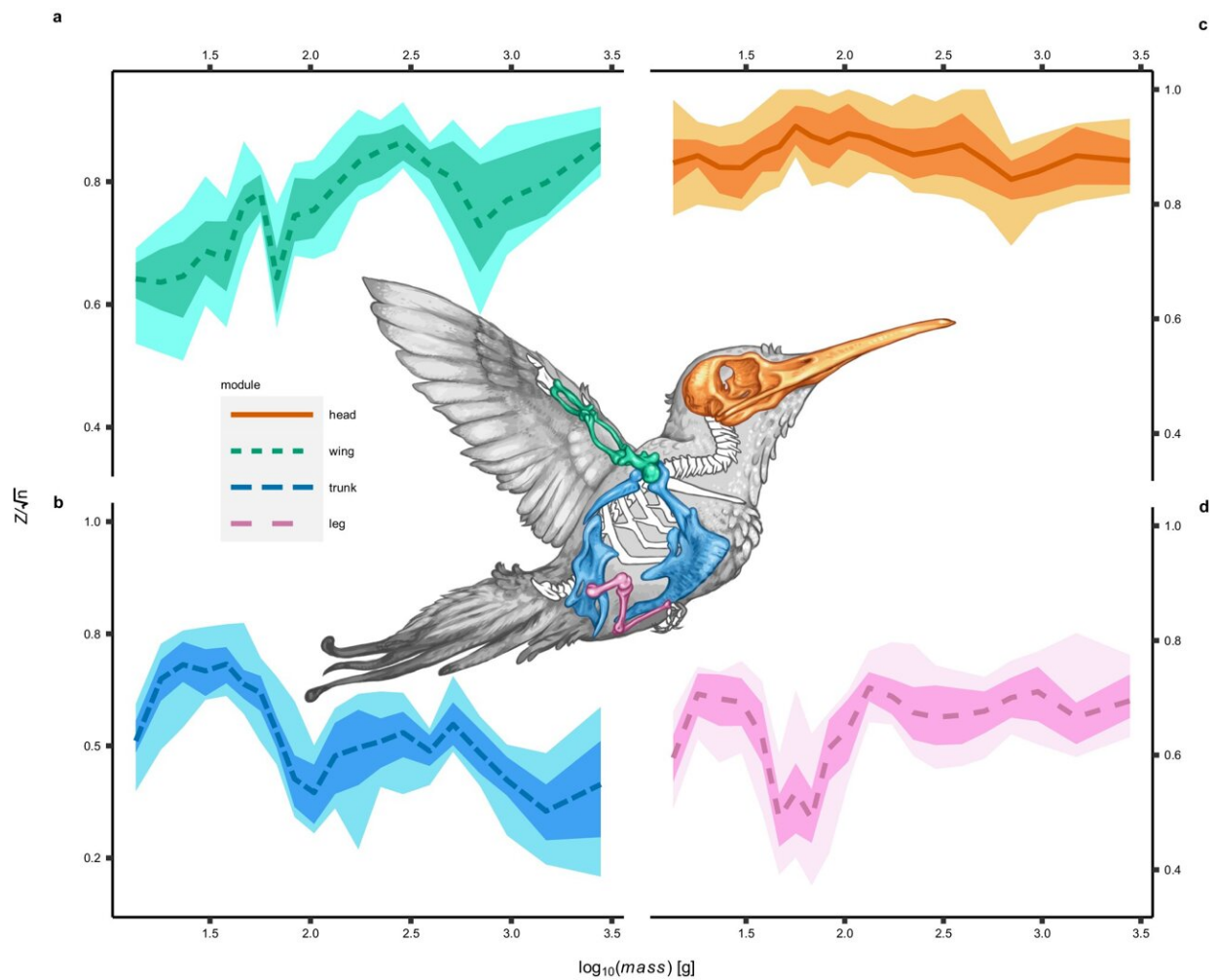


Small birds boast range of flight styles thanks to evolutionary edge

May 28 2024



Reorganization of modular integration with varying body mass. Credit: *Nature*

Small birds have explored a wide variety of styles of flight, ranging from hovering hummingbirds to bounding sparrows to soaring swifts and swallows. A new Cornell University [study](#) could explain why.

Load-bearing bones within the wings of smaller birds may evolve more freely than they do in larger birds, since larger birds have to resist higher levels of stress on their skeletons, the researchers found.

