Study revises understanding of primate origins

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A new study led by a University of Florida paleontologist reconstructs the base of our family tree and extends its roots 10 million years, a finding that sheds new light on the origin and earliest stages of primate evolution.

Published online this week in the *Proceedings of the National Academy of Sciences* and featured on the cover of its Jan. 23 print edition, the study offers compelling evidence that a group of archaic mammals called plesiadapiforms (please-ee-ah-dape-i-forms) are more closely related to modern primates than to flying lemurs, which previously had been proposed.

The two-part study examined specimens representing more than 85 modern and extinct species and provides evidence that plesiadapiforms are the most primitive primates. The team also discovered two 56-million-year-old fossils, the most primitive primate skeletons ever described.

“These fossil finds from Wyoming show that our earliest primate ancestors were the size of a mouse, ate fruit and lived in the trees,” said study leader Jonathan Bloch, a vertebrate paleontology curator at the Florida Museum of Natural History. “It is remarkable to think we are still discovering new fossil species in an area studied by paleontologists for over 100 years.”

Bloch discovered the new plesiadapiform species, Ignacius clarkforkensis and Dryomomys szalayi, just outside Yellowstone National Park in the Bighorn Basin with co-author Doug Boyer, a graduate student in anatomical science at Stony Brook University.

Ignacius previously was known to science only by skulls and isolated bones. Other scientists have proposed that the animal was not an archaic primate, but instead a gliding mammal related to flying lemurs. However, Bloch and his team debunked this idea based on an analysis of a more complete and well-preserved skeleton. The second species, Dryomomys, had a skull about the size of a grape with a body length of about 6 inches.

“The demise of the dinosaurs opened up ecological space for mammals to diversify, which they did—and quickly,” Bloch said. “The Paleocene, about 65 (million) to 55 million years ago, is the time period between the extinction of the dinosaurs and the first appearance of a number of undisputed members of the modern orders of mammals.”

Researchers previously hypothesized that plesiadapiforms may be the ancestors of modern primates, but this idea generated healthy debate within the paleontology community; Bloch’s team is the first to offer strong phylogenetic evidence supporting it. The team analyzed 173 characteristics of modern primates, tree shrews, flying lemurs with plesiadapiform skeletons to determine which species were most closely related.

“This collaboration is the first to bring together evidence from all regions of the skeleton, and offers a well-supported perspective on the structure of the earliest part of the primate family tree,” Bloch said.

Modern primates can be recognized by at least five characteristic features: relatively large brains, enhanced vision brought about in part by eyes that face forward, a specialized ability to leap, nails instead of claws on at least the first toes, and specialized grasping hands and feet. Plesiadapiforms have some but not all of these traits, and Bloch and his team argue that this group of early primates may have acquired these traits over 10 million years in incremental changes to exploit their environment.

Bloch said plesiadapiforms adapted to changes in flowering trees. As the trees evolved, the early primates became more efficient at utilizing their flowers, fruit and sap — and the insects attracted to

these same food sources.

“Plesiadapiforms have long been one of the most controversial groups in mammalian phylogeny,” said Michael J. Novacek, curator of paleontology at the American Museum of Natural History. “First, they are somewhere near primates and us. Second, historically they have offered tantalizing, but very often incomplete, fossil evidence. But the specimens in their study are beautifully and spectacularly preserved.”

The team also includes anthropology professors Eric Sargis of Yale University and Mary Silcox from the University of Winnipeg.

Source: University of Florida