

Zoobenthic colonization of artificial reefs in Balearic water

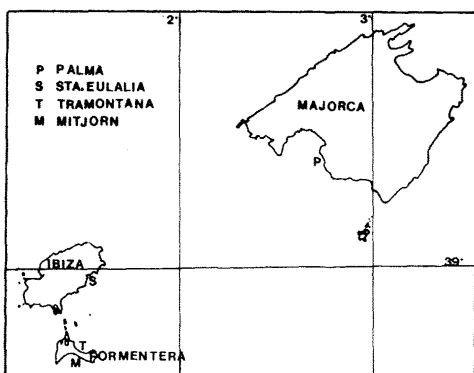
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In order to stop further damage of the sea bed and to enhance its natural regeneration four artificial reefs have been established on sand and *Posidonia* meadows in the coastal area of the Balearic Islands (Table and figure).

| ARTIFICIAL REEF | SITUATION | MOORING DATE | BEGINING OF THE MONITORING | BOULDERS N ^o | DEPTH m |
|-------------------------|-------------------------------|--------------|----------------------------|-------------------------|---------|
| Palma (Majorca) | 39° 27' 06" N 2° 42' 03" E | July-89 | February-91 | 49 | 30-32 |
| Sta. Eulalia (Ibiza) | 38° 58' 03" N 1° 32' 26" E | July-90 | February-91 | 50 | 25-27 |
| Tramontana (Formentera) | 38° 41' 45" N 1° 30' 00" E | July-90 | May-91 | 50 | 28-30 |
| Mitjorn (Formentera) | 38° 48' 03" N 1° 27' 30" E | July-90 | May-91 | 50 | 29-31 |

The reefs have been visited by scuba divers each four months from the date indicated in the table to February 1992. In each visit, as well as the photographic survey, four stones installed with this purpose, have been collected. In order to monitor the coverage, the stones have been studied under the microscope with a 2x2 cm mesh. A study of the reef necton and of the hydrographic conditions of the area is also carried out.



In the colonization some different stages in relation with the shape of the organisms, the zoological group they belong to and the spatial competition has been observed.

The first to colonize the substrata are small filamentous algae, hydroids, serpulid polychetes and bryozoans of stolonial growth. In the second stage forms with vertical growth appear, mainly hydroids and bryozoans with colonies higher than the previous ones. In this stage small calcareous sacklike sponges begin to appear. At the same time the serpulids increase in number and size. The next stage is characterized by the appearance of laminar forms: sponges, both calcareous and demospongiae and incrusting bryozoans. In this stage a competition for space is observed and some cases of epiphytism and epizoisms appear.

In relation to the four sides of the boulders, no significant differences were detected. Only in Sta. Eulalia (Ibiza) reef a slight siltation of the northside of some boulders was observed causing a difference in the population established.

It is too short a time for a definite population to be established. As the four reefs are established in nearby waters were no biogeographical differences are detected, the differences observed are due to local conditions or in the case of Palma, to the more advanced stage of the process. The sequence observed agrees with other authors as BALDUZZI *et al.*, 1986; RIGGIO *et al.* 1986 and RELLINI & CORMAGI, 1989. In contrast with some authors (BOMBACE, 1981; ARDIZZONE & BOMBACE, 1983 and ARDIZZONE *et al.*, 1989) the presence of mussels has not been recorded in any of the four reefs. We consider it due to the depth (RELLINI *et al.*, 1986) and to the oligotrophic conditions of the water. In fact the value of the contents of nutrients and pigments have been very low in the four reefs during all the monitoring time.

REFERENCES

- ARDIZZONE G. D. and BOMBACE G. 1983. - Artificial reef experiments along a Tyrrhenian Sea coast. *J. Etud. Récifs Artif. Maricult. Suspend.* Cannes CIESM : 49-51.
- ARDIZZONE G. D., GRAVINA M. F. and BELLUSCIO A., 1989. - Temporal development of epibenthic communities on artificial reefs in the central Mediterranean Sea. *Bull. Mar. Sci.* 44 (2) : 592-608.
- BALDUZZI A., BOERO F., CATTANEO R., PANSINI M., and PRONZATO R., 1986. - The colonization of the artificial reefs of the Monaco Natural Reserve. *Association Monégasque pour la Protection de la Nature.* 25-28.
- BOMBACE G., 1981. - Note on experiments in artificial reefs in Italy. In management of living resources in the Mediterranean coastal area. *Stud. Rev. Gen. Fish. Counc. Medit.* 58 : 309-324.
- RELLINI G. and CORMAGI P., 1989. - Colonisation patterns of hard substrata in the Loano artificial reef (Western Ligurian sea). *First session of G.F.C.M. working party on artificial reefs and mariculture.* 1-5.
- RELLINI G., PEIRANO A., TUNESI L. and ORSI RELLINI L. 1986. - The artificial reef in the Marconi Gulf (Eastern Ligurian Riviera). *FAO Fish. Rep.* (357) : 95-103.
- RIGGIO S., BADALAMENTI F., CHEMELLO R. and GRISTINA M., 1986. - Zoobenthic colonization of a small artificial reef in the Southern Tyrrhenian: results of a three-year survey. *FAO Fish. Rep.* (357) : 109-119.