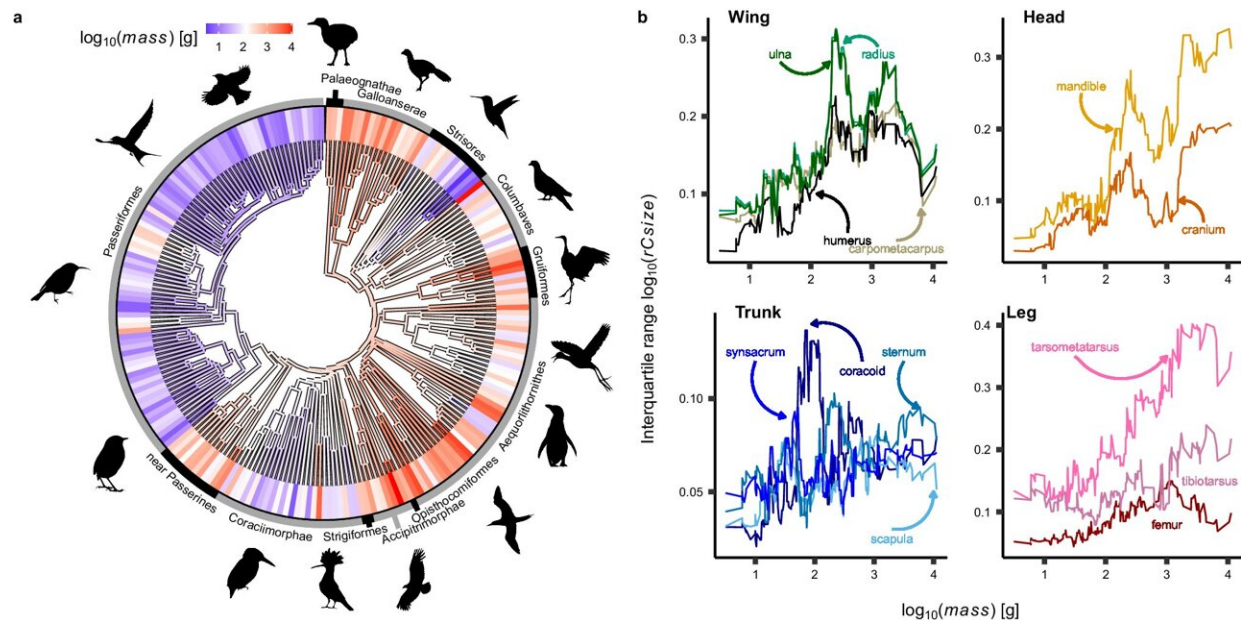
"The evolution of [wing](#) proportions is more tightly restricted in large birds, which operate under greater mechanical stresses," said Andrew Orkney, lead author and a postdoctoral researcher in the lab of co-author Brandon Hedrick, assistant professor of biomedical sciences.

Their study, [published](#) in *Nature Communications*, has potential implications for biological understanding of animal evolution beyond birds.

"We found that larger birds have to change different skeletal components of their wings at the same time rather than being able to evolve different parts of their wings independently," Hedrick said. "It's easier to change a small part of the wing than all of the wing. It could be that larger animals are less capable of evolving quickly and moving into new niches more generally."

Birds vary in [body mass](#) by a factor of 10,000, so they are an excellent model system to investigate this broader question in animals, the researchers said. Within birds, this may explain the special evolutionary

success of small-bodied lineages. For example, of the 11,000 total bird species, around 6,500 are songbirds, which are typically small.



Avian body mass and variance structure. Credit: *Nature Communications* (2024). DOI: 10.1038/s41467-024-48324-y

"Hummingbirds are also a very successful and small group, but nothing is as successful as songbirds within birds," Hedrick said.

The researchers used previously published, open-sourced datasets of precise measurements collected from 228 micro-CT-scanned bird skeletons. Landmarks for reference were marked on each bone. Using this archive, Orkney and Hedrick applied [statistical methods](#) to assess the degree to which different bones evolve either together or independently of one another across the avian family tree—known as their evolutionary "integration."

In future work, the researchers will investigate how changes within the thorax and abdomen interact with the wing in [small birds](#); whether integration in birds is structured differently between birds born able to fly as soon as they hatch and birds that are born helpless, and whether bats, which have evolved flight independently from birds, follow similar evolutionary rules or whether there are multiple ways to structure a flying vertebrate.

More information: Andrew Orkney et al, Small body size is associated with increased evolutionary lability of wing skeleton proportions in birds, *Nature Communications* (2024). [DOI: 10.1038/s41467-024-48324-y](#)

Provided by Cornell University

Citation: Small birds boast range of flight styles thanks to evolutionary edge (2024, May 28) retrieved 23 June 2024 from <https://phys.org/news/2024-05-small-birds-range-flight-styles.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.