



The Quick-Change Artistry of Darwin's Finches

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For many years two Chinese restaurants in my neighborhood existed side by side, with virtually identical menus. I was certain this competition couldn't go on forever, and recently one restaurant has morphed into a Starbucks.

This scenario is a common occurrence in the business world and it also illustrates an important principle of evolutionary biology, i.e., no two species can occupy the same niche at the same time. Here, niche, refers to everything the organisms do, especially the foods they eat. Two species living in the same place and eating the same foods cannot co-exist for long. Eventually, when resources become scarce, one species will outcompete the other and the loser will die off or leave the area. It may also undergo a change in resource-exploiting traits, such as jaws and beaks.

This competition-driven change is known as *character displacement*. Character displacement is an important phenomenon because it often leads to divergence of closely related species, and under certain conditions it leads to the formation of new species; however, no one has seen it occur in nature—that is until now.

The husband-and-wife team of Peter and B. Rosemary Grant, Princeton University, NJ, has been studying Darwin's finches for over 30 years. Each year they spend several months on a tiny Galápagos island, Daphne major, netting, banding, counting, measuring and observing all the finches on the island. In the July 16, 2006 issue of *Science* the Grants describe a clear example of character displacement in the Galápagos finches.



For many years the medium ground finch (*Geospiza fortis*) had the island pretty much to itself. With no competition from other finches, the birds fed on small seeds that are easier to crack open than the larger and abundant seed pods of the Jamaican feverplant (*Tribulus cistoides*). But a severe drought in 1977 wiped out most of the plants that produce the small seeds and only those finches able to handle the larger, tougher-to-crack seed pods survived. The net result was that in just a few generations medium ground finch beaks increased in size by an average of 4%. These bigger-beaked birds were able to open the fever plant seeds pods, but not as efficiently as the large ground finch (*G. magnirostris*), which can do it three times faster by virtue of its comparatively massive beak.

In 1982 the large ground finch established a breeding population on Daphne major. Nevertheless, all continued to go well for the medium ground finch because lots of food was available. Then in 2004 another drought resulted in stiff competition for feverplant seeds, and the medium ground finch was bound to lose. The food



supply was quickly depleted and both finch species suffered massive die-offs. However, the losses were greatest among those medium ground finches with the largest beaks. Only 13% survived.

This strong selection pressure caused the medium ground finch to return to its smaller-beaked form. In just two years their beaks decreased by 5% in length and 9% in depth, a dramatic example of character displacement. The Grants had predicted that once the large ground finch arrived, competition would force the medium ground finch back to its smaller-beaked form. They were, however, surprised by the rapidity with which it occurred.

In contrast, my Chinese restaurant lasted for about ten years before closing.

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