Dinosaurs put all colored birds' eggs in one basket, evolutionarily speaking

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Fossil theropod dinosaur egg (front), with corvid eggs in a nest. Fossil Deinonychus and oviraptor eggs were probably similar in coloration to corvid eggs. Credit: Jasmina Wiemann/Yale University

A new study says the colors found in modern birds' eggs did not evolve

independently, as previously thought, but evolved instead from dinosaurs.

According to researchers at Yale, the American Museum of Natural History, and the University of Bonn, birds inherited their egg color from non-avian dinosaur ancestors that laid eggs in fully or partially open nests. The researchers' findings appear Oct. 31 in the online edition of the journal *Nature*.

"This completely changes our understanding of how egg colors evolved," said the study's lead author, Yale paleontologist Jasmina Wiemann. "For two centuries, ornithologists assumed that egg color appeared in modern birds' eggs multiple times, independently."

The egg colors of birds reflect characteristic preferences in nesting environments and brooding behaviors. Modern birds use only two pigments, red and blue, to create all of the various egg colors, spots, and speckles.

Wiemann and her colleagues analyzed 18 fossil dinosaur eggshell samples from around the world, using non-destructive laser microspectroscopy to test for the presence of the two eggshell pigments. They found them in eggshells belonging to Eumaniraptoran dinosaurs, which include small, carnivorous dinosaurs such as Velociraptor.

Illustration of a hatching Deinonychus chick from a blue egg with brown spots. The diversity researchers recovered for dinosaur egg colors mirrors that found for modern bird eggs. Credit: Jasmina Wiemann/Yale University

"We infer that egg color co-evolved with open nesting habits in dinosaurs," Wiemann said. "Once dinosaurs started to build open nests, exposure of the eggs to visually hunting predators and even nesting parasites favored the evolution of camouflaging egg colors, and individually recognizable patterns of spots and speckles."

An assortment of paleognath and neognath bird eggs and a fossil theropod egg (on the right). Credit: Jasmina Wiemann/Yale University

Co-author Mark Norell, the Macaulay Curator of Paleontology at the American Museum of Natural History, noted that "Colored eggs have been considered a unique bird characteristic for over a century. Like feathers and wishbones, we now know that egg color evolved in their dinosaur predecessors long before birds appeared."

More information: Dinosaur egg colour had a single evolutionary origin, *Nature* (2018). DOI: 10.1038/s41586-018-0646-5 ,

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