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PHYTOBENTHOS OF THE ISLAND OF LOKRUM

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Introduction

Botanical investigations in the Adriatic Sea have a long tradition of over a century. From the early studies of Lorenz (1863) on the vegetation in the Bay of Kvarner to the recent studies on the vegetation of the whole Adriatic carried out by the eminent algologist, the late Professor Ante Ercegović (1960), many authors have devoted their interest to the flora and vegetation of the Adriatic Coast line.

Floristic studies have covered either the eastern Adriatic as a whole in search for the distribution and variability of a genus, such as e. g. *Fucus* (Linardić 1949), *Cystoseira* (Ercegović 1952) or *Codium* (Vouk 1936); or a particular restricted area of the Adriatic was floristically analysed in depth. Here the northern parts of the Adriatic have been studied more frequently: the vicinity of Rovinj (Vatova 1928), the island group Dugi Otok— Kornati (Vouk 1930), the exposed islands of Palagruža and Jabuka (Cammerloher 1911), the islands and the coast line of the middle Adriatic (Schiller 1914, Ercegović 1949, 1957, 1966, Špan 1975, 1980), and finally the various localities on the peninsula of Pelješac and the island of Lokrum (Schiffner 1933).

This last study is rather exceptional by its penetration into the south Adriatic; only Linardić (1940, 1949) went further south in his study on the geographical distribution of *Fucus virsoides*. These rare botanical excursions into the south of the Adriatic do not change the statement, however, that the south Adriatic coastal facies, i. e. the region south of Dubrovnik is floristically the least studied (Ercegović 1960).

The benthic algae of the eastern Adriatic coast line have become the target of the studies using contemporary techniques of diving with the aqua-lung equipment, but again the northern Adriatic localities are the

places of choice: the vicinity of Senj and Lukovo on the coast (Z a l o k a r 1942), and the vicinity of Šilo on the island of Krk (M u n d a 1954, 1960). The island of Hvar (Š p a n 1975, 1980) and the island of Vis — Biševo (Š p a n 1980) represent the localities further down to the south of the Adriatic and into the open Adriatic.

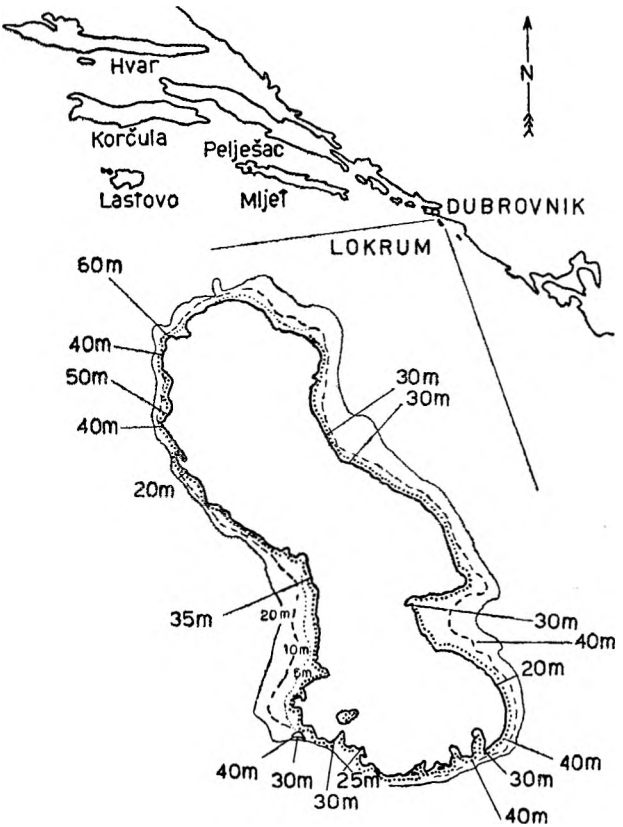

Fig. 1. Geographical position of the island of Lokrum and the vertical and horizontal profiles studied floristicaly.

Our investigations of the flora of the island of Lokrum were initiated in 1960, 1961, 1962, and continued in 1974 and 1979. The report on the floristic findings during the first three consecutive years of work on the island of Lokrum and the opposite Dubrovnik coast line was published in the senior author's degree thesis (Š e r m a n 1962). These results together with the new floristic findings, as well as the results concerning the sociological and ecological aspects of the same seaweed communities, which are to be published in the subsequent paper (in preparation) are considered for publication in Acta Botanica Croatica now, to serve as an early point of twenty years ago, or the zero stage of the Lokrum permanent ecological

plot. They will hopefully serve for further comparative ecological studies in the light of the growing awareness of the effects of the sea water pollution in general, and particularly in the tourist oriented Dubrovnik area.

