 m depth in the SML coral banks (Tursi et al., 2004).

With regard to Bivalvia, besides the very common Arcidae *Asperarca nodulosa* (Fig. 5f) and *Bathyarca philippiana* (Fig. 5g) collected on dead colonies and hard substrates, a great number of *Delectopecten vitreus* specimens were found (Fig. 5h) on both living and dead coral colonies. The specimens of *D. vitreus* found on the SML banks showed a fragile shell with a particular ornament of concentric rows of small scales and vesicles as reported by Schein (1989) for the variety of *D. vitreus vitreus*. This Pectinidae, with a long planktotrophic development (Dijkstra and Gofas, 2004), is able to disperse for long-distance and to colonise a variety of hard substrates on bathyal bottom. Specimens of *D. vitreus* were found not only on coral colonies but also on artificial substrates such as plastic bags and remains of longlines. Some living specimens of *Spondylus gussonii* (Fig. 5i) were found on firm substrates including living coral branches. Living specimens of these two latter species

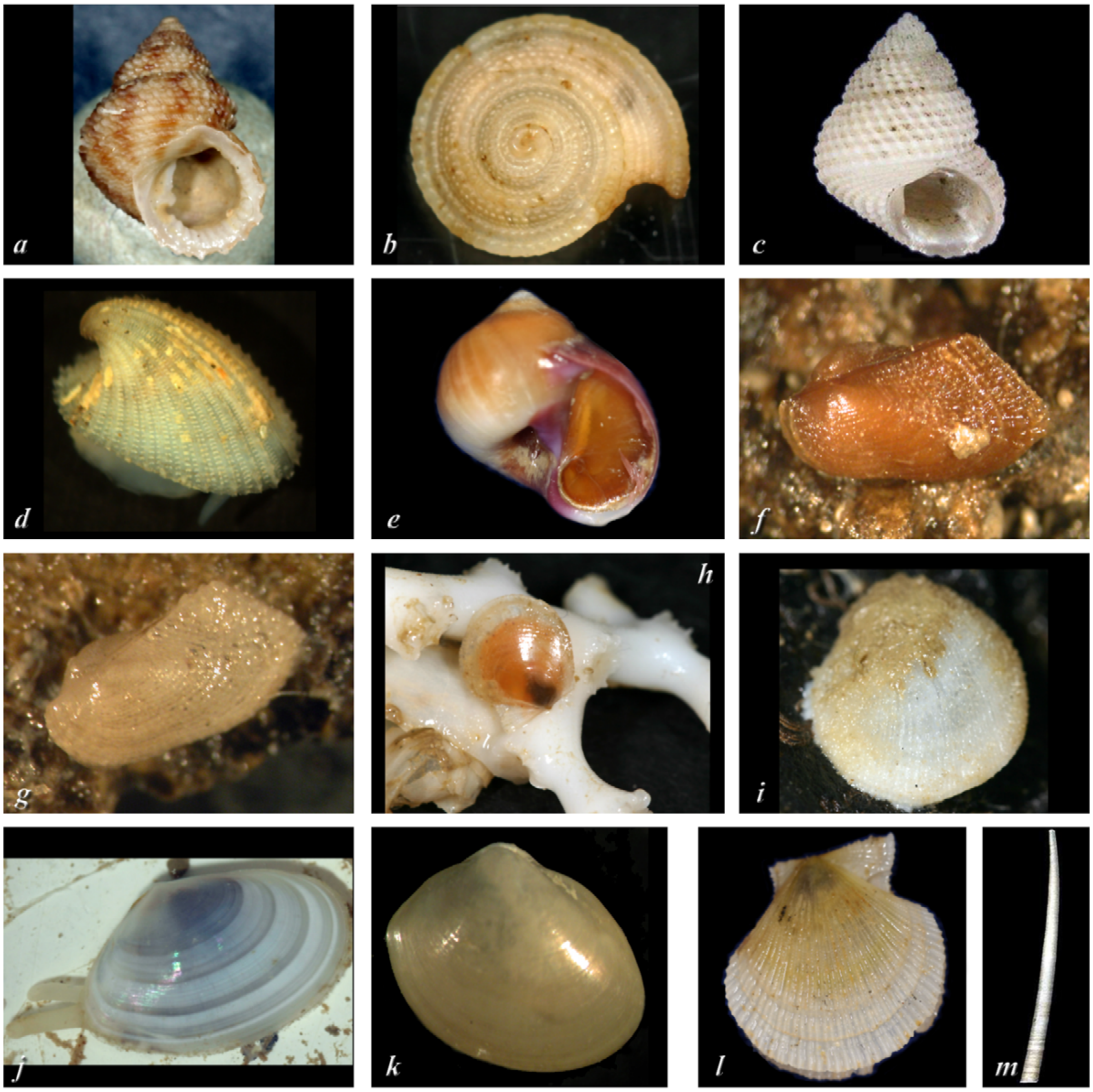

Fig. 5. Molluscs associated with the white corals collected off Cape Santa Maria di Leuca. (a) *Danilia tinei*; (b) *Discotectonica discus*; (c) *Putzeysia wiseri*; (d) *Emarginula adriatica*; (e) *Euspira fusca*; (f) *Asperarca nodulosa*; (g) *Bathyarca philippiana*; (h) *Delectopecten vitreus*; (i) *Spondylus gussonii*; (j) *Abra longicallus*; (k) *Ennucula aegeensis*; (l) *Pseudamussium sulcatum*; (m) *Antalis agilis*.

