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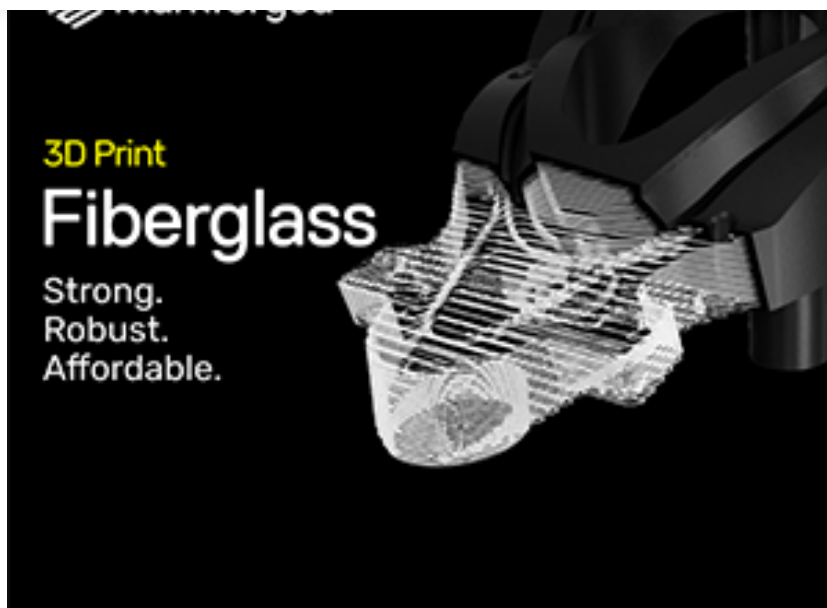
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A lucky mistake leads to the discovery of a bizarre amphibian...

INTERNATIONAL 2 months ago **REPORT**



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Most of the fossil albanian petontids are crushed or disordered. This CT image shows an exquisitely preserved adult Albanian petontid skull that helps researchers re-imagine these extinct amphibians. Photo credit: Edward Stanley / Florida Museum of Natural History / VGStudioMax3.4

Fossils of bizarre armored amphibians known as albanian petontids provide the oldest evidence of a slingshot-style tongue, a new one *science* Study shows.

Despite their lizard-like claws, scales and tails, Albanerpetontiden – luckily called “Albies” for short – were amphibians and not reptiles. Their lineage differed from today’s frogs, salamanders, and caecilians and dates back at least 165 million years and only died out about 2 million years ago.

Now a series of 99-million-year-old fossils are redefining these tiny animals as sedentary predators that snapped prey with projectile fire at their tongues – rather than underground graves as once thought. The fossils, previously misidentified as the early chameleon, are the first albies discovered in what is now Myanmar and the only known examples of amber.



They also represent a new genus and species: *Yaksha perettii*, named after treasure-protecting spirits known as yakshas in Hindu literature, and Adolf Peretti, the discoverer of two of the fossils.

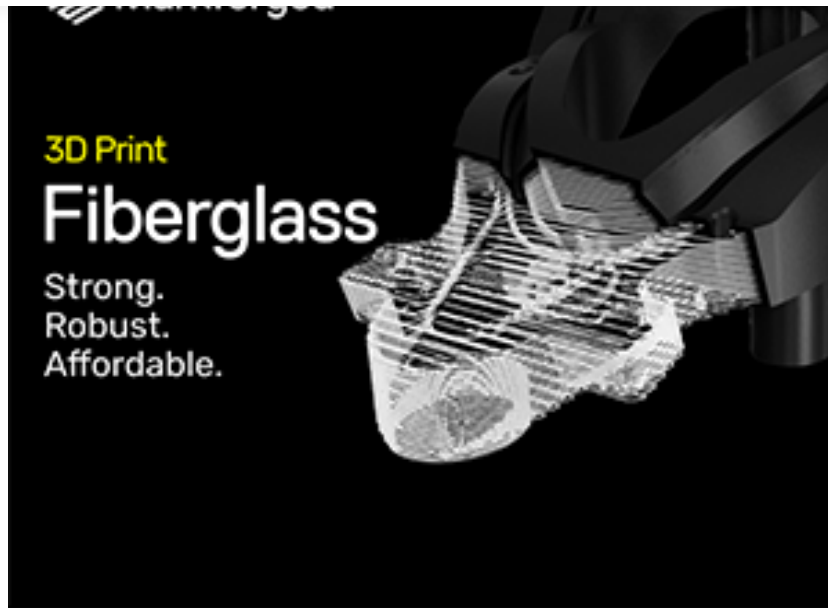
“This discovery adds a super cool piece to the puzzle of this obscure group of weird little animals,” said study co-author Edward Stanley, director of the Florida Museum of Natural History’s Digital Discovery and Dissemination Laboratory. “Knowing that they had that ballistic tongue gives us a whole new understanding of this entire line.”

Lucky mistake

The discovery began with a bumblebee.

In 2016, Stanley and Juan Diego Daza, lead science study authors and assistant professor of life sciences at Sam Houston State University, published an article that featured a dozen rare fossil amber lizards – or so they thought. A juvenile specimen possessed a jumble of confusing features, including a special tongue bone. After much debate and consultation with colleagues, the scientists finally referred to it as an ancient chameleon that is around 99 million years old. This estimate is based on radiometric dating of crystals at the site where the fossil was found.

