

STRUCTURAL ANALYSIS OF BENTHIC COMMUNITIES  
IN A COASTAL LAGOON OF WESTERN SARDINIA

by

G. CARRADA<sup>+</sup>, E. FRESI<sup>°</sup> & M. SCARDI<sup>°</sup>

<sup>+</sup>*Institute of Zoology, University of Naples, Naples (Italy).*

<sup>°</sup>*Stazione Zoologica di Napoli, Benthic Ecology Laboratory, Ischia (Italy).*

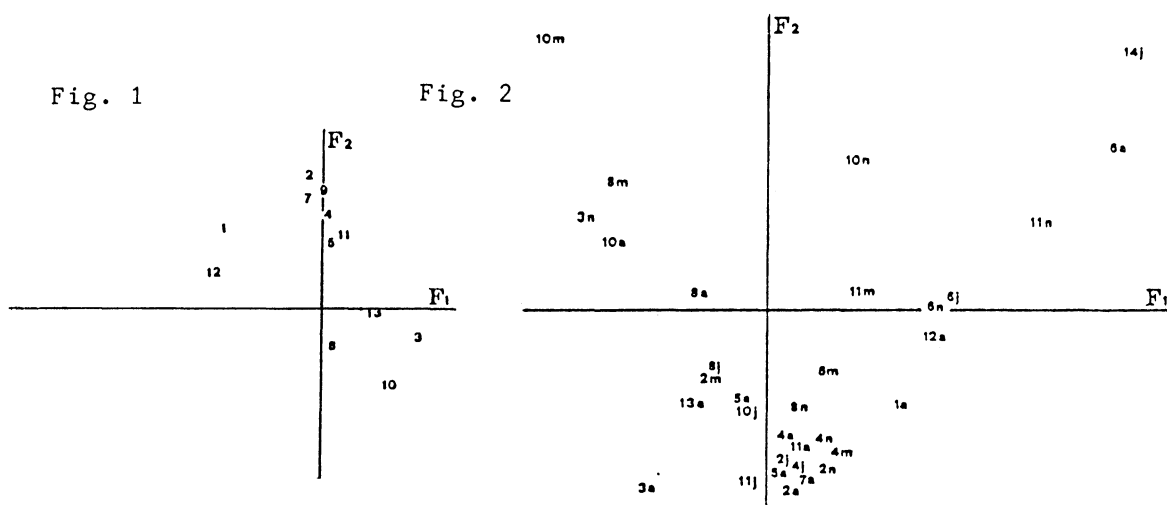
RESUME. *Une étude spatio-temporelle effectuée sur une lagune de la Sardaigne Occidentale met en évidence les effets du confinement sur la configuration de la communauté benthique. Ces effets sont interprétables surtout en termes d'énergie mécanique présente dans le système.*

INTRODUCTION. In the framework of an extensive research program, aimed at describing and modelling some representative lagunar ecosystems of Italian coasts, the lagoon of Marceddì (Oristano, W. Sardinia) was studied. The present paper deals with the analysis of benthic communities, performed on a series of stations from the outside to the inner portion of the lagoon and thus taking into account a gradient of "confinement" (GUELORGET and PERTHUISOT, 1983).

METHODS. A total of 14 sampling sites was considered for the benthos, in 6 of which the observations were repeated seasonally. Samples were seived onto a 1 mm mesh size screen. Sixtytwo taxa were identified, 57 of which at the species level, and fully enumerated. An environmental survey was carried out over the whole basin, including both physico-chemical and sedimentological variables. Faunistic data were treated by means of Factorial Analysis of Correspondences (FAC). Two distinct FAC were performed: 1) synchronic set of observations (april 1982); 2) diachronic set including april, july, november 1982 and march 1983. Both analyses were carried out on reduced sets of species, selected according the technique by CARRADA et al. (1981), i.e. analysis 1: 23 taxa; analysis 2: 33 taxa.

RESULTS. The ordination model of the synchronic data set, consisting of 13 observations is shown in Fig. 1 in the plane defined by the first two factors. F1 sharply separates outermost stations (1, 6, 12) from all the remaining ones. In the space of F2 inner stations are grouped in two clusters, which comprise respectively stations 3, 8, 10 and 13 and stations 2, 4, 5, 7, 9 and 11. Ordination of the diachronic set of observations looks quite similar to that of the synchronic set. F1 isolates outer stations from the inner ones, whereas those situated in the middle of the lagoon are consistently ordinated in a central cluster, which also includes almost all summer observations. Most of spring and

autumn observations of innermost and outermost stations are opposed to the central cluster in the space of F2. From the biocenotic standpoint, FAC reveals, above all, the opposition of two groups of species: 1) *Lumbriconereis latreilli*, *Nereis caudata*, *Gastrana fragilis* and *Venerupis aurea* characterising the outer stations; 2) *Nereis diversicolor*, *Abra ovata*, *Cerastoderma glaucum* and *Venerupis decussata* characterising the inner stations. Other species, e.g. *Nephtys hombergii*, have a central ordination indicating their uniform distribution over the biotope.



DISCUSSION. From the above results it is clear that a cenotic discontinuity exists between outer and inner stations. The time trajectories of both groups are such as to suggest that their variations are cycling and occur in different portions of the cenotic space (Fig. 2). They seem, however, to diverge from a sort of common structure identified both by observations intermediate in space and by summer observations. Such a pattern indicates that at the entrance of the lagoon a threshold effect manifests itself. When the environmental variables are considered, it is clearly seen that the major discontinuity occurs in the structure of sediments. In particular, there is a strong increase in deposition of the finer fractions (especially clay) that suggest an energetic threshold in the sedimentary balance coinciding with the above cenotic discontinuity. This seems to support the hypothesis that in a gradient of confinement the major role in species selection is played by water movement and the modulation it performs on other physical and chemical variables. As such a hydrodynamic threshold seem to persist in time, a rank of climatic factor must be attributed to water movement in the horizontal zonation of benthic communities.

REFERENCES.

- CARRADA, G.C. et al., 1981 - J. Plankton Research 3, 2: 291-314  
 GUELORGET, O. & PERTHUISOT, J.P., 1983 - Travaux du Laboratoire de Geologie, 16. Presses de l'Ecole Normale Supérieure, Paris.