

Researchers study parenting behaviors of stressed-out birds

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Tree swallows. Credit: P-G Bentz.

Imagine an environment filled with wind, storms, predators, noise, and limited food and shelter. Then imagine providing and caring for a tiny egg or peeping baby bird in those conditions. The tree swallow and most other wild birds face these stressful challenges on a day-to-day basis.

Virginia Tech biologists recently received a \$705,000 National Science Foundation grant to study how these [birds](#) respond to stress as well as the behaviors that stress produces. The question driving the research: do stressed out birds make good parents?

Fran Bonier, research scientist in biological sciences, and Ignacio Moore, associate professor of biological sciences, study stress hormones known as glucocorticoids. These hormones are present in most living organisms, including humans, and levels become elevated when a stressful life event occurs, such as danger, injury, reproduction, or parenting.

Glucocorticoids are used to provide the temporary energy boost needed to outrun a bear, dodge a falling limb, or rescue a baby from danger, Moore explained. But he and Bonier are interested in what happens when organisms sustain longer periods of elevated [glucocorticoids](#), such as when a soldier is deployed for six months in dangerous territory, or a tree swallow lives with limited resources for a long period of time.

For their experiment looking at tree swallows, Moore and Bonier partnered with Queens University in Kingston, Ontario, Canada, which operates a biological station that is home to many types of birds. The station provides boxes for the cavity-dwelling swallows to nest in, but otherwise, the birds live in a wild, natural habitat.

Bonier, stationed at Queens, takes blood samples from tree swallow mothers, which must be done within three minutes of human contact to get an accurate, base-line reading. During the next four years, she will compare the glucocorticoid levels in the birds' blood with their observable behaviors as parents. For example, at what level of stress will a bird abandon her young and focus on meeting her own needs? She will also conduct experiments in which she changes the birds' hormone levels, brood sizes, and blood parasite loads and then measures the effects on parenting behaviors.

The scientists predict that they will find one of several competing hypotheses to be true. One possible scenario is that there is no connection between glucocorticoid levels and bird parenting behaviors. In a second scenario, a mother's decision to cut and run will be based on

the offspring's age and health — if it's older and healthy, the mother will sacrifice her own needs to increase her young's chance of surviving. A last possible scenario is that the mother will choose to invest in herself when conditions worsen.

The experiments could provide groundbreaking insight into the effects of stress on organisms, as well as the evolution of biological systems. The Virginia Tech researchers share the total \$800,000 grant with Mark Haussmann, assistant professor of biology at Bucknell University, who will be measuring molecular markers of stress in the birds.

"The grant is going to dramatically change the scope of our research project, increasing our ability to answer important questions," Bonier said. Meanwhile, as part of the grant's outreach component she will offer annual public workshops on box-nesting birds in Ontario. Participants will learn how to build and maintain a nest box as well as identify nesting species.

Provided by Virginia Polytechnic Institute and State University

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