

"STRANGE AND WONDERFUL" IS THE FIRST EXAMPLE OF A FAST FIRE LANGUAGE IN EXTINCT AMPHIBIANS

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The Albanerpetontids had lizard-like claws, scales, and tails, but were aptly called “albums” and were amphibians, not reptiles. Their lineage differs from that of today’s frogs, salamanders, and cesilians, and they became extinct at least 165 million years ago, about 2 million years ago.

Now 99 million-year-old finds redefine these tiny creatures as unsteady predators that shoot with their tongues and seize prey. These artifacts, previously misidentified as chameleons, are the first albums to be unveiled in modern Myanmar and are the only known examples of amber.

They represent a new species, the *Yaksha perettii*, named after the guardian spirits known as yaksha in Hindu literature, and Adolf Peretti, who discovered the two finds.

“This discovery adds something amazing and amazing to the puzzle of this obscure group of strange little creatures,” said Edward Stanley, director of the Digital Discovery and Distribution Laboratory at the Museum of Natural History in Florida, co-author of the study. “Knowing that they have such a ballistic language will give them a whole new understanding of this lineage.”

Lucky mistake. The discovery began with a shield.

In 2016, Stanley and Juan Diego Daza, a leading author of scientific research at Sam Houston State University and an associate professor of biology, published a paper introducing dozens of rare amber lizards. One of the specimens of the teens had a hodgepodge with amazing features, such as a specialized tongue bone. After many debates and

After consulting with colleagues, scientists have named it an ancient chameleon about 99 million years old. This is a calculation based on the radiometric chronology of the crystals in the area where the fossils were found.

Upon reading the study, Susan Evans, a professor of vertebrate morphology and paleontology at the University College London and an album specialist, immediately recognized the amazing specimen. It was no chameleon. He sent an email to Daza.

"I remember it was one of the worst days of my life," he said.

But the newspaper caught the attention of a surprise colleague: Peretti, a gem doctor who contacted Daza about another collection of fossilized lizards from that region of Myanmar. (Note: The mining and sale of Burmese amber often violates human rights. Peretti's findings were obtained from companies that legally adhere to strict ethical standards. More information is provided in the ethics statement at the end of this story).

On the advice of Peretti Per Daza, the collection was sent to the University of Texas at Austin for CT scans to find out what was inside. As Daza began to clean the scanner, one of the finds caught his eye – the full skull of an adult albino.

Most fossil albums are crushed into a chaotic flat shape, forming bone fragments. In 1995, Evans published the first description of a complete sample of excavations in Spain, but "it was a lot of road work," he said. Yellow artifacts also deteriorate, soft tissues become mineralized and difficult to work with.

But the model wasn't just three-dimensional, it was "mint-shaped," Stanley said. "Everything was where it should be," he said. There was even some soft tissue. "The tongue, chin muscles, and eyelids were included.

It is the adult partner of a juvenile albino mistaken for a chameleon. As Daza sent the scanner to Evans, he glanced at its rich details. "All my Christmas has come at once!" he wrote back. 'Strange, wonderful.'

The stitched, reinforced skulls of the albums, classified as salamanders, have led many scientists to speculate that they are diggers. No one imagined they had a chameleon-like lifestyle, Stanley said. But he added, "If you're misidentifying an albino as a lizard, a chameleon will be your landing."

One is an amphibian and the other a reptile, but it has several features, including claws, scales, large eye sockets, and now we know – the feeding mechanism of the arrow.

The chameleon tongue is one of the fastest muscles in the animal kingdom, and some species can reach speeds of 0-60 miles per hour in a century. This speeds up, accumulates energy, and has the effect of regressing the flexible tongue. If the oldest album had a ballistic language, this feature is much older than the first chameleons that appeared 120 million years ago. Archaeological finds indicate that the albums are at least 165 million years old, but Evans said their lineage must be much older than 250 million years ago.

Y. perettii had a small body when armed with a rapid fire tongue: based on the skull of *Daza*, it was estimated to be about 2 inches long, excluding the tail of an adult. The minor was a quarter of that size.

"We imagine it to be a small thing that is littered with leaf litter, well-hidden, but occasionally comes out to catch flies, throws out its tongue, and grabs it," Evans said.

The album said the frog's tongue helps explain some of the "strange and wonderful" traits, such as the unusual joints of the jaw and neck, and the common features of predators, such as the large eyes that look forward. They may also be breathing through their skin, as salamanders do.

Although the specimen was remarkably well preserved, Stanley said that computed tomography was essential for analysis and revealed fine-grained properties that were covered in cloudy amber.

"They only survive with computed tomography," he said. "Digital technology is really important in this amber material."

Digitization has spread around the world, allowing researchers to co-analyze and describe specimens during the COVID-19 quarantine period, and then to make the same material available to others in digital form.

What does *albanerpetonid* have to do with other amphibians?

Regardless of the level of preservation and completeness of the *Y. perettii* specimen, the exact position of the albino amphibian in the fetal tree remains a mystery. The researchers coded the physical properties of the specimens and did not achieve any results through four models of amphibian interactions. Evans said it was wrong to combine the unusual characteristics of animals.

"Theoretically, the album would be able to find out what the ancestors of modern amphibians looked like," he said. "Unfortunately, they're very specialized and weird in their own way, so they don't help us all very much."

However, *Y. perettii* places the album in a new part of the map. The northwestern part of Myanmar may have been an island 99 million years ago and may be a remnant of the ancient southern part of Gondwana. mainland. With the exception of Morocco, all other fossil albums have been found in North America, Europe and East Asia. Daza said the Peretti Islands may have been invaded from mainland Asia or renewed the group's southern record.

We missed them

Why did the albums disappear when there were so many frogs, salamanders and cesilians?

We don't know. The albums are still almost alive, fading 2 million years ago, and the oldest hominids may have clashed with relatives, Evans said.

"It simply came to our notice then. I still hope they are alive somewhere. "

Other authors include Arnau Bolet of the Institute of Catala de Paleontology at the University of Barcelona in Spain and the University of Bristol in the United Kingdom. J. Salvador Arias of the National Scientific and Technical Research Council of Argentina (CONICET); Andrei Cheransky of the Comenius University in Bratislava, Slovakia; Joseph Bevitt of the Australian Nuclear Science and Technology Organization; Philip Wagner of Allwetterzoo Münster in Germany.

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3D digital samples are available online through MorphoSource. Adult skulls are housed in the Peretti Museum in Switzerland, and samples of minors are housed in the American Museum of Natural History.

Specimens were obtained in accordance with the Burmese Amber Code of Ethics issued by the Society of Vertebrate Paleontology. Peretti's specimens were purchased from authorized companies that legally export amber from Myanmar in accordance with the code of ethics, which states that human rights are not violated during trading and that the proceeds from the sale do not support armed conflict. The fossils contain traces of certified paper, including an export permit from Myanmar. All documents are available on request from the Peretti Museum Foundation.

Reference:

Daza, JD, Stanley, EL, Bolet, A., Bauer, AM, Arias, JS, ěerňanský, A., Bevitt, JJ, Wagner, P., Evans, SE (2020). In the middle of the Cretaceous, plastic-like mysterious amphibians were chameleon-shaped and

had ballistic feed. Science, 370 (6517): 687-691. 10.1126 / science.abb6005



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