

BOOKS & ARTS

Land of giants

Expansion of the railways across the western United States changed the face of vertebrate palaeontology, and perhaps the country itself, explains **Ross MacPhee**.

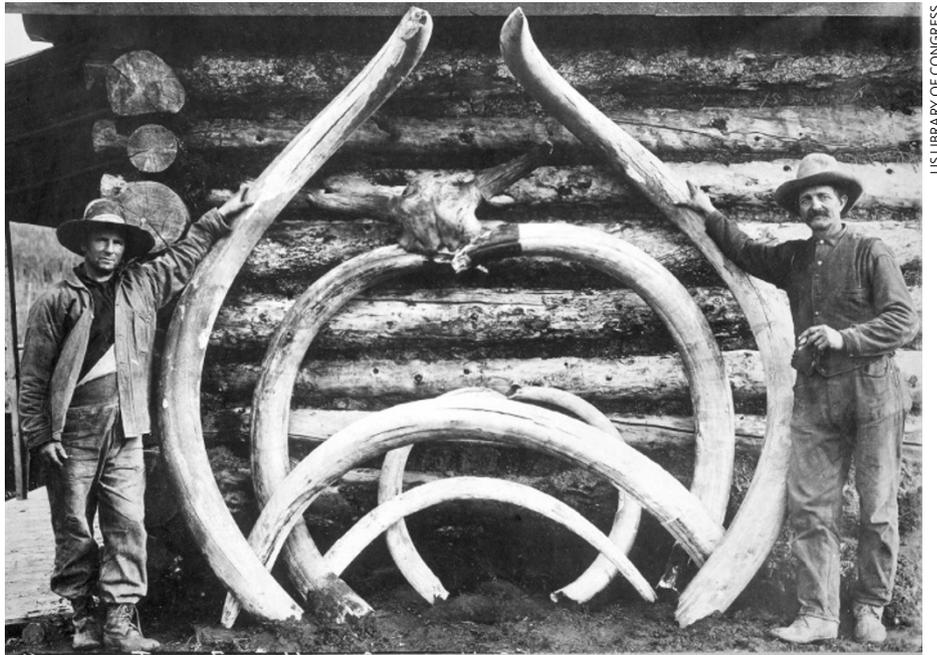
The Legacy of the Mastodon: The Golden Age of Fossils in America

by Keith Thomson

Yale University Press: 2008. 386 pp.
\$35, £22.50

Vertebrate fossils are rarely found in nature, but prominent exceptions are in the rich interior geological basins of western North America. The arrival of the railways in these desolate regions in the mid-nineteenth century set the stage for a 'bone rush', as Keith Thomson describes in his new book, *The Legacy of the Mastodon*. The colourful characters who forged their reputations as palaeontologists in this treasure trove, Thomson argues, contributed to the evolving image of the United States as a land of giants, figuratively as well as literally.

American vertebrate palaeontology got off to a slow start. Hardly anyone living in the United States at the beginning of the nineteenth century considered collecting old bones to be worthwhile, apart from a few savants associated with the American Philosophical Society, founded in 1745, and the Academy of Natural Sciences, created in 1812. Another notable exception was the third US president Thomas Jefferson, who held office between 1801 and 1809. When Meriwether Lewis and William Clark set out on their 1804 cross-country expedition to the Pacific, Jefferson asked them to look out for the animal owner of the 'great claw', a huge distal phalanx that had been found at the delightfully named Big Bone Lick in Kentucky. Jefferson believed that the claw belonged



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Huge mastodon bones from the US midwest dispelled the myth that all New World mammals were puny.

to a lion-like creature that still lurked in the west. In fact, it belonged to a ground sloth, later named *Megalonyx*. Jefferson, who did not think that species extinction was part of nature's plan, might have been disappointed to learn that *Megalonyx* had died out 10,000 years previously.

Public as well as scholarly interest was occasionally sparked when the remains of vanished beasts turned up under the plough or in the roadbed, especially if they could be portrayed

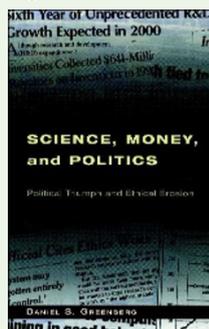
as hideous devourers of flesh removed from creation by a merciful God. In 1801, the Peale family of painters and showmen improved gate takings at their museum by inverting the tusks on a mastodon skeleton they had pieced together, creating the impression that it had been a carnivore armed with huge canines rather than a primitive kind of elephant.

Thomson explains that sideshow became science only after 1860, thanks to the opening of the west by the US railways. Ease of travel

Which science book should the next US president read?

Science, Money, and Politics by Daniel S. Greenberg
(Univ. Chicago Press, 2001)

What a president needs to understand is not science — which science, after all? — but the role of scientific expertise in the democratic political process. Daniel S. Greenberg is the outstanding writer on the politics of modern US science, and this is his most pertinent book. He takes for granted that the institutional framework for mobilizing and channelling scientific expertise works fairly well and should not be subject to cynical subversion. But he also understands that scientists enter a political arena when they



advise, and presidents must take decisions that reflect social and political priorities. Scientists, like anyone else, must hope that presidents have good priorities. No book of biology, physics or meteorology will ensure that they do.

Steven Shapin, professor of the history of science, Harvard University.

The Blind Watchmaker by Richard Dawkins
(W. W. Norton, 2006; first published by Longman, 1986)

There is a crisis in scientific literacy in the United States: only 25% of Americans accept our evolution from ape-like ancestors, yet 74% believe in angels. Republicans make it worse by proposing that creationism should be taught alongside evolution in public-school science classes. Anyone aspiring to be president should have a basic acquaintance with evolution

created new opportunities for agriculture, white settlement and political domination in the middle third of the country, and for the development of geology and vertebrate palaeontology. Fossil collecting had until then been an accidental affair. Now, targeted expeditions to fossil-rich areas such as the Bridger, Green River and Wasatch basins became feasible.

