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Biodiversity in the Mediterranean Sea: an introductory speech to the Marine Algae Symposium

Abstract

Giaccone, G.: Biodiversity in the Mediterranean Sea: an introductory speech to the Marine Algae Symposium. — *Boccone* 16(1): 183-192. 2003. — ISSN 1120-4060.

The surface of the Mediterranean Sea represents only a small percentage (0.8%) of World Ocean surface; but the biodiversity is paradoxically rather high (12%). Both biodiversity and structure of benthic assemblages are really reduced proceeding from west to east. The low values of biodiversity occurring in the eastern basin are linked to several factors among which microplates tectonic, paleoclimatic and meteorological events and especially geodynamic events of South Aegean microplate, Sapropel Crises occurred during last 30,000 years, Indian monsoon depending climate in the eastern basin and in the Nile flood, opening Bosphorus Straits during Pleistocene and Holocene and excavating of Suez Canal just a century and half ago.

Introductory speech

Seaweeds as subject of OPTIMA Meetings, are not frequent. Only in Seville (1995) and now here in Palermo special symposia concerning with algal biodiversity in the Mediterranean Sea were organized (Giaccone 1999). In this introductory speech I'll speak on the origin of biodiversity in the Mediterranean Sea and on the factors inducing vegetal marine diversity in this geographic area.

The surface of the Mediterranean Sea represents only a small percentage (0,8%) of World Ocean surface; but the biodiversity is paradoxically rather high (12%). In fact in the World Ocean live about 130,000 Metazoa and 8,000 macrophytobenthic Plants, while in the Mediterranean Sea during the last half century 7,241 (5.5%) Animals and 1,351 (16.2%) Plants were collected (Fredj & al. 1992; Giaccone G. & Di Martino V. 1997), (Table 2).

According to both Hutchinson's (1959) general theory on biodiversity and MacArthur's (1972) ecological niches system as well as from our experience, the high value of biodiversity in Mediterranean Sea depends on the following reasons:

- Due to its oligotrophic waters, Mediterranean habitats have higher range of resources;
- Due to their high specialization, benthic organisms show a high number of both endemic taxa (Animals 28.6% and Plants 26.6%: Tables 1, 3) and stenoeic species;

- High overlap of ecological niches as companion species in benthic assemblages and mutualistic taxa in trophic nets;
- High vertical structure in benthic assemblages as epiphytism or overlapping communities;
- Ecological niches not saturated by organisms owing both to recent origin of basins and to average environmental disturbances in different geographic regions or local seas (Tables 4, 5, 6).

Both biodiversity and structure of benthic assemblages are really reduced proceeding from west to east. According to Athanasiadis (1987) algal diversity in the Aegean Sea is reduced down to 32.2% of total Mediterranean marine flora. The gap of collecting and recognizing species in eastern and southern regions of Mediterranean Sea was reducing during last 20 years and last biodiversity data report values of 43.1% for Animals and of 57.6% for Plants (Table 4). Such low values of biodiversity occurring in the eastern basin are linked to several factors among which microplates tectonic, paleoclimatic and meteorological events and especially geodynamic events of South Aegean microplates (La Greca 1990; Giaccone 1991), Sapropel Crises occurred during last 30,000 years (Stanley 1978; Doumenge 1993), Indian monsoon depending climate in the eastern basin and in the Nile flood, opening of Bosphorus Straits during Pleistocene and Holocene and excavating of Suez Canal just a century and half ago (Giaccone 1999).

Phycological lectures of the present Symposium will concern both biogeographic and taxonomic themes.

