Researchers extract DNA from insects embedded in resin

September 29 2020

Senckenberg researcher Mónica Solórzano-Kraemer with one of the examined resin samples. Credit: Xavier Delclòs

For the first time, Senckenberg scientist Mónica Solórzano-Kraemer, together with lead authors David Peris and Kathrin Janssen of the

University of Bonn and additional colleagues from Spain and Norway, successfully extracted genetic material from insects that were embedded in six- and two-year-old resin samples. DNA—in particular, DNA from extinct animals—is an important tool in the identification of species. In the future, the researchers plan to use their new methods on older resin inclusions, as well. The study was published today in the scientific journal *PLOS ONE.*

The idea of extracting DNA from resin-embedded organisms inevitably invokes memories of the blockbuster "Jurassic Park."

"However, we have no intention of raising dinosaurs," says Dr. Mónica Solórzano-Kraemer of the Senckenberg Research Institute and Natural History Museum. "Rather, our current study is a structured attempt to determine how long the DNA of insects enclosed in resinous materials can be preserved."

To this end, lead author Dr. David Peris of the University of Bonn, the amber researcher from Frankfurt, and researchers from the Universities of Barcelona and Bergen and the Geominero Museum (IGME) in Valencia examined the genetic material of so-called ambrosia beetles that were trapped in the resin of amber trees (Hymenaea) in Madagascar. "Our study fundamentally aimed to clarify whether the DNA of insects embedded in resin continues to be preserved. Using the polymerase chain reaction (PCR) method, we were able to document that this is, indeed, the case in the six- and two-year-old resin samples we examined," explains Solórzano-Kraemer.

Resin with embedded ambrosia beetles. Credit: David Peris

To date, similar tests of inclusions in several-million-year-old amber and several-thousand-year-old copals had failed, since more recent environmental impacts had caused significant changes to the DNA of the

embedded insects or even destroyed it. Therefore, resin-embedded samples were deemed unsuitable for genetic examinations.

Solórzano-Kraemer adds, "We are now able to show for the first time that, although it is very fragile, the DNA was still preserved in our samples. This leads to the conclusion that it is possible to study the genomics of organisms embedded in resin."

It is still not clear just how long the DNA can survive inside the resin. To address this question, the researchers plan to apply the method in a stepwise fashion from the most recent to the oldest samples to determine the "shelf life" of the resin-embedded DNA.

"Our experiments show that water in the inclusions is preserved much longer than previously assumed. This could also affect the genetic material's stability. The extraction of functional DNA from several-million-year-old amber is therefore rather unlikely," says Solórzano-Kraemer.

More information: Peris et al. DNA from resin-embedded organisms: Past, present and future, *PLOS ONE* (2020). DOI: 10.1371/journal.pone.0239521

Provided by Senckenberg Research Institute and Natural History Museum