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## EXTINCTION EVENT THAT WIPE OUT DINOSAURS CLEARED WAY FOR FROGS

JULY 3, 2017

Native to Madagascar, *Boophis picturatus* lives in moist forests and rivers. Photo courtesy of Brian Freiermuth

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**T**he mass extinction that obliterated three-fourths of life on Earth, including non-avian dinosaurs, set the stage for the swift rise of frogs, a new study shows.

In a paper published this week (<http://www.pnas.org/content/early/2017/06/26/1704632114>) in the Proceedings of the National Academy of Sciences, an international team of researchers presented a new tree of life for frogs that helps solve longstanding riddles about relationships and sheds light on the history and pace of frog evolution.

Unexpectedly, their analyses showed three major lineages of modern frogs — about 88 percent of living species — appeared simultaneously, evolving on the heels of the extinction event that marked the end of the Cretaceous Period and the beginning of the Paleogene 66 million years ago. Previous research suggested a more ancient origin of many of these modern frog groups.

“Frogs have been around for well over 200 million years, but this study shows it wasn’t until the extinction of the dinosaurs that we had this burst of frog diversity that resulted in the vast majority of frogs we see today,” said study co-author David Blackburn, associate curator of amphibians and reptiles at the Florida Museum of Natural History on the University of Florida campus. “This finding was totally unexpected.”

The speed at which frogs diversified after the asteroid or comet impact that triggered a massive die-off of most plant and animal life suggests the survivors were probably filling up new niches on Earth, Blackburn said.

“We think there were massive alterations of ecosystems at that time, including widespread destruction of forests,” he said. “But frogs are pretty good at eking out a living in microhabitats, and as forests and tropical ecosystems rebounded, they quickly took advantage of those new ecological opportunities.”

Frogs rose to become one of the most diverse groups of vertebrates, with more than 6,700 described species. But sparse genetic data has hindered scientists from reliably tracing their evolutionary history and the links between frog families.

Blackburn joined researchers from Sun Yat-Sen University, the University of Texas at Austin and the University of California, Berkeley to tackle the mystery of frog evolution with a dataset seven times larger than that used in prior research. The team sampled a core set of 95 nuclear genes from 156 frog species, combining this with





*The analyses that generated this frog tree of life show that the mass extinction that killed non-avian dinosaurs, marked the beginning of a new era for frogs.*

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*Proceedings of the National Academy of Sciences*



The study also indicates that global frog distribution tracks the breakup of the supercontinents, beginning with Pangea about 200 million years ago and then, Gondwana, which split into South America and Africa. The data suggests frogs likely used Antarctica, not yet encased in ice sheets, as a stepping stone from South America to Australia.

Blackburn is eager to use the new phylogeny as a roadmap for the fossil record, particularly for frogs that occurred in the Cretaceous.

“This sets up expectations of what we should or shouldn’t find,” he said. “It’s exciting to think about what discoveries could lay ahead in the frog fossil record.”

While the survival and subsequent comeback of frogs testifies to their resilience, Zhang said, their current vulnerability to disease, habitat loss and degradation is cause for concern.

“I think the most exciting thing about our study is that we show that frogs are such a strong animal group. They survived from the mass extinction that completely erased dinosaurs and boomed back quickly,” he said. “However, frog species are declining nowadays because humans are destroying their habitats. Does that mean humans are making a huge extinction event even stronger than this one? We need to think about it.”

Other study co-authors are Yan-Jie Feng and Dan Liang of Sun Yat-Sen University, David Hillis and David Cannatella of the University of Texas at Austin and David Wake of the University of California, Berkeley.

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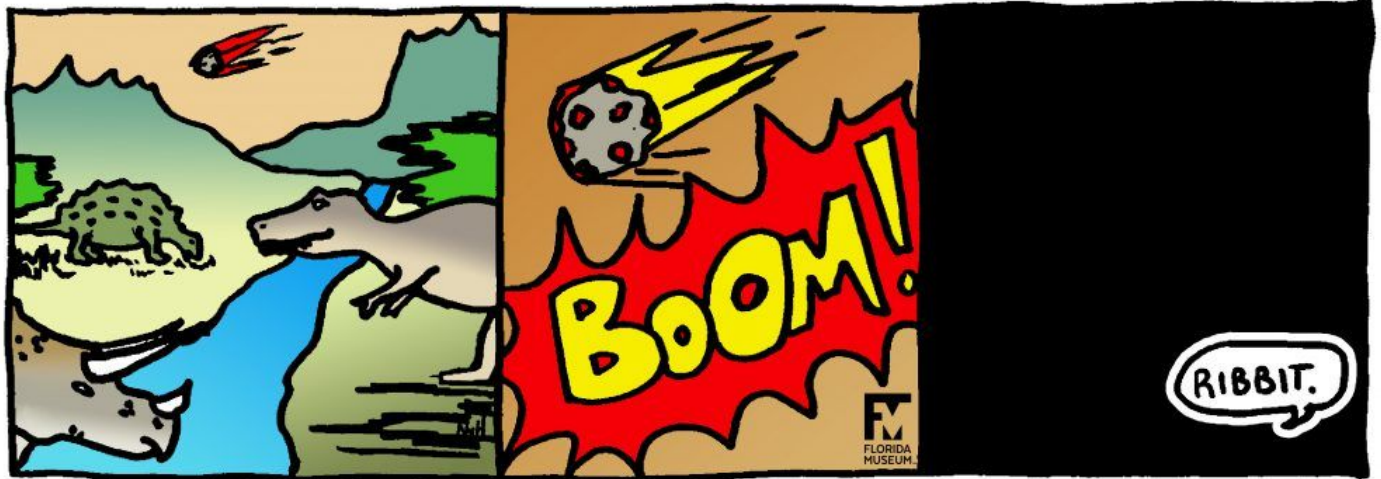
Sources: David Blackburn, [dblackburn@flmnh.ufl.edu](mailto:dblackburn@flmnh.ufl.edu) (<mailto:dblackburn@flmnh.ufl.edu>), 352-273-1943

Peng Zhang, [zhangp35@mail.sysu.edu.cn](mailto:zhangp35@mail.sysu.edu.cn) (<mailto:zhangp35@mail.sysu.edu.cn>)

*Note to reporters: David Blackburn is out of the office the week of July 3 and best reached by email or by contacting Natalie van Hoose at [nvanhoose@flmnh.ufl.edu](mailto:nvanhoose@flmnh.ufl.edu) (<mailto:nvanhoose@flmnh.ufl.edu>), 352-273-1922.*

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