

as a miracle-worker for seeming to stop the lava through the power of prayer when he celebrated a 'fire mass' that luckily coincided with the flow's final halt, and today as the meticulous chronicler of the eruption. His amazing career is here reduced to a litany of unfortunate events.

Tambora's stupendous 1815 eruption, by contrast, can hardly be oversold. Wood broadens our understanding beyond the 'year without a summer' cliché and the oft-parroted story of Mary Shelley and Lord Byron gloomily penning *Frankenstein* and *Darkness* in the eruption's aftermath while staying at the Villa Diodati near Lake Geneva, history's most famous holiday let. Tambora's eruption devastated the island of Sumbawa in Indonesia, and led to a decade of adverse weather that spread starvation and disease across North America, Europe, India and China — notably Yunnan Province, where successive crop failures turned a rice bowl into an opium-growing state.

Wood's command of the scientific literature is impressive, and more than matched by his knowledge of world history during this horrific episode of catastrophic global climate change. With the mass of information he has assimilated, he skilfully weaves a tale full of human and cultural interest, drawing in a "forgotten" 1816–18 Irish potato famine and Monticello, the Virginia home where Thomas Jefferson's dream of the New World as an Arcadian agricultural idyll fell apart during the "Tambora period".

Also making an appearance is John Barrow. This scheming second secretary to the British Admiralty successfully petitioned his employers to resume the quest for a North West Passage on the basis of whaler William Scoresby's reports of ice-free waters off northern Canada in 1817, with support from naturalist Joseph Banks at the Royal Society. With Napoleon defeated, Navy men needed to be kept busy. Many, Rear Admiral John Franklin being the best known, were sent to their deaths in the following decades: Tambora's far-flung climatic effects having waned, the ice returned with a vengeance and destroyed them.

This book is much more than brilliant popular science. Drawing together a world of data relating to this epoch-changing eruption, Wood has made a major contribution to volcanology, climatology and cultural history, driven by personal passion and conviction. ■

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Semipalmated sandpipers (*Calidris pusilla*) on their annual autumn migration.

#### ANIMAL BEHAVIOUR

## Nomads of necessity

Joel Greenberg casts an ornithologist's eye on a wide-ranging reading of animal migration.

Animal migration is a wondrous thing. Driven by seasonal changes in daylight and other factors, an incredible array of organisms fly, creep or run through urban and other habitat-restricted areas on their way to or from richer spots for wintering, feeding or breeding. When you watch the movement of migrants (and I know birds best), you see the beauty of the individuals, and are privy to the performance of ancient commands dictated by genetic coding. It is often a species' most vulnerable moment. Human-driven and other shifts can occur too quickly for an individual to adjust: a bird that has flown all night looks down at the landscape that emerges at dawn, and seeks an accommodating wood that may or may not still be standing.

In *The Homing Instinct*, biologist Bernd Heinrich explores the concept of 'home' — how organisms in a wide range of taxa, including insects, arachnids, amphibians, fish, birds and mammals, arrive at their destinations, construct or alter home territories, and live in them. He discusses the placement of nests according to geographic and site-specific factors; nest structure and hygiene; parasitism and feeding behaviour. In the telling, he relies on the latest scientific advances as well as his own field observations.



**The Homing Instinct: Meaning and Mystery in Animal Migration**  
BERND HEINRICH  
Houghton Mifflin Harcourt: 2014.

Despite the tens of thousands of human eyes trained on animal migrants, many elements of the migration period, such as routes and duration of travel, were difficult to investigate until the advent of satellite technology. This has shed light on astounding behaviours, and Heinrich discusses one of my favourite cases: the prodigious speed and endurance of the bar-tailed godwit (*Limosa lapponica*).

This long-billed, long-legged shorebird was known to nest in the Arctic and winter in Australia and New Zealand. In a 2009 study, transmitters were placed on 23 of the birds to track their flight paths. They revealed that the species can fly from Alaska to New Zealand in less than nine days without stopping, riding wind currents and expending half their body weight (R. E. Gill Jr *et al. Proc. R. Soc. B* **276**, 447–457; 2009). (On the way north, the birds do stop to feed.)

Heinrich discusses at length how ▶

YVA MOMATIUK & JOHN EASTCOTT/MINDEN PICTURES/FELPA

▶ species such as sandhill cranes (*Grus canadensis*) and bees return to the places of their birth. But from an evolutionary standpoint, it is important for some individuals not to get homing quite right.

Take salmon. These fish use smell to find their streams of origin, as was corroborated by experiments in which they were raised in hatcheries and exposed to a particular chemical, then released into Lake Michigan. Each of their spawning streams was treated with one of the chemicals, and indeed 90% of the salmon selected the stream with the smell of home. It is likely that most of the remainder did not survive; possibly they selected the 'correct' waterway, but it had become unsuitable for spawning. However, some of these mostly suicidal explorer fish would have survived, by finding different, habitable streams. This is essential for the long-term survival of the species.