Among the first to take advantage were Joseph Leidy and Ferdinand V. Hayden. They were soon superseded by the two dark personalities of US palaeontology in the 1870s and 1880s, Edward Drinker Cope and Othniel Charles Marsh. Apart from their scientific achievements, these men are remembered mainly for their lengthy, unpleasant and demeaning 'bone wars', in which they vied to outdo each other by any means possible in publishing new taxa.

Thomson covers the usual ground but provides new insights into the men that Cope and Marsh hired to do most of the collecting. These exploited and mistreated workers — ex-cowboys, clerks and roughnecks — were sent to hunt fossils in some of the harshest places in the country. They were expected to spy on rival teams, steal their specimens if possible, and generally act like boneyard bandits. Marsh's actions were particularly egregious. At the close of the 1879 season on Como Bluff in Wyoming, he instructed William Harlow Reed to destroy any unexcavated bones at one quarry so that others, namely Cope or those working for him, couldn't have them. Such actions today would have the perpetrator sent up before an ethics committee and thrown out of academia. But not back then: Marsh later became president of the National Academy of Sciences.

As sordid as this phase was in the development of US vertebrate palaeontology, the advances in knowledge were enormous. Thomson, himself a palaeontologist and evolutionary biologist, points out that when annual fieldwork became standard practice

in the late nineteenth century, institutions such as the Smithsonian and the American Museum of Natural History were able to amass the huge specimen-based collections for which they are famous. Better methods for fossil discovery and preservation, such as sieving and plaster jacketing, were rapidly developed, thanks much more to the ingenuity of poorly paid collectors such as John Bell Hatcher than to the quarrelling professors in the east. And hundreds of new species were added to lists of the extinct fauna of North America. Some of these proved useful for the geological correlation of isolated basins, a practical benefit at the time. By 1890, when Thomson closes his narrative, vertebrate palaeontology had changed from a minor diversion practised by few to a nascent professional discipline, mirroring the transformation of the United States from a marginal power at the century's beginning into the political and economic colossus it had become by the end.

Thomson makes much of this parallel progression, arguing that conditions in the early United States produced a peculiarly American style of palaeontology. The result is a view of history in which past events are interpreted as if they led inexorably to some predetermined end. One provocative argument in the book is that vertebrate palaeontology was destined to "play a role in the development of the myths of American nationhood". The only myth examined in detail is Comte de Buffon's 1766 theory of New World degeneracy. This held that the animal and human denizens of the Americas were physical and moral weaklings compared with their Old World counterparts. One of Buffon's 'proofs' — the lack of large, powerful mammals in North and South America — evaporated with the discovery of

giant beasts such as the mastodon, much to Jefferson's satisfaction. Rather than myths as such, Thomson is more concerned with beliefs about opportunity and image. Where else but in the western reaches of the expanding United States could one find an unexplored vastness, redolent with the possibility of great discoveries and great success? Certainly, nineteenth-century North America produced fossils that had never before been seen. Nonetheless, it is hard to imagine how the relatively harmless activity of fossilizing could have contributed to nation building, then or now. Jefferson

aside, Thomson's other examples are unconvincing. It seems improbable that the feckless Peale family really believed they were displaying "an aggressive symbol of American power" when they exhibited their reassembled mastodon skeleton in England in 1802.

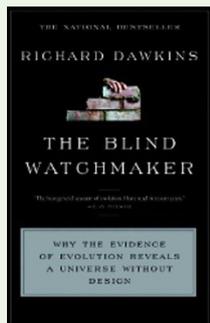
For the palaeontology buff,

Thomson supplies some unusual and amusing titbits, including some politically inspired doggerel that assails Jefferson's interest in both Pleistocene proboscideans and his mistress Sally Hemings. He also describes the machinations behind the first effort in 1858 to mount a dinosaur skeleton in a natural pose — a hadrosaur at the Academy of Natural Sciences. In appendices he introduces readers to geological time, and describes how Cope, much more than Marsh, contributed to the development of evolutionary theory. *The Legacy of the Mastodon* is a delicious read, instructive and amusing, and will entertain anyone who has wondered how we came to know the mastodon and its tribe. ■

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"It is hard to imagine how the harmless activity of fossilizing could have contributed to nation building."

and with the masses of evidence that it's not just a theory, but a fact. Charles Darwin's *On the Origin of Species* comes to mind, but it is outdated and written in turgid Victorian prose that is uncongenial to modern readers. Future US leaders should read a short, popular work that lays out the evidence for evolution and dispels the spectres of creationism and intelligent design without dwelling on religion. Sadly, no book fills this niche. My attempt, *Why Evolution is True* (Viking, 2009), will be published only after the election. Until then, I suggest Richard Dawkins's brilliant exposition of natural selection. If a presidential candidate doesn't accept evolution after reading this book, there is no hope. **Jerry Coyne**, professor of ecology and evolution, University of Chicago, Illinois.



Microbe Hunters by Paul de Kruif

(Houghton Mifflin Harcourt, 2002; first published by Harcourt, 1939)

Without question, the next president should read *Microbe Hunters* by Paul de Kruif. Probably more bioscientists and physicians have been stimulated to adopt their careers after reading this captivating book than any other. It is easy to read but still relevant, and might help a president to understand the life sciences and the commitment of life scientists to their work.

Rita Colwell, chairman of Canon US Life Sciences and distinguished university professor at the University of Maryland, College Park, and at Johns Hopkins University Bloomberg School of Public Health, Maryland.

