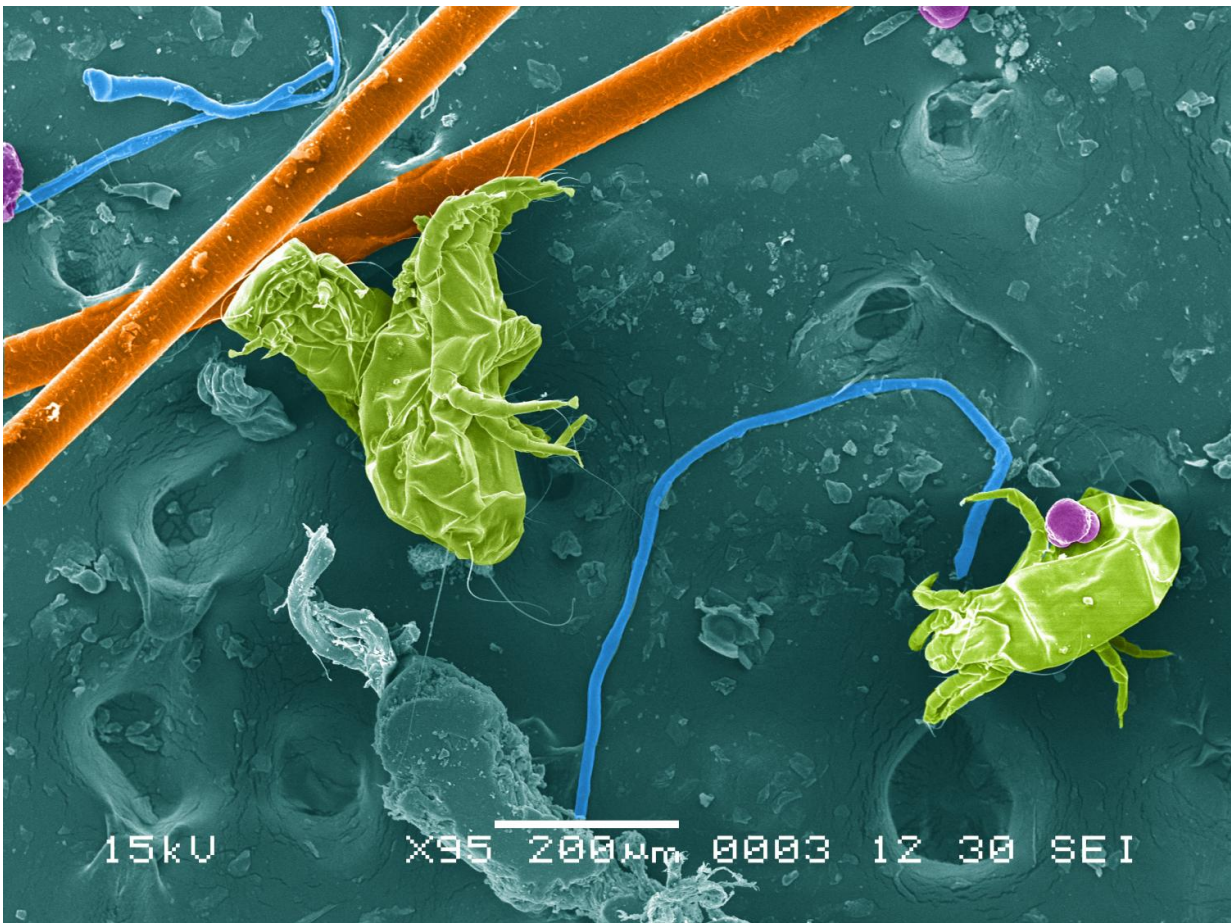


Study highlights diversity of arthropods found in US homes—from swabs of dust

November 1 2016, by Matt Shipman



Researchers used DNA testing to create an 'atlas' that shows the range and diversity of arthropods found in homes across the continental United States. This scanning electron micrograph is of a home dust sample collected as part of the project, including dust mites, animal fur, fibers, and pollen. Credit: Anne A. Madden, with the assistance from Robert McGugan at the University of Colorado, Boulder Nanomaterials Characterization Facility. False-coloring done

by Robin Hacker-Cary.

Researchers from North Carolina State University and the University of Colorado Boulder used DNA testing and citizen science to create an "atlas" that shows the range and diversity of arthropods found in homes across the continental United States.

"Previous research found a significant diversity of arthropods in homes in one part of North Carolina - we wanted to use advanced DNA sequencing-based approaches to get a snapshot of arthropod diversity in homes across the country," says Anne Madden, a postdoctoral researcher at NC State and lead author of a paper on the new work. "This work is a significant step toward understanding the ecology of our own homes, with the goal of improving our understanding of how those organisms in our homes may affect our health and quality of life."

To collect nationwide data, the researchers recruited more than 700 households across all 48 states in the continental United States. Study participants swabbed dust from the top of a doorway inside their house or apartment. The swab was then sealed and sent to the research team, which used high-throughput DNA analysis to identify every genus of arthropod DNA found in the dust samples.

"We found more than 600 genera of arthropods represented inside people's homes - not including food species, such as crabs and shrimp, which also showed up," Madden says. "That's an incredible range of diversity from just a tiny swab of house dust."

After analyzing the data, researchers identified several variables that were associated with greater arthropod diversity: having cats or dogs in the home; having a home in a rural area; or having a home with a

basement.

"Greater diversity does not necessarily mean greater abundance," Madden says. "We're talking about more types of arthropods, not necessarily larger populations of arthropods."

These findings expand on previous work that found pet ownership also increased the biodiversity of microbial organisms, such as bacteria and fungi.



Researcher Anne Madden, looking at trays of samples containing DNA samples from homes. Image Credit: Adrienne A. Madden.

"We were surprised to see that these three variables - which we have some control over - were more powerful predictors of biodiversity than climate," Madden says. "We had expected environmental factors associated with regional climate to play a larger role than they actually did."

However, the scope of the study data also allowed the researchers to create a national atlas they can use to track the range of specific arthropod genera. And, depending on the genus, climate factors were seen to play a significant role in determining the range of some arthropods.

For example, dust mites can be serious allergens in homes and the team found that they were more often associated with homes in humid regions of the country.

In addition, researchers were able to use the atlas to identify genera that had significantly expanded their range - but no one had previously noticed.

For example, the Turkestan cockroach (*Shelfordella lateralis*) was previously thought to be found only in the southern and western regions of the United States - but the data from this study showed that it had expanded as far as the Northeast.

"We're just scratching the surface of how we can use this data set and the arthropod atlas," Madden says. "What can it tell us about the food webs in our own homes? What can it tell us about how arthropod populations expand and contract across the country? What emerging allergens can it reveal? We're just getting started.

"Also, we want to stress that this was a [citizen science](#) project," Madden says. "This study would not have been possible without the participation

of people from across the country who volunteered to be actively involved in the work." [Note: anyone interested in participating in future citizen science projects with this research team can visit <http://www.yourwildlife.org/participate/>.]

The paper, "The diversity of [arthropods](#) in homes across the United States as determined by environmental DNA analyses," is published in the journal Molecular Ecology.

More information: The diversity of arthropods in homes across the United States as determined by environmental DNA analyses , [DOI: 10.1111/mec.13900](#) , onlinelibrary.wiley.com/doi/10.1111/mec.13900/full

Provided by North Carolina State University

Citation: Study highlights diversity of arthropods found in US homes—from swabs of dust (2016, November 1) retrieved 3 May 2024 from <https://phys.org/news/2016-11-highlights-diversity-arthropods-homesfrom-swabs.html>

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