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Inventory and distribution of hard bottom fauna from the marine protected area of Porto Cesareo (Ionian Sea): Porifera and Polychaeta

GIUSEPPE CORRIERO
MIRIAM GHERARDI
Dipartimento di Zoologia, Università di Bari,
Via E. Orabona 4, I-70125 Bari (Italy)
E-mail: *g.corriero@biologia.uniba.it, m.gherardi@biologia.uniba.it*

ADRIANA GIANGRANDE
Dipartimento di Scienze e Tecnologie Biologiche e Ambientali,
Università di Lecce,
Via Provinciale Lecce-Monteroni, I-73100 Lecce (Italy)
E-mail: *gianadri@ilenic.unile.it*

CATERINA LONGO
MARIA MERCURIO
Dipartimento di Zoologia, Università di Bari,
Via E. Orabona 4, I-70125 Bari (Italy)
E-mail: *c.longo@biologia.uniba.it, m.mercurio@biologia.uniba.it*

LUIGI MUSCO
Dipartimento di Scienze e Tecnologie Biologiche e Ambientali,
Università di Lecce,
Via Provinciale Lecce-Monteroni, I-73100 Lecce (Italy)

CARLOTTA NONNIS MARZANO
Dipartimento di Zoologia, Università di Bari,
Via E. Orabona 4, I-70125 Bari (Italy)
E-mail: *cnonnis@cheerful.com*

ABSTRACT

The hard bottom fauna of the marine protected area of Porto Cesareo (Salento Peninsula) was examined considering two representative benthic groups, Porifera and Polychaeta. Sampling was performed by SCUBA divers from the surface to a depth of 25 m in a variety of environments. Sponge and polychaete assemblages were rich and diversified, with a total of 160 taxa collected (66 and 94, respectively), representing the first large contribution to the knowledge of the two groups in the marine protected area. This was particularly true for polychaetes, 80% of which had not been previously reported in the literature for this area. The distribution of the species in the examined environments is also given.

KEY WORDS: Biodiversity - Porifera - Polychaeta - Hard bottom - Marine Reserve - Ionian Sea.

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INTRODUCTION

The Salento Peninsula (Apulia, Southern Italy) represents a very interesting area from a biogeographical and naturalistic point of view, being a transitional zone between the western and eastern Mediterranean Sea, which is not heavily influenced by urban seawage. The marine protected area of Porto Cesareo, located along the Ionian coast of the Salento Peninsula, was established in 1997.

As in most of the cases concerning the institution of marine protected areas in Italy, no accurate lists of species referring to the area proposed for protection are available. The problem is particularly evident at Porto Cesareo due to the presence of peculiar naturalistic features such as the coralligenous biocoenosis (Parenzan, 1983). This is a typical biogenic formation mainly built up of algae, bryozoans and sponges, widely distributed along the Apulian coasts from 15 to 40 m depth, and only investigated in any detail in the Adriatic Sea (Sarà, 1966, 1969). At lower depths the bottom is characterized by the abundance of the Mediterranean hermatypic madrepore *Cladocora caespitosa* (L.), forming conspicuous reefs (Parenzan, 1983). Another peculiarity is the presence of large banks of the benthopleustophytic alga *Cladophora prolifera* Kütz (Parenzan, 1969, 1983) and of one of the last shallow banks of the commercial sponge *Spongia officinalis* var. *adriatica* (Schmidt) (Pronzato *et al.*, 1996).

Several lists of species referring to the Salento Peninsula were reported by Parenzan (1983), who, unfortunately, did not specify the site or depth of the records. The only papers including comparable specific lists concern the coastal basin of La Strea, not included within the Marine Reserve (Parenzan, 1976; Corriero *et al.*, 1984, 1988; Castelli *et al.*, 1988, Gherardi *et al.*, 2001).

In the present study, hard bottom environments of Porto Cesareo were investigated considering Porifera and Polychaeta, two representative groups of the benthic fauna whose biodiversity is still largely unknown along the Ionian coast of Apulia. Besides giving a contribution to the faunistic knowledge of the area, this paper is a starting point to evaluate, at fine taxonomical level, the effect of environmental conservation on the groups studied.

MATERIALS AND METHODS

Sampling was performed by SCUBA divers in June 2001, within the B zone of the marine protected area of Porto Cesareo (Fig. 1) and was planned to be representative of the heterogeneity of hard bottoms off Porto Cesareo (Fig. 2), with the final aim of increasing knowledge of biodiversity in the protected area.

In this area, sponges are often characterized by very large specimens, and thus samples were collected by scraping off a large surface (10,000 cm^2). Polychaete samples were collected from a surface of 400 cm^2, which in the Mediterranean is considered the minimum sampling surface (Boudouresque & Belsher, 1979), usually utilized in polychaete investigations.