were collected for the first time in the SML coral banks by Tursi et al. (2004). Moreover, 9 bivalve and 1 scaphopod living species, belonging to the typical *facies* at *Abra longicallus* (Di Geronimo and Panetta, 1973) were found on the muddy bottoms around the coral colonies, namely *A. longicallus* (Fig. 5j), *Bathyarca pectunculoides*, *Kelliella abyssicola*, *Notolimea crassa*, *Ennucula aegeensis* (Fig. 5k), *Pseudamussium sulcatum* (Fig. 5l), *Parvamussium fenestratum*, *Yoldiella lucida*, *Y. philippiana* and the scaphopod *Antalis agilis* (Fig. 5m).

Finally, 12 cephalopod species, frequently caught on the muddy bottoms (e.g., Maiorano et al., 1999), were sampled using the trawl net in the areas around the coral colonies at depths between 300 and 680 m.

3.4.6. Annelida

Twenty-four Annelida species were collected (1 Capitellidae, 1 Eunicidae, 2 Hesionidae, 2 Lumbrineridae, 1 Nephtyidae, 1 Onuphidae, 1 Owenidae, 1 Phyllodocidae, 2 Polynoidae, 1 Sabellariidae, 9 Serpulidae, 1 Sigalionidae and 1 Terebellidae), 16 of which are new for the SML banks and 3, namely *Harmothoë vesiculosa*, *Nephtys* cfr. *paradoxa* and *Phalacrostemma* sp. are new records for the north-western Ionian Sea. Indeed they were not reported in this area in the recent check-list of Annelida (Castelli et al., 2008) (Table 2). Moreover, the finding of *Harmothoë vesiculosa* specimens represents the first record for the Mediterranean Sea. This rare species also has been found along the Atlantic coasts (Type locality SW of Ireland) and in the Canyon de Belle Ile (Bay of Biscay) at 1180 m depth (Ruth Barnich personal communication). The occurence of *H. vesiculosa* and *Subadyte* cfr. *pellucida* on living coral colonies is also interesting. In fact, the co-generic species *Harmothoë oculinarum* and other species of Polynoidae have been reported as common symbiotic species on Atlantic deep-water coral banks (Jensen and Frederiksen, 1992; Buhl-Mortensen and Mortensen, 2004).

Eunice norvegica (Fig. 6a) is a very common species in both *Madrepora* and *Lophelia* colonies. This Eunicidae feeds on food particles captured by the coral polyps, thus it may be considered as a kleptoparasitic species. However, it also exhibits mutualistic behaviour when it cleans the coral surface, attacks invading mobile organisms (Mortensen, 2001), or when it is able to move the coral fragments and aggregate them maintaining the integrity

Fig. 6. Annelids and Crustaceans associated with the white corals collected off Cape of Santa Maria di Leuca. (a) *Eunice norvegica*; (b) *Metavermilia multicristata*; (c) *Vermiliopsis monodiscus*; (d) *Serpula vermicularis*; (e) *Vermiliopsis eliasoni*; (f) *Phalacrostemma* sp. with detail of outer paleae of operculum and setae of parathoracic setigers; (g) *Stylocheiron suhmii*; (h) *Alpheus platydactylus*; (i) *Bathynectes maravigna*; (j) *Ebalia nux*; (k) *Munida* spp.; (l): *Rochinia rissoana*; (m) *Pandalina profunda*; (n) *Plesionika acanthonotus* ; (o) *Plesionika martia*.

of the colonies (Roberts, 2005). Moreover, the calcification of the sinuous parchment tube of *Eunice* by both *L. pertusa* and *M. oculata* increases the strength of the colonies (Roberts, 2005). For these reasons *E. norvegica* may be considered a true mutualist species in symbiosis with deep-coral species (Buhl-Mortensen and Mortensen, 2004).

The sampled serpulids were *Filogranula gracilis*, *Metavermilia multicristata* (Fig. 6b), *Vermiliopsis monodiscus* (Fig. 6c), *Serpula vermicularis* (Fig. 6d), *V. eliasoni* (Fig. 6e), *Filograna implexa*, *Filogranula stellata, Janita fimbriata* and *Hyalopomatus madreporae* (Table 2). The first two species, widespread in the eastern Atlantic and throughout the Mediterranean, are the most abundant. They usually colonise deep-circalittoral to bathyal bottoms and, less frequently, shallower bottoms where they thrive in cryptic habitats within concretions (Zibrowius, 1968a; Ben-Eliahu and Fiege, 1996) and submarine caves (Bianchi and Sanfilippo, 2003).

