

STEM Friday 2

Climate Change & Zebra Finches

After reading the article, discuss with your table groups each of the following:

- Is global warming real or a conspiracy**
- How has global warming affected animals in the past**
- What advantages could this have on offspring**

Be sure to have one person record the main points of your discussion so that you will have them when we discuss as a class!

Zebra finch call prepares their eggs for climate change

By Virginia Morell Aug. 18, 2016 , 2:45 PM

Scientists have long worried whether animals can respond to the planet's changing climate. Now, a new study reports that at least one species of songbird—and likely many more—already knows how to prep its chicks for a warming world. They do so by emitting special calls to the embryos inside their eggs, which can hear and learn external sounds. This is the first time scientists have found animals using sound to affect the growth, development, behavior, and reproductive success of their offspring, and adds to a growing body of research revealing that **birds can “doctor” their eggs.**

“The study is novel, surprising, and fascinating, and is sure to lead to much more work on parent-embryo communication,” says Robert Magrath, a behavioral ecologist at the Australian National University in Canberra who was not involved in the study. The idea that the zebra finch (*Taeniopygia guttata*) parents were “talking to their eggs” occurred to Mylene Mariette, a behavioral ecologist at Deakin University in Waurin Ponds, Australia, while recording the birds' sounds at an outdoor aviary. She noticed that sometimes when a parent was alone, it would make a rapid, high-pitched series of calls while sitting on the eggs. Mariette and her co-author, Katherine Buchanan, recorded the incubation calls of 61 female and 61 male finches inside the aviary. They found that parents of both sexes uttered these calls only during the end of the incubation period and when the maximum daily temperature rose above 26°C (78.8°F).

To find out whether the calls somehow prepared the chicks for higher temperatures, the scientists artificially incubated 166 eggs at a standard temperature of 37.7°C (99.9°F). During the last 5 days of incubation, they exposed the eggs to either recorded incubation calls or the parents' normal contact calls.

When the chicks hatched, those that had listened to the incubation calls were more vocal than the control nestlings. What's more, the chicks that had been exposed to the incubation calls **weighed less than the controls**, they report online today in *Science*. That could be an advantageous adaptation in a hot environment, the scientists argue. “With a smaller body size, they're better at losing heat,” Mariette says. She and Buchanan suggest that their lower body mass might also reduce oxidative damage, the harmful buildup of unstable molecules in proteins, fats, and DNA that can adversely affect reproduction.

They clinched their results with data on the success of the chicks: When kept in hot conditions, the lower weight chicks did indeed go on to produce more fledglings in their first breeding season than did the control birds. But the control birds were more successful in cooler conditions. And the incubation calls may have other lasting effects. For two breeding seasons, the males that heard these sounds preferred nesting boxes that were hot, whereas the control males chose cooler homes.

“It’s interesting and surprising that vocal communication at such an early stage of development could have such persistent effects,” says Renee Duckworth, an evolutionary ecologist at the University of Arizona in Tucson.

Incubation calls were first found in superb fairy wrens (*Malurus cyaneus*), another Australian songbird in a different family. Unlike the finches, the fairy wrens’ calls teach their embryos a special “password” to elicit food from their parents after hatching. Mariette and others now suspect that the calls may be widespread and used in various ways to program chicks for future challenges.

“This remarkable paper helps us understand how animals could adapt to changing climate by showing that parental care alters nestling growth,” says Sonia Kleindorfer, a behavioral ecologist at Flinders University in Adelaide, Australia, who was not involved in the study. “It also shows that ... embryos can learn much more than we ever imagined.” But Kleindorfer, who studies fairy wrens, wonders whether the calls are really sending a specific signal about the temperature, and are not just a natural response to the heat. She also wonders how often finches use the incubation calls in the wild, because fairy wrens suffer increased predation when they make these sounds.

Mariette thinks the finches’ ability to prepare their offspring for their future environment makes sense because they live in arid habitats and they breed whenever conditions are good—irrespective of the season. She adds that these finches show that some animals, at least, aren’t just sitting ducks when it comes to climate change—they may be much better able to adapt to a warming world than we thought.

Posted in: **Evolution Plants & Animals**

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Link for video:

<http://www.sciencemag.org/news/2016/08/video-zebra-finch-call-prepares-their-eggs-climate-change>