To date, the study of the biogeography of marine plants was also based on geodynamic, paleontologic and paleoclimatologic data; in taxonomic studies data acquired by chemotaxonomy, by molecular genetic, by experimental physioecology and synecology were only rarely utilized. From an ecological point of view, the species is defined by its role in the community and in the trophic nets either as resources producer or as energy and nutrients consumer. Until now, the epistemology of plants taxonomy was generally inspired by the philosophic principle expressed in the classic period by Parmenides: "the being is and the not being is not", that corresponds to the taxonomic concept that a living individual belongs to a certain species if its morphological and reproductive features make it and the Holotype of the species as like as two peas. But agreeing with Van Valen's (1973) metaphoric definition of species as a Red Queen evolving together the mutable environment, now the philosophic principle expressed by Heraclitus: "the being is the becoming", is more useful to taxonomy. According to Aristotle the being is an "Entelechia" that is, the being has as inside aim the end cause moving its role in the population or in the communities.

Concluding, in my opinion, taxonomy and particularly seaweeds taxonomy of third millennium must recover both philosophic dimension and synecologic perspective. Seaweeds, in fact, are not only specimens to observe at microscope in a laboratory, but beings living in a wonderful marine ecosystem and connecting numberless communities.

According to John Paul II: "The sea among nature realities is the highly talking to human mind calling him to stare farther, to elevate himself on high" and from this high point, from this vertical dimension we will best understand the "Entelechia", that is the deep nature and evolutive project of wonderful world of seaweeds. So we will discover that marine

phycologists are not only studious, but fellow – travellers of seaweeds along an evolutive process of the biosphere headed for God, the origin of being and of relations between beings forming ecosystems.

Table 1. List Of Mediterranean Endemic Seaweeds

(C = *Chlorophyta*; R = *Rhodophyta*; F = *Fucophyceae*; CY = *Cyanobacteriophyta*; + cited only from Italian coast)

- C - *Acrochaete inflata* (Ercegovic) Gallardo et al. -
- R - *Acrochaetium pallens* (Zanardini) Nägeli [T.i.] -
- R - *Acrodiscus vidovichii* (Meneghini) Zanardini -
- R - *Acrosymphyton purpuriferum* (J. Agardh) G. Sjöstedt -
- R - *Aeodes marginata* (Roussel) F. Schmitz
- R - *Aglaothamnion caudatum* (J. Agardh) Feldmann-Mazoyer -
- R - *Aglaothamnion tenuissimum* (Bonnemaison) Feldmann-Mazoyer var. *mazoyerae* G. Furnari, L'Hardy-Halos, Rueness et Serio -
- R - *Ahnfeltiopsis pusilla* (Montagne) P.C. Silva et DeCew -
- R - *Alsidium helminthochorton* (Schwendimann) Kützinger -
- R - *Antithamnion heterocladum* Funk -
- R - *Antithamnion piliferum* Cormaci et G. Furnari -
- R - *Antithamnion tenuissimum* (Hauck) Schiffner -
- + R - *Antithamnionella elegans* (Berthold) J.H. Price et D.M. John var. *decussata* Cormaci et G. Furnari -
- R - *Arachnophyllum confervaceum* (Meneghini) Zanardini -
- F - *Asperococcus bullosus* J.V. Lamouroux f. *profundus* Feldmann -
- R - *Audouinella duboscqii* (Feldmann) Garbary -
- R - *Audouinella hauckii* (Schiffner) Ballesteros -
- R - *Audouinella incrassata* (Ercegovic) F. Conde Poyales -
- R - *Audouinella mediterranea* (Levring) Ballesteros -
- R - *Audouinella minutissima* (Zanardini) Garbary -
- R - *Balliella cladoderma* (Zanardini) Athanasiadis -
- R - *Boergeseniella deludens* (Falkenberg) Kylin -
- C - *Bryopsidella neglecta* (Berthold) Rietema -
- C - *Bryopsis adriatica* (J. Agardh) Frauenfeld -
- C - *Bryopsis cupressina* J.V. Lamouroux -
- + C - *Bryopsis dichotoma* De Notaris -
- C - *Bryopsis feldmannii* Gallardo et G. Furnari -
- C - *Bryopsis penicillum* Meneghini -
- C - *Bryopsis secunda* J. Agardh -
- F - *Carpomitra costata* (Stackhouse) Batters var. *dichotoma* (Zanardini) Feldmann -
- R - *Ceramium bertholdii* Funk -
- R - *Ceramium ciliatum* (J. Ellis) Ducluzeau var. *robustum* (J. Agardh) Feldmann-Mazoyer -
- R - *Ceramium echionotum* J. Agardh var. *mediterraneum* G. Mazoyer -
- R - *Ceramium gaditanum* (Clemente) Cremades var. *mediterraneum* (Debray) Cremades -
- R - *Ceramium giacconeii* Cormaci et G. Furnari -
- R - *Ceramium graecum* Lazaridou et Boudouresque -
- + R - *Ceramium inconspicuum* Zanardini -
- R - *Ceramium rubrum auctorum* var. *implexo-contortum* Solier -