Samples were collected at four different depths between 1 and 25 m, considering five stations for sponges and seven for polychaetes:

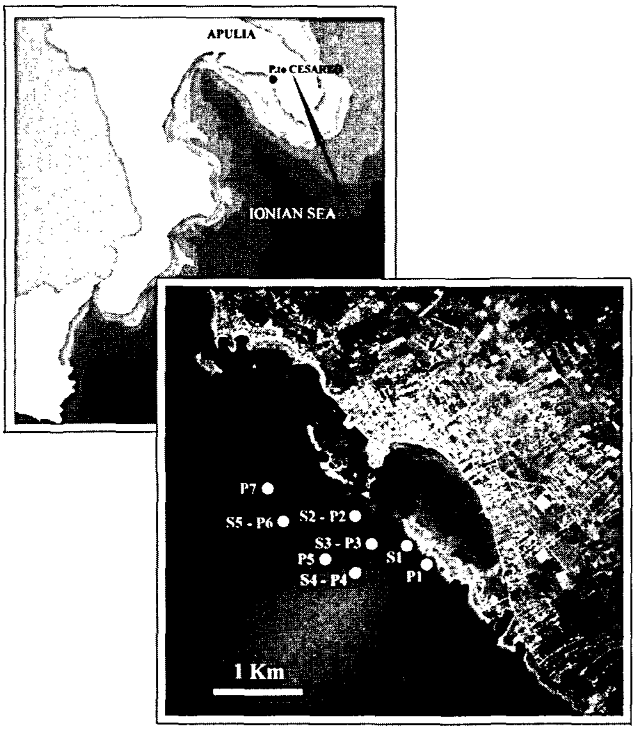


Fig. 1 - Porto Cesareo: map of the study site with sampling stations.

- 1 m, rocky substratum under the *Cystoseira* fringe for sponges (S1) (40°14.74' N; 17°53.86' E); within the *Cystoseira* fringe for polychaetes (P1) (40°14.54' N; 17°54.07' E);
- 5 m, *Chondrilla nucula* facies, a peculiar biocoenosis linked to the massive grazing of sea urchins. This facies is widely distributed along the Apulian coast, and particularly at Porto Cesareo, as a consequence of the fishing of *Lithophaga lithophaga* (Fanelli *et al.*, 1994), (S2 for sponges; P2 for polychaetes) (40°15.03' N; 17°53.37' E);
- 5 m, small cave (S3 for sponges; P3 for polychaetes) (40°14.97' N; 17°53.55' E);
- 15 m, semi-sciaphilous horizontal surface (S4 for sponges; P4 for polychaetes) (40°14.73' N; 17°53.35' E);
- 15 m, vertical cliff covered by sciaphilous algae, only for polychaetes (P5) (40°14.84' N; 17°53.11' E);
- 25 m, coralligenous formation with animal dominance characterized by irregular blocks between 1 and 3 m wide and about 1 m high, (S5 for sponges; P6 for polychaetes) (40°15.05' N; 17°52.82' E);
- 25 m, coralligenous formation with algal dominance, only for polychaetes (P7) (40°15.22' N; 17°52.52' E).

The sampling design was built up with the aim of studying those environments where sponges and polychaetes had been found to be better represented during previous surveys. This explains the difference in number of sampling sites between the two groups.

For both groups, specimens were fixed with 4% formaldehyde in sea water, and preserved in 70% alcohol. Sponge samples were restored in the laboratory, and a semiquantitative Abundance Index (AI) was assigned to each species of sponge to indicate its coverage (+ = AI ≈ 1%; ++ = 1 < AI < 10%; +++ = 10 < AI <20%; ++++ = 20 < AI < 30%). Slides of dissociated spicules and transversal sections of paraffin embedded sponges were prepared to study the spicular arrangement and skeletal structure. Polychaete samples were sorted using a 250-µm net, specimens were identified and counted. The nomenclature of syllids follows San Martin (1984, Ph.D. thesis, Univ. of Madrid).

RESULTS

Sponges

A total of 66 taxa were found, 63 of which were identified at the species level (Table I). Thirty-two species (50.8%) were reported for the first time in the study area, nine of them (*Lissodendoryx cavernosa, Axinella polypoides, Timea simplicistellata, Suberites domuncula, Spongia agaricina, Spiroxya heteroclita, Pleraplysilla spinifera, Mycale lingua* and *Dendroxea lenis*), corresponding to 14.3% of the species found, represent new records for the Ionian coast (Labate, 1968; Pulitzer-Finali & Pronzato, 1980; Pulitzer-Finali, 1983; Corriero *et al.*, 1984; Scalera Liaci & Corriero, 1993; Corriero & Scalera Liaci, 1997; Pansini & Pesce, 1998; Mercurio *et al.*, 2001).

In general, the number of species increased from shallower to deeper stations, even though a peak of species richness was observed in the cave, at 5 m of depth (Table I). Twenty species were collected from the shallowest photophilous stations (S1 and S2), where the most abundant species (more than 10% of the substrate covering) were *Chondrilla nucula, Cliona celata, Sarcotragus spinosulus,* and *Ircinia variabilis.* According to the literature (Sarà, 1962; Sarà & Melone, 1963; Pansini & Pronzato, 1973; Corriero *et al.*, 1984; Corriero, 1989), *C. nucula* and *C. celata* are typical of photophilous conditions, while the others are species with a wide vertical distributional range. Twenty-nine species were found at the semi-sciaphilous station (S4), with the dominance of *Cliona nigricans, Fasciospongia cavernosa* and *Crambe crambe.* Fifty-three species were collected from sciaphilous stations, 29 from the shallow cave (S3) and 41 from the coralligenous formation (S5), respectively. The most common species found within the cave were: *D. lenis, Petrosia ficiformis, I. variabilis, Chondrosia reniformis* and *Merlia normani.* Among them, *D. lenis* and *M. normani* are typical of Mediterranean marine caves (Corriero *et al.*, 2000), whereas the others are able to colonize environments with different light exposure. Finally, the most abundant sponges occurring in the deepest station (*Dysidea avara, Phorbas tenacior, P. ficiformis,* and *Axinella cannabina*), are frequently reported for coralligenous formations from the western Mediterranean (Vacelet, 1959; Sarà, 1968; Pansini & Pronzato, 1973; Sarà, 1999).

