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PRELIMINARY ZOOGEOGRAPHICAL ANALYSIS OF CRETE

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The island of Crete is situated in the southern part of the Aegean Sea. It is the largest island of Greece and one of the largest in the Mediterranean with an area of 8250 km. The history of the island dates from the Meiocene. According to palaeogeographers (CREUTZBURG, 1963), during the Meiocene, it was part of a land mass called Aegaeis that included the present day greek mainland, the Aegean Sea and Asia Minor. Slowly, the sea entered the Aegaeis from the canal between Crete and the Peloponnese and eventually separated Crete from the other Aegean islands. When the sea reached its highest level during the Pleiocene, Crete was broken into several smaller islands. Finally, the sea level fell and Crete acquired its present form.

Being a large island, Crete has a wide variety of biotopes and also a long history of human influence dating from the neolithic period. At the same time, it is well known for its richness in endemic plant and animal species. Therefore, it is expected that the present fauna must be differentiated within the island showing patches that either relate to its geological history or correspond to different biotopes or intensity of human activities.

The endemic species of Crete were chosen to study this differentiation because they show with greater clarity possible differences within a reduced area such as Crete. The total number of endemic species is unknown but it must be of the order of 1000. The available post-war literature was scanned and 224 taxa were recorded most of them belonging to the phylum Mollusca (61) and to the order Coleoptera (64).

Crete was divided into 36 rectangles of 18×22 km size corresponding to the rectangles provided by the National Statistical Service on its maps. The endemic taxa of each rectangle were noted. Species that belonged to rectangles with less than half of land were lumped together with the taxa of the adjacent inland rectangle.

Various indices of similarity were used provided by the SPSSX statistical package of the University of Crete Computing Centre. The most reasonable results were obtained by the Jaccard index of similarity. Consequently, cluster analysis with UPGMA was carried out in order to group the areas.

The rectangles proved an unsatisfactory means to explain the results. Therefore, they were rounded using the nearest contour, taking care to include all the localities of the original rectangle.

The dendrogram that resulted from clustering was cut in three positions, one giving 10 regions, a second giving 16 regions and a third giving 19 regions (fig. 1). From the maps, it is evident that Crete is first divided into two large parts, a western and an eastern part with several smaller parts that include the islets