The Region under Study

The island of Lokrum is geographically located immediately to the south of Dubrovnik and should therefore belong botanically to the southern coastal facies of the Adriatic Sea (Ercegović 1960; Fig. 1). This is a small island with the longer axis of about 1 800 m, and the variable width from 300 to 500 meters (Fig. 2).

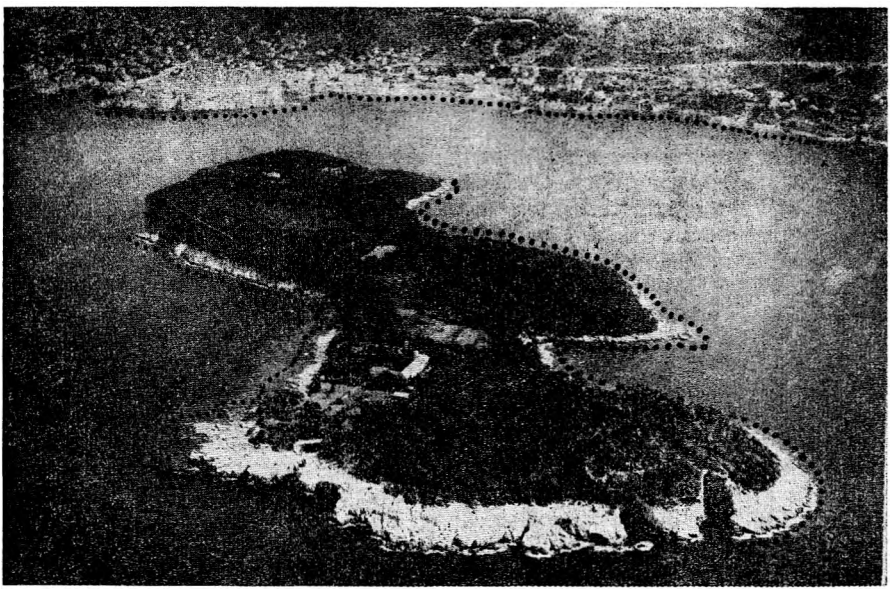

Fig. 2. The island of Lokrum with Dubrovnik in the background. The dotted lines indicate the region studied.

Lokrum spreads within the following geographic coordinates: 42°38′04″ and 42°37′14″ of the northern geographic latitude, and 18°06′52″ and 18°07′42″ of the eastern geographic longitude. Like the majority of Jugoslav islands it belongs geologically to the formation of Upper-Cretacean limestones.

Its unprotected and exposed position open to strong erosion by the waves and swell of the southerly wind "jugo" and the west-northwesterly "maestral« has caused pronounced erosion of the south and north-western coast displaying impressive vertical rocks a few metres to fifteen metres high, with correspondingly fearful submarine landscapes. A detailed description of the geomorphological formations at the various parts of the Lokrum coast line together with the various ecological factors will be given in the subsequent paper covering the ecological aspects (in preparation).

Along with the floristic study of the Lokrum infralittoral zone, we examined on two occasions (1960 and 1961) the horizontal profile up to the depth of approximately 6 metres (upper infralittoral zone) of the opposite Dubrovnik coast line (Fig. 2: dotted lines).

Material and Methods

The field work was carried out in the Biological Institute of the Yugoslav Academy of Sciences and Arts, Dubrovnik — Lokrum, in August 1960, August — September 1961, and May 1962. The Institute of Oceanography and Fisheries, Split undertook studies in the area of the island of Lokrum in July 1974 and 1979. Floristic samples were collected along vertical and horizontal profiles (Fig. 1). During this work many dives using the aqua-lung equipment were carried out along the deep vertical profiles, and numerous shallow coastal dives without the SCUBA equipment were carried out in various biotopes of the island of Lokrum. The material was collected also by dredging the bottom in the depth range between 20 and 60 metres.