All the sampling stations were characterized by the occurrence of unusually large specimens of the following species: *S. spinosulus* (stations S1, S2), *P. ficiformis* (stations S3, S5), *C. nigricans* and *F. cavernosa* (station S4), *D. avara* and *A. cannabina* (station S5).

Finally, it is interesting to note the frequency of records of *S. officinalis* var. *adriatica* with the typical wide vertical distribution that characterized populations from the northern Tyrrhenian Sea (Pansini & Pronzato, 1973) before the epidemic which caused their drastic decline (Gaino *et al.*, 1992).

TABLE I - *Porto Cesareo (Porifera): list of the taxa found and their semi-quantitative distribution among sampling stations.*

	S1	S2	S3	S4	S5
Clathrina coriacea (Montagu, 1818)			+		+
Clathrina rubra Sarà, 1958			+		
Sycon sp.	+				
Corticium reductum Pulitzer-Finali, 1983			+		
Oscarella lobularis (Schmidt, 1862)			++	+	+
Penares helleri (Schmidt, 1864)			+		
Jaspis johnstonii (Schmidt, 1862)			++	+	++
Erylus discophorus (Schmidt, 1862)		+			
Geodia cydonium (Jameson, 1811)					++
Dercitus plicatus (Schmidt, 1868)				+	
Cliona celata Grant, 1826	+++	+			
Cliona nigricans (Schmidt, 1862)			++	++++	+
Cliona schmidti (Ridley, 1811)			++		
Cliona vermifera Hancock, 1867	+	+			
Pione vastifica Hancock, 1849			+		+
Thoosa mollis Volz, 1939		+			+
Volzia albicans (Voltz, 1939)				+	+
Diplastrella bistellata (Schmidt, 1862)			++		+
Spirastrella cunctatrix Schmidt, 1868			++	++	++
Aaptos aaptos Schmidt, 1864			+	+	+
Suberites domuncula (Olivi, 1792)				+	+
Terpios fugax Duchassaing & Michelotti, 1864			+		
Tethya aurantium (Pallas, 1766)				+	+
Tethya citrina Sarà e Melone, 1965					+
Timea fasciata Topsent, 1934			+	+	
Timea simplicistellata Pulitzer-Finali, 1983					+
Timea stellata (Bowerbank, 1866)				+	+
Alectona millari Carter, 1879			+		
Spiroxya heteroclita Topsent, 1896					+
Chondrilla nucula Schmidt, 1862	+	++++			
Chondrosia reniformis Nardo, 1847		+	+++	++	+
Raspaciona aculeata (Johnston, 1842)					++
Batzella inops (Topsent, 1891)	++	+			
Lissodendoryx cavernosa (Topsent, 1892)					+
Crambe crambe (Schmidt, 1862)	++	++	++	+++	
Phorbas fictitius Bowerbank, 1866		+			
Phorbas paupertas Bowerbank, 1866	+	++			
Phorbas tenacior Topsent, 1925			+	+	+++
Tedania anhelans (Lieberkühn, 1859)			+		
Mycale lingua Bowerbank, 1866		+			
Merlia normani Kirkpatrick, 1908			+++		
Axinella cannabina (Esper, 1794)					+++
Axinella damicornis (Esper, 1794)			+	+	
Axinella polypoides Schmidt, 1862					++
Axinella verrucosa (Esper, 1794)				+	+
Phakellia rugosa Bowerbank, 1866					+
Bubaris vermiculata (Bowerbank, 1866)				+	+
Didiscus styliferus Tsurnamal, 1969			+		+
Acanthella acuta Schmidt, 1862				+	++
Hymeniacidon sanguinea (Grant, 1826)					+
Agelas oroides (Schmidt, 1864)					+
Dendroxea lenis (Topsent, 1892)			+++		
Haliclona sp.		++			
Reniera sarai Pulitzer-Finali, 1969				++	+
Petrosia ficiformis (Poiret, 1789)			+++	++	++
Ircinia variabilis (Schmidt, 1862)	+	++	+++	++	+++
Ircinia sp.	++	+			
Sarcotragus spinosulus Schmidt, 1862	++	+++	++	++	++
Cacospongia scalaris Schmidt, 1862		+	+	++	+
Fasciospongia cavernosa (Schmidt, 1862)		++	++	+++	++
Spongia agaricina Pallas, 1766					++
Spongia officinalis var. *adriatica* (Schmidt, 1862)		++		++	++
Spongia virgultosa (Schmidt)		+	+		
Dysidea avara (Schmidt)					+++
Pleraplysilla spinifera (Schulze, 1878)					+
Aplysina aerophoba Schimdt, 1862	++				
Total number of species 11 18 29 25 41					

