

Galapagos Finches Sing Different Mating Songs Due To Evolutionary Diversification Of Beaks, Says Umass Biologist

ScienceDaily (Jan. 16, 2001) — Amherst, MA -- An evolutionary biologist at the University of Massachusetts has presented new evidence that the different courting songs sung by the famous Darwin's finches of the Galapagos Islands, Ecuador, may be shaped by the evolutionary diversification of their beaks. Jeffrey Podos details his findings in the Jan. 11 issue of the journal *Nature*. A portion of the research was conducted during his postdoctoral work at the University of Arizona, and the work was funded by the University of Arizona and the National Science Foundation.

Darwin's finches are a textbook example of what scientists call "adaptive radiation," in which a group of closely related species diversifies to exploit a wide range of habitats, Podos says. "As ancestral populations of Darwin's finches occupied different islands, their beaks evolved, through natural selection, to best take advantage of available food sources. These food sources are diverse across the Galapagos Archipelago, and the finches have evolved an impressive array of beaks." Finches that live in the Galapagos lowlands, for example, have evolved large beaks, which are useful in cracking open the hard seeds that make up their diet. By contrast, smaller finches living in forested areas have evolved thin, agile beaks that enable them to probe for insects.

Podos has focused his research on bioacoustics and the evolution of vocal behavior in songbirds. He became interested in the songs of Darwin's finches during earlier research on songbirds and how they produce sound. Recent studies have revealed that the trachea and beak play a significant role in sound production, specifically in filtering out harmonic impurities of sounds produced by the syrinx, songbirds' primary vocal organ. Songbirds use body movements, including beak opening and closing, to track changes in note frequency, much as a trombone player does when sliding along different horn lengths.

In this most recent study, Podos hypothesized that variation in beaks among Darwin's finches would shape their ability to sing: "Birds with large beaks are in essence playing cumbersome musical instruments, while birds with smaller beaks, by comparison, should be more proficient as musicians," Podos says. This prediction was borne out in the data: birds with smaller beaks sing quicker songs, with a wider range of tones.

In addition to providing insights into vocal mechanics, this finding has implications for speciation - the evolutionary process by which one species splits into two or more distinct species. "As finch populations adapt to different environments, songs should evolve in step with beak evolution," says Podos. Because songs are used by females in choosing mates, the diversification of these mating signals may promote speciation.

Charles Darwin explored the animals and plants of the Galapagos Islands in the 1830s, and based on his observations, was the first scientist to suggest that species evolve and diversify from common ancestors. The Galapagos finches have since remained a renowned study system, providing insights into diverse evolutionary phenomena such as natural selection and speciation.