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DuQuark

Charles Darwin, Will You Be My Valentine?

By Meredith Bennett

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Staff Pieces

On Wednesday, February 14th, 2018 (truly a Valentine's Day to remember), Duquesne University held its annual Darwin Day celebration. Partnered with the Audubon Society of Western Pennsylvania and the National Aviary, the event was a huge success. And how fitting that the speakers for the celebration were Rosemary and Peter Grant, the renowned power couple of evolutionary biology! It was a once in a lifetime experience to listen to the scientists talk about their extraordinary work, and besides being geniuses in the realm of biology, they were excellent orators, and were continuously entertaining.

The Grants' research focuses on the amazing variety of a group of finches that inhabit the Galapagos Islands, referred to as Darwin's Finches. Specifically, the scientists chose the small island called Daphne Major as the setting of their research because of its isolation from human invasion. They landed on the island for the first time in 1973 and would go on to devote most of their lives to the study of those remarkable birds. It turns out that Darwin's Finches are a fantastic example of evolution in real time. This is a kind of evolution that we can observe taking place within mere generations or seasons of a population. The Galapagos finches are all descendent of a common ancestor bird that lived on the South American mainland. As the finches dispersed themselves throughout the Galapagos archipelago, the environment was primed for events called adaptive radiation – the rapid diversification of organisms, usually spurred on by an abundance of resources and a dynamic environment. The Galapagos islands offered a pristine environment for evolutionary change in the finches.

According to the Grants', there is now a total of eighteen species of Darwin's Finches, but this wasn't evident when they first arrived on the tiny island of Daphne Major. Day-to-day work on the island involved measuring beak width and length, weighing the birds, and taking blood samples. Of the numerous species examined, the two most central species of finch to the Grants' research, are *Geospiza fortis* and *Geospiza scandens.* While *fortis* is a seed-specialist, *scandens* feeds on cacti on the island. The beaks of the various kinds of finches are the deciding factor for what they eat, and consequently, how well they survive and reproduce. The dynamic environment of Daphne Major allowed the finches, specifically *fortis*, to undergo natural selection over, and over again in response to environmental changes.

One of the most dramatic environmental changes to affect the finches was the El Nino event of 1982-1983. Because of the torrential rain, plants were in extreme

overabundance. As a result, the plants that produce seeds that *fortis*usually ate, were smothered by other plants. Remarkably, the average beak size of the *fortis* population decreased. The finches that were born with smaller beaks than average were better equipped to eat the seeds of the new plants. These finches survived, and produced offspring, while the finches that were not as fit, died. This is natural selection at work. The Grants described several other events like this one, and every time, the average beak size of the finches changed to make the population better fit to their environment.

In addition to these discoveries of evolution in real time, the scientists have also encountered a phenomenon that could potentially result in a new species of finch. Speciation, the creation of new species, can result from hybridization when the size between two species of finch are relatively alike. This occurred when a backcross (a hybrid resulting from a cross with an organism's parent) from Espanola mated with a *fortis* on Daphne Major. This eventually led to a relatively distinct new group of birds referred to as Big Birds. For all intents and purposes, Big Bird functions as a separate species, and is another extraordinary example of evolution observable over generations.

Not everyone wants to be an evolutionary biologist, but that doesn't matter. The Grants make their story interesting for everyone. If you enjoyed the talk and want to learn more about these famous scientists and their work on Daphne Major, *The Beak of the Finch* by Jonathon Weiner goes into detail about their discoveries. Finally, for those who are interested in studying evolutionary biology in the future, Rosemary Grant says to pay attention to the exceptions and "follow your heart". This field of science is ever-changing, and full of possibility, so let's all celebrate Charles Darwin for laying the foundation that has taken us into these exciting times.

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