Supplementary Figures for Birand et al. “Patterns of species ranges, speciation, and extinction”
Figure 1: Boxplots of landscape features when the landscapes are created with different fractal dimensions $H = 0.1, 0.9$ and when the resources are distributed randomly. 

a. Number of clusters of patches in the landscapes. A cluster is defined as a group of patches that have the same resource.

b. The percentage of patches in the landscape that are ‘edges’, which means that there is a patch with a different resource in one of their eight neighboring patches. High values mean that the landscape is fragmented.

c. Simpson’s evenness index for cluster sizes, a higher value means that the clusters are more similar in size. Landscapes created with different values of $H$ differ significantly from each other, and from landscapes when the resources distributed randomly.

On each box, the central mark is the median, the edges of the box are the 25th and 75th percentiles, the whiskers extend to the most extreme data points not considered outliers, and outliers are plotted individually.
Figure 2: Total resource utilization efficiency $E$ of species with different niche widths vs. trade-off coefficient $\beta$ (Eq. 3 and 4) assuming that they are exposed to all four resources in their roaming ranges and spend equal time utilizing them. Note the assumption of equal representation of resources within the roaming ranges and having equal preferences for all four resources is an oversimplified scenario. It is not possible to calculate species advantages with different niche widths a priori since the individuals’ resource utilization efficiencies depend on the resources that are present in the roaming ranges and its preferences for those resources.
Figure 3: Relative range sizes of the species in the simulations of Fig. 2 scaled over the entire landscape vs. time (×1,000 generations) The colors correspond to the same species in Fig. 2. Note that some of the species do go extinct before the simulation ends at 200,000 generations, e.g. in simulation d, the two specialists (red and orange) with very small ranges existed more than 150,000 generations, but later went extinct.
Figure 4: The average values of ecological traits $x$ vs. preference traits $y$ of all the populations that are given in the simulations of Fig. 2. Each circle represents the average trait value of the population in a patch rather than individuals due to high population sizes, which potentially exaggerates the average values. Note that since only the relative values of preference traits are important (Eq. 1), the absolute values of $y$ do not always reach high values.
Figure 5: The average mating traits in the populations given in Fig. 2. First column: $c$ female choosiness vs. $m$ male display trait in the entire population across the landscape. Second column: $m$ male display trait and $f$ the male trait value females prefers the most in each ecological species (numbered 1 through 15). The graph boundaries are $[0, 1]$, the minimum and maximum values of each trait. The intensity of the black color is proportional to the frequency of the individuals with corresponding trait values. There are three mating groups (or sexual species) within each ecological species in a, b, c. Females show negative assortative mating in a, positive assortative mating in b and c. d. The two ecological species also diverge in their mating traits, one show positive assortative mating, whereas the other show negative assortative mating.
Figure 6: The distribution of the time to ecological speciation during the first 20,000 generations. Majority of speciation events occurred within the first 1,000 generations (1841 out of 2573 cases). There were only 81 cases when there was a speciation event occurring after 20,000 generations.

Figure 7: The distribution of the time to evolution of mating trait divergence (×1,000 generations, note the scale difference with Supplementary Fig. 6.)
Figure 8: Boxplots of duration of common (species with ranges > 200 patches) and rare species (species with ranges < 200 patches). On each box, the central mark is the median, the edges of the box are the 25th and 75th percentiles, the whiskers extend to the most extreme data points not considered outliers, and outliers are plotted individually.
Figure 9: The distribution of the total number of species that emerge during the simulations with different dispersal ranges ($D$), trade-off coefficients ($\beta$) when the fractal landscape dimensions is $H = 0.1$. 
Figure 10: Same as in Supplementary Fig. 9 but the fractal landscape dimensions is $H = 0.9$. 
Figure 11: a. A sample landscape created when the resources are distributed randomly. Four different resources are shown in different shades of gray, and b. the two-resource generalists that evolved on that landscape. This is a typical result of all 90 simulations that was initiated with all the parameter combinations of $\beta$ and $D$. All, but one simulation resulted in a single species during entire duration of the simulations for 200,000 generations irrespective of the values of $\beta$ and $D$. 