In this work we have adopted the vertical stratification of Ercegović (1960) with six strata: (1) the supralittoral, the shore above the high tide level, (2) the eulittoral, the shore between the high and the low tide level, (3) the upper infralittoral, the sea bottom from the low tide level up to the depth of 6 metres, (4) the middle infralittoral, the depths below 6 m down to 35 m, (5) the lower infralittoral, the bottom below 35 m down to 55 m, and (6) the elittoral. In our studies we have concentrated our collecting efforts mostly on the upper, the middle and the lower infralittoral zones (down to 55 m), with a single dive to the depth of 71 metres.

The localities chosen for study with deep vertical profiles along the coast line were decided upon on the basis on varied geomorphological characteristics of the bottom as judged by isobath spacing and configuration. The detailed hydrographic charts of the Lokrum infralittoral zone (Fig. 1) were obtained from and used with the permission by the Hydrographic Institute of the Yugoslav Navy, Split.

In choosing biotopes and localities for studies with both vertical and horizontal profiles we endeavoured to pay equal attention to various localities, differentiated either with respect to the character of the substrate (rocky shore — shattered bottoms), wave exposition and dynamics (wave beaten rocks — sheltered bays — inclosed bodies of water), or geographic exposition and coastal morphology (regarding the light intensity and the duration of diurnal light).

For *in situ* collection of algal specimens we used the technique of free diving with a Cousteau — Gagnan type of aqua-lung equipment. As anticipated by Drach (1948, 1960), Riedl (1954, 1960), Molinier (1960) and many others, this technique offers definite advantages in studies of the phytobenthos of the rocky infralittoral zone over any other type of collection with gear suspended from a waterborn vessel. In the studies carried out in 1974 and 1979 the research ship "Bios" was used.

In collecting along the horizontal, shallow profiles we dived in apnea, to avoid the tedious and time consuming charging of compressed air tanks. By this method depths of 5—6 metres (upper infralittoral) can easily by handled with no health hazards.

The algal specimens collected in this way into separate plastic bags, of known profile and depth (in 5 m strata) were subsequently conserved in 10% formaldehide until the determinations were carried out, either on

Lokrum, mostly in the Institute of Oceanography and Fisheries in Split, or in the Department of Botany in Zagreb. This method of collection makes it possible to trace the approximate location of any particular species. One can get a rough estimate of the position and depth of a certain location from the phytosociological chart to be published in the paper on the ecological aspects (in preparation).

In determining the specimens collected we consulted the following literature:

Hauck (1885), Ercegović (1948, 1949, 1952, 1955a, b, 1956, 1963b), Cammerloher (1915), Vatova (1928), Vouk (1930, 1936), Funk (1928, 1955), Hamel (1931—1939), Kylin (1956), Bliding (1960, 1963, 1968), Van Den Hoek (1963), Giaccone (1973, 1978), Giaccone e Bruni (1973), Giaccone e Bryce-Derni (1972), and Bressan (1974).

Results

In the material collected during the summer months in the upper, middle and lower infralittoral zones of the island of Lokrum and the upper infralittoral of the opposite Dubrovnik coast line we have determined 234 taxa of *Thallophyta* and 1 species of *Angiospermae*. This number does not represent, however, the real number of species even in the material collected, because the investigation was not carried out in all the seasons of the year. The summer period was not the most suitable for collection from the point of optimal annual vegetation, particularly for algal communities in the upper infralittoral zone, but the diving technique and the time available left no other choice.

Among the number of species reported the most abundant were *Rhodophyta* (157 taxa), *Chlorophyta* (39 taxa), and *Phaeophyta* (38 taxa) in that order.

The species recorded for the south coast of Lokrum by Schiffner (1933) are marked accordingly by (Sch.).

THE LIST OF SPECIES

RHODOPHYTA

RHODOPHYCEAE

PROTOFLORIDEAE

Goniotrichales
Goniotrichaceae:
Goniotrichum alsidii (Zanard.) Howe

FLORIDEAE

Acrochaetiales
Acrochaetiaceae:
Acrochaetium daviesii (Dillw.) Nägeli

Nemalionales
Chaetangiaceae:
Galaxaura oblongata (Ellis et Sol) Lamour.

Helminthocladiaceae:
Liagora viscida (Forsk.) C. Ag.
Nemalion helminthoides (Velley) Batt.

