Wrens teach their eggs to sing

Teaching embryos the password for food helps parents avoid having to feed imposters.

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Mothers usually set about teaching their offspring the moment they're born. But the females of one Australian bird can't wait that long.

NHPA/Photoshot

Baby fairy wrens won't get fed unless they sing the secret password they learned in the egg.

Superb fairy-wren (*Malurus cyaneus*) mothers sing to their unhatched eggs to teach the embryo inside a 'password' — a single unique note — which the nestlings must later incorporate into their begging calls if they want to get fed.

The trick allows fairy-wren parents to distinguish between their own offspring and those of the two cuckoo species that frequently invade their nests. The female birds also teach their mates the password.

Fairy-wrens were known to discriminate against cuckoo nestlings on the basis of their foreign begging calls[1], says Sonia Kleindorfer, an animal behaviourist at Flinders University in Adelaide, who led the work. But it wasn't known that wren nestlings learned the passwords before hatching.

“It has never been shown before that there is actually learning in the embryo stages,” says Kleindorfer. The finding, published today in *Current Biology*[2], has the potential to open up new lines of enquiry into prenatal learning in systems other than parasite-host relationships and in other animals — it could occur anywhere where it's a benefit, she adds.

Accidental discovery

The researchers stumbled across the embryonic learning quite by accident. They were recording inside the birds' domed nests in search of anti-predator calls when they noticed that female fairy-wrens were singing to their unhatched eggs.

Fairy wren incubation call
Colombelli-Negrel *et al.*, *Current Biology*
You may need a more recent browser or to install the latest version of the Adobe Flash Plugin.

When Kleindorfer and her team analysed recordings made over the full nesting cycle, they found that the wren nestlings in a given nest all had the same begging call, which was unique to their nest. That call contained a signature element present in the call the mothers had made while incubating the eggs, and in the call she used to solicit food from the father. When the researchers broadcast a foreign nestling call at the nests, both the female and male adult birds refused to feed the chicks.

To test if the begging call was learned or genetic, Kleindorfer swapped around eggs across 22 nests. When the swapped eggs hatched, nestlings used the call taught by their foster mother, not their biological mother.

Although cuckoo eggs get incubated alongside the wren's eggs, it seems that cuckoo embryos don't have enough time to learn the password well. The lessons begin about 10 days after the eggs are laid, giving wren embryos around 5 days to pick up the call before hatching, but cuckoo embryos, which hatch earlier and then push out any other eggs, only get about 2 days. This means that victimized parents can escape having to feed an enormous baby bird that isn't their own, and can leave to start a new nest.

Clever cuckoos

Wren's aren't perfect at spotting cuckoos, though. They can always identify one species, but catch the other only around 40% of the time[1]. Kleindorfer says there is evidence that, in the latter species, the cuckoo nestlings attempt to guess the password by trying out different calls.

Martin Stevens, a behavioural ecologist at the University of Cambridge, UK, says that the study has implications beyond birds battling cuckoos. “It opens up the possibility that adults could communicate information to their young even before they have hatched,” he

says.

Kleindorfer agrees. “There are many different scenarios where mother-to-egg communication would be useful,” she says, “for example to identify relatives or non-relatives.” It could also offer females an extra chance to favour certain cultural traits in the next generation. “It is a new perspective on the battle of the sexes,” says Kleindorfer.

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References

1. Langmore, N. E., Hunt, S. & Kilner, R. M. *Nature* **422**, 157–160 (2003).
2. Colombelli-Négrel, D. *et al*. *Curr. Biol.* http://dx.doi.org/10.1016/j.cub.2012.09.025 (2012).