They are already known to live on deep scleractinians (*M. oculata*, *D. cornigera*) from the Mediterranean Sea (Zibrowius, 1968a, 1971; Di Geronimo et al., 1993; Bourcier and Zibrowius, 1973). The micro-serpulid *H. madreporae* has been till now recorded only from the SML area (Sanfilippo, 2009). *V. monodiscus* seems to be an endemic Mediterranean species, although it is rarer in the Levantine Basin (Zibrowius, 1968b; Ben Eliahu and Fiege, 1996). The other species are known from both Atlantic and Mediterranean bathyal bottoms and have been recorded from the northern Ionian Sea, even if some are rare. In particular, *V. eliasoni*, an eastern Atlantic species, formerly described from off Portugal (Zibrowius, 1970), has only recently been recorded from the SML area (Tursi et al., 2004) living on white corals. In the examined material, *V. monodiscus* and *S. vermicularis* were found living on both dead coral colonies and rocky substrates, whereas *F. gracilis*, *H. madreporae* and *V. eliasoni* seem to settle preferentially on coral branches. No preference has been detected for other species as they were found only occasionally.

The highest diversity of Polychaeta occurred in the soft sediment around the coral bank. The finding of a specimen of *Phalacrostemma* sp. (Fig. 6f), a small abyssal species of Sabellariidae, represents a new record for the Ionian Sea. *Nephtys paradoxa* and *Leocrates atlanticus* are well-known species characteristic of assemblages colonising deep-water muddy bottoms whereas *Nothria conchilega* occurs on detritic substrata (Bellan Santini et al., 1998).

The record of *Leiochrides* sp., first reported by Harmelin (1964) and later by Gravina and Somaschini (1990), adds some information on the occurrence of this *genus* in the Mediterranean Sea.

3.4.7. Crustacea

A total of 23 crustacean species (2 Ostracoda, 1 Euphasiacea and 20 Decapoda) were collected in the sampled area; 11 of them are new records for SML and 2 are new records for the north-western Ionian Sea (Table 2), namely the decapods *Alpheus platydactylus* (Fig. 6h) and *Pandalina profunda* (Fig. 6m) not reported in the study area in the recent check-list of crustacean decapods (Froglia, 2006).

Two ostracods, *Bythocypris obtusata* and *Bairdia conformis*, were detected, both typically thriving in soft muddy bottoms and also in muddy pockets between coral branches. The former species is well known from the Atlantic–Mediterranean region at depths between 600 and 2700 m (Bonaduce et al., 1983) while the latter is widespread from infralittoral down to bathyal bottoms (Bonaduce et al., 1983; Montenegro et al., 1996).

The only Euphasiacea species sampled, *Stylocheiron suhmii* (Fig. 6g), occurred in the planktonic nets of the sledge dredge, where it was found to be very abundant.

Decapoda were the most abundant crustaceans in the samples. Most of them, such as *Aristaeomorpha foliacea*, *Aristeus antennatus*, *Bathynectes maravigna*, *Nephrops norvegicus*, *Parapenaeus longirostris*, *Plesionika acanthonotus*, *P. heterocarpus*, *P. martia*, and *Polycheles typhlops* are also common on the muddy bottoms outside the coral banks and their distribution in the north-western Ionian Sea is already well known (D'Onghia et al., 1998a, b, 2003; Maiorano et al., 1998, 2002; Abelló et al., 2001; Company et al., 2004). These decapods, previously recorded as accompanying and co-occurring species in the SML coral bank (Tursi et al., 2004), were collected using a trawl net on the soft bottoms adjacent to the coral bank.

Very few species, namely *Bathynectes maravigna* (Fig. 6i), *Ebalia nux* (Fig. 6j), *Munida intermedia*, *M. tenuimana* (Fig. 6k) and *Rochinia rissoana* (Fig. 6l) were sampled inside the coral skeletal structures using different dredges, the modified ‘‘ingegno'' and the trap. The strictly benthic habits of these species allow them to inhabit close and sometimes inside the three-dimensional framework formed by the coral colonies, where *B. maravigna* and *M. tenuimana* were also recorded by ROV. Other associations between corals and squat lobsters of the different genera *Eumunida* and *Munidopsis* have been previously documented in the Pacific Ocean (Saint Laurent and Macpherson, 1990) and in the North Atlantic (Dons, 1944; Mortensen, 2001), respectively.

Concerning the new records, *A. platydactylus* (courtesy of Carlo Froglia) (Fig. 6h) was caught in the coral rubble at 679 m using an Agassiz trawl and outside the coral bank at 538 m depth using a rectangular dredge, while *P. profunda* (Fig. 6m) was collected at a depth of 525–536 m using the epibenthic dredge outside the coral bank.