Gelidiales
Gelidiaceae:
Gelidiella tenuissima (Thur.) Feldm. et Hamel
Gelidium crinale (Turn.) Lamour., *G. latifolium* (Grev.) Thur. et Born., *G. latifolium* v. *hystrix* (J. Ag.) Hauck, *G. latifolium* v. *luxurians* (Crouan) Feldm. et Hamel, *G. melanoideum* (Schousb.) Bornet, *G. melanoideum* v. *filamentosum* Schousb., *G. pectinatum* (Schousb.) Mont., *G. pusillum* (Stackh.) Le Jol., *G. pusillum* v. *minusculum* W. van Bosse, *G. spathulatum* (Kütz.) Born.
Wurdemannia miniata (Drap.) Feldm. et Hamel

Cryptonemiales
Corallinaceae:
Amphiroa cryptarthrodia Zanard., *A. rigida* Lamour.
Corallina granifera Ellis et Sol. *C. officinalis* Linn.
Dermatolithon cystoseirae (Hauck) H. Huve', *D. hapalidioides* (Crouan) Foslie, *D. pustulatum* (Lamour.) Foslie
Fosliella farinosa (Lamour.) Howe, *F. farinosa* ssp. *solmsiana* (Falkenb.) Foslie, *F. lejolisii* (Rosanoff) Howe
Goniolithon papillosum (Zanard.) Foslie
Jania rubens (L.) Lamour.,
Lithophyllum incrustans Phill., *L. incrustans* f. *suodichotoma* Heydrich, *L. tortuosum* (Esp.) Foslie
Lithothamnium calcareum (Pallas) Aresch., *L. fruticulosum* (Kütz.) Foslie
Melobesia membranacea (Esp.) Lamour.
Neogoniolithon notarisii (Dufour) Setch. et Mas.
Phymatolithon lenormandii (Aresch.) Adey
Pseudolithophyllum expansum (Phil.) Lem.

Cryptonemiaceae:
Acrodiscus vidovichii (Menegh.) Zanard.
Cryptonemia lomation (Bertol.) J. Ag., *C. tunaeformis* (Bertol.) Zanard.
Halymenia dichotoma J. Ag.

Dumontiaceae:
Acrosymphyton purpuriferum (J. Ag.) Sjöst.
Dudresnaya verticillata (With.) Le Jol.

Gloiosiphonaceae:
Thuretella schousboei (Thur.) Schmitz.

Hildebrandiaceae:
Hildebrandia rubra (Sommerf.) Menegh.

Kallymeniaceae:
Kallymenia microphylla J. Ag., *K. reniformis* J. Ag.

Peyssonneliaceae:
Cruoria pellita Lyngb.
Peyssonnelia polymorpha (Zanard.) Schm., *P. rubra* (Grev.) J. Ag., *P. squamaria* (Gmel.) Dec.

Gigartinales

Gigartinaceae:
Gigartina acicularis (Wulf.) Lamour.

Gracilariaceae:
Gracilaria verrucosa (Huds.) Papenf.

Hypneaceae:
Hupnea musciformis (Wulf.) Lamour.

Nemastomaceae:
Nemastoma dichotoma J. Ag.
Platoma cyclocolpa (Mont.) Schm.

Phyllophoraceae:
Phyllophora nervosa (De Caud.) Grev.
Scottera nicalensis (Duby) Guiry et Holenb.

Plocamiaceae:
Plocamium cartilagineum (L.) Dixon

Rhabdoniaceae:
Catenella repens (Lightf.) Batt.
Rhodophyllis divaricata (Stackh.) Papenff.

Sphaerococcacceae:
Caulacanthus ustulatus (Mert.) Kütz.
Sphaerococcus coronopifolius (Good. et Woodw.) Ag.

Rhodymeniales

Lomentariaceae:
Champia parvula (C. Ag.) Harvey
Chylocladia reflexa (Chauv.) Lenorm., *Ch. verticillata* (Lightf.) Bliding
Gastroclonium clavatum (Roth) Ardiss.
Lomentaria articulata v. *linearis* (Zanard.) Giaccone

Rhodymeniaceae:
Botryocladia botryoides (Wulf.) Feldm., *B. microphysa* (Hauck) Kylin
Chrysimenia ventricosa (Lamour.) J. Ag.
Fauchaea repens (C. Ag.) Mont.
Gloiocladia furcata (C. Ag.) J. Ag.
Rhodymenia ardissonei (Ardiss.) Feldm.

