

The Rijeka Bay marine flora seldom was subject of botanists' interest (VOUK, 1915; BENACCHIO, 1938; LINARDIC, 1949). Basic data on the inventory and distribution of benthic flora in Rijeka Bay were obtained by research carried at the Krk Island in 1976-1978 and 1981 (ZAVODNIK *et al.*, 1981). Additional surveys were performed at the Cres Island, along the eastern coast of the Istrian peninsula, and along the northern coast of Rijeka Bay. It is a relatively close area, encircled to the south and east by Cres and Krk Islands, and to the north and west side by the mountain highlands of Risnjak and Učka. The coast is rocky and mostly steep, somewhere quite vertical. Only in the Krk Island area the coast is gently sloping. Over the whole Bay, within the compact rocky coast, small gravel beaches are interslated. At gently sloping sites, at the depth of 2-3 meters, the rocky bottom is substituted by sandy sediments which are often rich in organogenic detritus. The deep bottom plain is characterized by coastal terrigenous ooze. The area close to the Rijeka city is considerably affected by wastes of urban and industrial origin, especially the northern coastal area between the Lovran-Opatija Riviera and Kraljevica townlet, and in particular Bakar Bay.

Our field research and samplings were carried over the whole Rijeka Bay, at 65 transects mostly surveyed by SCUBA divers. The bionomic zones of supralittoral, mediolittoral, infralittoral, and partly circalittoral were studied.

Table I. Taxonomic survey of the Rijeka Bay algal flora

	RHODOPHYTA		PHAEOPHYTA		CHLOROPHYTA		Total	
	No.	%	No.	%	No.	%	No.	%
Species and infra species taxa	188	59	69	21	63	20	320	

The analysis of the plant material enabled the accomplishment of a relatively rich inventory of the Rijeka Bay benthic flora. In total 320 taxa (species, subspecies, varieties and forms) were recorded (Table I). Besides these eucariont algae, 9 species Cyanophyta, and 4 marine phanerogams (Angiospermae) were identified.

With an account to the diversity of marine benthic flora studied Rhodophyta absolutely dominated (190 taxa = 58.7%). The Phaeophyta and Chlorophyta taxa shared in about the same relations i.e. 69 (21.6%) and 63 (19.7%) taxa (Table I). The established R/P ratio was 2.7.

Table II. Species numbers and floristic composition of Rijeka Bays algal groups.

Distributional elements: AM = Atlantic-Mediterranean, MM = Medit., AMP = Atlantic-Medit.-Pacific, AMI = Atlantic-Medit.-Indian, CT = Circumtropic, AD = endemic Adriatic, CP = Cosmopolite

	RHODOPHYTA		PHAEOPHYTA		CHLOROPHYTA		Total	
	No.	%	No.	%	No.	%	No.	%
AM	109	58.0	31	44.9	44	69.8	184	57.5
MM	53	28.2	19	27.5	11	17.5	83	25.9
AMP	11	5.9	0	0.0	2	3.2	13	4.1
AMI	5	2.7	2	2.9	0	0.0	7	2.2
CT	2	1.1	5	7.2	0	0.0	7	2.2
AD	1	0.5	6	8.7	1	1.6	8	2.5
CP	7	3.7	6	8.7	5	7.9	18	5.6
Total	188		69		63		320	

By its origin, the Rijeka Bay benthic flora, and generally also the flora of the entire Adriatic Sea is not homogeneous: it comprehends floristic elements from several phytogeographic regions (Table II). With regard to the number of taxa, and percentage portions Atlantic-Mediterranean and typical Mediterranean floristic elements (in total 267 taxa = 83.3%) are characteristic in the area surveyed. The other five phytogeographic regions contribute to the Rijeka marine algal flora by only 16.7% of the taxa identified.

REFERENCES

- BENACCHIO N., 1938.- Osservazioni sistematiche e biologiche sulle Zosteracee dell'Alto Adriatico. *Thalassia*, 3 (3) 41 pp.
 LINARDIC J., 1949.- Studije o jadranskom fukusu (*Fucus virsoides*). *Acta Bot.*, Inst. Univ. Zagreb, 12-13: 7-132.
 VOUK V., 1915.- Morska vegetacija Bakarskog zaljeva. *Prir. istr. Hrv. Slav.*, 6: 1-23.
 ZAVODNIK D., SPAN A., ZAVODNIK N., SIMUNOVIC A. & ANTOLIC B., 1981.- Benthos of the western coast of the Island Krk (Rijeka Bay, the North Adriatic Sea). *Thalassia Jugosl.*, 17: 285-337.

Although the biological research in the Adriatic Sea is an about four centuries long tradition, reviews on particular animal groups, and regional check-lists of marine fauna are rather scarce.