A. platydactylus also has been recorded in the western Mediterranean by different authors (Forest, 1965; Crosnier and Forest, 1973; Noël, 1993), while it only occurs in the eastern basin of the Aegean Sea (Koukouras et al., 1992, 1993). The presence of *P. profunda* has been widely reported in the western Mediterranean (Zariquiey Álvarez, 1968; Relini Orsi, 1978; Garcia Raso, 1985; Carbonell and Abellò, 1998), while in the eastern basin it seems to be limited to the Aegean Sea (Koukouras et al., 1996) and to the Turkish Seas (Kocataş and Katağan, 2003). In the central Mediterranean it has only been recorded in the Adriatic Sea (Froglia, 1979). As for the other decapod species previously reported in the Ionian basin, *P. acanthonotus* (Fig. 6n), and *P. martia* (Fig. 6o), their occurrence in the coral bank community down to 1100 m extends their known depth range of occurrence in the Ionian Sea. In fact, *P. acanthonotus* and *P. martia* had been previously collected in this basin down to 1000 and 676 m, respectively (Maiorano et al., 2002; Company et al., 2004).

3.4.8. Bryozoa

A total of 19 living bryozoan taxa (Table 2) were found.

Cheilostomes sharply dominate with 14 species, namely *Aetea sica*, *Copidozoum exiguum*, *Setosellina capriensis*, *Setosella folini*, *S. vulnerata*, *Scrupocellaria delilii* (Fig. 7a), *Puellina* (*Glabrilaria*) *pedunculata*, *P.* (*Cribrilaria*) *pseudoradiata pseudoradiata*, *Smittina crystallina*, *Tessaradoma boreale*, *Schizomavella fischeri*, *Schizoporella neptuni* (Fig. 7b), *Reteporella sparteli* and *Herentia hyndmanni* (Fig. 7c). Cyclostomes were collected with 4 taxa, namely *Crisiidae* sp., *Anguisia verrucosa*, *Tervia barrieri* (Fig. 7d) and *Idmidronea* sp. 1. A ctenostome was found with a single indetermined taxon. All cheilostomes were determined at species rank, except for a single sub-specific taxon. Conversely, some cyclostomes, reported at generic or suprageneric level, represent new taxa, for which additional material is needed for a complete description and attribution. Furthermore, the collection of *A. verrucosa*, *T. barrieri*, *S. fischeri* and *S. folini* allowed these four species, which were previously unknown from the area, to be added in the new version of the bryozoan checklist from the Italian waters (Rosso et al., in press). The list greatly outnumbers the 3 species previously known from first surveys in the area (Rosso, 2003).

Living bryozoan colonies are usually a subordinate component within the SML benthos. Species mainly exhibit encrusting and erect colonies, both rigid and flexible. Erect rigid colonies are small-sized and poorly branched whereas the flexible ones are usually bush-shaped. Encrusting species develop unilaminar small colonies or grow as uniserial runners. No bryozoans were found on living coral tissue and, although most species grow on the exposed portions of the skeletons of living coral colonies, only two of them (*S. fischeri* and *S. neptuni*) seem to preferentially select frame-building corals as their substratum. In contrast, most species colonize all kinds of available hard substrata, particularly coral skeletons, skeletal and hard ground fragments and have been previously reported as coral encrusters (Zabala et al., 1993). Finally, only few species are able to directly colonize soft bottoms