- R - *Ceramium rubrum auctorum* var. *tenue* C. Agardh -
 C - *Chaetomorpha mediterranea* (Kützinger) Kützinger var. *crispa* (Feldmann) Gallardo et al. -
 F - *Chilionea hispanicum* (Sauvageau) R.L. Fletcher -
 R - *Chondria boryana* (J. Agardh) De Toni -
 R - *Chondria mairei* Feldmann-Mazoyer -
 R - *Chondrymenia lobata* (Meneghini) Zanardini -
 F - *Choristocarpus tenellus* Zanardini -
 R - *Chylocladia pelagosae* Ercegovic -
 R - *Chylocladia pygmaea* (Funk) Kylin -
 R - *Chylocladia verticillata* (Lightfoot) Bliding var. *kaliformis-unistratosa* (Ercegovic) Cormaci et G. Furnari -
 R - *Chylocladia verticillata* (Lightfoot) Bliding var. *kaliformis-unistratosa* (Ercegovic) Cormaci et G. Furnari fo. *breviarticulata* (Ercegovic) Cormaci et G. Furnari -
 F - *Cladosiphon cylindricus* (Sauvageau) Kylin -
 F - *Cladosiphon irregularis* (Sauvageau) Kylin -
 F - *Cladosiphon mediterraneus* Kützinger -
 F - *Climacosorus mediterraneus* Sauvageau -
 C - *Codium coralloides* (Kützinger) P.C. Silva -
 R - *Contarinia peyssonneliaeformis* Zanardini -
 R - *Contarinia squamariae* (Meneghini) Denizot -
 R - *Corallophila cinnabarina* (Grateloup ex Bory) R.E. Norris -
 + R - *Cordylecladia guiryi* Gargiulo, G. Furnari et Cormaci -
 F - *Corynophlaea flaccida* (C. Agardh) Kützinger -
 F - *Corynophlaea hamelii* Feldmann -
 F - *Corynophlaea umbellata* (C. Agardh) Kützinger -
 R - *Crouania attenuata* (C. Agardh) J. Agardh fo. *bispora* (P. et H. Crouan) Hauck -
 R - *Cryptonemia tunaeformis* (A. Bertoloni) Zanardini -
 F - *Cutleria chilosa* (Falkenberg) P.C. Silva -
 F - *Cystoseira algeriensis* J. Feldmann -
 F - *Cystoseira amentacea* (C. Agardh) Bory var. *amentacea* -
 F - *Cystoseira amentacea* (C. Agardh) Bory var. *spicata* (Ercegovic) Giaccone -
 F - *Cystoseira amentacea* (C. Agardh) Bory var. *stricta* Montagne -
 F - *Cystoseira barbata* (Stackhouse) C. Agardh [var. *barbata*] fo. *aurantia* (Kützinger) Giaccone -
 F - *Cystoseira barbata* (Stackhouse) C. Agardh [var. *barbata*] fo. *insularum* Ercegovic -
 F - *Cystoseira barbata* (Stackhouse) C. Agardh var. *tophuloidea* (Ercegovic) Giaccone -
 F - *Cystoseira barbatula* Kützinger emend. Cormaci, G. Furnari et Giaccone -
 F - *Cystoseira brachycarpa* J. Agardh emend. Giaccone var. *brachycarpa* -
 F - *Cystoseira brachycarpa* J. Agardh emend. Giaccone var. *claudiae* (Giaccone) Giaccone -
 F - *Cystoseira compressa* (Esper) Gerloff et Nizamuddin fo. *plana* (Ercegovic) Cormaci et al. -
 F - *Cystoseira compressa* (Esper) Gerloff et Nizamuddin fo. *rosetta* (Ercegovic) Cormaci et al. -
 F - *Cystoseira crinita* Duby -
 F - *Cystoseira crinitophylla* Ercegovic -
 F - *Cystoseira dubia* Valiante -
 F - *Cystoseira elegans* Sauvageau -
 F - *Cystoseira funkii* Schiffner ex Gerloff et Nizamuddin -
 + F - *Cystoseira hyblaea* Giaccone -
 F - *Cystoseira jabukae* Ercegovic -
 F - *Cystoseira mediterranea* Sauvageau var. *mediterranea* -
 F - *Cystoseira mediterranea* Sauvageau var. *valiantei* Sauvageau -

