

The Stagnone Sound (W Sicily) : a case history in the adaptation of Zoobenthos to a marine segregated environment

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Reproductive isolation of the genotypes selected in a peculiar environmental system is a prerequisite for the evolution of new taxa, which in the terrestrial biota is attained through the onset of spatial and/or ecological barriers. The constancy of the leading abiotic parameters and the physical continuum of the marine environment are on the other hand a severe restraint towards the isolation of selected gene pools, due to the high dispersal power of planktonic larvae. According to MAYR(1966), "...the genetic component of the phenotypic variation with changing water conditions seems smaller in the marine animals...The very free gene flow will result in a highly panmictic condition. All this counteracts local genetic differentiation and favors developmental flexibility...". A theoretical model of a marine biotope favourable to genetic isolation is provided by a segregated coastal lagoon widely communicating with the open sea and affected by an intense water renewal which results in salinities and temperatures by no means lower than in the open sea; in such a case the larvae inflowing with the currents should be selected against factors -as the water temperature and local salinity- related solely to the hydrodynamism and the nature of the substrata thereby giving rise to different types which could in their turn migrate back into the sea. Shallow seabeds encircled by islands and stretching around arid or semiarid continental regions fit the model: a case is provided by the bottoms off the Gulf of Gabes, Tunisia; a second case is the shallow sound of the Stagnone di Marsala. This "marine lagoon" communicates with the open sea through its northernmost and southernmost mouths; inside the lagoon at least three minor basins can be identified from the hydrodynamic point of view, distinguished by depths varying from 0.10m to 2.0m and spatially separated by three flat calcareous islets (RIGGIO et al., 1983).

The marine zoobenthos is characterized by the frequent occurrence of phenotypes which can be referred to as: a) partly or wholly reversible adaptations to the dominant thermal and hydrodynamic conditions; b) irreversible processes of genotypic selection and ecological segregation.

Numerous examples of both phenomena are observed in typically marine groups. Reversible adaptations to the hydrodynamism, of a non-genetic nature, are observed in the following taxa: the benthopelagic populations of the Demospongia *Geodia cydonium*, characterized by sterrasters sensibly smaller than open sea populations (CORRIERO, 1982-83); the colonies of the Hydroid *Aglaophenia harpago* attaining a gigantic size; *Plumularia obliqua*, (Hydroidea) showing a peculiar intrathecal morphology; *Cladocora caespitosa* living as an epibiont with corallites far longer than normal; the epiphytic Bryozoan *Aetea sica* budding well developed sacculi (RIGGIO S. e R. CHEMELLO, 1986). Within the genetically established types can be listed all the endemisms so far described in widely plastic taxa. Three new species of Doridacea have been so far identified among the Opistobranchia. They are *Chromodoris* sp. (GARCIA-GOMEZ et al., in press), *Discodoris* sp. and *Doriopsis* sp. The Gastropod *Calliostoma laugierii spongiarum*, whose distribution is restricted to the coast of the Gulf of Gabes and the Stagnone di Marsala as well (CHEMELLO and RIGGIO, a; b, in press) is also frequent; even the fish fauna includes an endemism, a small sized Gobiid, *Pomatoschistus tortonesei*, which is not reported elsewhere. No data are available for other taxonomic groups, which are still under study.

The high frequency of microevolutionary phenomena in the zoobenthos and the convergence observed in most characters makes their occurrence by chance rather unlikely; moreover the "endemisms" are by no means consistent with the evolutionary patterns typical of brackish coastal lagoons in central and northern Mediterranean. Their unique morphological characteristics stress the influence exerted on the benthic fauna of by a marine semiclosed system inside the lagoon, restricted to its central basin and including the two islets. The high summer temperatures and salinities and the skimming-oscillating water flow should select genotypes particularly well adapted to ecological factors typical of a sea situated much more South. Similar conditions dominate in the Gulf of Gabes and both biotopes might be a source of rapid biogeographic differentiation.

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