Worm-like mite species discovered on Ohio State's campus

February 28 2014

These are high-resolution images of two developmental stages of a new mite species discovered on Ohio State University's campus. It is the fifth species from this worm-like family, called Nematalycidae, to be described, and only the second from North America. Credit: US Department of Agriculture

It looks like a worm and moves like a worm – sort of. But it is a previously unidentified microscopic species of mite that was discovered by a graduate student on The Ohio State University campus.

Affectionately dubbed the "Buckeye Dragon Mite" by Ohio State's Acarology Laboratory, the mite is officially named *Osperalycus tenerphagus*, Latin for "mouth purse" and "tender feeding," in a nod to its complex and highly unusual oral structure.

This mite doesn't resemble a mythological winged dragon, but the snake-like Chinese dancing dragons that appear in festivities celebrating each new year. What it does not resemble is a typical mite characterized by a large round body and tough external surface. And at 600 microns, or just over half a millimeter, the adult mite cannot be seen by the naked human eye.

"It is incredibly intricate despite being the same size as some single-cell organisms," said Samuel Bolton, the doctoral student in evolution, ecology and organismal biology at Ohio State who discovered this species. "That's the fascinating thing about mites and arthropods – mites have taken the same primitive and complex form and structure that they've inherited and shrunken everything down. So we're dealing with complexity at an incredibly small scale."

Bolton's description of Osperalycus tenerphagus is published online in the *Journal of Natural History*. It is the fifth species from this worm-like family, called Nematalycidae, to be described, and only the second from North America.

An early look at mites collected from silty clay loam soil across the street from the acarology lab suggested Bolton had found a new species. Under a compound microscope, Bolton could see that the mites he collected from a soil depth of about 20 inches had numerous straight hairs all along their bodies – technically known as setae – that didn't match the hair-like patterns on other members of this family. The hairs help these mites feel their way around.

Nematalycidae are more closely linked to sandy soils, so Bolton was surprised to find the species in a clay-like patch of earth – and he thinks digging 50 centimeters down was key to locating the mysterious creatures.

He couldn't learn all the details of his campus find until a year later, when he was able to examine the discovery in a low-temperature scanning electron microscope (LT-SEM) run by the U.S. Department of Agriculture in Maryland.

Under the LT-SEM, Bolton obtained high-resolution images of these tiny creatures and marvelled at the machinery of their mouths. Structures called rutella, which typically function in a similar way to teeth in other mites, instead support a pouch-like vessel in the front of the mouth. Bolton's theory is that the pouch acts like a nutcracker, holding microorganisms in place while internal pincers puncture the organisms and suck up their fluid contents.

Imaging mites of this size and body type require cold-temperature scanning so they aren't crushed by the intense vacuum effect of a normal electron microscope. Bolton and his co-authors froze the living mites in liquid nitrogen immediately upon collecting them, allowing for images of the mites just as they appeared in their natural habitat.

And though its movement and muscle pattern along the length of its body does resemble a worm's, the mite cannot alter its diameter in the way a worm can.

With an external surface resembling abacus beads, these mites "are like miniature accordions," Bolton said. "It's a case of convergent evolution – they have the same basic way of moving as worms, insofar as their cuticle extends and contracts, but they also have legs and, to some extent, still use them. The worm-like motion helps them move around through tight spaces."

As far as evolution goes, the Nematalycidae branch off of the tree of life from ancient groups of mites whose fossils date back 400 million years, when the environment throughout much of the world was arid.

"They're well adapted to living in extremely adverse environments – which makes them extremophiles. They're also fascinating to look at, and are interesting for addressing ecological and evolutionary questions," he said. "Because of their small size, there is very little understanding of how mites interact with their environment or other organisms."

Bolton plans to further describe this mite's complex oral structure and hopes to identify specifically what it uses for food.

Provided by The Ohio State University

Citation: Worm-like mite species discovered on Ohio State's campus (2014, February 28) retrieved 23 April 2024 from https://phys.org/news/2014-02-worm-like-mite-species-ohio-state.html