

# World's oldest bug is fossil millipede from Scotland

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UT Austin scientists found that the fossil millipede *Kampecaris obanensis* was 425 million years old. Credit: British Geological Survey

A 425-million-year-old millipede fossil from the Scottish island of Kerrera is the world's oldest "bug"—older than any known fossil of an insect, arachnid or other related creepy-crawly, according to researchers at The University of Texas at Austin.

The findings offer new evidence about the origin and evolution of bugs and plants, suggesting that they evolved much more rapidly than some scientists believe, going from lake-hugging communities to complex [forest ecosystems](#) in just 40 million years.

"It's a big jump from these tiny guys to very complex forest communities, and in the scheme of things, it didn't take that long," said Michael Brookfield, a research associate at UT Austin's Jackson School of Geosciences and adjunct professor at the University of Massachusetts Boston. "It seems to be a rapid radiation of evolution from these mountain valleys, down to the lowlands, and then worldwide after that."

The research was recently published in the journal *Historical Biology*. Brookfield led the study with co-authors including Elizabeth Catlos, a professor in the Jackson School's Department of Geological Sciences, and Stephanie Suarez, a doctoral student at the University of Houston who made improvements to the fossil dating technique used in the study when she was an undergraduate at the Jackson School.



The world's oldest known “bug” fossil is from Kerrera, an island in Scotland.  
Credit: Michael Brookfield

The team found that the ancient millipede fossil is 425 million years old, or about 75 million years younger than the age other scientists have estimated the oldest millipede to be using a technique known as molecular clock dating, which is based on DNA's mutation rate. Other research using fossil dating found that the oldest fossil of a land-dwelling, stemmed plant (also from Scotland) is 425 million years old and 75 million years younger than molecular clock estimates.

Although it's certainly possible there are older fossils of both bugs and plants, Brookfield said that the fact they haven't been found—even in deposits known for preserving delicate fossils from this era—could



indicate that the ancient millipede and plant fossils that have already been discovered are the oldest specimens.

If that's the case, it also means both bugs and plants evolved much more rapidly than the timeline indicated by the molecular clock. Bountiful bug deposits have been dated to just 20 million years later than the fossils. And by 40 million years later, there's evidence of thriving forest communities filled with spiders, insects and tall trees.

"Who is right, us or them?" Catlos said. "We're setting up testable hypotheses—and this is where we are at in the research right now."



When she was an undergraduate student at UT Austin, Stephanie Suarez

developed a method for extracting minerals used in fossil dating. She is now a doctoral student at the University of Houston. Credit: Chris Watts, University of Houston

Given their potential evolutionary significance, Brookfield said that he was surprised that this study was the first to address the age of the ancient millipedes.

Suarez said a reason could be the difficulty of extracting zircons—a microscopic mineral needed to precisely date the fossils—from the ashly rock sediment in which the fossil was preserved. As an undergraduate researcher at the Jackson School, Suarez developed a technique for separating the zircon grain from this type of sediment. It's a process that takes practice to master. The zircons are easily flushed away when trying to loosen their grip on the sediment. And once they are successfully released from the surrounding rock, retrieving the zircons involves an eagle-eyed hunt with a pin glued to the tip of a pencil.

"That kind of work trained me for the work that I do here in Houston," Suarez said. "It's delicate work."

As an undergraduate, Suarez used the technique to find that a different [millipede](#) specimen, thought to be the oldest bug specimen at the time, was about 14 million years younger than estimated—a discovery that stripped it of the title of oldest bug. Using the same technique, this study passes the distinction along to a new specimen.

**More information:** M. E. Brookfield et al. Myriapod divergence times differ between molecular clock and fossil evidence: U/Pb zircon ages of the earliest fossil millipede-bearing sediments and their significance, *Historical Biology* (2020). [DOI: 10.1080/08912963.2020.1761351](https://doi.org/10.1080/08912963.2020.1761351)

Provided by University of Texas at Austin

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