Ceramiales

Ceramiaceae:
Aglaothamnion furcellariae J. Ag., *A. tenuissimum* (Bonnem.) G. Feldm., *A. tripinatum* (Grat.) G. Feldm.
Antithamnion cruciatum (C. Ag.) Näg., *A. cruciatum* v. *profundum* G. Feldm., *A. heterocladum* Funk, *A. plumula* v. *crispum* (Ducl.) Hauck, *A tenuissimum* Hauck
Callithamnion corymbosum (Smith) Lyngb., *C. granulatum* (Ducl.) C. Ag.
Centroceras cinnabarinum (Grat.) J. Ag., *C. clavulatum* Mont.
Ceramium bertholdii Funk, *C. ciliatum* (Ell.) Ducl.,
C. circinatum (Kütz.) J. Ag., *C. codii* (Rich.) G. Feldm.,
C. comptum (Berth.) Börg., *C. diaphanum* (Roth) Harv.,
C. diaphanum v. *strictum* (Kütz.) G. Feldm., *C. echinotum* J. Ag.,
C. gracillimum v. *byssoideum* (Harv.) G. Feldm.

C. rubrum v. *barbatum* (Kütz.) J. Ag., *C. tenerrimum* (Mart.) Okamura, *C. tenuissimum* (Lyngb.) J. Ag.
Crouania attenuata (Bonnem.) J. Ag.
Compsothamnion thuyoides (Smith) Nägeli
Griffithsia barbata (Smith) C. Ag., *G. phyllamphora* J. Ag., *G. schousboei* Mont., *G.* sp.
Gymnothamnion elegans (Bonnem.) Schmitz
Lejolisia mediterranea Bornet
Neomonospora pedicellata (Smith) G. Feldm. et Masl., *N. pedicellata* v. *tenuis* G. Feldm.
Pleonosporium borreri (Smith) Nägeli
Ptilothamnion pluma (Dillw.) Tur.
Seirospora apiculata (Menegh.) G. Feldm., *S. giraudyi* (Kütz.) De Toni, *S. interrupta* (Smith) Schmitz, *S. sphaerospora* Feldm.
Spermothamnion flabellatum Bornet, *S. johanis* G. Feldm., *S. repens* v. *variabile* (C. Ag.) G. Feldm.
Spondilothamnion multifidum (Huds) Nägeli
Spyridia filamentosa (Wulf.) Harv. — (Sch.)
Wrangelia penicillata C. Ag. — (Sch.)

Dasyaceae:

Dasya arbuscula (Dillw.) C. Ag., *D. corymbifera* J. Ag., *D. ocellata* (Grat.) Harv., *D. pedicellata* Zanard.
Dasyopsis plana (C. Ag.) Zanard., *D. spinella* (C. Ag.) Zanard.
Heterosiphonia wurdemanni (Baill.) Falk.

Delesseriaceae:

Acrosorium uncinatum (J. Ag.) Kylin
Apoglossum ruscifolium (Turn.) J. Ag.
Arachnophyllum confervaceum (Menegh.) Zanard.
Erythroglossum sandrianum (Zanard.) Kylin
Hypoglossum woodwardii (Woodw.) Kütz., *H. woodwardii* f. *profundum* Erceg.
Nitophyllum punctatum (Stack.) Grev.
Taenioma macrorum Thur.

Rhodomelaceae:

Börgeseniella fruticulosa (Wulf.) Kylin
Brogniartella byssoides (Good. et Woodw.) Schmitz
Chondria dasyphylla (Woodw.) C. Ag., *Ch. tenuissima* (Good. et Woodw.) C. Ag. — (Sch.)
Dipterosiphonia rigens (Schousb. Falk.
Halodictyon mirabile Zanard.
Halopithys incurvus (Huds.) Batt.
Herposiphonia secunda (C. Ag.) Nägeli — (Sch.), *H. tenella* (C. Ag.) Näg. — (Sch.)
Laurencia obtusa (Huds.) Lamour. — (Sch.), *L. paniculata* (C. Ag.) J. Ag., *L. papillosa* (Forssk.) Grev., *L. pinnatifida* (Gmel.) Lamour.
Lophosiphonia cristata Falk.
Polysiphonia elongata (Huds.) Harv., *P. opaca* (C. Ag.) Zanard., *P. sertularioides* (Grat.) J. Ag. — (Sch.), *P. subulifera* (C. Ag.) Harv.
Ricardia montagnei Derb. et Sol. — (Sch.)
Rodrigueella straforelli Schmitz
Rytiphloea tinctoria (Clement) C. Ag.
Vidalia volubilis (L.) J. Ag.

