

Head and body lice appear to be the same species, genetic study finds

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The head louse (left) and body louse (right) differ in habits, habitat and in their ability to transmit disease, but a new genetic analysis indicates they are likely the same species. Credit: Centers for Disease Control and Prevention

A new study offers compelling genetic evidence that head and body lice are the same species. The finding is of special interest because body lice can transmit deadly bacterial diseases, while head lice do not.

The study appears in the journal *Insect Molecular Biology*.

Scientists have long debated whether human head and [body lice](#) are the same or different species. The head louse (*Pediculus humanus capitis*) is a persistent nuisance, clinging to and laying its eggs in the hair, digging its mouthparts into the scalp and feeding on blood several times a day.

The [body louse](#) (*Pediculus humanus humanus*) tends to be larger than its cranial counterpart, and is a more dangerous parasite. It lays its eggs on clothing, takes bigger blood meals, and can transmit relapsing fever, trench fever and [epidemic typhus](#) to its [human host](#).

Previous studies have found that even when they are both present on the same host, head and body lice don't stray into each other's territories. They don't breed with one another in the wild, but they have been shown to successfully reproduce under specific laboratory conditions. The presence of [head lice](#) has little to do with human hygiene, but body lice seem to appear out of nowhere when hygiene suffers – in times of war or economic hardship, for example.

In the new study, researchers compared the number and sequences of all of the protein-coding genes expressed at every stage of the head and body louse life cycles.

"We were interested in understanding potentially how closely related head lice and body lice are," said University of Illinois entomology professor Barry Pittendrigh, who led the study. "Do they have the same number of genes? Do those genes look very similar or are they very different? What we found is that these two organisms are extremely similar in terms of their protein-coding genes."

The researchers also exposed the lice to a variety of environmental conditions to capture the greatest variety of gene activity.

"My colleagues at the University of Massachusetts, led by veterinary and animal sciences professor John Clark, collected lice at every developmental stage, exposed them to every pesticide they could get their hands on, multiple bacterial challenges, several physical challenges – cold, heat – to get the lice to express as many genes as possible," Pittendrigh said. Very few differences were detected in the number or

sequences of genes they expressed.

"The differences in their sequences were so minor that if we didn't know they were separate groups, we would have considered them the same species," he said.

"As body lice transmit diseases and head lice don't, this system provides a unique opportunity to understand subtle changes that allow body lice to transmit human diseases," said graduate student Brett Olds, who conducted the genetic analysis.

More information: The paper, "Comparison of the transcriptional profiles of head and body lice," is available online.

[onlinelibrary.wiley.com/doi/10 ... 83.2012.01132.x/full](https://onlinelibrary.wiley.com/doi/10.1002/ajmg.b.32132)

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