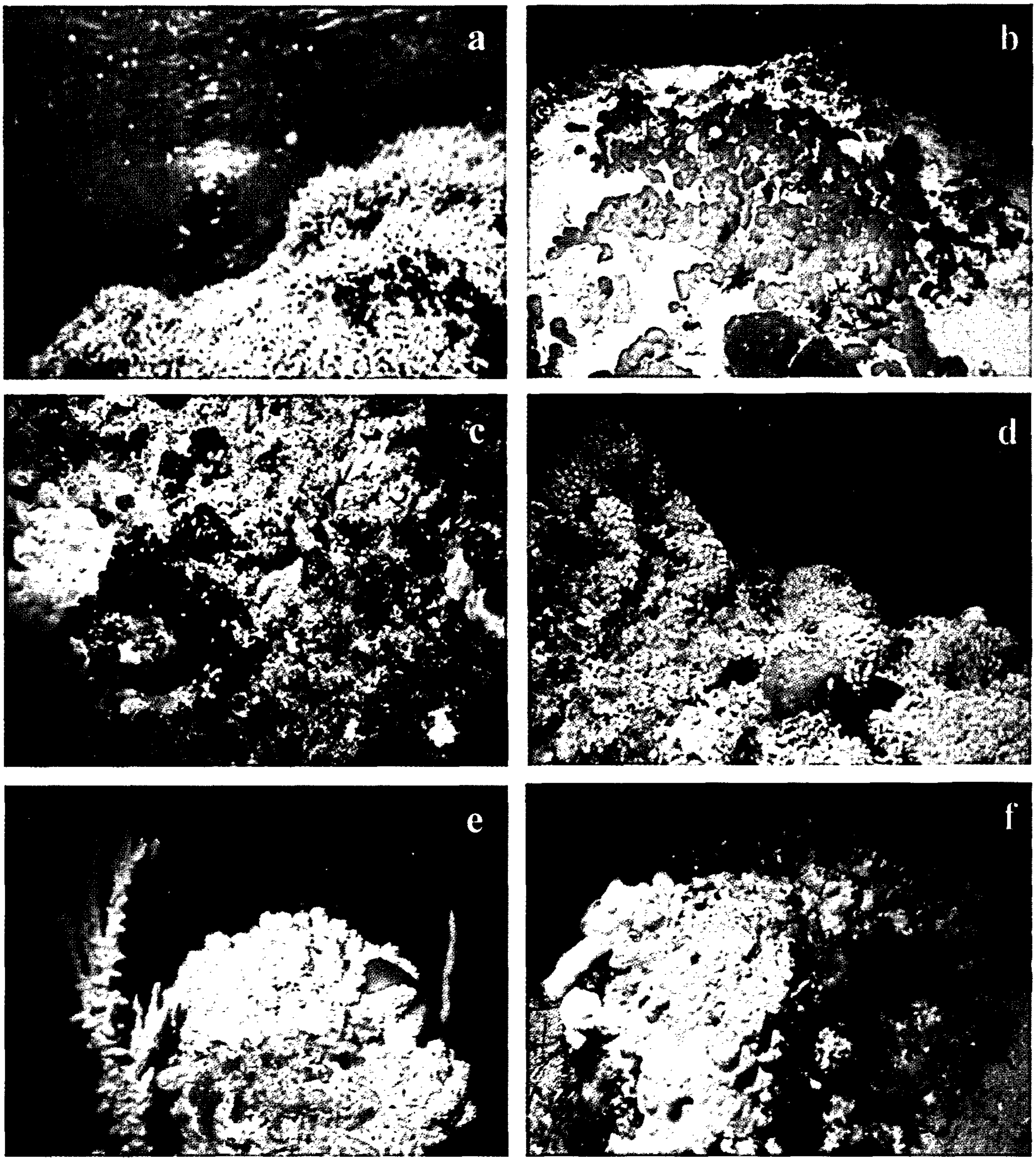


Fig. 2 - Porto Cesareo: underwater images from some of the most common environments which can be encountered in the Marine Reserve. **a**, *Cystoseira* fringe (photo: Laboratory of Zoology, Lecce); **b**, *Chondrilla nucula* facies (photo: C. Longo); **c**, typical assemblage from a shallow cave (5 m depth) (photo: C. Longo); **d**, *Cladocora caespitosa* assemblage at 15 m depth (photo: C. Longo); **e-f**, two different views of coralligenous formations with sponge dominance (photo: G. Corriero, C. Longo).

Polychaetes

A total of 1097 individuals were collected, belonging to 92 taxa, 88 of which were identified at the species level (Table II). Only 26 species had previously been reported for the area by Parenzan (1983). The family Syllidae showed the highest abundance (609 individuals), and the highest number of species (45 taxa), 50% of which had never been reported for the study area (Parenzan, 1983; Castelli *et al.*, 1988; Gherardi *et al.*, 2001), followed by the family Sabellidae (11 taxa) and Eunicidae (10 taxa). The most interesting findings regarded the family Syllidae. Some species, such as *Trypanosyllis aeolis*, *Syllis gerundensis*, *S. pontxioi*, and *S.*

jorgei are new for Italian coasts (Castelli *et al.*, 1995), but most of them have been reported for the Iberian Peninsula (San Martin & Lopez, 2000). To the list of new taxa for the Italian coasts we could add *S. corallicola* and *S. pulvinata*. However, the first species in the past has probably been confused with *S. columbretensis*, commonly reported for the Italian coast, and the second one, although not included in the check list of the Italian polychaetes (Castelli *et al.*, 1995), must be considered already present, due to its recent synonym with *S. mediterranea* (Licher, 1999).

Some species at first identified as *Syllis bouvieri* and *S. truncata cryptica*, *sensu* San Martin (1984, Ph.D. thesis, Univ. of Madrid), and recently found in the southern Adriatic Sea (Giangrande *et al.*, 2003), were not included in the Italian list, because the former species is now considered a synonym of *S. prolifera* and the latter a synonym of *S. gerlachi* (Licher, 1999). This is a remarkable feature, considering that *S. truncata cryptica* was, up to now, one of the most abundant species reported for the Italian coasts.