PHAEOPHYTA

PHAEOPHYCEAE

Ectocarpales

Ectocarpaceae:

Ectocarpus siliculosus v. *confervoides* (Roth) Russel
Feldmannia irregularis (Kütz.) Hamel, *F. paradoxa* (Mont.) Hamel
Giffordia dalmatica (Erceg.) Giaccone

Ralfsiaceae:

Ralfsia verrucosa (Aresch.) J. Ag.

Giraudyaceae:

Giraudya sphacelarioides Derb. et Sol.

Punctariaceae:

Colpomenia sinuosa (Mert.) Derb. et Sol.

Sphacelariales

Cladostephaceae:

Cladostephus verticillatus (Lightf.) C. Ag

Sphacelariaceae:

Sphacelaria cirrhosa (Roth) C. Ag., *S. fusca* (Huds.) C. Ag., *S. plumula* Zanard., *S. tribuloides* Menegh.

Stypocaulaceae:

Halopteris filicina (Gratel.) Kütz., *H. scoparia* (L.) Sauv.

Cutleriales

Cutleriaceae:

Aglaozonia chillosa Falk.
Zanardinia prototypus Nardo

Dictyotales

Dictyotaceae:

Dictyopteris membranacea (Stack.) Batters
Dictyota dichotoma (Huds.) Lamour., *D. linearis* (C. Ag.) Grev., *D. dichotoma* v. *implexa* (Desf.) J. Ag.
Dilophus fasciola (Roth) Howe
Padina pavonia (L.) Thivy — (Sch.)

Chordariales

Chordariaceae:

Castagnea mediterranea (Kütz.) Hauck

Elachistaceae:

Elachista fucicola (Velley) Aresch., *E. intermedia* Crouan

Spermatochnaceae:

Spermatochnus paradoxus (Roth) Kütz.
Stilophora rhizoides (Erht.) J. Ag.

Sporochnales

Sporochnaceae:

Nereia filiformis (J. Ag.) Zanard.
Sporochnus pedunculatus (Huds.) C. Ag.

Desmarestiales
Arthrocladiaceae:
Arthrochladia villosa (Huds.) Dubyi

Fucales
Cystoseiraceae:
Cystoseira compressa (Esper.) Gerlof et Nizamudin,
C. compressa ssp. *rosetta* Erceg., *C. corniculata* ssp. *laxior* Erceg.,
C. ercegovicii ssp. *latiramosa* (Erceg.) Giaccone,
C. spinosa Sauv., *C. spinosa* v. *squarrosa* (De Not.) Giaccone,
C. stricta v. *spicata* (Erceg.) Giaccone
Sargassaceae:
Sargassum vulgare C. Ag.

CHLOROPHYTA

CHLOROPHYCEAE

Volvocales
Palmellaceae:
Palmophyllum crassum (Nacc.) Rabenh.

Ulotrichales
Ulotrichaceae:
Ulothrix flacca (Dillw.) Thur., *U. subflacida* Wille

Ulvales
Ulvaceae:
Ulva rigida C. Ag.
Enteromorpha compressa (L.) Grev.

Chaetophorales
Chaetophoraceae:
Endoderma endolithicum (Lagerh.) Erceg.
Pringsheimiella sculata (Reinke) Schmidt

Cladophorales
Cladophoraceae:
Chaetomorpha capillaris (Kütz.) Börg., *Ch. capillaris* v. *crispa* (Schous.) Feldm., *Ch. aerea* (Dillw.) Kütz.
Cladophora coelothrix Kütz., *C. dalmatica* Kütz., *C. glomerata* (L.) Kütz., *C. lactevirens* (Dillw.) Kütz., *C. pellucida* (Huds.) Kütz, *C. pseudopellucida* Van den Hoeck, *C. prolifera* (Roth) Kütz. — (Sch.), *C. vagabunda* (L.) Van den Hoeck
Rhizoclonium kochianum Kütz., *R. riparium* (Roth) Harvey

Siphonocladiales
Anadyomenaceae:
Anadyomene stellata (Wulfen) C. Ag.
Microdictyon umbilicatum (Velley) Zanard.
Siphonocladaceae:
Siphonocladus pusillus (Kütz.) Hauck

Valoniaceae:
Valonia macrophysa Kütz., *V. utricularis* (Roth) C. Ag.

