

that behaviour also influences the longer lifespan of women. In the study, children of either sex who were drawn to masculine careers (those shown by tests to be mostly preferred by men, such as being a mechanical engineer or pilot) had a shorter lifespan than those who preferred more feminine occupations (such as being an interior decorator or working with children). Thus, cultural dimensions may explain why life expectancy for the sexes differs over time and between countries and cultures.

There are caveats to this milestone study. One issue is that it was originally planned for a narrower purpose: to investigate predictions of career success and

**“Children of either sex who were drawn to masculine careers had a shorter lifespan than those who preferred more feminine occupations.”**

failure. Terman picked white pupils with high IQs from San Francisco schools, so the sample is not representative of the wider population. Conclusions cannot be drawn concerning minority

groups, educational level, social class or geographic area. The authors do their best to account for these limitations in their analyses.

Another problem is inevitable in any longitudinal study. Terman's subjects, who were born around 1910, had very different lives from ours. Many societal changes have occurred in the past century, particularly in gender roles. Terman's subjects, known as Termites, lived at a time when most women were expected to stay at home. The different life choices available today are likely to result in smaller gender differences in health and longevity.

*The Longevity Project* focuses mainly on the individual. The role of society in fostering good health and long life is seldom mentioned in the book, except when exposing the failure of current health propaganda. Despite ubiquitous recommendations to eat less and keep fit, obesity rates in the United States and in many other developed countries are soaring. The authors recognize that other studies are badly needed to examine the impacts of public policy on health and to develop more successful approaches. As they show in this excellent book, it will be a difficult task. But it is necessary. ■

**Marten Lagergren** is an assistant professor at the Stockholm Gerontology Research Center, Stockholm, Sweden. e-mail: [marten.lagergren@aldrecentrum.se](mailto:marten.lagergren@aldrecentrum.se)



MARK HALLETT PALEOART/SPL

Giant ground sloths went extinct some 10,000 years ago, but could provide conservation lessons for today.

#### CONSERVATION

## After the auroch

Emma Marris is gripped by an account of our love-hate relationship with extinct megafauna.

It puzzles me that the many large, now extinct mammals of the Pleistocene Epoch have nowhere near the legions of fans claimed by dinosaurs. Mammals win the popularity contests among existing animals, yet few children can rattle off the weights and dietary habits of the gargantuan North American ground sloth *Megalonyx jeffersonii* or Australia's massive buck-toothed marsupial *Diprotodon optatum*. *Stegosaurus* gets all the love.

One fanciful explanation is that we have an abiding guilt for having killed them all off in our spear-hurling days. And it seems likely that human hunting played some part in many of these extinctions. In *Once and Future Giants*, biologist and journalist Sharon Levy lays out the evidence for this theory — and explores what this species drain can teach us now. The patterns and consequences of the Pleistocene die-offs can help us to predict how landscapes will change if we lose big mammals, and help us to spot warning signs of impending extinctions.

As we hesitantly take collective responsibility for these extinctions, we feel their loss more keenly. Today's 'wild' has diminished along with the megafauna. Spend enough time studying mastodons and moa, and even our most

rugged landscapes begin to look tame and denuded. North America's wolves and grizzlies no longer thrill; Yellowstone Park looks like a petting zoo. “We live in a highly abnormal world,” writes Levy, quoting US palaeoecologist David Burney. “We think of ground sloths and saber-toothed cats as peculiar and foreign, but it is the world of our own ancestry, the world our species evolved in.”

So, scientists and conservationists who can easily envision the landscapes of 13,000 years ago, just before the late Pleistocene extinctions, find themselves yearning for the past. They are starting to experiment with restoring these landscapes by introducing surrogates to fill long-vacant ecological roles — to graze, to browse, to kill, to knock over trees, even to terrify.

Levy recounts various rewilding experiments. Some have been intentional, such as the Pleistocene Park nature reserve in north-eastern Siberia, where rare native Yakutian



**Once and Future Giants: What Ice Age Extinctions Tell Us About the Fate of Earth's Largest Animals**  
SHARON LEVY  
Oxford University Press: 2011. 280 pp. \$24.95

➔ **NATURE.COM**  
For more on Pleistocene parks: [go.nature.com/kt4vnz](http://go.nature.com/kt4vnz)

horses roam. Others were accidental, such as the wild-mustang preserves of the American West. She reports on recent research supporting the notion that large animals are more than simply appealing — they can be major engineers of their ecosystems. Big predators such as the wolves of Yellowstone prevent herbivores from munching plant populations into oblivion and keep a lid on smaller predators. Big herbivores like the musk oxen of Greenland stop forests and weeds from overrunning the earth. They fertilize with their dung, and turn the earth with their big hooves.

