GENETIC DIFFERENTIATION AND SPECIATION IN THE GREEK ARCHIPELAGO : THE GENUS ALBINARIA

A. AYOUTANTI°, S. TSAKAS°, C.B. KRIMBAS° and M. MYLONAS°°

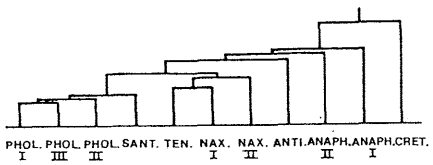
° Department of Genetics, Agricultural College of Athens, Iera Odos 75, Athens (Greece)

°° Department of Ecology and Systematics, Biology, The University of Athens, Panepistimioupolis-Kouponia, Athens (Greece)

The Aegean sea is full of islands forming an archipelago. This archipelago seem to be an ideal place for the study of genetic differentiation and speciation taking place because of geographical isolation imposed by the sea barriers between different islands. This holds true for those species that practically do not migrate. In this respect the ancienty of the islands is also relevant: They have been formed by the sinking and subsequent submersion by sea of a land mass occupying the Aegean, a process that started at the Miocene. The geologic history is however much more complicated: islands have been separated at different times, they split apart and have been again reunited either because of tectonic movements or by changes of sea level during glaciations. A detailed study of the genetic differentiation of populations belonging to the same species or genus could eventually shed also some light to the history of these geological processes. We have selected for study a land mollusc, the genus Albinaria, which according to taxonomists, displays several species and subspecies in the Aegean and the lands surrounding it. The positions of the eleven populations studied are indicated in the map.

1 Tenos (Albinaria coerulea coerulea), 2 Naxos (I:A.c.milleri, II:A.c.c.) 3 Antiparos (A.c.antiparea), 4 Pholegandros (I:A.c.Altecostata, II: A.c.milleri, III:A.c.c.), 5 Santorini (A.c.? or brevicollis?), 6 Anaphi (I:A.brevicollis contraria, II:A.b.anaphiensis), 7 Crete, Vamos (A.distans?).

Individuals from these populations have been studied electrophoretically for allozymes at a number of loci, 27 in total (Adh, Idh, Mdh-1,-2, Odh, Bdh-1,-2, a-Gpdh, Lap, Got-1,-2, Phi-1,-2, 6-Pgdh, Est-1,-2,-3, Pgm-1,-2, AK, Pept-1,-2,-3,-4,-5, Diaph-1,-2). The genetic distances between populations have been calculated and from their matrix a phylogenetic tree was constructed.



There is a high positive correlation between genetic distance and geographic distance. For all pairs of populations studied the correlation coefficient is r=0.78±0.08. This high correlation is produced mainly by the inclusion of Crete. When Crete is excluded it drops to 0.49±0.18. In the phylogenetic tree all populations from Cyclades are grouped together, the Anaphi and Cretan ones diverging from them. Populations described as different subspecies and residing in the same island do not differ genetically in the case of Naxos and Pholegandros, but they do so in Anaphi. Santorini seem to harbor a population similar to Pholegandros and that it should be included within the coerulea group. This species seem to occupy an area limited by the 200m isobath containing all the Cyclades islands studied except for Anaphi. The population from Crete is quite different from the others and this is not a surprise since Crete was separated from the other islands at an earlier time.

There is a good correspondance between genetic data and geographic and geological data. On the contrary morphology is not a good indicator of phylogeny; these characters probably have been subject to selection and similarities displayed reflect ecological similarities rather than phylogenetic affinities.