

# The redpoll finch saga: How two bird species just became one

July 18 2024, by Yvaine Ye

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An illustration of a common redpoll. Credit: Liz Clayton Fuller

This week, birders around the world lost one beloved feathered creature from their birding life list. Fortunately, no species went extinct. Instead, this change resolved a long-held misunderstanding about the redpoll finch.

On Thursday, the American Ornithological Society—the organization that oversees bird taxonomy—announced that the hoary redpoll finch, a small, plump bird commonly found in the Arctic, will be reclassified as the same [species](#) as the common redpoll finch, a smaller bird found in similar habitats. This announcement came as a direct result of a CU Boulder-led study which found that, despite their different looks, very few [genetic differences](#) exist between the two types of birds.

"We generally use the way organisms look to classify them as different species," said the study's senior author Scott Taylor, director of CU Boulder's Mountain Research Station and associate professor in the Department of Ecology and Evolutionary Biology.

"But variations in nature can occur for different reasons, and sometimes they are not linked to reproductive isolation. This is the case for the redpolls, where the variation is the result of a genetic quirk, which has exciting implications beyond just this group of birds."

The redpolls get their name from the bright red spot on the top of their head. While the common redpoll and hoary redpoll may look alike to laypeople, avian biologists and enthusiasts can tell them apart. Hoary redpolls are slightly larger, with smaller beaks compared to common redpolls. They are also paler, because they have more white feathers.

Both redpolls live in the Arctic and subarctic regions most of the year. In winters, they migrate slightly south to look for food. In 2013, a boom in

the redpoll populations led many of these birds to venture into rarely explored middle latitude areas, including Colorado and Utah.

"It was really exciting to see many of them come so far south," Taylor said. Birders were excited too—they got to check two species off their "life list," a running list of different species bird enthusiasts have seen over their lifetime.

Or so they thought.

## **Defining species**

Even among scientists, there is ongoing debate about what makes a species. The most common definition is that if two organisms fail to breed and produce fertile offspring, they are considered two separate species. For instance, while a horse and a donkey can mate and produce a mule, the mule itself can't reproduce. As a result, horses and donkeys are considered different species.

But not all species fit neatly into this definition. It is estimated that at least 16% of wild birds breed with other bird species. Interbreeding is particularly common when the two species' habitats overlap.

Taylor has been interested in redpolls since his time as a postdoctoral fellow at the Cornell Lab of Ornithology. Previous research on redpolls showed no significant genetic differences between common and hoary redpolls despite their distinct appearances. With better genetic sequencing technologies, Taylor and his collaborators decided to take a closer look at the birds' genomes to understand their differences.

In a study [published](#) in *Nature Communications* in 2021, the team, including Taylor and his graduate student at the time, Erik Funk, sequenced the genes of 73 redpolls from around the world.



An illustration of a hoary redpoll. Credit: Liz Clayton Fuller

They found across high latitude regions in North America, Europe and Asia, the two types of redpolls had no genetic differences except for a small section on one chromosome. This segment contains genes coded for beak size and plumage color.

In hoary redpoll chromosomes, the genes in this section are arranged in the opposite order compared to those in common redpolls. This inversion is responsible for their different appearances, Taylor said

Usually, [genetic material](#) between parents mixes and reshuffles to produce offspring gene combinations through a process called DNA recombination. However, genes in the redpolls' inverted segment, which the team call a "supergene," are packed together tightly and don't undergo recombination.

The supergene is passed down through generations as a unit. Birds that inherit the supergene look like hoary redpolls, while those that don't look like common redpolls. The rest of the genome moves freely between the two types of birds. As a result, these birds belong to the same species, the team concluded.

The finding explained why redpolls that live close together are genetically more similar regardless of what they look like.

"For example, a common redpoll from Russia and one from the U.S. are more genetically different than a common redpoll and a hoary redpoll from the U.S.," Taylor said.

"This finding in redpolls helps us build a better understanding of the kinds of differences that genetic changes like inversions might be responsible for," said Funk, who is now a postdoctoral associate at the San Diego Zoo Wildlife Alliance. "By adjusting the classification of these birds, their names better reflect what we know about their natural and evolutionary histories."

## Species reshuffling

Redpolls, because of their vibrant colors and special habitats, fascinate

birders. The Thursday announcement may be a disappointment for some, who enjoy adding new species to their lists.

"It's exciting to record different species, but in this case, it's even more fascinating that these birds have a supergene that maintains their different appearances while still belonging to the same species," Taylor said.

He added that as scientists continue studying birds, especially in previously overlooked regions like the tropics, they may find that more birds belong to the same species. But at the same time, they are also discovering new species.

In 2022, Taylor's student at CU Boulder revealed that the Chihuahuan Meadowlark, a bright yellow bird commonly found in the U.S. Southwest, should be classified as its own species. Their work not only added a new species to birdwatchers' lists but also made the meadowlark eligible for protection under the U.S. Endangered Species Act.

Additional co-authors of the study included Nicholas Mason of Louisiana State University, Snæbjörn Pálsson of the University of Iceland, Tomáš Albrecht of the Czech Academy of Sciences and Jeff Johnson of the Wolf Creek Operating Foundation in Wolf, Wyoming.

Provided by University of Colorado at Boulder

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