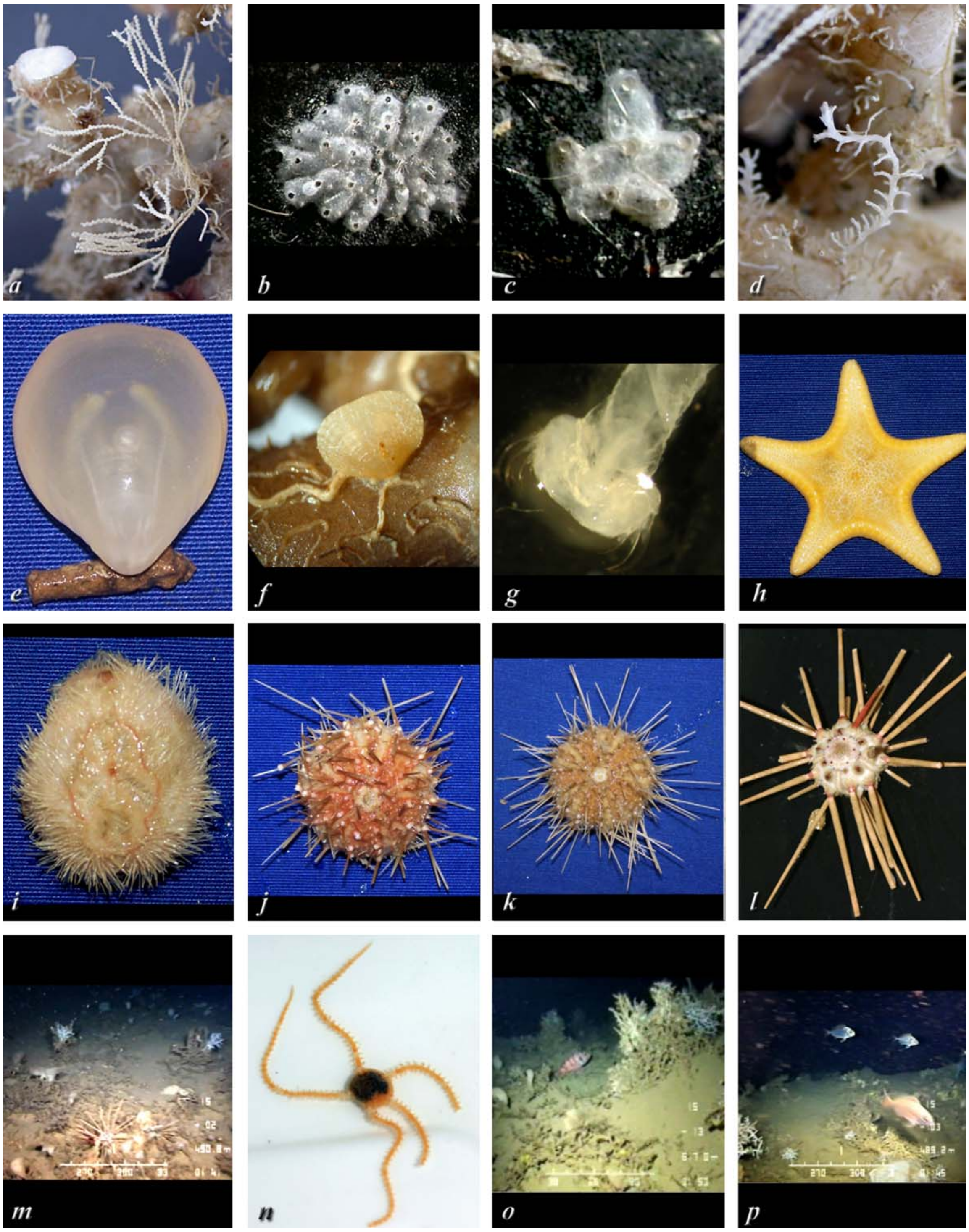

Fig. 7. Bryozoans, Brachiopods, Chetognata, Echinoderms and Fishes associated with the white corals collected off Cape Santa Maria di Leuca. (a) *Scrupocellaria delilii*; (b) *Schizoporella neptuni*; (c) *Herentia hyndmanni*; (d) *Tervia barrieri*; (e) *Gryphus vitrerus*; (f) *Megerlia truncata*; (g) *Flaccisagitta hexaptera*; (h) *Odontaster mediterraneus*; (i) *Brissopsis atlantica mediterranea*; (j) *Echinus melo*; (k) *Echinus acutus*; (l) *Cidaris cidaris*; (m) *C. cidaris* near the coral colonies; (n) *Amphiura filiformis*; (o) *Helicolenus dactylopterus* near the coral colonies; (p) School of *Pagellus bogaraveo* on the coral bank.

encrusting small-sized (millimetric) clasts (*S. capriensis* and also some *S. vulnerata* colonies) or seemingly free lying on the bottom (*S. folini*). A few species constitute the bulk of the bryozoan associations, namely the cheilostomes *S. delilii*, *T. boreale* and *C. exiguum* and the cyclostomes *Idmidronea* sp. 1 and *T. barrieri*. Nearly all the other species are represented by very few, sporadic specimens, except for *S. crystallina* and *H. hyndmanni*.

Most species have an Atlantic–Mediterranean distribution, except for a few, which can be presently considered as Mediterranean endemics. Furthermore, they are restricted to bathyal environments or extend up to the outer or midshelf and only some of these species have also been found within submarine dark caves in shallow waters.

Copidozoum exiguum, *S. vulnerata* and *T. boreale* thrive from the middle shelf (circalittoral zone) to the upper slope, at least down to 500 m in the Mediterranean and deepen in the Atlantic (Harmelin, 1979; Rosso and Di Geronimo, 1998), whereas *H. hyndmanni* is slightly shallower (Harmelin and d'Hondt, 1992a; Rosso, 1996; Hayward and Ryland, 1999; Berning et al., 2008). *Smittina crystallina* and *S. neptuni* show a deeper upper bathymetric limit, being restricted to the shelf-break, the shallowest distribution sites being located in upwelling areas (Harmelin and d'Hondt, 1992a).

Other species, such as the common *R. sparteli* and *A. verrucosa*, and the rarer *S. folini* and *S. fischeri*, are restricted to bathyal environments (Jullien, 1882; Harmelin, 1977; Hayward, 1981; Harmelin and d'Hondt, 1992a, b; Rosso and Di Geronimo, 1998), the latter species having previously been recorded only once from the Mediterranean, in the Sicily Straits, from 320 and 600 m (d'Hondt, 1974).

