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

F. Mastrototaro [a,*], G. D'Onghia [a], G. Corriero [a], A. Matarrese [a], P. Maiorano [a], P. Panetta [a], M. Gherardi [a], C. Longo [a], A. Rosso [b], F. Sciuto [b], R. Sanfilippo [b], C. Gravili [c], F. Boero [c], M. Taviani [d], A. Tursi [a]

[a] ULR CoNISMa, Dipartimento di Biologia Animale ed Ambientale, Università degli Studi di Bari, Via Orabona, 4, 70125 Bari, Italy
[b] ULR CoNISMa, Dipartimento di Scienze Geologiche, Università di Catania, Corso Italia, 55, 95129 Catania, Italy
[c] ULR CoNISMa, Dipartimento di Scienze e Tecnologie Biologiche ed Ambientali (DiSTeBA), Università del Salento, Via Prov.le Lecce, Monteroni, 73100 Lecce, Italy
[d] ISMAR, CNR, Via Gobetti, 101, 40129 Bologna, Italy

ARTICLE INFO

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 km². 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).

* Corresponding author. Tel./fax: +39 080 5443355.
E-mail address: f.mastrototaro@biologia.uniba.it (F. Mastrototaro).

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 (70×35.5 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 (2×1 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).
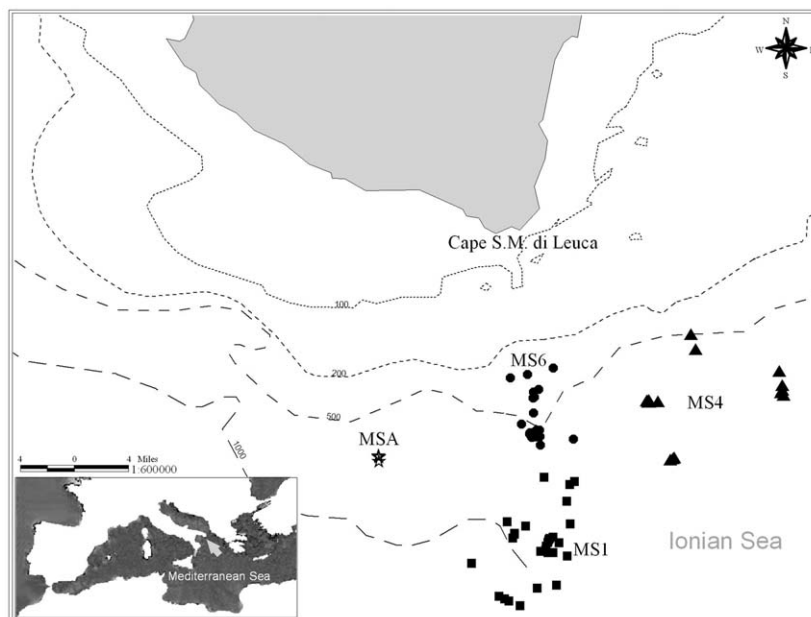

Fig. 1. Map of SML coral banks with indication of the four sub-areas MSA; MS1; MS4 and MS6.