Dasycladales
Dasycladaceae:
Acetabularia acetabulum (L.) Silva
Dasycladus vermicularis (Scopoli) Krassar

Caulerpales
Udoteaceae:
Halimeda tuna (Ell. et Sol.) Lamour. — (Sch.)
Pseudochlorodesmis furcellata (Zanard.) Börg.
Udotea petiolata (Turra) Börg.

Derbesiales
Derbesiaceae:
Derbesia tenuissima (De Not.) Crouan, *D. lamourouxii* (J. Ag.) Solier
Halicystis stadio ovalis (Lyngb.) Aresch.

Codiales
Bryopsidaceae:
Bryopsis disticha (J. Ag.) Kütz., *B. hypnoides* Lamour.
Pseudobryopsis myura J. Ag.) Bert.
Codiaceae:
Codium adhaerens (Cabrera) C. Ag., *C. bursa* (L.) C. Ag.
C. decorticatum (Woodw.) Howe

HELOBIAE

Potamogetonaceae:

Posidonia oceanica (L.) Del.

According to Schiffner (1933) the southernmost locality of *Fucus virsoides* (Don.) J. Ag. was the island of Lokrum with only one plant found. Relatively close to it on the northern coast of the peninsula of Lapad several plants of *Fucus virsoides* were found by the same author.

On the nearby locality (Gruž) *Fucus virsoides* was found again in August by Linardić (1940, 1949), and he found it even further south from Dubrovnik. The optimal southern localities of this Adriatic endemic species, which is widely spread in the Northern Adriatic, appeared to be in the vicinity of Herceg Novi and Tivat. Therefore Lokrum was not any more the southernmost locality of this element of the north Adriatic facies.

In spite of all the attention devoted to the possibility of finding *Fucus virsoides*, on Lokrum again, not a single individuum was observed along the Lokrum coast line during our field work.

In the same paper Schiffner (1933) describes the flora of the upper infralittoral zone (0—5 m) of the south coast of the island of Lokrum and cites 28 species, many of them epiphytic, therefore only few species are common with the species collected and determined in our work.

Discussion

According to the floristic studies of the Adriatic sea carried out by Ercegović (1960) and later by Špan (1980) and Gamulin-Brida and Špan (1978) in which they describe different floristic elements represented in the eastern Adriatic, it is interesting to note which among them have their representatives in the summer aspect of the Lokrum phytobenthos.

Benthic flora of the island Lokrum (its summer aspect) is not uniform in the phytogeographical sense because it is composed of floristic elements from various phytogeographical regions. The most numerous are the representatives of the Atlantic-Mediterranean element which amount to 146, and the endemic-Mediterranean element with 49 taxa. The representatives of these two elements comprise 195 taxa and constitute almost 84,1% of the total taxa in the summer flora of the Lokrum phytobenthos.

The Atlantic-Mediterranean element includes 30 taxa of the Atlantic-boreal character, and among these the following taxa are particularly well represented in the benthic flora on Lokrum:

Corallina officinals, Fosliella lejolisii, Rhodophyllis divaricata, Aglaothamnion furcellariae, A. tripinatum, Ralfsia verrucosa, Stilophora rhizoides, Sporochnus pedunculatus, Chaetomorpha capillaris, Cladophora coelothrix, C. glomerata, C. prolifera, Rhizoclonium riparium, and *Codium adhaerens.*

Besides those, the Atlantic-Mediterranean element includes also 33 taxa of the Atlantic-subtropic character, with the following species particularly abundant on Lokrum: *Gelidium latifolium, G. pusillum, Amphiroa cryptarthrodia, Lithophyllum incrustans, Psudolithophyllum expansum, Peyssonnelia squamaria, P. rubra, Sphaerococcus coronopifolius, Fauchea repens, Spyridia filamentosa, Wrangelia penicillata, Dasya pedicellata, Chrysimenia ventricosa, Feldmannia paradoxa, Sphacelaria tribuloides, Sargassum vulgare, Dasycladus vermicularis, Halimeda tuna, Udotea petiolata, Pseudochlorodesmis furcellata,* and *Pseudobryopsis myura.*

