

► and vultures. Finlayson suggests that tool marks left on the bones indicate that some of the species on Gibraltar were processed for food or, more controversially, for their feathers. He reminds us that birds come in many shapes and sizes, with a variety of behaviours and responses to humans, which implies that their exploitation would have required sophisticated knowledge. But he goes further, arguing that this knowledge was comparable to that drawn on by modern birders.

Not all of Finlayson's inferences (including

this one) are logically sound, and *The Smart Neanderthal* would have benefited from some editorial 'tough love'. His point about the neglect of avian evidence is well taken, however. So is his reflection that most of the humdrum things we do daily do not necessarily reflect our cognitive potential. His findings from Gibraltar — with those by anthropologist Dirk Hoffmann and his colleagues suggesting that Neanderthals decorated the walls of three caves in Spain — might have exposed a cognitively advanced

side of our Neanderthal cousins.

However, one swallow — or even a handful — does not make a summer. We need to find more sites in which Neanderthals were put through their behavioural paces. ■

**Bernard Wood**, a palaeoanthropologist who works on the distant ancestors of Neanderthals and modern humans, is University Professor of Human Origins at George Washington University in Washington DC.  
e-mail: [bernardawood@gmail.com](mailto:bernardawood@gmail.com)

## HISTORY

# Rebellion at the Royal Society

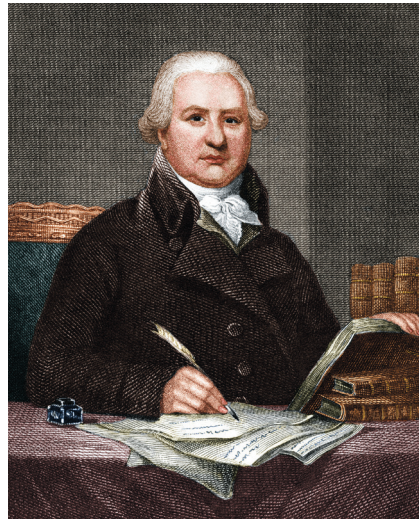
Rebekah Higgitt relishes a biography of mathematical reformer Charles Hutton.

Until the 1990s, eighteenth-century science received comparatively little attention. Historians of British science would leap from what they called the scientific revolution — culminating in the foundation of the Royal Society and Isaac Newton's achievements in the seventeenth century — to a 'second scientific revolution' in the early nineteenth. This saw the founding of a host of specialist societies (astronomical, geological, geographical, zoological). That narrative suggests that, by the eighteenth century, the Royal Society was dominated by trivial pursuits and aristocratic dilettantes rather than disciplinary experts.

Although that has since been revised, the mathematician Charles Hutton (1737–1823) would certainly have agreed, as his role in the 1780s 'Dissensions' at the Royal Society attests. Hutton saw himself as continuing Newton's legacy, applying mathematics to natural philosophy and to real-world problems, such as navigation, cartography and engineering. In *Gunpowder and Geometry*, historian of mathematics Benjamin Wardhaugh gives us the man and his method.

As Wardhaugh shows, during the Dissensions, Hutton was dismissed from his post as the society's foreign secretary. That provoked those claiming to be the real, scientific members to attack the autocratic presidency of botanist Joseph Banks, and the "train of feeble Amateurs" (as they put it) surrounding him. The rebels included mathematicians and astronomers, and a majority of active members. Banks, however, rallied his own supporters to pack the meetings and thereby defeat a series of votes aimed at limiting his power. Hutton did not return to the society until after Banks's death, in 1820.

Whereas Banks saw mathematics as little more than a tool "with which other sciences are hewed into form", Hutton championed its significance. And, as Wardhaugh puts it,



Mathematician Charles Hutton.

Hutton "carefully, deliberately, made himself the leading voice speaking for mathematics in English". Hutton's world was chiefly the classroom and print rather than the observatory or field. He was remarkably prolific, producing mathematical tables, textbooks, dictionaries, compendia and periodicals. These works, which ranged from elementary arithmetic to the mathematics of bridge building, leisure puzzles and historical discourses, cemented his reputation. It also gave him readers and networks, both before his election to the Royal Society and after he was excluded.

