NAT. CROAT. | VOL. 20 | No 1 | 53–95 | ZAGREB | June 30, 2011

original scientific paper / izvorni znanstveni rad

TAXONOMIC COMPOSITION, DEPTH DISTRIBUTION AND PHYTOGEOGRAPHIC CHARACTERISTICS OF MARINE BENTHIC MACROFLORA FROM RIJEKA BAY (NORTH ADRIATIC SEA, CROATIA)

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Antolić, B., Zavodnik, N., Špan, A.† & Žuljević, A.: Taxonomic composition, depth distribution and phytogeographic characteristics of marine benthic macroflora from Rijeka Bay (north Adriatic Sea, Croatia). Nat. Croat., Vol. 20, No. 1., 53–95, 2011, Zagreb.

Here we give a review of the taxonomic composition, depth distribution, and phytogeographic characteristics of benthic marine macroflora from Rijeka Bay. It is based on our research from 1950 to 2000, and on both a nomenclatural and a taxonomic critical revision of previous records from that region. The list contains 380 taxa belonging to the Rhodophyta (231), the Ochrophyta (74), the Chlorophyta (71) and the Magnoliophyta (4), 338 of which are at the species level while 42 are infraspecific (4 subspecies, 31 varieties, 7 forms, 1 stage). The established ratio between the number of Rhodophyta and Phaeophyceae (R/P Index; FELDMANN, 1937) was 3.1, and the relation between the number of Rhodophyta + Chlorophyta and Phaeophyceae (R+C/P Index; CHENEY, 1977) was 4.1. Both the above values show the subtropical character of benthic macroalgal flora in the surveyed area. With regard to its origin, the Rijeka Bay benthic flora is not homogenous. It comprises floral elements from several phytogeographic regions. Predominant by number and percentage are Atlantic (86 taxa – 23%), subcosmopolitan (75 taxa – 20%), Mediterranean (70 taxa – 19%), and Indo-Atlantic (53 taxa – 14%) floral elements. Other phytogeographic regions contribute only 96 taxa to Rijeka marine algal flora – 25% of total the 380 taxa recorded. Only 3 species (1%) are included in the category of Adriatic endemic (*Polysiphonia adriatica*, *Feldmannia irregularis* var. *lebeliides* and *Fucus virsoides*).

The analysis of benthic flora in relation to littoral bionomical zones reveals that the highest number of algal taxa is recorded in the upper infralittoral zone (325), and the lowest (the supralittoral excepted) in the eulittoral zone (109).

With regard to depth distribution, marine benthic flora of Rijeka Bay consists of a very small number of algal taxa which live only deeper than 6 m (36 taxa – 9.4%), in comparison with the relatively high number of algal taxa which live only as far as 6 m deep (153 taxa – 40.3%), and those living both above and below the depth of 6 m (191 taxa – 50.1%).

Key words: marine benthic macroalgae and seagrasses, check-list, taxonomic composition, depth distribution, phytogeographic characteristics, Rijeka Bay, north Adriatic Sea

Antolić, B., Zavodnik, N., Špan, A.† & Žuljević, A.: Taksonomski sastav, dubinska rasprostranjenost i fitogeografske značajke morske bentoske makroflore u Riječkom zaljevu (sjeverni Jadran, Hrvatska). Nat. Croat., Vol. 20, No. 1., 53–95, 2011, Zagreb.

U radu se iznosi popis bentoskih morskih makroalga i morskih cvjetnica Riječkog zaljeva koji se temelji na istraživanjima izvedenim od 1950. do 2000. godine, te starijim i novijim bibliografskim podacima. Popis sadrži ukupno 376 svojte bentoskih alga (231 svojti ili 60,8% Rhodophyta, 74 svojte ili 19,5% Ochrophyta, 71 svojta ili 18,7% Chlorophyta) i 4 vrste morskih cvjetnica (Magnoliophyta). Prema vrijednostima kvocijenata R/P (FELDMANN, 1937) i R+C/P (CHENEY, 1977) bentoska flora Riječkog zaljeva ima suptropski karakter. U fitogeografskom sastavu brojem i postotkom prevladavaju atlantski (86 svojti ili 22,5%), subkozmopolitski (75 svojte ili 19,8%), mediteranski (70 svojte ili 18,5%) i indo-atlantski (53 svojte ili 14%) florni elementi. Od endemskih jadranskih vrsta zabilježene su samo tri (*Polysiphonia adriatica*, *Feldmannia irregularis* var. *lebeliides* i *Fucus virsoides*). Najveći je broj svojti zabilježen u gornjem infralitoralu (325), dosta manje u srednjem (213) i donjem infralitoralu (190), a najmanje (izuzevši supralitoral gdje je određena samo jedna vrsta) u eulitoralu (109). Razmjerno mali broj svojti bentoske flore (36 ili 9,4% od ukupnog broja) živi na većim dubinama od 6 m, u odnosu na razmjerno velikog broja svojti koje žive samo do 6 m dubine (153 ili 40,3%), odnosno svojti koje su zastupljene u obje kategorije (191 ili 50,1%).

Ključne riječi: morske bentoske makroalge, morske cvjetnice, popis, taksonomski sastav, dubinska rasprostranjenost, fitogeografske značajke, Riječki zaljev, sjeverni Jadran

INTRODUCTION

Rijeka Bay is a land-locked north Adriatic Sea area located between the Istrian peninsula and Mt Učka to the west, Mt Risnjak to the north, Krk Island to the east, and Cres Island to the south. This area communicates with other parts of the Adriatic Sea through three narrow straits: Tihi kanal (between the mainland and the Krk Island), Srednja vrata (which separates Krk from Cres Islands), and Vela vrata (between Cres Island and the Istrian peninsula). The area of the bay is about 450 km^2, the maximum depth is 65 m, and the average depth over most of the bay is about 60 m (Fig. 1).

The research area is influenced by one of the most developed industrial and population urban centres in the eastern Adriatic. Rijeka town, populated by about 200 000 inhabitants, is famous for its large harbour, two oil refineries, three shipyards, a petrochemical and power plant, an oil terminal, and a number of other industrial facilities. In addition, famous tourist resorts are located along the Istrian peninsula coast and on Krk Island, at which about four million overnight stays per year are registered.

Having in mind the considerable economic and demographical importance of Rijeka and its environs, regional and state bodies have maintained efforts to achieve planned development in and protection of the area. Special attention has been paid to the marine environment, most at a subregional level. Therefore, one of the basic tasks of environmental studies was fundamental research in marine flora and fauna, with special regard to diversity and distributional patterns of taxa and benthic communities recorded. The aim of our efforts was to collect and process the data available and to establish an inventory, or check-list, of benthic marine macroflora. A short report on the matter was provided previously (ZAVODNIK *et al.*, 1992). The present list would be complementary to the index of the Rijeka Bay marine fauna which appeared a few years ago (ZAVODNIK & KOVAČIĆ, 2000).

HISTORICAL BACKGROUND

LORENZ (1863) provided the first invaluable data on the relation of marine flora and vegetation to the sea bottom and hydrographical conditions in the area which has remained of interest until the present. Unfortunately, the author did not note the exact collection sites of taxa which made his information unsuitable for inventory purposes.

HAUCK (1877, 1885) and HANSGIRG (1892, 1899) studied algological material they had collected at some sites in Rijeka Bay. CAMMERLOCHER (1915) reported on herbarium exsiccata from this area kept by the Botanical Department of the Vienna Court Museum. Short reviews of benthic flora were provided by MATISZ (1897) and D'ANCONA (1917). VOUK (1914a, b, 1915) studied material collected in Bakar Bay during the seasonal cruises of the RV Vila Velebita (MOROVIĆ, 1968). Curiously, scientists engaged at the Rijeka Royal Hungarian Marine Biological Station have paid no attention to marine benthic flora in this area (STILLER-RÜDIGER & ZAVODNIK, 1990).

Algological research was also insignificant in the mid-war period: only papers by LINARDIĆ (1949) on *Fucus virsoides*, and BENACCHIO (1938) can be referred to. But after the 2nd World War, within numerous ecological studies carried out in Rijeka Bay, seaweeds and seagrasses became a subject of continuous research (GOLUBIĆ, 1960; LOVRIĆ, 1971, 1981; RIZZI-LONGO, 1972–1973; ŠEGULJA & LOVRIĆ, 1977; ZAVODNIK *et al*., 1978, 1981; ZAVODNIK & ZAVODNIK, 1985, 1979; GAMULIN-BRIDA *et al*., 1980; PAVLETIĆ & ŽUTIĆ-MALOSEJA, 1981; IGIĆ, 1982; JAKLIN & ARKO-PIJEVAC, 1994, 1997; ZAVODNIK & JAKLIN, 1994). Occasionally, seaweeds were recorded in commercial bottom trawl catches (CRNKOVIĆ, 1970; unpublished results). Recently, much attention has been paid to monitoring the invasive alga *Caulerpa taxifolia* colony detected near Malinska on the western coast of the Krk Island (ŽULJEVIĆ, 1997; ZAVODNIK *et al*., 1998; IVEŠA *et al*., 2001; MEINESZ *et al*., 2001; ZAVODNIK *et al*., 2001; IVEŠA *et al*., 2006). In the areas of interest of special sponsors, *i.e.* in the Rijeka town environs, in Bakar Bay, and at selected stations located on the Krk Island, field research has been undertaken repeatedly, and where possible, seasonally (ZAVODNIK *et al*., 1978, 1981; TRAVIZI & ZAVODNIK, 2004). Algological sampling was also undertaken within a framework of specially designed tasks, such as test panel fouling studies in the Rijeka Bay Oil Port and the underwater coal transport tunnel in Bakar Bay (IGIĆ, 1982; Authors' unpublished Reports).

Data on Rijeka Bay algal and seagrass taxa also appeared in some monographs (HOEK, 1963; HARTOG, 1970), and were used in regional diversity and phytogeographical studies (GIACCONE, 1978; SEKULIĆ & LOVRIĆ, 1987; RAC & LOVRIĆ, 1998).

MATERIAL AND METHODS

This check-list was accomplished by data from papers published in the past 150 years and our recent algological researches between 1950 and 2000.

In our researches the algological material was collected by scuba diving along the 70 coastal transects, and also by grabs, dredges and bottom trawl catches located all around Rijeka Bay (Fig. 1).

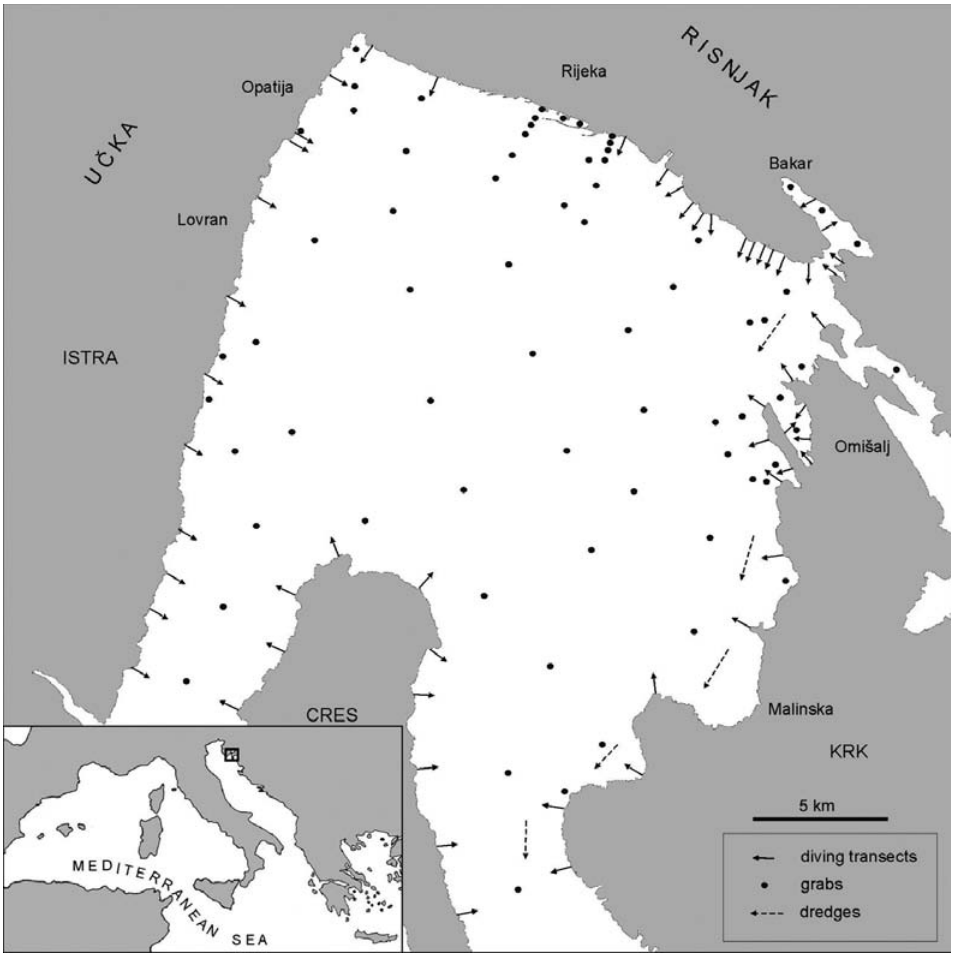

Fig. 1. Study area of Rijeka Bay.

The taxonomic nomenclature and general distribution of algal taxa are based on compilations by GIACCONE *et al*. (1985), RIBERA *et al*. (1992), GALLARDO *et al.*, 1993, and from the website www.algaebase.org (GUIRY & GUIRY, 2009).

For depth distribution of benthic algae (Rhodophyta, Ochrophyta, Chlorophyta) and seagrasses (Magnoliophyta) the zonation by ERCEGOVIĆ (1964) was used as the basis of our data. In the Adriatic Sea he recognized six bionomical zones: the supralittoral (the shore above the high tide level; the maximum height is about 1m in the research area), the eulittoral (the shore zone between the high and the low tide level, also known as mediolittoral), the infralittoral zone which was further divided into the upper infralittoral (from the low tide level up to 5–6 m depth), the middle infralittoral (from 5–6 m to 30–35 m depth) and the lower infralittoral (from 30–35 m to 100–120 m depth), and the elittoral (from 100–120 m to 250 m depth) (Ercegović, 1964). Our terminology for these zones, however, was adjusted to terminology suggested by PÉRÉS & PICARD (1964) and PÉRÉS (1967), and used recently in

all Mediterranean countries (BELLAN-SANTINI *et al.*, 1994) and the Adriatic Sea countries as well (GAMULIN-BRIDA, 1967; PÉRÉS & GAMULIN-BRIDA, 1973).

