

Suddenly discovered a completely new species in the dung pile more than 200 million years ago!

After studying the faeces fossils left by reptiles 230 million years ago using three-dimensional X-ray methods, an entirely new species has appeared before humans.

About 230 million years ago, a hungry *Silesaurus opolensis* was feeding in the swamp vegetation of present-day southwestern Poland. Like all vertebrates, like all other animals on our planet, this dinosaur with a height of nearly 1m and a 1m-long tail will excrete what it cannot. absorbed after eating.

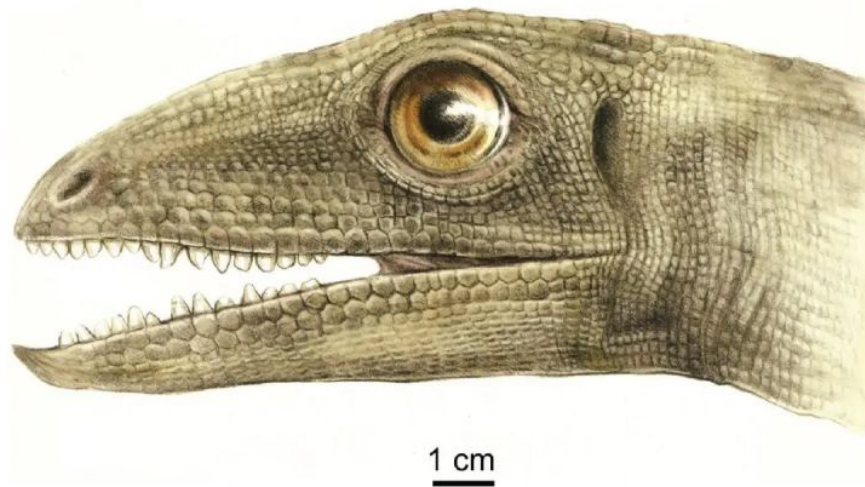
Over time, these piles of dung became fossils, and a number of small bugs were embedded in them. These bugs are likened to "ambassadors" of long-extinct insect branches, this is also the first time that humans have discovered a new insect species in dinosaur dung fossils. The discovery was recently published in the journal "Current Biology".



Since ancient times, amber has always been considered the best source of specimens for paleontologists and entomologists to study ancient arthropods. These ants, spiders, and beetles are dipped in tiny bits of golden plastic fossils, as if they were just crawling around. But amber specimens are only about 130 million years old, dating back to the Cretaceous period, while insects from more ancient periods such as the Jurassic and Triassic periods can only be found in the late Cretaceous period. flat rock specimens.

Fossils of animal feces can hold information from ancient times. As Martin Qvarnström, first author of the study and a paleontologist at Uppsala University in Sweden, says, the information provided by fecal fossils is also a fairly "rich but often neglected source of information." "

Qvarnström says that faecal fossils can not only reveal the species and evolution of faeces to which they belong, but also give paleontologists the opportunity to understand their ecology and eating habits.