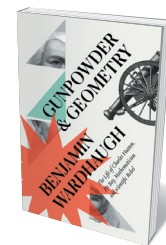
He overcame considerable obstacles, as Wardhaugh reveals. Newcastle-born, Hutton was a "pit boy turned professor" who avoided life at the coalface, eventually becoming a figure worthy of a bust (copies were produced to allow at-home "veneration" by admirers). His success began at school, where his intellectual talents were recognized. He was an unproductive coal hewer, but convinced his schoolmaster that he could command a classroom.

In this, Hutton was fortunate. Schooling in general, and mathematical education in particular, were in demand. By the age of 22, he was advertising an ambitious curriculum to cater to a range of pupils looking for specialist training in Newcastle. Wardhaugh shows why, and what sort of, mathematics was important in Georgian Britain. An education emphasizing basic principles, theory and applications in architecture, navigation, trade and engineering was promoted as both useful and a means of refining minds.

Hutton's ability as mathematician and teacher landed him one of the few available state-funded scientific positions. A public examination, private recommendations and a remorseless campaign of self-improvement led to a professorship at the Royal Military Academy at Woolwich, near London. He taught there for more than 30 years. He also became a neighbour, collaborator and friend of the astronomer royal, Nevil Maskelyne.

Through Maskelyne, Hutton contributed to key projects, including efforts to improve navigation by means of astronomy (H. Lewis-

Jones *Nature* 564, 340–342; 2018). To measure Earth's density, Maskelyne made observations of the gravitational pull of a mountain's mass; his assistant surveyed the site; and Hutton undertook arduous calculations. Yet Hutton's most original project was an experimental and mathematical investigation of ballistics, including the weight and shape of gun and projectile, the quality of gunpowder



**Gunpowder and Geometry: The Life of Charles Hutton, Pit Boy, Mathematician and Scientific Rebel**  
BENJAMIN WARDHAUGH  
William Collins (2019)

SHEILA TERRY/SPL

and the effects of air pressure. One of his papers on this won the Royal Society's Copley Medal in 1778.

Wardhaugh draws on sources from local, social, religious and military histories to histories of science and mathematics. Few of Hutton's personal papers have survived, so we have lost much of his voice. That does raise questions about the choice of writing a full biography, especially because Wardhaugh is commendably cautious in his claims for Hutton's significance. This is no 'the man who changed X' romp, but an informed, referenced and contextualized history. It might have made sense to place Hutton in a group biography, or in a broader treatment of Georgian mathematical culture, in the style of Jenny Uglow's 2002 book *Lunar Men*. Although revealing, the life-trajectory approach leaves little space to explore, say, key institutions such as the Spitalfields Mathematical Society or Royal Mathematical School.

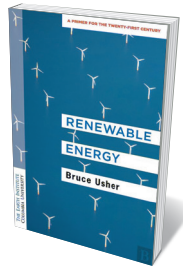
The approach does, however, ensure that the women in Hutton's life are given due attention. As was typical, the family business — mathematics, computation, transcription, editing — was a cottage industry in which wife, son and daughters were involved, if officially obscured. We follow, as far as possible, their lives and the dramas of bereavement, including the loss of Hutton's favourite daughter, Charlotte, marital breakdown (Hutton left his first wife, Isabella, and lived with Margaret Ord for many years before they married) and a surprising number of elopements.

There are tantalizing clues that might have brought the domestic element further to life. A portrait of his daughters Isabella and Camilla is included but not explored; a poem by Margaret, attacking Banks and lauding mathematician Samuel Horsley, Hutton's thundering defender at the Royal Society, is reproduced but not interpreted.

