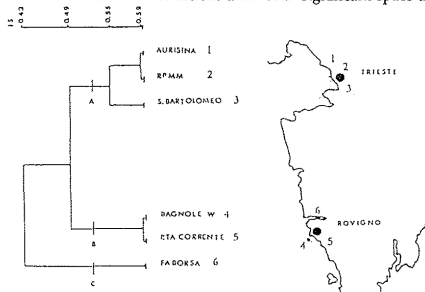


The study of macrophytobenthos is generally considered to be a useful reference (and even necessary) to the interpretation of space-time transformations of the sea environments. The object of this work is just that to bring into evidence some qualitative modifications of algal flora in the Northern Adriatic Sea in comparison with the latitudinal expansion of the coast, and to understand the meaning of the aforesaid transformations. The sampling sites, chosen to start this kind of research, have been located near : Aurisina (1), Natural Reserve of Miramare (2) and S. Bartolomeo (3) in Trieste (Italy); Bagnole W (4), Punta Corrente (5) and Faborsa (6) in Rovinj (Croatia) (fig.1). The sampling was carried out in the years 1989-1990, at a seasonal cadence, in a bathymetric interval that goes from mesolittoral level to inferior horizon of the infralittoral. The collected data have been arranged in a matrix, to which have been applied the cluster analysis.

On the basis of biotic classification relative to floral spectres (presence-absence of 191 species) in the different sampling sites, allowed the dendrogram (fig. 1) to bring into evidence, a clear-cut separation (IS < 0.55) among the sampling sites of Trieste (cluster A; IS = 0.55) and the ones of Rovinj (cluster B; IS = 0.59). The sampling site of Faborsa (cluster C; IS = 0.43), shows in this dendrogram a different position, due to the fact that in such a locality, owing to a unfavourable meteorological conditions, hasn't been possible to carry out the autumnal sampling with the consequent loss of information. The difference of the floral spectres of the sampling sites, that has been taken into consideration, seems to bring into evidence a biotic distinction, which is characterized by: a) a progressive retreat of some species from the Gulf of Trieste (as, e.g.: *Sargassum hornschiuchii* C. AGARDH, *Acetabularia acetabulum* (LINNEO) SILVA, *Sphaerococcus coronopifolius* STACKHOUSE and an isolation in small relict areas of others species, which instead were presented in the past (as, e.g.: *Cystoseira amentacea* BORY var. *spicata* (ERCEGOVIC) GIACCONE and *C. compressa* (ESPER) GERLOFF et NIZAMUDDIN *Hydroclathrus clathratus* (BORY ex C. AGARDH) HOWE, *Cladostephus spongiosus* f. *verticillatus* (LIGHTFOOT) PRUD'HOMME VAN REINE, *Peyssonnelia polymorpha* (ZAN.) SCHMITZ, *Posidonia oceanica* (LINNEO) DELILE); b) the recent appearance of species with wide spectre of ecological valence (*Codium fragile* (SURINGAR) HARIOT) in all the Gulf of Trieste. In fact this gulf, real and quite "cul de sac" inside of the Northern Adriatic Sea, is characterized, in comparison with the istrian coast, by: a lesser water replacement and a larger sedimentary regime, besides by a different geology and geomorphology. These environment conditions are moreover those ones that must have helped the upstart of scaphilous species from bionomical level below (BRESSAN et al., 1991).

With the help of tab. 1, it was possible to bring into evidence: a) a relatively high value (4,0-5,8) of biogeographical index R/P (IS R/P ≤ 4) by FELDMANN (1938), due to an increase of the percentage of *Rhodophyceae* and a parallel reduction on percentage of *Phaeophyceae*. Such index, that has been calculated also according to the different formulations of BOUDOURESQUE (1971) and of CORMACI et al. (1985), has turned out to be almost always out of scale (> 4) (tab. 1) and this, not so much why the Northern Adriatic Sea is to be considered biogeographically "tropical", but because the value of such index, also on the basis of specialized scientific literature, seems to suffer the environment alterations, losing the initial property (FELDMANN, 1938) of corological characterization; b) a low number (= 10%) of eutrophic nitonitrofile species, which are typical of polluted areas, as e.g. *Enteromorpha intestinalis* (LINNEO) LINK, *E. crinita* (ROTH) J. AGARDH, *Codium vermilara* (OLIVIERI) DELLE CHIAJE, *C. fragile* (SURINGAR) HARIOT, *Ulva lactuca* ARESCHOUG, *Pterocladia capillacea* (GMELIN) BORNET, etc.; c) a reduction of total number of species in comparison with the work of VATOVA (1928) in Rovinj and of GIACCONE (1967) in Trieste. Beyond the limits of comparison due to the methodological, instrumental and cultural differences, the objectiveness of this last observation will be trustworthy only on the basis of subsequent deepening, therefore on a number of sufficient data for a significant space-time comparison.



