



Fossil finds such as this whale — assembled by explorer Jacques Cousteau in Antarctica in 1979 — have helped to trace the complex ancestry of vertebrates.

PALAEONTOLOGY

In the bones

Jan Zalasiewicz enjoys a romp through vertebrate evolution and its eccentric scholars.

Brian Switek's *Written in Stone* boasts a fine selection of the eccentric characters that grace the annals of palaeontology. Some are well known, such as William Buckland and his gluttonous appetite for both collecting and eating animals. Less familiar figures include Baron Franz Nopcsa von Felső-Szilvás — a Hungarian aristocrat, spy and interpreter of pterosaur flight — and the impresario Albert Koch, who assembled sea monsters for the goggle-eyed public in the mid-nineteenth century. These characters add spice to a narrative that takes us, once again, in search of our origins.

Switek's book joins a seemingly inexhaustible supply of evolutionary tomes. Most have been generated in response to the fact that some people refuse to accept that the human species is linked by descent with the rest of the living world — and has shared ancestors with the gorilla and the chimpanzee in recent geological time. One more book will not change those beliefs. But Switek's engaging account may tempt the uncommitted to appreciate how interesting is the underground



Written in Stone: Evolution, the Fossil Record, and Our Place in Nature

BRIAN SWITEK
Bellevue Literary Press:
2010. 320 pp. \$17.95

bones of vertebrates, large and small, since his youthful pilgrimages to the dinosaur exhibits of the American Museum of Natural History in New York. It is they who stalk the pages. Their remains are rare and fragmentary, but humans empathize more with dinosaurs and dodos than with snails and scallops.

world, and how the vast storehouses of Earth's strata further our understanding of how life developed.

This is not a book about the small fry of Earth, despite the spectacular ammonites on the cover. That is a pity, because ammonites, graptolites and foraminifera are abundant visceral reminders of the reality of organic change through time. Rather, Switek has been fascinated by the

The book begins with the cautionary tale of *Ida*, the beautiful million-dollar ancient lemur that became a lesson in how not to claim human ancestry for a fossil. *Ida* also brings the reader into gentle contact with cladistics and phylogenetic relationships. Next comes a chase through the discovery of strata, fossils and deep time — by way of geologists Nicolaus Steno, James Hutton, Georges Cuvier and Charles Lyell — and through the early history of evolutionary ideas with Charles Darwin and Alfred Russel Wallace. This is well-trodden ground but the stories are clearly and briskly told.

The guts of the book describe the origins of major groups on branches of the vertebrate family tree: tetrapods, birds, mammals, whales, elephants, horses and primates (including humans). Each chapter is as craftily engineered as a computer game. The aim is to entice the reader from tales of quirk and scandal — with the Hungarian baron and his like pressed into service — into the taxonomic and osteological detail. It is pleasing to see credit given to the geologists who made the major discoveries: for instance, to Peter Friend of the University of Cambridge, UK, and his colleagues who first found the Greenland tetrapods long before their many-fingered qualities were dissected by the palaeontologists.

Switek's narrative device generally works well, although occasionally it is in danger of running aground. Detail threatens to overwhelm the chapter

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For more on China's fossil hunters, see: go.nature.com/3h7uzk

DANCE

Rhythm and reason

Nicola Jones witnesses a meeting of dance and ecology.

At a time when many scientists are struggling with how best to communicate with the public, it is refreshing to see the problem approached from the heart. The Canadian dance project *Experiments*, which ran in Vancouver at the end of November and may tour elsewhere, brings together four dancers and four local ecologists to explore synergies between their work.

Choreographer Gail Lotenberg of LINK Dance Foundation aims to convey the human side of research through the performance. She prepared by tapping hours of conversations with scientists she met through her husband, Alejandro Frid, a marine biologist at the Vancouver Aquarium Marine Science Centre. Video clips of the interviews — revealing what the scientists do and how they feel about it — are projected onto the back wall of the stage between the dances.

In one piece, the music samples the monologue of marine ecologist Anne Salomon at Simon Fraser University in Burnaby, British Columbia, on the interconnectedness of all things. In another, behavioural ecologist Larry Dill, also at Simon Fraser University, appears on stage in person — complete with Darwinesque beard and white lab coat — observing a dancer's movements just as an ecologist might observe wildlife.

Elements of the dance are inspired by both the process of science and the collaborators' specific research. Lotenberg peers at

**Experiments:
Where Logic and
Emotion Collide**

LINK DANCE
FOUNDATION,
VANCOUVER
25–27 November
2010

the audience with a flashlight to suggest curiosity; a dancer builds a tower of Styrofoam blocks to match a smaller model. The set pieces are beautiful but

often rather literal: two dancers dressed in pink and orange interlink to suggest coral and algae in symbiosis; the stage is lit in honeycomb patterns during a piece on bees; dancers in flowing greens and browns appear after Salomon's video describing her work with kelp forests.

Some more-interpretive moments are more revealing. After former ecologist and sculptor Lee Gass tells in a video of his delight at discovering a mathematical representation of the territorial defensive behaviour of hummingbirds, the dancers ponder and reposition cubes placed on stage as if interacting with data points on a graph. And the audience members become part of the 'experiment' when their reaction to a startling event is filmed and played back.

Lotenberg sees many similarities between scientists and artists. Both rely on a pivotal moment of inspiration, she says: "Scientists call it an 'aha' or 'eureka' moment." And the disciplines share rigour: "we repeat, repeat, repeat", scientists to get statistical significance and dancers to rehearse. But these links come across more powerfully through Lotenberg's words than through the dancing.

Mark Winston, a former bee researcher now at the Morris J. Wosk Centre for Dialogue at Simon Fraser University, has worked with Lotenberg before and encouraged the project from its inception. He found taking part in *Experiments* a deeply moving and collaborative experience. Salomon, too, was inspired by the interaction — she says it gave her the idea for a paper on marine conservation. But, she adds, it wasn't like a scientific collaboration in which co-authors all have control: "We were like a bucket of paint to a painter."

Gass says that the project clarified his thinking about the human side of science. He had assumed that in Lotenberg's subtitle, logic referred to science and emotion referred to dance, but later realized that Lotenberg probably meant something else: "Science is where logic and emotion collide." ■

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on mammals, for instance. It is the result of an embarrassment of riches, of course, especially in groups such as the whales, for which recent fossil discoveries have illuminated ancestry. Switek, a science writer and blogger, has clearly done a lot of homework. He demonstrates the replacement of old ideas of simple, almost linear evolutionary pathways — such as the classic early picture of horse evolution — with the complexity of modern phylogenetic reconstructions. The wealth of co-existing horse taxa more than 15 million years ago contrasts starkly with the poverty of horse diversity today, for example.

Switek's chapter on human ancestry is one of his best. The pace barely slackens, even as the number of hominin genera mount up. Alas, space seems to have not permitted mention of the awesome *Gigantopithecus*: not a hominin, perhaps, but the tale of its discovery, as 'dragon bones' in an apothecary's shop, would have fitted the book's style nicely. This giant ape, and others nearer our line, perished. Our own species thrives — for now. It is an accident of time and place, as Switek underlines. *Written in Stone* is a fine guide to the four-dimensional tapestry of life — the bony bits of it, at least. ■

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Coral symbiosis comes alive in *Experiments*.

C. RANDLE