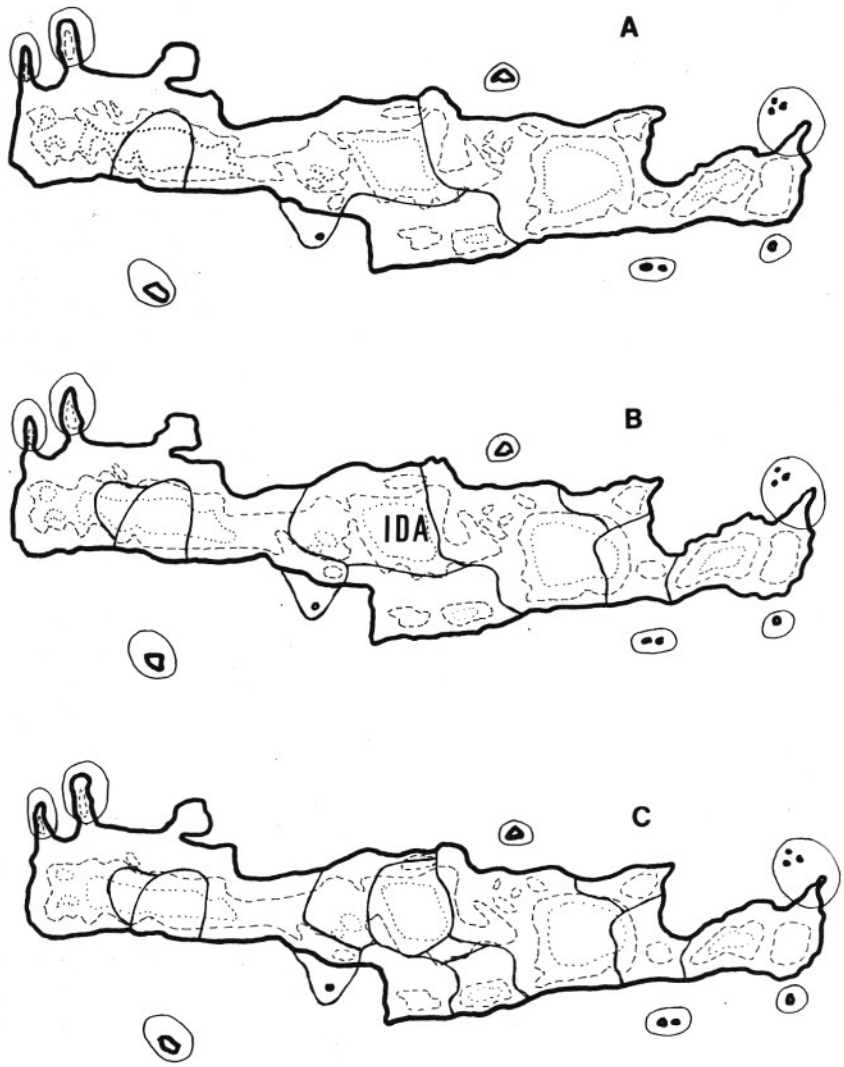

Fig. 1. Divisions of Crete at three levels (A, B, C) according to the dendrogram produced by the cluster analysis. Broken line: 400m. counter; dotted line: 800m contour.

surrounding Crete and its peninsulas. The limit between the two parts seems to be the eastern slopes of Mount Ida.

The second division separates the mountainous area of Ida, the plateau of Omalos in the west and the easternmost mountains near Sitia. A further division separates the lower slopes of Mt. Ida from the higher altitudes and the lower slopes of Mt. Asteroussia and the plain of Messara from the higher altitudes.

Comparing the results with the form that Crete might have had during the Pleiocene (Dermitzakis pers. comm.), there is a very high degree of similarity that is more evident in the mountains of Sitia, Ida, Asteroussia, Kedros and Lefka Ori, in the peninsulas of Grambousa, Rodopos and Sidero and in the islands surrounding Crete. The same similarity cannot be found comparing the results with the bioclimatic divisions of Crete.

It can be expected that the number of endemic taxa in each region is related to its area. To test this, Crete was divided into three regions*. The resulting relation was not satisfactory. For example, western Crete has more endemic taxa than central Crete although its area is smaller. The same is evident from data on the distribution of plants (GREUTER, 1971). If the theory that Crete was slowly separated from the adjacent land masses from west to east, it is expected that the number of endemic taxa would decrease from west to east. The relation between number of endemic taxa and distance from the last eastern connection of Crete, the island of Kasos, proved more satisfactory (fig. 2). An even better correlation was obtained if the distance were calculated from the top of the highest mountain of the region instead of the geometric centre.

The results suggest that the distribution of the endemic taxa of Crete is mostly due to the palaeogeographic history of the island especially during the Pleiocene and that the western part of the island was probably separated earlier than the eastern part.

The role of the ecological factors in the distribution of plants and animals in Crete is not clear from these facts. A study of the distribution of plants, for which exist extensive data, will reveal their importance.

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* Corresponding to the three main mountainous areas of Crete.

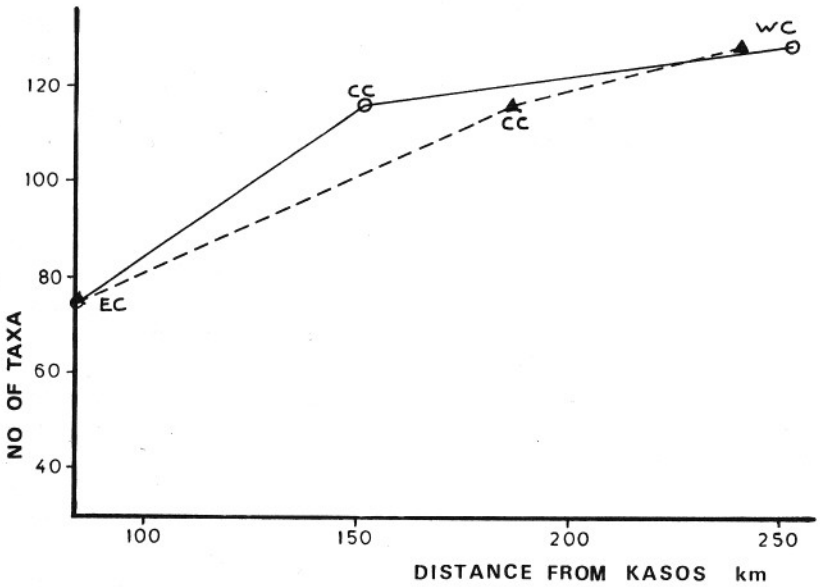

Fig. 2. Relation between number of endemic taxa of Crete and the distance from Kasos. Continuous line: distance from the geographical center, dotted line: distance from the highest peak. EC: eastern Crete, CC: central Crete, WC: western Crete.

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