Lastly, among syllids, the presence of a new taxon belonging to the genus *Sphaerosyllis* must be emphasized, together with another new taxon belonging to the family Eunicidae. Both taxa are described in a paper in preparation. With regard to the family Eunicidae, *Eunice norvegica* represents the second finding for the Italian coasts after Fauvel (1923) who reported it as *E. floridiana*, commensal with anthozoans in deep coral formations of the Apulian coast.

As far as the family Sabellidae is concerned, at present, only *Demonax tommasi*, *D. langerhansi*, and *Perkinsiana rubra* are known for the Apulian coasts. However, this is surely due to the scarce knowledge of hard bottom sabellids for most of the Italian coasts. Finally, it must be stressed that *Sabella spallanzanii*, although collected in the present study with very few individuals, at Porto Cesareo constitutes extensive facies between 5 and 20 m of depth, reaching a density of about 100 individuals/m^2, where single worms can reach very large sizes (up to 40 cm in length) (Giangrande, unpublished data).

Most of the species found showed an Atlantic affinity and were commonly reported for the western Mediterranean (Bellan, 1964; Giangrande, 1988; Sardà, 1991). *Syllis gerundensis*, *Exogone rostrata*, *Grubeosyllis alvaradoi*, *Pseudosyllides balearica*, *Syllis ferrani*, *Pseudofabricia aberrans* and *D. tommasi* are endemic in the Mediterranean Sea. From the bioclimatic point of view, however, most of the syllid species found at Porto Cesareo (60%) are commonly distributed in temperate-warm areas, while no species showing a cold area affinity were found.

As can be seen in Table II, most of the species showed relatively low abundance (1-10 individuals); only five species reached high abundance (more than 50 individuals). As far as distribution within the different examined biotopes is concerned, the greatest difference in species composition was observed between the shallowest station (P1) and the remaining ones (Fig. 3a). Among the most abundant species, *Platynereis dumerilii* and *Syllis vivipara* were exclusive to the *Cystoseira* fringe (station P1, 1 m depth). At this depth, *Exogone naidina*, *Amphiglena mediterranea*, *Nereis zonata*, *Sphaerosyllis hystrix*, *Grubeosyllis clavata*, and *Syllis prolifera* were also abundant. *Amphiglena mediterranea* was abundant to a depth of 5 m, together with *Syllis armillaris* and *S. gerlachi*, whilst *G. clavata* and *S. prolifera* were also abundant at 15 m (station P5). At this depth, other species such as *Nereis rava*, *Lysidice ninetta*, *S. gerlachi*, and *S. corallicola* became dominant. Finally, *Sphaerosyllis* sp. was exclusively collected at 5 m depth in the small cave (station P3).

Among the less abundant species (less than 10 specimens), *Amphicorina armandi* and *Arabella geniculata* were exclusive to the *Cystoseira* fringe (station P1); other species, such as *Autolytus quindecemdentatus* and *S. gracilis* were exclusive to station P2 (5 m depth); 10 species, among which *Trypanosyllis aeolis* and *S. pontxioi*, were exclusively found at 15 m depth (station P5). Among the species exclusively on coralligenous formations with algal dominance (station P7, 25 m depth), *Eunice norvegica* and *Pseudosyllis balearica* were found.

The distribution of the above-reported species can be summarized by the trends of some structural parameters: species richness showed two peaks at 5 m (station P2) and 15 m depth (station P5). Number of individuals showed two peaks, at 1 m (P1) and at 15 m depth (P5) (Fig. 3a). In contrast, both the diversity index and evenness showed a slight increase with depth, with the only exception of the latter showing a minimum value at station P5 (Fig. 3b).

DISCUSSION

The present paper represents a first inventory of sponges and polychaetes from the marine protected area of Porto Cesareo. Both groups are particularly rich and diversified, thus emphasizing the considerable heterogeneity of the investigated environment. A total of 158 taxa were collected, 66 sponges and 94 polychaetes, giving an important contribution to the knowledge of the protected area from a faunistic point of view. Only a small percentage of the recorded species had previously been reported for this area. This was particularly evident among polychaetes, with about 80% of the species new for the area (Parenzan, 1983; Castelli *et al.*, 1988; Gherardi *et al.*, 2001).

All the species of sponges collected during this study were commonly reported for the western Mediterranean; however, no comparable data referring to the eastern Mediterranean are available. The sponge assemblage shows a general increase in species richness proceeding from shallow to deep environments, in agreement with that reported for other Mediterranean areas (Pansini & Pronzato, 1973). The affinity of the sponge

TABLE II - *Porto Cesareo (Polychaeta), taxa found during the research period, with indicated density categories: light gray, ind. < 10; dark gray, 10 < ind. < 50; black, ind. > 50.*