Three taxa *P. p. pseudoradiata*, *P. pedunculata* and *S. capriensis* have been considered Mediterranean endemics, though the former two are also found in the Atlantic, within the deep Mediterranean outflowing waters (Harmelin and d'Hondt, 1992a). *P. p. pseudoradiata* seems restricted to upper bathyal bottoms (Harmelin and Aristegui, 1988; Harmelin and d'Hondt, 1992a). In contrast, *P. pedunculata* was previously known exclusively as a sciaphilic species typical of completely dark submarine caves and crevices within biogenic concretions at depths of 100–200 m (Gautier, 1962; Harmelin, 1970; Chimenz Gusso et al., 2006; Rosso, unpublished data) and the record at 528 m in depth on the Apulian plateau significantly widens its bathymetric distribution. Furthermore, samples from Leuca (513 and 790 m) delivered the first living specimens of *T. barrieri* and *Idmidronea* sp. 1, already known as fossils from the Mediterranean (Di Geronimo et al., 1998; Rosso, 1998; Rosso and Di Geronimo, 1998; Rosso, 2005, unpublished data).

Finally, *S. delilii* and *A. sica* are euryecious, particularly eurybathic, common species.

3.4.9. Brachiopoda

Two living brachiopoda were found, *Gryphus vitreus* (Fig. 7e), a rheophilic species very abundant in the MS4 and MS6 areas but not sampled during the previous study (Tursi et al., 2004) and *Megerlia truncata* (Fig. 7f) a common and widespread eurybathic species (Logan, 1979) found on dead *Madrepora* colonies.

3.4.10. Chaetognatha

One epibenthic Chetognata species *Flaccisagitta hexaptera* (Fig. 7g), was found caught with planktonic nets placed on the epibenthic sledge dredge.

3.4.11. Echinodermata

Eight Echinodermata species were found (1 Asteroidea, 4 Echinoidea, 2 Holothuroidea, 1 Ophiuridae) four of which, namely the Asteroidea *Odontaster mediterraneus* (Fig. 7h), the sea urchins *Bryssopsis atlantica mediterranea* (Fig. 7i) and *Echinus melo* (Fig. 7j) and the sea cucumber *Mesothuria intestinalis* are new records for the north-western Ionian Sea. Indeed they were not reported in this area in the recent check-list of Echinodermata (Matarrese, 2006).

The sea star *O. mediterraneus* was found in the SML coral bank within a depth range from 671 to 786 m. This species was previously reported from the eastern and southern Mediterranean Sea (Tortonese, 1965), Sardinian Waters (Piras, 1972), and along the Italian Adriatic coast (Fabiano, 1976; Ungaro, 1995). The heart urchin *B. atlantica mediterranea*, the regular urchin *E. melo*, and the sea cucumber *M. intestinalis* were recorded at about 700 m in depth, using the Agassiz trawl, in an area with muddy bottoms colonised by living coral colonies (sampling station 76). These 3 last species were previously reported from the Mediterranean Sea in the Tyrrhenian and Adriatic Sea (Tortonese, 1965; Lacour and Néraudeau, 2000; Matarrese, 2006). *E. melo* was found together with the co-generic and widespread species *E. acutus* (Fig. 7k). The pencil urchin *Cidaris cidaris* is very common on the SML coral bank near the coral colonies (Fig. 7l, m). Finally, the brittle star *Amphiura filiformis* (Fig. 7n) formed a true *facies* on muddy bottoms among the coral colonies in the MS6 area while the sea cucumber *Eosticopus regalis* was occasionally found.

3.4.12. Pisces

A total of 40 fish species (8 Chondroichthyes and 32 Osteichthyes) were collected in the SML coral area. All these species have been previously recorded from the Ionian Sea and the distribution and abundance of most of them are already well known (e.g., Matarrese et al., 1996; D'Onghia et al., 1998b, 2003; Sion et al., 2000, 2003; Politou et al., 2003; Mytilineou et al., 2005). The maximum depths where *Leucoraja circularis*, *Dipturus oxyrinchus* and *Caelorinchus caelorhincus* were caught in the SML coral area represent the deepest distribution records for these fish in the Ionian Sea.

The majority of species was caught using the trawl net (33), followed by the longline (17), trap (3), ROV (2) and "ingegno" (1). Such numerical differences seem to be due to the different catch ability of the different gears rather than to the preferential distribution of the species in the different habitats inside the coral area. In this respect, considering that all the species can swim, their roaming in the different habitats cannot be excluded.