Tax. divisions	TRIESTE						ROVINJO						Tot. sp.
	1	2	3	4	5	6	1	2	3	4	5	6	
Rhodophyceae	65	67,7	72	69,2	58	69,0	83	69,7	81	71,1	36	62,1	191
Phaeophyceae	14	14,6	13	12,5	15	16,7	17	14,3	14	12,3	9	15,5	
Chlorophyceae	17	17,7	19	18,3	12	14,3	19	16,0	19	16,7	13	22,4	
Part. tot. sp.	96	101	84	119	114	58							
R / P (**)	4,6		5,5	4,1	4,9	5,0						4,0	
R / P avg (**)		4,7			4,9								
R / P avg (***)	4,2	5,8	3,8	5,7	6,4	3,1							
Cl / Cr (****)	4,2	5,8	3,9	5,7	6,4	3,2							

(\*) by FELDMANN, 1938 - (\*\*) by CORMACI and coll., 1985 - (\*\*\*) by BOUDOURESQUE, 1971

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Benthic flora of the Southern Adriatic had long been quite unknown if compared to much better studied flora of other parts of this sea.

We have compiled a list of species composition of benthic flora settlements of this Adriatic part from our long-term studies in different parts of this area. The list consists of 412 taxa of three divisions of benthic algae (241 Rhodophyta, 94 Phaeophyta and 77 Chlorophyta) and three species of marine phanerogams (SPAN and ANTOLIC, 1988) (Table 1). This paper presents some general characteristics of studied benthic flora from a part of the Peljesac coast to Ulcinj town, and some parts of the coast of islands Korcula, Mljet, Koločep, Dakska and Lokrum.

Table 1. Review of species and infraspecific taxa of benthic flora from Southern and Middle Adriatic

	RHODOPHYTA		PHEAOPHYTA		CHLOROPHYTA		TOTAL N
	N	%	N	%	N	%	
Southern Adriatic	241	58.5	94	22.8	77	18.7	412
Middle Adriatic	301	56.7	136	25.6	94	17.7	531

The inventory of benthic flora of the Southern Adriatic is poorer in comparison to the revised Middle Adriatic benthic flora (SPAN and ANTOLIC, 1989) which consisted of 531 taxa (301 or 56.7 % Rhodophyta, 136 or 25.6 % Phaeophyta and 94 and 17.7 % Chlorophyta) (Table 1).

The difference between Middle Adriatic R/P quotient of 2.2 and that of 2.6 from the southern Adriatic seems not to be great, particularly if the values from some principal parts of the Southern Adriatic were higher; 3.6 for Dubrovnik area (SPAN and ANTOLIC, 1991) and separately for Lokrum (SPAN et al., 1989), 3.4 for open Monte Negro area (SPAN and ANTOLIC, 1983) and 3.2 for the bay of Boka Kotorska (ANTOLIC and SPAN, in press). Some data of biogeographical and bionomical distribution of Adriatic benthic algal taxa are used of GIACCONE (1977) check-list of Adriatic marine flora.

Benthic flora of both Middle and Southern Adriatic includes the elements of the same phytogeographical affinities, even though with different percentage presence. The atlantic-mediterranean (46.5 % and 50.2 %) and mediterranean (31.6 % and 30.8 %) elements are dominant in both the Middle Adriatic flora and Southern Adriatic flora making up 78.0 % and 81 % respectively. The adriatic (9.4 % and 6.1 %), indo-pacific-mediterranean (4.9 % and 6.1 %), cosmopolitan (3.6 % and 3.7 %), adriatic-atlantic (2.1 % and 1.2 %) and circumtropical (1.9 % and 2.4 %) elements constitute the rest of 22.0 % and 19.0 % respectively. High percent of the presence of adriatic elements and slightly poorer presence of atlantic-mediterranean elements in the flora of the Middle Adriatic is indicative of its better pronounced "Adriatic" character. On the contrary, higher percentage presence of the atlantic-mediterranean and lower percentage of adriatic elements in the flora of Southern Adriatic point out its rather mediterranean character.

The causes of rather modest development of benthic flora of the Southern Adriatic in comparison to the Middle Adriatic could be ascribed to very strong exposure of a larger part of the coast to the open sea unprotected by the islands in front. Depth distribution of benthic algae was hindered due to the formation of ample and uninterrupted surfaces of mobile bottoms, at times already at small depths near the coast. Typical and well developed coralligenous settlements, encountered around outer islands of the Middle Adriatic, where rich deep flora of benthic algae is also well developed, are almost completely absent from the Southern Adriatic bottoms.

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