Nevertheless, *Gunpowder and Geometry* is engaging and skilfully handled. Hutton's rise reveals how technical and intellectual ability, with luck and opportunity, could propel a few individuals up the social ladder. In Georgian Britain, mathematics was appreciated, not only for the utility that Hutton championed but also for its rich literary culture. Here, especially because of *The Ladies' Diary*, a hugely successful miscellany that he edited for more than 40 years, Hutton reigned supreme. ■

**Rebekah Higgitt** is senior lecturer in history of science at the University of Kent in Canterbury, UK. She is the co-author (with Richard Dunn) of *Finding Longitude*, editor of *Maskelyne* and author of *Recreating Newton*. e-mail: r.higgitt@kent.ac.uk

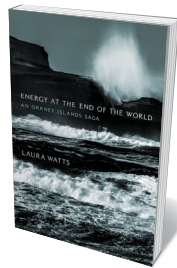
## Books in brief



### Renewable Energy

Bruce Usher COLUMBIA UNIVERSITY PRESS (2019)

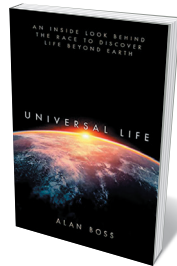
Public understanding of the energy transition from fossil fuels is woefully patchy — an artefact, in part, of political misinformation. So notes business expert Bruce Usher in this superb corrective, which reveals wind and solar to be the fastest-growing new power sources globally. Usher weighs up the science on and economics of sources from geothermal to hydro, and looks at financing, transportation, "grid parity" with fossil fuels and the social, environmental and geopolitical implications of the shift. The technology exists, getting cheaper by the month: a stark contrast, Usher notes, to the cost of delay.



### Energy at the End of the World

Laura Watts MIT PRESS (2019)

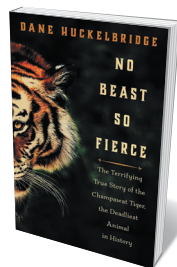
The people of Orkney, an archipelago off Scotland's northern coast, are renewable-energy pioneers. In a study mixing science, ethnography, poetry, history and memoir, interdisciplinary scholar Laura Watts trains a kaleidoscopic lens on Orcadian techno-innovation. She takes us from the 2003 establishment of the European Marine Energy Centre (a testing site for tidal- and wave-energy generators) to networks of micro-wind turbines and electric cars. In these weather-battered islands, energy is literally "in your face, on your tongue", but there is plenty of potential for replication elsewhere.



### Universal Life

Alan Boss OXFORD UNIVERSITY PRESS (2019)

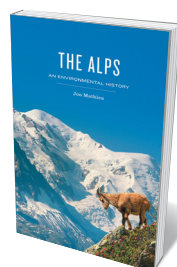
It's astonishing that just a decade on from the launch of NASA's Kepler space telescope — the first mission dedicated to detecting exoplanets — we now know that most stars spangling the night sky have planetary systems, many boasting habitable worlds. Astrophysicist Alan Boss, chair of NASA's Exoplanet Exploration Program Analysis Group, delivers a blow-by-blow history of the emergent findings by Kepler (and other instruments, including Europe's CoRoT satellite) that details the political vagaries and tensions between various agencies, along with the scientific thrills.



### No Beast So Fierce

Dane Huckelbridge WILLIAM MORROW (2019)

From 1900 to 1907, a female Bengal tiger (*Panthera tigris tigris*) killed hundreds of villagers in northern India and Nepal. This compelling account hinges on that grisly story, but digs deep into causation. Among the factors behind the attacks, Dane Huckelbridge shows, environmental mismanagement and habitat destruction by the British Raj were key, and a grim herald of today's global erosion of wilderness and its consequences. No less gripping is the interwoven narrative of British tracker Jim Corbett; enlisted to shoot the animal, he later became a fierce conservationist.



### The Alps: An Environmental History

Jon Mathieu (transl. Rose Hadshar) POLITY (2019)

Arcing 1,200 kilometres across the heart of Europe, the Alps are iconic mountains with a singular history. As Alpine scholar Jon Mathieu posits in this environmental chronicle, their importance as an Enlightenment symbol of nature influenced explorer-scientist Alexander von Humboldt and many Victorian botanists, geologists and zoologists. Mathieu's episodic but informative narrative tacks back and forth, from the arrival of hunter-gatherers millennia ago through milestones such as the first recorded ascent of Mont Blanc, in 1786, and wolves' resurgence in the twentieth century. **Barbara Kiser**