

The Done-Up Bird Gets the Worm

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SCIENCE

Starling chicks apply their preening oil as a lipstick to get more food from their parents

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Spotless starling chicks use a bright yellow oil to enhance the color of their mouth, which scientists verified by rubbing a cotton swab over the area. Juan José Soler

Spotless starling chicks make quite a sight when they're hungry. Tucked inside their nest, the gray baby birds stretch their necks, stick their little faces up in the air, open their beaks wide and cry out insistently. Like many bird parents, all the adult starlings see when they look down at their chicks is a cluster of circular yellow mouths, each vying for a

larger share of food. Now scientists know the color of those mouths results from a surprising trick that helps the chicks catch their parents' attention: they make a bright yellow lipstick that shows off their immune health.

A team of ecologists in Spain found that the color of the chicks' preen oil, which they take from a gland and apply to the edges of their beaks, influences how much food their parents give them. The birds with the most intense yellow and ultraviolet-colored mouths—an indicator of good immune health—get more worms. This finding, published in a recent [study](#) in *Behavioral Ecology*, represents one of the first known examples of birds using cosmetics to communicate between parents and offspring.

“Cosmetic coloration in birds mostly has been studied and understood or interpreted as serving as a signaling function, a sexual signaling function, like something that birds would do to attract other mates,” says [Liliana D'Alba](#), an evolutionary biologist at the Naturalis Biodiversity Center who was not involved in this study. This research “provides good evidence that this can also be a very important part of the communication between parents and their offspring.”

[Juan José Soler](#), lead author of the study and evolutionary ecologist at the [Estación Experimental de Zonas Áridas](#), explains in an email that this research was actually kicked off by an accidental discovery. Birds have a specialized gland that secretes the oil they use for preening their feathers, and Soler's team suspected that the oil might also have beneficial bacteria living in it. His team had been working with spotless starlings for years, but it was only when they started collecting samples for their microbe study that they noticed the conspicuous yellow color of the chicks' preen oil. The researchers found that the bright yellow preen oil produced by baby starlings eventually pales to a light beige by adulthood. Because only chicks have this yellow oil, they wondered if the youngsters use it to catch their parents' attention.

The scientists suspected that the yellow color of the oil might be due to [carotenoid pigments](#). In addition to providing color, carotenoids also [function as antioxidants](#). Soler writes that having lots of carotenoid pigments indicates that a bird has a generally healthy immune system. Since adult birds will often [give more food](#) to their healthiest offspring when resources are limited, the researchers thought that chicks with yellower mouths might get fed more by their parents.

To test this hypothesis, the scientists monitored the 94 nest boxes at their field site in southern Spain at the beginning of the starling breeding season in March 2019. They placed video cameras inside the nest boxes to verify that nestlings actually spread their preen oil on their mouth. They then tracked how much food the parents gave the chicks. At ten days old, the researchers took color measurements of the chicks' mouth and preen oil. At 14 days, the scientists measured the carotenoid levels in the chicks' blood.

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The video recordings verified that spotless starling chicks actively collect oil from their preen gland and spread it over their body. When the researchers rubbed cotton swabs over the chicks' mouths, the cotton turned a bright yellow from the oils. The scientists also found that parents gave more food to chicks whose preen oil was warmer-colored overall and whose mouths had more yellow, orange, or red and more ultraviolet coloration—a wavelength beyond the visible spectrum for humans. Chicks with more ultraviolet preen oil also tended to have higher carotenoid levels in their blood. The oil's yellow color was not directly associated with carotenoid levels, but the researchers note that the complex associations between the various color traits made it difficult to untangle how each one related to the chicks' health.

In another part of the experiment, the researchers switched two chicks between different nests so they would be raised by different parents. At ten days old, the warm colors as well as the hue of the preen oil were more similar among biological siblings, even if they were raised by different parents, than among unrelated nestmates, which suggests that these characteristics have a genetic basis. But other color characteristics were more influenced by where the chicks grew up, so the coloration of the preen oil seems to be due to both nature and nurture.

Based on all these findings, the scientists concluded that spotless starling chicks use their preen oil to alter the coloration of their mouth, which advertises their health to their parents. The adults then feed the chicks with yellower and more ultraviolet-colored mouths more often, possibly because those chicks have the healthiest immune systems.



A spotless starling nest as seen from above, with five hungry chicks begging for food. Juan José Soler

D'Alba suspects that this use of natural cosmetics by chicks may be found in other bird species as well. "I think it might be very common, especially in those birds that have what we call altricial chicks, those chicks that when they come out of their eggs are completely naked, and they have to spend a long time in their nest," she says. "There has to be something about this individual chick that makes the parent feed them more. So I think, in any of these species where we see this case, then I think it's very likely that cosmetic coloration could be important."

More research is needed to fully understand how and why the spotless starling chicks use their preen oil as makeup. [Philipp Heeb](#), a behavioral ecologist at the Université Paul Sabatier who was not involved in this study, asks "why would the birds put coloration in the preen gland instead of placing it directly in the mouth and the gapes? You know, why would they evolve this new system?"

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Soler says that his team is excited to study these birds more so they can piece together a clearer picture of the evolutionary origin and function of this fascinating behavior.

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