A STUDY OF TWO SPECIES OF GORGONIANS COEXISTING ON THE ROCKY SEABED IN THE STRAITS OF MESSINA

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The spatial distribution of the two species Eunicella cavolinii and Eunicella singularis (Alcyonaria), inhabiting the same rocky slope, in the straits of Messina was studied. Our objectives were to test: the population density of each species on the light-depth gradient, the aggregation and the degree of coexistence.

La distribution spatiale des deux espèces Eunicella cavolinii et Eunicella singularis (Alcyonaria), peuplant un même rocher pentu, dans le détroit de Messine, a été étudiée. Notre but etait de tester: la densité de population de chaque espèce en fonction du gradient lumière-profondeur, leur aggrégation et le degré de coexistence.

Of the two species of gorgonians Eunicella cavolinii (Esper) and Eunicella singularis (Koch), taxonomically closely related, the second one, only, hosts the Dinoflagellate Symbiodinium microadriaticum (Trench et Al., 1981). The trophic relationship between the Dinoflagellate and E. singularis is not completely known but we can postulate that light is an important factor involved in the spatial distribution of this species. Bearing this considerations in mind, we begun a study of the vertical distribution of the two species on a rocky slope of constant gradient. At this site the two species co-occur at such a density that we may hypothesize that they currently compete for space. The study site is located in S. Raineri, in the straits of Messina, were the current is strong (up to six knots), tidal and directionally constant.
A first survey, carried out by scuba diving has shown that colonies of Eunicella singularis begin at 8 meters with a low population density, they reach a higher density at 18 m., and few colonies only occur at 40 meters. They are absent below 40 meters.
Our objectives were to test: 1)the distribution of each species on the light-depth gradient, 2) the degree of aggregation of the colonies

of each species, 3) the minimum size of the grid needed to distinguish between an aggregated and a dispersed distribution, 4) the degree of interspecific coexistence (sensu Pielou).
It was found that: 1) E.cavolinii is dominant from 40 m. to 37 m., reaching an abundance of 22 colonies for m^2; beyond 34 m. E. singularis is dominant, reaching an abundance of 18 colonies for m^2, 2) the aggregation degree was calculated using an appropriate test:

$$\chi^2_{N-1} = \frac{\sigma^2 \quad (N - 1)}{\bar{x}}$$; σ= variances, $\bar{x}$= averages, for every grid

size (0.5, 1,2 m.), sampled in all possible ways (Scossiroli et Al., 1974). The test gives significant values for E. cavolinii and not for E. singularis for grids of 0.5 m. sampled in all possible ways. 3) The minimum grid (useful to distinguish between an aggregated and unaggregated distribution of the colonies of the two species) is smaller for E.cavolinii than for E. singularis (0.55 m. for E.c. and 0.75 for E.s. randomly sampled), 4) the coexistence test (Pielou et Al., 1967) calculated on 0.5 m. grids gave a value ($P<0.55$) meaning "close coexistence" according with Pielou interpretation. All these results are from preliminary survey, we are currentely working on a wider transect (using grid size, quadrat number, sampling methods, determined during this preliminary survey). Although preliminary, our results show the different distribution of the two species on the light-depth gradient and their different aggregation. Because of their different use of space and trophic strategies we suggest that the two species reduce competition and are, therefore, better able to coexist (close coexistence sensu Pielou) within a certain range on the light-depth gradient.

Bibliography

Trench, R.K., Colley, N.J., Fitt, W.K. - Recognition phenomena in symbiosis between marine invertebrate and "Zooxantellae". Ber. Dtsch. Bot. Ges. 94, 1981.

Scossiroli, R., Clementel, S., Scossiroli, S. in: Metodi statistici per l'Ecologia, Zanichelli, Bologna, 1974.

Pielou, D.P., Pielou, E.C. - The detection of the different degree of coexistence. J. Theor. Biol. 16, 427-437, 1967.