- F - *Cystoseira pelagosae* Ercegovic -
 F - *Cystoseira sauvageauana* Hamel -
 F - *Cystoseira sedoides* (Desfontaines) C. Agardh -
 F - *Cystoseira spinosa* Sauvageau var. *compressa* (Ercegovic) Cormaci et al. -
 F - *Cystoseira spinosa* Sauvageau var. *spinosa* -
 F - *Cystoseira spinosa* Sauvageau var. *tenuior* (Ercegovic) Cormaci et al. -
 F - *Cystoseira squarrosa* De Notaris -
 F - *Cystoseira susanensis* Nizamuddin -
 C - *Derbesia attenuata* Funk [N.i.][T.i.] -
 + C - *Derbesia corallicola* Funk -
 F - *Dictyota mediterranea* (Schiffner) G. Furnari -
 C - *Didymosporangium repens* Lambert -
 R - *Dohrniella neapolitana* Funk -
 F - *Ectocarpus siliculosus* (Dillwyn) Lyngbye var. *adriaticus* (Ercegovic) Cormaci et G. Furnari -
 F - *Ectocarpus siliculosus* (Dillwyn) Lyngbye var. *subulatus* (Kützinger) Gallardo -
 + F - *Ectocarpus siliculosus* (Dillwyn) Lyngbye var. *venetus* (Kützinger) Gallardo -
 F - *Ectocarpus tenellus* (Kützinger) Zanardini [T.i.] -
 C - *Enteromorpha adriatica* Bliding -
 C - *Enteromorpha aragoensis* Bliding -
 C - *Enteromorpha jugoslavica* Bliding -
 C - *Enteromorpha stipitata* P.J.L. Dangeard var. *linzoides* Bliding -
 C - *Entocladia endolithica* (Ercegovic) R. Nielsen -
 C - *Entocladia major* (Feldmann) R. Nielsen -
 R - *Erythrocytis montagnei* (Derbès et Solier) P.C. Silva -
 R - *Erythroglossum balearicum* (Rodriguez) J. Agardh -
 R - *Erythrotrichia rosea* P.J. L. Dangeard -
 R - *Eupogodon penicillatus* (Zanardini) P.C. Silva -
 F - *Feldmannia battersiides* (Ercegovic) Cormaci et G. Furnari -
 R - *Feldmannophycus rayssiae* (Feldmann et Feldmann-Mazoyer) H. Augier et Boudouresque -
 F - *Fucus virsoides* J. Agardh -
 R - *Gelidiella nigrescens* (Feldmann) Feldmann et Hamel -
 R - *Gelidiocolax cristianae* Feldmann et Feldmann-Mazoyer -
 R - *Gelidium spinosum* (S.G. Gmelin) P.C. Silva var. *hystrix* (J. Agardh) G. Furnari -
 R - *Gloiocladia furcata* (C. Agardh) J. Agardh -
 R - *Gracilaria corallicola* Zanardini -
 + R - *Gracilaria dendroides* Gargiulo, De Masi et Tripodi -
 R - *Gracilaria heteroclada* (Montagne) Feldmann et Feldmann-Mazoyer -
 R - *Gracilaria longa* Gargiulo, De Masi et Tripodi -
 + R - *Grateloupia cosentinii* Kützinger -
 R - *Grateloupia proteus* Kützinger -
 R - *Gulsonia nodulosa* (Ercegovic) Feldmann et Feldmann-Mazoyer -
 R - *Halosia elisae* Cormaci et G. Furnari -
 + R - *Halymenia asymmetrica* Gargiulo, De Masi & Tripodi -
 R - *Halymenia floresia* (Clemente) C. Agardh var. *ulvoidea* Codomier -
 F - *Hapalospongidion macrocarpum* (Feldmann) M.J. Wynne -
 F - *Hinckesia dalmatica* (Ercegovic) Cormaci et G. Furnari -
 F - *Hinckesia geniculata* (Ercegovic) Cormaci et G. Furnari -
 F - *Hinckesia hauckii* (Ercegovic) Cormaci et G. Furnari -
 + R - *Hypnea furnariana* Cormaci, Alongi et Dinaro -

