

Research trio finds bluebird mothers give sons extra dose of androgen when antagonized

February 20 2015, by Bob Yirka



This is an Eastern bluebird (*Sialia sialis*). Credit: Kitty Kono

(Phys.org)—A trio of researchers has found that western bluebird mothers add a little extra androgen to clutches of eggs during times when there is competition for nest cavities. In their paper published in the journal *Science*, University of Arizona biologists Renée Duckworth, Virginia Belloni and Samantha Anderson describe how they conducted a ten year field study of the bird species and also carried out some

experiments to learn more about induced maternal effects on the cycle of species replacement. Ben Dantzer, with the University of Michigan, offers a Perspectives piece on the work by the team in the same journal edition.

When forest fires happen in western parts of the U.S. many trees are killed but do not get burned away, providing an opportunity for insects. Woodpeckers then move into such areas to eat them and wind up creating nest cavities in the trees, which they eventually abandon. That leaves the nest cavities available for other birds to use. Quite often, mountain bluebirds move in first, because they are early migrants. But then, western bluebirds arrive and bully their way into the nest cavities, replacing the more docile species. Once established, though, less aggressive members of the western group eventually become the norm. Duckworth et al wanted to know what was the mechanism that allowed the western bluebirds to take over, so they set up a field study.

After watching the birds for many years, the team began to suspect that in areas where there was antagonism between birds of the same species, the mothers began adding more androgen to their eggs—which would of course make them both more aggressive and likely to venture into new territory, such as where recent burns had occurred. In addition to testing eggs for [androgen levels](#), the researchers modified some of the natural habitats by making more or fewer nest cavities available for the birds after a fire. They found that as the competition for such cavities increased, androgen levels in eggs rose, confirming their suspicions. The researchers are not, of course, suggesting that the bird mothers make a conscious decision to add more androgen—instead, it likely happens automatically as a reaction to certain types of stress.

In an interview on Science's weekly podcast, Duckworth noted such reactions are not restricted to [birds](#), prior studies have shown that humans, for example, while in utero can be impacted due to

environmental conditions in ways that have long term effects—thus, learning more about the process could very well lead to learning more about ourselves.

More information: Cycles of species replacement emerge from locally induced maternal effects on offspring behavior in a passerine bird, *Science* 20 February 2015: Vol. 347 no. 6224 pp. 875-877. [DOI: 10.1126/science.1260154](https://doi.org/10.1126/science.1260154)

ABSTRACT

An important question in ecology is how mechanistic processes occurring among individuals drive large-scale patterns of community formation and change. Here we show that in two species of bluebirds, cycles of replacement of one by the other emerge as an indirect consequence of maternal influence on offspring behavior in response to local resource availability. Sampling across broad temporal and spatial scales, we found that western bluebirds, the more competitive species, bias the birth order of offspring by sex in a way that influences offspring aggression and dispersal, setting the stage for rapid increases in population density that ultimately result in the replacement of their sister species. Our results provide insight into how predictable community dynamics can occur despite the contingency of local behavioral interactions.

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