Upon reading the study, Susan Evans, professor of vertebrate morphology and paleontology at University College London and an Albie expert, recognized the mysterious specimen immediately. It wasn’t a chameleon. She sent an email to Daza.



“I remember it as one of the worst days of my life,” he said.

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The paper also caught the attention of an unexpected collaborator: Peretti, a gemologist who contacted Daza about another collection of fossil amber lizards from the same region of Myanmar. (Note: Burmese amber mining and sales are often linked to human rights abuses. Peretti acquired the fossils legally from companies that follow a strict code of ethics. See an ethics statement at the end of this story for more details.)

Per Daza’s recommendation, Peretti sent the collection to the University of Texas at Austin for a CT scan to see what was inside. When Daza began cleaning up the scans, he noticed one fossil in particular – the entire skull of an adult albie.

Most fossil albies are crushed flat or a mess of bones in disarray. In 1995 Evans published the first description of a full specimen unearthed in Spain, but “it was a lot of roadkill,” she said. Even amber fossils are being broken down, and soft tissues can mineralize and become difficult to work with.



eyelids.

It was also the adult equivalent of the teenage Albie, who had been mistaken for a chameleon.

When Daza sent the scan to Evans, she was blinded by the many details.

“All of my Christmas came at once!” She wrote back.

“Strange and Wonderful”

Once classified as a salamander, the albies’ punctured, reinforced skulls led many scientists to hypothesize that they were excavators. Nobody imagined they had a chameleon-like lifestyle, Stanley said. But he added, “If you were to misidentify an albie as any type of lizard, a chameleon is absolutely what you would land on.”

Although one is an amphibian and the other a reptile, they share several traits in common, including claws, scales, massive eye sockets, and, as we now know, a projectile feeding mechanism.

The chameleon tongue is one of the fastest muscles in the animal kingdom and in some species can rocket from 0 to 60 miles per hour in a hundredth of a second. Its speed is obtained by a special accelerator muscle that stores energy by contracting and then launching the elastic tongue with a recoil effect. If the earliest albies also had ballistic tongues, the trait is much older than the first chameleons, which may have appeared 120 million years ago. Fossil evidence suggests that albies are at least 165 million years old, although Evans said their lineage must be much older and formed more than 250 million years ago.

While *Y. perettii* was armed with a rapid-fire tongue, it was tiny: based on the fossil skull, Daza estimates the adult was about 2 inches long, excluding the tail. The youth was a quarter that size.



The discovery that Albies had projectile tongues explains some of their “weird and wonderful” features, such as unusual jaw and neck joints and large, forward-looking eyes, a common characteristic of predators, she said. They may also have breathed through their skin like salamanders do.

Although the samples are remarkably well preserved, Stanley said CT scanning was essential to analysis, revealing fine-scale features obscured in cloudy amber.

“They only come to life with CT scans,” he said. “Digital technology is really key with this amber material.”

Digitization allowed researchers to be scattered around the world and settle down while doing so COVID-19 Quarantines to analyze and describe the samples together – and then make the same material digitally available to others.

How are Albanian petontids related to other amphibians?

Despite the degree of preservation and the completeness of the *Y. perettii* specimens, the exact place of Albies in the amphibian family tree remains a mystery. The researchers coded the physical properties of the samples and ran them through four models of amphibian relationships with no clear results. The unusual combination of characteristics in the animals is likely to be to blame, Evans said.

“In theory, albies could give us a clue as to what the ancestors of modern amphibians looked like,” she said. “Unfortunately they are so specialized and so strange in their own way that they don’t help us too much.”

But *Y. perettii* puts Albies on a new part of the map. Northwest Myanmar was probably an island 99 million years ago and possibly a remnant of Gondwana, the ancient landmass of the southern continent. With two exceptions in Morocco, all other fossil albies were found in North America, Europe and East Asia,



We just missed her

With such a wide distribution, why are albies critically endangered while there are still frogs, salamanders, and caecilians today?

We do not know it. Albies survived almost to the present, fading about 2 million years ago, possibly late enough to interbreed with our earliest hominid relatives, Evans said.

“We just missed her. I keep hoping that they are still alive somewhere. ”

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The author of the study by Arnau Bolet from the Institut Català de Paleontologia Miquel Crusafont at the Universitat Autònoma de Barcelona in Spain and on Bristol University In the United Kingdom; J. Salvador Arias of the National Scientific and Technical Research Council of Argentina (CONICET); Andrej Cernansky from Comenius University in Bratislava, Slovakia; Joseph Bevitt of the Australian Organization for Nuclear Science and Technology; and Philipp Wagner from the Allwetterzoo Münster in Germany.

Samples were collected according to the ethical guidelines for the use of Burmese amber established by the Society for Vertebrate Paleontology. Peretti's specimens were purchased from authorized companies that legally export pieces of amber from Myanmar. A code of ethics was followed to ensure that no human rights abuses were committed during mining and commercialization, and that money from sales did not support armed conflict. The fossils have an authenticated paper trail, including export permits from Myanmar. All documents are available on request from the Peretti Museum Foundation.

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