Phytogeographic elements are indicated by simbols used by Furnari *et al.*, (1999): M – Mediterranean; A – Atlantic; Ab – boreo-Atlantic; At – Atlantic tropical; Abt – boreo-tropical Atlantic; AP – Atlanto-Pacific; APt – tropical Atlanto-Pacific; APtc – Atlanto-Pacific cold temperate; IA – Indo-Atlantic; IAt – Indo-Atlantic tropical; IAtc – Indo-Atlantic cold temperate; C – Cosmopolitan; SC – Subcosmopolitan; CB – Circumboreal; IP – Indo-Pacific; P – Pantropical; EAD – Adriatic endemic (Table 4).

Valid specific and infraspecific taxa are presented in italics, while roman types are used for synonyms. Taxa are provided with full names of their authors (Table 4). In the Annex an alphabetical list of algal and seagrasses taxa is given.

RIJEKA BAY CHARACTERISTICS

Geomorphological features

Rijeka Bay is a roughly rectangular depression overflowed by the rising of the sea level in the postglacial period (ŠEGOTA, 1982). Its coasts are built of Mesozoic carbonate rocks, with steep slopes and vertical cliffs rich in karst formations. Coastal rocks are well intersected and eroded. Submerged tidal notches generated in the geological past are characteristic of the depth of 50–60 cm (BENAC & JURAČIĆ, 1998; BENAC *et al.*, 2004).

The western and northern coasts of Rijeka Bay are famous for numerous underwater springs (Croatian: vrulje) (KUŠČER, 1950; ALFIREVIĆ, 1969). The sea bottom is gently sloping only in the eastern side of the Bay, *i.e.* along the western coast of the Krk Island. About 90% of the Rijeka Bay bottom is represented by a 60–65 m deep plain which communicates with other parts of the north Adriatic through three straits, at about the same depth. There are two small embayments in the area named Bakar Bay and Omišalj Bay. The only islet in the area of interest is the Sv. Marko Islet located at the entrance to the Tihi Channel.

Substrate

The most characteristic feature of the coastal zone comprises compact rocks and cliffs. However, gravel and cobble beaches were formed at the heads of many coves, a few meters to more than fifty meters in length. At the depth of about 10 to 20 m, rocks are often replaced by rough sand and gravel screes which, generally at inclination of about 40–45°, descend continuously as far as a deep silty plain deprived of algae and phanerogams (ALFIREVIĆ, 1968, 1977, 1979; JURAČIĆ *et al.*, 1999; BENAC *et al.*, 2000). At some sites, sandy escarpments are interrupted by rocky steps and small ridges, or they are rich in loose stones and outcrops scattered on the slope.

Water movements

The most important parameter is that of wind-borne waves (ORLIĆ *et al.*, 1988). A part of the Istrian coast is fully exposed to waves generated by the south-eastern

wind, jugo (scirocco), while Cres Island and Istria in general are affected by the north-eastern wind, bora, which can sometimes be storm-strong. On the other hand, the northern area of the Bay, and the adjoining coast on Krk Island, are mostly exposed to the north-western wind, maestral or mistral. Maximum wave height in the area is about 3m and the tide oscillations vary within 0.6 m (BENAC et al., 2004).

Current circulation is not uniform (SEKULIĆ & ŽIVKOVIĆ, 1980). The main water exchange happens between the Vela vrata and the Srednja vrata straits: the current direction is clockwise in summer and anticlockwise in winter (LEGOVIĆ, 1982). In the northern subregion of the Bay, current circulation is variable and mostly depends on occasional predominant wind driving the surface currents, and the fresh water inflows, especially in Bakar Bay (ORLIĆ & KUZMIĆ, 1980). It seems that in winter the water is characterized by predominantly cyclonic surface currents, while in summer periodical eddies and gyres predominate causing a relative stagnation of water body (SMIRČIĆ & ILIĆ, 1981). Some results suggest that the speed of the surface currents is over 0.1 m/s. Tidal currents were noted only locally but, unfortunately, they were not subject of special measurements. It should be emphasized that in this semi-enclosed Rijeka basin, water circulation is especially important in the vertical and horizontal distribution of other hydrographical parameters (DEGOBBIS, 1981; SUPIĆ & ORLIĆ, 1992).

Transparency

Transparency greatly depends on numerous water column parameters. In the coastal areas, during rainy periods, the transparency can be much diminished by inputs of terrestrial material. Phytoplankton blooms and generated 'water snow' also have to be considered (ZAVODNIK, 1977). In general, the Rijeka Bay water is quite highly transparent, especially in its central and southern subregions. In the course of our field research, the visibility of a white Secchi disc was ranged mostly between 6 and 30 m.

Temperature

Seasonal temperature changes mainly depend on heat exchange between the sea and the atmosphere (DEGOBBIS, 1981). There is the influence of local freshwater discharge and water column mixing under wind effects, especially those of the bora, which cannot be disregarded (SUPIĆ & ORLIĆ, 1992). Long-term data reveal an apparent homothermy (8.5 °C) of the water column in the winter time. By contrast, in the summer time a well distinguished thermocline forms at about 15–18 m depth. The maximum summer surface temperature ranges between 21–24 °C, and at the 30 m depth it is 9.8–18 °C.

Due to local influences temperature regimes are not the same in certain Rijeka Bay subregions. Special temperature conditions were noted in Bakar Bay where, due to its relative shallowness and the constant cold freshwater inflow, the temperature range was smaller, and the upper part of water column, in general, was colder than in the other areas of Rijeka Bay (DEGOBBIS, 1981).

Salinity

Important differences in salinity were noted in various subregions of Rijeka Bay (DEGOBBIS, 1981). The most stable salinity conditions were noted in the central and the southern parts of the Bay. Although the salinity distribution in this area is influenced by water exchange with offshore areas of the North Adriatic, through the Vela vrata and the Srednja vrata straits, the salinity, in general, ranged between 36 and 38.5.

The salinity conditions in Bakar Bay were quite peculiar and characteristic for areas of great freshwater inflow. Here, the surface salinity was frequently below 10 to 20, but already at a few meters depth it sharply increased to the normal bottom salinity values. Seasonal variations in water column temperature and salinity structures were noted, but it appears that a significant portion of the freshwater inflow was not mixed in Bakar Bay but widely diffused into Rijeka Bay (DEGOBBIS, 1981). In the restricted northern coastal area, *i.e.* in the Rijeka town environs, the influences on surface salinities of the Rječina River, and the Rijeka sewage outfalls were noticed (DEGOBBIS *et al.*, 1979).

Pollution

Although some organic and inorganic pollutants were subjects of special research in Rijeka Bay (PICER & PICER, 1979; ĆOSOVIĆ & ŽUTIĆ, 1981; Rijavec *et al.*, 1981; Raspor, 1985), their effects on benthic flora and vegetation in this area have never been studied. Some attention to complex pollution effects has been paid by LORENZ (1863) and VOUK (1914a, b), and recently by GOLUBIĆ (1960), ZAVODNIK *et al.* (1978), ZAVODNIK (1979), and IGIĆ (1982).

Our scuba surveys of benthic communities indicated that sea water polluted by domestic sewage and industrial effluent is dispersed, probably by surface currents, along the northern and north-western coasts of the basin, affecting bottom communities in the mediolittoral and upper infralittoral zones up to 10–15 m in depth (ZAVODNIK, 1977; ZAVODNIK & ZAVODNIK, 1979).

Mediolittoral assemblages can also be severely affected by oil and tar deposits. Previous to closing down the coal plant, the silting phenomenon was the heaviest in the landlocked Bakar Bay where large quantities of ore and coal cargoes were handled (ZAVODNIK *et al.*, 1978). Recently, the effects of silting on benthic communities were studied by JAKLIN & ARKO-PIJEVAC (1994).

The increased eutrophication of Rijeka Bay also gave rise to intensive and frequent plankton and benthic microphytic blooms (VOUK, 1914a; ZAVODNIK, 1977). The consecutive phenomenon is the appearance of thick slimy deposits at the bottom that are fatal to benthic fauna and probably also affecting benthic vegetation (ZAVODNIK *et al.*, 1978; ZAVODNIK & ZAVODNIK, 1979).

RESULTS AND DISCUSSION

Taxonomic composition

The taxonomic studies of collected material, and a critical analysis and compilation of source data resulted in a relatively rich inventory of the Rijeka Bay benthic

Tab. 1. Number (N) and percentage (%) of taxonomical divisions (Rhodophyta, Ochrophyta, Chlorophyta, Magnoliophyta) in the benthic flora in selected bionomical zones of Rijeka Bay.

Bionomical zones	Supralittoral		Eulittoral		Infralittoral upper		Infralittoral middle		Infralittoral lower		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Rhodophyta	1	100.0	62	56.9	192	58.9	143	66.8	129	67.5	231	60.8
Ochrophyta	0	0.0	15	13.8	66	20.2	41	19.2	39	20.4	74	19.5
Chlorophyta	0	0.0	32	29.4	63	19.6	27	13.1	22	12.0	71	18.7
Magnoliophyta	0	0.0	0	0.0	4	1.2	2	0.9	0	0.0	4	1.1
TOTAL	1		109		325		213		190		380	

macroflora. A total of 376 taxa (species, subspecies, varieties, forms, and stages) of macrobenthic algae and 4 species of marine seagrasses (Magnoliophyta) were recorded. In this list, 338 elements of flora are noted at a specific level, and 42 are infraspecific (4 subspecies, 31 varieties, 7 forms, 1 stage) (Tabs. 1 and 4).

The recorded number of algal taxa equals 60% of the total number of algal taxa noted previously in the eastern Adriatic Sea (ANTOLIĆ, unpublished results). Rhodophyta is the most diverse group with 231 taxa (60.8% of total benthic marine macroalgae) classified in 20 orders and 43 families. Ochrophyta contain 74 taxa (19.5%) in 8 orders and 13 families, and Chlorophyta are represented by 71 taxa (18.7%) placed in 7 orders and 20 families (Tabs. 1 and 4).

In Rhodophyta, the dominant orders are Ceramiales (116 taxa – 31% of total number of benthic marine flora), Corallinales (27 taxa – 7%) and Gigartinales (19 taxa – 5%). Characteristically, all three orders together represent 70 % of all Rhodophyta recorded in Rijeka Bay. In Ochrophyta, only two orders (Ectocarpales and Fucales) are abundant. They both contain 52 taxa *i.e.* 70% of all Ochrophyta in Rijeka Bay. Most Chlorophyta belong to the orders Cladophorales with 23 taxa, and Bryopsidales with 18 taxa – 58% of total number in this phylum (Tab. 4).

The established ratio between the number of Rhodophyta and Phaeophyceae (*i.e.* R/P Index; FELDMANN, 1937) was 3.1, and relation between the number of Rhodophyta + Chlorophyta and Phaeophyceae (R+C/P Index; CHENEY, 1977) was 4.1. Both values showed a subtropical character of benthic macroalgal flora in the area surveyed.

The values of R/P and R+C/P Indexes for Rijeka Bay are somewhat higher than those for the entire northern Adriatic (2.5 and 3.5 respectively), and they are much higher than those for the whole eastern Adriatic (2.0 and 2.7 respectively; ANTOLIĆ, unpublished results).

Phytogeographic characteristics

The benthic flora of Rijeka Bay is not homogenous because it comprehends floral elements from many phytogeographic regions (Tab. 2). With regard to the number and per cent values of taxa, the flora consists of 86 taxa or 22.5% of Atlantic (including: A – Atlantic, Ab – boreo-Atlantic, Abt – boreo-tropical Atlantic, At – Atlantic tropical), 75 or 19.8% of Subcosmopolitan, 70 or 18.5% of Mediterranean, and 53

Tab. 2. Number (N) and percentage (%) of phytogeographic elements recorded in the benthic flora of Rijeka Bay: M – Mediterranean; A – Atlantic; Ab – boreo-Atlantic; At – Atlantic tropical; Abt – boreo-tropical Atlantic; AP – Atlanto-Pacific; Apt – tropical Atlanto-Pacific; Aptc – Atlanto-Pacific cold temperate; IA – Indo-Atlantic; Iat – Indo-Atlantic tropical; Iatc – Indo-Atlantic cold temperate; C – Cosmopolitan; SC – Subcosmoplitan; CB – Circumboreal; IP – Indo-Pacific; P – Pantropical; EAD – Adriatic endemic.

Division	Rhodophyta		Ochrophyta		Chlorophyta		Magnoliophyta		T O T A L	
Phyt. elem.	N	%	N	%	N	%	N	%	N	%
M	47	20.3	18	24.3	4	5.6	1	25.0	70	18.5
Ab	35	15.2	10	13.5	6	8.5	1	25.0	52	13.7
At	6	2.6	1	1.4	3	4.2	0	0.0	10	2.6
Abt	15	6.5	3	4.1	1	1.4	1	25.0	20	5.3
A	3	1.3	0	0.0	1	1.4	0	0.0	4	1.1
APt	0	0.0	0	0.0	1	1.4	0	0.0	1	0.3
APtc	3	1.3	1	1.4	0	0.0	0	0.0	4	1.1
AP	4	1.7	1	1.4	4	5.6	0	0.0	9	2.4
IAt	3	1.3	0	0.0	0	0.0	0	0.0	3	0.8
IAtc	2	0.9	2	2.7	0	0.0	0	0.0	4	1.1
IA	32	13.9	4	5.4	10	14.1	0	0.0	46	12.1
C	19	8.2	11	14.9	11	15.5	0	0.0	41	10.8
SC	39	10.0	17	23.0	19	46.0	0	0.0	75	19.7
CB	4	1.7	0	0.0	1	1.4	1	25.0	6	1.6
IP	6	2.6	1	1.4	4	5.6	0	0.0	11	2.9
P	12	5.2	3	4.1	6	8.5	0	0.0	21	5.5
EAD	1	0.4	2	2.7	0	0.0	0	0.0	3	0.8
TOTAL	231		74		71		4		380	

or 14.0% of Indo-Atlantic (included: IA – Indo-Atlantic, Iat – Indo-Atlantic tropical, IAtc – Indo-Atlantic cold temperate) floral elements, respectively. The remaining phytogeographic regions contribute to the Rijeka marine algal flora only by 96 or 25.0% of the total of 380 taxa recorded. Only three species (0.8%) are included into the Adriatic endemic category (*Polysiphonia adriatica*, *Feldmannia irregularis* var. *lebeliides* and *Fucus virsoides*) (Tabs. 2 and 4).

