

## ▶ VERTEBRATES

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One of the biggest science news stories in 2002 was the discovery by French paleontologist Michel Brunet and colleagues of *Sahelanthropus tchadensis*, the nearly complete skull of a small hominid from beds 6 to 7 million years old in northern Chad. Their report (*Nature*, v. 418, p. 145-151) was quickly picked up by the scientific and popular press around the world and hailed as a spectacular find by most paleontologists (*Geotimes*, September 2002). The skull is chimp-like in its small size, small brain and large brow ridges — so large that it suggests a male. However, it shows some remarkably precocious human-like features, including upright posture. Its great age (at least a million years older than the next youngest hominid fossil) contradicts the molecular biologists'

claim that the human lineage diverged from the chimpanzee-gorilla lineage only 5 to 6 million years ago.

Hominids were not the only important news last year, however. Evidence that birds are feathered dinosaurs continued to accumulate. Xing Xu and others (*Nature*, v. 421, p. 335-339) reported the fossil of a feathered dinosaur, *Microraptor gui*, from the Early Cretaceous of China that apparently had long flight feathers on its hind limbs as well as its front limbs. The authors argue that this fossil shows that bird flight originated from gliding, rather than from ground-up flapping argued by some paleontologists. Through experiments with chukar partridges, however, Kenneth P. Dial showed how ground birds use their wings to help propel themselves up steep inclines, suggesting a preadaptive function for the flapping motion of the wings before birds used them for flight (*Science*, v. 299, p. 402-404).

These same Lower Cretaceous Chinese deposits that yield so many beautifully pre-

served fossil birds and feathered dinosaurs yield spectacular early mammal specimens as well. Qiang Ji and colleagues (*Nature*, v. 416, p. 816-822) report the earliest known placental mammal: an exceptionally complete specimen from the Lower Cretaceous Yixian Formation of northeastern China, it even has hair impressions. At 125 million years old, it is 40 to 50 million years older than the next oldest skeletal remains of a placental mammal found anywhere in the world. Dubbed *Eomaia scansoria*, the fossil is primitive in most features, except for its limbs and toes, which are adapted for climbing trees.

Even older rocks in China yield other Mesozoic mammals. Zhe-Xi Luo and colleagues (*Science*, v. 292, p. 1535-1540) describe *Hadrocodium wui*, a complete skull and jaws from the Lower Jurassic Lufeng Formation of China, that had triconodont teeth but an enlarged brain and a fully mammalian ear region more than 195 million years ago. Luo and co-workers pro-

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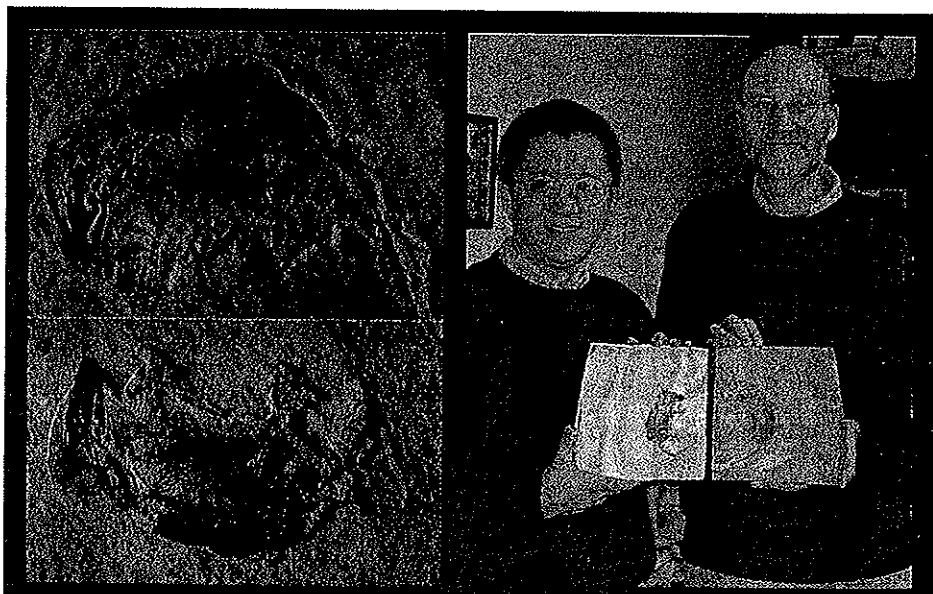
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vided a long-awaited update of the phylogeny of Mesozoic mammals (*Nature*, v. 409, p. 53-57; *Acta Paleontologica Polonica*, v. 47, p. 1-78). They argue that the tribosphenic tooth condition with the reversed triangle shearing between molar crowns may have evolved twice independently, once in the more familiar tribosphenic mammals (such as marsupials and placentals, the *Boreosphenida*) and again within the newly recognized *Australosphenida*.

Finally, Min Zhu and colleagues describe *Sinostega*, the first Devonian tetrapod from Asia (*Nature*, v. 420, p. 760). It is more similar to the Euramerican *Acanthostega* than the Australian genus, *Metaxygnathus*, but it shows that early tetrapods were evolving on several continents in the Late Devonian.

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Earliest known placental mammal: Zhe-Xi Luo (left) and John Wible (right) of the Carnegie Museum of Natural History display the fossil of the earliest eutherian *Eomaia scansoria*, a 125-million-year old placental mammal found in China's Yixian Formation. At left, the fossil up close. Preserved in shale, the fossil consists of a part and a counter-part. *Eomaia scansoria* is from the lake sediments of Yixian Formation of the Liaoning Province, China.

Left: Mark A. Klingler, Carnegie Museum of Natural History. Right: Carnegie Museum of Natural History