- R** - *Kallymenia lacerata* Feldmann -
R - *Kallymenia patens* (J. Agardh) P.G. Parkinson -
R - *Kallymenia spathulata* (J. Agardh) P.G. Parkinson -
F - *Kuetzingiella battersii* (Bornet ex Sauvageau) Kornmann var. *mediterranea* (Sauvageau) Gomez et Ribera -
F - *Laminaria rodriguezii* Bornet -
R - *Laurencia minuta* Vandermeulen, Garbary et Guiry subsp. *scammaccae* G. Furnari et Cormaci -
R - *Laurencia coronopus* J. Agardh [T.i.] -
R - *Laurencia epiphylla* Boisset et Lino -
F - *Leathesia mucosa* Feldmann var. *condensata* Feldmann -
F - *Leathesia mucosa* Feldmann var. *mucosa* -
+ F - *Leptonematella neapolitana* (Schussnig) Cormaci et G. Furnari -
+ R - *Lithothamnion minervae* Basso -
R - *Lithothamnion valens* Foslie -
R - *Lomentaria articulata* (Hudson) Lyngbye var. *linearis* Zanardini -
R - *Lomentaria chylocradiella* Funk -
R - *Lomentaria clavaeformis* Ercegovic -
R - *Lomentaria compressa* (Kützinger) Kylin -
R - *Lomentaria ercegovicii* Verlaque, Boudouresque, Meinesz, Giraud, Marcot-Coqueugnot -
R - *Lomentaria firma* (J. Agardh) Kylin f. *compressa* Ercegovic -
R - *Lomentaria jabukae* Ercegovic -
R - *Lomentaria verticillata* Funk -
R - *Mesophyllum macroblastum* (Foslie) W.H. Adey -
R - *Metapeysonnelia feldmannii* Boudouresque, Coppejans et Marcot -
R - *Monosporus pedicellatus* (J.E. Smith) Solier var. *tenuis* (Feldmann-Mazoyer) Huisman et Kraft -
F - *Myriactula elongata* (Sauvageau) Hamel -
F - *Myriactula gracilis* Ben van der -
F - *Myriactula rigida* (Sauvageau) Hamel -
R - *Myriogramme carnea* (J. J. Rodriguez) Kylin -
R - *Myriogramme conchicola* (Feldmann) Boudouresque -
R - *Myriogramme distromatica* Boudouresque [N.i.] [I.s.] -
F - *Myriotrichia adriatica* Hauck -
F - *Nemacystus flexuosus* (C. Agardh) Kylin var. *giraudyi* ("giraudii") (J. Agardh) De Jong -
R - *Nemastoma dichotomum* J. Agardh -
R - *Neurocaulon foliosum* (Meneghini) Zanardini -
R - *Nitophyllum albidum* Ardissonne -
R - *Nitophyllum flabellatum* Ercegovic -
R - *Nitophyllum micropunctatum* Funk -
R - *Nitophyllum rotundum* Funk [T.i.] -
R - *Nitophyllum tristromaticum* Rodriguez ex Mazza [i.s.] -
+ R - *Osmundea maggsiana* Serio, Cormaci et G. Furnari -
+ R - *Osmundea pelagiensis* G. Furnari -
R - *Osmundea pelagosae* (Schiffner) Nam -
R - *Osmundea verlaquei* G. Furnari -
C - *Pedobesia solieri* Feldmann ex Abélard et Knoepffler -
R - *Peyssonnelia bornetii* Boudouresque et Denizot -
R - *Peyssonnelia coriacea* Feldmann -
R - *Peyssonnelia crispata* Boudouresque et Denizot -
R - *Peyssonnelia magna* Ercegovic -