We should add that in the Rijeka area algae and seagrasses have never been given any serious economic attention, nor were they ever used as food items in past periods of starvation (FABER, 1883; ZAVODNIK, 1997).

Depth distribution

The analysis of benthic flora in relation to its representation in bionomical zones showed that the highest number of algal taxa is recorded in the upper infralittoral zone (325 taxa), much less in the middle (213) and the lower infralittoral zones (190), and the lowest number of taxa was recorded in the eulittoral zone (109) (Tab. 1).

Tab. 3. Number (N) and percentage (%) of taxonomical divisions of Rijeka Bay benthic flora in the shallow water (above the 6 m depth: S-supralittoral + E- eulittoral + UI-upper infralittoral), deep water (deeper than 6 m: MI-middle infralittoral + LI-lower infralittoral), and at various depths (*i.e.* taxa presented in both depth levels).

	Rhodophyta		Ochrophyta		Chlorophyta		Magnoliophyta		TOTAL	
	N	%	N	%	N	%	N	%	N	%
shallow-water: 0 – 6 m depth										
S+E	9	3.9	2	2.7	6	8.5	0	0,0	17	4.5
UI	40	17.4	20	27.0	17	23.9	2	50.0	79	20.8
E+UI	28	12.2	8	10.8	21	29.6	0	0,0	57	15.0
Total	77	33.5	30	40.5	44	62.0	2	50.0	153	40.3
deep-water: deeper than 6 m depth										
MI	2	0.9	0	0.0	0	0.0	0	0.0	2	0.5
LI	10	4.3	3	4.1	0	0.0	0	0.0	13	3.4
MI+LI	16	7.0	3	4.1	2	2.8	0	0.0	21	5.5
Total	28	12.2	6	8.2	2	2.8	0	0.0	36	9.4
at various depths										
UI+MI	20	8.7	4	5.4	5	7.0	2	50.0	31	8.2
UI+MI+LI	83	36.1	29	39.2	17	23.9	0	0.0	129	34.0
E+UI+MI	4	1.7	1	1.4	0	0.0	0	0.0	5	1.3
E+UI+MI+LI	19	7.8	4	5.4	3	4.2	0	0.0	26	6.6
Total	126	54.3	38	51.4	25	35.2	2	50.0	191	50.1

By number and percentage, Rhodophyta dominated in all bionomical zones, followed by Ochrophyta and Chlorophyta. In the eulittoral zone alone, Chlorophyta predominated over Ochrophyta. This was expected because the diversity and distribution of benthic flora and vegetation in sea surface layers are much influenced by freshwater inputs from numerous underwater springs and Rijeka town domestic sewage and industrial effluent. The typical domination of Ochrophyta over Chlorophyta in natural algal communities in the Adriatic Sea has been reversed here, in that Chlorophyta predominate over Ochrophyta. This phenomenon is characteristic for polluted areas like the shallowest parts of the Rijeka Bay (*i.e.* in the eulittoral zone). It should be pointed out that the number of algal taxa in all phyla decreases with depth in the upper, middle, and lower infralittoral zones. However, in relation to increasing depth, the total Rhodophyta percentage increases, while in Ochrophyta and Chlorophyta the trend of diversity decrease is obvious.

The marine benthic flora of Rijeka Bay includes a very small number of algal taxa which live deeper than 6 m (36 taxa – 9.4%) in comparison with the relatively high number of algal taxa which live only between the sea surface and the 6 m depth level (153 taxa – 40.3%), and the number of taxa living above and below 6m depth (191 taxa – 50.1%) (Tab. 3). This phenomenon could be explained by the appearance of sludgy sediments at just the slight depth of about 15 m, which re-

duces the possibility of recruitment and development of rich benthic flora in deeper areas.

It is evident that the phylum Rhodophyta dominates by number and percentage of taxa in all depth components of the benthic flora. It is followed by Chlorophyta and Ochrophyta in shallow water, and by Ochrophyta and Chlorophyta in deep water and widely distributed benthic flora. This relation is changed in the shallow water flora because the influence of freshwater springs, domestic sewage and industrial effluent of Rijeka town have favorized the development of the green algae.

ACKNOWLEDGEMENT

The authors are very grateful to scuba divers from Ruđer Bošković,Center of Marine Research, Rovinj and the Institute of Oceanography and Fisheries, Split, for their help in collection of benthic materials.

Tab. 4. Check-list of benthic algae and seagrasses recorded in Rijeka Bay bionomical zones (S – supralittoral; E – eulittoral; UI – upper, MI – middle and LI – lower infralittoral). A phytogeographic distribution of taxa is noted by following symbols: M – Mediterranean; A – Atlantic; Ab – boreo-Atlantic; At – Atlantic tropical; Abt – boreo-tropical Atlantic; AP – Atlanto-Pacific; APt – tropical Atlanto-Pacific; APtc – Atlanto-Pacific cold temperate; IA – Indo-Atlantic; IAt – Indo-Atlantic tropical; IAtc – Indo-Atlantic cold temperate; C – Cosmopolitan; SC – Subcosmoplitan; CB – Circumboreal; IP – Indo-Pacific; P – Pantropical; EAD – Adriatic endemic).

STUDY AREA		RIJEKA BAY				
Bionomical zones		S	E	UI	MI	LI
Phyt. elem.	Depth (m)	(+ 1.0) – (+ 0.3)	(+ 0.3) – (– 0.3)	(– 0.3) – (– 6)	(– 6) – (– 35)	(– 35) – (– 120)
	RHODOPHYTA R.Wettstein					
	BANGIOPHYCEAE R.Wettstein					
	Bangiales F.Schmitz					
	Bangiaceae Engler					
	Bangia Lyngbye					
C	*B. atropurpurea* (Roth) C.Agardh	–	+	+	–	–
	Porphyra C.Agardh					
A	*P. leucosticta* Thuret	–	+	+	–	–
	COMPSOPOGONOPHYCEAE G.W. Saunders *et* Hommersand					
	Erythropeltidales Garbary, Hansen *et* Scagel					
	Erythrotrichiaceae G.M.Smith					
	Erythrotrichia J.E.Areschoug					
C	*E. carnea* (Dillwyn) J.Agardh	–	+	+	+	+
IA	*E. investiens* (Zanardini) Bornet	–	–	+	+	+
Ab	*E. reflexa* (P.L.Crouan *et* H.M.Crouan) Thuret *ex* De Toni	–	+	+	–	–
	Sahlingia Kornmann					

Bionomical zones		S	E	UI	MI	LI
SC	*S. subintegra* (Rosenvinge) Kornmann = Erythrocladia subintegra Rosenvinge	–	–	+	+	+
	FLORIDEOPHYCEAE Cronquist					
	Acrochaetiales J.Feldmann					
	Acrochaetiaceae Fritsch *ex* W.R.Taylor					
	Acrochaetium Nägeli					
M	*A. hauckii* Schiffner = Rhodochorton hauckii (Schiffner) G. Hamel = Audouinella hauckii (Schiffner) Ballesteros	–	–	+	+	–
SC	*A. microscopicum* (Nägeli *ex* Kützing) Nägeli = Audouinella microscopica (Nägeli ex Kützing) Woelkerling	–	+	–	–	–
M	*A. pallens* (Zanardini) Nägeli = Rhodochorton pallens (Zanardini) Hauck	–	–	+	–	–
SC	*A. savianum* (Meneghini) Nägeli = Acrochaetium thuretii (Bornet) F.S. Collins et Hervey	–	–	+	–	
AP	*A. virgatulum* (Harvey) Batters	–	–	+	+	+
	Rhodochorton Nägeli					
AP	*R. velutinum* (Hauck) G.Hamel	–	–	+	+	+
	Acrosymphytales R.D.Withall *et* G.W.Saunders					
	Acrosymphytaceae S.C.Lindstrom					
	Acrosymphyton Sjöstedt					
M	*A. purpuriferum* (J.Agardh) G. Sjöstedt	–	–	+	+	+
	Bonnemaisoniales J.Feldmann *et* J.Feldmann					
	Bonnemaisoniaceae J.Feldmann *et* J.Feldmann					
	Falkenbergia F. Schmitz					
C	*F. rufolanosa* (Harvey) F. Schmitz – stadium	–	–	+	+	–
	Ceramiales Oltmanns					
	Callithamniaceae Kützing					
	Aglaothamnion G.Feldmann-Mazoyer					
M	*A. caudatum* (J.Agardh) G.Feldmann-Mazoyer	–	–	+	–	–
IAt	*A. cordatum* (Børgesen) G.Feldmann-Mazoyer	–	–	+	–	–
Ab	*A. scopulorum* (C. Agardh) G.Feldmann-Mazoyer	–	–	+	–	–
IA	*A. tenuissimum* (Bonnemaison)G.Feldmann-Mazoyer = Aglaothamnion furcellariae (J. Agardh) G.Feldmann-Mazoyer = Aglaothamnion byssoides (Arnott ex Harvey) C.F.Boudouresque et M.M.Perret-Boudouresque	–	–	+	+	+
IA	*A. tripinnatum* (C.Agardh) G.Feldmann-Mazoyer	–	–	+	–	–
	Callithamnion Lyngbye					
Abt	*C. corymbosum* (J.E. Smith) Lyngbye	–	+	+	–	–
IA	*C. granulatum* (Ducluzeau) C.Agardh	–	+	+	–	–
	Crouania J. Agardh					
SC	*C. attenuata* (C.Agardh) J.Agardh	–	–	+	+	+

Bionomical zones		S	E	UI	MI	LI
	Seirospora Harvey					
M	*S. apiculata* (Meneghini) G.Feldmann-Mazoyer	–	–	–	+	–
M	*S. giraudyi* (Kützing) De Toni	–	–	+	+	+
Ab	*S. interrupta* (J.E.Smith) F.Schmitz	–	–	+	+	–
M	*S. sphaerospora* J.Feldmann	–	–	–	+	+
	Ceramiaceae Dumortier					
	Antithamnion Nägeli					
	A. cruciatum (C.Agardh) Nägeli					
IA	var. *cruciatum*	–	+	+	–	–
Abt	var. *profundum* G.Feldmann-Mazoyer	–	–	+	+	+
M	*A. heterocladum* Funk	–	–	+	+	–
M	*A. tenuissimum* (Hauck) Schiffner	–	–	–	+	+
	Ceramium Roth					
M	*C. bertholdii* Funk	–	–	+	+	+
	C. ciliatum (J.Ellis) Ducluzeau					
AP	var. *ciliatum*	–	+	+	+	+
M	var. *robustum* (J. Agardh) G. Feldman-Mazoyer	–	+	+	–	–
IA	*C. circinatum* (Kützing) J.Agardh	–	–	+	–	–
SC	*C. codii* (H.Richards) G. Feldman-Mazoyer	–	+	+	+	+
SC	*C. diaphanum* (Lightfoot) Roth = Ceramium tenuissimum (Roth) J.E.Areschoug	–	+	+	+	–
IA	*C. deslongchampsii* Chauvin *ex* Duby = Ceramium diaphanum var. strictum (Kützing) G. Feldmann-Mazoyer	–	–	+	+	+
C	*C. flaccidum* (A.S.Harvey *ex* Kützing) Ardissone = Ceramium gracillimum var. byssoideum G. Feldmann-Mazoyer	–	+	+	+	+
	C. rubrum C. Agardh					
SC	var. *barbatum* G.Feldmann-Mazoyer	–	–	+	–	–
	C. siliquosum (Kützing) Maggs *et* Hommersand					
A	var. *elegans* (Roth) G.Furnari = Ceramium diaphanum var. elegans (Roth) Roth	–	–	+	–	–
M	var. *zostericola* (Thuret) G.Furnari = Ceramium diaphanum var. zostericola (Thuret) G.Feldmann-Mazoyer	–	–	+	+	–
SC	*C. tenerrimum* (G.Martens) Okamura	–	+	+	–	–
SC	*C. virgatum* Roth = Ceramium rubrum C.Agardh	–	–	+	–	–
	Corallophila Weber-van Bosse					
M	*C. cinnabarina* (Grateloup *ex* Bory de Saint-Vincent) R.E. Norris = Ceramium ordinatum Kützing = Centroceras cinnabarinum (Grateloup ex Bory de Saint-Vincent) J. Agardh	–	–	+	+	+
	Gymnothamnion J. Agardh					
SC	*G. elegans* (Schousboe *ex* C.Agardh) J.Agardh	–	–	+	–	–

Bionomical zones		S	E	UI	MI	LI
	Pterothamnion Nägeli					
SC	*P. crispum* (Ducluzeau) Nägeli	–	+	+	–	–
SC	*P. plumula* (J.Ellis) Nägeli	–	+	+	+	+
	Dasyaceae Kützing					
	Dasya C. Agardh					
P	*D. baillouviana* (S.G. Gmelin) Montagne = Dasya elegans (G. Martens) C. Agardh = Dasya pedicellata (C. Agardh) C. Agardh	–	–	–	+	+
Abt	*D. corymbifera* J.Agardh	–	+	+	–	–
Ab	*D. hutchinsiae* Harvey = Dasya arbuscula *sensu* Harvey	–	+	+	+	–
IA	*D. ocellata* (Grateloup) A.S.Harvey	–	–	+	–	–
Abt	*D. rigidula* (Kützing) Ardissone = Dasya squarrosa (Kützing) Zanardini	–	–	+	+	+
	Eupogodon Kützing					
IA	*E. planus* (C.Agardh) Kützing = Dasyopsis plana (C. Agardh) Falkenberg	–	–	+	+	+
Ab	*E. spinellus* (C.Agardh) Kützing = Dasyopsis spinella (C. Agardh) Zanardini	–	–	–	+	+
	Halydictyon Zanardini					
Abt	*H. mirabile* Zanardini	–	–	+	+	+
	Heterosiphonia Montagne					
IA	*H. crispella* (C. Agardh) M.J. Wynne = Heterosiphonia wurdemannii (J. Bailey ex Harvey) Falkenberg	–	–	+	+	+
	Delesseriaceae Bory					
	Acrosorium Zanardini *ex* Kützing					
IA	*A. ciliolatum* (Harvey) Kylin = Acrosorium venulosum (Zanardini) Kylin = Acrosorium uncinatum var. venulosum (Zanardini) C.F.Boudouresque, M.M.Perret-Boudouresque et Knoepffler-Péguy	–	–	–	+	+
	Apoglossum J. Agardh					
IA	*A. ruscifolium* (Turner) J.Agardh	–	–	+	+	+
	Arachnophyllum Zanardini					
M	*A. confervaceum* (Meneghini) Zanardini	–	–	–	+	+
	Erythroglossum J. Agardh					
Ab	*E. sandrianum* (Zanardini) Kylin	–	–	+	+	+
	Hypoglossum Kützing					
Ab	*H. hypoglossoides* (Stackhouse) F.S. Collins *et* Hervey = Hypoglossum woodwardii Kützing	–	+	+	+	+
	Myriogramme Kylin					
M	*M. tristromatica* (J.J.Rodríguez y Femenías *ex* Mazza) C.F.Boudouresque = Nitophyllum tristromaticum J.J.Rodríguez y Femenías ex Mazza	–	–	–	+	+

