



Tribune photo by Terrence Antonio James

Genetic similarities between a hummingbird (foreground) and a nightjar were among surprising results in a Field Museum study.

Field Museum's genetic study rewrites family tree on birds

**By Jeremy Manier
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When a falcon swoops from the sky to seize its fleeing prey, no one would mistake the sleek predator for a gaudy parrot.

Yet the secret kinship of falcons and parrots is one of many surprises in a landmark genetic study of 169 bird species being published by Field Museum researchers.

The lovely birds we see each day may never look quite the same again.

One likely consequence of the

study in Friday's edition of the journal *Science* is a re-ordering of the field guides that many of America's 80 million bird-watchers use. Most bird guides are based on scientific classifications, which experts said the new work could change in numerous ways.

"This is the most important single paper to date on the higher-level relationships of birds," said Joel Cracraft, curator of birds at the American Museum of Natural History in New York, who was not part of the study.

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Birds are all around us, having evolved into a dazzling variety of forms in every part of the world, but the chore of mapping their family tree has long stumped scientists. Many previous studies relied on painstaking comparisons of outward characteristics and behaviors.

Genetic comparisons can tell a deeper story, so the Field Museum launched a five-year effort with seven other institutions to do an unprecedented genetic analysis using powerful computers. They discovered many cases in which seemingly similar birds were merely distant relatives, or birds long assumed to be unrelated were closely linked.

Grebes, a type of diving bird, are not related to loons, as ornithologists had long believed. Surprisingly, grebes appear closely related to flamingos.

The analysis also showed falcons are more closely related to parrots than to other hunters such as hawks and eagles. If true, the finding would mean that falcons do not even belong in the scientific order originally named for them.

"It's kind of crazy to us too," said Shannon Hackett, a lead author of the study and associate curator of birds at the Field Museum. "People have been studying birds a long time, but now we're in a time when we should question everything, because for the first time we have the tools to answer these questions."

The bird project was part of a larger, federally funded effort called Assembling the Tree of Life, which aims to trace the evolutionary origins of all living things, from marine bacteria to domesticated corn and Australian snakes.

Using birds to study evolution is nothing new—the diversity of Galapagos finches helped fuel Charles Darwin's theory of evolution. But many details of avian evolution remained a mystery, in part because the animals' light, hollow bones left few fossils.

Genetic studies can reconstruct evolutionary links by comparing small changes that have accumulated within the genes of different spe-



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Darwin's Finches are on display in the Field Museum, which has just published a genetic study of 169 bird species.

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cies. But studying birds that way posed a challenge because the major bird groups emerged in quick succession more than 65 million years ago, making all of their genetic changes harder to decipher.

The new report analyzed more than 30,000 pieces of 19 bird genes, yielding a family tree of unprecedented detail, said Scott Edwards, a bird specialist and professor of evolutionary biology at Harvard University.

"The great thing about this molecular data is that you can compare species that don't share any obvious traits," said Edwards, who was not one of the study authors.

The new lineage helps showcase how evolution works, experts said. Although falcons do not appear closely related to hawks, each species developed similarly shaped beaks and talons to hunt prey—an evolutionary process that biologists call convergence.

Working the new results into the guidebooks that birders use could take years, but many experts said some change is likely. Such books

normally take their cue from the American Ornithologists' Union, which releases an updated checklist of bird species each year.

Carla Cicero, curator of birds at the University of California-Berkeley's museum of ornithology and a member of the committee that decides on changes to the checklist, said the committee typically waits for many teams to duplicate new findings before changing its bird classifications.

Still, "there are going to be a lot of changes, I can tell you that," Cicero said.

For Hackett, who led the group along with Field Museum researcher Sushma Reddy and University of Florida zoologist Rebecca Kimball, the genetic study is the fulfillment of daydreams she had as a child while leafing through picture books of birds.

"For me this is the grown-up, scientific equivalent of looking through those picture books and speculating why those birds looked the way they did," Hackett said.

Although conclusions like the falcon-parrot link may rattle some bird specialists, Joel Greenberg, an expert bird-watcher and editor of an anthology of Chicago nature writing, said such surprises can deepen the delight of studying birds.

"This may be one more of God's little jokes," Greenberg said.

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