

Common cuckoo and warbler eggshells undergo similar levels of eggshell thinning

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As avian embryos develop, they draw needed calcium from the inner most layer of their eggshell, which in turn thins the eggshell and facilitates hatching. Yet, parasitic cuckoos, which lay their eggs in nests of other bird species (hosts), must maintain thick eggshells to avoid pecking and ejection by the sharp beaks of the foster parents. A new study in the *Journal of Zoology* shows that common cuckoo eggs undergo similar degrees of embryonic eggshell thinning as eggs of their host, thus maintaining thick-shelled eggs at all stages of development.

The article, titled "Brood parasite and host eggshells undergo similar levels of decalcification during [embryonic development](#)," is the collaboration of an international team of researchers, including Mark Hauber, Professor of Psychology, Hunter College, and Interim University Vice Provost for Research, City University of New York.

Common cuckoos are brood parasitic birds that lay their eggs in the nests of host species. Soon after hatching, the cuckoo chick evicts all other nestlings and eggs from the nest. Hosts combat this parasitism in part by puncturing and destroying cuckoo eggshells. In response, cuckoos have evolved thick-shelled eggs to protect their young. However, thicker shells require more time and energy for cuckoos to hatch than a host that lays eggs of similar size but with a thinner eggshell, the great reed warbler. Researchers therefore asked whether cuckoo eggshells might be specifically adapted to ease hatching from an initially thicker shell. They compared the thicknesses of unincubated and hatched cuckoo and warbler eggshells using scanning electron

microscopy, and found that cuckoo and warbler eggshells experience similar amounts of decalcification during embryonic development.

Principal author, Branislav Igic, Department of Biology, University of Akron (now at the Research School of Biology, Australian National University), said, "Contrary to our expectations, common cuckoo eggshells underwent similar degrees of embryonic eggshell thinning as warbler eggshells. Cuckoo eggs retained greater eggshell thicknesses than warbler eggs throughout embryonic development." Dr. Igic points out that cuckoo eggshells may still lose more tensile strength than their warbler counterparts during embryogenesis. Because the innermost layer of cuckoo eggshells is stronger than that of warbler eggshells, it is still possible that common cuckoo eggshells experience a greater reduction in overall breaking strength than warbler eggshells. However, this question requires further study.

Steve Portugal, Senior Lecturer in Animal Behavior, Royal Holloway University of London, said, "This study firmly suggests that the extra thickness of the cuckoo eggshell is related to the risk of host bird puncture, and getting the egg safely into the host nest unharmed. Interestingly, it means that the extra shell thickness and the calcium it contains is not related to the increased rate of development of the cuckoo chick, or a requirement for bigger, stronger, bones that may assist in the eviction of host eggs and chicks."

The investigators also point to the importance of comparing parasitic and non-parasitic cuckoo eggshells: Other than differences in size and eggshell thickness, little is known about how eggshells may vary among cuckoo species.

Provided by The City University of New York

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