	P1	P2	P3	P4	P5	P6	P7
Opheliidae							
Polyophthalmus pictus (Dujardin, 1839)							light gray
Goniadidae							
Goniada maculata Oersted, 1843						light gray	
Hesionidae							
Kefersteinia cirrata (Keferstein, 1862)				light gray			
Syllidae							
Autolytus prolifer (Müller, 1788)					light gray		
Autolytus quindecemdentatus Langerhans, 1884		light gray					
Brania arminii Langerhans, 1880		light gray					
Brania pusilla (Dujardin, 1839)			light gray		light gray		
Ehlersia ferrugina (Langerhans, 1881)		light gray	light gray		light gray		
Eurysyllis tuberculata Ehlers, 1864					light gray		
Eusyllis lamelligera Marion & Bobretzky, 1875		light gray	light gray		light gray		
Exogone dispar Webster, 1879	light gray		light gray		light gray		
Exogone naidina Oersted, 1845	black	light gray	light gray		light gray		
Exogone rostrata Naville, 1933			light gray				
Grubeosyllis alvaradoi (San Martin, 1984)			light gray				
Grubeosyllis clavata (Claparède, 1863)	black	light gray		light gray	dark gray		
Grubeosyllis limbata (Claparède, 1868)					light gray		
Grubeosyllis vieitezi (San Martin, 1984)					light gray		
Grubeosyllis yraidae (San Martin, 1984)					light gray		
Haplosyllis spongicola (Grube, 1855)					dark gray		light gray
Parapionosyllis brevicirra Day, 1954				light gray	light gray		
Pseudosyllides balearica San Martin, 1982							light gray
Sphaerosyllis hystrix Claparède, 1863	dark gray			light gray	light gray		light gray
Sphaerosyllis pirifera Claparède, 1868					light gray		
Sphaerosyllis sp.			dark gray				
Syllides fulvus Marion & Bobretzky, 1875					light gray		
Syllis armillaris Müller, 1771		dark gray	light gray		dark gray		
Syllis beneliahuae Campoy & Alquezar, 1982			light gray				
Syllis corallicola Verrill, 1900		light gray	light gray		dark gray	light gray	
Syllis ferrani Alòs & San Martin, 1987		light gray	light gray		light gray		
Syllis garciai Campoy, 1982		light gray				light gray	light gray
Syllis gerlachi Hartmann-Schröeder, 1960	light gray	dark gray	dark gray	light gray	black	light gray	light gray
Syllis gerundensis (Alòs & Campoy, 1981)		light gray	light gray		light gray		
Syllis gracilis Grube, 1840		light gray					
Syllis hyalina Grube, 1863		light gray	light gray	light gray	light gray	light gray	light gray
Syllis jorgei San Martin & Lopez, 2000		light gray	light gray				
Syllis pontxioi San Martin & Lopez, 2000					light gray		
Syllis prolifera Krohn, 1852	dark gray				light gray		
Syllis pulvinata Langerhans, 1881		light gray	light gray			light gray	
Syllis rosea (Langerhans, 1879)	light gray	light gray	light gray		light gray		
Syllis torquata Marion & Bobretzky, 1875					light gray		
Syllis variegata Grube, 1860		light gray	light gray	light gray	light gray	light gray	
Syllis vivipara (Krohn, 1869)	dark gray						
Syllis westheidei San Martin, 1984	light gray	light gray			light gray		
Trypanosyllis aeolis Langerhans, 1879					light gray		
Trypanosyllis coeliaca Claparède, 1868					light gray		
Trypanosyllis zebra (Grube, 1860)		light gray	light gray	light gray	light gray		light gray
Xenosyllis scabra (Ehlers, 1864)					light gray		

Continued

assemblage to sciaphilous environments is also noted from the larger number of species characterizing the shallow cave station, compared to the number of species found in the photophilous one located at the same depth (29 species vs 17).

However, the sponge assemblage from coralligenous formations of the studied area (41 species) seems relatively poor in comparison with other Mediterranean sites. Sarà (1999) reported about one hundred species for the coralligenous biocoenosis of the Adriatic coast of Apulia; Pansini & Pronzato (1973) reported 75 species of sponges for the same biocoenosis of the coast of eastern Liguria. Their data, however, refer to a greater number of sites distributed over a larger area. As for photophilous

TABLE II - *Continued*

Nereididae
- *Ceratonereis costae* (Grube, 1840)
- *Nereis rava* Ehlers, 1868
- *Nereis zonata* Malmgren, 1867
- *Platynereis dumerilii* (Audouin & Milne-Edwards, 1833)
- *Nereis* sp.

Aphroditidae
- *Pontogenia chrysocoma* (Baird, 1865)

Polynoidae
- *Harmothoe* sp.
- *Lepidonotus squamatus* (L., 1767)

Chrysopetalidae
- *Chrysopetalum debile* (Grube, 1855)

Eunicidae
- *Eunice norvegica* (L., 1767)
- *Eunice harassii* Audouin & Milne-Edwards, 1834
- *Eunice schizobranchia* Claparède, 1870
- *Eunice torquata* Quatrefages, 1865
- *Eunice vittata* Delle Chiaje, 1889
- *Eunice* sp.
- *Lysidice ninetta* Audouin & Milne-Edwards, 1833
- *Marphysa bellii* (Audouin & Milne-Edwards, 1833)
- *Nematonereis unicornis* (Grube, 1840)
- *Palola siciliensis* (Grube, 1840)

Lumbrineridae
- *Lumbrinereis coccinea* (Renier, 1804)
- *Lumbrinereis funchalensis* (Kinberg, 1865)
- *Lumbrinereis gracilis* (Ehlers, 1868)