The occurrence of the rockfish (*Helicolenus dactylopterus*) (Fig. 7o) and the blackspot seabream (*Pagellus bogaraveo*) (Fig. 7p) in the coral habitat were also shown by means of ROV and could be linked to their spawning requirements. Indeed, as reported in D'Onghia et al. (2010), the noteworthy number of large specimens of rockfish, both maturing and mature, captured in the SML coral banks, suggests that this habitat can be a spawning area for this fish. In this regard, several observations report that the Atlantic rockfish, such as those of the genus *Sebastes* and *Sebastolobus*, are preferentially distributed in deep-water coral habitats (Pearcy et al., 1989; Heifetz, 2002; Husebø et al., 2002; Krieger and Wing, 2002; Costello et al., 2005).

Moreover, the remarkable density of the young-of-the-year of the deep-water shark *Etmopterus spinax* as well as of *Merluccius merluccius*, *Micromesistius poutassou*, *Phycis blennoides* and *H. dactylopterus*, indicates that the SML coral banks also act as a nursery area for these deep-water species, which find suitable environmental conditions in their early life stages and refuge from fishing (D'Onghia et al., 2010).

Further information on the fish fauna collected in the SML coral area is reported in D'Onghia et al. (2010). Finally, it is worth mentioning that significantly greater biomass, densities and sizes were obtained inside the coral area than outside.

4. Discussion and conclusions

The extensive multi-gear sampling carried out from 2000 to 2006 and the collaboration of specialists working on several taxonomic groups allowed updating of the knowledge of the SML coral biodiversity with respect to previous records (Mastrototaro et al., 2002; Rosso, 2003; Tursi et al., 2004; Longo et al., 2005). The use of different sampling gears allowed the collection of not only coral colonies together with their epi-fauna but also bottom sediments including hard-ground fragments and macro- and micro-organisms thriving on and inside the substratum. Moreover, some gears were also employed to collect highly mobile benthic and demersal organisms such as fish, crustaceans and cephalopods dwelling within and near coral build-ups and also in neighbouring areas.

A total of 222 species have been identified, 135 of which are new records in SML coral banks and 31 are new records for north-western Ionian Sea. The finding of the annelid *H. vesiculosa* is the first record for the Mediterranean Sea. Moreover during this study was described a new species of annelid the serpulidae *H. madreporae* (Sanfilippo, 2009). New information is reported on the occurrence and on the distribution in the north-western Ionian Sea for several deep-water benthic and bentho-pelagic Mediterranean species. It is noteworthy that living specimens belonging to two Bryozoans species, namely *T. barrieri* and *Idmidronea* sp., previously known exclusively as fossils, were collected for the first time from SML coral build-ups. For some species, such as the crustaceans *P. martia* and *P. acanthonotus*, the bryozoans *S. crystallina*, *S. neptuni* and *S.* (*G.*) *pedunculata* and the fish *L. circularis*, *D. oxyrinchus* and *C. caelorhincus*, the deepest bathymetric limits in the Ionian Sea have been reported.

The present study, with its new data about the presence of 135 newly found species in SML bank, confirm the important role of the white coral banks in the context of Mediterranean biodiversity. Only 30 species were found on living coral colonies of *M. oculata* and *L. pertusa*, while 83 were found on dead coral branches and 59 in the coral rubble. The higher species diversity found on dead coral branches and on the coral rubble is probably due to the use of the exposed coral skeleton as attachment sites for a great number of sessile invertebrates. In contrast, the reduced occurrence of sessile fauna on the living coral surface may be due to the antifouling properties of the coral coenosarc or to instability of this living tissue (Jensen and Frederiksen, 1992; Mortensen and Fosså, 2006).

The coral banks consist of a complex three-dimensional structure providing several ecological niches for a large diversity of associated species (Rogers, 1999). At the same time they represent a refuge for prey as well as a spawning and nursery area for many species including those of economic interest (D'Onghia et al., 2010). It could be suggested that on bathyal bottoms deep-water coral build-ups play a role similar to that of coralligenous pinnacles on the soft bottoms of the circalittoral zone in which the diversified niches sustain a complex community dominated by algae, sessile suspension feeders and a rich and diverse vagile fauna (Ballesteros, 2006).

As reported for the Atlantic white coral banks (Jensen and Frederiksen, 1992), the major component of the associated coral fauna consists of Porifera species that use the coral surface as hard substrates, following by Mollusca and Cnidaria. Moreover, the boring species, such as *Cliona* sp., *Spiroxya heteroclite* and *S. levispira*, are involved in the bioerosion processes of the coral banks (Jensen and Frederiksen, 1992; Freiwald et al., 2002).