Bionomical zones		S	E	UI	MI	LI
	Nitophyllum Greville					
IA	*N. punctatum* (Stackhouse) Greville	–	+	+	–	–
	Radicilingua Papenfuss					
Ab	*R. reptans* (Kylin) Papenfuss	–	–	+	–	–
	Spyridiaceae J.Agardh					
	Spyridia Harvey					
C	*S. filamentosa* (Wulfen) Harvey	–	+	+	+	+
	Wrangeliaceae J.Agardh					
	Anotrichium Nägeli					
Abt	*A. barbatum* (C. Agardh) Nägeli = Griffithsia barbata C.Agardh	–	–	+	–	–
APtc	*A. furcellatum* (J. Agardh) Baldock = Griffithsia furcellata J. Agardh	–	–	+	+	–
to	*Compsothamnion* (Nägeli) F. Schmitz					
Abt	*C. thuyoides* (J.E. Smith) Nägeli	–	+	+	+	+
	Griffithsia C. Agardh					
M	*G. genovefae* J.Feldmann	–	–	+	+	–
IA	*G. opuntioides* J.Agardh	–	–	+	+	+
Abt	*G. phyllamphora* J.Agardh	–	+	+	–	–
IA	*G. schousboei* Montagne	–	–	+	+	+
	Halurus Kützing					
Abt	*H. flosculosus* (J. Ellis) Maggs *et* Hommersand = Griffithsia setacea (Hudson) C. Agardh = Griffithsia flosculosa (J. Ellis) Batters	–	–	+	–	–
	Lejolisia Bornet					
P	*L. mediterranea* Bornet	–	–	+	+	+
	Monosporus Solier					
	M. pedicellatus (J.E.Smith) Solier					
Ab	var. *pedicellatus*	–	–	+	+	+
M	var. *tenuis* (G.Feldmann-Mazoyer) J.M.Huisman *et* G.T.Kraft	–	–	+	–	–
	Pleonosporium Nägeli					
IA	*P. borreri* (J.E.Smith) Nägeli	–	+	+	–	–
	Ptilothamnion Thuret					
IA	*P. pluma* (Dillwyn) Thuret	–	+	+	–	–
	Spermothamnion J.E.Areschoug					
M	*S. flabellatum* Bornet	–	–	+	+	+
M	*S. johannis* G.Feldmann-Mazoyer	–	–	–	+	+
	S. repens (Dillwyn) Rosenvinge					
Ab	var. *repens* = Spermothamnion repens var. turneri (Mertens ex Roth) Miranda	–	+	+	–	–
M	var. *variabile* (C.Agardh) J. Feldmann	–	–	+	+	–
	Sphondylothamnion Nägeli					
Ab	*S. multifidum* (Hudson) Nägeli	–	–	+	+	–

Bionomical zones		S	E	UI	MI	LI
	Wrangelia C. Agardh					
P	*W. penicillata* (C.Agardh) C.Agardh	–	+	+	+	+
	Rhodomelaceae J.E.Areschoug					
	Alsidium C. Agardh					
At	*A. corallinum* C. Agardh	–	–	+	+	–
M	*A. helminthochorton* (Schwendimann) Kützing	–	–	+	–	–
	Boergeseniella Kylin					
Ab	*B. fruticulosa* (Wulfen) Kylin = Polysiphonia fruticulosa (Wulfen) Sprengel	–	+	+	+	+
	Brongniartella Bory de Saint-Vincent					
Ab	*B. byssoides* (Goodenough *et* Woodward) F.Schmitz	–	–	–	+	+
	Chondria C. Agardh					
SC	*C. capillaris* (Hudson) M.J. Wynne = Chondria tenuissima C.Agardh	–	+	+	+	+
SC	*C. dasyphylla* (Woodward) C. Agardh	–	–	+	+	+
	Dipterosiphonia F.Schmitz *et* Falkenberg					
At	*D. rigens* (Schousboe *ex* C.Agardh) Falkenberg	–	–	–	+	+
	Erythrocystis					
M	*E. montagnei* (Derbès *et* Solier) P.C.Silva = Ricardia montagnei Derbès et Solier	–	–	+	+	–
	Herposiphonia Nägeli					
	H. secunda (C. Agardh) Ambronn					
P	f. *secunda*	–	–	+	–	–
P	f. *tenella* (C.Agardh) M.J.Wynne	–	–	+	+	–
	Laurencia J.V.Lamouroux					
IP	*L. microcladia* Kützing	–	–	+	–	–
C	*L. obtusa* (Hudson) J.V.Lamouroux	–	+	+	–	–
M	*L. radicans* (Kützing) Kützing	–	–	+	–	–
	Lophosiphonia Falkenberg					
P	*L. cristata* Falkenberg	–	+	+	+	–
SC	*L. obscura* (C.Agardh) Falkenberg	–	–	+	–	–
	Osmundaria J.V. Lamouroux					
IA	*O. volubilis* (Linnaeus) R.E. Norris = Vidalia volubilis (Linnaeus) J.Agardh	–	–	+	+	+
	Osmundea Stackhouse					
M	*O. pelagosae* (Schiffner) K.W. Nam = Laurencia pelagosae (Schiffner) Ercegović = Rodriguezella pelagosae Schiffner	–	–	+	+	+
Ab	*O. pinnatifida* (Hudson) Stackhouse = Laurencia pinnatifida (Hudson) J.V. Lamouroux	–	+	–	–	–
	Palisada K.W.Nam					
C	*P. perforata* (Bory de Saint-Vincent) K.W.Nam = Chondrophycus papillosus (C. Agardh) Garbary et J.T.Harper = Laurencia papillosa (C.Agardh) Greville	–	+	–	–	–

Bionomical zones		S	E	UI	MI	LI
SC	*P. thuyoides* (Kützing) Cassano, Sentíes, Gil-Rodríguez *et* M.T.Fujii = Chondrophycus thuyoides (Kützing) G.Furnari = Laurencia paniculata (C.Agardh) J.Agardh = Chondrophycus paniculatus (C. Agardh) G.Furnari	–	–	+	+	–
	Polysiphonia Greville					
EAD	*P. adriatica* Schiffner	–	–	+	+	+
M	*P. arachnoidea* (C.Agardh) Zanardini	–	–	+	+	+
M	*P. breviarticulata* (C.Agardh) Zanardini	–	–	+	+	+
IA	*P. brodiei* (Dillwyn) Sprengel	–	–	+	+	+
SC	*P. denudata* (Dillwyn) Greville *ex* Harvey	–	–	+	–	–
M	*P. deusta* (Roth) Sprengel	–	–	–	+	+
M	*P. dichotoma* Kützing	–	–	–	–	+
IA	*P. elongata* (Hudson) Sprengel	–	+	+	+	+
IA	*P. fucoides* (Hudson) Greville = Polysiphonia violacea (Roth) Sprengel	–	–	+	–	–
APtc	*P. furcellata* (C. Agardh) Harvey	–	–	+	+	+
Ab	*P. opaca* (C.Agardh) Moris *et* De Notaris	–	+	+	–	–
Ab	*P. sanguinea* (C.Agardh) Zanardini	–	–	+	–	–
P	*P. scopulorum* Harvey = Lophosiphonia scopulorum (A.S.Harvey) Womersley	–	–	+	+	+
IA	*P. sertularioides* (Grateloup) J.Agardh	–	+	–	–	–
CB	*P. stricta* (Dillwyn) Greville = Polysiphonia urceolata (Lightfoot ex Dillwyn) Greville	–	–	+	–	–
Ab	*P. stuposa* Zanardini *ex* Kützing	–	–	+	+	–
Ab	*P. subulata* (Ducluzeau) P.L. Crouan *et* H.M. Crouan	–	–	+	–	–
Ab	*P. subulifera* (C.Agardh) Harvey	–	–	–	–	+
IP	*P. tenerrima* Kützing	–	–	+	+	–
	Pterosiphonia Falkenberg *in* Engler *et* Prantl					
SC	*P. pennata* (C.Agardh) Sauvageau	–	–	+	+	+
	Rodriguezella F. Schmitz					
M	*R. bornetii* (J.J.Rodríguez) F. Schmitz *ex* J.J.Rodríguez y Femenías	–	–	–	–	+
M	*R. pinnata* (Kützing) F. Schmitz *ex* Falkenberg	–	–	–	–	+
M	*R. strafforelloi* F.Schmitz *ex* J.J.Rodríguez y Femenías	–	–	–	–	+
	Rytiphlaea C. Agardh					
IAt	*R. tinctoria* (Clemente) C.Agardh	–	–	+	+	+
	Vertebrata S.F.Gray					
Ab	*V. lanosa* (Linnaeus) T.A.Christensen = Polysiphonia lanosa (Linnaeus) Tandy = Polysiphonia fastigiata (Roth) Greville	–	–	+	+	+
	Womersleyella Hollenberg					
P	*W. setacea* (Hollenberg) R.E. Norris = Polysiphonia setacea Hollenberg	–	–	–	+	–

Bionomical zones		S	E	UI	MI	LI
	Colaconematales J.T. Harper *et* G.W.Saunders					
	Colaconemataceae J.T. Harper *et* G.W. Saunders					
	Colaconema Batters					
SC	*C. daviesii* (Dillwyn) Stegenga = Chantransia daviesii (Dillwyn) Thuret = Acrochaetium daviesii (Dillwyn) Nägeli = Audouinella daviesii (Dillwyn) Woelkerling	–	–	+	+	+
Ab	*C. hallandicum* (Kylin) Afonso-Carillo, Sanson, Sangil *et* Diaz-Villa = Acrochaetium hallandicum (Kylin) G. Hamel = Chantransia hallandica Kylin	–	–	+	–	–
	Corallinales P.C. Silva *et* H.W. Johansen					
	Corallinaceae J.V. Lamouroux					
	Amphiroa J.V. Lamouroux					
IAt	*A. beauvoisii* J.V.Lamouroux	–	–	+	+	+
P	*A. cryptarthrodia* Zanardini	–	–	+	+	+
SC	*A. rigida* J.V.Lamouroux	–	–	+	+	+
	Corallina Linnaeus					
A	*C. elongata* J.Ellis *et* Solander = Corallina mediterranea J.E.Areschoug	–	–	+	+	+
SC	*C. officinalis* Linnaeus	–	+	+	–	–
	Haliptilon (Decaisne) Lindley					
IAtc	*H. virgatum* (Zanardini) Garbary *et* H.W.Johansen = Corallina granifera J.Ellis et Solander	–	–	+	–	–
	Hydrolithon (Foslie) Foslie					
C	*H. boreale* (Foslie) Y.M. Chamberlain = Fosliella farinosa f. callithamnioides (Falkenberg) Y.M. Chamberlain	–	–	+	+	+
C	*H. farinosum* (J.V. Lamouroux) D. Penrose *et* Y.M. Chamberlain = Fosliella farinosa (J.V. Lamouroux) M.A. Howe	–	–	+	+	+
	Jania J.V. Lamouroux					
IA	*J. longifurca* Zanardini	–	–	+	–	–
C	*J. rubens* (Linnaeus) J.V.Lamouroux	–	–	+	+	+
	Lithophyllum Philippi					
IP	*L. byssoides* (Lamarck) Foslie = Lithophyllum tortuosum (Esper) Foslie = Tenarea tortuosa (Esper) M.Lemoine = Lithophyllum lichenoides Philippi	–	+	–	–	–
IA	*L. corallinae* (P.L.Crouan *et* H.M.Crouan) Heydrich = Titanoderma corallinae (P.L.Crouan et H.M.Crouan) Woelkerling, Y.M.Chamberlain et P.C. Silva = Dermatolithon corallinae (P.L.Crouan et H.M. Crouan) Foslie	–	–	+	–	–

Bionomical zones		S	E	UI	MI	LI
Ab	*L. cystoseirae* (Hauck) Heydrich = Titanoderma cystoseirae (Hauck) Woelkerling, Y.M. Chamberlain et P.C.Silva = Dermatolithon cystoseirae (Hauck) H.Huvé	–	–	+	+	+
Ab	*L. dentatum* (Kützing) Foslie = Lithophyllum incrustans f. dentata (Kützing) Heydrich = Spongites dentata Kützing	–	+	+	–	–
Ab	*L. incrustans* Philippi	–	+	+	+	–
IA	*L. pustulatum* (J.V.Lamouroux) Foslie = Titanoderma pustulatum (J.V.Lamouroux) Nägeli = Dermatolithon pustulatum (J.V.Lamouroux) Foslie = Dermatolithon hapalidiodes (P.L. Crouan et H.M. Crouan) Foslie = Titanoderma litorale (P.L. Crouan et H.M. Crouan) C.F.Boudouresque et M.M.Perret	–	+	+	+	+
IP	*L. racemus* (Lamarck) Foslie	–	–	+	+	+
At	*L. stictaeforme* (J.E.Areschoug) Hauck	–	–	+	+	+
	Neogoniolithon Setchell *et* R.L.Mason					
SC	*N. brassica-florida* (Harvey) Setchell *et* R.L.Mason = Spongites notarisii (Dufour) Athanasiadis = Neogoniolithon notarisii (Dufour) G.Hamel et M.Lemoine	–	+	+	–	–
At	*N. mamillosum* (Hauck) Setchell *et* R.L.Mason = Lithothamnium mamillosum Hauck	–	–	+	+	+
	Pneophyllum Kützing					
CB	*P. confervicola* (Kützing) Y.M. Chamberlain = Fosliella minutula (Foslie) Ganesan	–	–	+	+	+
C	*P. fragile* Kützing = Fosliella lejolisii (Rosanoff) M.A.Howe = Pneophyllum lejolisii (Rosanoff) Y.M. Chamberlain	–	–	+	+	+
	Spongites Kützing					
IP	*S. fruticulosus* Kützing = Lithothamnium fruticulosum (Kützing) Foslie	–	–	+	+	+
	Hapalidiaceae J.E.Gray					
	Choreonema F. Schmitz					
C	*C. thuretii* (Bornet) F. Schmitz	–	–	+	–	–
	Melobesia J.V.Lamouroux					
SC	*M. membranacea* (Esper) J.V.Lamouroux = Epilithon membranaceum (Esper) Heydrich	–	+	+	+	+
	Phymatolithon Foslie					
Ab	*P. calcareum* (Pallas) W.H.Adey *et* D.L.McKibbin = Lithothamnion calcareum (Batters) Foslie	–	–	+	+	+
CB	*P. lenormandii* (J.E.Areschoug) W.H.Adey = Lithophyllum lenormandii (J.E.Areschoug) Rosanoff = Lithothamnium lenormandii (J.E.Areschoug) Foslie	–	+	–	–	–