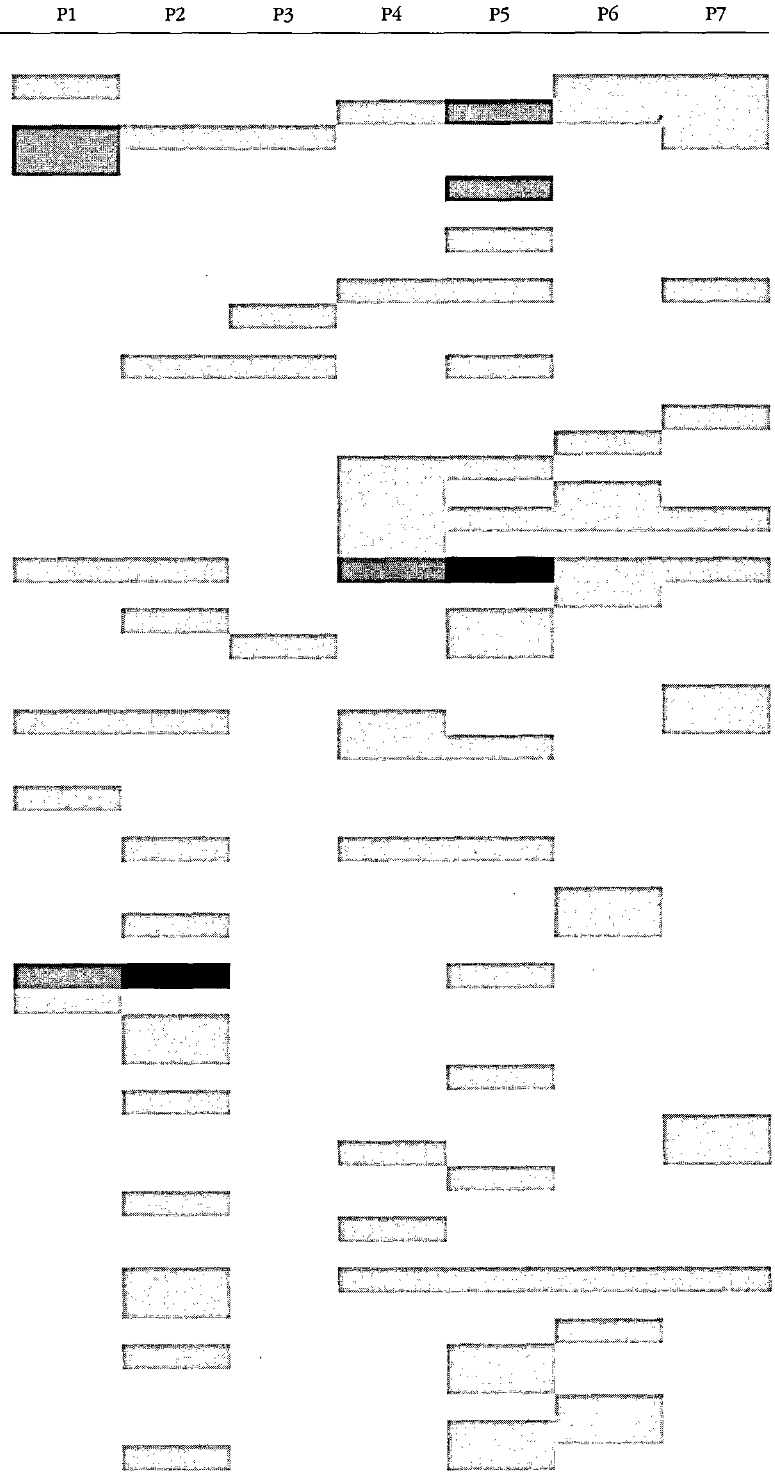
Arabellidae
- *Arabella geniculata* (Claparède, 1868)

Dorvilleidae
- *Dorvillea rubrovittata* (Grube, 1855)

Terebellidae
- *Thelepus cincinnatus* (Fabricius, 1780)
- *Terebella lapidaria* L., 1767

Sabellidae
- *Amphiglena mediterranea* (Leydig, 1851)
- *Amphicorina armandi* (Claparède, 1864)
- *Branchiomma lucullanum* (Delle Chiaje, 1828)
- *Demonax langerhansi* Knight-Jones, 1983
- *Demonax tommasi* Giangrande, 1994
- *Fabricia stellaris* (Müller, 1774)
- *Myxicola aestetica* (Claparède, 1870)
- *Perkinsiana rubra* (Langerhans, 1880)
- *Pseudofabricia aberrans* Cantone, 1972
- *Pseudopotamilla reniformis* (Bruguiere, 1789)
- *Sabella spallanzanii* (Gmelin, 1791)

Serpulidae
- *Hydroides pseudouncinatus* Zibrowius, 1968
- *Josephella marenzelleri* Caullery & Mesnil, 1896
- *Pomatoceros triqueter* (L., 1767)
- *Serpula concharum* Langerhans, 1880
- *Serpula vermicularis* L., 1767
- *Vermiliopsis infundibulum* (L., 1788)
- *Vermiliopsis labiata* (Costa, 1861)
- *Vermiliopsis striaticeps* (Grube, 1862)



sponges, the number of species recorded at Porto Cesareo is comparable to that reported for other sites on the Tyrrhenian coast (Sarà, 1962; Sarà & Melone, 1963).

The sponge assemblage shows high covering values in all the environments examined, with a clear vertical pattern occurring among the most abundant species. However, *Ircinia variabilis* and *Petrosia ficiformis* are distributed in most of the sampled sites, being able to colonize environments with different light exposure by means of algal symbiotic populations, which protect them from light radiation (Sarà *et al.*, 1998).