- R - *Peyssonnelia rara-avis* Marcot et Boudouresque -
- R - *Peyssonnelia rosa-marina* Boudouresque et Denizot -
- R - *Peyssonnelia squamaria* (S.G. Gmelin) Decaisne -
- R - *Peyssonnelia stoechas* Boudouresque et Denizot -
- + F - *Phaeostroma bertholdii* Kuckuck -
- R - *Polysiphonia arachnoidea* (C. Agardh) Zanardini -
- R - *Polysiphonia atra* Zanardini -
- R - *Polysiphonia banyulensis* Coppejans -
- R - *Polysiphonia beguinotii* Schiffner [T.i.] -
- R - *Polysiphonia biformis* Zanardini -
- R - *Polysiphonia breviariculata* (C. Agardh) Zanardini -
- R - *Polysiphonia castagnei* Kützing [T.i.] -
- R - *Polysiphonia cladorhiza* Ardissonne -
- R - *Polysiphonia derbesii* Solier ex Kützing -
- R - *Polysiphonia deusta* (Roth) Sprengel -
- R - *Polysiphonia dichotoma* Kützing -
- R - *Polysiphonia flexella* (C. Agardh) J. Agardh -
- R - *Polysiphonia mottei* Lauret -
- R - *Polysiphonia ornata* J. Agardh -
- + R - *Polysiphonia perforans* Cormaci, G. Furnari, Pizzuto et Serio -
- R - *Polysiphonia polyspora* (C. Agardh) Montagne -
- R - *Polysiphonia setigera* Kützing -
- R - *Polysiphonia tripinnata* J. Agardh -
- A - *Posidonia oceanica* (Linnaeus) Delile -
- R - *Predaea ollivieri* Feldmann -
- R - *Predaea pusilla* (Berthold) Feldmann -
- F - *Protasperococcus myriotrichiiformis* Sauvageau -
- C - *Pseudochlorodesmis tenuis* Ercegovic -
- + R - *Pseudocrouania ischiana* Funk -
- F - *Pseudolithoderma adriaticum* (Hauck) Verlaque -
- R - *Ptilocladopsis horrida* Berthold -
- R - *Ptilophora mediterranea* (H. Huvé) R. E. Norris -
- R - *Radicilingua adriatica* (Kylin) Papenfuss -
- R - *Rhodochaete parvula* Thuret -
- R - *Rhodophyllis strafforelloii* ("strafforellii") Ardissonne -
- R - *Rhodymenia ligulata* Zanardini -
- R - *Rissoella verruculosa* (A. Bertoloni) J. Agardh -
- R - *Rodriguezella bornetii* (Rodriguez) F. Schmitz -
- R - *Rodriguezella ligulata* Feldmann [N.n.] -
- R - *Rodriguezella pinnata* (Kützing) F. Schmitz ex Falkenberg -
- R - *Rodriguezella strafforelloii* ("strafforerllii") F. Schmitz ex Rodriguez -
- F - *Sargassum hornschi* C. Agardh -
- F - *Sargassum trichocarpum* J. Agardh -
- + CY - *Schizothrix codiiformis* (Giaccone) Giaccone -
- R - *Sebdenia dichotoma* Berthold -
- R - *Sebdenia monardiana* (Montagne) Berthold -
- R - *Sebdenia rodrigueziana* (Feldmann) P.G. Parkinson -
- R - *Seirospora apiculata* (Meneghini) Feldmann-Mazoyer -
- R - *Seirospora giraudyi* (Kützing) De Toni -

