

A tool to measure stress hormone in birds -- feathers

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When faced with environmental threats like bad weather, predators or oil spills, wild birds secrete a hormone called corticosterone. Traditionally, researchers have analyzed blood samples to detect corticosterone levels in wild birds.

But recently, scientists have shown that corticosterone spikes can also be detected by analyzing bird feathers. A Tufts University study published in the May 11 online edition of [Journal of Avian Biology](#) confirmed the new technique as a useful way to determine avian [stress response](#) not only to sudden natural threats but also to human-caused activities that have a long-term impact on the environment, such as large construction projects or oil spills.

L. Michael Romero, professor of biology in the School of Arts and Sciences at Tufts, says the findings will be useful to [conservationists](#). "There is a fair bit of public interest in whether human activities create stress in wildlife," says Romero, who directed the study that was led by doctoral student Christine R. Lattin. "The idea is that we can determine whether human changes will leave a record of stress in birds' feathers."

Feathers Offer Advantages Over Blood Sampling

For researchers studying stress in birds, feathers present significant advantages over blood sampling. Scientists can obtain feather samples by collecting naturally-molted feathers from the nest without having to

handle birds.

Also, [blood samples](#) provide only a snapshot of corticosterone in the blood at the moment the blood sample is drawn. Feathers, however, reflect [hormone levels](#) during the time it takes feathers to grow, says Lattin.

"This is important in understanding the long-term impacts of [stressors](#) on animals, because [stress hormones](#) are mostly beneficial in the short term, and only become a problem when they are at high levels for a sustained period of time," Lattin says.

To test the hypothesis that corticosterone levels in birds' feathers correspond to levels in birds' tissues, the researchers collected feathers from captive European starlings and compared the feather cortisone levels of starlings with and without experimentally-elevated cortisone (via a small capsule implant) They also collected blood samples from each bird three times during the experiment: before implantation and three and five days after implantation.

The researchers analyzed the feathers in two ways. They divided one batch into subgroups that differentiated three stages of growth—before, during and after implantation.

In the second part of the study, the scientists wanted to determine if feathers from the same bird would have similar corticosterone levels. To do this, they selected two feathers from the same bird.

An analysis of the feathers yielded several findings. The nine starlings implanted with corticosterone had significantly higher levels of the hormone in their feathers during the study period than the other birds. Also, the scientists found no difference in corticosterone levels between feathers taken from the same bird, indicating a consistency in feathers

grown at the same time.

Romero and Lattin are collaborating with other researchers to see if this technique can be applied to preserved bird specimens at the Smithsonian Institute in Washington, D.C. Feathers may be a way to determine whether birds that lived in the wild decades ago lived in stressful environments.

"This opens up the possibility to use museum specimens to look at how changes in the environment may have affected the birds," says Romero.

Elevated Corticosterone is Related to Deformities in Feathers

In previous experiments, the scientists found that feathers from birds implanted with corticosterone in had lighter, weaker [feathers](#). Lattin says that the results suggest that elevated corticosterone levels could impact birds' health.

More information: [DOI: 10.1111/j.1600-048X.2010.05310.x](https://doi.org/10.1111/j.1600-048X.2010.05310.x)

Provided by Tufts University

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