Bionomical zones		S	E	UI	MI	LI
	G e l i d i a l e s Kylin					
	Gelidiaceae Kützing					
	Gelidium J.V. Lamouroux					
Ab	*G. bipectinatum* G.Furnari = Gelidium pectinatum Schousboe ex Montagne	–	–	–	+	+
SC	*G. crinale* (Hare ex Turner) Gaillon	–	–	+	+	+
C	*G. minusculum* (Weber-van Bosse) R.E. Norris = Gelidium pusillum var. minusculum Weber-van Bosse	–	+	+	–	–
Ab	*G. pulchellum* (Turner) Kützing	–	–	+	–	–
C	*G. pusillum* (Stackhouse) Le Jolis	–	+	+	+	+
Ab	*G. spathulatum* (Kützing) Bornet	–	+	+	–	–
	G. spinosum (S.G.Gmelin) P.C.Silva					
SC	var. *spinosum* = Gelidium latifolium Bornet ex Hauck = Gelidium latifolium var. luxurians (P.L.Crouan et H.M.Crouan) J.Feldmann *et* G.Hamel	–	+	+	+	+
M	var. *hystrix* (J. Agardh) G.Furnari = Gelidium latifolium var. hystrix (J. Agardh) Hauck	–	–	+	+	+
	Gelidiellaceae Fan					
	Gelidiella J.Feldmann *et* G.Hamel					
IP	*G. lubrica* (Kützing) J.Feldmann *et* G. Hamel	–	–	+	+	+
	Parviphycus B. Santelices					
SC	*P. tenuissimus* (J.Feldmann *et* G.Hamel) B.Santelices = Gelidiella tenuissima J.Feldmann et G. Hamel = Gelidiella pannosa (J.Feldmann) J.Feldmann et G. Hamel	–	–	+	+	+
	Pterocladiaceae G.P. Felicini *et* C. Perrone					
	Pterocladiella B.Santelices *et* Hommersand					
SC	*P. capillacea* (S.G.Gmelin) B.Santelices *et* Hommersand = Pterocladia capillacea (S.G.Gmelin) Bornet	–	+	+	–	–
	P. melanoidea (Schousboe *ex* Bornet) B.Santelices *et* Hommersand					
Abt	var. *melanoidea* = Gelidium melanoideum Schousboe ex Bornet	–	–	+	–	–
Abt	var. *filamentosa* (Schousboe *ex* Bornet) M.J. Wynne = Gelidium melanoideum var. filamentosum Schousboe ex Bornet	–	–	+	–	–
	G i g a r t i n a l e s F. Schmitz					
	Calosiphonaceae Kylin					
	Calosiphonia P.L. Crouan *et* H.M. Crouan					
CB	*C. vermicularis* (J.Agardh) F. Schmitz	–	–	+	+	+
	Caulacanthaceae Kützing					
	Catenella Greville					

Bionomical zones		S	E	UI	MI	LI
SC	*C. caespitosa* (Withering) L.M. Irvine = Catenella repens (Lightfoot) Batters = Catenella opuntia (Goodenough et Woodward) Greville	+	+	–	–	–
	Caulacanthus Kützing					
SC	*C. ustulatus* (G.Martens *ex* Turner) Kützing	–	–	+	+	+
	Cystocloniaceae Kützing					
	Hypnea J.V. Lamouroux					
P	*H. musciformis* (Wulfen) J.V. Lamouroux	–	–	+	+	+
	Rhodophyllis Kützing					
Ab	*R. divaricata* (Stackhouse) Papenfuss = Rhodophyllis bifida Kützing	–	–	+	+	–
	Dumontiaceae Bory					
	Dudresnaya P.L. Crouan *et* H.M. Crouan					
Ab	*D. verticillata* (Withering) Le Jolis = Dudresnaya coccinea (C. Agardh) P.L. Crouan et H.M. Crouan	–	–	+	+	+
	Furcellariaceae Kylin					
	Neurocaulon Zanardini *ex* Kützing					
M	*N. foliosum* (Meneghini) Zanardini = Neurocaulon reniforme (Postels et Ruprecht) Zanardini = Constantinea reniformis (Turner) Postels et Ruprecht = Neurocaulon grandifolium Rodriguez	–	–	–	+	+
	Gigartinaceae Kützing					
	Chondracanthus Kützing					
C	*C. acicularis* (Roth) Fredericq = Gigartina acicularis (Roth) J.V.Lamouroux	–	+	+	–	–
	Gloiosiphoniaceae F.Schmitz					
	Thuretella F. Schmitz					
APtc	*T. schousboei* (Thuret) F. Schmitz	–	–	+	+	+
	Kallymeniaceae (J. Agardh) Kylin					
	Meredithia J.Agardh					
Abt	*M. microphylla* (J.Agardh) J.Agardh = Kallymenia microphylla J.Agardh	–	–	+	+	+
	Kallymenia J.Agardh					
SC	*K. reniformis* (Turner) J.Agardh	–	–	–	+	+
	Phyllophoraceae Nägeli					
	Ahnfeltiopsis P.C. Silva *et* DeCew					
M	*A. pusilla* (Montagne) P.C. Silva *et* DeCew = Gymnogongrus pusillus (Steinheil ex Montagne) J.Feldmann et G.Feldman-Mazoyer	–	–	+	–	–
	Phyllophora Greville					
Ab	*P. crispa* (Hudson) P.S. Dixon = Phyllophora nervosa (A.P. de Candolle) Greville	–	–	+	+	+

Bionomical zones		S	E	UI	MI	LI
Ab	*P. sicula* (Kützing) Guiry *et* L.M. Irvine = Phyllophora palmettoides J. Agardh	–	–	+	+	–
	Schottera Guiry *et* Hollenberg					
IA	*S. nicaeensis* (J.V. Lamouroux *ex* Duby) Guiry *et* Hollenberg	–	+	+	–	–
	Rhizophyllidaceae F.Schmitz					
	Contarinia Zanardini					
M	*C. peyssonneliaeformis* Zanardini	–	–	+	+	+
M	*C. squamariae* (Meneghini) Denizot	–	–	+	+	+
	Solieriaceae J. Agardh					
	Wurdemannia Harvey					
P	*W. miniata* (Sprengel) J.Feldmann *et* G.Hamel	–	–	+	+	+
	Sphaerococcaceae F.Schmitz *et* Hauptfleisch					
	Sphaerococcus Stackhouse					
Ab	*S. coronopifolius* Stackhouse	–	–	+	+	+
	G r a c i l a r i a l e s S. Fredericq *et* M.H.Hommersand					
	Gracilariaceae Nägeli					
	Gracilaria Greville					
SC	*G. bursa-pastoris* (S.G. Gmelin) P.C. Silva = Gracilaria compressa (C. Agardh) Greville	–	–	+	–	–
M	*G. corallicola* Zanardini	–	–	–	+	+
IA	*G. dura* (C.Agardh) J.Agardh	–	–	+	–	–
C	*G. gracilis* (Stackhouse) M. Steentoft, L.M. Irvine *et* W.F. Farnham = Gracilaria verrucosa (Hudson) Papenfuss = Gracilaria confervoides Greville	–	–	+	+	+
	H a l y m e n i a l e s G.W. Saunders *et* G.T.Kraft					
	Halymeniaceae Kützing					
	Acrodiscus Zanardini					
M	*A. vidovichii* (Meneghini) Zanardini	–	–	+	+	+
	Aeodes J.Agardh					
M	*A. marginata* (Roussel) F. Schmitz	–	–	–	–	+
	Cryptonemia J.Agardh					
IA	*C. lomation* (A.Bertoloni) J.Agardh	–	–	–	–	+
M	*C. tunaeformis* (A.Bertoloni) Zanardini	–	–	–	–	+
	Grateloupia C.Agardh					
SC	*G. filicina* (J.V. Lamouroux) C.Agardh	–	+	+	–	–
	Halymenia C.Agardh					
SC	*H. floresii* (Clemente) C.Agardh	–	–	+	+	+
	H i l d e n b r a n d i a l e s Pueschel et Cole					
	Hildenbrandiaceae Rabenhorst					
	Hildenbrandia Nardo					
SC	*H. rubra* (Sommerfelt) Meneghini = Hildenbrandia prototypus Nardo	–	+	–	–	–
	N e m a l i a l e s F.Schmitz					

Bionomical zones		S	E	UI	MI	LI
	Galaxauraceae P.G. Parkinson					
	Tricleocarpa J.M.Huisman *et* Borowitzka					
P	*T. fragilis* (Linnaeus) J.M.Huisman *et* R.A.Townsend = Galaxaura oblongata (J.Ellis et Solander) J.V.Lamouroux	–	–	–	–	+
	Liagoraceae Kützing					
	Liagora J.V. Lamouroux					
SC	*L. distenta* (Mertens *ex* Roth) J.V.Lamouroux	–	–	+	–	–
SC	*L. viscida* (Forsskål) C.Agardh	–	–	+	–	–
	Nemalion Duby					
SC	*N. helminthoides* (Velley) Batters	–	+	–	–	–
	Nemastomatales Kylin					
	Nemastomataceae F.Schmitz					
	Nemastoma J.Agardh					
M	*N. dichotomum* J.Agardh	–	–	+	+	+
	Peyssonnelilales D.M.Krayesky, Fredericq *et* J.N.Noris					
	Peyssonneliaceae Denizot					
	Peyssonnelia Decaisne					
IA	*P. dubyi* P.L. Crouan *et* H.M. Crouan	–	–	+	+	+
Ab	*P. harveyana* P.L.Crouan *et* H.M.Crouan *ex* J.Agardh	–	–	+	+	+
SC	*P. polymorpha* (Zanardini) F. Schmitz	–	–	+	+	+
IA	*P. rubra* (Greville) J.Agardh	–	–	+	+	+
M	*P. squamaria* (S.G. Gmelin) Decaisne	–	–	+	+	+
	Plocamiales G.W. Saunders *et* G.T. Kraft					
	Plocamiaceae Kützing					
	Plocamium J.V. Lamouroux					
SC	*P. cartilagineum* (Linnaeus) P.S. Dixon = Plocamium coccineum (Hudson) Lyngbye	–	–	+	+	+
	Rhodymeniales F.Schmitz					
	Champiaceae Kützing					
	Champia Desvaux					
C	*C. parvula* (C.Agardh) Harvey	–	+	+	–	–
	Chylocladia Greville					
At	*C. verticillata* (Lightfoot) Bliding = Chylocladia kaliformis (Goodenough et Woodward) Greville	–	+	+	+	+
	Gastroclonium Kützing					
M	*G. clavatum* (Roth) Ardissone	–	+	+	–	–
	Faucheaceae I.M. Strachan, G.W. Saunders *et* G.T. Kraft					
	Gloiocladia J.Agardh					
IA	*G. repens* (C.Agardh) Sánchez *et* Rodríguez-Prieto = Fauchea repens (C.Agardh) Montagne et Bory de Saint-Vincent	–	–	–	–	+
	Lomentariaceae J. Agardh					

Bionomical zones		S	E	UI	MI	LI
	Lomentaria Lyngbye					
IAtc	*L. clavellosa* (Turner) Gaillon	–	+	+	–	–
M	*L. chylocladiella* Funk	–	–	–	+	+
M	*L. verticillata* Funk	–	–	+	+	+
	Rhodymeniaceae Harvey					
	Botryocladia J.Agardh					
IA	*B. botryoides* (Wulfen) J.Feldmann	–	–	+	+	+
Abt	*B. chiajeana* (Meneghini) Kylin	–	–	+	+	+
Abt	*B. microphysa* (Hauck) Kylin = Chrysymenia microphysa Hauck	–	–	+	+	+
	Chrysymenia J. Agardh					
At	*C. ventricosa* (J.V. Lamouroux) J.Agardh	–	–	+	+	+
	Rhodymenia Greville					
Ab	*R. ardissonei* (Kuntze) J.Feldmann = Rhodymenia corallicola Ardissone	–	+	+	+	+
M	*R. ligulata* Zanardini	–	–	+	+	+
Abt	*R. pseudopalmata* (J.V. Lamouroux) P.C.Silva = Rhodymenia palmetta (Stackhouse) Greville	–	–	+	+	–
	Sebdeniales R.D.Withall *et* G.W.Saunders					
	Sebdeniaceae Kylin					
	Sebdenia (J. Agardh) Berthold					
M	*S. dichotoma* Berthold	–	–	–	+	+
	STYLONEMATOPHYCEAE H.S.Yoon *et al.*					
	Stylonematales K.M.Drew					
	Stylonemataceae K.M.Drew					
	Chroodactylon Hansgirg					
C	*C. ornatum* (C.Agardh) Basson = Asterocytis ornata (C. Agardh) G. Hamel	–	+	+	–	–
	Stylonema Reinsch					
C	*S. alsidii* (Zanardini) K.M. Drew = Goniotrichum alsidii (Zanardini) M.A. Howe = Goniotrichum elegans (Chauvin) Zanardini	–	+	+	+	+
AP	*S. cornu-cervi* Reinsch = Goniotrichum cornu-cervi (Reinsch) Hauck	–	–	+	+	+
	OCHROPHYTA					
	PHAEOPHYCEAE Kjellman					
	Cutleriales Oltmanns					
	Cutleriaceae Griffith *et* Henfrey					
	Cutleria Greville					
M	*C. chilosa* (Falkenberg) P.C.Silva = Cutleria monoica Ollivier	–	–	–	–	+
SC	*C. multifida* (Turner) Greville	–	–	+	+	+
	Zanardinia Zanardini					
AP	*Z. typus* (Nardo) P.C.Silva = Zanardinia prototypus (Nardo) Nardo	–	–	+	+	+