R - *Seirospora sphaerospora* Feldmann -
C - *Siphonocladus pusillus* (C. Agardh ex Kützing) Hauck -
R - *Spermothamnion flabellatum* Bornet f. flabellatum -
R - *Spermothamnion flabellatum* Bornet f. disporum Feldmann-Mazoyer -
R - *Spermothamnion johannis* Feldmann-Mazoyer -
F - *Sphacella subtilissima* Reinke -
F - *Stictyosiphon adriaticus* Kützing -
F - *Streblonemopsis irritans* Valiante -
F - *Taonia atomaria* (Woodward) J. Agardh f. ciliata (C. Agardh) Nizamuddin -
+ F - *Taonia lacheana* Cormaci, G. Furnari et Pizzuto -
R - *Tenarea tortuosa* (Esper) Me. Lemoine -
C - *Trichosolen myura* (J. Agardh) W.R. Taylor -
+ C - *Ulva neapolitana* Bliding -
F - *Zosterocarpus oedogonium* (Meneghini) Bornet -

Table 2. Biodiversity in the Mediterranean Sea.

	Surface	Vegetals (Macrophytobenthos)	Animals (Metazoa)
World Ocean	99.2 %	8,000	130,000
Mediterranean Sea	0.8 %	1,351 (16.2 %)	7,241 (5.5 %)

Table 3. Chorologic spectrum of the marine organisms of the Mediterranean Sea.

	Animals	Vegetals
Mediterranean (endemic)	28.6 %	26.6 %
Mediterranean + Atlantic	50.1 %	48.6 %
Mediterranean + Indian-Pacific	4.4 %	4.9 %
Mediterranean + Atlantic + Indian-Pacific	16.8 %	19.9 %

Table 4. Species living in the Mediterranean Sea and collected during last 50 years

	Western Mediterranean	Adriatic Sea	Eastern Mediterranean
Animals sp. no. 4094 / 7241	87.1 %	48.9 %	43.1 %
Vegetals sp. no. 1100 / 1351	89.5 %	64.4 %	57.6 %

Table 5. Chorologic spectrum of the marine flora of the Italian coast.

<i>Biogeographical Groups</i>	No. taxa	%
A (Atlantic)	13	1.44
Ab (Atlantic boreal)	181	20.00
Abt (Atlantic boreo-temperate)	39	4.30
At (Atlantic tropical)	21	2.32
AP (Atlantic-Pacific)	23	2.54
Aptf (Atlantic-Pacific temperate cold)	10	1.10
IA (Indian-Atlantic)	100	11.05
IAt (Indian-Atlantic tropical)	6	0.66
Iatf (Indian-Atlantic temperate cold)	8	0.90
IP (Indian-Pacific)	45	4.97
P (Pantropical)	28	3.09
SC (Subcosmopolite)	96	10.60
C (Cosmopolite)	91	10.05
CA (Circumastral)	1	0.11
CB (Circumboreal)	8	0.90
CBA (Circumboreoastral)	3	0.33
M (Mediterranean)	232	25.64
Total taxa (only valid taxa)	905	

Table 6. supposed origin of the marine flora along the italian coast.

	No. taxa	%
Tethyan and Mesogean	202	22.3
Plio - pleistocenic	254	28.0
Cosmopolite	217	23.9
Endemic mediterranean	232	25.6

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