Photo F. Kohl

Is this beetle the oldest fungi cultivator in the world?

Lennart van de Peppel, who works in the Laboratory of Genetics, has received a Rubicon grant for a postdoc at the University of Freiburg. He will use DNA analyses to find out whether the ship-timber beetle is the oldest fungi cultivator on Earth.

Ambrosia beetles cultivate fungi as a source of food. The beetles mainly live in dead wood. They envelop their eggs in fungi so the fungi grow in the wood; then the beetle larvae can eat the fungi. In return, the beetles keep competing fungi at bay. Van de Peppel will be working on one beetle family that includes both fungi eaters and wood eaters: the ship-timber beetles. Not much research has been done to date on this family.
Van de Peppel has spent the past few years studying termites that cultivate fungi. The termites learned how to do this 30 million years ago. Previous research already showed that various beetle species have been cultivating fungi for 90 million years. The symbiosis between the beetle and the fungus developed independently in 12 different locations. Van de Peppel wants to find out whether the ship-timber beetle was the first to cultivate fungi.
The beetle got its name from its habit of burrowing into the wood of ships' hulls. It is found all over the world, including in the Netherlands. Van de Peppel recently caught one in Wageningen. But he is also looking for specimens in museum beetle collections. Specimens millions of years old can also be found trapped in amber; the oldest such amber beetle is 125 million years old.

'DNA from dried ship-timber beetles lets you make a family tree to show the relationships'

Organ

Van de Peppel wants to know when this beetle started cultivating fungi. To figure this out, he will map the DNA of beetles and fungi, determine the degree of kinship and draw up a DNA family tree.
He also wants to scan the ancient beetle specimens in amber to see whether they have the special organ that is used to store and transport the fungus. The female beetle uses this organ to graft the fungus onto her offspring. Beetles with this organ were probably fungi cultivators, beetles without it probably not.
Using DNA research, Van de Peppel will be able to conclude that if two sisters had a specific trait, the mother did too. 'DNA from dried ship-timber beetles in museum collections lets you make a proper family tree to show the relationships.'
But the family tree can't tell you how long ago particular branches emerged. That is where the beetles in amber come in. 'If you can place a fossil specimen in the family tree, it lets you calibrate it. The more fossils you have, the better the calibration.' AS