Bionomical zones		S	E	UI	MI	LI
	Desmarestiales Setchell *et* N.L.Gardner					
	Arthrocladiaceae Chauvin					
	Arthrocladia Duby					
Ab	*A. villosa* (Hudson) Duby	–	–	–	–	+
	Dictyotales Kjellman					
	Dictyotaceae J.V.Lamouroux *ex* Dumortier					
	Dictyopteris J.V.Lamouroux					
C	*D. polypodioides* (A.P.de Candolle) J.V. Lamouroux = Dictyopteris membranacea (Stackhouse) Batters	–	–	+	+	+
	Dictyota J.V. Lamouroux					
	D. dichotoma (Hudson) J.V. Lamouroux					
C	var. *dichotoma*	–	+	+	+	+
SC	var. *intricata* (C.Agardh) Greville = Dictyota dichotoma var. implexa (Desfontaines) S.F. Gray	–	–	+	+	+
SC	*D. linearis* (C.Agardh) Greville	–	–	+	+	+
SC	*D. fasciola* (Roth) J.V. Lamouroux = Dilophus fasciola (Roth) M.A.Howe	–	+	+	–	–
	Padina Adanson					
P	*P. pavonica* (Linnaeus) J.V. Lamouroux	–	+	+	+	–
	Taonia J.Agardh					
IA	*T. atomaria* (Woodward) J.Agardh	–	–	+	–	–
	Ectocarpales Setchell *et* N.L.Gardner					
	Acinetosporaceae G.Hamel *ex* J. Feldmann					
	Acinetospora Bornet					
Abt	*A. crinita* (Carmichael) Sauvageau = Acinetospora vidovichii (Meneghini) Sauvageau	–	+	+	–	–
	Feldmannia G. Hamel					
	F. caespitula (J.Agardh) Knoepffler-Péguy					
IAtc	var. *caespitula*	–	–	+	–	–
Ab	var. *lebelii* (J.E.Areschoug *ex* P.L.Crouan *et* H.M.Crouan) Knoepffler-Péguy	–	–	+	–	–
SC	*F. paradoxa* (Montagne) G. Hamel = Feldmannia globifera (Kützing) G. Hamel	–	–	+	+	+
	F. irregularis (Kützing) G. Hamel					
C	var. *irregularis* = Ectocarpus irregularis Kützing	–	+	+	+	+
EAD	var. *lebeliides* (Ercegović) Antolić *et* Špan	–	–	+	–	–
	Hincksia J.E. Gray					
M	*H. dalmatica* (Ercegović) Cormaci *et* G.Furnari = Ectocarpus dalmaticus Ercegović	–	–	+	+	+
C	*H. mitchelliae* (Harvey) P.C. Silva	–	–	+	+	+
SC	*H. sandriana* (Zanardini) P.C. Silva	–	–	+	–	–
	Pylaiella Bory de Saint-Vincent					
C	*P. littoralis* (Linnaeus) Kjellman	–	–	+	–	–

Bionomical zones		S	E	UI	MI	LI
	Chordariaceae Greville					
	Ascocyclus Magnus					
SC	*A. orbicularis* (J. Agardh) Kjellman = Myrionema orbiculare J.Agardh	–	–	+	+	+
	Asperococcus J.V. Lamouroux					
SC	*A. bullosus* J.V. Lamouroux	–	–	+	+	+
	Cladosiphon Kützing					
M	*C. mediterraneus* Kützing = Castagnea mediterranea (Kützing) Hauck	–	–	+	+	+
	Corynophlaea Kützing					
M	*C. umbellata* (C. Agardh) Kützing = Leathesia umbellata (C. Agardh) Endlichter	–	–	+	+	–
	Giraudia Derbès *et* Solier					
IAtc	*G. sphacelarioides* Derbès *et* Solier	–	–	+	+	+
	Herponema J. Agardh					
Ab	*H. velutinum* (Greville) J. Agardh	–	–	+	–	–
	Kuetzingiella Kornmann					
SC	*K. battersii* (Bornet *ex* Sauvageau) Kornmann	–	–	+	–	–
	Liebmannia J. Agardh					
Abt	*L. leveillei* J. Agardh	–	–	+	–	–
	Myriactula Kuntze					
IA	*M. rivulariae* (Suhr) J.Feldmann	–	–	+	+	+
Ab	*M. stellulata* (Harvey) Levring	–	–	+	+	+
	Myrionema Greville					
SC	*M. magnusii* (Sauvageau) Loiseaux = Ascocyclus magnusii Sauvageau	–	–	+	–	–
SC	*M. strangulans* Greville	–	–	+	+	+
	Sauvageaugloia G. Hamel *ex* Kylin					
IA	*S. divaricata* (Clemente y Rubio) Cremades = Sauvageaugloia griffithsiana (Greville ex W.J.Hooker) G. Hamel ex Kylin	–	–	+	–	–
	Spermatochnus Kützing					
Ab	*S. paradoxus* (Roth) Kützing	–	–	–	–	+
	Stictyosiphon Kützing					
M	*S. adriaticus* Kützing	–	–	+	+	+
	Stilophora J.Agardh					
SC	*S. tenella* (Esper) P.C.Silva = Stilophora rhizodes (Turner) J.Agardh	–	–	+	+	+
	Striaria Greville					
APct	*S. attenuata* (Greville) Greville	–	–	+	–	–
	Ectocarpaceae C. Agardh					
	Ectocarpus Lyngbye					
	E. siliculosus (Dillwyn) Lyngbye					
C	var. *siliculosus* = Ectocarpus confervoides Le Jolis	–	+	+	+	+

Bionomical zones		S	E	UI	MI	LI
M	var. *adriaticus* (Ercegović) Cormaci *et* G.Furnari = Ectocarpus adriaticus Ercegović	–	–	+	+	+
Abt	var. *dasycarpus* (Kuckuck) T.Gallardo = Ectocarpus siliculosus var. crassus (Kjellman) T.Gallardo	–	–	+	+	–
	E. fasciculatus Harvey					
Ab	var. *fasciculatus*	–	–	+	+	–
Ab	var. *abbreviatus* (Kützing) Sauvageau = Ectocarpus abbreviatus Kützing	–	–	+	+	–
	Scytosiphonaceae Farlow					
	Colpomenia (Endlicher) Derbès *et* Solier					
C	*C. sinuosa* (Mertens *ex* Roth) Derbès *et* Solier	–	+	+	–	–
	Petalonia Derbès *et* Solier					
C	*P. fascia* (O.F.Müller) Kuntze = Phyllitis fascia (O.F. Müller) Kützing	–	+	+	–	–
	Scytosiphon C.Agardh					
C	*S. lomentaria* (Lyngbye) Link = Scytosiphon simplicissimus (Clemente) Cremedes	–	+	+	–	–
	Fucales Kylin					
	Fucaceae Adanson					
	Fucus Linnaues					
EAD	*F. virsoides* J.Agardh	–	+	–	–	–
	Sargassaceae Kützing					
	Cystoseira C.Agardh					
	C. amentacea (C.Agardh) Bory de Saint-Vincent					
M	var. *spicata* (Ercegović) Giaccone = Cystoseira spicata Ercegović	–	+	+	–	–
IP	*C. barbata* (Stackhouse) C. Agardh	–	–	+	+	+
	C. compressa (Esper) Gerlof *et* Nizamuddin					
Ab	*f. compressa* = Cystoseira fimbriata Bory de Saint-Vincent = Cystoseira abrotanifolia (Linnaeus) C.Agardh	–	+	+	–	–
M	*f. rosetta* (Ercegović) Cormaci *et al.* = Cystoseira abrotanifolia subsp. rosetta Ercegović	–	+	+	–	–
	C. corniculata (Turner) Zanardini					
M	subsp. *corniculata*	–	–	+	–	–
M	subsp. *laxior* Ercegović	–	–	+	+	+
M	*C. crinita* Duby	–	–	+	–	–
M	*C. crinitophylla* Ercegović	–	–	+	–	–
	C. foeniculacea (Linnaus) Greville = Cystoseira discors (Linnaeus) C.Agardh					
M	*f. foeniculacea*	–	–	+	+	+
M	*f. latiramosa* (Ercegović) A. Gómez Garreta, M.C. Barceló, M.A.Ribera *et* J.R.Lluch = Cystoseira discors subsp. latiramosa Ercegović	–	–	+	+	+

Bionomical zones		S	E	UI	MI	LI
Ab	*C. humilis* Schousboe *ex* Kützing = Cystoseira abrotanifolia subsp. pustulata Ercegović = Cystoseira compressa var. pustulata Ercegović	–	–	+	–	–
	C. spinosa Sauvageau					
M	var. *spinosa* = Cystoseira adriatica Sauvageau	–	–	+	+	+
M	var. *compressa* (Ercegović) Cormaci, G.Furnari, Giaccone, Scammacca *et* D.Serio = Cystoseira adriatica var. compressa (Ercegović) Giaccone	–	–	–	+	+
	Sargassum C.Agardh					
P	*S. acinarium* (Linnaeus) Setchell = Sargassum linifolium C.Agardh	–	–	–	+	+
M	*S. hornschuchii* C.Agardh	–	–	–	+	+
P	*S. vulgare* C.Agardh (*nom.illeg.*)	–	–	+	–	–
	Ralfsiales Nakamura					
	Ralfsiaceae Farlow					
	Pseudolithoderma Svedelius *ex* Kjellman *et* Svedelius					
M	*P. adriaticum* (Hauck) Verlaque	–	–	+	–	–
	Ralfsia Berkeley *in* J.E.Smith *et* Sowerby					
SC	*R. verrucosa* (J.E.Areschoug) J.E.Areschoug	–	+	–	–	–
	Sphacelariales Oltmanns					
	Sphacelariaceae Decaisne					
	Cladostephus C.Agardh					
	C. spongiosum (Hudson) C. Agardh					
IA	*f. verticillatum* (Lightfoot) Prud'homme van Reine = Cladostephus verticillatus (Lightfoot) Lyngbye	–	–	+	–	–
	Sphacelaria Lyngbye					
SC	*S. cirrosa* (Roth) C.Agardh = Sphacelaria cirrosa var. pennata (Lyngbye) Hauck	–	+	+	+	+
SC	*S. fusca* (Hudson) S.F. Gray	–	–	+	+	+
Ab	*S. plumula* Zanardini	–	–	+	+	+
C	*S. rigidula* Kützing	–	–	+	+	+
C	*S. tribuloides* Meneghini	–	–	+	+	+
	Stypocaulaceae Oltmanns					
	Halopteris Kützing					
SC	*H. filicina* (Grateloup) Kützing	–	–	+	+	+
	Stypocaulon Kützing					
SC	*S. scoparium* (Linnaus) Kützing = Halopteris scoparia (Linnaeus) Sauvageau	–	–	+	–	–
	Sporochnales Sauvageau					
	Sporochnaceae Greville					
	Nereia Zanardini					
At	*N. filiformis* (J.Agardh) Zanardini	–	–	+	+	+

Bionomical zones		S	E	UI	MI	LI
	CHLOROPHYTA Reichenbach					
	BRYOPSIDOPHYCEAE Bessey					
	B r y o p s i d a l e s J.H. Schaffner					
	Bryopsidaceae Bory					
	Bryopsis J.V.Lamouroux					
AP	*B. corymbosa* J.Agardh	–	–	+	–	–
A	*B. duplex* De Notaris = Bryopsis disticha (J.Agardh) Kützing	–	–	+	–	–
M	*B. feldmannii* T.Gallardo *et* G. Furnari = Bryopsis cupressoides J.Feldmann	–	–	+	–	–
C	*B. hypnoides* J.V.Lamouroux = Bryopsisi monoica Berthold ex Funk	–	+	+	–	–
SC	*B. plumosa* (Hudson) C.Agardh	–	+	+	–	–
	Pseudobryopsis Berthold					
M	*P. myura* (J.Agardh) Berthold = Trichosolen myura (J.Agardh) W.R. Taylor	–	–	+	–	–
	Caulerpaceae Kützing					
	Caulerpa J.V.Lamouroux					
P	*C. taxifolia* (Vahl) C.Agardh	–	–	+	–	–
	Chaetosiphonaceae Blackman *et* Tansley					
	Blastophysa Reinke					
AP	*B. rhizopus* Reinke = Blastophysa polymorpha Kjellman	–	–	+	+	+
	Codiaceae Kützing					
	Codium Stackhouse					
IP	*C. adhaerens* C.Agardh	–	–	+	+	+
Abt	*C. bursa* (Olivi) C.Agardh	–	–	+	+	+
IP	*C. effusum* (Rafinesque) Delle Chiaje = Codium difforme Kützing	–	–	+	+	+
At	*C. vermilara* (Olivi) Delle Chiaje = Codium dichotomum (Hudson) S.F.Gray	–	–	+	–	–
	Flabellia Richenbach					
At	*F. petiolata* (Turra) Nizamuddin = Udotea petiolata (Turra) Børgesen	–	–	+	+	+
	Derbesiaceae Hauck					
	Derbesia Solier					
SC	*D. tenuissima* (Moris *et* De Notaris) P.L.Crouan *et* H.M.Crouan	–	–	+	+	+
	Pedobesia Mac Raild *et* Womersley					
CB	*P. simplex* (Meneghini *ex* Kützing) M.J. Wynne *et* Leliaert = Derbesia lamourouxii (J.Agardh) Solier = Pedobesia lamourouxii (J. Agardh) J.Feldmann, Loreau, Codomier et Couté	–	–	+	–	–
	Halimedaceae Link					
	Halimeda J.V. Lamouroux					