The only attempt to review the total macrofauna of the Adriatic Sea is that of STOSSICH (1880-1885), followed by CARUS (1885-1893), and in part also that of RIEDL (1963). GRAEFFE (1881-1905) and VATOVA (1928) treated chiefly the Gulf of Trieste and the Rovinj area, respectively. The total fauna of other Adriatic regions has never been considered.

Table I.- Species numbers and distributional pattern of the Rijeka Bay benthic fauna

Taxon	Species Nos	Distributional pattern							
		Adriatic	Mediterranean	Atlant.-Medit.	Amphiatlantic	Boreal-Medit.	Boreal	Cosmopolite	Others
PORIFERA	43	-	12	6	-	3	1	10	11
CNIDARIA	32	1	9	15	-	2	-	2	3
MOLLUSCA	186	1	35	99	1	44	3	2	1
NEMATODA	35	1	13	4	6	3	1	3	4
ANNELIDA	124	1	6	44	9	29	7	13	15
CRUSTACEA	105	1	22	51	4	12	-	-	15
ECHINODERMATA	45	-	8	24	-	10	-	2	1
VERTEBRATA	101	-	21	63	2	10	-	5	-
VARIA	46	-	6	17	1	4	4	8	6
Total No.	717	5	132	323	23	117	16	45	56
Total %	99	1	18	45	3	16	2	6	8

We have undertaken, therefore, efforts to compile old literature and our recent data on benthic fauna in Rijeka Bay, outstanding by its industrial, traffic and touristic importance in the national economy. The Bay is a semi-closed marine area which surface is 550 km², and average depth about 60 m (maximum 66 m). It is famous for its peculiar hydrographic properties (DEGOBBIS, 1981) and rich in a variety of benthic habitats. Benthic communities most distributed in the area are littoral communities of rocky shore, the biocoenosis of photophilic seaweeds, and communities of fine well calibrated sands and coastal detritic ooze, respectively. In the northern part of the Bay pollution effects were noted.

Modern studies in the area were introduced by LORENZ (1863) but since then no check-list of benthic fauna has ever been prepared. According to our review, by now, 717 benthic species were noted in the area (Tab. I). The species list reflects the absence, or scarcity of previous research and collection of taxonomic material in some peculiar benthic habitats, such as beach gravels mixed with boulders, algal assemblages, and criptic habitats. Therefore, the data on some high animal taxa are almost completely lacking, especially on Foraminifera, Turbellaria, Copepoda Harpacticoida, and Isopoda. Some other groups, such as Porifera, Hydrozoa, Nemertina, Ostracoda, Tentaculata, Tunicata, and others, obviously deserve the taxonomists' interest in the nearest future. With regard to data available from other Adriatic regions, after thorough taxonomic studies, in Rijeka Bay at least 1500 benthic animal taxa can be expected.

Most of the species listed belong to stocks of the Mediterranean and Atlantic-Mediterranean distributional pattern (Tab. I). Actually, in opposition to old suggestions based on peculiar hydrographic features of the area, taxa of boreal origin are not common. Only four taxa are considered hitherto to be Adriatic endemics (*Epizoanthus unioittatus*, *Cultrensis adriaticus*, *Astomonema otti*, *Lumbrineris rovinensis*) - a qualification which perhaps is more reliable to our present knowledge than to a real distribution of taxa.

REFERENCES

- CARUS V., 1885-1893.- Prodrum faunae mediterraneae, I et II. I.E. Schweizerbart (E. Koch), Stuttgart, 524 + 711 pp.
 DEGOBBIS D., 1981.- Hydrographic characteristics of the Rijeka Bay (the Northern Adriatic). *Thalassia Jugosl.*, 17: 141-154.
 GRAEFFE E., 1881-1905.- Übersicht der Seethierfauna des Golfes von Triest. I-X. *Arb. Zool. Inst. Wien*, 3: 333-344, 4: 313-321, 5: 333-362, 7: 445-470, 13: 33-80, 14: 89-136, 15: 97-112, 317-331.
 LORENZ J.R., 1863.- Physicalische Verhältnisse und vertheilung der Organismen im Quarnerischen Golfe. *Verh. Akad. Wiss. Wien*, 379 pp.
 RIEDL R., 1963.- Fauna und Flora der Adria. Paul Parey, Hamburg u. Berlin, 702 pp.
 STOSSICH M., 1880-1885.- Prospetto della fauna del Mare Adriatico. I-VI. *Boll. Soc. adri. Sci. nat. Trieste*, 5: 18-71, 157-286, 6: 178-271, 7: 168-242, 8: 90-110, 9: 112-155.
 VATOVA A., 1928.- Compendio della flora e fauna del Mare Adriatico presso Rovigno. *Mem. R. Com. Talas. ital.*, 143: 614 pp.