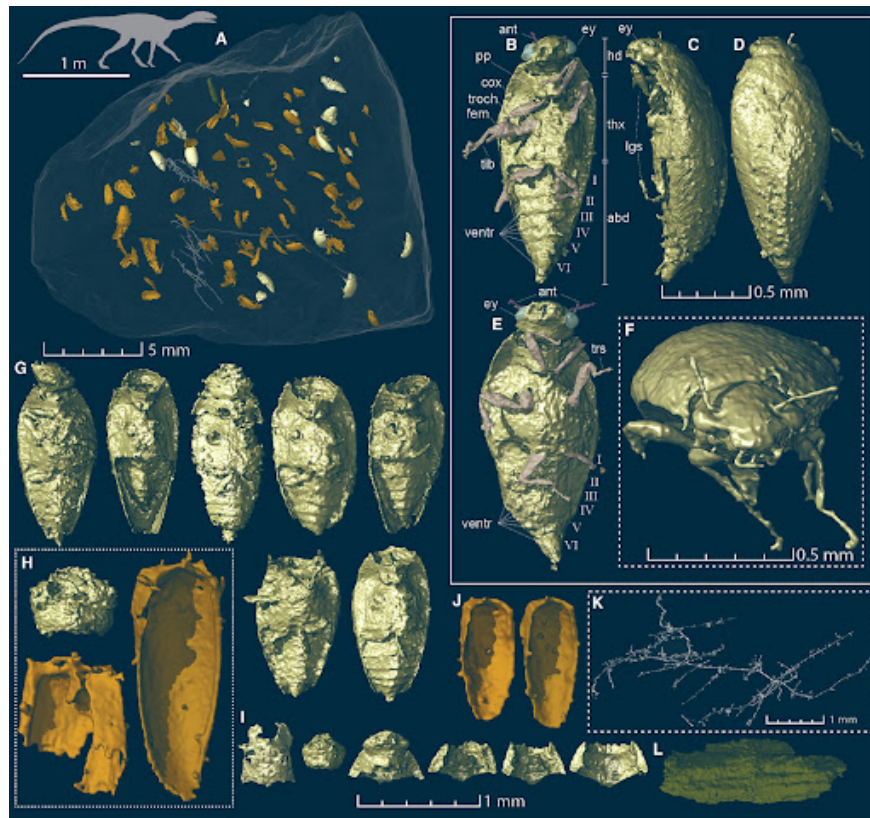
Based on the size, shape and other anatomical features, the scientists determined that the fossilized feces contained the newly discovered species of beetle excreted by the dinosaur *Silesaurus opolensis*. This is a small dinosaur about 2m long, weighs about 15kg and lived in Poland about 230 million years ago during the Triassic period.

Qvarnström and colleagues found a dime-sized fecal fossil in a clay pit near Ozymek (a town in southwestern Poland). Scientists were very interested in the Triassic food web inhabited by *Silesaurus opolensis*, so they used microsynchrony to document the interior of this opaque fossil.

Among them, X-rays were beamed at the fossil from all directions, clearly showing its internal composition. Putting together the generated image files into a 3D model of the inside of a fecal fossil is a laborious task, but when details about the composition of the feces emerge, suddenly there is a fossil of a species. Ancient bugs appeared in front of Qvarnström.

To identify these insects that may have been swallowed up by *Silesaurus*, paleontologists contacted Martin Fikáček, an entomologist at Sun Yat-sen University in Taiwan, China. At first, Fikáček doubted whether the bugs were well preserved.

"There are a lot of fossils that seem to be well-preserved, but we can't confirm which species they are because we can't see all of its features," he explains. But Fikáček soon realized that this specimen was different from all the previous ones. This ancient insect has features that are significantly different from other beetles, such as long antennae and segmented abdomens. "We check each step and do computational analysis. The results always show that this is a completely new clade of extinct insects." And to commemorate its origins, the team named the new species *Triamyxa coprolithica*, a small aquatic or semi-aquatic beetle that feeds on algae.



Margaret Thayer, Chicago Field Museum's emeritus curator (who was not involved in the study), said: "What the team did with this tiny fecal fossil has left a profound impression on us. This suggests that it is possible that in recent years researchers have also performed imaging analyzes on other fecal fossils, although some of them contain fragments of insects. , but no new species have been found, they are completely different from this study".

Thayer says synchrotron radiation micro tomography technology allows researchers to see "a lot of detail" without having to see the insect directly. She added that high-resolution imaging technology has "really revolutionized our ability to study previously difficult specimens", such as the triassic scarab in dinosaur droppings. She points out that before the technology came along, "we didn't even know that they were specimens."



This newly discovered species of beetle belongs to the suborder Myxophaga, which often lives in colonies in humid environments. Fikáček was pleased to see that such ancient specimens were very similar to living members of the subspecies Phycophagous. "These bugs were small in size, and very numerous at the time," he said. The cause of their extinction is still unclear, but Thayer said: "In a sense, evolution is a large-scale experiment. Some species have succeeded, some species have not."

Both Qvarnström and Fikáček say that among the many fecal fossils that paleontologists have found dating from the Triassic period or even earlier, there may be more secrets about insect evolution. They hope this discovery will inspire others to use imaging technology to look inside these fossils and fecal fossils unearthed in the future.

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