Bionomical zones		S	E	UI	MI	LI
P	*H. tuna* (J. Ellis *et* Solander) J.V. Lamouroux	–	–	+	+	+
	Udoteaceae J. Agardh					
	Pseudochlorodesmis Børgesen					
SC	*P. furcellata* (Zanardini) Børgesen	–	+	+	+	+
M	*P. tenuis* Ercegović	–	–	+	+	+
	CHLOROPHYCEAE Wille					
	Tetrasporales Lemmermann					
	Palmellopsidaceae Korshikov					
	Palmophyllum Kützing					
APt	*P. crassum* (Naccari) Rabenhorst	–	–	+	+	+
	ULVOPHYCEAE K.R. Mattox *et* K.D. Stewart					
	Cladophorales Haeckel					
	Anadyomenaceae Kützing					
	Anadyomene J.V. Lamouroux					
P	*A. stellata* (Wulfen) C.Agardh	–	–	+	+	+
	Cladophoraceae Wille					
	Chaetomorpha Kützing					
C	*C. aerea* (Dillwyn) Kützing	–	+	+	–	–
SC	*C. crassa* (C.Agardh) Kützing	–	+	–	–	–
C	*C. linum* (O.F.Müller) Kützing	–	+	+	–	–
	Cladophora Kützing					
SC	*C. albida* (Nees) Kützing	–	+	+	–	–
Ab	*C. battersii* Hoek	–	–	+	+	–
IA	*C. coelothrix* Kützing = Cladophora repens (J.Agardh) Harvey	–	+	+	–	–
IA	*C. dalmatica* Kützing	–	+	+	–	–
IA	*C. echinus* (Biasoletto) Kützing	–	–	–	+	+
IA	*C. flexuosa* O.F.Müller) Kützing = Cladophora gracilis (Griffiths ex Mackay) Kützing	–	–	+	–	–
Ab	*C. fracta* (O.F.Müller *ex* Vahl) Kützing	–	–	+	–	–
SC	*C. glomerata* (Linnaeus) Kützing	–	+	+	–	–
SC	*C. hutchinsiae* (Dillwyn) Kützing	–	–	+	–	–
SC	*C. laetevirens* (Dillwyn) Kützing	–	+	+	–	–
IA	*C. lehmanniana* (Lindenberg) Kützing	–	–	+	+	–
Ab	*C. nigrescens* Zanardini *ex* Frauenfeld	–	–	+	+	–
IA	*C. pellucida* (Hudson) Kützing	–	–	+	+	–
IA	*C. prolifera* (Roth) Kützing	–	–	+	+	+
Ab	*C. ruchingeri* (C.Agardh) Kützing	–	+	+	–	–
SC	*C. sericea* (Hudson) Kützing	–	+	+	–	–
IA	*C. socialis* Kützing	–	–	+	–	–
SC	*C. vagabunda* (Linnaeus) C.Hoek	–	–	+	–	–
	Rhizoclonium Kützing					
SC	*R. tortuosum* (Dillwyn) Kützing	–	+	+	–	–

Bionomical zones		S	E	UI	MI	LI
	Dasycladales Pascher					
	Dasycladaceae Kützing					
	Dasycladus C.Agardh					
At	*D. vermicularis* (Scopoli) Krasser = Dasycladus clavaeformis (Roth) C. Agardh	–	–	+	+	+
	Polyphysaceae Kützing					
	Acetabularia J.V.Lamouroux					
IA	*A. acetabulum* (Linnaeus) P.C. Silva = Acetabularia mediterranea J.V. Lamouroux	–	+	+	+	+
	Siphonocladales (Blackman *et* Tansley) Oltmanns					
	Siphonocladaceae F.Schmitz					
	Siphonocladus F.Schmitz					
M	S. pusillus (C.Agardh *ex* Kützing) Hauck	–	–	+	+	+
	Valoniaceae Kützing					
	Valonia C.Agardh					
P	*V. aegagropila* C.Agardh	–	–	+	–	–
P	*V. macrophysa* Kützing	–	–	–	+	+
P	*V. utricularis* (Roth) C.Agardh	–	+	+	–	–
	Ulotrichales Borzi					
	Gomontiaceae De Toni					
	Gomontia Bornet *et* Flahault					
SC	*G. polyrhiza* (Lagerheim) Bornet et Flahault	–	–	+	–	–
	Ulothrichaceae Kützing					
	Ulothrix Kützing					
AP	*U. implexa* (Kützing) Kützing	–	+	+	–	–
IP	*U. subflaccida* Wille	–	+	+	–	–
	Ulvales Blackman *et* Tansley					
	Bolbocoleonaceae O'Kelly *et* Rinkel					
	Bolbocoleon N.Pringsheim					
SC	*B. piliferum* N.Pringsheim	–	–	+	+	+
	Phaeophilaceae D.F. Chappell, C.J. O'Kelly, L.W. Wilcox *et* G.L. Floyd					
	Phaeophila Hauck					
SC	*P. dendroides* (P.L.Crouan *et* H.M.Crouan) Batters	–	–	+	+	+
	Ulvaceae J.V.Lamouroux *ex* Dumortier					
	Blidingia Kylin					
SC	*B. minima* (Nägeli *ex* Kützing) Kylin	–	+	–	–	–
SC	*B. marginata* (J. Agardh) P.J.L. Dangeard *ex* Bliding	–	+	–	–	–
	Enteromorpha Link					
IP	*E. multiramosa* Bliding	–	+	+	–	–
	Ulva Linnaeus					
C	*U. clathrata* (Roth) C.Agardh = Enteromorpha clathrata (Roth) Greville = *Enteromorpha muscoides* (Clemente) Cremades	–	–	+	–	–

Bionomical zones		S	E	UI	MI	LI
C	*U. compressa* Linnaeus = Enteromorpha compressa (Linnaeus) Nees = Enteromorpha usneoides Bonnemaison ex J. Agardh = Enteromorpha compressa var. usnoides (Bonnemaison ex J.Agardh) Bliding	–	+	–	–	–
	U. flexuosa Wulfen	–	+	+	–	–
C	subsp. *flexuosa* = Enteromorpha flexuosa (Wulfen) J.Agardh					
IA	subsp. *paradoxa* (C.Agardh) M.J.Wynne = Enteromorpha flexuosa subsp. paradoxa (C. Agardh) Bliding	–	+	+	–	–
	U. intestinalis Linnaeus					
C	var. *intestinalis* = Enteromorpha intestinalis (Linnaeus) Nees	–	+	+	–	–
Ab	var. *asexualis* (Bliding) E.Taskin = Enteromorpha intestinalis var. asexualis Bliding	–	+	–	–	–
C	*U. lactuca* Linnaeus	–	+	+	–	–
C	*U. linza* Linnaeus = Enteromorpha linza (Linnaeus) J.Agardh	–	+	+	–	–
SC	*U. prolifera* O.F.Müller = Enteromorpha prolifera (O.F.Müller) J.Agardh	–	+	+	–	–
C	*U. rigida* C.Agardh	–	+	+	–	–
	Percursaria Bory de Saint-Vincent					
AP	*P. percursa* (C. Agardh) Rosenvinge	–	+	–	–	–
	Ulvellaceae Schmidle					
	Acrochaete N.Pringsheim					
Ab	*A. flustrae* (Reinke) O'Kelly = Epicladia flustrae Reinke = Endoderma flustrae (Reinke) Batters = Entocladia flustrae (Reinke) W.R. Taylor	–	–	+	+	–
C	*A. viridis* (Reinke) R.Nielsen = Entocladia viridis Reinke = Endoderma viride (Reinke) De Toni	–	–	+	+	+
	Pringsheimiella Höhnel					
SC	*P. scutata* (Reinke) Marchewianka	–	–	+	+	+
	Ulvella P.L.Crouan *et* H.M.Crouan					
SC	*U. lens* P.L.Crouan *et* H.M.Crouan	–	+	+	+	+
	MAGNOLIOPHYTA Cronquist, Takhtajan *et* W. Zimmermann					
	LILIOPSIDA Scopoli					
	Potamogetonales Dumortier					
	Cymodoceaceae N. Taylor					
	Cymodocea K.D. König					
Abt	*C. nodosa* (Ucria) Ascherson	–	–	+	+	–
	Posidoniaceae Lotsy					

Bionomical zones		S	E	UI	MI	LI
	Posidonia König					
M	*P. oceanica* (Linnaeus) Delile	–	–	+	+	+
	Zosteraceae Dumortier					
	Nanozostera Tomlinson *et* Posluszny					
Ab	*N. noltii* (Hornemann) Tomlinson *et* Posluszny = Zostera noltii Hornemann	–	–	+	–	–
	Zostera Linnaeus					
CB	*Z. marina* Linnaeus	–	–	+	–	–

Received February 8, 2010

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SAŽETAK

Taksonomski sastav, dubinska rasprostranjenost i fitogeografske značajke morske bentoske makroflore u Riječkom zaljevu (sjeverni Jadran, Hrvatska)

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Ovaj popis bentoskih morskih makroalga i morskih cvjetnica Riječkog zaljeva temelji se na našim istraživanjima izvedenim od 1950. do 2000. godine, te starijim i novijim bibliografskim podacima. Bentoska flora istraživanog područja prikazana je pomoću brojčane i postotne zastupljenosti glavnih sistematskih odjeljaka bentoskih alga (Rhodophyta, Ochrophyta i Chlorophyta) i morskih cvjetnica (Magnoliophyta), fitogeografske pripadnosti pojedinim flornim elementima te njihove dubinske rasprostranjenosti. Popis sadrži ukupno 376 svojte bentoskih alga i 4 vrste morskih cvjetnica. Od ukupnog broja svojti njih 338 pripada vrsti, a 42 nižim taksonomskim kategorijama (4 podvrste, 31 odlika, 7 oblika, 1 stadij). Najviše su zastupljene svojte iz odjeljka Rhodophyta (231 svojti ili 60,8%), a slijede ih svojte iz odjeljaka Ochrophyta (74 svojti ili 19,5%) i Chlorophyta (71 svojta ili 18,7%). Određene su sve 4 morske cvjetnice koje obitavaju uz istočnu obalu Jadranskog mora (*Posidonia oceanica*, *Cymodocea nodosa*, *Zostera marina* i *Zostera noltii*) koje čine oko 1% ukupnog broja svojti zabilježenih u bentoskoj flori Riječkog zaljeva. Prema vrijednostima kvocijenata R/P (FELDMANN, 1937) i R+C/P (CHENEY, 1977) bentoska flora Riječkog zaljeva ima suptropski karakter. U fitogeografskom sastavu brojem i postotkom prevladavaju atlantski (86 svojti ili 22,5%), subkozmopolitski (75 svojti ili 19,8%), mediteranski (70 svojti ili 18,5%) i indo-atlantski (53 svojte ili 14%) florni elementi, koji ukupno obuhvaćaju 284 svojte ili 75% svih dosad određenih svojti bentoskih alga i morskih cvjetnica (380) u podmorju Riječkog zaljeva. Od endemskih jadranskih vrsta zabilježene su samo tri (*Polysiphonia adriatica*, *Feldmannia irregularis* var. *lebeliides* i *Fucus virsoides*). U odnosu na zastupljenost bentoske flore na pojedinoj bionomskoj stepenici, najveći je broj svojti zabilježen u gornjem infralitoralu (325), dosta manje u srednjem (213) i donjem infralitoralu (190), a najmanji u eulitoralu (109). U stepenici supralitorala nađena je samo jedna vrsta. Bentoska flora Riječkog zaljeva sadrži vrlo mali broj svojti koje žive samo na većim dubinama od 6 metara (36 ili 9,4% od ukupnog broja), za razliku od razmjerno velikog broja svojti koje žive samo do 6 metara dubine (153 ili 40,3%), odnosno svojti koje su zastupljene u obje kategorije (190 ili 50,1%).

ANNEX: Alphabetical list of algal and seagrass taxa

Acetabularia acetabulum	Asterocytis ornate	Ceramium diaphanum
Acetabularia mediterranea	*Asperococcus bullosus*	var. zostericola
Acinetospora crinita	Audouinella daviesii	*Ceramium flaccidum*
Acinetospora vidovichii	Audouinella hauckii	Ceramium gracillimum
Acrochaete flustrae	Audouinella microscopica	var. byssoideum
Acrochaete viridis	*Bangia atropurpurea*	Ceramium ordinatum
Acrochaetium daviesii	Blastophysa polymorpha	Ceramium rubrum
Acrochaetium hallandicum	*Blastophysa rhizopus*	*Ceramium rubrum*
Acrochaetium hauckii	*Blidingia marginata*	var. *rubrum*
Acrochaetium microscopicum	*Blidingia minima*	*Ceramium siliquosum*
Acrochaetium pallens	*Boergeseniella fruticulosa*	var. *elegans*
Acrochaetium savianum	*Bolbocoleon piliferum*	*Ceramium siliquosum*
Acrochaetium virgatulum	*Botryocladia botryoides*	var. *zostericola*
Acrochaetium thuretii	*Botryocladia chiajeana*	*Ceramium tenerrimum*
Acrodiscus vidovichii	*Botryocladia microphysa*	Ceramium tenuissimum
Acrosorium ciliolatum	*Brongniartella byssoides*	*Ceramium virgatum*
Acrosorium uncinatum	*Bryopsis corymbosa*	*Chaetomorpha aerea*
var. venulosum	Bryopsis cupressoides	*Chaetomorpha crassa*
Acrosorium venulosum	Bryopsis disticha	*Chaetomorpha linum*
Acrosymphyton purpuriferum	*Bryopsis duplex*	*Champia parvula*
Aeodes marginata	*Bryopsis feldmannii*	Chantransia daviesii
Aglaothamnion byssoides	*Bryopsis hypnoides*	Chantransia hallandica
Aglaothamnion caudatum	Bryopsis monoica	*Chondracanthus acicularis*
Aglaothamnion cordatum	*Bryopsis plumosa*	*Chondria capillaries*
Aglaothamnion furcellariae	*Callithamnion corymbosum*	*Chondria dasyphylla*
Aglaothamnion scopulorum	*Callithamnion granulatum*	Chondrya tenuissima
Aglaothamnion tenuissimum	*Calosiphonia vermicularis*	Chondrophycus paniculatus
Aglaothamnion tripinnatum	Castagnea mediterranea	Chondrophycus. papillosus
Ahnfeltiopsis pusilla	*Catenella caespitosa*	Chondrophycus thuyoides
Alsidium corallinum	Catenella opuntia	*Choreonema thuretii*
Alsidium helminthochorton	Catenella repens	*Chroodactylon ornatum*
Amphiroa beauvoisii	*Caulacanthus ustulatus*	Chrysymenia microphysa
Amphiroa cryptarthrodia	*Caulerpa taxifolia*	*Chrysymenia ventricosa*
Amphiroa rigida	Centroceras cinnabarinum	Chylocladia kaliformis
Anadyomene stellata	*Ceramium bertholdii*	*Chylocladia verticillata*
Anotrichium barbatum	*Ceramium ciliatum*	*Cladophora albida*
Anotrichium furcellatum	var. *ciliatum*	*Cladophora battersii*
Antithamnion cruciatum	*Ceramium ciliatum*	*Cladophora coelothrix*
var. *cruciatum*	var. *robustum*	*Cladophora dalmatica*
Antithamnion cruciatum	*Ceramium circinatum*	*Cladophora echinus*
var. *profundum*	*Ceramium codii*	*Cladophora flexuosa*
Antithamnion heterocladum	*Ceramium deslongchampsii*	*Cladophora fracta*
Antithamnion tenuissimum	*Ceramium diaphanum*	*Cladophora glomerata*
Apoglossum ruscifolium	Ceramium diaphanum	Cladophora gracilis
Arachnophyllum confervaceum	var. elegans	*Cladophora hutchinsiae*
Arthrocladia villosa	Ceramium diaphanum	*Cladophora laetevirens*
Ascocyclus magnusii	var. strictum	*Cladophora lehmanniana*
Ascocyclus orbicularis		*Cladophora nigrescens*