The SML coral bank is the sole Mediterranean living coral bank in which the associated fauna is studyied, in fact, other studies on Mediterranean deep-water corals report few data on the associated fauna (Tunesi et al., 2001; Schembri et al., 2007). Concerning these recent studies, it is interesting to underline the absence in the SML coral bank of the large and easily to identify barnacle *Pachylasma giganteum* frequently attached to the living and dead white coral colonies sampled in the Maltese banks (Schembri et al., 2007). However, the comparison of biodiversity between different studies is problematic due to the different sampling methods used, different number of samples and unequal attention to different taxonomic groups. At this regard, in a recent review article, Buhl-Mortensen and Mortensen (2004) report more than 980 species for the Atlantic coral banks. In a single area such as the Sula Reef situated offshore of the Island of Hitra (Norway), in which Mortensen and Fosså (2006) used a similar sampling methods with ROV, grab and dredge samples, they reported a total of 361 taxa but some of the examined taxa, such as the Foraminifera (41 taxa), the Isopoda (18 taxa) and the Amphipoda (20 taxa) have not yet been studied in samples from the SML coral banks. The data collected in the SML coral bank reduce the difference in terms of number of species between Atlantic and Mediterranean white coral banks. However, it is clear that the number of species reported is strictly linked to the different taxonomic focus of the authors and that it is very important to encourage cooperation between more taxonomists to understand the true and complex biodiversity of the white coral banks both in the Mediterranean and in the Atlantic.

As reported for the Atlantic banks (Jensen and Frederiksen, 1992; Mortensen and Fosså, 2006), there is not a specific fauna associated to coral banks as postulated by Dons (1944) and only few species are common between the Atlantic and Mediterranean white coral banks. However, the Eunicidae *Eunice norvegica* seems to be a species specific to the white coral banks both in the Mediterranean and in the Atlantic. In fact, this Polychaeta may be considered a true mutualist species in symbiosis with deep-coral species (Buhl-Mortensen and Mortensen, 2004).

The biodiversity in the SML coral area and the presence of many suspension feeder species seem to be linked to the energetic trophic system of the study area. In fact, an important vertical flux of particulate matter occurs barely northwards due to the water masses that flow from the Southern Adriatic to the Northern Ionian. Moreover, an important coupling between the surface production process and the transfer of suspended organic matter to the slope has been detected in the area (De Lazzari et al., 1999). Such transfer is a crucial factor for suspension feeders like corals (Frederiksen et al., 1992). As reported by Hovland et al. (2002), deep-sea coral reefs establish themselves at locations on the seafloor where there is a continuous and regular supply of concentrated food and nutrients due to the flow of a relatively strong current. At this regard the high-resolution videos showed an abundant zooplankton, consisting of copepods, euphasian, cumaceans and chaetognaths around the coral colonies, all taxa documented as food for the deep-water scleractinians (Freiwald et al., 2002). The zooplankton plays an important role in transferring the energy flux from the surface to the deep seafloor in the well-known phenomenon of bentho-pelagic coupling.

The high-resolution videos confirming the patchy distribution of SML coral colonies (Tursi et al., 2004) showed the occurrence of two different *facies* within the white coral biocoenosis. The first characterized by the occurrence of massive sponges (*P. compressa*, *P. monilifera*, *Erylus papulifer*) while the second featured the presence of large colonies of the black coral *L. glaberrima*.

Finally, the SML coral banks represent an important "hot-spot" of species diversity in the Mediterranean basin comparable to the *Posidonia* meadows and coralligenous bioconstructions on the shelf. For this reason, considering the impact of human activities such as the trawl fishing and of other fishing gear (i.e. longlines) on the white coral banks (Hall-Spencer et al., 2001; Fosså et al., 2002; Reed, 2002) in January 2006 the General Fisheries Commission for the Mediterranean (GFCM) decided on recommendations concerning the prohibition of towed gears (dredges and trawl nets) in the deep-water coral banks of SML. In order to protect these deep areas the GFCM has created the new legal category of "Deep-sea fisheries restricted area". The GFCM recommends members to notify the appropriate authorities in order to protect these particular habitats. Finally, as proposed by Tudela et al. (2004), the institutional process for a marine protected area beyond the territorial waters in the northern Ionian Sea should be carried out in the context of the Barcelona Convention Protocol relative to Specially Protected Areas and Biological Diversity in the Mediterranean (SPA Protocol), as realized for the Ligurian Sea Cetacean Sanctuary in 1999 by France, Italy and Monaco on the Mediterranean High Seas.

Acknowledgments

Thanks are due to captains, crews and colleagues of *R/V Urania* and *R/V Universitatis*. The authors are particularly indebted to Guido Gay (GAYMARINE srl Milano) for underwater video imaging by means of Pluto 1000; to Rossella Baldacconi, Ruth Barnich, Carlo Froglia, Pablo J. Lopez-Gonzales, Donata Violanti and Helmut Zibrowius for their taxonomic suggestions.

This paper was funded by grants to Bari ULR CoNISMa (Prof. A. Tursi) and Catania ULR CoNISMa (Prof. A. Rosso) as part of the APLABES Project FIRB—Deep-Sea Coral Banks on the Apulian Plateau (Ionian Sea), coordinated by CoNISMa. It also contributes to the ESF Moundforce, EU Hermes and Hermione projects and is ISMAR-Bologna scientific contribution no. 1646. Catania Palaeo-ecological Research Group: contribution n. 342.

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