The occurrence of many large species, represented by

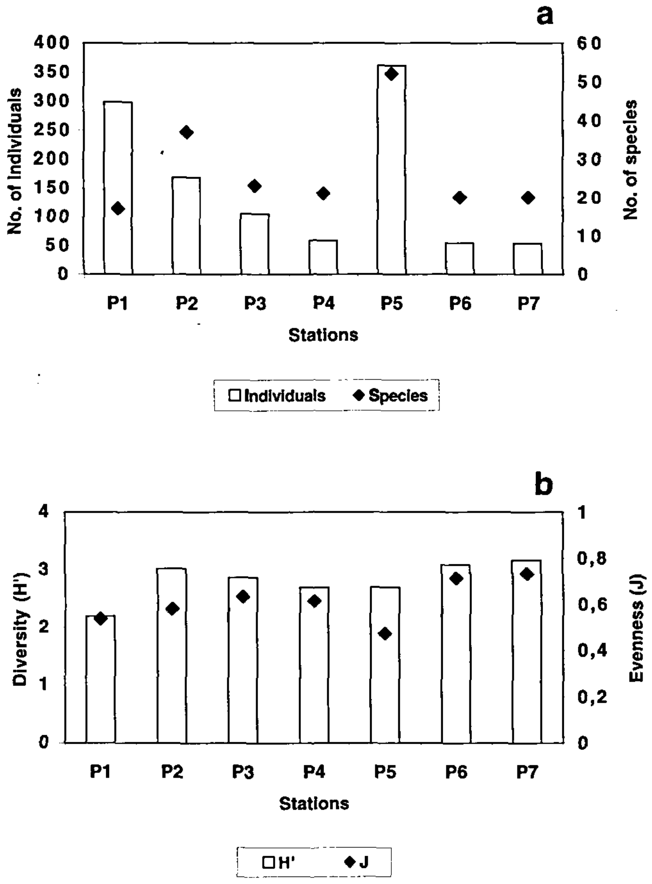


Fig. 3 - Porto Cesareo (Polychaeta): trend of abundance and number of species (**a**), diversity (H') and evenness (J) (**b**) in the sampling stations. P1, 1 m *Cystoseira* fringe; P2, 5 m *Chondrilla nucula* facies; P3, 5 m small cave; P4, 15 m horizontal surface; P5, 15 m vertical cliff; P6, 25 m coralligenous (invertebrate dominance); P7, 25 m coralligenous (algal dominance).

massive (*Sarcotragus spinosulus, P. ficiformis, I. variabilis*), branched (*Axinella polypoides*), crustose (*Crambe crambe, Phorbas tenacior, Merlia normani*) and boring forms (*Cliona celata, C. nigricans*), points to the importance of the sponge assemblage in different ecological roles (i.e. increasing spatial heterogeneity for massive and branched species, and bioerosion processess, for boring species) (Sarà, 1999). The unusual occurrence of large-sized sponges throughout the study site could be due to the peculiar features of water, which probably provide a rich trophic supply for filter-feeder organisms. The presence of a wide *Sabella spallanzanii* facies (Giangrande *et al.*, 2003) could be a further indication of such features, this species being a filter-feeder typical of eutrophic environments.

Until the wide spread use of SCUBA diving, large specimens of *S. officinalis* var. *adriatica* and *S. agaricina* were commonly found at Porto Cesareo. Since then, intense fishing and a recent epidemic event have caused a sharp reduction in density and size in both species (Pronzato *et al.*, 1996). Now these species are relatively abundant and their recovery can also be considered a result of the prohibition of fishery, due to the institution of the marine protected area.

With regard to polychaetes, species richness shows an irregular trend with a maximum at 15 m depth. The changes in polychaete assemblage with depth, showing the greatest discontinuity between the shallowest site and the remaining depths, is a feature typical of hard bottom environments (Giangrande, 1988; Giangrande *et al.*, 2003). In contrast with what was observed for sponges, polychaetes do not seem to prefer deeper sites. Indeed coralligenous substrata, both with animal and algal dominance, appear quite poor in species. This had already been observed in a study of polychaete assemblages at Otranto (Adriatic Sea) (Giangrande *et al.*, 2003), and it is in agreement with the few literature reports existing for the Tyrrhenian and Adriatic coasts (Bellan, 1961a, b; Laubier, 1966). However, the highest diversity (H') value is found in the assemblage from coralligenous formations, probably reflecting a stable condition of environmental parameters. In contrast, the lowest diversity value was recorded at the shallowest site, where a peculiar assemblage occurs, with a few well represented species, often exclusive to this depth. In this particular environment, species are selected against the environmental stress by water movement (Giangrande, 1988). The station characterized by the massive presence of *Chondrilla nucula* was particularly rich in species, while at the same depth (5 m) the small cave, despite being characterized by a rich sponge assemblage, was extremely poor in polychaete species, probably due to the lack of the algal component.

The most suitable environment for polychaete colonization seems to be that of intermediate depths, between superficial and deeper environments, which proved extremely rich both in number of species and individuals. This habitat could be interpreted as an ecotone where photophilous and sciaphilous conditions coexist and the conspicuous algal cover made of frondose and calcareous algae produces a series of different microhabitats.

Although most of the polychaete species found show an Atlantic-Mediterranean affinity, the bioclimatic characterization of the Syllidae, the most represented family, seems to confirm the hypothesis of Parenzan (1976), who stressed the sub-tropical affinity of the benthic fauna recorded from the adjacent basin of La Strea, a feature also pointed out by Castelli *et al.* (1988).

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