Levy notes that many of the surrogates that conservationists use are the domesticated descendants of wild creatures. Specially bred cattle are used as proxies for extinct aurochs, the giant wild cattle that once roamed Europe, but Levy says that the modern cattle pale in comparison. Real aurochs — the kind painted by our ancestors in caves — were “longer of leg, bigger of brain, more graceful and fearless than their domesticated brethren”, she speculates.

The slightly mournful lesson of the book is this: any large animals we add to landscapes must be carefully managed. For example, condors reintroduced in the United States wear radio collars; wild mustangs are rounded up by the US government, dividing family groups and leaving excess animals held in pens. What differentiates such animals from pets?

To be truly wild, according to Levy, animals must have their numbers controlled by wild predators, not by humans. They must also live with fear. “The threat of a hungry carnivore lurking at the water hole is the essence of the truly wild horse,” she writes. And yet the idea of reintroducing predators — the key to wildness — is the most difficult to sell to local peoples around the world. Conservationists might love the thought of introducing African lions to the Great Plains in a bid to fill the gap left by the extinct American lion, but ranchers and rural residents understandably have qualms.

“We cannot raise the auroch, but its tamed descendent may yet fill a vital ecological niche,” concludes Levy in her examination of the increasing use of domestic cattle in conservation projects. Where once there were mammoths clashing tusks, giant short-faced kangaroos and woolly rhinoceroses, we now have Bessie the cow, grazing and fertilizing the soil and raising her head in vague interest as cars whizz past. It is one way of plugging the megafauna gap, but I long for the grandeur and strangeness of those lost giants. ■

**Emma Marris** is a writer based in Columbia, Missouri.  
e-mail: e.marris@gmail.com

## Books in brief



### **On Being: A Scientist's Exploration of the Great Questions of Existence**

*Peter Atkins* OXFORD UNIVERSITY PRESS 152 pp. \$19.95 (2011)

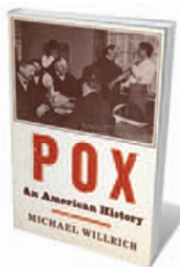
Why are we here? Chemist and author Peter Atkins answers this big question succinctly and elegantly in this slim volume. Following in the footsteps of rationalists such as Richard Dawkins, he argues that we should find as much awe in the workings of science as we might in any god. Although he acknowledges the role of spiritual beliefs in society and the comfort they can bring to some, he finds greater solace in the scientific underpinnings of origins and endings, birth and death.



### **Naked Genes: Reinventing the Human in the Molecular Age**

*Helga Nowotny and Giuseppe Testa* MIT PRESS 192 pp. £18.95 (2011)

Advances in the life sciences have revealed many previously hidden aspects of biology, from the genes and proteins within cells to the developmental stages of the fetus. European Research Council president Helga Nowotny and stem-cell scientist Giuseppe Testa argue that these building blocks are not valueless, but are ‘naked’ blank canvasses that take on multiple meanings in different social contexts, from court rooms to parliaments. They assess how these varied perspectives influence attitudes to biotechnology in topics such as assisted reproduction and personalized medicine.



### **Pox: An American History (Penguin History of American Life)**

*Michael Willrich* PENGUIN PRESS 400 pp. \$27.95 (2011)

Attitudes to public-health interventions have not changed much in the past 100 years, explains historian Michael Willrich. He describes how measures at the turn of the last century to stem the spread of a smallpox epidemic in the United States — using quarantines, pesthouses and ‘virus squads’ — were met with suspicion and popular resistance despite their success. A well-organized anti-vaccination movement sprang up to champion personal choice over powerful government, resulting in the disputed political landscape around inoculation that is familiar today.



### **Beyond the Finite: The Sublime in Art and Science**

*Edited by Roald Hoffmann and Iain Boyd Whyte* OXFORD UNIVERSITY PRESS 208 pp. \$24.95 (2011)

How should we depict protein folding or negative mass? Scientists must create new imagery to describe such natural concepts every day, and in that sense they have a lot in common with artists who attempt to display the sublime. Nine scholars of science and art convey their perspectives in this volume. From the beauty of images taken by the Hubble Space Telescope to quantum romanticism, the contributors touch on natural aesthetics in physics, neuroscience, chemistry, painting and music.



### **Bird Watch: A Survey of Planet Earth's Changing Ecosystems**

*Martin Walters* UNIVERSITY OF CHICAGO PRESS 256 pp. \$45 (2011)

Bird populations worldwide are threatened by climate change and environmental destruction. This illustrated survey, produced in cooperation with the global conservation partnership BirdLife International, documents all 1,227 endangered bird species on the Red List of the International Union for Conservation of Nature. Region by region, the book describes the birds' habitats and the environmental pressures on them, as well as charting conservation efforts and top birding sites around the globe.