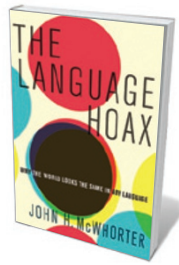
I think Heinrich could have left out the chapter 'Homing to the Herd', in which he switches his discussions from homing based on place to homing based on the flock. He sees the mass gatherings of the now-extinct Rocky Mountain locusts (*Melanoplus spretus*) as the home, even though they shifted from place to place. And in his treatment of the also extinct passenger pigeon (*Ectopistes migratorius*), which up to its demise in the late 1870s gathered in everything from pairs to aggregations of billions, he gets some important facts wrong.

It is true that passenger pigeons "were reputed to nest for most of the year wherever and whenever they found food". But those so reputed were often hunters or dealers in the game-meat industry, who wanted to allay fears that the birds were disappearing. In any event, as the naturalist A. W. Schorger (whom Heinrich cites as a reference) made clear, passenger pigeons generally nested only once a year. Heinrich bases much of this discussion on a comparison with the mourning dove (*Zenaida macroura*); however, genetic work has shown the passenger pigeon to be much closer to a group that includes the band-tailed pigeon (*Patagioenas fasciata*).

Having said all that, this is an informative and fascinating book. In choosing to explore this elemental behaviour across such a vast range of taxa, Heinrich has written a work for which many will provide a home. ■

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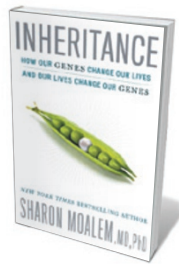
## Books in brief



### The Language Hoax: Why the World Looks the Same in Any Language

John H. McWhorter OXFORD UNIVERSITY PRESS (2014)

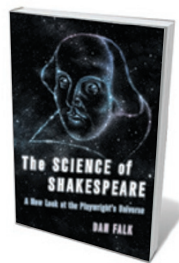
In this manifesto for a logical linguistics, one of John H. McWhorter's many intriguing examples hinges on the colour blue. To an English speaker, it is one subtly graded hue, from robin's-egg to deep navy. To a Russian, pale and dark blue are different colours. But does this point to crucial differences in how Russian and English speakers perceive? Emphatically not, avers McWhorter. He tackles such linguistic determinism — the Sapir-Whorf hypothesis — head on, arguing that world views are human, not strapped to one culture.



### Inheritance: How Our Genes Change Our Lives — and Our Lives Change Our Genes

Sharon Moalem GRAND CENTRAL PUBLISHING (2014)

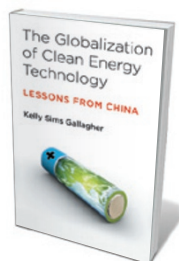
Physician Sharon Moalem delivers heavyweight genetics with a light touch in this study of "flexible inheritance" — the perpetual tango between genes and experience. He uses diagnostic readings of his patients (a bluish white of the eye, for instance, can indicate the bone-weakening condition osteogenesis imperfecta) as springboards for broader discussion on the complexities of genetic expression, 'handedness' and more. The idea of the genetic life sentence is shifting, he argues, even with some serious disorders.



### The Science of Shakespeare: A New Look at the Playwright's Universe

Dan Falk THOMAS DUNNE BOOKS (2014)

As the 450th anniversary of Shakespeare's birth looms, many are debating whether the bard's plays reflect the new science of his era — a point that historian Jennifer Rampling has made in these pages (*Nature* 508, 39–40; 2014). Here, science writer Dan Falk weighs in, combing the dramas for traces of findings such as heliocentricity. Falk speculates entertainingly as he confers with scientists and Shakespeare experts, some sceptical, some gung-ho about the possibilities. But as with so much regarding the enigma from Stratford-upon-Avon, Falk's conclusion is ambiguous.



### The Globalization of Clean Energy Technology: Lessons from China

Kelly Sims Gallagher MIT PRESS (2014)

The need for clean-energy innovation has never been greater, yet pundits argue that trade barriers and intellectual-property issues hinder technology diffusion. Kelly Sims Gallagher's study of China — the world's leading energy consumer, and a hotbed for the production and export of imported technologies — offers nuance. Her take on the country's solar photovoltaic industry, for instance, busts myths about barriers, revealing that channels such as joint research and development have globalized technology transfer. The real issue, she argues, is a lack of viable government-policy incentives.



### Are We All Scientific Experts Now?

Harry Collins POLITY PRESS (2014)

Forty years of work with gravitational-wave physicists has given sociologist Harry Collins an unusual perspective on scientific expertise, as chronicled in *Gravity's Ghost* and *Big Dog* (University of Chicago Press, 2013; see M. de Laet *Nature* 501, 164–165; 2013). Here, he distils his findings to clarify why specialized scientific knowledge is essential for all. Partly a polemic for lay readers still aghast at Climategate, this is also a reminder of why the values and aspirations of lab scientists matter. **Barbara Kiser**