

Bird louse study shows how evolution sometimes repeats itself

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Illinois Natural History Survey ornithologist Kevin Johnson and his colleagues determined the evolutionary relationships of avian feather lice. Credit: L. Brian Stauffer

Birds of a feather flock together and – according to a new analysis – so do their lice.

A study of the genetic heritage of avian feather [lice](#) indicates that their louse ancestors first colonized a particular group of birds (ducks or songbirds, for example) and then "radiated" to different habitats on those birds – to the wings or heads, for instance, where they evolved into different species. This finding surprised the researchers because wing lice from many types of birds look more similar to one another than they do to head or body lice living on the same birds.

The study appears in the journal *BMC Biology*.

Wing lice are long and narrow and insert themselves between the feather barbs of a bird's wings. This allows them to avoid being crushed or removed by a bird when it preens, said Kevin Johnson, a University of Illinois ornithologist with the state Natural History Survey. Johnson conducted the new analysis with Vincent Smith, of the Natural History Museum in London, and Illinois graduate student Scott Shreve.

"If you were just guessing at their ancestry based on external traits, you would think the wing lice on different birds were more closely related to one another than they were to head or body lice on the same bird," Johnson said. "But that's just not the case."

PARROTS

HEAD LOUSE



WING LOUSE



BODY LOUSE



The lice that live on parrots look very different from one another, but they are more closely related to one another than to similar-looking lice on other types of birds. Credit: Vincent Smith, The Natural History Museum, London

Each type of louse is adapted to life on a particular part of the body. Head lice are rounder than wing lice, for example, and have triangular, grooved heads. The groove helps them cling to a single feather barb so their bird host can't scratch them off.

Body lice are plump and will burrow into the downy feathers or drop from feather to feather to avoid being preened. And the lice known as generalists, which range all over the bird, have their own method of escaping preening: They run.

"The similarities between the lice living in specific habitats on the bodies of [birds](#) are really striking," Johnson said. "But it appears that those similarities are the result of what we call 'convergent evolution': The lice independently arrived at the same, or similar, solutions to common ecological problems. This occurred only after they had colonized a particular type of bird."

In the new analysis, Johnson and his colleagues drew up two family trees of feather lice. The first tree grouped the lice according to physical traits; the second mapped their genetic relationships.

The two trees looked significantly different from one another, Johnson said. The genetic tree showed that different types of feather lice living on the same type of bird were often closely related, whereas lice that had evolved to survive on specific bird parts, such as the wing, were only

distantly related across bird groups, he said.

The history of feather lice turns out to be a very robust example of convergent evolution, Johnson said.

"Here we see how evolution repeats itself on different bird types," he said. "The lice are converging on similar solutions to the problem of survival in different microhabitats on the bird."

More information: The paper, "Repeated Adaptive Divergence of Microhabitat Specialization in Avian Feather Lice," is available [online](#).

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