

# Common arctic finches are all the same species

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A Redpoll with a white body and bright red patch on its head sits on a branch while snow falls. Credit: Pexels / Erik Karits

For birders struggling to figure out what kind of Redpoll they're watching, new research from the University of Colorado Boulder says don't worry—the different species are actually all one and the same.

This new research, out recently in *Nature Communications*, finds that

Redpolls, a bird found in the Arctic that will sometimes come to the Southern latitudes during the winter and can be hard to differentiate, aren't actually multiple species, genetically speaking. Instead, the three recognized species are all just one with a "supergene" that controls differences in plumage color and morphology, making them look different.

This research builds on findings from 2015 suggesting this might be the case but without having a clear idea as to why. This time, with greater genetic technological capability, the researchers looked at the full genome of the different species and found that what commonly signifies different subspecies in [birds](#) doesn't apply to Redpolls.

"I think, solidly now, the new paper shows that there is widespread gene flow across the (Redpoll's) genome, except for this one region, and it just so happens this one region influences the way they look," said Scott Taylor, assistant professor in the Department of Ecology and Evolutionary Biology, director of CU Boulder's Mountain Research Station and author on the paper.

Redpolls are a type of "winter finch," or a finch that lives in the northernmost reaches of the globe and fly south only sporadically. While known for their characteristic red marking on their heads, appearance within the species can vary widely, with some Redpolls being white with small bills and others with larger and darker bills. Initially, it was thought that these differences signified three different species of the bird—like is the case with many other [bird species](#)—but those "species" can be difficult to differentiate.

"Redpolls have been taxonomically confusing for a long time, and we only get to see them every once in a while in the winter," Taylor explained. "They aren't a bird you're guaranteed to see at your feeder, so when it happens, people get excited, and they want to know what they're

looking at."

In 2015, however, then-postdoc Taylor and graduate student Nicholas A. Mason, now an assistant professor at Louisiana State University, found preliminary genetic data suggesting they aren't different species. Instead, they are all the same species, just with different appearances—but the researchers weren't quite sure why.

These new findings picked up where that previous research left off, with Erik Funk, graduate student at CU Boulder and the lead author of the paper, going back and re-examining the original samples and adding a few more from other areas, including Greenland, Iceland and parts of Europe, to get a more complete picture.

Altogether, Funk examined the full genome of 73 individuals from all the different subtypes, including the Common Redpoll, the Hoary Redpoll and the Lesser Redpoll.

What he found is that, despite the differences in appearance, the birds are almost identical genetically but with a "supergene" that controls the different traits that make the birds appear different. In particular, the researchers found a chromosomal inversion, or when part of the chromosome is flipped, for one of the chromosomes, that allowed this supergene to get created.

"Often times we assume that a lot of traits can act independently, meaning that different traits can be inherited separately from one another, but this particular result shows that sometimes these traits are actually tightly linked together. ... At least for these birds, they're inheriting a whole group of traits together as one," said Funk.

And redpolls aren't alone with these supergenes. Many species, from other birds to certain types of mice, are now known to have these

supergenes.

"It seems to be less common, but I think one of the things that we are learning as we have access to more sequence data now is that maybe they're not as uncommon as we once thought," Funk said.

While the researchers now have an answer about why this [species'](#) appearance varies, questions still remain as to how. So, how are these traits maintained? And how will that change with the arctic warming for these arctic specialists? Both questions the researchers hope to dig into next.

"Sometimes birders get mad if you take birds off their list, but I think it makes the Redpolls even more interesting," Taylor said. "Understanding the genetic basis of the trait makes it make much more sense now, which I think is pretty cool."

**More information:** Erik R. Funk et al, A supergene underlies linked variation in color and morphology in a Holarctic songbird, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-27173-z](https://doi.org/10.1038/s41467-021-27173-z)

Provided by University of Colorado at Boulder

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