Dinos out of way, mammals ballooned to record sizes

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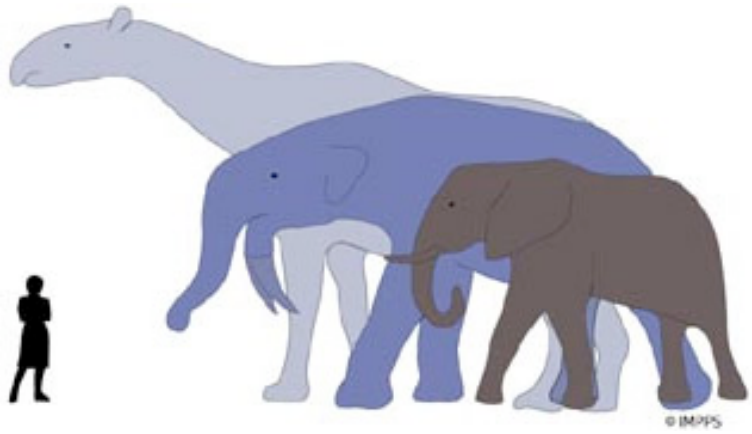
Courtesy of the University of New Mexico
and World Science staff

The dinosaurs' demise 65 million years ago paved the way for mammals to eventually grow over a thousandfold in size, hitting records for heft some 34 million years ago, a new study suggests.

"Size impacts all aspects of biology, from reproduction to extinction," said University of New Mexico biologist Felisa Smith, who led the research. "Understanding the constraints operating on size is crucial to understanding how ecosystems work."



The largest land mammals ever, *Indricotherium* (shown in pale blue) and *Deinotherium*, early relatives of elephants (dark blue), would have dwarfed today's biggest, the African Elephant (gray). (Image: UNM)

Smith and colleagues collected data on the maximum size for each continent's major groups of land mammals. These included *Perissodactyla* or so-called odd-toed ungulates, such as horses and rhinos; *Proboscidea*, which includes elephants, mammoth and mastodon; *Xenarthra*, the anteaters, tree sloths, and armadillos; and other, extinct groups.

"We estimated body size from fossil teeth," Smith said, "the most commonly preserved parts of mammals." It turned out, the scientists said, that mammals grew from a maximum of about 10 kg (22 lbs) when they shared the earth with dinosaurs to a maximum of 15,400 kg (17 tons) afterwards. The pattern was surprisingly consistent across lineages, regions and dietary types, they added.

Maximum sizes started ballooning as the dinosaurs faded out, they explained, and peaked in the Oligocene Epoch (about 34 million years ago) in Eurasia. Those glory days witnessed the largest mammal ever: *Indricotherium transouralicum*, a hornless rhino-like plant-eater weighing about 17 tons and about 18 feet (5.5 m) tall at the shoulder. A second peak in maximum mammalian sizes was identified later, in the Miocene (some 10 million years ago) in Eurasia and Africa.

"The remarkable similarity in the evolution of maximum size on the different continents suggests that there were similar ecological roles to be filled by giant mammals across the globe," said Smith. "This strongly implies that mammals were responding to the same ecological constraints."

The results give clues as to what sets the limits on maximum body size on land, said members of Smith's group: the amount of space available to each animal and the prevailing temperatures. The colder the climate, the bigger the mammals seem to get, as bigger animals conserve heat better. It also shows, they added, that no one group of mammals dominates the largest size class: different

lineages produced record-breakers in different times and regions.

“Global temperature and terrestrial land area set constraints on the upper limit of mammal body size,” said Smith, “with larger mammals evolving when the earth was cooler and the terrestrial land area greater.”

Smith said her interest in the size of mammals began years ago as a graduate student at the University of California. “I worked on a number of islands off the coast of Baja, California where rodents had evolved into gigantic body sizes. I’ve been interested in size ever since.” The new findings are published in the Nov. 25 issue of the research journal *Science*.