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Social Transmission of a Host Defense Against Cuckoo Parasitism

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Posted on **06/10/2009 10:21:42 AM PDT** by **M203M4**

Defeating the Cuckoo

Brood parasite-host interactions show ongoing antagonistic coevolution. What mediates rapid behavioral changes that do not reflect genetic change? Davies and Welbergen show that reed warblers learn from their neighbors to behave aggressively toward models of the parasitic common cuckoo. Furthermore, reed warblers seem to be predisposed to learn to respond to cuckoos as enemies: Hosts that witnessed neighbors mobbing a harmless parrot model did not increase their aggression toward a cuckoo model. Thus, birds have templates for threats, and relevant antithreat behaviors can be turned on or off depending on social experience.

TOPICS: Culture/Society; Miscellaneous
KEYWORDS: coevolution; parasitism; phenotypicplasticity; template

Basic idea: one species of bird plants its own eggs in the nest of another bird, hoping that the adoptive-parent bird will expend the resources necessary to raise the biological parent's young, leaving the dumper bird free to spend more resources on producing more young to similarly dump on other birds. Have a bunch of kids, get others to feed them, pay their tuition, etc.

This goes on for enough generations that the erstwhile duped birds who happen to attack certain other bird species on sight (and/or reject some of the eggs in their nest) suffer less from the dumping of said bird offspring, and thus enjoy higher reproductive fitness (from being able to focus their resources only upon their own young, not the young of the freeloaders).

That much is well known already - the new parts are related to the interplay between the genes responsible for this behavior and the particular environment of an individual bird - that is to say, exactly how "plastic" a particular characteristic (phenotype) is, and the environmental/social factors influencing behavioral expression.

ABSTRACT

Coevolutionary arms races between brood parasites and hosts involve genetic adaptations and counter-adaptations. However, hosts sometimes acquire defenses too rapidly to reflect genetic change. Our field experiments show that observation of cuckoo (Cuculus canorus) mobbing by neighbors on adjacent territories induced reed warblers (Acrocephalus scirpaceus) to increase the mobbing of cuckoos but not of parrots (a harmless control) on their own territory. In contrast, observation of neighbors mobbing parrots had no effect on reed warblers' responses to either cuckoos or parrots. These results indicate that social learning provides a mechanism by which hosts rapidly increase their nest defense against brood parasites. Such enemy-specific social transmission enables hosts to track fine-scale spatiotemporal variation in parasitism and may influence the coevolutionary trajectories and population dynamics of brood parasites and hosts.

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Snippets:

Cuckoo-host interactions involve adaptations and counteradaptations in response to selection from the host and the parasite and are a model for investigating the outcome of biotic changes involving coevolution. However, host defenses can be costly. Attacking and mobbing an adult cuckoo can reduce the chance that the host nest is parasitized, but may attract nest predators or other brood parasites and can put the mobbers themselves at risk. Egg rejection may redeem a host's reproductive investment but entails a risk in that the host could reject its own eggs rather than the parasite egg. Therefore, defenses are advantageous only above a threshold level of parasitism. A host population may experience conditions on either side of this parasitism threshold because of fine-scale spatial and temporal variation in the parasitism rate. Therefore, individual hosts would maximize their fitness by adjusting their defenses according to local cuckoo activity. As predicted, the propensity to mob adult cuckoos increases with local parasitism risk, and hosts are more likely to reject eggs or desert nests if they see a cuckoo at their nest. Phenotypically flexible host behavior is thus likely to explain small-scale geographical variation in host defenses, as well as result in rapid changes in defenses at a site within seasons and between years.

Hosts of the common cuckoo (Cuculus canorus) introduced from Britain to New Zealand some 130 years ago, and isolated from that brood parasite ever since, have retained the behavior of rejecting foreign eggs but, unlike their ancestral populations in Europe, do not mob a cuckoo mount. In general, birds isolated from predators are less responsive to nest enemies but can rapidly learn to increase their response, either from their own experience of predation or by observing others mobbing an enemy. This suggests that introduced birds might have lost their response to adult cuckoos through lack of experience with parasitism rather than genetic change. In central Japan, common cuckoos began to parasitize azure-winged magpies (Cyanopica cyana) 40 years ago. Initially, magpies showed little defense, but aggression toward cuckoos and egg rejection increased more rapidly than can be explained by a change in host genotypes. Instead, it suggests that these birds learned to respond to the cuckoo and to exhibit a preexisting, but phenotypically flexible, egg rejection behavior.

...

Reed warblers distinguish cuckoos from other nest enemies and specifically adjust cuckoo mobbing to local parasitism risk. The specificity of social learning observed here provides evidence that mobbing is a phenotypically plastic trait, adaptive in the context of brood parasitism. We suggest that naive individuals may learn from bolder birds or from those who, by chance, observed a cuckoo depredate or parasitize their nest. Further experiments are needed to test whether social learning leads only to a change in the perception of parasitism risk or also may involve the refining of a template for cuckoo recognition, akin to the genetic predispositions that guide learning in other contexts.

Social learning could trigger a marked increase in host defenses; by focusing on neighbors' responses to adult cuckoos, focal pairs not only increase cuckoo mobbing as a front line of defense but are also alerted to increased vigilance and egg rejection. Therefore, our results support the hypothesis that rapid changes in host defenses may reflect social transmission of responses to adult cuckoos as nest enemies. ***Social learning has implications for the coevolutionary trajectories of brood parasites and hosts because it promotes phenotypic plasticity that can drive or impede genetic evolution****. Furthermore, by influencing how rapidly hosts lose or gain defenses, social learning may affect the population dynamics of both brood parasites and hosts.*

Subscription needed for entire article.

1 posted on **06/10/2009 10:21:43 AM PDT** by **M203M4**
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To: **M203M4**

I have long argued that brood parasitism is the perfect analogy for illegal immigration into the U.S.

2 posted on **06/10/2009 10:27:28 AM PDT** by **La Lydia** (.)
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To: **M203M4**

"cuckoo parasitism", should have come with statement clarifying for purpose of this article, its not about liberals.

3 posted on **06/10/2009 10:27:52 AM PDT** by **tm61** (somewhere in chicago, a ward is missing it's crook)
[**Post Reply** | **Private Reply** | **To 1** | **View Replies**]

To: **tm61**

Actually, it is. It perfectly describes the Liberal approach to illegal immigration and anchor babies.

4 posted on **06/10/2009 10:29:43 AM PDT** by **La Lydia** (.)
[**Post Reply** | **Private Reply** | **To 3** | **View Replies**]

To: **La Lydia**

Very similar, acting as a (disproportionate) addition to domestic brood parasitism.

For completeness of the article:

An adoptive warbler feeding the young Cuckoo left on its doorstep.

5 posted on **06/10/2009 10:44:42 AM PDT** by **M203M4** (A rainbow-excreting government-cheese-pie-eating unicorn in every pot.)
[**Post Reply** | **Private Reply** | **To 2** | **View Replies**]

To: **M203M4**

and a comparison of the eggs:

6 posted on **06/10/2009 10:48:02 AM PDT** by **M203M4** (A rainbow-excreting government-cheese-pie-eating unicorn in every pot.)
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