

Long incubation times may defend birds against parasites

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Some tropical birds have longer egg incubation times than their temperate cousins, even though their habitat is teeming with egg-eating predators. The reason why has long been a mystery, but a new study from *The Auk: Ornithological Advances* applies new methods to confirm the evidence for an old hypothesis—that a longer development period leads to a stronger, more efficient immune system.

The University of Missouri-St. Louis's Robert Ricklefs first studied this relationship in the early 1990s, using data from microscopic examination of avian [blood](#) samples for the presence of [parasites](#), primarily those that cause malaria. He found that the longer a species' [incubation period](#), the lower its prevalence of parasites. However, Ricklefs remained concerned that especially low parasite loads could have been missed during microscope examination, affecting parasite prevalence estimates.

Advances in DNA sequencing offered a new solution. For their new study, Ricklefs and his colleagues collected blood samples from birds in the eastern U.S. and several Neotropical countries and checked for the presence of parasite DNA, tabulating how many individuals from various families of birds were sampled at each site and how many were infected with Haemoproteus or Plasmodium parasites. About 22% of individual birds in both temperate and tropical regions had parasite DNA in their blood. While [incubation](#) time varies little among temperate species, it does vary among tropical species, and in [tropical birds](#) parasite prevalence was significantly lower in species with longer incubation times.

These results confirm those of the old blood smear analysis. While there is still no direct evidence for the hypothesis that a longer incubation time promotes a stronger immune system, this correlation provides a strong hint that this could indeed be the solution to the mystery of why the embryos of some tropical [birds](#) take so long to develop. "My interest in blood parasites was stimulated by a former graduate student, Victor Apanius, primarily in the context of community ecology. However, I had been working on the diversification of avian life histories, particularly embryo and chick growth rates, and I couldn't help but notice a connection between the two," says Ricklefs. "I wasn't surprised that the new results confirm the old ones so well, really, because the two techniques estimate the same attribute. However, more detailed studies of the avian immune response and how variation in host defense is related to development certainly are warranted."

"This paper is a nice follow up the 1992 study that showed an inverse relationship between parasite prevalence and egg incubation period. Since that time, PCR methods have been developed that detect more infections than microscopy, and the work is important because it verifies the previous results with revised methods," according to San Francisco State University's Ravinder Sehgal, an expert on avian blood parasites who was not involved in the study. "Moreover, it renews interest in a phenomenon that has gone largely unexplored. It will be now be important to test the work in an experimental system, to study the parasitology and explore the tradeoffs between embryo growth rate and immune function."

More information: Robert E. Ricklefs et al, Duration of embryo development and the prevalence of haematozoan blood parasites in birds, *The Auk* (2018). [DOI: 10.1642/AUK-17-123.1](https://doi.org/10.1642/AUK-17-123.1)

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