Next follows the Indopacific floristic element with 18 taxa among which the following species are the most frequent: *Amphiroa rigida, Jania rubens, Kallymenia reniformis, Peyssonnelia polymorpha, Hypnea musciformis, Champia parvula, Lejolisia mediterranea, Laurencia paniculata, Sphacelaria cirrhosa,* and *Halopteris scoparia.*

Next comes the cosmopolitic element with 9 taxa, among which the following species are the most frequent: *Goniotrichum alsidii, Fosliella farinosa, Gigartina acicularis, Phymalithon lenormandii, Catenella repens, Dictyota dichotoma,* and *Enteromorpha compressa;* the circumtropic element with 8 taxa, the most frequent being: *Herposiphonia secunda, Colpomenia sinuosa, Dictyota linearis, Dilophus fasciola,* and *Padina pavonia;* and the endemic-Adriatic element with only 4 taxa. The representatives of the circumboreal region have not been registered in the summer aspect of the benthic flora of the island of Lokrum.

Ercegović (1960) has further divided the Adriatic Sea into 3 phytogeographic facies: 1. the south coastal facies (south of Dubrovnik), 2. the northern coastal facies, and 3. the facies of the open Adriatic. Since the phytobenthos of the island of Lokrum includes a number of elements from the northern facies, Lokrum cannot be classified floristically as a typical southern coastal facies. From the northern facies, which is typically developed north from the 44° of northern geographic latitude (line Zadar — Rimini) the following species are found on Lokrum: *Acrodiscus*

vidovichii, Vidalia volubilis, Lomentaria articulata v. *linearis, Rhytiphloea tinctoria, Cystoseira corniculata* ssp. *laxior,* and *Cryptonemia tunaeformis.* The elements of the souhern coastal facies found in this study are *Cystoseira spinosa, C. spinosa* v. *squarrosa, Taenioma macruorum, Wurdemannia minuata,* and *Codium decorticatum,* the last one found in the old harbour of Dubrovnik and not on Lokrum itself.

The species *Nemastoma cyclocolpa* and particularly *Lithophyllum tortuosum* with their modestly developed but numerous localities of the trotoire formation (M o l i n i e r 1960) as elements of the open Adriatic facies (E r c e g o v i ć 1960) might indicate that Lokrum belongs to the last one. This indication is supported by Ercegović's statement that in the open Adriatic facies certain genera do not have the period of summer rest. The representatives of these genera on the island of Lokrum: *Derbesia lamourouxii, Nithophyllum punctatum, Erythroglossum sandrianum, Dasya pedicellata, D. ocellata, Heterosiphonia wurdemanii, Nemastoma cyclocolpa, Griffithsia setacea,* and *G. opuntioides* are abundantly developed and normally active in this period of summer rest.

Summary

The summer aspect of seaweed communities of the island of Lokrum and the opposite Dubrovnik coastline was studied by the technique of free diving. Algal specimens were collected in August—September 1960 and 1961, May 1962, and in July 1974 and 1979, along many vertical and horizontal profiles within the upper, middle, and lower infralittoral zones. Among the specimens collected 234 taxa of *Thallophyta* and 1 species of *Angiospermae* were determined, belonging to the following phylla: *Rhodophyta* 157 taxa, *Phaeophyta* 38 taxa, and *Chlorophyta* 39 taxa.

On the ground of its geographic location, its vicinity to the coast, and the strong influence of the open sea, Lokrum seems to display transitional characteristics between the southern coastal facies and the facies of the open sea.

*

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SAŽETAK

FITOBENTOS OTOKA LOKRUMA

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Ljetni aspekt zajednica bentoskih algi otoka Lokruma i nasuprotnog dubrovačkog primorja ispitivan je tehnikom slobodnog ronjenja. Alge su skupljane od kolovoza do rujna 1960. i 1961. godine, u svibnju 1962. godine i u srpnju 1974. i 1979. godine, uz veći broj vertikalnih i horizontalnih profila unutar gornjeg, srednjeg i donjeg infralitorala. Među skupljenim uzorcima određena je 1 vrsta angiosperma i 234 vrsta talofita, i to *Rhodophyta* 157 vrsta, *Phaeophyta* 38 vrsta i *Chlorophyta* 39 vrsta.

Svojim geografskim položajem, blizinom kopna, a unatoč tome pod jakim utjecajem otvorena mora, Lokrum svojom bentoskom florom pokazuje prijelazni oblik između južnog priobalnog facijesa i facijesa otvorenog mora.

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