PATTERNS OF ALGAL ZONATION ON SOME ISLANDS OF THE ROVINJ ARCHIPELAGO, NORTH ADRIATIC (BAGNOLE, FIGAROLA)

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Abstract : The environmental conditions on islands cause very particular and variable zonation patterns, different from those found on the mainland. They are described on the example of two islands of the Rovinj archipelago : Bagnole, which is highly exposed and provides a wide variety of intertidal habitats, and the nearshore island of V. Figarola, which is partly sheltered.

Résumé : Le milieu insulaire provoque une zonation algale très particulière et variable, différente de celle de la côte. On en donne deux exemples pris sur les îles de l'archipel de Rovinj :Bagnole, qui est très exposée et offre une grande variabilité de milieux médiolittoraux, et V. Figarola, plus près de la côte et partiellement protégée. Une extrême variabilité de la zonation algale a été trouvée dans ces habitats insulaires.

On small islands of the Rovinj archipelago, a great variety of habitats were observed, both regarding the exposure to different wind directions and shore topography. Islands represent, however, isolated habitats and provide conditions for the development of widely different zonation patterns. Floristic and vegetational differences increase with the distance of the islands from the mainland. Common features of algal zonation on small islands are, however, an uplift of algal belts and absence or scarse occurence of fucoids. Two examples will be treated here : the small island of Bagnole, 1.7 km offshore and highly exposed, and the nearshore island of V. Figarola (0.6 km offshore), which is partly protected. The banks of these islands are formed or rough limestone, which forms small platforms, fissures, rocks pools, caves and small mediolittoral depressions. The shore topography is particularly variable on Bagnole. Different zonation patterns were found around this small island, where *Fucus virsoides* belts are present. *Cystoseira* species are sparse and limited mainly to rock pools. On the western banks the following vertical sequence was found : *Enteromorpha intestinalis*, *E. compressa* in eulittoral depressions, *Ulva rigida* on small platforms and belts of *Mytilus galloprovincialis*, covered by small red algae (e.g. *Porphyra leucosticta*, *Callithamnion granulatum*, *Polysiphonia sertularioides*, *Gastroclonium clavatum*, *Ceramium ciliatum)* and *Ectocarpus fasciculatus*, *Ulva rigida* and *Bryopsis* spp. In the sublittoral follow mats of *Corallina officinalis*, mixed with *Amphiroa* spp, *Laurencia paniculata*, *Chylocladia verticillata*

and *Dilophus fasciola*. Locally, *Catenella caespitosa* occupied the level of the littoral fringe. In the south of the island, close to a big cave, the slopes were still dominated by *Mytilus* shells, covered with red algae (among which *Porphyra leucosticta* was dominant) and by mats of *Corallina* with its companion species. In the mediolittoral the number of belts was increased and the following vertical sequence observed : *Ctenella caespitosa-Bangia atropurpurea-Blidingia minima* with *Cladophora dalmatica-Mytilus* zone-belt of red algae (*Polysiphonia variegata*, *Ceramium diaphanum*, *Laurencia* spp. , *Chylocladia verticillata)*. Small platforms were a rule covered by *Ulva rigida-Enteromorpha linza* or by *Corallina* mats. Locally *Dictyota dichotoma* meadows dominated infralittorally. On the steep eastern banks the number of algal belts was reduced to : *Bangia atropurpurea* - red algae covered mussels - *Corallina officinalis*. In the northern direction the *Mytilus* was absent and the zonation of steep slopes reduced to belts of *Catenella caespitosa* - *Lithophyllum tortuosum* - *Corallina officinalis*. On gently sloping rocky surfaces of the north and NW of the island, green algae dominated eulittorally and *Cystoseira* spp. were well represented in pools. On this side of the island, *Bangia*, *Mytilus* and *Catenella* belts were absent and *Corallina* mats reduced to patches. The zonation was broken by numerous pools, which exhibited a gradient in floristic composition. The uppermost pools were covered by *Cladophora albida*, the lower ones by *Cl. dalmatica* and *Enteromorpha* spp. or by diverse red algae (*Ceramium* spp., *Chylocladia verticillata*, *Laurencia* spp., *Polysiphonia variegata*). Deeper pools were covered by *Cystoseira stricta v. spicata* or *C. crinita*, accompanied by *Dictyota dichotoma*, *Padina pavonica*, *Scytosiphon lomentaria* and *Ectocarpus* spp. The sublittoral slopes were covered by mats of *Dictyota dichotoma* and *Stypocaulon scoparium*. *Jania rubens*, *Chylocladia verticillata* and *Laurencia* species were richly represented in the vegetation of this side of the island.

The island of V. Figarola is relatively protected along its landward banks. Here a recovery of *Fucus virsoides* belts was newly observed and the zonal sequence was as follows : *Cladophora albida* in pools, belts of *Enteromorpha intestinalis* - *Fucus virsoides* - *Ulva rigida* - *Laurencia* spp. with *Chylocladia verticillata* - scattered mats of *Cystoseira compressa* - *C. barbata* with *Dictyota dichotoma*. Another zonation type was : *Gelidiella* spp.-*Gelidium* spp. - *Fucus virsoides* - *Scytosiphon lomentaria* with *Ectocarpus siliculosus* - mats of *Dictyota dichotoma* and *Stypocaulon scoparium*. Locally the infralittoral slopes were clean. The seaward banks were dominated by *Mytilus* shells, covered by *Porphyra leucosticta* and *Cystoseira stricta v. spicata* in rock pools. *Corallina* mats dominated sublittorally and *Catenella caespitosa* in the level of the littoral fringe. *Fucus* belts were absent and green algae mats found only in patches.

In general, red-algae covered *Mytilus* shells dominated along the exposed banks on both islands, along with infralittoral *Corallina* mats. Fucoids were well represented on the landward side of V. Figarola and in the north and NW of Bagnole.