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Transplant experiments to examine the habitat exclusivity of lichen dominated soil crust communities in the El Cautivo badlands, SE Spain

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Successive episodes of erosion into late Miocene marls have produced the complex, deeply incised topography of the El Cautivo badlands in Almería, SE Spain. Phanerogamic vegetation is sparse in this extreme semi-arid environment and biological soil crusts constitute the predominant cover on all surfaces except those with active erosion. The soil crusts comprise a diverse range of lichen-dominated communities, which previous work (Bevan, 2008) has indicated can be separated into four main types, each characterised by one or a small number of lichen species. Distribution patterns of these main crust types appear to reflect (micro)topographic and microclimatic variability at the site with each community type occupying a specific habitat.

The main crust types are identified as BC, a brown crust typically containing Endocarpon pusillum, Collema spp, Fulgensia spp and Placynthium nigrum, and DC, SC, LC, three white crusts characterised respectively by Diploschistes diacapsis, Squamarina lentigera and Lepraria crassissima. Previous work at the site (Bevan, 2008) has revealed associations between the distribution of these four crust types and a number of microclimatic variables, in particular insolation and temperature. BC tends to occur in the most exposed parts of the site where insolation and surface temperatures reach their highest levels and humidity and soil moisture tends to be low. LC appears more restricted to shaded sites with lower insolation and temperature and higher humidity and soil moisture. DC and SC occupy intermediate ranges of these variables.

In order to test the degree to which the apparent habitat preferences of the crust types are obligatory or preferential a series of transplant experiments were devised. Replicate samples representative of each of the four crust types were reciprocally transplanted into areas dominated by each of the other types and also into an area previously eroded and bare. Each location had the following groups of plots: a) control not touched x3 replicates b) host crust / lichen species replanted to the same site x3 replicates c) reciprocal transplants x3 replicates each. This resulted in a total of 18 plots in each site. The transplants were monitored at regular intervals over a period of 5 years to assess the degree to which they flourished, remained unchanged or died/disappeared.

Key findings are that BC is the most able to colonize bare areas, while L. crassissima has the narrowest habit preference being the species least able to colonize out of its preferred habitat. D. diacapsis and L. lentigera have intermediate success colonising locations outside their preferred locations. However they only reach significant abundance when optimally located according to their ecophysiological requirements. The results support the successional sequence proposed for the Tabernas Desert by Lazaro (2008).