Cladophora pellucida	Cystoseira compressa	*Dipterosiphonia rigens*
Cladophora prolifera	var. pustulata	Dermatolithon corallinae
Cladophora repens	*Cystoseira compressa*	Dermatolithon cystoseirae
Cladophora ruchingeri	*f. rosetta*	Dermatolithon hapalidiodes
Cladophora sericea	*Cystoseira corniculata*	Dermatolithon pustulatum
Cladophora socialis	subsp. *corniculata*	Dudresnaya coccinea
Cladophora vagabunda	*Cystoseira corniculata*	*Dudresnaya verticillata*
Cladosiphon mediterraneus	subsp. *laxior*	Ectocarpus adriaticus
Cladostephus spongiosum	*Cystoseira crinita*	Ectocarpus abbreviatus
f. verticillatum	*Cystoseira crinitophylla*	Ectocarpus confervoides
Cladostephus verticillatum	Cystoseira discors	Ectocarpus dalmaticus
Codium adhaerens	Cystoseira discors	*Ectocarpus fasciculatus*
Codium bursa	subsp. latiramosa	var. *abbreviatus*
Codium dichotomum	Cystoseira fimbriata	*Ectocarpus fasciculatus*
Codium difforme	*Cystoseira foeniculacea*	var. *fasciculatus*
Codium effusum	*f. foeniculacea*	Ectocarpus irregularis
Codium vermilara	*Cystoseira foeniculacea*	*Ectocarpus siliculosus*
Colaconema daviesii	*f. latiramosa*	var. *adriaticus*
Colaconema hallandicum	*Cystoseira humilis*	Ectocarpus siliculosus
Colpomenia sinuosa	Cystoseira. spicata	var. crassus
Compsothamnion thuyoides	*Cystoseira spinosa*	*Ectocarpus siliculosus*
Constantinea reniformis	var. *spinosa*	var. *dasycarpus*
Contarinia peyssonneliaeformis	*Cystoseira spinosa*	*Ectocarpus siliculosus*
Contarinia squamariae	var. *compressa*	var. *siliculosus*
Corallina elongate	Dasya arbuscula	Endoderma flustrae
Corallina granifera	*Dasya baillouviana*	Endoderma viride
Corallina mediterranea	*Dasya corymbifera*	Enteromorpha clathrata
Corallina officinalis	Dasya elegans	Enteromorpha compressa
Corallophila cinnabarina	*Dasya hutchinsiae*	Enteromorpha compressa
Corynophlaea umbellata	*Dasya ocellata*	var. usnoides
Crouania attenuate	Dasya pedicellata	Enteromorpha usneoides
Cryptonemia lomation	*Dasya rigidula*	Enteromorpha flexuosa
Cryptonemia tunaeformis	Dasya squarrosa	Enteromorpha flexuosa
Cutleria chilosa	Dasycladus clavaeformis	subsp. paradoxa
Cutleria monoica	*Dasycladus vermicularis*	Enteromorpha intestinalis
Cutleria multifida	Dasyopsis plana	Enteromorpha intestinalis
Cymodocea nodosa	Dasyopsis spinella	var. asexualis
Cystoseira abrotanifolia	Derbesia lamourouxii	Enteromorpha linza
Cystoseira abrotanifolia	*Derbesia tenuissima*	*Enteromorpha multiramosa*
subsp. pustulata	Dictyopteris membranaceae	Enteromorpha prolifera
Cystoseira abrotanifolia	*Dictyopteris polypodioides*	Enteromorpha muscoides
subsp. roseta	*Dictyota dichotoma*	Entocladia flustrae
Cystoseira adriatica	var. *dichotoma*	Entocladia viridis
Cystoseira adriatica	*Dictyota dichotoma*	Epicladia flustrae
var. *compressa*	var. *intricata*	Epilithon membranaceum
Cystoseira amentacea	Dictyota dichotoma	Erythrocladia subintegra
var. *spicata*	var. implexa	*Erythrocystis montagnei*
Cystoseira barbata	*Dictyota linearis*	*Erythroglossum sandrianum*
Cystoseira compressa	*Dictyota fasciola*	*Erythrotrichia carnea*
f. compressa	Dilophus fasciola	*Erythrotrichia investiens*

Erythrotrichia reflexa	Gigartina acicularis	*Jania rubens*
Eupogodon planus	*Giraudia sphacelarioides*	Kallymenia microphylla
Eupogodon spinellus	*Gloiocladia repens*	*Kallymenia reniformis*
Falkenbergia rufolanosa	*Gomontia polyrhiza*	*Kuetzingiella battersii*
Fauchea repens	Goniotrichum alsidii	Leathesia umbellata
Feldmannia caespitula	Goniotrichum cornu-cervi	*Laurencia microcladia*
var. *caespitula*	Goniotrichum elegans	*Laurencia obtusa*
Feldmannia caespitula	*Gracilaria bursa-pastoris*	Laurencia paniculata
var. *lebelii*	Gracilaria compressa	Laurencia papillosa
Feldmannia globifera	Gracilaria confervoides	Laurencia pelagosae
Feldmannia irregularis	*Gracilaria corallicola*	Laurencia pinnatifida
var. *irregularis*	*Gracilaria dura*	*Laurencia radicans*
Feldmannia irregularis	*Gracilaria gracilis*	*Lejolisia mediterranea*
var. lebeliides	Gracilaria verrucosa	*Liagora distenta*
Feldmannia paradoxa	*Grateloupia filicina*	*Liagora viscida*
Flabellia petiolata	Griffithsia barbata	*Liebmannia leveillei*
Fosliella farinosa	Griffithsia flosculosa	*Lithophyllum byssoides*
Fosliella farinosa	Griffithsia furcellata	*Lithophyllum cystoseirae*
f. callithamnioides	*Griffithsia genovefae*	*Lithophyllum corallinae*
Fosliella lejolisii	*Griffithsia opuntioides*	*Lithophyllum dentatum*
Fosliella minutula	*Griffithsia phyllamphora*	*Lithophyllum incrustans*
Fucus virsoides	*Griffithsia schousboei*	Lithophyllum incrustans
Galaxaura oblongata	Griffithsia setacea	f. dentata
Gastroclonium clavatum	Gymnogongrus pusillus	Lithophyllum lenormandii
Gelidiella lubrica	*Gymnothamnion elegans*	Lithophyllum lichenoides
Gelidiella pannosa	*Halimeda tuna*	*Lithophyllum pustulatum*
Gelidiella tenuissima	*Haliptilon virgatum*	*Lithophyllum racemus*
Gelidium crinale	*Halopteris filicina*	*Lithophyllum stictaeforme*
Gelidium corneum	Halopteris scoparia	Lithophyllum tortuosum
var. *pectinatum*	*Halurus flosculosus*	Lithothamnion calcareum
Gelidium bipectinatum	*Halydictyon mirabile*	Lithothamnium fruticulosum
Gelidium latifolium	*Halymenia floresii*	Lithothamnium lenormandii
Gelidium latifolium	*Herponema velutinum*	Lithothamnium mamillosum
var. hystrix	*Herposiphonia secunda*	*Lomentaria clavellosa*
Gelidium latifolium	f. *secunda*	*Lomentaria chylocladiella*
var. luxurians	*Herposiphonia secunda*	*Lomentaria verticillata*
Gelidium melanoideum	f. *tenella*	*Lophosiphonia cristata*
Gelidium melanoideum	*Heterosiphonia crispella*	*Lophosiphonia obscura*
var. filamentosum	Heterosiphonia wurdemannii	Lophosiphonia scopulorum
Gelidium minusculum	Hildenbrandia prototypus	*Melobesia membranacea*
Gelidium pectinatum	*Hildenbrandia rubra*	*Meredithia microphylla*
Gelidium pulchelum	*Hincksia dalmatica*	*Mesophyllum expansum*
Gelidium pusillum	*Hincksia mitchelliae*	*Monosporus pedicellatus*
Gelidium pusillum	*Hincksia sandriana*	var. *pedicellatus*
var. minusculum	*Hydrolithon boreale*	*Monosporus pedicellatus*
Gelidium spathulatum	*Hydrolithon farinosum*	var. *tenuis*
Gelidium spinosum	*Hypnea musciformis*	*Myriactula rivulariae*
var. *spinosum*	*Hypoglossum hypoglossoides*	*Myriactula stellulata*
Gelidium spinosum	Hypoglossum woodwardii	*Myriogramme tristromatica*
var. *hystrix*	*Jania longifurca*	*Myrionema magnusii*

Myrionema orbiculare	*Polysiphonia denudata*	*Rhodymenia pseudopalmata*
Myrionema strangulans	*Polysiphonia deusta*	*Rodriguezella bornetii*
Nanozostera noltii	*Polysiphonia dichotoma*	Rodriguezella pelagosae
Nemalion helminthoides	*Polysiphonia elongata*	*Rodriguezella pinnata*
Nemastoma dichotomum	Polysiphonia fastigiata	*Rodriguezella strafforelloi*
Neogoniolithon brassica-florida	Polysiphonia fruticulosa	*Rytiphlaea tinctoria*
Neogoniolithon mamillosum	*Polysiphonia fucoides*	*Sahlingia subintegra*
Neogoniolithon notarisii	*Polysiphonia furcellata*	*Sargassum acinarium*
Nereia filiformis	*Polysiphonia lanosa*	*Sargassum hornschuchii*
Neurocaulon foliosum	*Polysiphonia opaca*	Sargassum linifolium
Neurocaulon grandifolium	*Polysiphonia sanguinea*	*Sargassum vulgare*
Neurocaulon reniforme	*Polysiphonia scopulorum*	*Sauvageaugloia divaricata*
Nitophyllum punctatum	*Polysiphonia sertularioides*	Sauvageaugloia griffithsiana
Nitophyllum tristromaticum	Polysiphonia setacea	*Schottera nicaeensis*
Osmundaria volubilis	*Polysiphonia stricta*	*Scytosiphon lomentaria*
Osmundea pelagosae	*Polysiphonia stuposa*	Scytosiphon simplicissimus
Osmundea pinnatifida	*Polysiphonia subulata*	*Sebdenia dichotoma*
Padina pavonica	*Polysiphonia subulifera*	*Seirospora apiculata*
Palisada perforata	*Polysiphonia tenerrima*	*Seirospora giraudyi*
Palisada thuyoides	Polysiphonia urceolata	*Seirosporai interrupta*
Palmophyllum crassum	Polysiphonia violacea	*Seirospora sphaerospora*
Parviphycus tenuissimus	*Porphyra leucosticta*	*Siphonocladus pusillus*
Pedobesia lamourouxii	*Posidonia oceanica*	*Spermatochnus paradoxus*
Pedobesia simplex	*Pringsheimiella scutata*	*Spermothamnion flabellatum*
Percursaria percursa	*Pseudobryopsis myura*	*Spermothamnion johannis*
Peyssonnelia dubyi	*Pseudochlorodesmis furcellata*	*Spermothamnion repens*
Peyssonnelia harveyana	*Pseudochlorodesmis tenuis*	var. *repens*
Peyssonnelia polymorpha	*Pseudolithoderma adriaticum*	Spermothamnion repens
Peyssonnelia rubra	Pterocladia capillacea	var. turneri
Peyssonnelia squamaria	*Pterocladiella capillacea*	*Spermothamnion repens*
Petalonia fascia	*Pterocladiella melanoidea*	var. var*iabile*
Phaeophila dendroides	var. *filamentosa*	*Sphaerococcus coronopifolius*
Phylitis fascia	*Pterocladiella melanoidea*	*Sphacelaria cirrosa*
Phyllophora crispa	var. *melanoidea*	var. *cirrosa*
Phyllophora nervosa	*Pterothamnion crispum*	Sphacelaria cirrosa
Phyllophora palmettoides	*Pterothamnion plumula*	var. pennata
Phyllophora sicula	*Ptilothamnion pluma*	*Sphacelaria fusca*
Phymatolithon calcareum	*Radicilingua reptans*	*Sphacelaria plumula*
Phymatolithon lenormandii	*Ralfsia verrucosa*	*Sphacelaria rigidula*
Pilayella littoralis	Ricardia montagnei	*Sphacelaria tribuloides*
Pleonosporium borreri	*Rhizoclonium tortuosum*	*Sphondylothamnion multifidum*
Plocamium cartilagineum	Rhodochorton hauckii	Spongites dentata
Plocamium coccineum	Rhodochorton pallens	*Spongites fruticulosus*
Pneophyllum confervicola	*Rhodochorton velutinum*	Spongites notarisii
Pneophyllum fragile	Rhodophyllis bifida	*Spyridia filamentosa*
Pneophyllum lejolisii	*Rhodophyllis divaricata*	*Stictyosiphon adriaticus*
Polysiphonia adriatica	*Rhodymenia ardissonei*	*Stylonema alsidii*
Polysiphonia arachnoidea	Rhodymenia corallicola	*Stylonema cornu-cervi*
Polysiphonia breviarticulata	*Rhodymenia ligulata*	Stilophora rhizodes
Polysiphonia brodiei	Rhodymenia palmetta	*Stilophora tenella*

Striaria attenuata	*Ulva clathrata*	*Ulva rigida*
Stypocaulon scoparium	*Ulva compressa*	*Ulvella lens*
Taonia atomaria	*Ulva flexuosa*	*Valonia aegagropila*
Tenarea tortuosa	subsp. *flexuosa*	*Valonia macrophysa*
Thuretella schousboei	*Ulva flexuosa*	*Valonia utricularis*
Titanoderma corallinae	subsp. *paradoxa*	*Vertebrata lanosa*
Titanoderma cystoseirae	*Ulva intestinalis*	Vidalia volubilis
Titanoderma littorale	*var. intestinalis*	*Womersleyella setacea*
Titanoderma pustulatum	*Ulva intestinalis*	*Wrangelia penicillata*
Trichosolen myura	*var. asexualis*	*Wurdemannia miniata*
Tricleocarpa fragilis	*Ulva lactuca*	Zanardinia prototypus
Udotea petiolata	*Ulva linza*	*Zanardinia typus*
Ulothrix implexa	*Ulva paradoxa*	*Zostera marina*
Ulothrix subflaccida	*Ulva prolifera*	Zostera noltii